

Rhythmica

RESYNTHESIS DRUM MACHINE

User manual

Version 1.0.0

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Manual

This manual describes the Rhythmica instrument: its window, its sources and FX, the modulation, the sequencer, the presets and the Resynthesize page.

Start here

1. Getting started: install Rhythmica and play the first kit.
2. Concepts: kits, zones, layers, sources and the signal flow.
3. The window: the parts of the screen and how to move between them.

Reference

Page	Contents
Kits and zones	Zones, MIDI notes, choke groups, velocity.
Layers, buses and master	Layers, groups, sends, buses, the mixer.
Sources	The eight sound generators.
Curves	The curve editor and frames.
Formulas	The formula language for tables of harmonics and partials.
FX	FX chains and every FX module.
Macros and modulation	Macros, routes and the modulation matrix.
Sequencer	Patterns, steps, step locks, grooves.
Presets	The preset browser, saving, factory content.
Resynthesize	A recorded hit to a synthesized patch.
Settings	The settings panel.
Keyboard shortcuts	Keys and mouse gestures.

Page	Contents
Glossary	The terms of this manual.

Getting started

This page tells you how to install Rhythmica, open it and play your first sound.

Formats

Rhythmica is an instrument. It plays MIDI notes and makes stereo audio. It is available in these formats:

Platform	Formats
macOS	VST3, Audio Unit, CLAP, LV2, standalone app
Windows	VST3, CLAP, standalone app
Linux	VST3, CLAP, LV2, standalone app

The standalone app is the same instrument in its own window. Use it when you do not have a host (a DAW).

Install

Each installer also installs the factory content: the factory presets, kits and patterns. The plug-in reads them from a fixed folder.

macOS

Open `Rhythmica-<version>-macOS.pkg` and follow the steps. The package is signed and notarized. You can select the formats to install. LV2 is not selected by default.

Item	Location
VST3	`/Library/Audio/Plug-Ins/VST3`
Audio Unit	`/Library/Audio/Plug-Ins/Components`
CLAP	`/Library/Audio/Plug-Ins/CLAP`
LV2	`/Library/Audio/Plug-Ins/LV2`
Standalone app	`/Applications`
Factory content	`/Library/Application Support/Rhythmica/Factory`

Windows

Run `Rhythmica-<version>-Windows.exe`. Select **Everything**, or select **Choose** to install only some of the items.

> **Note**
>
> The installer is not signed. If Windows SmartScreen shows "unknown publisher", click **More info**, then **Run anyway**.

Item	Location
VST3	`C:\Program Files\Common Files\VST3`
CLAP	`C:\Program Files\Common Files\CLAP`
Standalone app	`C:\Program Files\Rhythmica`
Factory content	`C:\ProgramData\Rhythmica\Factory`

Linux

1. Extract `Rhythmica-<version>-Linux.tar.gz`.
2. In the extracted folder, run `./install.sh`. The script asks for your password (sudo) for one step: the factory content.

To remove Rhythmica, run `./install.sh --uninstall`.

Item	Location
VST3	`~/.vst3`
CLAP	`~/.clap`
LV2	`~/.lv2`
Standalone app	`~/.local/bin`
Factory content	`/usr/share/rhythmica/Factory`

Beta versions

A beta version stops 30 days after it is built. To see the version and its end date, put the pointer on the Rhythmica logo at the left of the header.

After the end date, the plug-in makes no sound. The window shows **This beta has expired** and a link: **Download the latest beta**. Install the new beta to continue.

A release version (not a beta) does not stop.

Open Rhythmica

In a host

1. Add Rhythmica to an instrument track (a MIDI track).
2. Open the plug-in window.

Standalone app

1. Start the Rhythmica app.
2. Open **Audio/MIDI Settings...**. On macOS it is in the app menu. On Windows and Linux it is in the **Options** menu.
3. Select the audio output device.
4. Select your MIDI input device.

The app keeps these settings for the next start. The standalone app has one stereo output. The extra outputs (see Kits and zones) are available only in the plug-in.

A new instance has one empty zone. It plays no sound until you load a preset or add a layer.

Play your first sound

This procedure loads a factory kit and plays it.

1. In the header, click the preset name. A new instance shows **Init**. The preset browser opens.
2. Find a kit and load it. See Presets. The patch tree on the left shows the zones of the kit.
3. Play notes on your MIDI keyboard. Each zone plays on its own note. The note shows at the right of the zone row.
4. To play one zone without a MIDI keyboard, hold the play button (the triangle) on its row in the patch tree.
5. To play the kit's pattern, press `Space`, or click **PLAY** in the foot of the window. Press `Space` again to stop.

> **Note**
>
> `Space` works when the Rhythmica window has the keyboard focus. Some hosts keep the space bar for their own transport.

To learn the parts of the window, read The window. To learn how a sound is built, read Concepts.

Host parameters

The host sees a fixed set of 137 parameters:

- 8 macros for each of the first 16 zones, named **Zone 1 Macro 1** to **Zone 16 Macro 8**. When you rename a macro, the host shows its name, for example **Z1 Tune**.
- 8 kit macros, named **Kit Macro 1** to **Kit Macro 8**.
- **Master**, the output level of the instrument.

The macros of zones 17 to 64 and the other controls are not host parameters. To move them from the host, assign them to a macro. See Macros and modulation.

Concepts

This page describes how Rhythmica is built. Read it before the other pages. It defines the terms that the manual uses.

A drum is a set of layers

Rhythmica does not have a fixed kick or snare engine. You build each drum from **layers**. Each layer has one **source** (a sound generator) and an **FX chain**. The drum is the sum of its layers.

A real drum hit has parts. A kick has a pitched body and a click at the start. A snare has a body, a crack and the rattle of its wires. Each part can be one layer, with the source that suits it. For example:

Part of the hit	A typical source
The pitched body of a kick or tom	Osc or Analog
The click at the start of a kick	Partials or Noise
The rattle of snare wires	Noise
The ring of a drum shell	Partials
Hats and cymbals	Metal, Partials or Sampler
Shakers and claps	Particles

The kick, snare and hat sounds in the factory content are presets: layouts of layers. You can change every part of them.

The kit and its zones

The **kit** is the whole instrument. It has up to 64 **zones**. A zone is one drum of the kit, for example the kick or the closed hat. A zone plays when it gets its MIDI note. A zone can also answer to a range of notes, to play its sound chromatically.

A zone has:

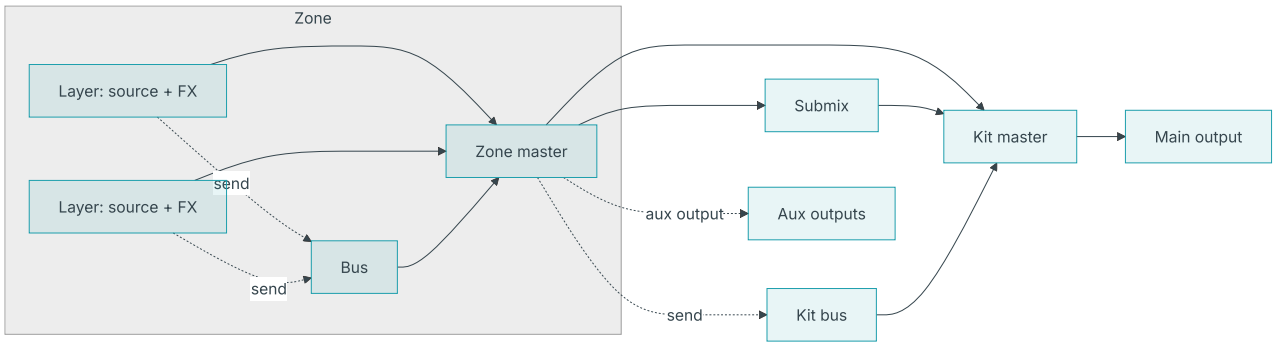
- its layers,
- its buses,

- its zone master,
- its 8 macros,
- its row in each pattern of the sequencer,
- a drum role (kick, snare, closed hat, ...). The sequencer and the presets use the role.

Zones in the same **choke group** stop each other. For example, the closed hat stops the open hat.

The kit is one preset file. It holds the zones, the kit master, the kit macros and the patterns. Refer to Kits and zones.

Signal flow



1. Each layer's source plays through the layer's FX chain.
2. The layers of a zone sum into the **zone master**. A layer can also send to a **bus** of the zone. A bus has its own FX chain, for example a reverb.
3. A **group** is a layer with no source. The layers in a group play through the group's FX chain.
4. The zones sum into the **kit master**. A zone can play into a **submix** first: for example, all the toms through one compressor. A zone can also send to the **kit buses**.
5. The kit master goes to the main output. A zone can go to one of 15 aux stereo outputs instead, for a multi-output setup in the host.

Refer to Layers, buses and master.

Time of the hit and curves

Most parameters of a drum change during the hit. The pitch of a kick falls. The level decays. A filter closes. In Rhythmica you draw these changes as **curves** over the time of the hit. Refer to Curves.

Macros and modulation

The host sees a fixed set of parameters: 8 **macros** for each zone, 8 **kit macros** and the master level. A macro moves one or more parameters by **routes**. A route connects a modulation source to a parameter. Modulation sources include macros, velocity, MIDI controllers and the hit of another layer. Refer to Macros and modulation.

Sequencer

Each zone has a row in the step sequencer. A **pattern** is a set of **steps** for all the zones. A step can hold its own parameter values (a step lock). Refer to Sequencer.

Resynthesis

Resynthesis makes a patch from a recorded hit. Rhythmica analyses the sample. Then it builds layers of its own sources that make the same sound. The result is a synthesized drum that you edit like any other. Refer to Resynthesize.

The window

This page describes the parts of the Rhythmica window and what each part is for. The other pages give the details of each control.

The window has four areas:

Area	Position	What it is for
Header	Top	Presets, export, undo and redo, the output meter, settings.
Patch tree	Left	The zones, layers, FX, buses and masters of the kit. Select a row to edit it.
Detail view	Right	The page of the selected row: a source, an FX, a layer, a bus, a master, the step grid or the mixer.
Foot	Bottom	The transport and groove on the left, the macros and modulation sources on the right.

You can resize the window. The smallest size is 880 × 560 pixels. The largest size is 1600 × 1100 pixels. To make all of the window larger, use **INTERFACE SIZE** in Settings.



Header

From left to right, the header has these controls:

Control	What it does
Rhythmica logo	Put the pointer on it to see the version (and, for a beta, its end date).
Preset name (**PRESET**)	Shows the name of the sound, or of the kit when there are two or more zones. Click it to open the preset browser. See Presets.
Save	Saves the sound (or the kit) as a preset in the User folder. See Presets.
Export WAV	Saves one hit of the selected zone as a WAV file. See Export a hit as WAV.
Export MIDI	Saves the pattern as a MIDI file. See Sequencer.
Undo / **Redo**	Undoes or redoes the last edit. See Undo and redo.
Resynthesize	Opens the Resynthesize page: make a sound from a recorded one-shot. See Resynthesize.
Last-hit readout	The peak level of the last hit, in dBFS. Red: over 0 dBFS. Yellow: over -3 dBFS.
Output meter	The left and right output levels. See Output meter.
Settings (gear)	Opens the settings. See Settings.

Each icon button shows its name when you put the pointer on it.

When the window is narrow, the header removes items in this sequence: the **PRESET** label, the text of **Resynthesize** (the icon stays), then the word "RHYTHMICA" (the logo stays).

Export WAV is not available when no layer of the selected zone makes sound. **Export MIDI** is not available when the pattern has no steps.

Output meter

The meter shows the output of the instrument, from -48 dBFS to 0 dBFS, in segments of 4 dB.

Colour	Level
Green	Below -12 dBFS
Yellow	-12 dBFS to -3 dBFS
Red	Above -3 dBFS

A line on each bar holds the peak for 1.5 s. The light at the top of each bar comes on when the output goes over 0 dBFS. It stays on. To reset the clip lights and the last-hit readout, click the meter.

Export a hit as WAV

Export WAV renders one hit of the selected zone. The hit plays at full velocity, on the key of the zone, through the kit's master. The file is 24-bit stereo, at the sample rate of the host. The render stops when the hit has ended, or after 10 s.

You can use **Export WAV** in two ways:

- Click it. A file dialog opens. Select the name and the folder.
- Drag it into your DAW. The DAW gets the WAV file. The file has the name of the sound.

Export MIDI works in the same two ways.

Patch tree

The patch tree shows the structure of the kit as a list of rows. Select a row to show its page in the detail view.

The tree has these sections, from top to bottom:

Section	Rows
ZONES	One row for each zone. The **+** adds a zone. The selected zone opens under its row.
LAYERS	The layers of the selected zone. Each layer has a source row and an **FX** row with its FX. The sends button shows the sends of each layer on its row. The **+** adds a layer.
BUSES	The 2 FX buses of the zone. The button at the right shows or hides them.

Section	Rows
Master / **Zone master**	The master of the zone: its **FX** and its **Output**.
MODULATION	**Matrix**: every route of the sound. See Macros and modulation.
KIT	Only when the kit has two or more zones: **SUBMIXES**, the kit **BUSES** and the kit **Master**.

For the zone rows, see Kits and zones. For the layer, bus and master rows, see Layers, buses and master.

Above the tree, a line shows which zone you edit, for example **ZONE 2 / SNARE**. When a zone row or the kit **Master** row is selected, a button at the right of this line changes the detail view between the step grid and the mixer.

To change the width of the tree, drag its right edge. The width is from 300 to 640 pixels, and at most half the window. Rhythmica keeps the width for the next time.

Common actions in the tree

Action	How
Select a row	Click it.
Fold or open a layer, a bus or a zone	Click its chevron.
Rename a layer	Double-click its name. Press `Enter ⏎` to keep the name, or `⎋ Esc` to cancel.
Turn a layer on or off	Click its coloured square.
Turn an FX on or off	Click the dot at the right of its row.
Move an FX in its chain	Drag its row.
Move a layer	Drag its row.
Open a menu	Right-click a zone, layer, FX or submix row.

Copy and paste

You can copy, paste and duplicate layers and zones. Select a layer row or a zone row, then use a key or the right-click menu.

Key	On a layer row	On a zone row
⌘ Cmd + C	Copy the layer (a group with its layers).	Copy the zone: its sound, its pattern lanes and its drum role.
⌘ Cmd + V	Paste the copied layer after this layer.	Paste a copied zone in place of this zone. A copied layer goes after the last layer of the zone.
⌘ Cmd + D	Duplicate the layer.	Duplicate the zone, directly below it.

On Windows and Linux, use ^ Ctrl in place of ⌘ Cmd.

A copy goes to the system clipboard. You can paste it into another instance of Rhythmica. A pasted zone keeps the key and the mixer settings of the zone it replaces.

Detail view

The detail view shows the page of the selected row. The title of the page is at the top left, for example **OSC** with **KICK / SOURCE** next to it.

Selected row	Page
A zone row, or the kit **Master**	The step grid of all zones, or the mixer. See Sequencer and the mixer.
A source row	The source page. See Sources.
A layer row	The layer page: level, pan, routing, sends, velocity, ducking. See Layers.
An FX row	The FX page. See FX.
A bus, master or submix row	Its page. See Layers, buses and master.
An **Output** row	The output level and a picture of the output. See The Output page.

Selected row	Page
Matrix	The modulation matrix. See Macros and modulation.

Source and FX pages have two controls in the title row:

Control	What it does
Icon at the left of the title	Turns the layer (on a source page) or the FX (on an FX page) on or off.
MASTER	Shows the master output behind the curves, in place of the layer. On an FX page, it shows the master output in place of the sound after this FX.

Module picker

The module picker opens when you add a layer or an FX. It covers the window.

- **ADD LAYER** shows the sources. Click a source to add a new layer with it.
- **ADD FX** shows the FX. Click an FX to add it at the end of the chain.

To open it:

- To add a layer, click the **+** on the **LAYERS** header.
- To add an FX, click the **+** on an **FX** row.

To close it without a choice, press Esc or click outside the panel.

On a layer chain, **Delay** and **Reverb** show **MASTER ONLY**. Put them on a bus or a master chain, and send the layer to it. Inside a band of a **Multiband**, a second **Multiband** shows **NOT IN A BAND**.

A zone has at most 16 layers. A chain has at most 24 FX.

Foot

The foot is at the bottom of the window. It shows the same controls on every page, so you can play a pattern while you edit a sound.

Part	Controls	Page
TRANSPORT	**PLAY**, **REC**, the metronome, **HOST** (in a host), **TEMPO**	Sequencer

Part	Controls	Page
GROOVE	**BEND**, **AMOUNT**, **GROOVES**	Sequencer
MACROS	The 8 macro knobs of the selected zone. In a kit, the **ZONE** and **KIT** tabs select the zone's macros or the kit's macros.	Macros and modulation
EXPRESSION	The mod wheel, pressure and bend. This part shows only when the sound uses one of them.	Macros and modulation
SOURCES, **MATRIX**	Arm a modulation source. Open the modulation matrix.	Macros and modulation

Undo and redo

Rhythmica keeps the last 100 edits of the kit.

Action	macOS	Windows and Linux
Undo	⌘ Cmd + Z	^ Ctrl + Z
Redo	⇧ Shift + ⌘ Cmd + Z or ⌘ Cmd + Y	^ Ctrl + ⇧ Shift + Z or ^ Ctrl + Y

You can also click **Undo** and **Redo** in the header.

One step is one gesture. For example, one drag of a knob, from the click to the release, is one step. A key, a typed value or a menu item is one step.

The mute and solo of a zone are not in the history. An undo does not change them.

Kits and zones

A **kit** is the whole instrument. It has from 1 to 64 **zones**. A zone is one drum of the kit: for example the kick, the snare or the closed hat. Each zone plays its own sound when it gets its MIDI note.

Use one zone to design one sound. Use two or more zones to make a drum kit that you play from a MIDI keyboard or from the sequencer.

What a zone has

Part	What it is
Sound	Its layers, its 2 buses, its master and its modulation. See Layers, buses and master.
Keys	The MIDI note (or range of notes) that plays it.
Choke group	A group of zones that stop each other.
Drum role	What the zone plays in the kit: Kick, Snare, Closed Hat...
Macros	8 macro knobs. See Macros and modulation.
Pattern lanes	Its row in each pattern of the sequencer. See Sequencer.
Mixer strip	Its level, pan, mute, solo, sends and output. See the mixer.

One zone and a kit

A new instance has one empty zone on all keys. With one zone, every note plays the zone. The tree shows its master as **Master**.

When you add a second zone, the instrument becomes a kit:

- Each zone keeps its own master. The tree shows it as **Zone master**.
- All zones sum into the kit's **Master**, under the **KIT** section of the tree.
- The kit has 2 kit buses and can have submixes.
- The macro strip shows a **KIT** tab with 8 kit macros.

If the first sound has FX on its master when you add the second zone, a dialog asks where the FX go:

Button	Result
Keep on the zone	The FX stay on the master of zone 1. They process only zone 1.
Move to the Master	The FX go to the kit's Master. They process the whole kit.
Cancel	No zone is added.

The zone rows

The **ZONES** section of the tree has one row for each zone. The number at the right of the header is the number of zones.

A zone row shows, from left to right:

Item	What it is
Chevron	On the selected zone: click it to fold or open the zone's rows.
Colour tick	The colour of the zone's drum role. No tick: the zone has no role, or the kit has one zone.
Number	The zone number, 1 to 64.
Name	The name of the zone's sound.
C1 … **C8**	The choke group. No badge: no choke group.
Key	The note of the zone, for example **C1**, a range (**C1-B1**) or **ALL KEYS**.
Play button (triangle)	Hold it to play the zone on its key. Release it to stop.
Level	The level of the zone, from -inf to +6 dB. Drag up or down. Hold ⇧ Shift for fine steps. Double-click: 0 dB.
M / **S**	Mute and solo. ⌘ Cmd-click **S** to solo this zone and no other zone.
Pan	**C**, **L1** to **L100**, **R1** to **R100**. Drag up or down. Double-click: **C**.

Item	What it is
Meter	The output of the zone.

The level of a zone is the gain of its zone master. In an instance with one zone, this level is the host **Master** parameter, from -inf to 0 dB.

A muted zone still plays and still chokes its group, but you do not hear it. When one or more zones are soloed, only the soloed zones play.

Select a zone

- Click a zone row to select the zone. The tree opens its layers under its row.
- Click the row of the selected zone to show the step grid of the kit.

The layers in the tree take shades of the zone's role colour.

Add, duplicate, move and remove zones

- To add a zone, click the **+** on the **ZONES** header. The new zone is empty and goes at the end of the list. It has no choke group.
- To duplicate a zone, right-click its row and select **Duplicate**, or select the row and press ⌘ Cmd + D. The copy goes directly below the original. The zones after it move down one place. The copy keeps the choke group of the original.
- To move a zone, drag its row to a new place in the list. You can also right-click its row and select **Move up** or **Move down**.
- To remove a zone, right-click its row and select **Remove**. You cannot remove the last zone.

The keys follow the list

When you add, duplicate, move or remove a zone, Rhythmica sets the keys of all the zones again. The keys start at the lowest key of the kit. Each zone gets the next key after the zone above it, so the list is always in note order. A zone with a key range keeps the width of its range.

- A zone keeps its sound, lanes, macros, choke group, role and mixer settings when its key changes.
- A zone on **ALL KEYS** stays on all keys.
- To put the kit back on a drum map, use **Remap kit to**.

> **Note**
>
> If zone 1 is on **ALL KEYS**, it also plays on the key of a new zone. Zones that share a key play together. Set zone 1 to one key with **Learn key**.

When you remove a zone from a kit of 2 zones, the instrument goes back to one zone. The FX of the kit's Master move into the chain of the zone that stays.

- If this makes more than 24 FX in that chain, Rhythmica does not remove the zone. Remove some FX from the kit's Master or from the zone first.
- If the zone that stays sends into the kit buses, a dialog asks what to do: **Move to the zone** (the kit buses become the zone's buses), **Drop the sends**, or **Cancel**.

Keys

Each zone plays on one key, on a range of keys, or on all keys. The key names use C3 as middle C (MIDI note 60), so MIDI note 36 is C1.

To do this	Do this
Set one key	Double-click the key of the zone row (for example **C1**), or right-click the row and select **Learn key**. The key shows **KEY?**. Play the note.
Set a range of keys	Right-click the zone row and select **Learn key range (chromatic)**. The key shows **LOW?**. Play the lowest note, then the highest note.
Play on all keys	Right-click the zone row and select **All keys**.

To stop a key learn, press Esc. The zone keeps its keys.

Choke groups

A choke group stops the zones in it. When a zone in a group plays, every other zone in the same group fades to silence. For example, put the closed hat and the open hat in group 1. The closed hat then stops the open hat.

To set the group, right-click the zone row, select **Choke group**, then select **None** or **Group 1** to **Group 8**.

A zone does not choke itself. Two zones in one group that play on the same note do not stop each other.

The fade time is **Choke** on the master page of the stopped zone: 1 ms to 100 ms, 10 ms by default. See Master.

Reverse

Reverse plays the zone's whole hit backwards: all of its layers and its master chain. The hit ends on its loudest part. If the master chain has a reverb, the reverb tail plays first and swells into the hit. Use it for a reverse clap or a reverse cymbal into the beat.

To set it, select the zone's **Master** row. Click **ON** next to **Reverse**. Set **Length**: how much of the hit plays backwards, from its start. The default is 500 ms.

When the zone plays:

- **From a pattern, a key or the play button**: the hit starts on the step or at the note. The swell starts there, and the loudest part of the hit comes **Length** later. To make a reverse clap that ends on beat 2, put its step one **Length** before beat 2.
- **Choke**, mute and solo stop or silence the reversed hit as they stop or silence a hit that plays forward.

Rhythmica records the reversed hit before it plays. It records the hit again after each change to the zone: its sound, its patterns, its macros or the tempo. Until the new recording is ready, the zone plays the last one. It records one hit for each velocity that the zone's patterns use. A key plays the nearest of these, at the level of the key's velocity.

The recording keeps the values at the start of the hit: the velocity, the key, the random values and the macros. Modulation that changes a hit while it plays does not change a reversed hit. Step locks and the groove dynamics do not change it either.

Drum roles

The drum role tells Rhythmica what the zone plays: **Kick**, **Snare**, **Clap**, **Rim**, **Closed Hat**, **Open Hat**, **Ride**, **Crash**, **Low Tom**, **Mid Tom**, **High Tom**, **Shaker** or **Perc**.

Pattern presets and drum maps use the role. A pattern preset puts each part on the zone with the same role. See Presets.

To set the role, right-click the zone row, select **Drum role**, then select a role or **None**.

When a sound loads into a zone with no role set, Rhythmica selects a role from the sound's category and name.

Drum maps

A drum map gives each role a key and a choke group. To move all the zones with a role onto a map, right-click a zone row and select **Remap kit to**. Zones with no role do not move.

Role	GM Drums	16 Pads
Kick	C1	C1
Snare	D1	C#1
Clap	D#1	D1
Rim	C#1	D#1
Closed Hat	F#1, choke group 1	E1, choke group 1
Open Hat	A#1, choke group 1	F1, choke group 1
Ride	D#2	F#1
Crash	C#2	G1
Low Tom	F1	G#1
Mid Tom	A1	A1
High Tom	C2	A#1
Shaker	A#3	B1
Perc	G#2	C2

GM Drums is the General MIDI map. DAW drum editors and MIDI files use it. **16 Pads** puts the roles on 16 pads from C1.

New kit from a template

A template makes a new kit of empty zones, each with a role, on the keys of a drum map.

> **Warning**
>
> A template replaces the whole kit. To get the kit back, use undo.

1. Right-click a zone row.
2. Select **New kit from template**.
3. Select a template.

Template	Zones
GM Kit	13 zones on the GM Drums map: Kick, Snare, Rim, Clap, Closed Hat, Open Hat, Low Tom, Mid Tom, High Tom, Crash, Ride, Shaker, Perc.
Basic 4	Kick, Snare, Closed Hat, Open Hat on the GM Drums map.
16 Pads	16 zones with no role, named **Pad 1** to **Pad 16**, from C1 up.
808 Kit	10 zones on the GM Drums map, each with a factory 808 sound.

The zone menu

Right-click a zone row to open its menu.

Item	What it does
Rename…	Edits the name of the zone's sound in the row.
Learn key	The next note you play becomes the zone's key.
Learn key range (chromatic)	The next two notes become the lowest and highest key.
All keys	The zone plays on every key.
Choke group	**None**, **Group 1** to **Group 8**.
Drum role	**None** or a role.
Copy	Copies the zone (⌘ Cmd + C).
Paste (replace)	Replaces this zone with the copied zone (⌘ Cmd + V). The key and mixer settings stay.
Duplicate	Adds a copy directly below the zone (⌘ Cmd + D).
Move up	Moves the zone one place up in the list.
Move down	Moves the zone one place down in the list.

Item	What it does
Remove	Removes the zone.
Resample	Records one hit of the zone (its layers, buses and Master, at full velocity) as a sample. Adds a new zone with one Sampler layer at the end of the list. The zone stays as it is.
Remap kit to	Moves the zones with a role onto a drum map.
New kit from template	Replaces the kit with a template.

Velocity

Each layer has its own response to velocity: how loud a soft hit is, and what else velocity changes. Set it on the layer page. See Layers.

Outputs

In a kit, each zone goes to one output. Set it with **Output** on the **Zone master** page, or with **OUTPUT** on the zone's mixer strip.

Choice	Where the zone goes
MAIN	Through the kit's Master to the main output.
A submix	Into that submix. See Submixes.
OUT 2 to **OUT 16**	To that stereo output of the plug-in, past the kit's Master.

The outputs **OUT 2** to **OUT 16** are available only in the plug-in, not in the standalone app. Connect them in your host. If the host has not connected an output, the zone plays on the main output, and the mixer shows the choice dimmed.

The kit's buses, submixes and Master

A kit has its own section in the tree, under **KIT**:

- **SUBMIXES**: shared FX chains for groups of zones.

- **BUSES**: 2 kit buses. The zones send into them.
- **Master**: the FX chain and output level of the whole kit.

See Layers, buses and master.

Layers, buses and master

A zone makes its sound from **layers**. Each layer has one source, an FX chain, and its own level, pan, mute and solo. The zone sums its layers, sends them to its buses, and plays them through its master.

This page tells you how to add and arrange layers, and how the signal goes from a layer to the output.

Signal flow

In each zone, the sound goes this way:

1. Each layer: its source, then its FX chain, then its level and pan.
2. The layer goes to the zone's master chain (its **Output** setting can change this). It can also send to the zone's 2 buses.
3. Each bus: its FX chain, then its return level and pan. The bus returns into the zone's master chain, or into Bus 2.
4. The zone's master: its FX chain, then the zone gain.

In a kit, each zone then goes to the kit's Master, to a submix, or to its own output. See The kit section.

Layer rows

In the patch tree, each layer has a row under **LAYERS**. Under the layer row are its source row and its **FX** row with one row for each FX.

Item	What it does
Chevron	Folds or opens the rows under the layer.
Square	The layer colour. Click it to turn the layer on or off (the same as **M**). An outline: the layer is off.
Name	The layer name. A new layer has the name of its source. Double-click to rename.
Level	From -inf to 0 dB. Drag up or down. Hold `⇧ Shift` for fine steps. Double-click: 0 dB.
M	Mutes the layer. Its rows show grey.

Item	What it does
S	Solos the layer. When one or more layers are soloed, only the soloed layers play.
Pan	**C**, **L1** to **L100**, **R1** to **R100**. Drag up or down. Double-click: **C**.

The level is calibrated. At 0 dB, the default sound of each source peaks at 0 dBFS, so layers of different sources start at the same loudness.

Add a layer

1. Click the **+** on the **LAYERS** header. The module picker opens with **ADD LAYER**.
2. Click a source. The new layer goes at the end of the list, with its level at -6 dB. The detail view shows its source page.

A zone has at most 16 layers (groups count as layers). When the zone is full, the **+** is not available. For the sources, see Sources.

Add an FX

1. On the **FX** row under a layer, click the **+**. The module picker opens with **ADD FX**.
2. Click an FX. The FX goes at the end of the chain. The detail view shows its page.

A chain has at most 24 FX. To change the sequence of the FX, drag an FX row up or down in its chain. To remove an FX, right-click its row and select **Remove FX**. For the FX, see FX.

The layer menu

Right-click a layer row to open its menu.

Item	What it does
Copy	Copies the layer, and all the layers in it when it is a group (⌘ Cmd + C).
Paste after	Pastes the copied layer after this one (⌘ Cmd + V).
Paste (replace)	Replaces this layer with the copied layer.
Duplicate	Adds a copy after this layer (⌘ Cmd + D).

Item	What it does
Group	Puts the selected layers in a new group (⌘ Cmd + G).
Ungroup	Only on a group. Removes the group and keeps its layers (⇧ Shift + ⌘ Cmd + G).
Move out of group	Only on a layer in a group. Moves it out, after the group.
Rename…	Edits the name in the row.
Save as preset…	Saves this layer (a group with its layers) as a sound preset. See Presets.
Resample	Records one hit of the layer (a group with its layers) through its FX chain as a sample. Adds a Sampler layer after it and mutes the original. To compare them, change the mutes.
Remove layer / **Remove group**	Removes the layer, or the group with all its layers.

Groups

A **group** is a layer with no source. The layers in it play through the group's FX chain, level and pan. Use a group to process several layers as one, for example to drive the body and the click of a kick into one distortion.

Make a group

1. Click the first layer row.
2. ⌘ Cmd-click each other layer row to add it. ⇧ Shift-click to add all the rows between. The detail view shows **N LAYERS / SELECTION**.
3. Press ⌘ Cmd + G, or right-click a selected row and select **Group N layers**. The new group takes the place of the first layer.

A plain click on a row selects only that row again.

In the tree, the layers of a group show under the group row, indented. The group's **FX** row comes after its layers. The chevron of a group folds all of its layers.

Change a group

- To move a layer into a group, drag its row onto the middle of the group row.

- To move a layer out of a group, right-click it and select **Move out of group**.
- To remove the group but keep its layers, select the group and press ⇧ Shift + ⌘ Cmd + G.

> **Caution**
>
> **Ungroup** removes the group's FX chain and the routes on the group. Move the FX to another chain first if you want to keep them.

Groups can be inside groups, to a depth of 4.

When a group is muted, all its layers are muted. When a layer in a group is soloed, the group also plays.

The layer page

Select a layer row (or a group row) to show the layer page. It has these sections: **OUTPUT**, **ROUTING**, **BUS 1**, **BUS 2**, **VELOCITY** and **DUCKING**, with the curve tabs under them.

OUTPUT

Control	What it does	Range
Level	The loudness of the layer. The same value as the level in the tree.	-inf to 0 dB
Pan	The position of the layer between left and right.	100 L to 100 R
Delay	Starts the whole layer later: its curves and its FX too.	0 to 48 s

Delay is also the left handle of the TIME row on the source page. There you can set it in note divisions, up to **4 bars**. See Curves.

Use a long delay to put a riser and its impact in one preset: set the **Delay** of the impact layer to the length of the riser. If a new hit comes before the delay ends, the layer plays both hits, each at its own time. A choke cancels the hits that have not started. A layer can hold 256 hits and note-offs that have not started. When there are more, it drops the oldest.

Level and **Pan** can take modulation. See Macros and modulation.

ROUTING

Control	What it does
Output	Where the layer goes. **Master**: through the zone's master chain. **Direct**: past the master chain, to the zone's output (under **Direct level** and the zone gain). **Sends only**: only into the buses.
Pre tap	Where the **Pre** sends leave the layer's FX chain: **Before FX**, or **After** one of its FX.

BUS 1 and BUS 2

Each bus has two sends:

Control	What it does	Range
Pre	Sends the layer into the bus at the **Pre tap**.	-inf to +12 dB
Post	Sends the layer into the bus after its FX chain.	-inf to +12 dB

The sends include the layer's level and pan, and its velocity response.

VELOCITY

This section sets how the layer responds to how hard you play it. At full velocity, the layer plays as you designed it.

The first line is **Amplitude**: the loudness response.

Control	What it does	Range
Response curve	The curve from velocity (left to right) to gain (bottom to top). Drag the curve to bend it. Hold `⇧ Shift` for fine steps. Double-click resets it.	
Depth	How much quieter a soft hit is. 100 %: silent at velocity 0. 0 %: every hit at the same loudness. Double-click: 100 %.	0 to 100 %

To let velocity change the sound of the layer, add a link:

1. Click **+ VELOCITY LINK**. A new line shows.
2. Select the target: the parameter of this layer that velocity moves.

3. Set **DEPTH**: how far a soft hit moves the target, as a part of its range. A positive value gives more of the parameter to hard hits.

Control	What it does	Range
Response curve	How far the target moves for each velocity. Drag to bend. Double-click straightens it.	
DEPTH	How far a soft hit moves the target. Double-click: 0 %.	-100 % to +100 %
x	Removes the link.	

DUCKING

Ducking makes this layer quieter when another layer of the zone hits. For example, duck a long noise layer under the click of the kick.

Control	What it does	Range
Ducked by	The layer whose hit ducks this one. **Nothing**: no ducking.	
AMOUNT	How far this layer drops at the bottom of the curve. A positive value lifts the layer. Double-click: -12 dB.	-60 dB to +12 dB
TIME	How long the duck lasts after the other layer's hit. This is the width of the curve. Double-click: 200 ms.	5 ms to 2000 ms
Curve	The volume of this layer over **TIME**. Bottom: down by **AMOUNT**. Top: its own level.	

The bar next to **DUCKING** shows the duck as it plays, in dB. To edit the curve, see Curves.

Curves on Level and Pan

A curve moves **Level** or **Pan** while the hit plays. For example, a curve on **Pan** moves a swoosh from the left to the right.

While a parameter has a curve, the curve sets its value. The knob of that parameter has no effect. Routes from macros and other sources add to the value of the curve.

To add a curve:

1. At the bottom of the layer page, click **+**. A menu shows **Level** and **Pan**.

2. Click the parameter. A new tab with the name of the parameter opens. The curve rises from the current value of the parameter (**From**) to a second value (**To**).
3. Draw the curve. See Curves.
4. Set **From** and **To**.

Control	What it does
Follow	**Off**: the curve runs over the length of the layer: its hit and the tail of its FX. The name of a layer: the level of that layer moves the curve. The x axis then goes from the loudest level of the layer (100 %) to silence (0 %).
From	The value at the bottom of the curve.
To	The value at the top of the curve.
Attack	When the curve follows a layer: how fast the level follower of that layer rises. 0.1 ms to 200 ms.
Release	When the curve follows a layer: how fast the level follower of that layer falls. 5 ms to 2000 ms.

The curve also moves the signal that the layer sends to the buses.

A curve on **Level** does not change what other curves and ducks read from this layer.

To edit a curve, click its tab. To remove a curve, right-click its tab and click **Remove curve**. The parameter then goes back to its knob.

Buses

Each zone has 2 FX buses: **Bus 1** and **Bus 2**. A bus is a shared FX chain beside the master chain. Layers send into a bus, and the bus returns into the master chain. Use a bus for an FX that several layers share, for example a reverb or a distortion that mixes the layers before it processes them.

To show or hide the bus rows, click the button at the right of the **BUSES** header. When they are hidden, the header shows **HIDDEN**.

A bus row has the same controls as a layer row: level (the return level, -inf to +12 dB), **M**, **S** and pan. When one or more buses are soloed, only the soloed buses (and the buses they feed) play.

To add an FX to a bus, click the **+** on its **FX** row.

Select a bus row to show its page:

Control	What it does	Range
Return level	The level of the bus output.	-inf to +12 dB
Returns to	**Master chain**, or (for Bus 1) **Bus 2**.	

Under the controls, the page lists the layers that send into the bus.

Sends on the layer rows

You can set the sends in the tree too. Click the sends button at the right of the **LAYERS** header. Each layer row then shows its sends to Bus 1 and Bus 2, in dB. A folded layer also shows them. The **PRE** / **POST** button selects which sends all the layer rows show.

- Drag a value up or down. Hold `⇧ Shift` for fine steps.
- Double-click a value to turn the send off.

In a kit, the same button also adds a **Sends** row under the **Zone master**. It shows the zone's sends into **KIT BUS 1** and **KIT BUS 2**.

Master

The master is the output section of the zone. In a kit, the tree shows it as **Zone master**. The zone's master is part of its sound and is saved with it.

Under the **Master** row are its **FX** row and its **Output** row.

Select the **Master** row to show its page:

Control	What it does	Range
Output	Only in a kit, when the kit has a submix or the plug-in has aux outputs. Where the zone goes: **MAIN**, a submix, or an aux output. See Kits and zones.	
Kit bus 1 pre / **Kit bus 1 post**	Only in a kit. Sends the zone into kit bus 1: before its master chain (pre), or after its mixer strip (post).	-inf to +12 dB
Kit bus 2 pre / **Kit bus 2 post**	The same, for kit bus 2.	-inf to +12 dB
Choke	How fast the zone fades to silence when it is choked. See Choke groups.	1 ms to 100 ms

Control	What it does	Range
Reverse	**ON** plays the zone's whole hit backwards. See Reverse.	
Length (next to **Reverse**)	How much of the hit plays backwards, from its start.	20 ms to 4000 ms
Direct level	The level of the layers with **Output** set to **Direct**.	-inf to +12 dB

The Output page

Select the **Output** row to show the Output page. It has the output level and a picture of the output.

Control	What it does	Range
Master Gain	With one zone: the host **Master** parameter.	
Zone gain	In a kit: the level of the zone. The same value as the level on its zone row.	-inf to +6 dB

The buttons at the top right select the picture:

Button	What it shows
SCOPE	The waveform of the hit after the master chain.
SPECTRUM	The level of the hit over frequency: the average (filled) and the peak.
SPECTROGRAM	Time against frequency, with the level as colour.

The picture comes from a render of the hit. It shows without a note played and follows each edit. On the kit Master, the scope shows the output as it plays.

The **Output** row in the tree also has a level control and a meter.

The kit section

When the kit has two or more zones, the tree shows a **KIT** section under the zones. Its rows are on a band of a different colour, so they do not look like part of a zone.

Submixes

A submix is a shared FX chain and level for some zones of the kit. For example, put all the toms in one submix and compress them together. A kit can have up to 8 submixes.

1. Click the **+** on the **SUBMIXES** header. The new submix shows under the header.
2. Select a zone, then select its **Master** row.
3. Set **Output** to the submix.

A submix row has a level (-inf to +6 dB), **M**, **S**, pan and a meter. **S** solos the submix and the zones in it. To rename a submix, double-click its row. To remove it, right-click its row and select **Remove (its zones play out on their own)**.

Select a submix row to show its page:

Control	What it does	Range
Level	The level of the submix.	-inf to +6 dB
Output	Plug-in only: **MAIN** or an aux output.	
Kit bus 1 pre / **post**, **Kit bus 2 pre** / **post**	Sends the submix into the kit buses.	-inf to +12 dB

Under the controls, the page lists the zones in the submix.

Kit buses

The kit has 2 buses: **Kit bus 1** and **Kit bus 2**. They work like the buses of a zone, but the zones send into them. A kit bus returns into the kit's Master chain, or into Kit bus 2. The kit buses are saved with the kit.

Set the sends of a zone on its **Master** page, or on its mixer strip (post sends only).

You can also show the sends on the zone rows. Click the sends button at the right of the **KIT** header. Each zone row then shows its sends to Kit bus 1 and Kit bus 2. The **PRE** / **POST** button selects which sends all the zone rows show.

Kit Master

The kit's **Master** processes the whole kit. Each zone, through its own zone master, sums into the kit Master's FX chain with the kit buses. Then the output level applies. The kit Master is saved with the kit, not with a sound.

The level on its **Output** row is the host **Master** parameter.

The mixer

The mixer shows a strip for each zone of the kit. To open it, select a zone row or the kit **Master** row, then click the mixer button at the right of the line above the tree. Click it again to go back to the step grid.

From left to right, the mixer has a strip for each zone, a strip for each submix, a **+** to add a submix, and the **MASTER** strip.

A zone strip has, from top to bottom:

Control	What it does
Number and name	Click to select the zone. The key shows under the name.
PAN	The balance between left and right. Double-click: centre.
M / **S**	Mute and solo. `⌘ Cmd`-click **S** to solo this strip only.
1 / **2**	Only in a kit: the post sends into Kit bus 1 and Kit bus 2. The pre sends are on the zone's **Master** page.
Fader and meter	The level of the zone, from -inf to +6 dB. Double-click: 0 dB.
OUTPUT	Where the zone goes: **MAIN**, a submix, or **OUT 2** to **OUT 16**.

A submix strip has the same controls. Its **OUTPUT** is **MAIN** or an aux output. Click its name to open its page. Double-click its name to rename it. Right-click its name for **Rename** and **Remove**.

The **MASTER** strip is the host **Master** parameter and the output meter.

With one zone, the level of the zone strip is the host **Master** parameter.

Sources

Sources

A source is the sound generator of a layer. Each layer has one source. Its FX chain processes the sound that the source makes. To make a drum from more than one part (for example a body and a click), use more than one layer.

To add a layer, click the **+** on the **LAYERS** header of the tree and pick a source. Refer to Layers, buses and master.

Which source do I use

Source	What it makes	Use it for
Osc	One pitched tone with pitch, level and drive curves. The wave is a basic shape, a set of harmonics or a formula.	Kick and tom bodies, sub tones, pitched hits.
Analog	Models of analog drum machine circuits: a pinged resonator or a VCO, with their envelopes.	808, 909 and 606 style kicks, snares and toms.
Noise	Colored noise through a filter, with its own curves.	Snare rattle, hats, the noise part of a click, washes.
Partials	A set of sine tones. Each has its own frequency, level and decay. You place them by hand, read them from a sample, or make them with a formula.	Drum shell modes, clicks, rings, bells, cymbals.
Metal	A stack of square waves at inharmonic ratios, through band filters.	Hats, cymbals, cowbells, bells.
Particles	Many small collisions, like seeds in a shaker.	Shakers, claps, tambourines, sizzle.
Struck	An exciter that strikes up to 3 resonant bodies.	Wood blocks, bells, shells, struck percussion.
Sampler	A recorded one-shot with trim and an envelope.	Recorded hits, crashes, layers under a synthesized drum.

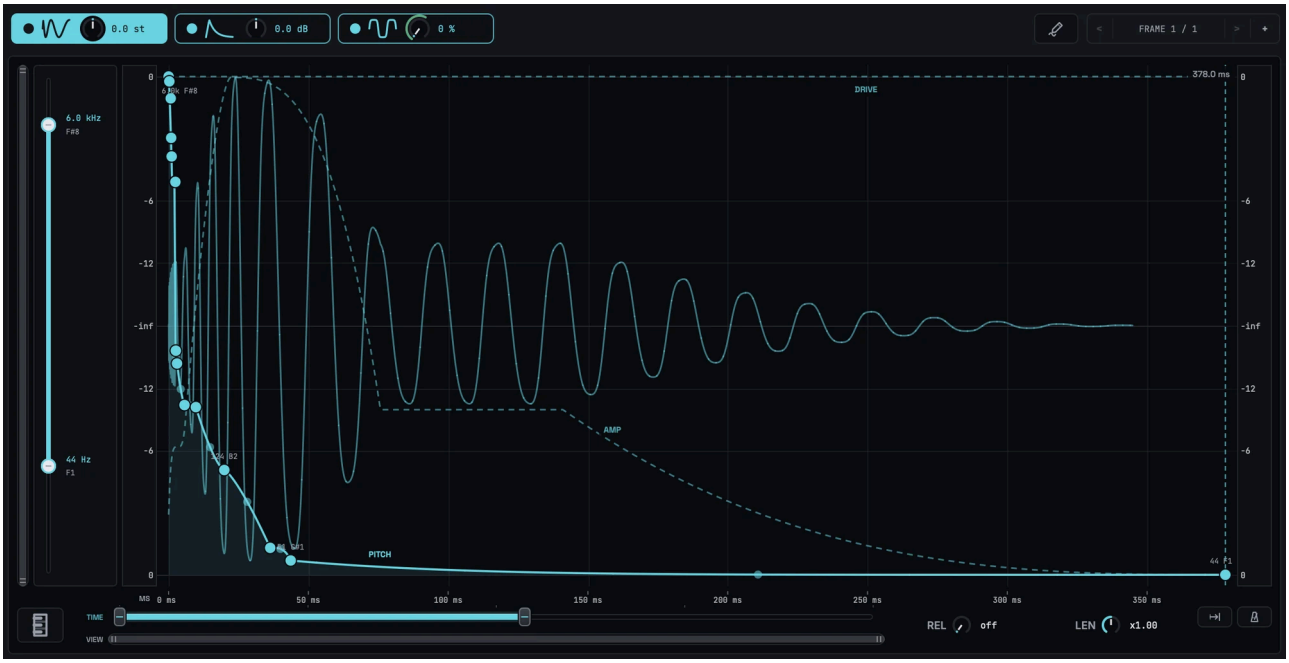
Common to all sources

- The source page shows the controls of the source and a preview of the hit.
- Most sources have curves over the time of the hit, for example pitch and level. Refer to Curves.
- A table of values (harmonics, partials, ratios) can also come from a formula. Refer to Formulas.
- Any knob can be moved by a macro or another modulation. Refer to Macros and modulation.

Osc

The Osc is an oscillator with a pitch sweep, an amplitude curve and a saturation stage. Use it for tonal parts of a hit that have one pitch at a time:

- the body of a kick (a sine that falls from a high pitch to a low pitch),
- the body of a tom or a snare,
- a sub-bass layer that follows the keys (see CHROMATIC).



How the Osc makes its sound

The Osc plays one wave. Three curves move it over the time of the hit:

1. The **PITCH** curve sets the frequency of the wave.
2. The **AMP** curve sets the level of the wave.
3. The **DRIVE** curve sets the amount of saturation. The saturation comes after the AMP curve. Thus the loud start of the hit saturates more than the quiet tail. The saturation does not make the hit longer.
4. The **AMP** knob sets the output gain, after the saturation.

All the curves share one time axis: the length of the hit, which you set on the **TIME** bar below the curves. For how to draw and edit a curve, and for the **TIME** bar, see Curves.

The page

The top row of the page has, from left to right:

- the **PITCH**, **AMP** and **DRIVE** buttons, each with its knob,
- the **WAVE** button, which opens the wave editor,
- the **FRAME** box (see Frames).

Below the top row is the curve editor. It shows the edited curve over the waveform of this layer. The other curves show dimmed behind it.

- Click **PITCH**, **AMP** or **DRIVE** to edit that curve.
- Click the dot on a button to show or hide that curve behind the edited one.
- Click a dimmed curve to edit it.

The editor always shows a curve, also before you edit it. Your first edit starts from the curve that you see, so the sound does not change until you move a point.

Curves

Curve	Vertical axis	Range
PITCH	The frequency, on a log scale between the two handles of the pitch range bar. Bottom = the base, top = the peak.	10 Hz to 24 kHz
AMP	The level of the wave.	Top = 0 dB, bottom = -inf
DRIVE	The saturation amount, as a percentage of the **DRIVE** knob.	Top = 100 %, bottom = 0 %
FRAME	The position across the frames of the wave.	Bottom = frame 1, top = the last frame

When you move a point, the readout shows its value: Hz and the note name for **PITCH**, dB for **AMP**, the actual drive in % for **DRIVE**, and the frame number for **FRAME**.

The **AMP** curve also has a release (**REL** on the **TIME** bar). See Curves.

Knobs

Each knob moves its whole curve. The curve keeps its shape.

Control	What it does	Range
PITCH knob	Transposes the whole pitch curve. Double-click: 0.	-24 to +24 st
AMP knob	The output gain, after the saturation. Double-click: 0. Right-click: **Normalize to 0 dB**.	-12 to +12 dB
DRIVE knob	The saturation amount. 0 % is clean. The **DRIVE** curve shapes this amount over the hit.	0 to 100 %
Pitch range bar	Two handles along the vertical axis. The bottom handle is the base: the pitch where the sweep ends. The top handle is the peak: the top of the **PITCH** curve. Right-click: **Chromatic**.	10 Hz to 24 kHz

Normalize to 0 dB sets the **AMP** knob to the gain that puts the peak of the hit at 0 dBFS. The menu item shows that gain. The gain stays in the range of the knob, -12 to +12 dB.

The **PITCH**, **AMP** and **DRIVE** knobs can be targets of modulation. See Macros and modulation.

CHROMATIC

Use CHROMATIC when the layer must play the note of the key, for example a sub-bass or a tuned tom. CHROMATIC is a setting of the layer. A different layer in the same zone can stay at a fixed pitch.

With CHROMATIC on:

- The base of the pitch range is fixed at 55 Hz (MIDI note 33, A1).
- MIDI note 33 plays the **PITCH** curve as you drew it. Each other note plays the curve that number of semitones higher or lower.
- The top handle of the pitch range bar sets the size of the sweep.
- The **PITCH** knob moves in steps of 1 semitone.

To set CHROMATIC on or off:

1. Right-click the pitch range bar.
2. Click **Chromatic**.

To see the notes along the pitch range bar, click the keyboard button in the bottom-left corner of the curve editor.

The wave

Click **WAVE** to open the wave editor. It replaces the curve editor until you click **WAVE** again. The tooltip of **WAVE** shows the wave that plays now.

The wave editor shows:

- **ONE CYCLE**: one cycle of the wave that plays.
- **HARMONICS**: the level (dB) and the phase of each harmonic of the wave.

Which wave do I use

Choice	What it plays
SINE	The fundamental alone. Use it for kick and sub bodies.
TRI	A triangle: odd harmonics, falling at 1/n^2.
SAW	Every harmonic, falling at 1/n.
SQUARE	Odd harmonics, falling at 1/n.
HARMONICS	Harmonics that you draw by hand, up to 64.
FORMULA	Harmonics that a formula calculates, up to 512.

The **HARMONICS** and **FORMULA** waves are band-limited: they do not alias at high pitch. The four basic shapes are not band-limited.

Each step starts from the wave that you hear:

- If you select **HARMONICS** from a basic shape, the bars start as the harmonics of that shape.
- If you select **FORMULA** from a basic shape, the formula starts as the formula of that shape.
- If you select **HARMONICS** from **FORMULA**, the bars keep the values that the formula calculated.
- If you select **FORMULA** from **HARMONICS**, Rhythmica writes a formula that gives the same harmonics.

Draw the harmonics

The bars show the level of each harmonic, from 0 dB at the top to -60 dB at the bottom. The strip under the bars (**PH**) shows the phase of each harmonic, from 0 at the bottom to 1 turn at the top.

- Drag across the bars to draw the levels.
- Drag a bar to the bottom to switch that harmonic off.
- Drag across the **PH** strip to draw the phases.
- Hold the pointer on a bar to read its number, level and phase.

If the wave is a basic shape or a formula, your first stroke changes it to **HARMONICS**. The bars start from the same sound.

The **harmonics** knob sets the number of harmonics: 1 to 64 for **HARMONICS**, 1 to 512 for **FORMULA**.

Write a formula

With **FORMULA**, the editor shows two formula fields and two named knobs:

- **gain(n)**: the level of harmonic n, in dB.
- **phase(n)**: the phase of harmonic n, in turns.

For the formula language, the templates and the knobs, see Formulas.

Frames

A wave with frames holds up to 8 sets of harmonics. The Osc can move across the frames over the time of the hit. Between two frames, it blends the two. If the wave is a basic shape, **+** changes it to **HARMONICS** first. The shape becomes frame 1.

The **FRAME** box shows the current frame, for example **FRAME 2 / 4**.

Control	What it does
< / **>**	Show the previous or the next frame.
+	**ADD FRAME**: adds a copy of the shown frame, directly after it. Up to 8 frames.
FRAME label, click	Opens the **FRAME** curve. Click again to close it.
FRAME label, drag	Moves the frame position.

Control	What it does
FRAME label, right-click	**Delete frame**, **Move left**, **Move right**.

The wave editor shows and edits the frame that the **FRAME** box shows. If you click a basic shape while the wave has frames, the shape goes into the shown frame only.

A new frame is a copy, so the sound does not change until you edit the new frame.

To make a wave that changes over the hit:

1. Click **WAVE**.
2. Select **HARMONICS**.
3. Click **+** in the **FRAME** box.
4. Draw the harmonics of the new frame.
5. Click the **FRAME** label.

   The editor shows the **FRAME** curve. Each frame has a guide line.
6. Draw the **FRAME** curve from frame 1 to the last frame.

If there is no **FRAME** curve, the **FRAME** box sets the frame that plays for all of the hit. If there is a **FRAME** curve, the curve sets the frame that plays.

Analog

The Analog source is a set of models of analog drum circuits. Use it for the sounds of analog drum machines and modular drums: kicks, snares, toms, congas and rims.

There are two kinds of circuit:

- **Generic circuits**: a circuit type with its stages and knobs. You can make many different drums with one generic circuit.
- **Machine models**: one drum of one machine, modeled part by part from its circuit. A machine model has the knobs of the machine's own panel.



Select a circuit

The top row of the page has three circuit buttons: **PINGED**, **VCO** and **FILTER PING**. After you select a model, its button shows the name of that model.

1. Click **PINGED** or **VCO**.

   A menu shows the models of that circuit type.
2. Click a model.

FILTER PING has one model. Click the button to select it.

PINGED

Model	What it is
PINGED	Generic: a damped network (bridged-T / twin-T) that the trigger pulse makes ring. The circuit type of the 808, 606, CR-78 and DR-55.
PINGED - FEEDBACK	A model of the 808 bass drum circuit.
PINGED - 2-TONE + NOISE	A model of the 808 snare drum circuit.
PINGED - DIODE TUNED	A model of the 808 tom and conga circuits.
PINGED - BODY + KNOCK	A model of the 606 bass drum circuit.
PINGED - DROP + NOISE	A model of the 606 snare drum circuit.
PINGED - BENT	A model of the 606 tom circuits.

VCO

Model	What it is
VCO	Generic: an oscillator on a pitch envelope, through a VCA. The circuit type of the 909, Simmons and DRM1.
VCO - GATED	A model of the 909 bass drum circuit.
VCO - 2-OSC + NOISE	A model of the 909 snare drum circuit.
VCO - 3-OSC	A model of the 909 tom circuits.

FILTER PING

Model	What it is
FILTER PING	Generic: a resonant 4-pole ladder low-pass filter that the trigger strikes. Its cutoff follows the pitch envelope. The modular kick.

Behind the waveform of the hit, the page shows the schematic of the circuit type.

Generic circuits

The stages

A generic circuit has up to four stages. The stage buttons are on the right of the top row. Click a stage button to show the knobs of that stage. The envelope of that stage becomes the edited one in the plot.

Stage	What it is
PITCH	How far above **TUNE** the pitch starts, and how it falls back to **TUNE**.
BODY	The tone of the drum and its level over time.
2ND	A second tone voice (for snares), and a third network or oscillator (for rims and toms). **FILTER PING** has no **2ND** stage.
NOISE	The noise branch: the snare wires.

TUNE shows on all stages. It sets the pitch where the drum settles. Range: 20 Hz to 4 kHz.

Knobs

A circuit shows only the knobs that it has.

PITCH stage:

Control	What it does	Range
PUNCH	The fast pitch drop that makes the first transient: how far above **TUNE** it starts.	0 to 50 x
PUNCH TIME	The time constant of the fast drop.	0.05 to 50 ms
GLIDE	The slow pitch drop after the punch: how far above **TUNE** it starts.	0 to 800 %
GLIDE TIME	The time constant of the slow drop.	1 to 1000 ms

Control	What it does	Range
SAG	The pitch follows the level of the body: sharp while it rings loud, it settles as it fades. **PINGED** and **VCO** only.	0 to 200 %

BODY stage:

Control	What it does	Range
DECAY	The time for the body to fall to -60 dB.	5 ms to 10 s
DRIVE	The saturation of the output stage. It flattens the loud start and leaves the tail clean.	0 to 6
ATTACK	The level of the attack branch: the trigger pulse shaped into a click, with low-passed noise, on a short envelope. Its settings are on the BACK.	0 to 4
CLIP	The first oscillator starts near a square wave and becomes round over **CLIP TIME** (on the BACK). This is the punch of the 909 tom. **VCO** only.	0 to 100 %
TONE	The low-pass filter on the output. **PINGED** only.	100 Hz to 16 kHz
CLICK	The level of the trigger pulse that goes directly to the output. **PINGED** only.	0 to 4

2ND stage:

Control	What it does	Range
2ND	The pitch of the second tone voice, as a ratio of **TUNE**. For example: 808 snare about 2 x, 909 snare about 1.6 x.	0.5 to 4 x
2ND LEVEL	The level of the second tone voice against the first. 0 makes a bass drum.	0 to 30
2ND DECAY	The time for the second voice to fall to -60 dB.	10 ms to 2 s
3RD	The pitch of a third network (**PINGED**) or a third oscillator (**VCO**), as a ratio of **TUNE**.	0.25 to 8 x

Control	What it does	Range
3RD LEVEL	The level of the third voice against the first. 0 is off.	0 to 30
3RD DECAY	The time for the third voice to fall to -60 dB.	2 ms to 2 s

NOISE stage:

Control	What it does	Range
SNAPPY	The level of the noise branch. 0 is off.	0 to 200
NOISE DECAY	The time for the noise to fall to -60 dB.	5 ms to 2 s
NOISE TONE	The low-pass filter on the noise.	200 Hz to 20 kHz

All the knobs except **PUNCH TIME**, **CLICK**, **2ND**, **2ND DECAY**, **3RD**, **3RD LEVEL** and **3RD DECAY** can be targets of modulation. See Macros and modulation.

Envelopes in the plot

The plot shows the hit, with the envelopes of the stages on it. The envelope of the selected stage has handles. The other envelopes show dimmed and dashed. Each handle moves the same setting as its knob.

Stage	Handle	Drag sideways	Drag up / down
PITCH	PUNCH	**PUNCH TIME**	**PUNCH**
PITCH	GLIDE	**GLIDE TIME**	**GLIDE**
PITCH	SAG	-	**SAG**
BODY	DECAY	**DECAY**	-
2ND	2ND	**2ND DECAY**	-
NOISE	NOISE	**NOISE DECAY**	**SNAPPY**

The DECAY handles sit on the -20 dB point of their envelope.

FRONT and BACK

The FRONT / BACK button is the two-square button to the right of the circuit buttons. Click it to change between the two faces:

- FRONT: the playing knobs and the hit.
- BACK: the internal settings of the circuit. These are all the settings that the FRONT does not show.

A circuit shows only the settings that it has. A setting dims when its part is silent. For example, the **ATTACK** settings dim when **ATTACK** is 0.

Trigger, body, wave and output

Group	Control	What it does	Range
TRIGGER	**PULSE**	The width of the trigger pulse. A wider pulse rings a network harder and duller. On the **VCO**, the time that the oscillator waits before it starts; the attack sounds alone in this gap.	0.05 to 5 ms
BODY	**HOLD**	The course of the body's decay. 1 falls exponentially from the start. Above 1, the level holds before it falls. **VCO** and **FILTER PING** only.	0.5 to 8
BODY	**SAG CURVE**	How **SAG** follows the level of the body. A higher value releases the pitch sooner. Dims when **SAG** is 0.	0.1 to 10
BODY	**CLIP TIME**	The time that the clipper of the first oscillator takes to release after the trigger. Dims when **CLIP** is 0. **VCO** only.	0.5 to 80 ms
WAVE	**WAVE**	The waveform of the oscillator, from triangle (0 %) to sine (100 %). **VCO** only.	0 to 100 % sine
WAVE	**START PHASE**	Where in its cycle the oscillator starts. **VCO** only.	0 to 360 deg
OUTPUT	**BIAS**	The asymmetry of the output stage under **DRIVE**: even harmonics. Dims when **DRIVE** is 0.	-1 to +1
OUTPUT	**LOW CUT**	A high-pass filter after the output stage. It removes the low end, for example of a rim. 20 Hz is off. **PINGED** only.	20 Hz to 4 kHz

Group	Control	What it does	Range
OUTPUT	**INVERT**	Inverts the polarity of the output.	On / off

Attack

The click that the trigger makes, before the body.

Control	What it does	Range
TONE	The resonant low-pass filter of the attack click.	200 Hz to 16 kHz
RESONANCE	How long the click rings at its **TONE**.	0.5 to 20
CUT	The high-pass filter of the attack click.	20 Hz to 4 kHz
NOISE	The level of low-passed noise against the click. 0 % is the click alone.	0 to 100 %
NOISE TONE	The low-pass filter of the attack noise.	50 Hz to 16 kHz
DECAY	The time for the attack to fall to -60 dB.	2 to 500 ms

Noise

Control	What it does	Range
LOW CUT	The high-pass filter of the noise branch.	20 Hz to 16 kHz
RESONANCE	The resonance of the noise low-pass filter at **NOISE TONE**.	0.5 to 8
HOLD	The course of the noise decay. 1 falls exponentially. Above 1, the level holds before it falls.	0.25 to 8
BRIGHT	The level of a bright noise path: high-passed noise on its own short envelope. This is the snap of the 909 snare. 0 is off.	0 to 30
BRIGHT CUT	The high-pass filter of the bright path.	200 Hz to 16 kHz

Control	What it does	Range
BRIGHT DECAY	The time for the bright path to fall to -60 dB.	2 to 500 ms

The NOISE settings dim when **SNAPPY** is 0.

Length of the hit

On a generic circuit, the **TIME** bar sets the delay of the layer and the length of the hit. The hit fades out at the end of its length. See Curves.

Machine models

A machine model shows the knobs of the machine's panel. It has no stages, no envelopes in the plot and no BACK.

Most knobs read 0 to 10, as on the machine.

Model	Knobs
VCO - GATED (909 bass drum)	**TUNE**, **ATTACK**, **DECAY**, **LEVEL**
VCO - 2-OSC + NOISE (909 snare drum)	**TUNE**, **TONE**, **SNAPPY**, **LEVEL**
VCO - 3-OSC (909 toms)	**TOM**, **TUNE**, **DECAY**, **LEVEL**
PINGED - FEEDBACK (808 bass drum)	**DECAY**, **TONE**, **LEVEL**
PINGED - 2-TONE + NOISE (808 snare drum)	**TONE**, **SNAPPY**, **LEVEL**
PINGED - DIODE TUNED (808 toms and congas)	**VOICE**, **TYPE**, **TUNING**, **LEVEL**
PINGED - BODY + KNOCK (606 bass drum)	**LEVEL**, **ACCENT**
PINGED - DROP + NOISE (606 snare drum)	**LEVEL**
PINGED - BENT (606 toms)	**VOICE**, **LEVEL**

909 models

Control	Drum	What it does
TUNE	bass drum	How long the pitch takes to fall. The end pitch does not change.
ATTACK	bass drum	The click and the noise on their short envelope. As on the machine, it is never fully off.
DECAY	bass drum	How fast the body falls after the gate closes.
LEVEL	bass drum	The gain of the output amplifier. Above about 0.7 on the knob, it drives the amplifier into clipping.
TUNE	snare drum	The pitch of both oscillators, and how far the pitch bends at the hit.
TONE	snare drum	How long the snappy noise lasts.
SNAPPY	snare drum	The noise against the drum. 0 is the drum alone.
TUNE	toms	The **TUNE** knob of the tom.
DECAY	toms	The envelope of the long oscillator.
LEVEL	toms	The gain of the output amplifier. At high settings, the accented attack drives the amplifier into clipping: a clipped, full start.
TOM	toms	**LOW**, **MID** or **HIGH**.

808 models

Control	Drum	What it does
DECAY	bass drum	The feedback that keeps the drum ringing. With a longer ring, the pitch glides down for longer.
TONE	bass drum	The low-pass filter on the output: the edge of the click and the top of the body.
TONE	snare drum	Blends from the lower tone of the snare to the higher tone.
SNAPPY	snare drum	How high the noise envelope starts: louder and longer noise.

Control	Drum	What it does
LEVEL	snare drum	The gain of the mixer. At high settings, the top of the sound becomes darker.
VOICE	toms and congas	**LOW**, **MID** or **HIGH**.
TYPE	toms and congas	**TOM** or **CONGA**. A conga is higher, longer and cleaner, with no noise.
TUNING	toms and congas	The **TUNING** knob of the machine.

606 models

Control	Drum	What it does
ACCENT	bass drum	The AC LEVEL knob of the machine: how hard an accented hit drives the body into clipping.
VOICE	toms	**LOW** or **HIGH**.

On every machine model, **PITCH** plays the circuit faster or slower, as a recording of the machine would play. The envelopes follow: one octave up gives twice the pitch in half the time. Range: -24 to +24 st.

On the other models, **LEVEL** is the **LEVEL** knob of the machine.

All the machine model knobs except **TOM**, **VOICE** and **TYPE** can be targets of modulation.

Velocity

On the 909 models, the 808 models and the 606 bass drum, the velocity of the hit is the accent of the machine. On the 606 snare drum and the 606 toms, the velocity sets only the level of the layer.

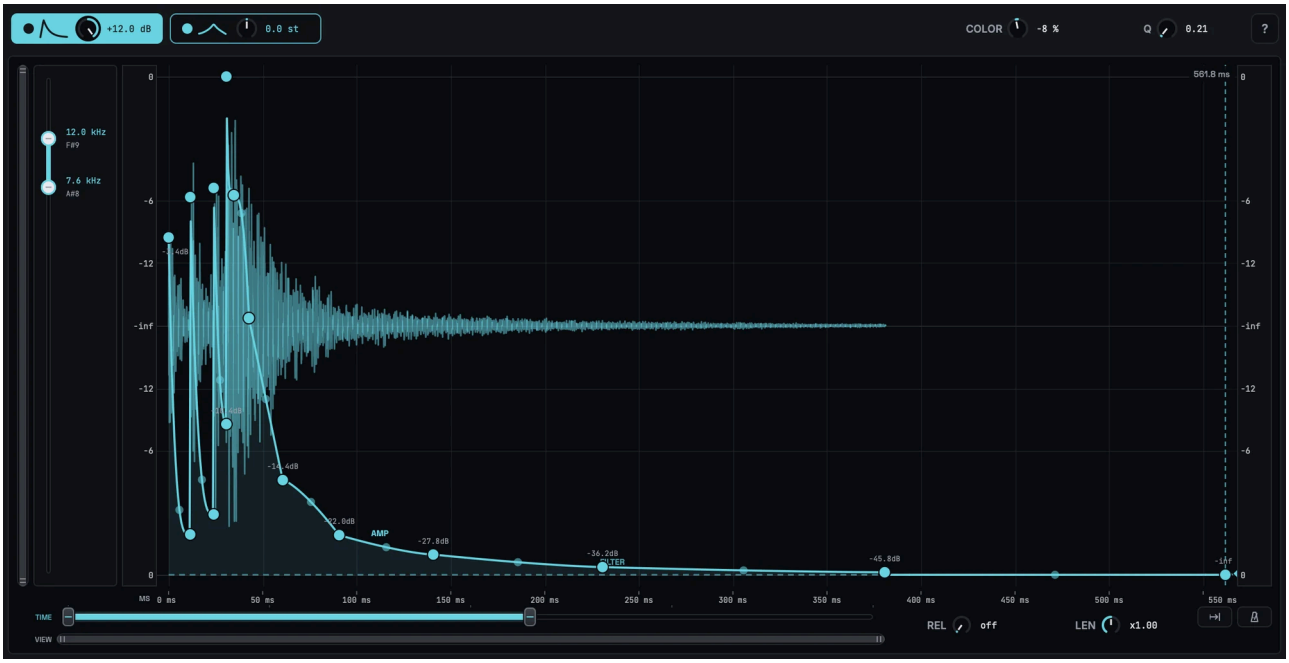
Length of the hit

On a machine model, the circuit sets the length of the hit. The **TIME** bar sets only the delay of the layer.

Noise

The Noise source is white noise through a filter, with an amplitude curve. Use it for the parts of a hit that have no pitch:

- the click at the start of a kick,
- the rattle of the snare wires,
- hats.



How the Noise source makes its sound

1. A white-noise generator makes the noise.
2. A resonant filter shapes the noise. **COLOR** sets the type of filter. The **FILTER** curve moves the cutoff over the hit.
3. The **AMP** curve sets the level over the hit.
4. The **AMP** knob sets the gain of the whole **AMP** curve.

Each hit plays the same noise. Thus a preset sounds the same on each hit and in each render.

Both curves share one time axis: the length of the hit, which you set on the **TIME** bar below the curves. For how to draw and edit a curve, and for the **TIME** bar, see Curves.

The page

The top row of the page has:

- on the left, the **AMP** and **FILTER** buttons, each with its knob,
- on the right, the **COLOR** and **Q** knobs and the **?** button.

Below the top row is the curve editor. It shows the edited curve over the waveform of this layer. The other curve shows dimmed behind it.

- Click **AMP** or **FILTER** to edit that curve.
- Click the dot on a button to show or hide that curve behind the edited one.
- Click the dimmed curve to edit it.
- Hold the pointer on **?** to see the mouse actions of the curve editor.

The editor always shows a curve, also before you edit it. Your first edit starts from the curve that you see, so the sound does not change until you move a point.

Curves

Curve	Vertical axis	Range
AMP	The level of the noise.	Top = 0 dB, bottom = -inf
FILTER	The cutoff frequency, on a log scale between the two handles of the filter range bar. Bottom = the base, top = the peak.	100 Hz to 20 kHz

On the **FILTER** curve, a straight line between two points moves the cutoff at a constant rate in octaves.

The **AMP** curve also has a release (**REL** on the **TIME** bar). See Curves.

Controls

Control	What it does	Range
AMP knob	Boosts or cuts the whole **AMP** curve. Double-click: 0.	-12 to +12 dB
FILTER knob	Transposes the whole **FILTER** curve. Double-click: 0.	-48 to +48 st

Control	What it does	Range
Filter range bar	Two handles along the vertical axis. The bottom handle is the base: the cutoff when the **FILTER** curve is flat at the bottom. The top handle is the peak: the top of the **FILTER** curve.	100 Hz to 20 kHz
COLOR	The type of filter. -100 % is low-pass, 0 % is band-pass, +100 % is high-pass. Between these values, the filter blends the two types. Double-click: 0.	-100 to +100 %
Q	The resonance of the filter.	0.1 to 10
ROUND ROBIN	Makes each hit different. Each hit gets new noise and small changes to the cutoff (up to 4 st), the length (up to about 19 %) and the level (up to 2 dB). The first hit plays exactly as you set it. At 0, all hits are the same.	0 to 1

The **AMP**, **FILTER**, **COLOR**, **Q** and **ROUND ROBIN** knobs can be targets of modulation. See Macros and modulation.

Make a noise burst that gets darker

This procedure makes a noise layer whose cutoff falls over the hit, for example for a snare.

1. Set **COLOR** to -100 % (low-pass).
2. Drag the top handle of the filter range bar to the start cutoff.
3. Drag the bottom handle to the end cutoff.
4. Click **FILTER**.
5. Draw the **FILTER** curve from the top at the start to the bottom at the end.
6. Click **AMP**.
7. Draw the **AMP** curve for the length of the noise.

Partials

The Partials source makes a hit from a set of partials. A partial is one sine tone with its own frequency, level, decay and start phase. All partials start at the hit and ring down. Each partial decays at its own rate.

Use Partials for sounds that are mostly a set of ringing tones:

Sound	What the partials make
Drum shell, tom, hand drum	The few ringing tones of the shell.
Click, attack transient	Many short partials that start in phase and then go out of alignment.
Bell, cowbell, metal ring	Inharmonic tones with long decays.
Cymbal, ride, hat	Many partials (128 or more) with frames to change the tone over the hit.

Resynthesize fills a Partials layer from a recording. Refer to Resynthesize.



The page

The Partials page has two sections:

- At the top, the header row and the partials plot.

- At the bottom, the **AMP ENVELOPE**: one envelope over all the partials.

If the window is too narrow for the header, the header shows on two rows.

The partials plot

The plot shows each partial as a vertical bar.

- The horizontal axis is frequency, 20 Hz to 20 kHz, on a log scale. The grid marks 100, 1k and 10k.
- The vertical axis is level, from -60 dB at the bottom. The top is 0 dB, or higher when a partial is louder than 0 dB.
- A brighter bar decays for longer. A dimmer bar decays faster.
- The text at the top left shows the number of partials, for example **64 PARTIALS**. With frames, it also shows the frame, for example **FRAME 2**.
- With 16 partials or fewer, each bar shows its number.

The bars show the partials as they play, with **Pitch** and **Spread** applied.

Edit the partials with the mouse

Action	Result
Drag a bar	Sets the frequency (left / right) and the level (up / down) of that partial.
Scroll over a bar	Sets the decay of that partial. Scroll up for a longer decay.
Double-click a bar	Removes that partial. One partial always stays.
Double-click an empty area	Adds a partial at that frequency and level. Its decay is the median decay of the other partials.
Right-click	Opens the reinforce menu. Refer to Reinforce with an Osc.

The **?** button shows these actions as a tooltip.

A partial can be up to `+24 dB`. Its decay is `1 ms` to `20000 ms`, the time to fall by 60 dB. There can be up to 1024 partials.

> **Note**
>
> If the partials come from formulas, the first drag, scroll or double-click on a bar changes the formulas into values. The partials keep the sound they have at that moment.

Start phase

The start phase of the partials makes the difference between a click and a chord. When many partials start in phase, the attack is a sharp click.

To edit the start phase of a partial:

1. Click the **PHASE** button (the icon button next to the **VALUES** / **FORMULA** buttons). The plot shows a strip under the bars, labelled **PH**.
2. In the strip, drag the mark of a partial up or down. The bottom of the strip is 0. The top is one full turn.

Header controls

Control	What it does	Range
VALUES / **FORMULA**	Selects how the partials are set: as values that you place on the plot, or by formulas. Refer to Formula mode.	-
PHASE	Shows or hides the start-phase strip under the bars.	On / off
?	Shows the mouse actions for the plot.	-
SUSTAIN	When on, the partials stop decaying while the note is held and keep their level. At note-off they ring down from that level. When off, the hit is a one-shot for every note length.	On / off
Pitch	Transposes all partials together. The ratios between them stay the same. Double-click sets 0.	`-24` to `+24` `st`
Gain	The output level of the Partials layer. Double-click sets `0 dB`. Right-click and select **Normalize to 0 dB** to set the gain that brings the peak to 0 dB.	`-24` to `+24` `dB`
Spread	Detunes each partial by its own fixed amount, up to plus or minus this value. The detune is the same on every hit. Double-click sets 0.	`0` to `100` `ct`

Control	What it does	Range
Freq jit	On each hit, detunes each partial by a new random amount, up to plus or minus this value.	`0` to `50 ct`
Decay jit	On each hit, makes the decay of each partial longer or shorter by a new random amount, up to this value.	`0` to `100 %`
Phase jit	On each hit, moves the start phase of each partial by a new random amount, up to plus or minus this value.	`0` to `180 deg`
FRAME	Selects the frame that the plot shows and edits, and the frame that plays. Refer to Frames.	1 to 8 frames

Use **Freq jit**, **Decay jit** and **Phase jit** to make repeated hits sound different from each other. At 0, every hit is identical.

Pitch, **Gain**, **Spread**, **Freq jit**, **Decay jit** and **Phase jit** accept modulation. Refer to Macros and modulation.

Formula mode

In formula mode, four formulas set the partials. Each formula uses `n`, the number of the partial (1 for the first).

Formula	Sets	Unit
freq(n)	The frequency of partial `n`.	Hz
amp(n)	The level of partial `n`.	dB
decay(n)	The decay of partial `n`, the time to fall by 60 dB.	ms
phase(n)	The start phase of partial `n`.	turns (0 to 1)

When you click **FORMULA**, the formulas start from the partials as they are now. When you click **VALUES**, the formulas change into values with the same sound.

The formula strip also has these controls:

- **partials**: the number of partials, 1 to 1024.
- Four knobs with names. A formula reads a knob by its name. The default names are `stretch`, `bright`, `damp` and `jitter`.

- **Templates**: a list of starting formulas. A template sets one formula and the knobs that it uses.
- **?**: shows the variables and functions that the formulas can use.

The four named knobs accept modulation. For the formula language, refer to Formulas.

Frames

Use frames for a hit in parts, for example stick, body and tail, or for a hit that gets darker over time. A frame is a level for each partial. The frequencies and the start phases stay the same in all frames.

Each frame starts when the frame before it ends. A partial starts with the first frame that it plays in. With one frame, the partials play at their own levels.

The **FRAME** box shows the frame that the bars show, for example **FRAME 2 / 3**.

Action	Result
Click **<** or **>**	Shows the previous or next frame.
Click **+**	Adds a copy of the current frame after it. The sound does not change until you edit the new frame.
Drag the box	Moves through the frames.
Right-click the box	Opens a menu: **Delete frame**, **Move left** and **Move right**.

When there are 2 or more frames, the bars show the levels of the current frame.

Action on a bar, with frames	Result
Drag	Sets the level of that partial in the current frame.
Drag to the bottom	Removes that partial from the current frame. The bar shows as a short stub.
Double-click	Puts that partial into the current frame, or removes it from that frame. A partial that is in no frame is deleted.
Double-click an empty area	Adds a partial to the current frame only.

When there are 2 or more frames, three knobs show in the header. They set the frame in the **FRAME** box.

Knob	What it sets
Length	The time that the frame plays before the next frame starts. On the last frame, it is the time of the ring.
Rise	The time that new partials in this frame take to come in. The first frame has no rise.
Fade	The time that the frame takes to change to the levels of the next frame, at its end. The last frame has no fade.

Dotted lines on the **AMP ENVELOPE** show where the frames join.

Pitch changes the speed of the frames. For example, +12 st plays each frame in half the time. The frames stay joined at all values of **Pitch**, so there are no silent gaps.

TIME and **LEN** change the decays. They do not move the joins, and only the last frame gets longer or shorter. When **Pitch** is above 0, the last frame keeps its length. When **Pitch** is below 0, the last frame gets longer with the other frames.

The frames always play to the end. **SUSTAIN** stops the decays while you hold the note, and the last frame rings until you release the note. A note-off does not move the frames. For a loop, use a loop on the **AMP ENVELOPE**.

For frames on the Osc, refer to Curves: frames.

The AMP ENVELOPE

The **AMP ENVELOPE** is one gain envelope over all the partials. It is applied on top of the decay of each partial. By default the envelope is flat at 0 dB: the partials ring with their own decays.

The **TIME** row under the envelope sets the hit:

- The left thumb sets the delay of the layer.
- The right thumb sets the length of the hit. On the Partials layer, a change of length also makes all decays longer or shorter, by `x0.25` to `x4`.

SYNC, **LENGTH**, **REL**, **LEN** and ↦| **1-SHOT** work as on all sources. Refer to Curves.

Reinforce with an Osc

The reinforce menu adds a new Osc layer that plays with the Partials layer. The Osc stays in phase with the partials, so it adds to them and does not cancel them. The new layer is linked to free macros for its level, its drive and the pitch of both layers.

Right-click the plot and select one of these items:

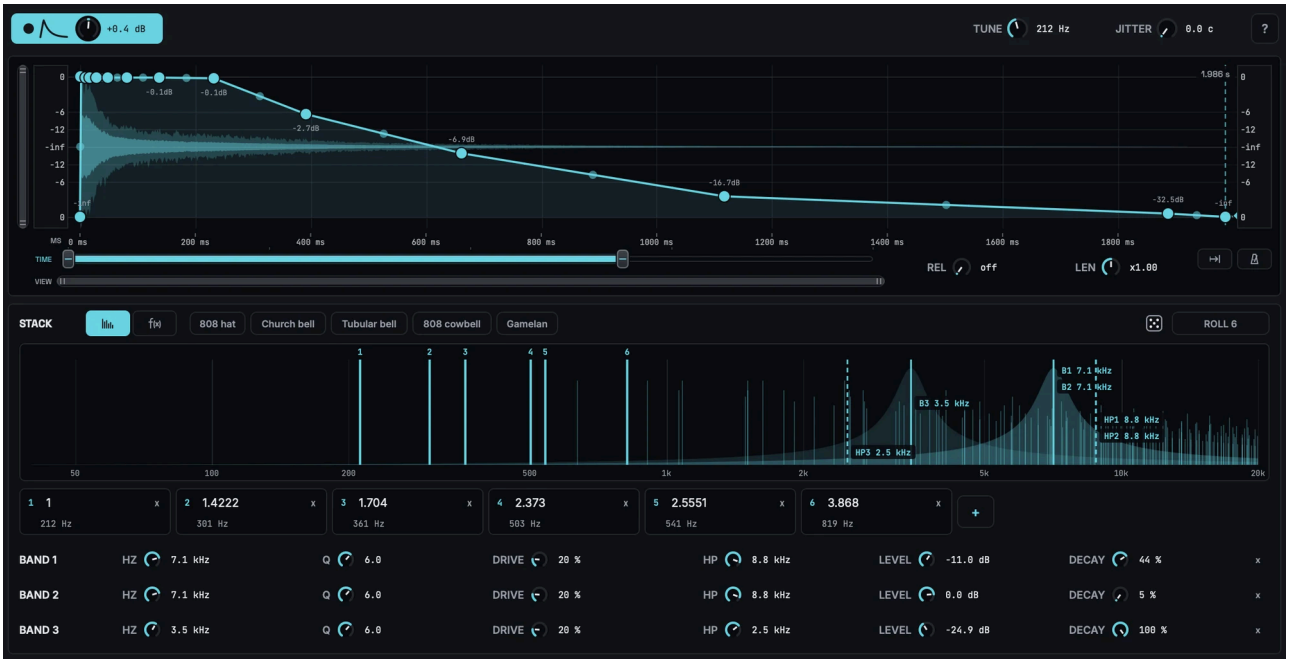
Menu item	Adds
Reinforce this partial with Osc (phase-locked)	A sine at the frequency and phase of the partial under the pointer.
Reinforce the body glide with a sweep (phase-locked)	An Osc with a pitch sweep that follows the low partials (under 300 Hz).
Sub an octave below this partial	A sine one octave below the partial under the pointer.
Sub an octave below the body glide	The same sweep, one octave lower.

The first and the third items are available only when the pointer is on a bar. For the Osc source, refer to Osc.

Metal

The Metal source makes metallic hits from a stack of square-wave oscillators. It follows the cymbal and hat circuit of the TR-808. The frequencies of the oscillators are not multiples of one frequency, so the stack sounds metallic, not like a chord.

Use Metal for hats, cymbals, cowbells and bells.



How it works

The sound goes through these stages:

1. The stack: up to 8 square-wave oscillators. Each oscillator plays at its ratio times **TUNE**.
2. The bands: 1 to 3 bands. Each band takes the stack through its own chain:
3. A band-pass filter selects a frequency range of the stack.
4. A switch, driven by the AMP envelope, turns the band on and off. Its **DRIVE** sets how hard it switches. A hard switch adds many high harmonics: this makes the dense, ringing metal sound.
5. A high-pass filter keeps the top of the switched sound.
6. The band level sets the band in the mix.
7. The **AMP** offset sets the level of the whole hit.

The ratio set gives the instrument its character. The same bands with different ratios can make a hat, a bell or a cowbell. The bands set the tone.

The page

The Metal page has three sections, from top to bottom:

- The top row: the **AMP** chip, **TUNE**, **JITTER**, **ROUND ROBIN** and **?**.
- The AMP envelope over the hit, with the **TIME** and **VIEW** rows.
- The **STACK** box: the ratio sets, the stack plot, the ratio cells and the bands.

Top row

Control	What it does	Range
AMP	The AMP envelope chip. Its knob boosts or cuts the whole hit, after the drive. Double-click the knob to set 0.	`-12` to `+12 dB`
TUNE	The root frequency of the stack. Each oscillator plays at its ratio times **TUNE**. The 808 is at `205.3 Hz`.	`40` to `2000 Hz`
JITTER	Moves each period of each oscillator off by a small random amount. This makes the tones shimmer. At 0, the oscillators are steady. Every hit uses the same random periods, unless **ROUND ROBIN** is above 0.	`0` to `50 c` (cents)
ROUND ROBIN	Makes each hit different. Each hit gets new start phases and new **JITTER** periods. It also gets small changes to each oscillator (up to 25 c), the bands (up to 2 st), the length (up to about 19 %) and the level (up to 2 dB). The first hit plays exactly as you set it. At 0, all hits are the same.	`0` to `1`
?	Shows the mouse actions for the curve and the stack plot.	-

AMP, **TUNE**, **JITTER** and **ROUND ROBIN** accept modulation. Refer to Macros and modulation.

The AMP envelope

The AMP envelope is the level of the hit over time. Each band plays the envelope over its own share of the hit (refer to **DECAY** in Band controls). The envelope covers the band with the longest share.

The right thumb of the **TIME** row sets the length of the hit. The left thumb sets the delay of the layer. For how to edit the curve and the **TIME** row, refer to Curves.

The STACK box

Ratio sets

The buttons in the **STACK** header load a ratio set. A ratio set changes only the ratios and the number of oscillators. **TUNE**, the bands, the drive and the envelope do not change. The button of the set that the stack plays now is lit.

Ratio set	Oscillators	Description
808 hat	6	The six oscillators of the TR-808 (205.3 / 304.4 / 369.6 / 522.7 / 540 / 800 Hz).
Church bell	8	Hum, prime, tierce, quint, nominal. The tierce at 1.2 is a minor third.
Tubular bell	4	The modes of a free bar: wide and stretched.
808 cowbell	2	Two squares at 1 : 1.48. Set **TUNE** to `540 Hz` for the 808 cowbell (540 / 800 Hz).
Gamelan	5	Inharmonic modes, similar to a bonang.

Other header controls

Control	What it does
VALUES / **FORMULA**	Selects how the ratios are set: as values, or by a formula. Refer to Formula mode.
Dice button	Rolls new start phases for the oscillators. The ratios stay the same; the shimmer changes.
IN PHASE / **ROLL** *n*	Shows the start phases. **IN PHASE**: all oscillators start together. **ROLL** *n*: the phases come from a roll. Click it to go back to **IN PHASE**.

The stack plot

The plot shows the stack on a log-frequency axis, from 40 Hz to 20 kHz.

- A bright vertical line is the fundamental of an oscillator. Its number is at the top.
- The faint lines above each fundamental are its odd harmonics.

- A filled shape is the band-pass of a band. Its centre line is labelled **B1**, **B2** or **B3**, with its frequency.
- A dashed line is the high-pass of a band, labelled **HP1**, **HP2** or **HP3**.

Action	Result
Drag a fundamental left or right	Changes the ratio of that oscillator.
Drag a **B** line	Moves the band-pass centre of that band.
Drag an **HP** line	Moves the high-pass of that band.
Hold `⇧ Shift` while you drag	Makes fine changes.
Double-click a **B** or **HP** line	Resets it to its default (`7.1 kHz` for **B**, `7 kHz` for **HP**).

Ratio cells

Under the plot, one cell shows each oscillator: its number, its ratio and the frequency it plays.

- Click the ratio to type a new one. A number or a fraction is correct, for example `1.5` or `6/5`. The range is `0.05` to `32`.
- Click **x** to remove the oscillator. One oscillator always stays.
- Click **+** after the last cell to add an oscillator. The stack has up to 8.

If you remove an oscillator and then click **+**, the removed ratio comes back.

Bands

Each band has one row, **BAND 1** to **BAND 3**.

- Click **+ BAND** to add a band. The new band is a copy of the last band, one octave lower. The 808 cymbal uses 3 bands. The 808 hats use 1.
- Click **x** at the end of a row to remove that band. One band always stays.

Band controls

Control	What it does	Range
HZ	The centre of the band-pass: the frequency range of the stack that this band uses. The 808 cymbal uses `7.1 kHz` and `3.45 kHz`.	`200 Hz` to `18 kHz`

Control	What it does	Range
Q	How narrow the band-pass is. The 808 uses about 6.	`0.5` to `20`
DRIVE	How hard the band switches. At `0 %` the band is clean. Higher values make the dense, ringing metal sound.	`0` to `100 %`
HP	The high-pass after the switch. It keeps the top of the switched sound.	`20 Hz` to `16 kHz`
LEVEL	The level of the band in the mix.	`-48` to `+12 dB`
DECAY	The share of the hit that this band uses. The AMP envelope plays over this part of the hit. The 808 cymbal has a short high band and a long low band.	`5` to `100 %`

All band controls accept modulation.

Formula mode

In formula mode, one formula, **ratio(n)**, sets the ratio of each oscillator. `n` is the number of the oscillator (1 for the first). The result is a ratio to **TUNE**.

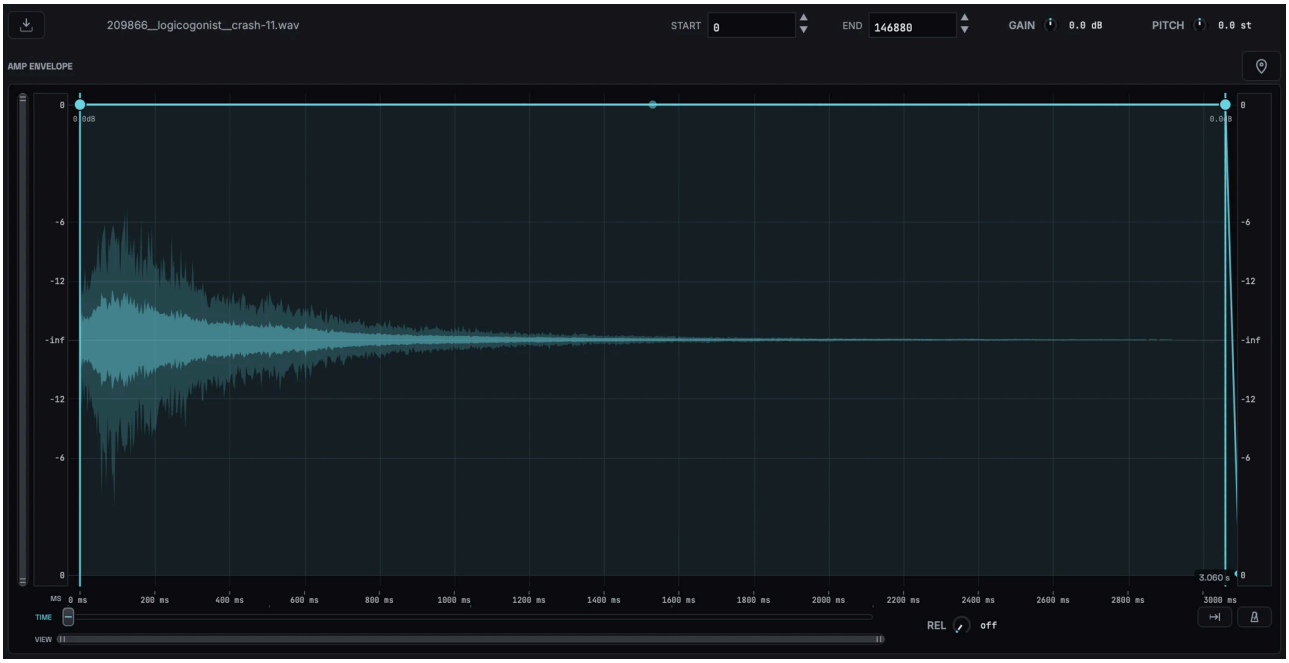
When you click f(x) **FORMULA**, the formula starts from the ratios as they are now. If you drag a fundamental or type a ratio, the formula changes into values first.

The formula strip has two knobs with names, a **Templates** list and a **?** button. The **?** button shows the variables and functions. The two knobs accept modulation. For the formula language, refer to Formulas.

Sampler

The Sampler plays a recorded sound. Use it for hits that you want to keep as recorded: cymbals, crashes, a found sound, a break. You can also cut a break into slices, make each slice a zone of the kit, or send one slice to Resynthesize.

The Sampler plays the sample from **START** to **END**. This part of the sample is the hit. **PITCH** changes the playback speed, so it also changes the length of the hit.



Load a sample

You must have an audio file in one of these formats: WAV, AIFF, FLAC, OGG or MP3.

1. Click the **LOAD** button (the import icon at the top left of the panel).
2. Select the file and click **Open**.

   The name of the sample shows in the top row. **START** is at the start of the sample and **END** is at its end.

When you load a file, Rhythmica copies the audio into the kit. After this, the kit does not need the original file. A stereo file becomes mono (the two channels are mixed). Rhythmica keeps the first 10 seconds of a file that is longer.

If the sample is not found when a kit opens, the top row shows the sample name with **(missing)**.

The top row

Control	What it does	Range / unit
LOAD	Opens a file to import a one-shot sample.	-
TO ZONES	Makes each slice a zone of the kit, and puts its hit in the pattern. Opens a menu: **Slices to zones**, **Slices to zones, with the groove**, or **Resynthesize all slices...**. Shows in both views. See Make slices into zones.	-
Play / **Stop**	Plays the sample from **START** to **END**, at the **GAIN** and **PITCH** of the Sampler. Click again to stop. Shows in both views.	-
Loop	When it is on, **Play** plays again from **START** until you click **Stop**. A slice that you play from the slice row also plays again. If you set it to off while the sample plays, the sample plays to **END** and stops.	-
Resynthesize	Opens the sample from **START** to **END** on the Resynthesize page, as if you chose its file there. The audio goes as recorded, without **GAIN** or **PITCH**. Select the method and options on that page. In this zone, the result goes after the Sampler layer as a group, and the Sampler layer is muted. If the sample has more than one slice, each slice becomes its own zone.	-
Sample name	The name of the loaded sample, or "No sample loaded".	-
START	The sample frame where the hit starts. Type a number, then push Enter ⏎ or click away. Push ⎋ Esc to cancel.	0 to **END**, in sample frames
END	The sample frame where the hit ends.	**START** to the last frame, in sample frames
Up / down arrows	Move **START** or **END** by one sample frame for each click. Hold the arrow to repeat.	1 frame
GAIN	The level of the sample. Double-click to set 0 dB.	-24 dB to +24 dB
PITCH	Transposes the sample. A higher pitch plays the sample faster, so the hit is shorter. Double-click to set 0.	-24 st to +24 st

Control	What it does	Range / unit
ROUND ROBIN	Makes each hit different. About half of the hits start up to 5 ms after **START**, which softens the attack. Each hit also gets small changes to the pitch (up to 50 c) and the level (up to 2 dB). The first hit plays exactly as you set it. At 0, all hits are the same.	0 to 1

START cannot go past **END**, and **END** cannot go before **START**.

A change to **START**, **END** or **PITCH** applies from the next hit. A change to **GAIN** applies immediately, also to a hit that plays.

The AMP ENVELOPE view

The **AMP ENVELOPE** view shows the whole sample with two markers, **START** and **END**. The area outside the markers is shaded. The amp curve covers the part between the markers.

- Drag the **START** or **END** marker to move it. A marker always stops on a sample frame.
- Edit the curve to shape the level of the hit. When you have not edited it, the curve is flat at 0 dB: the sample plays as recorded. For how to edit a curve, see Curves.

The **TIME** bar under the curve shows the length of the hit. It does not set it: **START**, **END** and **PITCH** set the length. A **RELEASE** on the amp curve can stop the hit before **END**.

To zoom both views to the part between **START** and **END**, click **ZOOM TO START - END** at the right of the header.

The SAMPLE view

Use the **SAMPLE** view to see the whole recording, to set **START** and **END**, and to cut the recording into slices.

To open it, click the view button at the right of the **AMP ENVELOPE** header. To go back, click the same button again. The editor remembers the last view that you used.

The **SAMPLE** view has four parts, from top to bottom:

Part	What it shows
Slice row	The name or number of each slice.
Waveform	The sample, scaled to fill the height.

Part	What it shows
Spectrogram	The frequencies of the sample over time, from 30 Hz (bottom) to 20 kHz (top). Each attack shows as a sharp vertical edge. The colours go from dark (90 dB below the loudest point) to bright (the loudest point).
Zoom bar	The visible part of the sample. Drag it to zoom and scroll. Double-click it to show the whole sample.

START and **END** show as lines in the colour of the layer. The part of the sample after **END** is shaded. Slice markers show as white lines.

Gestures in the SAMPLE view

Gesture	Result
Click the waveform or the spectrogram	Adds a slice marker at that point. You cannot add a marker after **END**.
Drag a slice marker	Moves it. It stays between its two neighbours, and before **END**.
Double-click a slice marker	Removes it.
Drag **START** or **END**	Moves it. If a slice marker is on the same point, drag the **START** or **END** label to move it. Drag lower to move the slice marker.
Click **START**	Adds a slice marker on **START**.
Drag an empty area	Scrolls the view.
Mouse wheel	Zooms in or out at the pointer.
Sideways scroll	Scrolls the view.
Click a slice in the slice row	Plays that slice.
Right-click	Opens the menu of the slice under the pointer.

All positions stop on a sample frame.

The **SAMPLE** view shows the amp curve as a dim line over the hit. The **AMP ENVELOPE** view shows the slice markers as dotted lines. The lines are for reference only. Edit each one in its own view.

Slices

A slice starts at its marker and continues to the next marker. The last slice continues to the end of the sample. The part before the first marker is not a slice, and it is shaded.

Slices are not the same as **START** and **END**. **START** and **END** set what this layer plays. Slices set the hits that **TO ZONES** and **Resynthesize...** use.

When you play a slice from the slice row, you hear it at the **GAIN** and **PITCH** of the Sampler, without the amp curve.

A slice without a name shows its number. When it becomes a zone, a slice without a name gets the name of the preset (or of the sample) and its number.

The slice menu

Right-click the **SAMPLE** view to open the menu.

Menu item	What it does
Play	Plays the slice.
Rename...	Opens a text box on the slice row. Type the name, then push `Enter ⏎`. Push `⎋ Esc` to cancel.
Role	Sets what the slice is: **Kick**, **Snare**, **Hat** and so on. The slice row shows the icon of the role. When the slice becomes a zone, the zone gets the role as its category. **Uncategorised** removes the role.
Remove its marker	Removes the marker where the slice starts.
Resynthesize...	Opens the slice on the Resynthesize page. The slice goes as recorded, without **GAIN** or **PITCH**.
All slices to zones	Opens **Slices to zones** and **Slices to zones, with the groove**, as **TO ZONES** does.
Resynthesize all slices...	Opens the sample on the Resynthesize page, with its slice markers. Each slice becomes its own zone. If the last method was **Kick** or **Snare**, the page selects **Stick / body / tail**.
Clear slices	Removes all the slice markers.

Menu item	What it does
Detect slices	Adds a slice marker at each hit between **START** and **END**. The markers that are already there stay. Use it to place the markers, then move or remove them.

The first five items show only when the pointer is on a slice.

Make slices into zones

Use this procedure to play a break from its hits. You must have a sample with one or more slice markers.

1. Open the **SAMPLE** view.
2. Set **START** on the first hit of the loop and **END** at the end of its last bar.
3. Set **TEMPO** near the tempo of the loop, and the grid of the pattern you edit to the grid of the loop (**STRAIGHT** or **TRIPLET**).
4. Click the waveform at the start of each hit to add a marker. To start from markers on the hits, right-click and select **Detect slices**.
5. Click **TO ZONES**, then select one of these items:
   - **Slices to zones**: the steps only.
   - **Slices to zones, with the groove**: the steps, and the groove of the loop: the timing and the level of each hit.

   Each slice becomes a new zone at the end of the kit's list. Each new zone has this sound, with **START** and **END** on the slice. The last slice ends at the **END** of the sample.

   In the pattern that you edit, the row of each new zone has one step on: the step nearest to the hit of its slice. **TEMPO** changes to the tempo of the loop.

   Each step has the default velocity. The slice keeps the level it has in the recording.

   With the groove, **BEND** comes on with the groove of the markers: the distance of each hit from the straight grid. The result is the same as **GROOVES** > **From a recording...** on the Sequencer, but with your markers as the hits. The levels of the hits go into the groove dynamics: each role of the slices gets a row with the mean level of its hits at each step, the loudest step at 100 %. The slices with no role fill the **All** row. The dynamics change nothing until you add a **Groove** route.

Rhythmica reads the loop between **START** and **END** as whole bars. A slice that starts before **START** or after **END** becomes a zone with no step on.

A kit holds 64 zones. If there are not sufficient free zones, Rhythmica makes as many zones as it can and shows "The kit is full".

The slice markers are saved with the kit. You can undo when you add, remove, rename or clear markers. One undo removes the zones, the steps, the tempo and the groove that **TO ZONES** made.

Particles

Particles makes the sound of many small objects that hit each other: the beads in a shaker, the jingles of a tambourine, the hands of a clap. Use it for shakers, maracas, cabasas, tambourines, claps and the sizzle of an open hat.

Each hit is a series of collisions. Each collision rings a resonator, which sets what the objects are made of. The model is PhISEM (Physically Informed Stochastic Event Modeling), from the work of Perry Cook. See References. The panel has three parts:

- The timeline: **when** the collisions occur (**BURSTS**, **SHAKE**, and the **STRIKE** batch).
- **MATERIAL**: **what** the collisions hit.
- **AMP**: the loudness of the hit over time.

The collisions and the loudness are two different things. The timeline sets how long the objects collide. **AMP** sets how loud the hit is. The two share one time axis, so you can compare them.

The pill at the top of the panel names the type of hit, for example "struck + shaken / like a tambourine". If all the collision types are off, it shows "silent - turn on a lane".



Collision types

A hit can use one, two or all three collision types.

Type	What it is	Good for
STRIKE	A batch of hits that all land at the start of the hit.	A struck tambourine.
BURSTS	Hits that you put at a time by hand.	The slaps of a clap.
SHAKE	A random stream of collisions that swells and then dies away.	A shaker, a maraca.

The timeline

The timeline has two lanes, **BURSTS** and **SHAKE**. Each lane has an on/off switch at its left. The label column shows how many hits the lane makes. The ruler at the top shows **TIME ms**.

The ticks in the timeline are the real collisions of the hit, as it plays. The same settings always give the same collisions.

BURSTS

Gesture	Result
Double-click the lane	Adds a burst at that time. A hit has a maximum of 8 bursts.
Drag a burst sideways	Moves it in time, from 0 ms to 2000 ms.
Drag a burst up or down, out of the lane	Removes it when you release the mouse.

SHAKE

The **SHAKE** lane shows the collision rate as a curve. It has two handles:

Handle	Gesture	What it sets	Range
Diamond (**Swell** / **Density**)	Drag sideways	**Swell**: how long the collisions take to build. A shaker swells. A tambourine does not.	0 ms to 500 ms

Handle	Gesture	What it sets	Range
	Drag up or down	**Density**: how many objects collide.	1 to 3000
Circle (**WINDOW**)	Drag sideways	How long the objects continue to collide. This is not the loudness: **AMP** sets the loudness.	1 ms to 2000 ms

A dashed line shows the **WINDOW** on the timeline and on the **AMP** strip.

Zoom, scroll and audition

Gesture	Result
Drag the ruler up or down	Zooms in (up) or out (down) at the pointer. Hold `⇧ Shift` to zoom faster. Hold `⎇ Alt` to zoom slower.
Drag the ruler sideways	Scrolls the view.
Double-click the ruler	Fits the view to the hit.
Drag an empty area of the timeline	Scrolls the view.
Click and hold an empty area of the timeline	Plays the hit while you hold the mouse button.
Zoom bar under the **AMP** strip	Zooms and scrolls the timeline and the **AMP** curve together. Double-click it to fit the view to the hit.

AMP

The **AMP** strip is the amp curve of the layer, on the same time axis as the timeline. Before you edit it, the label column shows the attack (**A**) and the decay (**D**) that the layer plays. The curve shows the same shape. When you edit the curve, the label column shows "curve" and the length of the hit. For how to edit a curve, see Curves.

MATERIAL

MATERIAL sets what the collisions hit.

The plot shows the resonator as a peak over frequency (100 Hz to 20 kHz). The grey area is the **Body**.

Gesture on the plot	Result	Range
Drag sideways	Sets the frequency of the resonator.	100 Hz to 20 kHz
Drag up or down, or mouse wheel	Sets the Q of the resonator. A high Q rings like metal. A low Q sounds like wood or skin.	Q 0.2 to 80

The plot shows the frequency and the Q at its top left.

Material buttons

Each button sets the resonator to a start point. After you click one, you can change all the values. A button is lit when the sound uses its values.

Button	Frequency	Q	Jingle pairs	Body
Gourd	5200 Hz	14	Off	Not changed
Seeds	6200 Hz	6	Off	Not changed
Metal jingle	9200 Hz	45	On	Not changed
Hands	1800 Hz	0.7	Off	0
Skin	3200 Hz	3	Off	0.6

Jingle pairs

Control	What it does	Range
Jingle pairs	When on, each collision rings two discs a short time apart and slightly detuned. This is a large part of the difference between a tambourine and a bright shaker.	On / off
Detune	How far apart the two discs of a pair are in pitch. You hear this as beating. Available only when **Jingle pairs** is on.	0 % to 20 %

STRIKE

Control	What it does	Range
On/off switch	Turns on the batch of hits at the start of the hit. When you turn it on again, it uses the last number of hits.	On / off
Hits	How many hits land in the batch.	1 to 64
Spread	How close together the hits of the batch land. A smaller spread sounds harder. For a wider spread (a flam), put the hits in **BURSTS**.	0 ms to 20 ms

Density, Body and Width

Control	What it does	Range
Density	How many objects collide in the **SHAKE** lane. This is the same value as the height of the **SHAKE** curve.	0 to 3000
Body	The level of the low wood or skin sound under the jingles. It shows as the grey area in **MATERIAL**.	0 to 1
Width	Puts each collision and each burst at its own position in the stereo field. At 0 the sound is mono. The **Body** stays in the centre.	mono to 100 %

PERFORMANCE

Control	What it does	Range
Round robin	Makes each hit different. Each hit gets new collisions and small changes to pitch, window and level. Every second hit is a back-stroke. At 0, all hits are the same.	0 to 1
VARIANT (dice button)	Selects a different random pattern of collisions for the same settings. The number under the button shows the pattern.	#0 to #65535

+ ADVANCED

Click **+ ADVANCED** to show two more controls. Click **- ADVANCED** to hide them.

Control	What it does	Range
Reservoir	How slowly the collision energy follows the swell. A longer time makes the **SHAKE** curve smoother.	1 ms to 500 ms
Disc spacing	The time between the two hits of a jingle pair.	0 ms to 5 ms

Factory presets

The **Particles** folder of the factory presets has a start point for each type of hit: **Cabasa**, **Clap**, **Maraca**, **Shaker** and **Tambourine**.

References

- Perry R. Cook. "Physically Informed Sonic Modeling (PhISM): Synthesis of Percussive Sounds". *Computer Music Journal* 21(3), 1997.
- Perry R. Cook. "Physically Informed Sonic Modeling (PhISM): Percussive Synthesis". *Proceedings of the International Computer Music Conference*, Hong Kong, 1996.
- Perry R. Cook. *Real Sound Synthesis for Interactive Applications*. A K Peters, 2002.

Struck

Struck makes the sound of an object that is hit: a stick on a wood block, a mallet on a bar, a hand on a drum head, a bell. Use it for wood blocks, bells, bars, plates, the shell of a snare, and hats.

Struck is a PhISM model (Physically Informed Sonic Modeling), from the work of Perry Cook. See References. Struck has two parts:

- The **exciter**: the thing that hits (a stick, a mallet, a burst of noise).
- Up to three **bodies**: the things that ring. Each body is a set of modes. A **mode** is one frequency at which the body rings, with its own level and decay.

The modes ring only because the exciter hits them. A soft exciter does not reach the high modes, so the same body hit softer sounds darker.

The pill at the top of the panel shows what the layer is, for example "impulse → 2 bodies, 24 modes".



Make an instrument from a recording

To make a Struck layer from a recorded hit, use the Resynthesize page:

1. Click **Resynthesize** in the header.
2. Drop the sample on the page.
3. Select the **Ringing hit** method.
4. Set **As Struck** to on.
5. Click **Resynthesize**.

The ring of the recording becomes the modes of the bodies. With the **Exciter** option set to **Recorded**, the attack of the sample becomes the exciter. Refer to Ringing hit.

EXCITER

Select the exciter type with the four buttons at the top of **EXCITER**.

Exciter	What it is	Good for
Impulse	One strike: a pulse. **Hardness** sets its width.	A clean hit on a bar or a block.
Noise	A shaped burst of noise. **Burst** sets its length.	Brushes, hats, sounds that continue to push.
Impact	The attack of a real striker: a generated stick, mallet, finger or rim, or a recorded attack that you load.	A realistic stick or hand.
Particles	A stream of collisions, as in the Particles source.	Beads, snare wires, the contents of a shaker.

Controls for all exciters

Control	What it does	Range
Hardness	The material of the striker. Harder makes a shorter, brighter hit that reaches higher modes.	0 % to 100 %
Level	How hard the exciter hits. It goes into every body and into the dry sound. Double-click to set 0 dB.	-24 dB to +12 dB
Dry	The level of the exciter itself in the output: the click of the hit.	0 % to 100 %

Noise

Control	What it does	Range
Burst	How long the noise pushes the bodies. The **BURST** envelope sets its shape.	0.5 ms to 2000 ms

Impact

Select the striker with the buttons under the exciter types.

Button	What it does
Stick, **Mallet**, **Finger**, **Rim**	A generated striker. A higher **Hardness** plays it faster and brighter.
Sample	Strikes with a recorded attack that you load.

To load a recorded attack:

1. Click **Load...**.
2. Select an audio file and click **Open**.

   The name of the file shows next to **Load...**. Rhythmica keeps the first 0.5 s of the file. The exciter changes to **Impact** with **Sample**.

Particles

Control	What it does	Range
Density	How many particles collide during the shake.	0 to 3000
Strikes	How many particles all hit at the start of the hit, as the jingles of a struck tambourine.	0 to 64
Window	How long the shake continues to collide.	1 ms to 2000 ms
Swell	How long the shake takes to build. A shaken gesture swells. A struck gesture does not.	0 ms to 500 ms

MODES

The **MODES** plot shows the modes of all the bodies, by frequency (20 Hz to 20 kHz) and level (-60 dB to +12 dB). The selected body is in front. The other bodies are dim. A body that is off is very dim.

Each mode is a bar:

- The outline of the bar is the level of the mode.

- The filled part is the level that the exciter gives the mode. With a soft exciter, the high modes stay hollow.
- The width of the cap at the top of the bar shows the decay. A wider cap rings longer.

The dashed line marked **STICK** is the spectrum of the exciter.

When you put the pointer on a mode of the selected body, the plot shows its body, its number, its frequency, its ratio to the body pitch, its level and its decay.

Edit the modes

You edit the modes of the selected body. To select a body, click its strip in **BODIES**.

Gesture	Result
Drag a bar	Sets the frequency (sideways) and the level (up or down) of the mode.
Mouse wheel on a bar	Sets the decay of the mode.
Click an empty area	Adds a mode there. Continue to drag to put it in position. The new mode decays as long as the middle mode of the body.
Right-click or double-click a bar	Removes the mode.

A body has a maximum of 32 modes.

Controls in the MODES header

Control	What it does
SHAPES	Fills the selected body with the modes of a known object. The body keeps its pitch and switches on. You can change all the values after.
VALUES / FORMULA toggle	VALUES: the modes as you put them on the plot. FORMULA: the ratio, level and decay of each mode come from formulas. See Formulas.
8, **16**, **32** (modes / body)	How many modes of each body ring. The modes past this number show faint on the plot and do not ring.

SHAPES

Shape	Description on the screen
Wood bar	free-free beam: the woodblock / claves series
Marimba	a bar tuned 1 : 4 : 10
Xylophone	a bar tuned 1 : 3 : 6
Glockenspiel	a metal bar: long, bright, inharmonic
Chime	a free-free tube
Membrane	an ideal circular drum head (Bessel zeros)
Timpani	an air-loaded head: nearly harmonic
Tabla	a loaded head tuned harmonic
Bell	church-bell partials: hum, prime, tierce, quint, nominal
Plate	a square plate: dense, clangy
Hollow block	a slotted wood block: a strong low mode, a quick cluster
Harmonic	a string's series: pitched, not percussive

Formulas

When the toggle is on FORMULA, a strip with three formulas shows over the plot:

- **ratio(n)**: the frequency of mode n, as a ratio to the body pitch.
- **gain(n)**: the level of mode n.
- **decay(n)**: the decay of mode n.

The **modes** knob sets how many modes the body has (1 to 32). Two more knobs are values that the formulas can read. The formulas start from the modes as they are. When you drag, scroll or click on the plot, the body changes back to VALUES with the modes that the formulas made. For the formula language, see Formulas.

PHYSICAL

The **PHYSICAL** knobs change every body at the same time. At 0, the bodies ring as drawn. Double-click a knob to set it to 0.

Control	What it does	Range
Pitch	Transposes every body.	-24 st to +24 st
Size	A bigger size rings lower and longer. A smaller size rings higher and shorter.	-100 % to +100 %
Material	wood: the high modes stop quickly. metal: the high modes ring as long as the low modes.	wood 100 to metal 100
Inharm	Inharmonicity. Positive values move the modes apart (more like a bell or a cymbal). Negative values move them closer together.	-100 % to +100 %
Damping	The decay of every mode. Positive is shorter, as a hand on the object. Negative is longer.	-100 % to +100 %
Position	Strike position. centre: the even modes cancel and the top is darker. edge: the lowest mode is weaker and the top is brighter.	edge 100 to centre 100

VARIATION

VARIATION makes each hit different from the last. The same notes always play the same hits.

Control	What it does	Range
Variation	How much each hit changes: the pitch, level and decay of each mode (the upper modes most), and the exciter.	0 % to 100 %
Pitch	How much of the variation moves the pitch of the modes.	0 % to 100 %
Decay	How much of the variation moves the decay of the modes.	0 % to 100 %
Level	How much of the variation moves the level of the modes.	0 % to 100 %

Control	What it does	Range
Exciter	How much of the variation moves the exciter: its level and hardness. With the **Particles** exciter, it also gives new collisions.	0 % to 100 %

The four lower knobs are dim when **Variation** is at 0 %.

BODIES

Each of the three bodies has a strip with the name **BODY 1**, **BODY 2** or **BODY 3** and its number of modes. Click a strip to select that body.

Control	What it does	Range
on	Switches the body on or off. A body that is off keeps its modes. A body that you switch on with no modes starts with the default modes.	On / off
Pitch	The base frequency of the body. The ratio of each mode is relative to it.	20 Hz to 12 kHz
Amount	How hard the exciter drives this body.	0 % to 100 %
Velocity	How much more this body follows velocity than the layer does. At 100 %, the body follows velocity linearly.	0 % to 100 %
Decay	Multiplies the decay of every mode. x1 is the modes as drawn.	x0.05 to x8
Delay	The body gets the exciter this much later, as a drum shell that rings after the head.	0 ms to 50 ms

ENVELOPE

The **ENVELOPE** area has two curves. Select one with the buttons in its header. For how to edit a curve, see Curves.

Curve	What it shapes
AMP	The output over the hit. When you have not edited it, the bodies ring for their natural length.

Curve	What it shapes
BURST	The shape of the noise exciter over its length. Available only with the **Noise** exciter. When you have not edited it, the burst dies away.

With **AMP** selected, the **TIME** bar sets the length of the hit. With **BURST** selected, the **TIME** bar sets the burst length: this is the same value as the **Burst** knob.

Modulation

These knobs take modulation: **Hardness**, **Level**, **Dry** and **Burst** in **EXCITER**; all the **PHYSICAL** knobs; **Variation**; and **Pitch**, **Amount**, **Velocity**, **Decay** and **Delay** in each body strip. The two formula knobs also take modulation. See Macros and modulation.

Factory presets

The **Struck** folder of the factory presets has these start points: **Bell**, **Closed Hat**, **Open Hat**, **Snare Shell** and **Woodblock**.

References

- Perry R. Cook. "Physically Informed Sonic Modeling (PhISM): Synthesis of Percussive Sounds". *Computer Music Journal* 21(3), 1997.
- Perry R. Cook. "Physically Informed Sonic Modeling (PhISM): Percussive Synthesis". *Proceedings of the International Computer Music Conference*, Hong Kong, 1996.
- Perry R. Cook. *Real Sound Synthesis for Interactive Applications*. A K Peters, 2002.

Curves

A curve changes a value over the time of the hit. Use a curve when a static knob is not sufficient: a pitch that falls, a level that decays, a drive that is strong only on the attack. The source pages and some FX pages use the same curve editor. This page describes how it works.

What a curve is

A curve is a line through a set of **points**. The horizontal axis is the time of the hit. The vertical axis is the value that the curve controls.

- A curve has 2 to 16 points.
- The first point is always at the start of the hit. The last point is always at the end of the hit. You can move these two points up and down, but not in time.
- A **segment** is the part of the curve between two adjacent points. Each segment is a straight line, a bent line or a **hard corner**: two straight lines that meet at a sharp point.

Each named curve of a page is an **envelope**. The envelope sets what the vertical axis means:

Envelope	Vertical axis	Page
PITCH	The pitch, from the bottom to the top of the range slider. Equal steps on the axis are equal steps in octaves.	Osc
AMP	The gain, from silence (bottom) to 0 dB (top).	Osc, Noise, Metal, Partials and other sources
DRIVE	A share of the drive amount, from 0 % (bottom) to 100 % (top).	Osc
FILTER	The cutoff frequency of the filter.	Noise
FRAME	The position across the frames, from the first frame (bottom) to the last frame (top). Refer to Frames.	Osc, Partials
CUTOFF, **RESONANCE**	The filter cutoff and resonance.	FX

The envelope area

The envelope area has these parts:

Part	What it shows or does
The plot	The curve, its points and its bend handles. Behind the curve, the waveform of each layer of the zone, in the color of its layer.
The vertical zoom bar	At the left edge. Zooms and moves the vertical axis.
The axis strip	On pages with a pitch or filter axis: the range slider and the labels of the axis.
The dB strips	At the left and right of the plot. The level scale of the waveform: `0`, `-6`, `-12` dBFS and `-inf` at the centre.
The time ruler	Under the plot. The time labels. The label at its left shows **MS** or **BARS**.
TIME	The delay of the layer and the length of the hit. Refer to The TIME row.
VIEW	The horizontal zoom bar. Zooms and moves the time axis.

During a hit, a white line moves across the plot. It shows the time of the hit that plays now.

If the layer has a delay, the plot shades the time before the hit starts. If other layers of the zone play longer than this layer, the plot shades the time after the end of this layer.

Envelope chips

On a page with more than one envelope, each envelope has a chip above the plot. The chip shows a dot, an icon and, on some envelopes, a knob with its value.

Action	Result
Click the chip	Makes this envelope the edited one. The chip fills with the color of the envelope.
Click the dot	Shows or hides the envelope behind the edited one. The edited envelope is always shown.
Turn the knob	Moves the whole envelope: an offset (**PITCH** and **FILTER** in semitones, **AMP** in dB) or an amount (**DRIVE**). The knob works with or without a curve.

Action	Result
Right-click	Opens the menu of the chip, if the page has one. For example, the **AMP** knob of the Osc has **Normalize to 0 dB**.

The envelopes that are shown but not edited are dimmed, dashed curves. Click one of these curves to make it the edited envelope. When curves overlap, each curve has a name tag.

Edit points and segments

Each segment has a **bend handle**: a small dot at the middle of the segment. On a hard corner, the handle is a small square at the sharp point.

Action	Result
Double-click an empty area	Adds a point. The new point is selected.
Drag a point	Moves the point. If more than one point is selected, all the selected points move together.
Double-click a point	Removes the point. You cannot remove the first or the last point.
Drag a bend handle up or down	Bends the segment. The middle of the segment follows the pointer.
Drag a hard-corner handle	Moves the sharp point, in time and in value. It stays between the two points of its segment.
Right-click a bend handle	Changes the segment to a hard corner, or the hard corner back to a bent line. The curve keeps its position at the handle.
Double-click a bend handle	Makes the segment straight. This also removes a hard corner.
Right-click a point	Opens the point menu. Refer to The point menu.
Right-click an empty area	Opens a menu with **Init**, if the curve has a default shape.

A bent segment always stays between the values of its two points. It does not overshoot.

When you move the pointer over a point, the point shows its value and its time. Points with space next to them show a short label all the time.

Select points

Action	Result
Click a point	Selects only this point.
⇧ Shift + click or ⌘ Cmd + click a point	Adds the point to the selection, or removes it.
⇧ Shift + drag or ⌘ Cmd + drag in an empty area	Draws a box. The points in the box are added to the selection.
Click an empty area	Clears the selection.
⌘ Cmd + A	Selects all points.
⎋ Esc	Clears the selection.

When 2 or more points are selected, a box shows around them. The box has a handle at the middle of each edge.

Action on the selection box	Result
Drag the left or right handle	Scales the selected points in time. The opposite edge stays where it is.
Drag the top or bottom handle	Scales the values of the selected points. The opposite edge stays where it is.

The box shows the time handles only if the selection spans time. It shows the value handles only if the selection spans values.

Keys

These keys work after you click the plot.

Key	Result
⌦ Del or ⌫ Backspace	Removes the selected points. The first and last points stay.
S	Makes the segments between the selected points straight. If no two selected points are adjacent, it makes straight every segment that touches a selected point.
⌘ Cmd + C	Copies the selected points.
⌘ Cmd + X	Cuts the selected points.
⌘ Cmd + V	Pastes the copied points. The first pasted point goes to the time of the pointer. The pasted points replace the points under them and become the selection.
L	Gives the loop end point the level of the loop start point. Refer to Sustain and loop.

You can copy points from one curve and paste them into a different curve. A paste does not occur if the result has more than 16 points.

To undo a change, press ⌘ Cmd + Z. To redo it, press ⌘ Cmd + ⇧ Shift + Z or ⌘ Cmd + Y. Undo applies to the whole kit.

Draw a curve

1. Hold ⎇ Alt. The pointer changes to a pencil.
2. Drag across the plot.

The curve follows the pencil. Rhythmica changes the stroke into points and bent segments, with 16 points at most. The stroke replaces the points in the time span that you draw over. The new points become the selection.

If the stroke goes to the left or right edge of the plot, it also sets the first or last point.

To draw a straight line, hold ⎇ Alt + ⇧ Shift and drag. You can also push ⇧ Shift during a stroke: the stroke changes to a straight line from its start.

The point menu

Right-click a point to open this menu. If the point is not selected, the right-click selects it first.

Item	Result
Delete point / **Delete points**	Removes the selected points.
Straighten (S) / **Straighten segments (S)**	The same as the S key.
Hard corner	Changes the segments between the selected points to hard corners. If no two selected points are adjacent, it changes every segment that touches a selected point. A check mark shows when all these segments are hard corners: select the item again to change them back to bent lines.
Zig-zag between selected	Replaces the curve between the first and last selected points with a zig-zag: **4**, **6**, **8** or **12 corners**. The corners are irregular, and each use makes a new zig-zag. The **fading** items make corners that get smaller from start to end. Use the top handle of the selection box to change the depth. You must select 2 or more points.
Sustain here	Makes this point the sustain point.
Loop starts here	Makes this point the start of the loop.
Loop ends here	Makes this point the end of the loop.
Level loop end to start (L)	The same as the L key.
No sustain	Removes the sustain point or the loop.
Init	Puts back the default shape of the curve. It also removes the sustain, the loop and the release.

On a pitch curve, a zig-zag spreads the sweep into extra tones at each side of the pitch.

Zoom and move the view

Action	Result
Scroll on the plot	Zooms the time axis, at the pointer. Scroll up to zoom in.
⌘ Cmd + scroll on the plot	Zooms the vertical axis, at the pointer.

Action	Result
Drag an empty area of the plot	Moves the view.
Drag an end of a zoom bar	Zooms that edge of the view.
Drag the middle of a zoom bar	Moves the view.
Double-click the **VIEW** bar	Shows the whole time axis.

The maximum zoom is approximately 500 times on each axis.

When the length of the hit changes, the view keeps the same time span in ms. To see the whole hit again, double-click the **VIEW** bar.

The time ruler

Click the time ruler to show the time in ms, or in bars and beats. Bars and beats use the tempo of the host. In the standalone application, the tempo is 120 BPM. The first beat of the hit is **1.1**. This setting applies to all curve editors. When **SYNC** is on, the ruler always shows bars.

Sustain and loop

A sustain point or a loop holds the curve while the note is held. Use it for long sounds that stay as long as you hold the key, for example a pad or a roll. A tap on a drum pad plays the curve as drawn: the sustain or the loop does not change it.

Type	How to set it	While the note is held
Sustain point	Right-click a point, then click **Sustain here**.	The curve stops at the point and holds its value.
Loop	Right-click a point, then click **Loop starts here**. Right-click a later point, then click **Loop ends here**.	The segments between the two points repeat.

At the note-off:

- From a sustain point, the curve continues from the point.
- From inside a loop, the curve goes to the loop end point and continues from there. It glides from the held value to the curve in 10 ms, so there is no click.

- If the note-off comes before the curve gets to the sustain point or the loop, the curve plays as drawn.

The plot shows the sustain point as a line with a flag at the top. It shows a loop with a flag at each end and shades the curve outside the loop. To move a flag to a different point, drag it in the top strip of the plot. A flag always goes to a point, never between points.

If you add or remove points, the sustain and the loop stay on the same points. If you remove a point that the loop uses, the loop goes off.

For a loop with no step at the join, press L or click **Level loop end to start (L)**.

> **Note**
>
> If ↦| **1-SHOT** is on, the layer ignores the note-off. The sustain points and loops then play through.

Release

The release is a fall to silence after the end of the hit. Only the **AMP** envelope has a release.

- If there is no note-off, or ↦| **1-SHOT** is on, the hit plays to its end. Then the level falls from the last point to silence, over the release time.
- At a note-off, the level falls from where it is to silence, over the release time.
- With a loop, the note-off first leaves the loop, then the curve plays to its end, then the release starts.

To set the release:

1. Make **AMP** the edited envelope.
2. Find the release handle at the bottom of the plot, after the end of the hit.
3. Drag the handle to the right.

The plot labels the handle **RELEASE**, with the time. To remove the release, drag the handle back to the end of the hit, or double-click the handle. The **REL** knob in the **TIME** row sets the same release. The range is off to 10 s.

The TIME row

The **TIME** row sets where the hit of the layer sits on the time axis.

Control	What it does	Range
TIME left thumb	The delay of the layer. Drag it to move the whole hit later. The length stays the same.	0 to 48 s
TIME right thumb	The end of the hit. The length is the end minus the delay.	The bar spans 0 to 60 s
REL	The release of the **AMP** envelope. Double-click: off.	off to 10 s
LEN	Stretches all the envelopes of the layer and the release together. Double-click: `x1`.	`x0.25` to `x4`
↦| **1-SHOT**	The hit always plays from start to end. The layer ignores the note-off, and the sustain points and loops play through.	on / off
SYNC	The delay and the length of the hit follow the tempo, in note values.	on / off

The **TIME** bar does not jump to a click: grab a thumb and drag it.

The curve keeps its own time when you turn **LEN**. The plot shows the stretched result as a dashed line over the curve, with a tag such as **LEN x1.50**.

LEN accepts modulation. Refer to Macros and modulation.

Tempo sync

When you click **SYNC**, the length of the hit changes to the nearest note value at the tempo. The **TIME** bar changes to these controls:

Control	What it does
DELAY MS / **DELAY NOTE**	Click to set the delay in ms or in note values. When you change to note values, the delay goes to the nearest note value.
The delay slider	The delay in ms (with **DELAY MS**).
The delay picker	The delay as a note value (with **DELAY NOTE**).
LENGTH	The length of the hit as a note value.

On a picker, click the value to open the list. Click **<** or **>** to step one value. Drag sideways or scroll to step through the values.

The note values are **1/64** to **1 bar**, each also dotted (**D**) and as a triplet (**T**), and **2 bars** and **4 bars**. For example: **1/16**, **1/8 D**, **1/4 T**, **1 bar**. The tempo is the tempo of the host, or 120 BPM in the standalone application.

On the Sampler, the length of the hit is the slice. **SYNC** then moves only the delay.

Frames

A frame is one version of the sound of a layer. With 2 or more frames, the layer can move from one frame to the next over the hit. Use frames to make a hit change its tone over time: for example, a hit that gets darker as it decays.

Source	What a frame holds	Between two frames
Osc	One set of harmonics: the level and the phase of each harmonic.	The Osc crossfades the two frames.
Partials	A level for each partial. The frequencies and the phases are the same in all frames.	The next frame starts when the frame ends. The **FRAME** curve is not used.

A layer can have 1 to 8 frames. With one frame, the layer plays as if it has no frames.

This section describes the frames of the Osc. For the frames of a Partials layer, refer to Frames.

The FRAME box

The **FRAME** box is in the top row of the page. It shows the current frame and the number of frames, for example **FRAME 2 / 3**. Between two frames it shows a decimal, for example **FRAME 1.5 / 3**.

Action	Result
Click **<** or **>**	Goes to the previous or next frame.
Click **+**	Adds a copy of the current frame after it. The sound does not change until you edit the new frame.
Drag the box up or to the right	Moves forward through the frames: one frame each 24 px.

Action	Result
Click the box	Opens the **FRAME** curve. Click again to close it.
Right-click the box	Opens a menu: **Delete frame**, **Move left**, **Move right**.

FRAME is a parameter. A macro, the velocity or a different modulation source can move it. Refer to Macros and modulation.

The **WAVE** tab shows the harmonics of the current frame.

The FRAME curve

The **FRAME** curve moves through the frames over the time of the hit. The bottom of the plot is the first frame. The top of the plot is the last frame. A guide line marks each frame, labelled **FRAME 1**, **FRAME 2** and so on. A flat part of the curve on a guide line holds that frame.

- If there is no **FRAME** curve, the hit plays the frame in the **FRAME** box.
- If there is a **FRAME** curve, the hit follows the curve. The **FRAME** box then only selects the frame that you edit.

The **FRAME** curve is available only when the layer has 2 or more frames. You edit it with the same gestures as all curves.

Formulas

A formula calculates the values of a table, one row at a time. Use a formula when a table has many rows that follow a rule: the harmonics of a saw, the partials of a bell, the modes of a bar. One formula and one or two knobs then control all the rows. You can also start from values that you placed by hand, and use a formula to change them all together.

Tables with a formula mode

Four tables have a formula mode. Each table has one formula for each column. The formula of a column is a function of the row number `n`.

Source	Table	Columns and units
Osc	The harmonics of the wave	**gain(n)**: dB. At `-120` dB or lower, the harmonic is absent. **phase(n)**: turns (0 to 1).
Partials	The partials	**freq(n)**: Hz. **amp(n)**: dB. **decay(n)**: ms to -60 dB. **phase(n)**: turns (0 to 1).
Metal	The oscillator ratios	**ratio(n)**: times **TUNE**.
Struck	The modes of a body	**ratio(n)**: times the pitch of the body. **gain(n)**: dB. **decay(n)**: ms to -60 dB.

All tables use the same units for the same quantity:

Quantity	Unit
Gain	dB
Phase	turns: 0 to 1 is one full cycle. 0.25 is a quarter cycle.
Decay	ms to -60 dB
Frequency	Hz
Ratio	times the root of the table (**TUNE** on Metal, the pitch of the body on Struck)

Change a table to a formula

Each table has two buttons:

Button	What the table uses
VALUES (the bars icon; **HARMONICS** on the Osc)	The values that you place by hand.
FORMULA (the f(x) icon)	A formula for each column.

On the Osc, the buttons are on the **WAVE** tab. On Struck, the buttons apply to the selected body.

When you change to **FORMULA**, the sound does not change. For each column, Rhythmica keeps the formula that the table had before, if that formula gives the current values. If not, the formula of the column becomes `v`: the hand-placed value of each row. On the Osc, if the wave was a basic shape, the formula starts as the formula of that shape.

When you change back to **VALUES**, the values that the formulas give become the hand-placed values. The sound does not change.

The formula strip

In formula mode, the page shows the formula strip.

Control	What it does
A field for each column, for example **freq(n) =**	The formula of that column.
The named knobs	Values that the formulas read by their names.
Templates	A list of starting formulas for each column. Refer to Templates.
?	Move the pointer over it to see the variables and functions of this table.

Each table also has a knob for its number of rows:

Table	Knob	Range
Osc	**harmonics**	1 to 512 in formula mode, 1 to 64 with hand-placed values

Table	Knob	Range
Partials	**partials**	1 to 1024
Struck	**modes**	1 to 32

Metal has 1 to 8 oscillators. Refer to Metal.

Type a formula

1. Click the field of a column.
2. Type the formula.
3. Push `Enter ⏎`, or click outside the field.

The table uses the new formula immediately.

If the formula is not correct, the field shows amber. The field keeps your text, and the table continues to use the last correct formula. Thus the sound does not stop while you type. Correct the text and push `Enter ⏎` again.

If a saved sound has a formula that is not correct, the field shows amber when you load it. That column then uses its hand-placed values.

If a formula gives a result that is not a number, for example `1/0`, that row uses its hand-placed value.

The named knobs

A knob is a value that the formulas of the table can read. The name of the knob is the name that you type in the formula. For example, if a knob has the name `tilt`, the formula `tilt*log2(n)` reads it.

Table	Named knobs	Default names
Osc	2	`tilt`, `warp`
Partials	4	`stretch`, `bright`, `damp`, `jitter`
Metal	2	`a`, `b`
Struck	2 for each body	`a`, `b`

A template gives the knobs the names, ranges and start values that its formula uses. On Partials, Metal and Struck, the named knobs accept modulation. Refer to Macros and modulation.

The formula language

A formula is one expression, for example `f0 * n^1.02`. It can be 63 characters long at most.

Numbers

Write numbers with a decimal point, for example `2`, `0.25` or `.5`. An exponent is also correct: `1e3` is 1000 and `2.5e-3` is 0.0025.

Names

A name starts with a letter or `_`. It continues with letters, digits or `_`. A name can have 11 characters at most. Upper case and lower case are different: `n` and `N` are two different variables.

A name that is not a variable, a named knob or a function is an error.

Operators

Operator	What it does
`+` `-`	Add, subtract
`*` `/`	Multiply, divide
`%`	The remainder of a division, the same as `mod(a, b)`
`^`	Power: `2^3` is 8
`-x`	Negative
`( )`	Groups a part of the formula

The order of operations, from first to last:

1. Parentheses.
2. `^`. It groups from the right: `2^3^2` is `2^(3^2)`.
3. The sign `-` before a value. Thus `-n^2` is `-(n^2)`.
4. `*`, `/` and `%`, from left to right.
5. `+` and `-`, from left to right.

The language has no constant for pi. Type the number, for example `3.14159`.

Variables

All tables have the variable `v`: the hand-placed value of the row in the column that the formula fills. The formula `v` plays the hand-placed values with no change. The formula `v * 1.02` makes all ratios 2 % higher.

Osc: the harmonics

Variable	Meaning
`n`	The harmonic number, from 1. Harmonic 1 is the fundamental.
`N`	The number of harmonics.
`sr`	The sample rate (Hz).
`v`	The hand-placed value of this harmonic in this frame: dB in **gain(n)**, turns in **phase(n)**.
`fr`	The frame that the Osc builds, from 0.
`NF`	The number of frames.
`t`	The position of the frame: 0 is the first frame, 1 is the last frame.

For frames, refer to Curves: frames. The formula builds each frame with its own `fr`, `t` and `v`.

Partials

Variable	Meaning
`n`	The partial number, from 1.
`N`	The number of partials.
`f0`	The base frequency (Hz).
`d0`	The base decay (ms).
`f`	The frequency of this partial, from the **freq(n)** column. In the **freq(n)** formula, `f` is 0.
`sr`	The sample rate (Hz).

Variable	Meaning
`v`	The hand-placed value of this partial in the column that the formula fills.

Metal: the oscillator ratios

Variable	Meaning
`n`	The oscillator number, from 1.
`N`	The number of oscillators.
`f0`	The root of the oscillators, **TUNE** (Hz).
`v`	The hand-placed ratio of this oscillator.

Struck: the modes of a body

Variable	Meaning
`n`	The mode number, from 1.
`N`	The number of modes of the body.
`f0`	The pitch of the body (Hz).
`r`	The ratio of this mode, from the **ratio(n)** column. In the **ratio(n)** formula, `r` is 0.
`v`	The hand-placed value of this mode in the column that the formula fills.

The named knobs of the table are also variables.

Functions

All tables have these functions.

Function	Result
`sin(x)`	The sine of `x`, in radians
`cos(x)`	The cosine of `x`, in radians

Function	Result
`log2(x)`	The logarithm of `x` to base 2
`log10(x)`	The logarithm of `x` to base 10
`exp(x)`	e to the power `x`
`sqrt(x)`	The square root of `x`
`abs(x)`	The absolute value of `x`
`floor(x)`	`x` rounded down
`round(x)`	`x` rounded to the nearest whole number
`sign(x)`	-1, 0 or 1
`min(a, b)`	The smaller of `a` and `b`
`max(a, b)`	The larger of `a` and `b`
`clamp(x, lo, hi)`	`x`, kept between `lo` and `hi`
`pow(a, b)`	`a` to the power `b`, the same as `a^b`
`mod(a, b)`	The remainder of `a / b`, the same as `a % b`
`rnd(i)`	A random value from -1 to 1 for the whole number `i`. In the same sound, the same `i` always gives the same value.
`cents(c)`	The frequency ratio of `c` cents: `2^(c/1200)`. `cents(1200)` is 2.
`dbamp(x)`	The linear gain of `x` dB: `dbamp(-6)` is approximately 0.5.
`db(x)`	The gain in dB of the linear gain `x`: `db(0.5)` is approximately -6.

`rnd` gives a different value for each `i`. Use `rnd(n)` for a different value on each row. To get values that are not related to `rnd(n)` in a different column, add a number to `n`, for example `rnd(n + 500)`.

Errors

These are errors. The field shows amber until you correct them.

- An empty field.
- A name that is not a variable, a named knob or a function.
- A function with the wrong number of arguments.
- A `(` with no `)`, or a `)` with no `(`.
- A formula that stops before it is complete, for example `2 *`.
- A name with more than 11 characters.
- A character in a position where it cannot be, for example `n n`.
- A formula that is too long to calculate. Make it shorter.

Templates

A template is a named starting formula for one column. Use a template to start a formula from a known shape, then adjust its knobs.

To use a template:

1. Change the table to f(x) **FORMULA**.
2. Click **Templates**.
3. Find the heading of the column, for example **freq(n)**.
4. Click the template.

The column gets the formula. The knobs that the formula reads get their names, ranges and start values. A knob that already has the name keeps its value. A new knob uses a knob that the formulas of the other columns do not read. If no knob is free, the template is grey in the list.

The **Knobs** column below gives each knob as name: range (start value).

Osc: gain(n)

Template	Formula	Knobs
Values	`v`	
Saw	`-db(n)`	
Saw, tilted	`tilt*log2(n) - db(n)`	`tilt`: -24 to 12 (-3)
Square	`db(mod(n, 2) / n)`	

Template	Formula	Knobs
Square, tilted	`db(mod(n, 2) / n) + tilt*log2(n)`	`tilt`: -24 to 12 (-3)
Triangle	`db(mod(n, 2) / n^2)`	
Pulse	`db(abs(sin(3.14159*n*width)) / n)`	`width`: 0.01 to 0.5 (0.25)
Odd / even balance	`even*(1 - mod(n, 2)) - db(n)`	`even`: -48 to 12 (-12)
Resonant peak	`boost*exp(-((n - peak)/3)^2) - db(n)`	`peak`: 1 to 48 (8); `boost`: 0 to 36 (18)
Values, tilted	`v + tilt*log2(n)`	`tilt`: -24 to 12 (-3)
Saw, tilt over frames	`tilt*t*log2(n) - db(n)`	`tilt`: -24 to 12 (-12)

Osc: phase(n)

Template	Formula	Knobs
Values	`v`	
Sine phase	`0`	
Cosine phase	`0.25`	
Triangle signs	`0.5*mod((n - 1)/2, 2)`	
Random	`spread*rnd(n)`	`spread`: 0 to 0.5 (0.5)
Values, drift over frames	`v + drift*t*n`	`drift`: 0 to 1 (0.1)

Partials: freq(n)

Template	Formula	Knobs
Values	`v`	
Harmonic	`f0 * n`	
Stiff string	`f0 * n * sqrt((1 + stiff*n^2) / (1 + stiff))`	`stiff`: 0 to 0.05 (0.004)
Bar (free ends)	`f0 * (2*n + 1)^2 / 9`	
Bell / plate	`f0 * ((n + 1) / 2)^curve`	`curve`: 1 to 2.5 (1.6)
Membrane	`f0 * n^0.6`	
Stretched	`f0 * n^(1 + stretch)`	`stretch`: 0 to 1 (0.25)
Values, random detune	`v * cents(detune*rnd(n))`	`detune`: 0 to 100 (12)

Partials: amp(n)

Template	Formula	Knobs
Values	`v`	
Flat	`0`	
Falling 1/n	`-db(n)`	
Tilt with pitch	`bright * log2(f/f0)`	`bright`: -24 to 6 (-3)
Values, tilted	`v + bright * log2(f/f0)`	`bright`: -24 to 6 (-3)
Values, random levels	`v + spread*rnd(n + 500)`	`spread`: 0 to 24 (6)
Resonant peak	`12*exp(-log2(f/peak)^2) - db(n)`	`peak`: 50 to 12000 (1000)

Partials: decay(n)

Template	Formula	Knobs
Values	`v`	
Constant	`d0`	
Falls with pitch	`d0 * (f0/f)^damp`	`damp` : 0 to 2 (0.6)
Falling 1/n	`d0 / n`	
Values, falls with pitch	`v * (f0/f)^damp`	`damp` : 0 to 2 (0.6)
Values, random	`v * (1 + vary*rnd(n + 900))`	`vary` : 0 to 0.9 (0.3)

Partials: phase(n)

Template	Formula	Knobs
Values	`v`	
Sine phase	`0`	
Cosine phase	`0.25`	
Alternating	`0.5*mod(n, 2)`	
Random	`rnd(n + 101)`	

Metal: ratio(n) and Struck: ratio(n)

Metal and the Struck bodies have the same ratio templates.

Template	Formula	Knobs
Values	`v`	
Harmonic	`n`	

Template	Formula	Knobs
Stiff string	`n * sqrt((1 + stiff*n^2) / (1 + stiff))`	`stiff`: 0 to 0.05 (0.004)
Bar (free ends)	`(2*n + 1)^2 / 9`	
Bell / plate	`((n + 1) / 2)^curve`	`curve`: 1 to 2.5 (1.6)
Membrane	`n^0.6`	
Geometric	`spread^(n - 1)`	`spread`: 1 to 3 (1.5)
Values, random detune	`v * cents(detune*rnd(n))`	`detune`: 0 to 100 (12)
Values, stretched	`v^stretch`	`stretch`: 0.5 to 1.5 (1.05)

Struck: gain(n)

Template	Formula	Knobs
Values	`v`	
Flat	`0`	
Falling 1/n	`-db(n)`	
Tilt with pitch	`tilt*log2(r)`	`tilt`: -24 to 6 (-6)
Values, tilted	`v + tilt*log2(r)`	`tilt`: -24 to 6 (-6)
Values, random levels	`v + spread*rnd(n + 500)`	`spread`: 0 to 24 (6)

Struck: decay(n)

Template	Formula	Knobs
Values	`v`	

Template	Formula	Knobs
Values, falls with pitch	`v / r^damp`	`damp`: 0 to 2 (1)
Values, random	`v * (1 + vary*rnd(n + 900))`	`vary`: 0 to 0.9 (0.3)

Examples

These examples come from the templates.

A saw with a tilt (Osc, gain(n))

```
tilt*log2(n) - db(n)
```

`-db(n)` gives each harmonic the level `1/n` in dB: this is a saw. `log2(n)` is the number of octaves above the fundamental. Thus `tilt` adds `tilt` dB for each octave. At `tilt = 0` the wave is a saw. At `tilt = -6` the high harmonics are lower, and the wave is darker.

A square (Osc, gain(n))

```
db(mod(n, 2) / n)
```

`mod(n, 2)` is 1 on odd harmonics and 0 on even harmonics. The odd harmonics get `1/n`. The even harmonics get `db(0)`, which is below `-120` dB. Thus the even harmonics are absent.

High partials decay faster (Partials, decay(n))

```
d0 * (f0/f)^damp
```

The partial at `f0` decays in `d0` ms. A partial one octave higher decays in `d0 * 0.5^damp` ms. At `damp = 0` all partials have the same decay. At `damp = 1` the decay is half for each octave.

Detune the hand-placed ratios (Metal, ratio(n))

```
v * cents(detune*rnd(n))
```

Each oscillator keeps its hand-placed ratio `v`, detuned by up to `detune` cents. Each oscillator gets a different detune, and the detune is the same on each hit.

FX

FX

FX change the sound after the source. Use them to shape a hit (EQ, Filter, Dynamics, Transient), to add color (Distortion, Clipper, Bitcrush, Ring Mod), to give it a pitch or a body (Resonator, Convolution) and to put it in a space (Delay, Reverb).

An FX chain is a list of FX modules. The sound goes through the modules in sequence, from the top of the list to the bottom.

Where the FX chains are

Each of these items has its own FX chain. In the tree, the chain is the **FX** row under the item, with one row for each module.

Item	The sound that goes through the chain
Layer	The sound of the layer's source. See Layers, buses and master.
Group	The sum of the layers in the group.
Bus (**Bus 1**, **Bus 2**, ...)	The sends from the layers of the zone.
Zone master (**Master** when the kit has one zone)	The sum of the zone.
Kit bus (**Kit bus 1**, ...)	The sends from the zones.
Submix	The zones that play into the submix.
Kit **Master** (badge **KIT**)	The sum of all the zones.

A chain holds up to 24 modules. The modules in a Multiband lane count in this total.

> **Note**
>
> Delay and Reverb are only available on a bus, a submix and a master chain. On a layer or a group, the module picker shows them dimmed, with the badge **MASTER ONLY**.

Add an FX

1. In the tree, find the **FX** row of the chain.
2. Click **+** on the **FX** row. The module picker opens. Its title is **ADD FX**, followed by the name of the chain.
3. Click the FX card. The FX goes to the end of the chain. The page of the new FX opens.

To close the picker without a change, push Esc or click the dimmed area around it.

The picker also has the card **OTT**. It adds a Multiband with three bands and a Dynamics module in each band. See Multiband.

Turn an FX on or off

An FX that is off lets the sound through with no change. Its settings stay.

- In the tree, click the dot on the FX row. A filled dot: the FX is on. An empty ring: the FX is off.
- On the FX page, click the FX icon left of the page title.

Move an FX

1. Drag the FX row up or down in the tree. A line shows where the FX will go.
2. Release the mouse button.

You can move an FX only in its own chain. Release it on these rows:

Release on	The FX goes
An FX row, upper half	Before that FX.
An FX row, lower half	After that FX.
The **FX** row of the chain	To the start of the chain.
A lane row of a Multiband	To the start of that lane.

A Multiband moves with all the FX in its lanes. A Multiband cannot go into a lane.

Remove an FX

1. Right-click the FX row in the tree.

2. Click **Remove FX**.

> **Warning**
>
> Do not remove a Multiband if you want to keep the FX in its lanes. Rhythmica removes the Multiband and every FX in its lanes.

The FX page

Click an FX row in the tree to open its page. A page has these parts:

- The picture of the FX at the top: a response, a transfer curve or a level plot. On most pictures you can drag a handle to set a value.
- The controls: knobs and switches in named groups.
- The bottom panel: the **Hit** tab and the FX curves. See FX curves.

The **Hit** tab shows the hit right after this FX in a bright color and the hit as it went into the FX in a faint color. The lines at the top and bottom are 0 dB. Next to the wave is the spectrum of the hit, in and out. EQ, Filter, Multiband, Freq Shift, Ring Mod and Disperse do not show the wave, because their picture shows the change. Click the **MASTER** button in the page title to see the output of the master instead.

The FX on the kit's chains (kit buses, submixes, kit master) do not show a preview of the hit, because these chains process every zone.

To set a knob, drag it up or down. To type a value, double-click the value under the knob. Right-click a knob to assign a macro or a MIDI controller to it. See Macros and modulation.

FX curves

An FX curve moves one parameter of an FX over the time of the hit. For example, a curve on the Frequency of a Disperse makes a zap. A curve can also follow the level of a layer, so that one layer changes the FX of another.

While a parameter has a curve, the curve sets its value. The knob of that parameter has no effect.

The Filter has its own curve page. See Filter. The Amp has its own envelope. See Amp. Clipper, Transient, Convolution, Delay, Reverb, Freq Shift and Multiband have no FX curves.

Add an FX curve

1. On the FX page, click **+** in the bottom panel. A menu shows the parameters that a curve can move. For the EQ, each parameter has a submenu with one item for each band.

2. Click the parameter. A new tab with the name of the parameter opens. The curve rises from the current value of the parameter (**From**) to a second value (**To**).
3. Draw the curve. See Curves.
4. Set **From** and **To**.

Control	What it does
Follow	**Off**: the curve runs over the hit. The name of a layer: the level of that layer moves the curve. The x axis then goes from the loudest level of the layer (100 %) to silence (0 %).
From	The value at the bottom of the curve.
To	The value at the top of the curve.
Time	How long the curve takes, from the start of the hit. Only on the kit master, 5 ms to 5 s. On every other chain the curve runs over the full length of the chain.
Attack	When the curve follows a layer: how fast the level follower of that layer rises. 0.1 ms to 200 ms.
Release	When the curve follows a layer: how fast the level follower of that layer falls. 5 ms to 2000 ms.

Attack and **Release** are settings of the followed layer. Every curve that follows the same layer uses the same values.

On a bus or a master chain, a curve over the hit follows the latest hit.

To edit a curve, click its tab. To remove a curve, right-click its tab and click **Remove curve**. The parameter then goes back to its knob.

Multiband lanes

A Multiband splits the sound into 2 to 5 frequency bands. Each band has its own FX chain, called a lane. In the tree, a Multiband shows its lanes under it:

Lane	The sound that goes through it
Full band	The full sound, before the split.
Band 1 … **Band 5**	One frequency band, from low to high.

Lane	The sound that goes through it
Post	The bands after they are added together.

To add an FX to a lane, click **+** on the lane row. The picker title ends with the lane: **/ full band**, **/ band 2**, **/ post**. A lane cannot hold a Multiband: the picker shows it with the badge **NOT IN A BAND**.

To split or merge bands, see Multiband.

The FX

The list is in the order of the module picker.

FX	What it does
Distortion	Saturates the sound. Bias, fuzz, sag and emphasis change the character.
EQ	Four parametric bands: bell, shelves and pass filters.
Dynamics	Compressor, limiter, expander, gate and upward compression in one module.
Transient	Makes the start of the hit sharper or softer, and the body longer or shorter.
Clipper	Cuts the peaks at a ceiling: a louder, harder hit.
Amp	A gain and a volume envelope over the hit.
Convolution	Puts the sound through a recorded space or body (an impulse response).
Filter	A low-pass, high-pass or band-pass filter with envelopes on the cutoff and the resonance.
Freq Shift	Moves every frequency by the same number of Hz.
Disperse	Delays the frequencies around one frequency: a click becomes a chirp.
Ring Mod	Multiplies the sound by a sine: metallic tones, or amplitude modulation.
Bitcrush	Fewer bits and a lower sample rate: lo-fi grit.

FX	What it does
Resonator	A tuned ring on the hit: a skin, a tube, a snare wire.
Delay	Echoes, with feedback, tone and ping-pong. Bus and master chains only.
Reverb	A room, a hall or a plate. Bus and master chains only.
Multiband	Splits the sound into bands with an FX chain on each.

Distortion

Distortion saturates the sound. It adds harmonics and makes a hit louder and more aggressive. Use it to add weight to a kick, grit to a snare or edge to a hat.

With all the character controls (**Bias**, **Fuzz**, **Sag**, **Emphasis**) at 0, the Distortion is a plain saturator. **Drive** sets how much it saturates.



The picture

The picture is the transfer curve: the output level (**OUT**) for each input level (**IN -1..1**). The dashed diagonal is no change. The more the curve bends away from the diagonal, the more the sound saturates. The value of **Drive** shows at the top right.

When **Sag** is above 0, a second dashed curve, **LOUD HIT**, shows the curve during a full-scale hit.

Controls

The **SHAPER** group:

Control	What it does	Range
Drive	How much the shaper saturates. 0 is clean.	0 to 1
Bias	Moves the signal off center before the shaper. One half of the wave clips first, which adds even harmonics. The sign selects the half.	-1 to 1
Fuzz	Mixes in an octave-up copy of the signal and adds a dead zone at low levels. The tail of the hit sputters and cuts out.	0 to 1
Sag	The level of the input decreases the drive and moves the bias. A loud hit breaks up differently from its tail.	0 to 1

The **TONE / MIX** group:

Control	What it does	Range
Emphasis	Boosts a band before the shaper and cuts it by the same amount after. The grit goes into that band and the tonal balance stays. A negative value keeps the grit out of the band.	-24 dB to 24 dB
Emphasis Hz	The center of the emphasis band.	40 Hz to 12 kHz
Tone	A tilt after the shaper, around 700 Hz. Negative is darker, positive is brighter.	-1 to 1
Mix	The balance between the dry sound (0) and the distorted sound (1).	0 to 1

FX curves

A curve can move **Drive**, **Bias**, **Fuzz**, **Sag**, **Emphasis** and **Mix**. See FX curves.

EQ

The EQ changes the level of frequency ranges. Use it to remove mud, to boost the body or the click of a hit, or to cut the low end of a hat.

The EQ has four bands. Each band has its own type, frequency, gain and Q. A new EQ has all four bands off, at 60 Hz, 250 Hz, 1.2 kHz and 6 kHz.



The picture

The picture shows the response of all the bands that are on, from 20 Hz to 20 kHz and from -18 dB to +18 dB. Behind it, the spectrum of the hit shows as it goes into the EQ (filled) and as it comes out (a line).

Each band has a numbered handle on the curve.

Action on a handle	Result
Drag	Sets the frequency, and the gain of a bell or shelf band.
Mouse wheel	Sets the Q.
Double-click	Turns the band on or off.

Band types

Type	What it does	Gain
Bell	Boosts or cuts a range around the frequency.	Yes
Low Shelf	Boosts or cuts everything below the frequency.	Yes
High Shelf	Boosts or cuts everything above the frequency.	Yes
High Pass	Removes the frequencies below the frequency.	No
Low Pass	Removes the frequencies above the frequency.	No
Band Pass	Keeps only a range around the frequency.	No

Controls

Each band has a card (**BAND 1** to **BAND 4**) under the picture.

Control	What it does	Range
On / off switch	Turns the band on or off.	
Type icons	Selects the band type.	
Freq	The frequency of the band.	20 Hz to 20 kHz
Gain	The boost or cut. Only for Bell, Low Shelf and High Shelf.	-18 dB to 18 dB
Q	The width of the band. A higher Q is narrower.	0.1 to 10

FX curves

A curve can move **Freq**, **Gain** and **Q** of each band. In the **+** menu, each parameter has a submenu with one item for each band. See FX curves.

Dynamics

Dynamics controls the level of the sound by its level. One module does the work of a compressor, a limiter, an expander, a gate and an upward compressor. Use it to make a hit more even, to stop the peaks, to cut the tail of a hit or to bring up its quiet parts.

The module has two sides. Each side has its own level detector and its own switch. When both sides are on, their gain changes add together.

Side	What it does
ABOVE (compress / limit)	Decreases the level above **Threshold**.
BELOW (expand / gate / lift)	Decreases or increases the level below **Low thresh**.



The picture

The picture shows the output level for each input level, from -90 dB to 0 dB. The dashed diagonal is no change. Dashed vertical lines mark the thresholds.

The **GR** meter next to the picture shows the gain reduction while the sound plays, on a 24 dB scale. In the **Hit** tab, a dashed line (**THR**) marks the **Threshold** of the ABOVE side.

Which setting do I use

To get	Set
A compressor	ABOVE on. **Ratio** above 1:1.
A limiter	ABOVE on. Turn **Ratio** to the end of its travel (**limit**). Add **Look-ahead**.
An expander	BELOW on. **Low slope** above 1.
A gate	BELOW on. **Low slope** at the top of its range.
Upward compression	BELOW on. **Low slope** below 1.
Parallel compression	ABOVE on. **Ratio** above 1:1. **Mix** below 1.

Controls

The **ABOVE** group (compress / limit):

Control	What it does	Range
Switch	Turns the ABOVE side on or off.	
Threshold	The compression starts above this level.	-90 dB to 0 dB
Ratio	How much the level above the threshold decreases. 1:1 is no change. The end of the travel is a brickwall limiter (**limit**): with look-ahead, no sound passes the threshold.	1:1 to 100:1, then **limit**
Knee	A soft knee of this width at the threshold. 0 is a hard corner.	0 dB to 48 dB
Attack	How fast the compression starts.	0.1 ms to 200 ms
Release	How fast the compression stops.	1 ms to 2000 ms
Look-ahead	Delays the sound, so that the gain is down before a peak arrives. It adds this much latency.	0 ms to 5 ms

Control	What it does	Range
Makeup	Gain after the compression.	-24 dB to 24 dB

The **BELOW** group (expand / gate / lift):

Control	What it does	Range
Switch	Turns the BELOW side on or off.	
Low thresh	The low stage works below this level.	-90 dB to 0 dB
Low slope	1 is off. Above 1, the quiet sound gets quieter (expansion; a high value is a gate). Below 1, the quiet sound gets louder (upward compression). At 0, it holds the quiet sound at the threshold. Below 0, the quieter sound comes out louder.	-20 to 50
Low thresh 2	A second low stage works below this level.	-90 dB to 0 dB
Low slope 2	The slope of the second low stage. 1 is off.	-20 to 50
Max lift	The maximum increase that the low stages can give. 120 dB is no limit.	0 dB to 120 dB
Knee	A soft knee of this width at the low thresholds.	0 dB to 48 dB
Attack	How fast the low side follows a rise in level.	0.1 ms to 200 ms
Release	How fast the low side follows a fall in level.	1 ms to 2000 ms

The **MIX** group:

Control	What it does	Range
Mix	The balance between the dry sound (0) and the processed sound (1). Both sides are in the processed sound. A value between 0 and 1 gives parallel compression.	0 to 1

When a side is off, its group is dimmed. Its values stay.

FX curves

A curve can move **Threshold** and **Makeup**. See FX curves.

Transient

Transient changes the start of the hit and the body after it. Use it to give a kick more punch, to soften a hard snare, or to make a hit shorter or longer.

The module has no picture. The **Hit** tab under the controls shows the hit after the module (bright) and before it (faint).



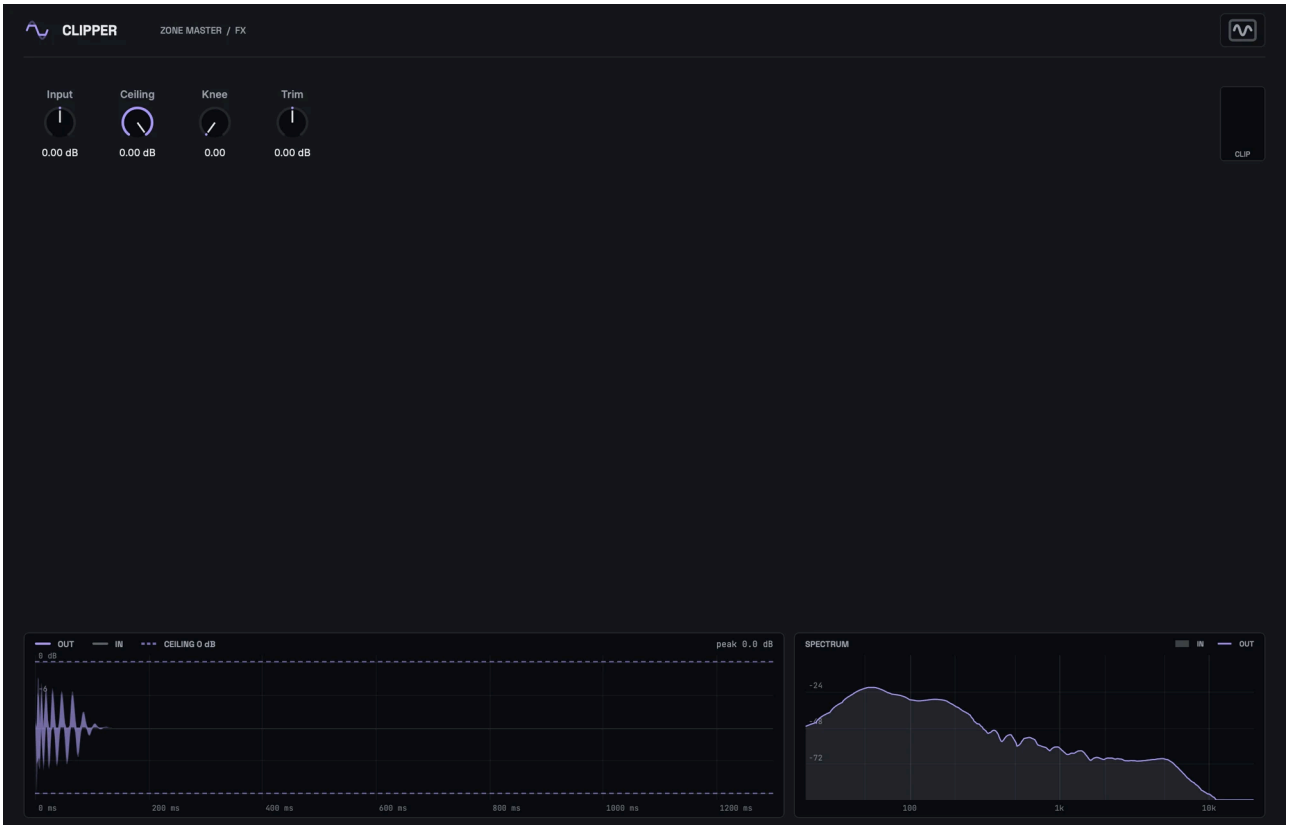
Controls

Control	What it does	Range
Attack	The start of the hit. -1 makes it softer, +1 makes it sharper.	-1 to 1
Sustain	The body after the start. -1 makes it shorter, +1 makes it longer.	-1 to 1

Double-click a knob to set it back to 0 (no change).

Clipper

The Clipper cuts the peaks of the sound at a ceiling. The sound never goes above the ceiling. Use it to make a kick or a snare louder and harder, with flat tops on the wave.



Controls

Control	What it does	Range
Input	Gain into the clipper. Increase it to clip harder.	-24 dB to 24 dB
Ceiling	The clip level. No sound passes it.	-36 dB to 0 dB
Knee	The shape of the corner. 0 is a hard corner. Toward 1, the curve bends into the ceiling earlier and rounder.	0 to 1
Trim	Gain after the clipper.	-24 dB to 24 dB

The **CLIP** meter shows how far the input peak goes above the ceiling, in dB.

In the **Hit** tab, a dashed line (**CEILING**) marks the highest level that the Clipper puts out: **Ceiling** plus **Trim**.

Amp

The Amp is a gain stage with a volume envelope over the hit. Use it to boost or cut the level at one point of the chain, to gate the tail of a hit, or to give the hit a new volume shape.



Controls

Control	What it does	Range
Gain	A plain boost or cut. It is the top of the envelope.	-24 dB to 24 dB

The envelope

The rest of the page is the envelope, drawn over the full length of the hit. The top of the envelope is **Gain**. The bottom is silence. A flat line at the top is a plain gain. A new Amp starts with this flat line.

Behind the envelope, the hit shows as it goes into the Amp (faint) and as it comes out (bright). Click the **MASTER** button in the page title to see the output of the master instead.

To draw the envelope, see Curves.

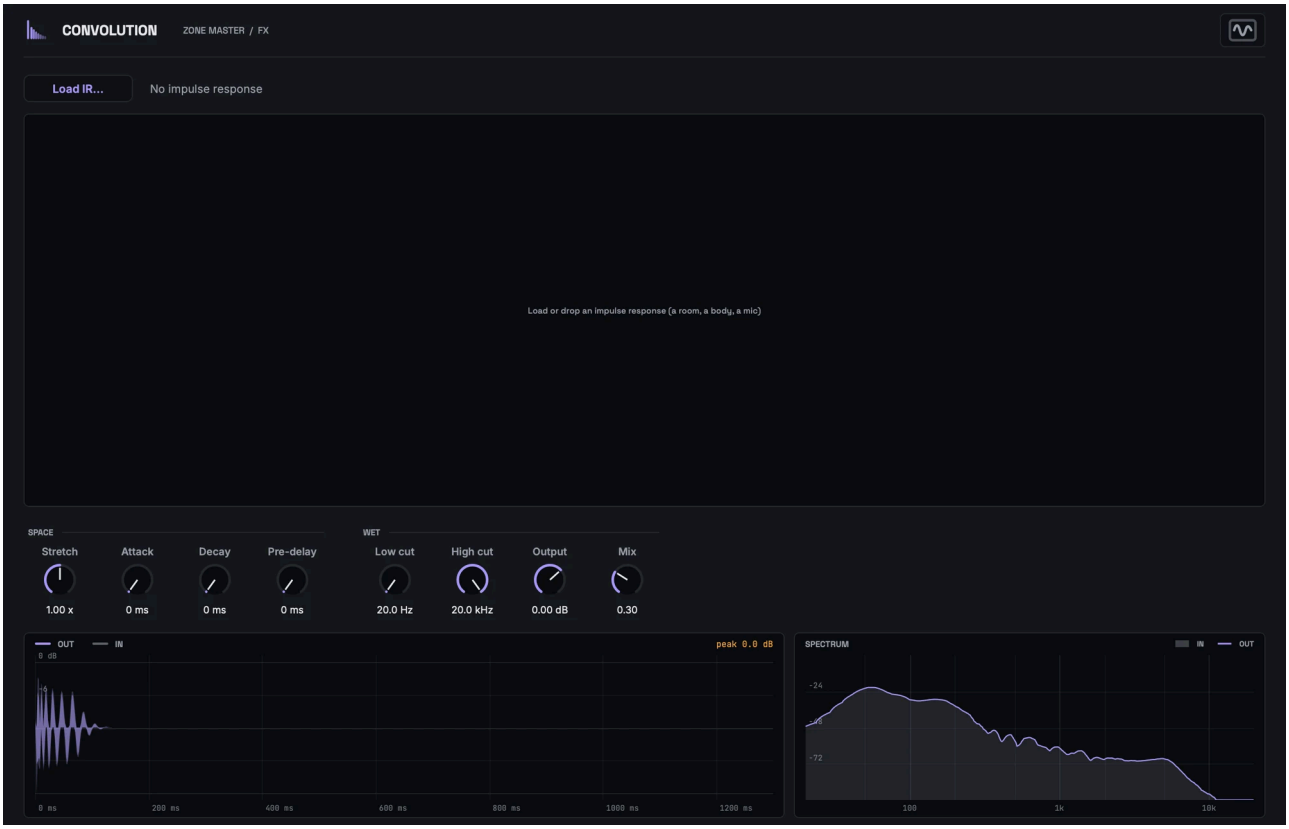
The envelope starts at the start of the hit. On a layer, it follows the hit of the layer. On a bus or a master chain, it follows the latest hit. After its end, the envelope holds its last value. Before the first hit, the Amp is a plain gain.

The length of the envelope follows the length of the hit, from 5 ms to 10 s.

Convolution

Convolution puts the sound through an impulse response. An impulse response is a recording of how a space or an object answers a short click: a room, the body of a drum, a microphone. Use it to place a hit in a real room, or to give it the body of a different object.

The wet sound has no latency. It stays aligned with the dry sound to the sample.



Load an impulse response

1. Click **Load IR...**.
2. Select a WAV, AIFF, FLAC, OGG or MP3 file. The name of the file shows next to the button. The picture shows the impulse response.

You can also drop one audio file on the page. Rhythmica reads the first 4 s of the file.

With no impulse response, the module lets the dry sound through. If the file of a saved impulse response is not found, its name shows with **(missing)**.

The picture

The picture shows the level of the impulse response over time, from 0 dB to -60 dB, as the module plays it: after **Stretch**, **Attack** and **Decay**. Its length shows at the bottom right.

Controls

The **SPACE** group:

Control	What it does	Range
Stretch	The time scale of the impulse response. Above 1 is a bigger space, below 1 a smaller one.	0.25 x to 4 x
Attack	Fades in the start of the impulse response. It softens the early reflections.	0 ms to 500 ms
Decay	Fades out the impulse response to -60 dB at this time. 0 keeps the tail of the impulse response.	0 ms to 10000 ms
Pre-delay	The gap before the wet sound.	0 ms to 200 ms

The **WET** group:

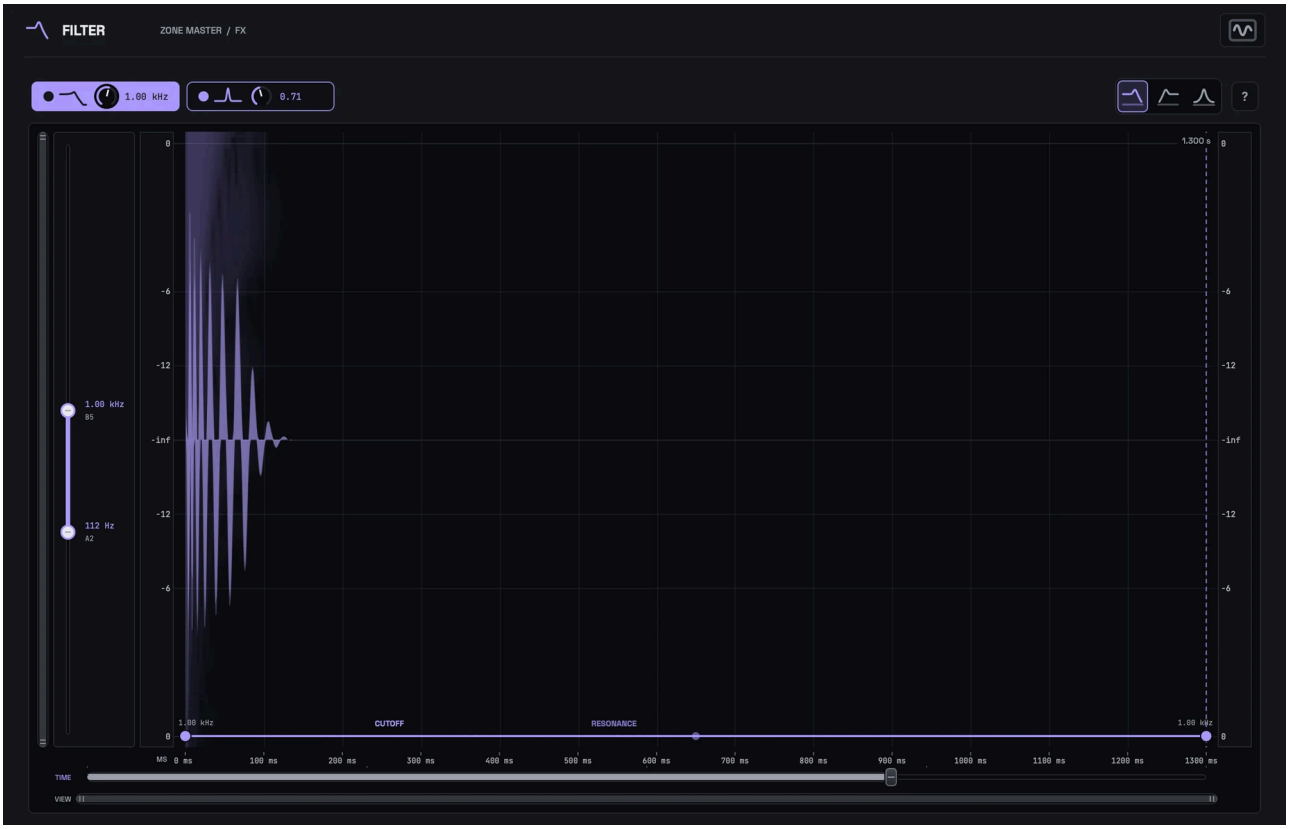
Control	What it does	Range
Low cut	Removes the lows of the wet sound. 20 Hz is off.	20 Hz to 2 kHz
High cut	Removes the highs of the wet sound. 20 kHz is off.	1 kHz to 20 kHz
Output	The level of the wet sound.	-48 dB to 24 dB
Mix	The balance between the dry sound (0) and the wet sound (1).	0 to 1

A macro or a controller cannot move **Stretch**, **Attack** and **Decay**.

Filter

The Filter removes frequencies above or below its cutoff. Each of its two parameters, the cutoff and the resonance, has an envelope over the hit. Use it to make a hit darker, to remove its low end, or to sweep the cutoff during the hit.

The Filter page is one envelope editor. It has no knob panel and no **Hit** tab.



Modes

Select the mode with the icons at the top right of the page.

Mode	What it does
Low Pass	Removes the frequencies above the cutoff.
High Pass	Removes the frequencies below the cutoff.
Band Pass	Keeps only a range around the cutoff.

The envelopes

The two chips at the top select the envelope to edit:

Chip	Parameter	Range
CUTOFF	The frequency of the filter.	20 Hz to 20 kHz
RESONANCE	The Q of the filter. A higher Q gives a sharper peak at the cutoff.	0.1 to 10

Click the name on a chip to edit its envelope. Click the dot on a chip to show or hide its envelope behind the edited one.

The knob on a chip sets the value of the parameter. This value is also the bottom of the envelope. The range slider next to the editor sets the two ends of the envelope: the bottom handle is the same value as the knob, and the top handle is the value at the top of the envelope.

An envelope that you did not draw is a flat line at the bottom. The filter then plays at the value of the knob. When you edit the line for the first time, the envelope starts to move the parameter.

The envelope runs over the full length of the hit. On the kit master only, set its length with the time bar, from 5 ms to 5 s.

Behind the **CUTOFF** envelope, a spectrogram shows the hit as it goes into the filter. Use it to place the cutoff relative to the energy of the hit. Behind the envelope, the hit also shows as it goes in (faint) and as it comes out (bright). Click the **MASTER** button in the page title to see the output of the master instead.

To draw an envelope, see Curves. Click **?** for the mouse actions of the editor.

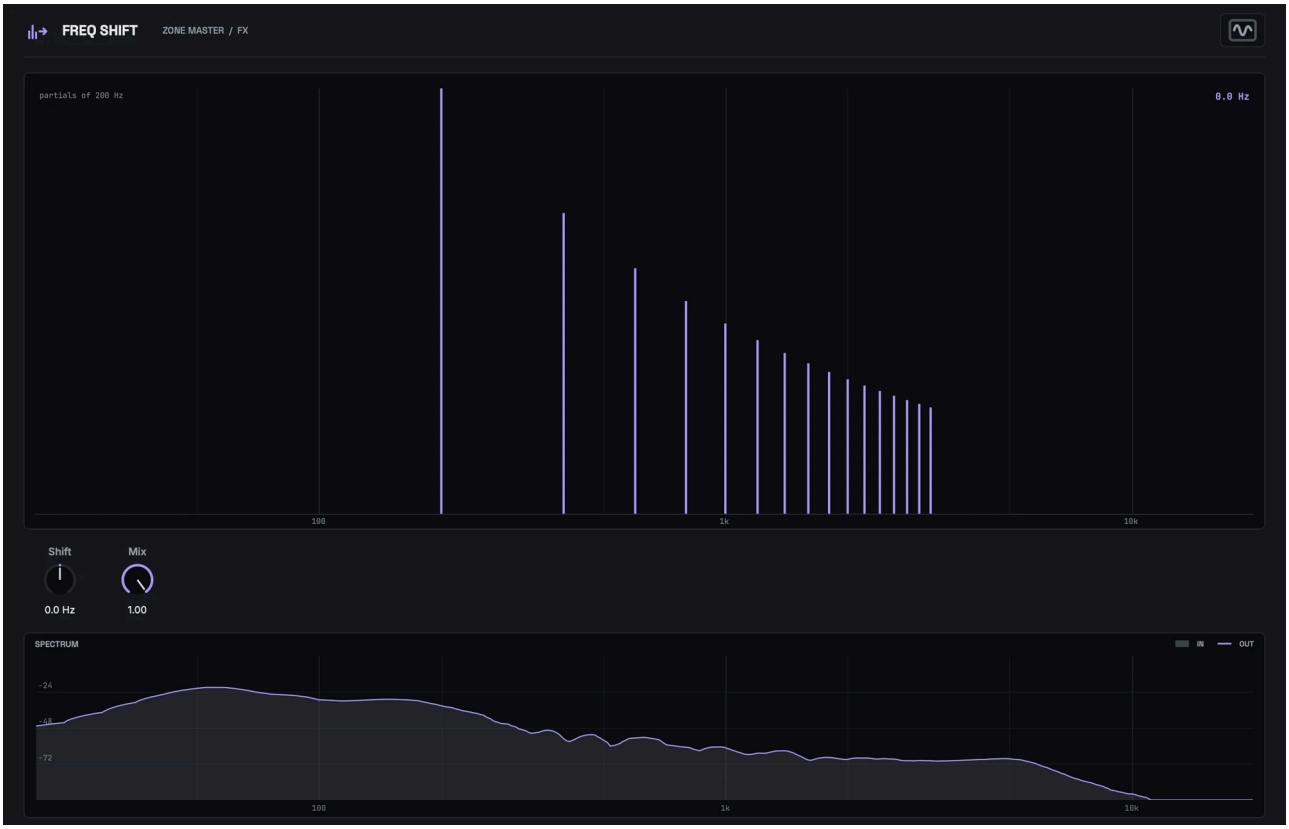
Clear an envelope

1. Right-click the chip.
2. Click **Clear envelope**. The parameter goes back to the bottom value of the envelope.

Freq Shift

Freq Shift moves every frequency of the sound by the same number of Hz. A harmonic sound becomes inharmonic: a tone becomes a clang. Use it to make a hit metallic.

The space in Hz between the harmonics stays the same. Their ratios change, so they are no longer whole-number multiples of one frequency.



The picture

The picture shows the harmonics of a 200 Hz tone (faint) and where the shift moves them (bright). The heights show the balance of dry and shifted sound. A frequency that the shift moves below 0 Hz folds back above 0 Hz. The shift value shows at the top right.

Controls

Control	What it does	Range
Shift	The number of Hz added to every frequency. A negative value moves the frequencies down.	-5000 Hz to 5000 Hz

Control	What it does	Range
Mix	The balance between the dry sound (0) and the shifted sound (1).	0 to 1

Shift has a fine resolution near 0 Hz. Double-click it to set it back to 0 Hz.

Disperse

Disperse delays the frequencies of the sound by different amounts. The frequencies around **Frequency** come out last. The level of each frequency does not change. A click becomes a chirp. With a curve that sweeps **Frequency** over the hit, a click becomes a zap.

Use it to give a click a chirp or zap character.



The picture

The picture shows when each frequency comes out: the delay in ms on the vertical axis, from 0.1 ms to 20 s. The peak of the curve is at **Frequency**. The text at the top right shows the longest delay and its frequency.

Action	Result
Drag the handle on the bottom axis	Sets **Frequency**.
Mouse wheel on the picture	Sets **Pinch**.

Controls

Control	What it does	Range
Frequency	The frequency with the longest delay.	20 Hz to 20 kHz
Amount	The number of all-pass stages. More stages give a longer delay.	1 to 32
Pinch	How narrow the delay peak is. A higher value gives a narrower and taller peak.	0.1 to 16
Mix	The balance between the dry sound (0) and the dispersed sound (1). Between the two, the mix makes notches in the spectrum.	0 to 1

FX curves

A curve can move **Frequency**, **Amount**, **Pinch** and **Mix**. See FX curves.

Ring Mod

Ring Mod multiplies the sound by a sine wave, the carrier. Each frequency f of the sound becomes two frequencies: f minus the carrier frequency and f plus the carrier frequency. The result is metallic and inharmonic. With **Bias**, the dry sound also comes through, which is amplitude modulation.

Use it to make metallic, inharmonic hits and clangs from a simple tone.

The carrier starts at the same point of its cycle on every hit.



The picture

The left picture shows two cycles of the carrier after **Rectify**, **Bias** and **Mix**. The dashed line at 1 is the dry level. On a stereo chain with **Spread** above 0, a dashed line shows the right channel.

The right picture shows the harmonics of a 200 Hz tone (faint) and the frequencies after the multiplication (bright). The carrier frequency shows at the top right. Drag the handle on the bottom axis to set **Frequency**.

Controls

The **CARRIER** group:

Control	What it does	Range
Frequency	The frequency of the carrier. With **Key track** on, the frequency at the root key.	1 Hz to 20 kHz
Key track	The carrier follows the played key. The root key is MIDI note 33.	On / off
Spread	Moves the phase of the carrier between left and right, up to 90 degrees each way. Only on a stereo chain.	0 to 1

The **SHAPE** group:

Control	What it does	Range
Bias	Adds a constant to the carrier, so that the dry sound comes through next to the new frequencies. 1 is 100 % amplitude modulation.	0 to 1
Rectify	Folds one half of the carrier. At 0.5 or -0.5, that half is cut to zero (half-wave). At 1 or -1, it is flipped (full-wave): the new frequencies then sit around two times the carrier frequency. The sign selects the half.	-1 to 1

Control	What it does	Range
Mix	The balance between the dry sound (0) and the modulated sound (1).	0 to 1

Spread is dimmed on a mono layer.

FX curves

A curve can move **Frequency**, **Bias**, **Rectify**, **Spread** and **Mix**. See FX curves.

Bitcrush

Bitcrush lowers the bit depth and the sample rate of the sound. Use it for lo-fi grit. With **Mu-law** on, it has the converter steps of early PCM drum machines.



The picture

The picture shows a 200 Hz sine (faint) and the same sine through this module (bright). The steps in time are the rate. The steps in level are the bits. The values of **Bits** and **Rate** show at the top right. When **Rate** is at or above the sample rate that Rhythmica runs at, the text shows **no hold**: the rate has no effect.

Controls

The **CONVERTER** group:

Control	What it does	Range
Bits	The bit depth. Fewer bits give coarser level steps and more noise.	1 to 24 bits

Control	What it does	Range
Mu-law	Uses mu-law steps instead of equal steps: fine steps near silence, coarse steps near full scale. This is the converter of early PCM drum machines.	On / off
Rate	The sample rate. A lower rate gives longer steps in time.	20 Hz to 48 kHz
Anti-alias	A low-pass filter before the rate reduction. 0 is the raw grit. At 1, the cutoff is 0.4 times **Rate**.	0 to 1
Smooth	A low-pass filter after the rate reduction. It rounds the steps. 0 is off. At 1, the cutoff is 0.4 times **Rate**.	0 to 1

The **NOISE** group:

Control	What it does	Range
Dither	Adds noise before the bit reduction, up to one step of level.	0 to 1
Jitter	Moves the time of each step at random, up to half of a step.	0 to 1

Control	What it does	Range
Mix	The balance between the dry sound (0) and the crushed sound (1).	0 to 1

Dither and **Jitter** start the same random sequence on each hit, so a hit always renders the same.

FX curves

A curve can move **Bits**, **Rate**, **Smooth** and **Mix**. See FX curves.

Resonator

The Resonator adds a tuned ring to the sound. The hit rings at **Pitch** and at its harmonics, like a drum skin, a tube or a snare wire. Use it to add a ring to a hit, or with **Key track** to tune the ring to the played key.

A click comes out at the same level at any **Decay**.



The picture

The picture shows one line for each harmonic that rings. The height of a line is its ring time, on a scale from 5 ms to 10 s. **Damping** makes the high harmonics shorter. The text at the top right shows **Pitch** and **Decay**.

Drag the handle on the first harmonic: sideways to set **Pitch**, up or down to set **Decay**.

Controls

The **RING** group:

Control	What it does	Range
Pitch	The frequency of the ring. With **Key track** on, the frequency at the root key.	30 Hz to 8 kHz
Key track	The ring follows the played key. The root key is MIDI note 33.	On / off
Decay	The time that the lowest harmonic takes to fall by 60 dB.	5 ms to 10000 ms
Damping	Makes the high harmonics die first. 0: all harmonics ring for the same time. 1: only the lowest few ring.	0 to 1

The **COLOUR** group:

Control	What it does	Range
Odd harmonics	Only the odd harmonics ring. The sound is hollow, like a closed tube.	On / off
Spread	Detunes left and right, up to 15 cents each way. Only on a stereo chain.	0 to 1

Control	What it does	Range
Mix	The balance between the dry sound (0) and the ring (1).	0 to 1

Spread is dimmed on a mono layer.

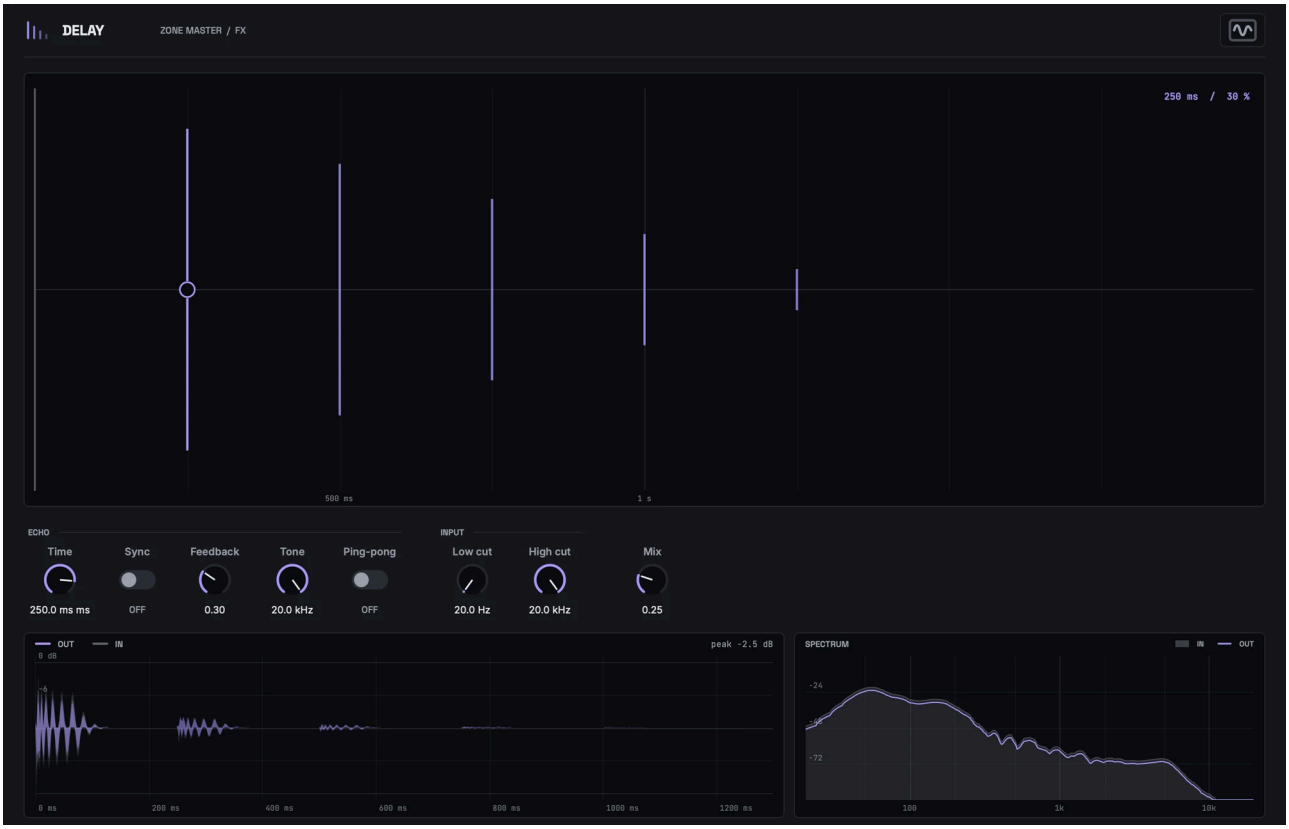
FX curves

A curve can move **Pitch**, **Decay**, **Damping** and **Mix**. See FX curves.

Delay

The Delay repeats the sound as echoes. Each echo is quieter than the one before it, as set by **Feedback**. Use it for short or long echoes, for repeats in time with the tempo (**Sync**), or with **Ping-pong** for echoes that cross between left and right.

> **Note**
>
> The Delay is available only on a bus, a submix and a master chain. Put it on a bus and send the layers to it. See Layers, buses and master.



The picture

The picture shows the echoes over 2 s. Each echo is a line at its time, as tall as its level (down to -60 dB). With **Ping-pong** on, the left echoes are above the center line and the right echoes are below it. The text at the top right shows **Time** and **Feedback**.

Drag the handle on the first echo sideways to set **Time**.

Controls

The **ECHO** group:

Control	What it does	Range
Time	The time between the echoes. With **Sync** on, a note division.	1 ms to 600 ms
Sync	**Time** follows the tempo in note divisions. The tempo is the host's tempo, or 120 BPM in the standalone app. When you turn **Time**, it goes to the nearest division.	On / off
Feedback	How much of each echo goes back into the delay. A higher value gives more echoes.	0 to 0.98
Tone	A low-pass filter in the feedback path. Each echo is darker than the one before it. 20 kHz is open.	200 Hz to 20 kHz
Ping-pong	The echoes cross between left and right.	On / off

The **INPUT** group filters the sound before it goes into the delay:

Control	What it does	Range
Low cut	Removes the lows. 20 Hz is open.	20 Hz to 2 kHz
High cut	Removes the highs. 20 kHz is open.	500 Hz to 20 kHz

Control	What it does	Range
Mix	The balance between the dry sound (0) and the echoes (1).	0 to 1

Reverb

The Reverb puts the sound in a space. It has two types with one set of controls. Use it to give a dry hit a room, a hall or a plate tail.

> **Note**
>
> The Reverb is available only on a bus, a submix and a master chain. Put it on a bus and send the layers to it. See Layers, buses and master.



Types

Select the type with the **Type** icons.

Type	What it makes
Room / Hall	A room. A larger **Size** gives a hall. Early reflections (**Early**) come first, then the tail.
Plate	A dense tail from the first millisecond, with no separate reflections. **Diffusion** sets how fast the hit spreads into the tail.

The picture

The picture shows how the tail falls, in dB over a time scale from 10 ms to 20 s. The solid line is the lows: they fall by 60 dB over **Decay**, after **Pre-delay**. The dashed line is the highs. With **Room / Hall**, a bump at the start shows the early reflections. The value of **Decay** shows at the top right.

Drag the handle at the -60 dB point of the lows sideways to set **Decay**.

Controls

The **TAIL** group:

Control	What it does	Range
Decay	The time that the low frequencies of the tail take to fall by 60 dB.	0.05 s to 20 s
Highs	The decay of the high frequencies (above about 4 kHz), as a part of **Decay**. 1: the highs last as long as the lows. Lower: the tail gets darker as it falls.	0.1 to 1
Size	The size of the space.	0.25 x to 2 x
Pre-delay	The gap before the reverb starts.	0 ms to 100 ms

The **FRONT** group shows one control, as set by the type:

Control	What it does	Range
Early	**Room / Hall** only. The level of the early reflections.	0 to 2
Diffusion	**Plate** only. How fast the hit spreads into the tail.	0 to 1

Control	What it does	Range
Width	The stereo width of the reverb. 0 is mono.	0 to 1
Level	The level of the reverb (the wet sound).	-48 dB to 24 dB
Mix	The balance between the dry sound (0) and the reverb (1).	0 to 1

Multiband

The Multiband splits the sound into 2 to 5 frequency bands. Each band has its own FX chain, called a lane. Use it to process the low end and the top of a hit in different ways: for example, distortion on the highs only, or a different compression on each band.

When the lanes are empty, the bands add back together with a flat frequency response.



Lanes

In the tree, the Multiband shows its lanes under it. Each lane row has its own **+** to add an FX to that lane.

Lane	The sound that goes through it
Full band	The full sound, before the split.
Band 1 … **Band 5**	One band, from low to high.
Post	The bands after they are added together. **Post send** sets how much of each band goes through it.

A lane cannot hold a Multiband. See Multiband lanes for how to add and move FX in a lane.

The picture

The picture shows the bands from 20 Hz to 20 kHz. Each band shows its response at its gain, its name (**B1**, **B2**, ...) and the number of FX in its lane. **S** and **M** next to the name show that the band is soloed or muted. A silent band has diagonal lines. Behind the bands, the spectrum of the hit shows as it goes into the Multiband and as it comes out.

Action	Result
Click a band	Selects the band. Its controls show under the picture.
Drag a split line	Moves the split frequency.
Drag the handle in a band	Sets the gain of the band.
Double-click in a band	Splits the band in two at that frequency. The new band has an empty lane.
Double-click a split line	Merges the two bands next to it. The FX of both lanes go into the merged lane.

Split and merge bands

A Multiband has 2 to 5 bands. A new Multiband has 3 bands, split at 140 Hz and 2.5 kHz.

- To add a band, double-click inside a band at the frequency where you want the split. You cannot add a band when there are 5 bands.
- To remove a band, double-click the split line between two bands. You cannot remove a band when there are 2 bands.

Controls

The selected band (its title shows the band, its frequency range and its number of FX):

Control	What it does	Range
Gain	The level of the band after its lane.	-24 dB to 24 dB

Control	What it does	Range
Post send	How much of the band goes through the **Post** lane. The rest goes past it.	0 to 1
Mute	Silences the band.	On / off
Solo	Plays only the soloed bands.	On / off

The **EVERY BAND'S DYNAMICS** group changes every Dynamics module in the band lanes at the same time:

Control	What it does	Range
Depth	Scales every ratio and slope. 0: every ratio and slope at 1:1. 1: as set in each Dynamics.	0 to 1
Time	Multiplies every attack and release time.	0.1 x to 10 x
Downward	How much of the downward compression (the ABOVE side).	0 to 1
Upward	How much of the low stages (the lift or the expansion of the BELOW side).	0 to 1

These controls do not change the Dynamics modules in the **Full band** and **Post** lanes.

The **OUTPUT** group:

Control	What it does	Range
Post mix	The balance between the bands before the **Post** lane (0) and after it (1).	0 to 1
Mix	The balance between the input of the Multiband (0) and its output (1).	0 to 1
Output	Gain after the Multiband.	-24 dB to 24 dB
Phase-aligned dry	The dry sound of **Mix** also goes through the band split. This prevents phase cancellation when you blend.	On / off

The OTT card

The module picker has an **OTT** card: 3-band upward and downward compression. It adds a Multiband with these settings:

- 3 bands, split at 120 Hz and 2.5 kHz.
- **Phase-aligned dry** on.
- In each band lane, one Dynamics: **Threshold** -30 dB, **Ratio** 4:1, **Low thresh** -40 dB, **Low slope** 0.25, **Max lift** 24 dB, attack 2 ms and release 80 ms on both sides.

Use **Depth** and **Time** to set the amount and the speed of the effect.

Macros and modulation

Use modulation to let one control move other parameters. A macro knob can tune a whole drum. Velocity can make hard hits brighter. A MIDI controller can open a hat. One layer's hit can pull the level of a different layer down.

Each of these is a **route**: one source of modulation that moves one parameter, by a depth. A parameter can have routes from many sources. A source can move many parameters.

How modulation works

A route has these parts:

Part	What it is
Source	What moves the parameter: a macro, velocity, a MIDI controller, and so on. See Sources.
Target	The parameter that moves, for example **PITCH** of an Osc layer.
Depth	How far the source moves the target, from `-100 %` to `+100 %` of the range of the target.
Options	**BI**, **INV**, **LATCH** and the response curve. See The matrix page.

The source adds to the value that the knob of the target has. When the source is at 0, the target stays at its knob value. When the source is at its maximum, the target moves by the depth. The result always stays inside the range of the target.

Each sound (zone) holds up to 128 routes. The kit master holds its own 128.

Which parameters take modulation

These parameters take routes:

- The **Level**, **Pan** and **Length** of a layer.
- The parameters of the source of a layer.
- The parameters of an FX module that can change while the hit plays.
- The 8 macros of the zone.

A knob that takes routes shows them as a ring in the modulation colour (mint green) around its dial. The ring shows the range that each route moves the knob over. A dot on the ring shows where the moving sources hold the knob now.

Macros

A macro is a knob that moves one or more parameters by routes. Use macros to make a small set of controls for a sound, for example **Tune**, **Decay** and **Punch**. Your DAW can automate the macros. See Host automation.

Zone macros and kit macros

Each zone has 8 macros of its own. The kit also has 8 kit macros. A kit macro can move parameters in all zones and in the kit master.

The **MACROS** section is at the bottom of the window. It shows 8 knobs. In a kit with more than one zone, two tabs show at the top of the section:

Tab	What the 8 knobs are
ZONE n	The macros of the selected zone (n is its number).
KIT	The 8 kit macros.

The text **n / 8 MAPPED** at the right of the section title shows how many of the 8 knobs move something.

The parts of a macro

Each macro has a number, a name, a knob and a chip.

Part	What it does
Number	`01` to `08`.
Name	The name of the macro. A macro with no name shows **Macro**. Double-click the name to change it.
Knob	The value of the macro, from 0 to 100 %. The text in the knob shows the value in the units of the first parameter that the macro moves, for example `2.40 kHz` or `-6.0 dB`. A macro that moves nothing shows a percentage.
Chip	What the macro moves: the name of its first target, and `+n` for the other targets. A macro that moves nothing shows a dashed **ASSIGN** chip. Click the chip to arm the macro. Drag the chip onto a knob to assign the macro to that knob.

If all the routes of a macro are bipolar, the arc of the knob starts at 12 o'clock. Double-click the knob to set it back to the centre.

The macro knob menu

Right-click a macro knob to open its menu:

Item	What it does
Rename...	Opens the name for editing.
Load at n % with the sound	Saves the current knob value with the sound. When the sound loads, the knob goes to this value. For a kit macro, the item is **Load at n % with the kit**.
Clear its n routes	Removes all the routes of this macro. For a kit macro, it removes them from all zones and the kit master.
Modulation items	A macro knob is also a target. The other items let other sources move this macro. See The knob menu.

What can move a macro

A macro knob is a target too. When a source moves a zone macro, the macro moves all its targets with it.

- A zone macro takes routes from the kit macros, the performance sources, MIDI controllers and the locks of a sequencer step. See Sequencer.
- A kit macro takes routes from MIDI controllers, **Aftertouch**, **Pitch bend** and the other kit macros.

A macro cannot move itself.

Make a route

There are four ways to make a route. All four make the same route. A new route starts at a depth of `+25 %`.

Method	Use it to
Arm a source, then drag knobs	Set the depth by ear on many knobs, one after the other.
Drag a source onto a knob	Make one route fast.
Right-click a knob	Pick any source for this knob.
+ ROUTE on the matrix page	Pick any source and any target from menus.

Arm a source

When you arm a source, every knob that takes the source shows a circle. Drag a knob up or down to set how far the source moves it. The first drag makes the route.

To arm a source, do one of these:

- Click the chip of a macro.
- Click **SOURCES** and pick a source from the **ARM A SOURCE** menu.
- Click a meter in the **EXPRESSION** section.

While a source is armed:

- A banner at the bottom of the window shows the name of the source.
- Drag a knob up to increase the depth. Drag down to decrease it. A drag of 150 pixels moves the depth by 100 %. Hold `⇧ Shift` for fine steps.
- A box above the knob shows the depth as you drag.
- Double-click a knob to remove the route from that knob.
- The other controls continue to work. You can open other pages.

To stop, press `⎋ Esc` or click the armed chip or button again. The source also stops when a full-window panel opens, for example the preset browser.

Drag a source onto a knob

Drag the chip of a macro, or a meter in the **EXPRESSION** section, onto a knob. A dashed line follows the pointer. Release the mouse button on the knob to make the route.

The knob menu

Right-click a knob that takes modulation. The **MODULATE** section of the menu has these items:

Item	What it does
Macro	The 8 macros of the zone.
Kit macro	The 8 kit macros. This shows only in a kit with more than one zone.
Velocity, **Mod wheel**, **Aftertouch**, **Key pressure**, **Pitch bend**, **Key**, **Random**, **Groove**	The performance sources.

Item	What it does
MIDI controller	**Learn - move a controller**, the named controllers, and all 128 controllers in groups of 32.

A tick shows a source that moves the knob now. Pick a ticked source to remove its route. A source that cannot move this knob shows in grey.

Below the sources, the menu shows each route on the knob, with its depth. Each route has a submenu:

Item	What it does
Depth slider	Sets the depth, from `-100 %` to `+100 %`.
Bipolar - centred on the source's middle	Same as **BI** on the matrix page.
Invert	Same as **INV** on the matrix page.
Latch at the hit	Same as **LATCH** on the matrix page.
Remove	Removes this route.

Remove all modulation removes all routes from the knob. **Show the matrix** opens the matrix page.

Learn a MIDI controller

1. Right-click the knob.
2. Select **MIDI controller** > **Learn - move a controller**. The banner shows "Move a MIDI controller to assign it to ...".
3. Move a controller on your MIDI device. The first controller that moves gets a route to the knob.

To cancel, press ⎋ Esc.

Sources

Source	Value	When it is read
Macro 1 to **Macro 8**	The macro knob of the zone.	All the time.
Kit macro 1 to **Kit macro 8**	The kit macro knob.	All the time.
Velocity	How hard the note is played.	At the hit.
Mod wheel	MIDI controller 1.	All the time.
Aftertouch	The channel pressure of your MIDI device.	All the time.
Key pressure	The pressure of the key that played the hit.	All the time.
Pitch bend	The pitch bend wheel. Its centre is the middle of the range.	All the time.
Key	The MIDI note number that played the hit, 0 to 127.	At the hit.
Random	A new random value at each hit, different for each route.	At the hit.
Groove	The bar of the groove dynamics for the step that played the hit. See Groove.	At the hit.
CC n	Any MIDI controller, 0 to 127.	All the time.
Curves	A curve drawn over the time of the hit. See Curves.	During the hit.
A layer's hit	The hit of another layer, for ducking. See Ducking.	During the hit.

These MIDI controllers have names in the menus: 1 **Mod wheel**, 2 **Breath**, 4 **Foot (hat pedal)**, 7 **Volume**, 10 **Pan**, 11 **Expression**, 16 to 19 **General 1** to **General 4**, 64 **Sustain pedal**, 71 **Resonance**, 74 **Brightness**.

A source that is "read at the hit" keeps one value for the full hit.

Velocity

A velocity route works differently from the other sources:

- A hit at full velocity plays the sound as you hear it on the page.
- A softer hit moves the target by the depth. With a positive depth, harder hits have more of the target.
- Velocity does not move the **Level** of a layer. Each layer controls its loudness with the **Amplitude** line in its **VELOCITY** section.

The **VELOCITY** section on the page of a layer shows the velocity routes of that layer. Click **+ VELOCITY LINK** to add one.

Groove

The **Groove** source is the groove dynamics of the step that played the hit, in the row of the zone's role, scaled by the dynamics' **AMOUNT**.

- The dynamics change nothing until you add a **Groove** route. For the levels of a recording, route **Groove** to a layer's level as a gain of -24 dB: a bar at 0 % then plays the hit 24 dB down.
- A step at 100 %, a note that you play and a lane that does not follow the groove play the sound as you hear it on the page. As with velocity, a lower bar moves the target by the depth.

The EXPRESSION section

The **EXPRESSION** section shows three meters: **MOD** (the mod wheel), **PRES** (aftertouch) and **BEND** (pitch bend). Each meter shows the last value received. The **BEND** meter shows the value from its centre.

The section shows only when the sound has a route from one of these three sources, or when one of them is armed. Click a meter to arm its source. Drag a meter onto a knob to make a route.

The SOURCES button

SOURCES opens the **ARM A SOURCE** menu. The menu shows each performance source and the **MIDI controller** submenu. A number in brackets shows how many routes a source has.

The button shows **SOURCES n**, where n is the number of routes from sources that are not macros. While a performance source is armed, the button shows its short name, for example **VEL** or **CC 74**.

The matrix page

The matrix page shows all the routes of the sound on one page. To open it, do one of these:

- Click **MATRIX** in the strip at the bottom of the window.
- Select **Matrix** under **MODULATION** in the tree.
- Right-click a knob and select **Show the matrix**.

The top of the page shows **ROUTES** and the number of routes, for example `12 / 128`. **+ ROUTE** is at the right.

The routes are in groups by source, in this sequence: the macros, velocity, the MIDI controllers, aftertouch, key pressure, pitch bend, key, random, then **Drawn sweeps and ducks**. Each group header shows the source and its number of routes. In a kit with more than one zone, the routes of the kit master follow, under **Kit master**.

The locks of sequencer steps do not show here. They show on the sequencer page. See Sequencer.

The controls of a route

Control	What it does	Range
Chip	The short name of the source: **M1**, **KIT 1**, **VEL**, **WHEEL**, **AT**, **POLY AT**, **BEND**, **KEY**, **RND**, **CC n**, **CURVE**, **HIT**.	-
Target	The target, for example **Kick / Osc / Pitch offset**. Click it to open the page of the target. If the target is not in the sound, the text is grey and shows **(moves nothing here)**.	-
DEPTH	How far the source moves the target, as a part of the range of the target. Double-click to set `0 %`.	`-100 %` to `+100 %`
BI	Bipolar. The middle of the source has no effect. Below the middle, the target moves in the opposite direction. Not on velocity routes.	On / off
INV	Invert. The source is read upside down: its maximum is 0 and 0 is its maximum. Not on velocity routes.	On / off
LATCH	The value of the source at the hit stays for the full hit. Off: the target follows the source as it moves. Use it for a hat pedal: the hat keeps the openness it had at the strike. Not on velocity, key or random routes, which are always read at the hit.	On / off
Response knob	Bends the response of the source. Above 1, the target moves only near the top of the source. Below 1, the target moves early. Double-click to set a straight response (1.00).	0.25 to 4.00

Control	What it does	Range
x	Removes the route.	-

Drawn sweeps and ducks show a description in place of these controls, for example `Sweep 200 Hz -> 4.00 kHz over 300 ms`, or `Duck -12.0 dB by Kick over 200 ms of Kick's hit`. Edit a sweep on the curve tabs of its FX or layer page. See FX curves and Curves on Level and Pan. Edit a duck on the page of its layer. See Ducking.

Add a route with + ROUTE

1. Click **+ ROUTE**. A menu shows the sources under **FROM**.
2. Select a source. A submenu shows the targets.
3. Select a target.

The targets are in submenus:

- Each layer: **Level**, **Pan**, **Length**, a submenu with the parameters of its source, and **FX**.
- **Bus 1** and **Bus 2**: the FX of the buses.
- **Macros**: the 8 macros of the zone.
- **Master** (in a kit: **Zone master**): the FX of the master.
- In a kit with more than one zone, also **Kit macros**, **Kit master** and **Kit bus n**.

A target that has a route from this source already shows a tick.

Ducking

Use ducking to make one layer quieter when a different layer hits. For example, the tail of a snare can drop for a short time when the stick sound hits.

The **DUCKING** section is on the page of the layer that becomes quieter.

Control	What it does	Range
Ducked by	The layer whose hit makes this layer quieter. **Nothing** removes the duck.	**Nothing** or any other layer
AMOUNT	How far this layer drops where the curve is at the bottom. Turn right to duck deeper. Left of `0 dB`, the layer becomes louder.	`+12 dB` to `-60 dB`, default `-12 dB`

Control	What it does	Range
TIME	How long the duck lasts after the hit of the other layer. It is the width of the curve.	`5 ms` to `2000 ms`, default `200 ms`
Curve	The volume of this layer after the hit of the other layer. The bottom is down by the full **AMOUNT**. The top is the own level of the layer.	-

The duck starts at the hit of the other layer, after the delay of that layer. A softer hit of the other layer makes a smaller duck. The meter at the top of the section shows the duck in dB as it plays.

A new duck starts with a curve that is fully down at the hit and goes back up to the level of the layer.

Host automation

Your DAW sees a fixed list of 137 parameters:

Parameters	Name in the DAW	Name after you name the macro
8 macros for each of the first 16 zone positions	**Zone 1 Macro 1** to **Zone 16 Macro 8**	**Z1** and the macro name, for example **Z1 Punch**
8 kit macros	**Kit Macro 1** to **Kit Macro 8**	**Kit** and the macro name, for example **Kit Tune**
The output level	**Master**	-

The list does not change when you add or remove zones. A zone position with no zone has no effect. When you remove a zone, the macro values of the zones after it move with their zones.

The list holds only the first 16 zone positions. To automate a macro of zones 17 to 64, add a route from a kit macro to it, then automate the kit macro.

The DAW shows the value of a macro in the units of its first target, the same as the text in the macro knob. The layer, source and FX parameters are not host parameters. To automate one of them, assign a macro to it, then automate the macro.

Procedures

Make a macro that tunes the kick

This procedure makes macro 1 move the pitch of an Osc layer by up to 12 semitones up or down. You need a sound with an Osc layer.

1. Double-click the name of macro 1.
2. Type `Tune` and press `Enter ⏎`.
3. Open the page of the Osc layer.
4. Drag the chip of macro 1 (**ASSIGN**) onto the **PITCH** knob. The chip shows the name of the target.
5. Click **MATRIX**.
6. In the line of the new route, set **DEPTH** to `+25 %`.
7. Click **BI**. The middle of the macro is now the original pitch.
8. Set the macro knob to 50 %.
9. Right-click the macro knob and select **Load at 50 % with the sound**.

The **PITCH** range is 48 semitones. A bipolar depth of `25 %` moves it from `-12 st` to `+12 st`. To tune more layers with the same knob, arm the macro and drag their pitch knobs.

Duck the tail with the kick

This procedure makes a tail layer drop by `12 dB` for `200 ms` at each hit of a kick layer.

1. Open the page of the tail layer.
2. In the **DUCKING** section, set **Ducked by** to the kick layer.
3. Set **AMOUNT** to `-12 dB`.
4. Set **TIME** to `200 ms`.
5. Play the zone. The meter shows the duck as it plays.
6. If the tail comes back too fast, drag the points of the curve down.

Make velocity control the click level

This procedure makes soft hits play the click layer quieter. Use the **Amplitude** line of the layer. Velocity routes do not move **Level**.

1. Open the page of the click layer.
2. In the **VELOCITY** section, find the **Amplitude** line.
3. Set the slider to `100 %`. At velocity 0, the layer is silent.

4. Drag the curve in the response picture to change how fast the level falls at soft hits. Double-click it to reset it.
5. Play soft and hard notes, and compare the click.

To make velocity change the sound of the click, for example its decay, click **+ VELOCITY LINK** and select the parameter.

Sequencer

The sequencer plays patterns on the zones of the kit. Use it to write a beat while you shape the sounds, to audition a kit, or to record what you play on the keys.

The sequencer has two parts:

- The **step grid**. It shows when you select a zone row or the kit's **Master** in the tree. It has one lane for each zone, level with the row of that zone.
- The **TRANSPORT** and **GROOVE** sections at the bottom left of the window. They stay on the screen on all pages, so a pattern can play while you edit a sound.



How it works

A kit has 16 patterns. A pattern has one lane for each zone. A lane has up to 64 steps. A lit step plays its zone one time.

- Each lane has its own length (1 to 64 steps). All lanes count the same steps, and a shorter lane starts again from its first step. For example, a 12-step lane against a 16-step lane makes a polymeter.
- Each pattern has its own grid: **STRAIGHT** (4 steps for each beat, 1/16 notes) or **TRIPLET** (3 steps for each beat, 1/8 triplets). **TEMPO** sets how fast the steps play.
- A lane plays its zone at the lowest MIDI note of that zone. It plays only that zone, also if another zone uses the same note.

- A step holds its note for half a step.
- When you add, duplicate, move or remove a zone, its lanes go with it (see Kits and zones).

The step grid

Steps

Each lit step has four values. The icons at the right end of the top row select the value that the lit steps show and that a drag edits.

Value	What it does	Range
Velocity	The strength of the hit. The step shows it as the height of a bar.	1 to 127. A new step is 100.
Chance	The probability that the step plays on each pass. The step shows it as the height of a bar.	0 to 100 %
↔ **Nudge**	Moves the hit early or late. The step shows a bar from its centre to where the hit plays.	-50 % to +50 % of one step
Ratchet	The number of hits in the step, spaced equally. The step shows its hits side by side.	1 to 4

Chance is calculated again on each pass of the lane. The same pattern plays the same result each time you play it from the start.

To do this	Do this
Light a step	Click an empty step. To light more steps, drag along the lane.
Clear a step	Click a lit step.
Clear more steps	Press a lit step and drag along the lane.
Change the value of a step	Drag a lit step up or down. For ↔ **Nudge**, drag left or right. The value shows above the step.
Set the value back to its default	Double-click a lit step, or ⎇ Alt-click it. The defaults are: velocity 100, chance 100 %, nudge 0, ratchet 1.

A drag changes **Velocity** and **Chance** by 1 for each pixel. **Ratchet** changes by one hit for each 14 pixels. With ↔ **Nudge**, the marker follows the mouse: the width of one step is 100 %.

The grid and the playhead

The grid shows the longest lane, in whole groups of 16 steps. The step numbers are above the lanes. Each group of four steps has its own shade.

If a lane is shorter than the grid, the cells after its end show the repeat of the lane, dimmed. You cannot edit these cells. A thin line shows where the repeat starts.

While the pattern plays, the step number of the current step is lit. Each lane also tints the step it plays now. The playhead shows only when the pattern you edit is the pattern that plays.

Lane length

Control	What it does
The length box of a lane (at the right of the lane)	Shows the length of that lane in steps. Drag up or down to change it, 1 step for each 6 pixels. Click it to open a menu: **1 bar**, **2 bars**, **4 bars**, and **Every lane this long**.
The length control of all lanes (in the top row, after **CHAIN**)	Sets the length of all lanes. If the window is wide, it shows **1**, **2** and **4 BARS**: click one. If the window is narrower, it shows a number: drag it, or click it to open the **PATTERN LENGTH - EVERY LANE** menu.

A bar has 4 beats: 16 steps on the **STRAIGHT** grid, 12 steps on the **TRIPLET** grid. A length in bars that is more than 64 steps is not available (grey). If you make a lane shorter, the steps after its end stay. They play again if you make the lane longer.

Patterns and the chain

The top row of the grid shows the 16 patterns as numbered chips.

- The pattern you edit is filled.
- The pattern that plays has an outline.
- An empty pattern has a dim number.
- A dot under a chip shows that the pattern is in the chain.

If the window is too narrow for 16 chips, the row shows **<** *number* **>**. Click the arrows to go to the previous or next pattern. Right-click the number to open its menu.

To do this	Do this
Edit a pattern	Click its chip. If the sequence plays, the new pattern starts at the end of the pattern that plays now.

To do this	Do this
Add a pattern to the chain	`⇧ Shift`-click its chip, or use **Add to the chain (shift-click)** in its menu.
Remove a pattern from the chain	Click **CHAIN**, then click the entry.
Remove the chain	Click **CHAIN**, then click **Clear the chain**.
Copy a pattern to a different one	Right-click the first pattern and click **Copy**. Right-click the second pattern and click **Paste pattern** *n*.
Clear a pattern	Right-click it and click **Clear**.
Move all the lines of a pattern one step earlier or later	Right-click it and click **Shift left** or **Shift right**, or press `⇧ Shift` + `⎇ Alt` + `← Left` or `⇧ Shift` + `⎇ Alt` + `→ Right` for the pattern you edit.
Change the grid of a pattern	Click the grid chip (after the length control): **STRAIGHT** or **TRIPLET**. It changes the pattern you edit.

The chain holds up to 16 entries. **CHAIN** shows the number of entries. If there is a chain, the patterns in it play in sequence and then start again. Each pattern plays for the length of its longest lane, and all its lanes start from their first step. If there is no chain, the pattern you edit plays. A chain can have patterns on both grids: each pattern plays on its own grid, at the same tempo.

When you change the grid of a pattern, its steps stay. A 16-step lane on the **TRIPLET** grid is 1 bar and 4 steps long.

Copy, **Paste** and **Clear** apply to the lanes of all zones, with their step locks. **Paste** also copies the grid. **Clear** also sets each lane back to 16 steps and the grid to **STRAIGHT**.

The pattern menu also has **Load pattern preset...** and **Save as pattern preset...**. See Pattern presets.

Select and copy hits

Select hits to copy, move or clear a section of a pattern. Use this to rearrange a break. A kit made from a break has one zone for each hit, so one section of the break is on many lanes.

To do this	Do this
Select one column	Click its step number. The selection includes all the zones.

To do this	Do this
Select more columns	Drag along the step numbers, or ⇧ Shift-click a second step number. To add columns to the selection, hold ⌘ Cmd.
Add a step to the selection, or remove it	⌘ Cmd-click the step.
Add a rectangle of zones and steps to the selection	⌘ Cmd-drag in the grid.
Clear the selection	Press ⎋ Esc, or click an empty step or an empty place in the grid. This click does not light the step.
Copy or cut the selected hits	Press ⌘ Cmd + C or ⌘ Cmd + X.
Paste the hits	Click a step number, then press ⌘ Cmd + V. The hits go to the zones that they came from. The first copied step goes to the first column of the selection.
Duplicate the selected hits	Press ⌘ Cmd + D. The copy starts directly after the selection.
Clear the selected hits	Press ⌦ Del.
Move the selected hits one step earlier or later	Press ⇧ Shift + ← Left or ⇧ Shift + → Right.

With no selection, ⌘ Cmd + C, ⌘ Cmd + V and ⌘ Cmd + D apply to the layer or the zone that you select in the tree, and ⇧ Shift + ← Left and ⇧ Shift + → Right move the lane.

If step record is on, a click on the step numbers moves the record cursor. To select hits, ⌘ Cmd-click or ⌘ Cmd-drag in the grid.

To copy separate hits, select only those hits. A paste replaces only the steps that you selected and keeps the distance between them. ⇧ Shift-click on a step in the grid starts step locks (see Step locks).

The selected steps have a light tint. The selected hits also have an outline. After a paste or a duplicate, the new hits are the selection.

A copy holds the full step: velocity, chance, nudge, ratchet and step locks. The copy stays when you edit a different pattern, so you can paste a section into that pattern. If the kit gets more or fewer zones, Rhythmica removes the copy and the selection.

- **Paste:** the paste replaces all the steps in its area, also with empty steps.

- **Time bend:** a pasted hit plays with the time bend of its new position. To keep the feel of a section, use **BAKE** before you copy it.
- **Lane length:** a paste past the end of a lane makes the lane longer, up to 64 steps. Hits past step 64 are not pasted. The hits in the cells that show the repeat of a lane are not selected.
- **Undo:** each paste, cut, duplicate, clear and move is one undo step.

Lane menu

Right-click a lane to open its menu.

Item	What it does
Shift left (shift + left)	Moves the lane one step earlier. The first step goes to the end of the lane.
Shift right (shift + right)	Moves the lane one step later. The last step goes to the start of the lane.
Follows the groove (time bend and dynamics)	On (the default): the lane plays through the time bend and the groove dynamics. Off: the lane plays straight on the grid, at the velocity of its steps. Use this to keep a kick on the beat while the hats follow the groove.
Lock parameters (shift-click)	Only on a step. Starts step locks on that step.
Unlock	Only on a step with locks. Removes the lock of one parameter. Each item shows the parameter and its locked value.
Unlock all	Only on a step with locks. Removes all the locks of the step.

Step locks

A step lock sets a parameter of the zone to a different value for one step only. Use it to change the pitch, decay or filter of single hits in a pattern. A lane can lock up to 16 different parameters.

To lock a parameter on a step:

1. `⇧ Shift`-click the step. You can also right-click it and click **Lock parameters (shift-click)**. The step gets an outline. Rhythmica selects the zone of the lane. A banner shows **STEP** *n* and the instructions.
2. In the tree, select the layer or the module that has the parameter.

3. Drag the knob of the parameter up or down. Hold ⇧ Shift for fine steps. The locked value shows above the knob.
4. To stop, press ⎋ Esc or ⇧ Shift-click the step again.

A step with locks has a dot in its corner. To remove one lock while the step is armed, double-click the knob. To remove locks at other times, use the lane menu.

TRANSPORT

Control	What it does	Range
PLAY	Starts the sequence from its start on the internal clock. Click again to stop. The space bar does the same.	-
REC	Records the notes you play into the pattern. Right-click for the record options.	-
Metronome	Plays a click on each beat while the sequence plays. The first beat of each bar has a higher pitch. Right-click for **Only while recording**.	-
HOST	Only in a plugin host. On: the sequence follows the transport of the host.	Off (default) / on
TEMPO	The tempo of the internal clock. Drag up or down to change it in steps of 1 BPM. Hold ⇧ Shift for steps of 0.01 BPM. Double-click to type a value.	20 to 999 BPM. The default is 120 BPM.

The metronome is never in an exported file.

Record

Recording writes each note into the lanes of the zones that the note plays. The step gets the velocity of the note. Recording works in two ways:

- **While the sequence plays**: each note goes to the step nearest to when you played it, in the pattern that plays. The step gets a nudge that keeps the timing you played. If the lane follows the time bend, the note goes to the step that the bend reads at that time.
- **While the sequence is stopped (step record)**: a red cursor shows on the step numbers. Each note goes to the cursor step, and the cursor moves to the next step. Notes that start within 50 ms of each other are one chord and go to one step. Click a step number to move the cursor.

The **REC** right-click menu has these options:

Item	What it does
Quantize - notes land on the grid (no nudge)	Recorded steps get no nudge.
COUNT-IN: **None**, **1 bar**, **2 bars**	If **REC** is on when you click **PLAY**, the metronome counts this number of bars before the pattern starts. The count-in clicks also if the metronome is off. The default is **1 bar**.

To record a pattern while it plays:

1. Select the pattern to record into.
2. Click **REC**.
3. Click **PLAY**. The count-in plays. Then the pattern starts.
4. Play the notes on your MIDI keyboard.
5. Click **PLAY** to stop. Click **REC** to stop recording.

Tempo and the host

If the host gives a tempo, the sequence uses the tempo of the host. **TEMPO** then shows **TEMPO HOST**, and you cannot edit it.

HOST	What happens when the host plays	What PLAY does
Off	The pattern does not play. The MIDI notes from the host play the zones.	Plays the pattern on the internal clock.
On	The pattern plays at the position of the host transport. Loops and jumps in the host put the steps at the correct positions.	Nothing while the host plays. **PLAY** is lit.

HOST is saved with the plugin instance. It is not saved in a kit preset or a pattern preset.

In a plugin host, each hit of the sequence also goes to the MIDI output of the plugin, on MIDI channel 1, at the note of its zone.

GROOVE

The **GROOVE** section sets the timing feel of the sequence. These settings apply to all patterns. The grid of each pattern is on the step grid (see Patterns and the chain).

Control	What it does	Range
BEND	Switches the time bend on or off.	Off / on
Eye (next to **BEND**)	Shows or hides the time bend editor on the step grid. A hidden time bend still plays.	-
AMOUNT	How much of the time bend you hear. 0 % plays straight. 100 % plays the curve as drawn. Only available while **BEND** is on.	0 to 100 %
CYCLES	How many times the curve repeats in a bar. Only available while **BEND** is on.	1x to 8x
GROOVES	Opens the groove presets, and **From a recording...**.	-

Time bend

The time bend changes **when** the steps of the pattern play. It does not change the steps. Swing, a late snare, a rush into the next bar, a pause and a pattern that plays backwards are all time bends. A groove from the **GROOVES** menu is a time bend that is made for you.

How the time bend works

Think of a read head that moves through the pattern. With no bend, it moves at a constant speed, and each step plays at its position on the grid. The time bend is a curve that sets where the read head is at each moment:

- The horizontal axis is **time**: one pass of the curve.
- The vertical axis is the **position in the pattern** that the read head reads at that time. **PATTERN START** is at the bottom, **PATTERN END** at the top.
- Each horizontal line is one step. A step plays at the moment the curve crosses its line.

The dashed diagonal is the straight line: the pattern as written. Where the curve is above the diagonal, the steps play early. Where it is below, they play late.

In the diagrams below, the pass is 2 beats of 1/16 steps, and all 8 steps are lit. A dot is a hit. The marks under the time axis show when the hits play. The grey ticks show the straight grid.

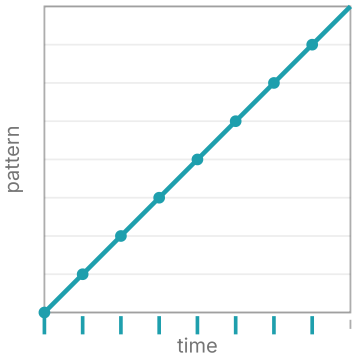


Figure 1: Straight: each step on the grid.

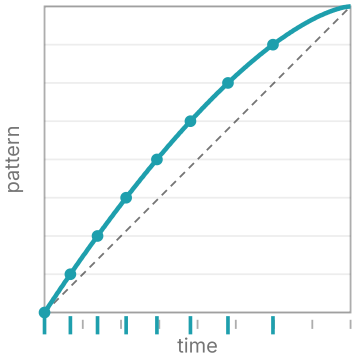


Figure 1: Rush: the steps bunch early.

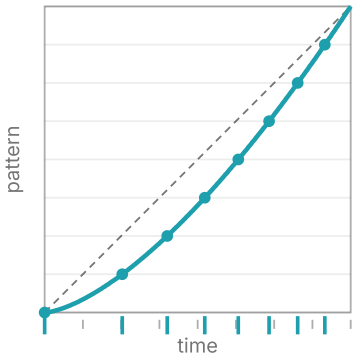


Figure 1: Drag: the steps bunch late.

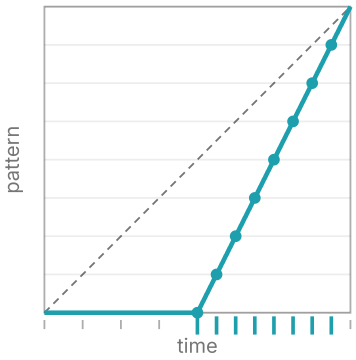


Figure 1: Hold, then catch up: a pause, then a roll.

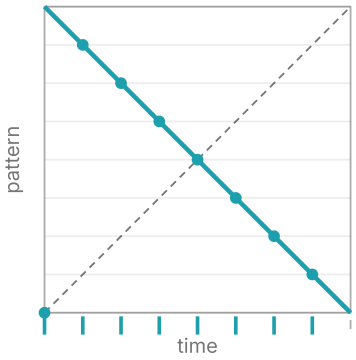


Figure 1: Backwards: the pattern from its end.

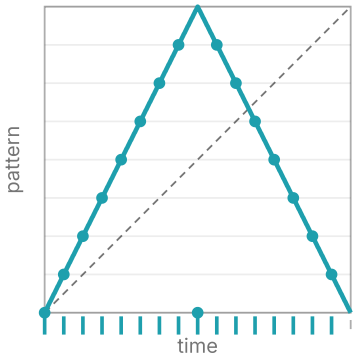


Figure 1: There and back: forwards, then backwards.

The slope of the curve is the speed of the read head:

Shape of the curve	Result
Rising, parallel to the diagonal	The steps play at their normal distance.
Rising, steeper than the diagonal	The steps come closer together: a roll.
Rising, less steep than the diagonal	The steps move apart: the pattern slows down.
Flat	The read head stops. No step plays until the curve rises again.
Falling	The read head moves backwards. The steps play in reverse order. A step that the curve crosses two times plays two times.

A step that the curve never crosses does not play. The step grid dims it.

AMOUNT

AMOUNT mixes the curve with the straight line. At 100 %, the read head follows the curve. At 50 %, it is half way between the curve and the diagonal: each hit moves half as far from the grid. At 0 %, the pattern plays straight.

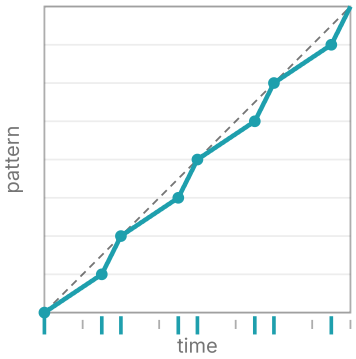


Figure 1: Swing 1/4 at 100 %.

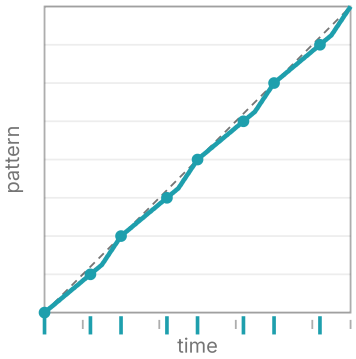


Figure 1: Swing 1/4 at 50 %.

Use **AMOUNT** to set the strength of a groove.

CYCLES

One pass of the curve is the time under the curve editor. **CYCLES** sets how many times the curve repeats in a bar: **1x** is a 1-bar pass, **4x** a 1-beat pass. The curve repeats for the full pattern, so a 1-bar curve on a 4-bar pattern bends each bar in the same way. A pass is never longer than the pattern.

A groove sets its own pass, so **CYCLES** can show a value such as **0.5x** (a 2-bar groove).

Lanes that play straight

Each lane can follow the bend or play straight. To keep a lane on the grid, open its lane menu and set **Follows the groove (time bend and dynamics)** to off. For example, keep the kick on the beat while the hats and the snare swing. See Lane menu.

Grooves and swing

Rhythmica has no separate swing control: swing is a groove. A groove moves each note of a short figure earlier or later, and repeats the figure for the full curve.

To apply a groove:

1. Click **GROOVES**.
2. Select a family, then a groove. **BEND** comes on. The curve and **CYCLES** change to the groove.
3. Set **AMOUNT** to the strength that you want.

To remove the groove, click **GROOVES** and select **None**. This switches **BEND** off.

The fraction in the name of a groove is the note value that it moves: **1/4** moves 1/16 notes, **1/2** moves 1/8 notes, **1/1** moves 1/4 notes. In the table, a "step" is one of these notes.

Family	What it does
Swing	Every second note plays late. **Swing 1/4**, **Swing 1/2** and **Swing 1/1**: late by half a step, a hard swing. **Basic 8th Swing** and **Basic 16th Swing**: late by one third of a step, which puts the note on the triplet (the shuffle).
Push Swing	A swing, and note 5 of the 8-note figure plays a quarter step early.
Pull Swing	A swing, and note 5 of the 8-note figure plays a quarter step late.
Push Snare	Note 5 of the 8-note figure plays half a step early. With **PushSnare 1/4**, this is the snare on beats 2 and 4.
Pull Snare	Note 5 of the 8-note figure plays half a step late.
Timing	1/4 notes that drift late and come back (**Slow Fast**), or drift early and come back (**Fast Slow**). **Slow Fast 2** and **Fast Slow 2** drift over 2 bars.
Random	Each 1/8 note has its own small offset, over 2 bars: up to 3 % of a step (**New Slightly Random**) or up to 8 % (**new more random**). The offsets are the same on each pass.

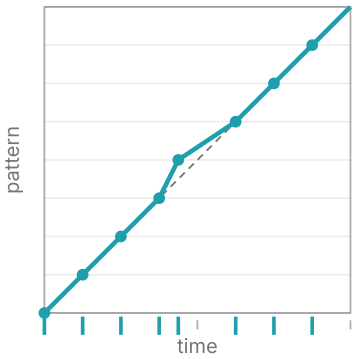


Figure 1: PushSnare 1/4: the snare on beat 2 plays early.

A groove cannot make the first note of its figure play early. The curve cannot go below the start of the pass.

If a groove is grey in the menu, the curve cannot hold it. The time bend curve has up to 32 points, and a groove needs one point for each note of its figure.

Get a groove from a recording

Rhythmica can read the groove of a recorded drum loop, for example a break. It finds each hit in the loop and measures how early or late the hit is against the step grid. The result is a groove, the same as a groove preset.

Before you start, cut the loop to whole bars. The first hit must be at the start of the file.

1. Set **TEMPO** near the tempo of the loop. Rhythmica uses it to count the bars in the loop.
2. Set the grid of the pattern you edit to the grid of the groove: **STRAIGHT** for 1/16 notes, **TRIPLET** for 1/8 triplets.
3. Click **GROOVES**, then **From a recording...**.
4. Select the audio file of the loop. **BEND** comes on. The curve is the timing of one bar of the loop. The dynamics come on too: the **All** row is the level of each step of the loop. See Groove dynamics.
5. Set **AMOUNT** to the strength that you want.

You can also drag the audio file onto the **GROOVE** section.

Each step of the groove is the mean timing of its hits in all the bars of the loop. A step that has no hit in the loop stays on the grid.

Make a 1/16 swing

1. Click **GROOVES**.
2. Select **Swing**, then **Basic 16th Swing**.
3. Set **AMOUNT** to 60 %.
4. Play the pattern. To get more swing, increase **AMOUNT**.

Make a pause, then a roll

1. Set **CYCLES** to **1x** (one pass is one bar).
2. To open the time bend editor, click the eye next to **BEND**.
3. Click **SHAPE** and select **Hold, then catch up**.
4. Drag the middle point to the right, to about 75 % of the pass. The read head stops for the first three beats. Then the full bar plays as a fast roll in the last beat.

The time bend editor

The time bend editor shows along the bottom of the step grid when the eye in the **GROOVE** section is open. When you switch **BEND** on, the editor opens. Edit the curve in the same way as other curves (see Curves). The time bend curve has up to 32 points.

Control	What it does
SHAPE	Replaces the curve with a start shape: **Straight**, **Rush (hits bunch early)**, **Drag (hits bunch late)**, **Rush, then drag**, **Hold, then catch up**, **Backwards**, **There and back**.
GRID	The vertical grid lines in the editor: **1/4**, **1/8**, **1/16**, **1/32**, **1/8 T**, **1/16 T**.
SNAP	On: points that you move go to the nearest grid line.
BAKE	Writes the time bend into the steps. Refer to Bake the time bend.
Expand (the arrows at the right)	Makes the editor fill the page. The lanes show through it, faded. Click again to make it small.

The editor also shows:

- A horizontal line for each step of the pass, and a dot where the curve plays a hit.
- If **AMOUNT** is less than 100 %, a second line that shows the curve as it plays.
- Under the curve, a strip with a mark for each hit where it plays. The height of the mark shows the velocity.

On the lanes:

- Each lane that follows the bend shows a mark along its bottom edge for each hit, where the hit plays.
- A lit step that the curve never reaches is dimmed.
- If you put the mouse on a lit step, lines connect it to its hits.
- While the sequence plays, a vertical line shows the position in the pattern that the bend reads now.

Bake the time bend

BAKE writes the time bend into the steps of every pattern, so that the pattern plays the same with **BEND** off. Then you can edit each hit by hand.

1. In the time bend editor, click **BAKE**.
2. Select one:
   - **Bake the timing into the steps**: each lit step gets the nudge that puts it where the bend plays it now (with the current **AMOUNT**).
   - **Bake the timing and the dynamics (velocity)**: the same, and the velocity of each step also changes by the level of its groove dynamics bar. The groove dynamics then go off.

BEND goes off. To undo the bake, press undo.

Each step bakes from the first pass of its lane. Lanes that play straight do not change.

A nudge is half a step at most. A hit that the bend moves more than half a step stays half a step from its place. A step that the bend plays more than once gets the nudge of the hit nearest to its place. A step that the bend never plays does not change.

Groove dynamics

A groove has timing and dynamics. The time bend sets when the steps play. The groove dynamics set how loud each step of the groove plays. The dynamics do not change the velocity of the steps.

The dynamics have one bar for each step of the groove's figure. The figure is one pass of the time bend: a swing has a figure of 2 steps, a 1-bar curve at **1/16** has 16. The bars repeat with the figure for the full pattern.

To show the dynamics, open the time bend editor (the eye next to **BEND**) and click **DYNAMICS** at the left of its header. Click **TIME** to go back to the curve.

Control	What it does	Range
ROW	The drum role whose bars you see and edit. **All** is for each zone that has no role, or no row of its own. A zone's role is the category of its sound.	**All**, **Kick**, **Snare**, **Hat**, ...
ON	Switches the dynamics on or off.	Off / on
AMOUNT	How much of the dynamics you hear. 0 % plays each step at full level. Drag up or down. Double-click to set 100 %.	0 to 100 %
Bars	One bar for each step, under the step columns. Drag across the bars to draw them. Alt-click a bar to set it to full. The repeats of the figure show faded: edit one and the others change with it.	0 to 100 %

When you draw on the row of a role, that role gets its own row, a copy of the **All** row. To give the role back to **All**, click **ROW** and select **Remove the ... row**.

By default, the dynamics change nothing. To hear them, add a **Groove** route to the zone in the modulation matrix (see Modulation): for example, to the level of its layers.

The dynamics apply to the hits of the sequencer only. Notes that you play, or that the host sends, play at full level. A lane that does not follow the groove plays without the dynamics.

The dynamics are saved with the pattern settings and in pattern presets.

Export the sequence as MIDI

The MIDI export button in the header saves the sequence as a `.mid` file.

- Click the button to save a file.
- Drag the button into your host to drop the file into a track.

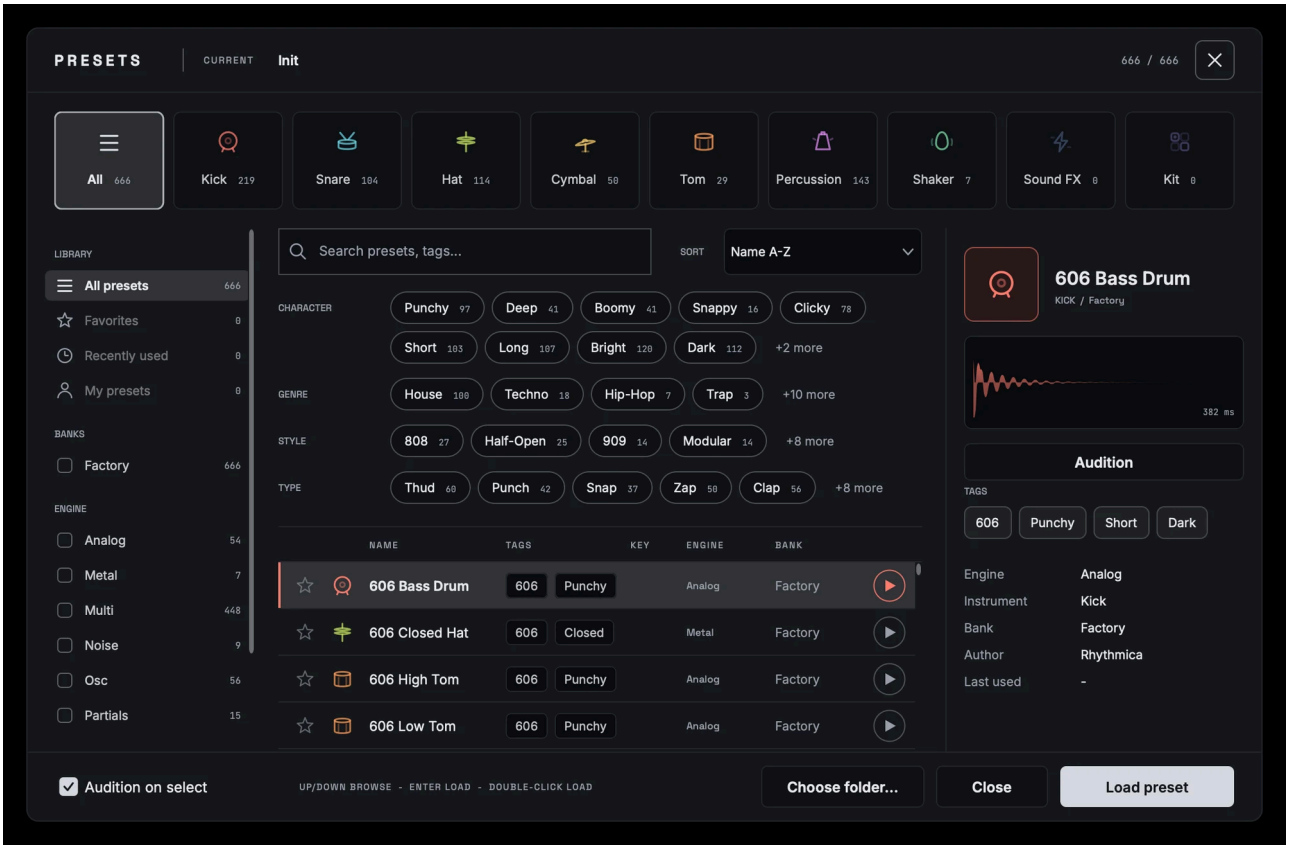
The file holds one pass of the pattern you edit. If there is a chain, the file holds the chain one time. The file includes chance, nudge, ratchets and the time bend as they play on the first pass. The default file name is **Rhythmica Pattern** *n* or **Rhythmica Chain**. The button is dim if the sequence has no step that can play.

Shortcuts

Key	What it does
Space	Starts or stops the sequence on the internal clock.
⎋ Esc	Stops step locks on the armed step.
⎋ Esc	Clears the selection of hits.
⇧ Shift + ← Left / ⇧ Shift + → Right	Moves the selected hits one step earlier or later. With no selection, moves the lane of the selected zone.
⌘ Cmd + C / ⌘ Cmd + X / ⌘ Cmd + V	Copies, cuts or pastes the selected hits.
⌘ Cmd + D	Duplicates the selected hits directly after the selection.
⌦ Del	Clears the selected hits.
⇧ Shift + ⎇ Alt + ← Left / ⇧ Shift + ⎇ Alt + → Right	Moves all the lanes one step earlier or later.

Presets

A preset is a file that holds a sound, a kit or a pattern. Use presets to load factory content, to save your work, and to move sounds between projects and computers.



Types of preset

Type	What it holds	File
Sound preset	The sound of one zone: its layers, buses, master and macros.	`.rhythmica`
Kit preset	The whole kit: all zones, their patterns, the kit **Master** and the output gain. Its category is **Kit**.	`.rhythmica`
Pattern preset	One pattern: a part for each drum role, with its steps, the length, the grid and the groove.	`.rhythmica-pattern`

A sound preset or a kit preset also holds the samples that its Sampler layers use. You can copy the file to a different computer and it loads complete.

A pattern preset has no zones. Each part has a drum role (for example **Kick**, **Snare**, **Closed Hat**). When you load the pattern, each part goes to the zone that has that drum role. A pattern preset holds no step locks. To set the drum role of a zone, see Kits and zones.

Where the files are

Bank	What it is	Location
Factory	The factory sounds, kits and patterns. Read-only.	macOS: `/Library/Application Support/Rhythmica/Factory` Windows: `%ProgramData%\Rhythmica\Factory` Linux: `/usr/share/rhythmica/Factory`
User	The sounds and kits that you save.	macOS: `~/Library/Rhythmica/Presets` Windows: `%APPDATA%\Rhythmica\Presets` Linux: `~/.config/Rhythmica/Presets`
User patterns	The patterns that you save. They show in the **User** bank of the pattern browser.	macOS: `~/Library/Rhythmica/Patterns` Windows: `%APPDATA%\Rhythmica\Patterns` Linux: `~/.config/Rhythmica/Patterns`
Custom	One more folder of `.rhythmica` files that you choose.	Any folder

The Factory folder has one subfolder for each bank of content, for example `Kicks`, `Snares`, `Kits` and `Patterns`. The browser reads all subfolders of each location.

If the Factory folder is missing, the browser footer shows **FACTORY CONTENT MISSING** and the path. Install Rhythmica again to repair it.

Add your own folder

To add a folder of presets as the **Custom** bank:

1. Open the preset browser.
2. Click **Choose folder...**.

3. Select the folder. The browser shows its presets in the **Custom** bank.

You can also set the folder in **Settings**, at **CUSTOM PRESET FOLDER**: click **Choose...** to set it, or **Clear** to remove it.

To use preset files from a different person or computer, copy them into the User folder or into your Custom folder. To give your presets to a different person, copy the files from the User folder.

The preset browser

Click the preset name in the header (next to **PRESET**) to open the preset browser. The browser fills the window. The header of the browser shows **PRESETS**, the **CURRENT** preset and the number of presets in the list against the total.

Find a preset

Top

Control	What it does
Category tiles	**All**, **Kick**, **Snare**, **Hat**, **Cymbal**, **Tom**, **Percussion**, **Shaker**, **Sound FX** and **Kit**. Click a tile to show only that category. Each tile shows its number of presets.

Left

Section	Control	What it does
LIBRARY	**All presets**	Every preset.
LIBRARY	**Favorites**	The presets with a star.
LIBRARY	**Recently used**	The presets you loaded. Rhythmica keeps the last 50.
LIBRARY	**My presets**	The presets in your own folders.
BANKS	**Factory**, **User**, **Custom**	Click a bank to show only that bank. Click more banks to show all of them. Click again to remove the filter.
ENGINE	The sources	Shows only presets that use that source in all layers. **Multi** is a preset with more than one type of source.

Centre

Control	What it does
Search	Type words. A preset shows if each word is in its name, tags, genres, bank, folder, engine or category.
SORT	**Name A-Z**, **Name Z-A**, **Recently used**, **Category**, **Bank**, **Pitch**. **Pitch** goes from low to high, with the presets that have no pitch last.
Tag chips	Click a chip to show only presets with that tag. See Tags and genres.

The list

Each row shows these columns. On a narrow window, some columns do not show.

Column	What it shows
Star	Click it to add the preset to **Favorites** or to remove it.
NAME	The name of the preset.
TAGS	The tags of the preset.
KEY	The pitch of the hit as a note name, for example `F1`.
ENGINE	The source of the preset, **Multi**, or **Kit**.
BANK	The bank of the preset.
Play	Click it to audition the preset.

To do this	Do this
Select the next or previous preset	Press `↓ Down` or `↑ Up`. This works while you type in the search box.
Load the selected preset	Press `Enter ⏎`, double-click the row, or click **Load preset**. For a kit, the button shows **Load kit**.
Close the browser	Press `⎋ Esc`, or click **Close** or the cross at the top right.

The selected preset

The panel at the right shows the selected preset. It shows only if the window is wide enough.

Item	What it shows or does
Name	The name of the preset. You can select the text and copy it.
Category and bank	For example **KICK / Factory**.
Waveform	The hit of the preset and its length. For a kit, the steps of its pattern, one row for each zone with steps.
Audition	Plays the preset.
Load sounds	Only for a kit. See Load a kit.
Load patterns	Only for a kit. See Load a kit.
TAGS	The tags of the preset. On your own presets, you can edit them.
Engine, **Instrument**, **Bank**, **Author**, **Last used**	Information about the preset.

Audition

The browser plays a preset before you load it:

- A sound preset plays one hit at full velocity, with the macros at their start values. A hit plays for 10 s at most.
- A kit preset plays its pattern (its chain, if it has one) with its own sounds, for 2 bars at least. If the kit has no steps, it plays the hit of its open zone.

If **Audition on select** is on, a preset plays when you select it. This setting is on by default. It is also in **Settings**.

The browser keeps the last 64 previews that it made. When you select one of these presets again, it plays immediately.

Tags and genres

The tag chips are in groups:

Group	What it holds
CHARACTER	Words that describe the sound: **Punchy**, **Deep**, **Boomy**, **Snappy**, **Clicky**, **Short**, **Long**, **Bright**, **Dark**, **Roomy**, **Gated**, **Distorted**.
GENRE	The styles of music that the preset is for.
STYLE	All other tags, for example machine names and your own tags.
TYPE	What the sound is in its category, for example **Clap**, **Open**, **Closed**, **Ride**, **Crash**, **Bell**.

Each chip shows the number of presets in the list that have it.

- If you select more than one tag, a preset must have all of them.
- If you select more than one genre, a preset must have one of them.
- If a group has more chips than fit, the last chip shows the number of hidden chips, for example **+5 more**. Click it to show them all. Click **Less** to hide them again.

To edit the tags of one of your own presets:

1. Select the preset in the browser.
2. To remove a tag, click the cross on the tag.
3. To add a tag, click **+ Add tag**, type the tag, and press `Enter ⏎`. Rhythmica writes the change into the preset file.

Load a preset

Load a sound

A sound preset loads into the selected zone. The zone keeps its MIDI notes. The macros of the zone go to the values in the preset. If the kit has only one zone, the preset also sets the output gain.

Load a kit

A kit preset can load in three ways:

Button	What it loads
Load kit	The whole kit: the zones, the patterns, the kit **Master** and the output gain. The current kit goes.

Button	What it loads
Load sounds	The sounds of the kit, which then play your patterns. Rhythmica matches zones by drum role.
Load patterns	The patterns of the kit, played by your sounds. Rhythmica matches zones by drum role. If no zone has the drum role of a part, Rhythmica adds an empty zone for it.

Save a preset

To save a sound or a kit:

1. Click the save button in the header. The save dialog opens. Its title is **SAVE PRESET** or **SAVE KIT**.
2. Select **KIT** or **ZONE**. **KIT** saves the whole kit. **ZONE** saves the sound of the selected zone. If the kit has more than one zone, the dialog starts on **KIT**.
3. Type a **NAME**.
4. For a zone, select a **CATEGORY**. A kit always has the category **Kit**.
5. Edit the **TAGS**. Separate the tags with commas.
6. Click **Save**, or press `Enter ⏎`. Rhythmica saves the preset in the **User** bank.

> **Warning**
>
> If a User preset with the same name exists, the button shows **Replace**. Before you click it, make sure that you want to replace the file. The old preset is lost.

The **TAGS** field starts with suggested tags. Rhythmica reads them from the sound: tags for its structure, and the **CHARACTER** tags that it measures on the hit for the category. If you change the category, Rhythmica changes the measured tags. Your own tags stay. **KIT** and **ZONE** each keep their own name and tags while you change between them.

Save one layer

You can save one layer, and all the layers in it, as a sound preset:

1. Right-click the layer in the tree.
2. Click **Save as preset...**. The dialog opens without **KIT** and **ZONE**.
3. Type the name, select the category, and click **Save**. The zone keeps its own name.

Pattern presets

A pattern preset loads a rhythm into one pattern of the kit. Use it to start a beat, or to try a factory rhythm on your own sounds.

Load a pattern preset

1. Do one of these:
   - Click **PATTERNS** in the top row of the step grid. On a narrower window, this is an icon. The pattern loads into the pattern you edit.
   - Right-click a pattern chip and click **Load pattern preset...**. The pattern loads into that pattern.

   The pattern browser opens. 2. Select a pattern. The panel at the right shows its parts. Each part shows the zone that will play it. A dim part has no zone yet. 3. Click **Load pattern**, or press `Enter ⏎`. A message at the bottom of the grid shows what loaded.

> **Note**
>
> A pattern preset replaces the pattern, its grid and its step locks. It also sets the time bend, which applies to all patterns of the kit. If no zone has the drum role of a part, Rhythmica adds an empty zone for it.

The pattern browser works like the preset browser, with these differences:

- The browser shows the Factory patterns and the patterns you saved. It has no **Choose folder...** button.
- The tiles at the top are genres.
- The **GRID** column shows the rate and the length, for example `1/16  1 bar`.
- The panel at the right shows **Genre**, **Grid** and **Groove**. **Groove** is **Time bend** or **Straight**.
- **Audition** plays the pattern with the sounds of your current kit, for 2 bars at least.

Save a pattern preset

1. Right-click a pattern chip.
2. Click **Save as pattern preset...**. The **Save pattern preset** dialog opens.
3. Type a **Name**.
4. Select a **Genre**.
5. Click **Save**. Rhythmica saves the pattern in your Patterns folder. A message at the bottom of the grid shows the result.

Rhythmica saves each lane as the drum role of its zone. A lane whose zone has no drum role is not saved. The message names these zones. If two zones have the same drum role, their lanes become one part. If a file with the same name exists, Rhythmica saves a new file with a different name.

Other files

- To export one hit as a WAV file, or the sequence as a MIDI file, use the export buttons in the header. See The window and Export the sequence as MIDI.
- The step grid, the patterns and the tempo are also saved with your host project.

Resynthesize

Resynthesis turns a recorded drum sound into a sound made by Rhythmica's sources. You give it one sample. Rhythmica measures the sound and makes a zone of layers that plays the same sound. Each layer is an Osc, Analog, Noise or Partials source, with its curves and FX.

Use resynthesis when you have a drum sample and want to edit it as a synth sound: change its pitch sweep, its decay, its click or its noise. The result does not play the sample. You can edit all the controls of each layer.

On this page, the **hit** is the sound in the sample from its start (the onset) to its end.

Open the Resynthesize page

You can open the page in four ways.

From	Do this	Where the result goes (default)
The header	Click **Resynthesize** in the header bar.	**This zone**
A Sampler layer	In a Sampler layer, click **Resynthesize** in the top row. The page opens with the sample from **START** to **END**.	**This zone**
A Sampler slice	In a Sampler layer, right-click a slice. Select **Resynthesize...**	**A new zone**
All the slices of a Sampler layer	In a Sampler layer with slices, click **TO ZONES** or right-click the **SAMPLE** view. Select **Resynthesize all slices...**	One zone for each slice

> **Note**
>
> If the window is narrow, the header shows the **Resynthesize** button as an icon only. Its tooltip gives its name.

If you open the page from the header, the page has no sample yet. The top area shows **Drop a one-shot or a break here**. Do one of these:

- Drag an audio file onto the page.
- Click **Choose a file...** and select a file.

The page reads WAV, AIFF, FLAC, OGG and MP3 files. It reads the first 10 s of the file. If the file has more than one channel, the page adds the channels together into one (mono). If the page cannot use the file, it shows the file name and the reason: "not an audio file this can read" or "too short to fit".

To use a different sample, click **Choose file...** at the top of the page, or drop a new file on the page.

The parts of the page

Part	What it shows
Header	**RESYNTHESIZE**, the name of the sample and the length of the hit in seconds, or the number of slices. The view button, **Play**, **Choose file...** and **x** (close).
Hit view	The waveform of the sample over its spectrogram, with a time ruler and the markers.
SAMPLE view	The whole recording with **START** and **END**. With **Stick / body / tail** and **Ringing hit**, the page opens on this view and it also shows the slice markers. With **Kick** and **Snare**, the page opens on the hit view. The view button changes between the two views. See Set START and END and Resynthesize a break.
METHOD	One card for each method. Each card shows the method name, the layers it makes and the time the run will take on this sample.
OPTIONS	A description of the selected method and its options. **Defaults** sets all the options of the method back to their default values.
Footer	**LANDS IN**: **This zone** or **A new zone**. With more than one slice: **Zones** or **With the groove**. The time estimate. The **Resynthesize** button.

The page opens on the method and the options that you used last time.

To listen to the sample, click **Play** or push `Space`. A playhead moves over the view. Click **Stop** or push `Space` again to stop.

To close the page without a change, click **x**, push `Esc` or click outside the page.

Choose a method

Select the card of the method for the type of hit that you have. Use this table to find the method and the options to start with.

The hit	Method	Start with
A kick from a drum machine or a synth, or a processed kick	**Kick**	**Model** Osc, **Click** None
A kick from an 808 or a 909	**Kick**	**Model** 808 or 909
A snare from a drum machine or a synth, or a processed snare	**Snare**	**Model** Osc
A snare from an 808 or a 909	**Snare**	**Model** 808 or 909
An acoustic snare, a tom, a hit cut from a break	**Stick / body / tail**	**Parts** Stick, body, tail
A timpani, or a drum with a held low tone	**Stick / body / tail**	**Low end** Osc
A metal hit, a bell, a cowbell, a hand drum	**Ringing hit**	**Layout** Burst + tail
A ringing hit that you want to play with the Struck controls	**Ringing hit**	**As Struck** on

With **Model** 808 or 909, the result is the drum of that machine, with its knobs set to match the hit. You can then change the sound with the knobs of the machine. With **Model** Osc, Rhythmica reads the pitch and the level of the drum from the hit, cycle by cycle.

Each method makes these layers:

Method	Type of hit	The layers it makes
Kick	Synthetic and processed kicks	One Osc for the body of the kick, with its pitch and level curves. Optional: a click layer (Partials or Noise) and a Noise layer for the noise floor. With **Model** 808 or 909: one Analog layer.
Snare	Synthetic and processed snares	One Osc (**Body**) for the tone of the drum and one Noise layer (**Noise**) for the rattle. Distortion, EQ and Clipper on the zone master. Optional: a Partials layer (**Shell**). With **Model** 808 or 909: one Analog layer.
Stick / body / tail	Acoustic hits with parts that sound different: snares, toms, hits from breaks	One Partials layer that plays the parts in sequence. One Noise layer for the rattle. Optional: a sine Osc for a held low tone.

Method	Type of hit	The layers it makes
Ringing hit	Hits that are mostly a ring: metal, bells, hand drums	One Partials layer. With **As Struck**: one Struck layer.

Kick

Osc + click + noise floor, or an 808 / 909

One Osc makes the body of the kick. Rhythmica reads the pitch and the level of the body from the hit, cycle by cycle, and writes them into the Osc's pitch and level curves. Rhythmica sets the level of each layer to match the hit.

Option	What it does	Values
Model	**Osc**: the Osc, click and noise floor layers. **808** / **909**: the bass drum of that machine, as an Analog layer. Rhythmica sets its knobs (DECAY, TONE, LEVEL for the 808; TUNE, ATTACK, DECAY, LEVEL for the 909, and PITCH) to match the hit, at full accent.	Osc, 808, 909
Click	The top end of the attack. **Mid**: a Partials layer (**Click**) over the first 30 ms. **High**: a Noise layer (**Click**) over the first 15 ms. Shown with **Model** Osc only.	None (default), Mid, High
Noise floor	Adds a high-passed Noise layer (**Noise floor**) under the full body. Shown with **Model** Osc only.	On / off (default off)

If Rhythmica cannot read the kick with the Osc, it makes the full hit as one Partials layer (**Partials**).

Use **Click** Mid if the attack has a tone, for example the knock of a processed kick. Use **Click** High if the attack is a short tick of noise.

Example. The sample is the **909 Bass Drum Long** preset (an Analog layer), rendered to a file. **Model** Osc, **Click** Mid.

Sample	Result

Snare

Osc + noise, or an 808 / 909

One Osc makes the tone of the drum, with the pitch fall of the hit. A high-passed Noise layer makes the rattle of the snare wires. The Osc ducks (turns down) the Noise layer. Both layers go through the Distortion, an EQ that matches the tone of the hit, and a Clipper on the zone master.

Option	What it does	Range
Model	**Osc**: the Osc and Noise layers. **808** / **909**: the snare of that machine, as an Analog layer. Rhythmica sets its knobs (TONE, SNAPPY, LEVEL for the 808; TUNE, TONE, SNAPPY, LEVEL for the 909, and PITCH) to match the hit, at full accent.	Osc, 808, 909
Clip	The Clipper on the zone master. **Auto**: Rhythmica decides from the hit.	Auto, On, Off
Clip drive	The drive into the Clipper. Use it for hits that are clipped flat.	0 to 24 dB (default 9 dB)
Distortion	The amount of the Distortion.	0 to 100 % (default 0 %)
EQ	Adds the EQ that matches the tone of the hit.	On / off (default on)
Noise trim	Changes the level of the Noise layer.	-24 to +12 dB (default 0 dB)
Partials	Adds the ringing tones of the drum shell as a Partials layer (**Shell**). **One frame**: one set of partials for the full hit. **Burst + tail**: one set for the attack and one set for the ring after it.	Off, One frame, Burst + tail

All the options after **Model** show only with **Model** Osc.

Example. The sample is the **909 Snare Drum** preset (an Analog layer), rendered to a file. **Model** Osc, all the other options at their defaults.

Sample	Result

Stick / body / tail

Partials in parts + noise - acoustic hits

Rhythmica cuts the hit at your markers into parts: the click of the stick, the body (the ring of the drum shell) and the tail. Each part has its own set of partials. One Partials layer (**Partials**) plays the parts one after the other. A Noise layer (**Rattle**) makes the rattle of the snare wires. The body of the hit ducks the Noise layer. The zone gets two macros: **Decay** and **Tune**.

Option	What it does	Range
Parts	The parts that the hit is cut into.	Stick, body, tail (default) / Stick + tail / Body + tail / Body
Partials per part	The maximum number of partials in each part before the last one.	32 to 512 (default 128)
Tail partials	The maximum number of partials in the last part.	32 to 512 (default 128)
Analysis window	The length of the audio that Rhythmica examines at one time to find the partials.	20 to 1000 ms (default 250 ms)
Rattle noise	Adds the Noise layer for the rattle.	On / off (default on)
Rattle noise fitted on	**What the partials leave**: Rhythmica measures the noise in the sound that the partials do not make. **The record**: it measures the noise in the sample.	What the partials leave (default), The record
Rattle noise level	Changes the level of the Noise layer.	-24 to +12 dB (default 0 dB)
Low end	**Partials**: the partials make the low end. **Osc**: a sine Osc layer (**Low end**) makes a held low tone, for example of a timpani.	Partials (default), Osc

Rattle noise fitted on and **Rattle noise level** show only when **Rattle noise** is on. If **Low end** is **Osc** and **Rattle noise** is on, the Noise layer is **Wash**: a low-passed noise over the low tone.

Use fewer parts if the hit has fewer changes. For example, use **Body + tail** for a tom hit with a soft mallet, which has no click of a stick.

Example. An acoustic snare. All the options and the markers at their defaults.

Sample	Result

Ringing hit

Partials - metal, bells, hand drums

The full hit becomes one Partials layer (**Partials**). The zone gets two macros: **Decay** and **Tune**.

Option	What it does	Range
Layout	**One frame**: one set of partials for the full hit. **Burst + tail**: one set for the attack (the burst) and one set for the ring after it (the tail).	One frame, Burst + tail (default)
Burst length	**Auto**: Rhythmica measures the end of the burst. **Marker**: the **BURST** marker sets it. Shown with **Burst + tail** only.	Auto (default), Marker
Burst fade	The length of the fade from the burst into the tail. Shown with **Burst + tail** only.	10 to 100 % (default 50 %)
Partials per frame	The maximum number of partials in each set.	32 to 512 (default 128)
Tail cut	Where the end of the hit fades out. **Level**: where the hit falls to the **Cut fades to** level. **Marker**: the **CUT** marker sets it.	Level (default), Marker
Cut fades from	The level where the fade-out starts.	-60 to -6 dB (default -30 dB)
Cut fades to	The level where the fade-out ends. Shown with **Tail cut** Level only.	-80 to -20 dB (default -50 dB)
Analysis window	The length of the audio that Rhythmica examines at one time to find the partials.	20 to 1000 ms (default 250 ms)
As Struck	Makes the result as a Struck layer in place of the Partials layer.	On / off (default off)
Exciter	The exciter of the Struck layer. **Recorded**: the attack of the sample, kept as a sample. Shown with **As Struck** on.	Recorded (default), Impulse, Stick, Mallet, Rim
Modes	The number of modes in the Struck bodies. Shown with **As Struck** on.	1 to 96 (default 96)

Option	What it does	Range
Recorded attack	The length of the recorded attack. Shown with **Exciter** Recorded only.	2 to 200 ms (default 30 ms)
Correction passes	The number of passes that adjust the Struck layer to the hit. More passes take more time. Shown with **As Struck** on.	0 to 8 (default 4)

A short hit holds fewer partials than a long hit. Next to **Partials per frame**, the page shows the maximum for this sample, for example "here: up to 180" or "here: burst 40, tail 200". If your value is more than this maximum, the note shows in the accent color. Rhythmica then uses the maximum.

Example. A doumbek (a hand drum), the low stroke. All the options at their defaults.

Sample	Result

As Struck

With **As Struck** on, Rhythmica makes the ring as the modes of the bodies of a Struck layer. The exciter hits the bodies. Use As Struck when you want to change how the hit is played: for example, set the exciter to **Mallet** for a softer attack, or change the decay of the modes. With **Exciter** Recorded, the attack of the sample is the exciter, and the result sounds closest to the sample.

Example. The doumbek sample of the example above. **As Struck** on, all the other options at their defaults.

Result

Set START and END

START and **END** set the part of the recording that Rhythmica uses. All the methods use them.

1. If the page shows the hit view, click the view button in the header. The page shows the **SAMPLE** view.
2. Drag **START** to the start of the part that you want.
3. Drag **END** to the end of that part.

Rhythmica measures the markers of the hit again when you move **START** or **END**. If you opened the page with the **Resynthesize** button of a Sampler layer, that layer gets the same **START** and **END**.

With more than one slice, Rhythmica uses only the slices with a marker between **START** and **END**.

Set the markers

The markers on the hit view set the part of the sample that Rhythmica uses. To show the hit view, click the view button in the header. Rhythmica measures these markers if you do not move them. The page dims the audio before the onset and after the end.

Marker	Method	What it sets
ONSET	All	The start of the hit.
BURST	**Ringing hit**, with **Burst + tail**	The end of the burst.
CUT	**Ringing hit**	The end of the hit.
BODY	**Stick / body / tail**	The start of the body.
TAIL	**Stick / body / tail**	The start of the tail.
END	**Stick / body / tail**	The end of the hit.

The markers show only when the method and the options use them. Rhythmica puts each marker at a measured position when it loads the sample.

- To move a marker, drag it left or right.
- To put a marker back at its measured position, double-click it.

If you drag **BURST**, **Burst length** changes to **Marker**. If you drag **CUT**, **Tail cut** changes to **Marker**.

Mark the parts of an acoustic hit

This procedure sets the markers for **Stick / body / tail**. Use the spectrogram in the hit view: a change of the sound shows as a change of the colors.

1. Click **Play** and listen to the hit.
2. Drag **ONSET** to the start of the hit.
3. Drag **BODY** to where the click of the stick stops and the drum rings.

4. Drag **TAIL** to where the ring becomes a quiet decay.
5. Drag **END** to where the sound of the drum stops.

If **Parts** is **Stick + tail** or **Body + tail**, the page shows **TAIL** only. If **Parts** is **Body**, the page shows no part marker.

Run the resynthesis

1. Select **This zone** or **A new zone** next to **LANDS IN**.
2. Click **Resynthesize**, or push Enter ⏎.

The page closes. A progress window shows **RESYNTHESIZING**, the sample name and the method. It shows:

- The waveform of the hit (**HIT**). When the result is ready, its waveform (**FIT**) draws over the hit.
- The partials that Rhythmica finds, as dots on a frequency axis from 20 Hz to 20 kHz (**PARTIALS**). A larger, higher dot is a louder partial. Dots that Rhythmica does not keep fade out.
- The step that runs now, a progress bar and the time left.

To stop the run, click **Cancel** or push Esc. Rhythmica stops after the step that runs now. Your zone does not change.

The time on each method card is an estimate for this sample. Rhythmica corrects the estimate from the time of your previous runs of each method.

If the method finds no result, a "No fit" message tells you to try a different method.

The result

LANDS IN	What happens
This zone	The result replaces the sound of the selected zone. Rhythmica opens the zone and selects its first source.
This zone, from a Sampler layer	The Sampler layer stays and Rhythmica mutes it. The result goes after it, as one group with the name of the sample. Rhythmica selects the group. To compare the result with the sample, unmute the Sampler layer and mute the group. If the zone has no space for more layers, the result goes in a new zone.
A new zone	Rhythmica adds a new zone with the result and selects it. The selected zone does not change.

The zone gets the name of the sample. To compare the result with the sample, play the zone, then open the page again and click **Play**.

To undo the resynthesis, click **Undo** in the header or push ⌘ Cmd + Z (^ Ctrl + Z on Windows and Linux).

Resynthesize a break

Use this procedure to make one zone from each hit of a break. You must have a sample with more than one hit on the page, or a Sampler layer with slices.

1. Click the **Stick / body / tail** or the **Ringing hit** card. The page shows the **SAMPLE** view.
2. Set the slice markers. This view has the same gestures and the same menu as the SAMPLE view of the Sampler: click to add a marker, drag a marker to move it, or right-click and select **Detect slices**.
3. To use different methods for different hits, right-click each slice and set its **Role**.
4. Set the options of the method. All the slices use this method.
5. If a role needs the other method, select it next to the role, in **BY ROLE**. These slices use that method with its options as you last set them.
6. Next to **LANDS IN**, select one of these items:
   - **Zones**: the steps only.
   - **With the groove**: the steps, and the timing and the level of each hit.
7. Click **Resynthesize**.

   The progress window shows the number of the slice, a progress bar and the time left for all the slices.

With one slice marker, the page fits one hit. With more than one, the buttons next to **LANDS IN** change to **Zones** and **With the groove**.

Each slice that gets a result becomes a new zone at the end of the list. The zone has the name and the role of the slice. In the pattern that you edit, the row of each new zone has one step on, as in Make slices into zones.

Rhythmica measures the markers of each slice, so the page does not show the **ONSET**, **BURST**, **CUT**, **BODY**, **TAIL** and **END** markers. To set these markers by hand, right-click the slice and select **Resynthesize this slice alone**. The page then shows that slice with its markers.

The **Kick** and **Snare** methods take one hit. If the sample has slices and you click one of these cards, the page fits the sample from **START** to **END** as one hit, and the slice markers do not show. To use one of these methods on a slice, right-click the slice and select **Resynthesize this slice alone**, then click the card.

To stop the run, click **Cancel** or push ⎋ Esc. Rhythmica finishes the slice that runs now, and then stops. The zones that it made stay.

If you opened the page from a Sampler layer, the markers are the markers of that sample. The Sampler layer shows your changes when you close the page.

Get a good result

- Use a one-shot: one hit in the file. The page uses only the first 10 s.
- Use a clean recording of the drum alone. Rhythmica makes layers for all the sound in the hit.
- Put **ONSET** at the start of the hit. Put the end marker (**CUT** or **END**) where the sound of the drum stops.
- For **Stick / body / tail**, put **BODY** and **TAIL** where the sound of the hit changes.

If the result sounds wrong

Find the problem in the table. Change the option, then click **Resynthesize** again. To go back to the result before, push ⌘ Cmd + Z (^ Ctrl + Z on Windows and Linux).

Method	Problem	Do this
All	A "No fit" message shows.	Select a different method.
All	The result starts late or misses the attack.	Drag **ONSET** to the start of the hit.
Kick	The result has a click that the sample does not have.	Set **Click** to **None**.
Kick	The attack is softer than the attack of the sample.	Set **Click** to **Mid**. If the attack is a short tick of noise, set **Click** to **High**.
Kick	The sample has a hiss under the kick that the result does not have.	Set **Noise floor** to on.
Snare	The rattle is too loud or too quiet.	Change **Noise trim**.
Snare	The sample is flat at its peaks (clipped) and the result is not.	Set **Clip** to **On**. Increase **Clip drive**.
Snare	The sample is distorted and the result is clean.	Increase **Distortion**.

Method	Problem	Do this
Snare	The ring of the drum is missing.	Set **Partials** to **One frame**. If the attack and the ring sound different, set it to **Burst + tail**.
Stick / body / tail	One part sounds wrong.	Move **BODY** and **TAIL** to where the sound changes.
Stick / body / tail	The rattle is too loud or too quiet.	Change **Rattle noise level**.
Stick / body / tail	The low tone is weak or it stops too early.	Set **Low end** to **Osc**.
Stick / body / tail	The hit rings for a long time and the result has a click where the parts change.	Use **Ringing hit**.
Ringing hit	The attack is soft.	Set **Layout** to **Burst + tail**. If the burst is too short or too long, drag **BURST**.
Ringing hit	The ring stops too early.	Drag **CUT** to the right. Or decrease **Cut fades to**, for example from -50 dB to -70 dB.
Ringing hit	The result has fewer tones than the sample.	Increase **Partials per frame**, up to the maximum that the page shows.

Resynthesize a kick sample

This procedure makes a zone from a kick sample with an Osc body and a click. You need a kick one-shot as a WAV, AIFF, FLAC, OGG or MP3 file.

1. Click **Resynthesize** in the header bar.
2. Drag the kick file onto the page.
3. Click **Play** to listen to the sample.
4. Click the **Kick** card. The hit view shows the waveform and the **ONSET** marker.
5. If **ONSET** is not at the start of the kick, drag it to the start.
6. Set **Model** to **Osc**.
7. Set **Click** to **Mid**.
8. Select **This zone** next to **LANDS IN**.

9. Click **Resynthesize**. The progress window shows the hit and then the result.
10. Play the zone and compare it with the sample.
11. If the result has a click that the sample does not have, push ⌘ Cmd + Z.
12. Do steps 1 to 9 again with **Click** set to **None**.

Sample credits

The audio examples on this page use these recordings:

- Stick / body / tail: "maypex-s" from the Maypex Drum Kit by datasoundsample - Freesound pack 2660, CC BY 4.0.
- Ringing hit and As Struck: "dum1" from Doumbek / Darbuka / Goblet Drum by hollandm - Freesound pack 38695, CC0 1.0.

The kick and the snare samples are Rhythmica presets.

Settings

The settings panel holds the preferences of the editor. Rhythmica keeps them on this computer, for every instance and project. The oversampling settings are the exception: they are saved with the project.

To open the settings, click **Settings** (the gear) at the right of the header, or press ⌘ Cmd + , (^ Ctrl + , on Windows and Linux).

To close the settings, click **Done**, press ⎋ Esc, or click outside the panel. Each change applies immediately.

EDITOR

Setting	What it does	Default
Show FX buses in the patch tree	Shows or hides the bus rows under **BUSES**. The button on the **BUSES** header does the same.	On
Audition presets on select	The preset browser plays a preset when you select it. See Presets.	On

CUSTOM PRESET FOLDER

A folder of your own `.rhythmica` presets. The preset browser shows it with the factory and User presets. See Presets.

Control	What it does
Path	The folder. **None**: no folder is set.
Choose...	Opens a dialog to select the folder.
Clear	Removes the folder from the browser. The files stay on the disk.

INTERFACE SIZE

Makes all of the window larger: **100 %**, **125 %** or **150 %**.

If the display is too small for the window at a size, Rhythmica uses the largest size that fits.

OVERSAMPLING

Oversampling makes the engine run at a higher sample rate, then come back down to the host rate. It makes the drive, distortion and clipper cleaner. A higher value uses more CPU.

These two settings are saved with the project, not on the computer.

Setting	When it applies	Values	Default
Live	While you play.	**Off**, **2x**, **4x**	**2x**
Offline render	When the host bounces or renders the project.	**Off**, **2x**, **4x**	**4x**

Keyboard and mouse shortcuts

This page lists the keys and mouse actions of Rhythmica.

On Windows and Linux, use `^ Ctrl` in place of `⌘ Cmd`. "Right-click" is also `^ Ctrl`-click on macOS.

The keys work when the Rhythmica window has the keyboard focus. Some hosts keep some keys, for example `Space`, for their own use.

Everywhere

Key	What it does
`Space`	Starts or stops the pattern on the internal clock.
`⌘ Cmd` + `Z`	Undo.
`⇧ Shift` + `⌘ Cmd` + `Z` or `⌘ Cmd` + `Y`	Redo.
`⌘ Cmd` + `,`	Opens Settings.
`⎋ Esc`	Releases an armed modulation source. Closes an open panel (module picker, preset browser, save dialog, settings, Resynthesize page).

Patch tree

These keys act on the selected row of the patch tree.

Key	On a layer row	On a zone row
`⌘ Cmd` + `C`	Copies the layer.	Copies the zone.
`⌘ Cmd` + `V`	Pastes the copied layer after this layer.	Pastes a copied zone in place of this zone, or a copied layer at the end of the zone.
`⌘ Cmd` + `D`	Duplicates the layer.	Duplicates the zone.

Key	On a layer row	On a zone row
⌘ Cmd + G	Puts the selected layers in a group.	
⇧ Shift + ⌘ Cmd + G	Removes the group and keeps its layers.	

Mouse action	What it does
Click a row	Selects it and shows its page.
Click the row of the selected zone	Shows the step grid.
Click a chevron	Folds or opens a zone, layer, group or bus.
Double-click the key of a zone row	Learns the zone's key from the next note you play. ⎋ Esc stops the learn.
Hold the play button of a zone row	Plays the zone.
Click the square of a layer	Turns the layer on or off.
⌘ Cmd-click a layer row	Adds the layer to the selection, or removes it.
⇧ Shift-click a layer row	Adds all the layers between to the selection.
Double-click a layer row	Renames the layer.
Double-click a submix row	Renames the submix.
Drag a layer row	Moves the layer. Drop it on the middle of a group row to put it in the group.
Drag an FX row	Moves the FX in its chain.
Click the dot of an FX row	Turns the FX on or off.
⌘ Cmd-click **S** on a zone	Solos this zone and no other zone.
Right-click a zone, layer, FX or submix row	Opens its menu.

Mouse action	What it does
Drag the right edge of the tree	Changes the width of the tree.

While you rename a row: Enter ⏎ keeps the name, ⎋ Esc cancels, a click outside keeps the name.

Values and knobs

Mouse action	What it does
Drag a level, pan or send value up or down	Changes it.
⇧ Shift + drag a level, pan or send value	Changes it in fine steps.
Double-click a knob, fader or value	Sets it to its default: 0 dB for a level, centre for a pan, off for a send.
Right-click a knob that takes modulation	Opens the **MODULATE** menu: assign a macro or another source. See Macros and modulation.

Modulation

Action	What it does
Click the chip under a macro	Arms the macro.
Drag a knob while a source is armed	Sets how far the source moves that knob. Hold ⇧ Shift for fine steps.
Double-click a knob while a source is armed	Removes the route from that source to the knob.
Drag the chip of a macro onto a knob	Assigns the macro to the knob.
⎋ Esc, or click the chip again	Releases the armed source.
Double-click the name of a macro	Renames the macro.

Action	What it does
Right-click a macro knob	Opens the macro menu: **Rename…**, **Load at**, **Clear its routes**.

See Macros and modulation.

Curves

Click the curve first, so that it has the keyboard focus. See Curves.

Key	What it does
⌘ Cmd + A	Selects all points.
⌘ Cmd + C	Copies the selected points.
⌘ Cmd + X	Cuts the selected points.
⌘ Cmd + V	Pastes points.
⌦ Del or ⌫ Backspace	Deletes the selected points.
⎋ Esc	Clears the selection.
S	Straightens the selected segments.
L	Gives the loop end point the level of the loop start point.

Mouse action	What it does
Double-click an empty place	Adds a point.
Double-click a point	Removes the point. The first and the last point stay.
Double-click a bend handle	Straightens the segment.
Double-click the release handle	Removes the release.
⇧ Shift-click or ⌘ Cmd-click a point	Adds the point to the selection, or removes it.

Mouse action	What it does
⇧ Shift-drag or ⌘ Cmd-drag in an empty place	Selects the points in a rectangle.
⎇ Alt-drag	Draws the curve freehand.
⎇ Alt + ⇧ Shift-drag	Draws a straight line.
Drag in an empty place	Moves the view.
Scroll	Zooms the time axis.
⌘ Cmd + scroll	Zooms the value axis.
Right-click a point	Opens the point menu: sustain and loop points, delete, straighten.
Right-click an empty place	Opens the curve menu (**Init**).

Sequencer

See Sequencer.

Action	What it does
Click or drag along the step numbers	Selects the hits in those columns, in all the zones.
⇧ Shift-click a step number	Selects the columns from the last step number that you clicked.
⌘ Cmd-click a step	Adds the step to the selection, or removes it.
⌘ Cmd-drag in the grid	Adds a rectangle of zones and steps to the selection.
⎋ Esc	Clears the selection of hits.
⌘ Cmd + C / ⌘ Cmd + X / ⌘ Cmd + V	Copies, cuts or pastes the selected hits.
⌘ Cmd + D	Duplicates the selected hits directly after the selection.

Action	What it does
⌦ Del	Clears the selected hits.
⇧ Shift + ← Left / ⇧ Shift + → Right	Moves the selected hits one step earlier or later. With no selection, moves the lane of the selected zone.
⇧ Shift + ⎇ Alt + ← Left / ⇧ Shift + ⎇ Alt + → Right	Moves all the lanes of the pattern one step earlier or later.
⇧ Shift-click a step	Arms the step for parameter locks.
⎇ Alt-click a lit step	Sets the value of the step to its default.
Double-click a lit step	Sets the value of the step to its default.
⇧ Shift-click a pattern	Adds the pattern to the chain.
Right-click a pattern	Opens the pattern menu.
Right-click a lane	Opens the lane menu.
Click the step numbers (step record)	Moves the record cursor.

Foot

Action	What it does
Drag **TEMPO** up or down	Changes the tempo. Hold ⇧ Shift for fine steps.
Double-click **TEMPO**	Lets you type the tempo.
Right-click **REC**	Opens the record menu: quantize and count-in.
Right-click the metronome	Opens the metronome menu: **Only while recording**.

Mixer

Action	What it does
Click the name of a zone strip	Selects the zone.
Click the name of a submix strip	Opens the submix page.
Double-click the name of a submix strip	Renames the submix.
Right-click the name of a submix strip	Opens the submix menu: **Rename**, **Remove**.
⌘ Cmd-click **S**	Solos this strip only.

Panels

Panel	Key or action	What it does
Module picker, settings, Resynthesize page	Click outside the panel	Closes the panel.
Preset browser	↑ Up / ↓ Down	Selects the previous or next preset in the list.
Resynthesize page	Enter ⏎	Starts the resynthesis.
Resynthesize page	Space	Plays or stops the hit.
Resynthesize progress	⎋ Esc	Cancels the resynthesis. With more than one slice, finishes the slice that runs now, and then stops.

Header

Action	What it does
Click the output meter	Resets the clip lights and the last-hit readout.
Drag **Export WAV** or **Export MIDI** into a DAW	Puts the WAV or MIDI file into the DAW.

Glossary

The terms of this manual, in alphabetical order.

accent

> A drum machine's emphasized hit. On the machine models of the Analog source, the velocity sets the accent.

analysis window

> The length of audio that Resynthesize examines at one time to find the partials.

arm

> Select a modulation source, so that a drag on a knob sets the depth of that source on the knob. Refer to Macros and modulation.

band (Metal)

> One output path of the Metal source: a band-pass filter, a drive stage, a high-pass filter and a level.

band-limited

> A wave with no harmonics above half the sample rate. A band-limited wave does not alias.

bank (presets)

> A source of presets in the preset browser: Factory, User or Custom. Refer to Presets.

base / peak

> The bottom and the top handle of a two-handle range bar: the lowest and the highest value of a pitch or filter curve.

bend handle

> The dot at the middle of a curve segment. Drag it to bend the segment.

bipolar

> A modulation setting. The middle of the modulation source has no effect. Below the middle, the target moves the other way.

body (of a hit)

The pitched or resonant part of a drum hit, after the transient. For example, the falling tone of a kick.

body (Struck)

A set of modes that ring when the exciter of a Struck source hits them. A Struck source has up to 3 bodies.

burst / tail

The attack of a ringing hit, and the ring after it.

carrier

The sine wave that Ring Mod multiplies the sound by.

chain (sequencer)

A list of up to 16 patterns that play in sequence. Refer to Sequencer.

chip

A small button with a label. A macro chip shows what the macro moves. An envelope chip selects, shows or hides an envelope.

choke group

A set of zones that stop each other. When a zone of the group plays, the other zones of the group fade out.

CHROMATIC

An Osc setting. MIDI note 33 (55 Hz) plays the pitch curve as you drew it. Other notes transpose it.

collision

One contact between small objects in the Particles source. Each collision rings the resonator.

curve

A breakpoint line that sets the value of a parameter over the time of the hit. Refer to Curves.

depth

How far a route moves its target, from -100 % to +100 % of the range of the target.

direct output

A path of a layer that goes past the master chain.

drum map

A key and a choke group for each drum role, for example GM Drums or 16 Pads.

drum role

What a zone plays in the kit: Kick, Snare, Clap, Rim, Closed Hat, Open Hat, Ride, Crash, Low Tom, Mid Tom, High Tom, Shaker or Perc. Patterns, pattern presets and drum maps use it.

duck

One layer becomes quieter when a different layer hits.

envelope

A named curve of a source or FX page, for example **PITCH**, **AMP** or **DRIVE**. The screen uses this word for the curves of a page.

exciter

The part of a Struck source that starts the sound: Impulse, Noise, Impact or Particles. In resynthesis, a recorded exciter is the attack of the sample.

Follow

An FX curve setting. The level of a layer drives the curve, not the time of the hit.

formula

A short expression that fills a table, for example the gains of the harmonics of an Osc. Refer to Formulas.

formula strip

The fields, named knobs, **Templates** and **?** of a table in formula mode.

frame

One version of the sound of a layer, for example one set of Osc harmonics or one set of Partials levels. A layer has 1 to 8 frames. On an Osc layer, the **FRAME** curve moves between them over the hit. On a Partials layer, they play one after the other.

FX curve

A curve that moves one FX parameter over the hit, or with the level of a layer.

FX chain

The serial list of FX on a layer, group, bus, submix or master.

GR

Gain reduction. The Dynamics meter shows it.

group

A layer with no source. The layers in it play through its FX chain.

groove

A time bend preset. Swing is a groove.

hit

One sound of a drum, from its start to its end. A zone plays one hit each time it gets its note. A sample can also hold a hit.

impulse response

A recording of how a space or an object answers a click. Convolution uses it.

jitter

A random detune or offset. It is new on each hit (Partials) or on each period (Metal).

kit

The whole instrument: up to 64 zones, the kit buses, the submixes, the kit master, the kit macros and the patterns. A kit is one preset file.

kit bus

A bus of the kit. The zones send to it.

kit macro

One of the 8 macros of the kit. It can move parameters in all zones and in the kit master.

lane (Multiband)

The FX chain of one band of a Multiband.

lane (sequencer)

The row of steps of one zone in a pattern.

latch

A modulation setting. The value of the modulation source at the start of the hit stays the same for the full hit.

layer

One source, its FX chain, and its level, pan, mute and solo. A zone sums its layers.

look-ahead

A short delay that lets Dynamics decrease the gain before a peak arrives.

loop (curve)

The segments between two points of a curve that repeat while you hold the note.

machine model

A model of one drum of one drum machine in the Analog source, with the panel knobs of that machine.

macro

A knob that moves one or more parameters by routes. Each zone has 8 macros.

master

The output section of a zone (the zone master) or of the kit (the kit master), with its own FX chain.

mode

One frequency at which a body rings, with its own level and decay.

module picker

The panel where you pick a source or an FX: **ADD LAYER** or **ADD FX**.

named knob

A knob that a formula reads by its name.

one-shot

A sample file with one hit in it.

onset

The start of the hit in a sample.

OTT

A card in the module picker. It adds a 3-band Multiband with upward and downward compression.

partial

One sine tone with its own frequency, level, decay and start phase.

pattern

A sequence of steps for the zones of the kit.

performance source

A modulation source that you play: velocity, mod wheel, aftertouch, key pressure, pitch bend, key or random.

point

A breakpoint of a curve. A curve has 2 to 16 points.

pre / post send

A send taken before or after the FX chain. For a zone: before its master, or after its mixer strip.

ratio (Metal)

The frequency of one oscillator of the Metal source as a multiple of **TUNE**. A ratio set is a named group of ratios.

reinforce

Add an Osc layer that stays in phase with a partial.

release

The fall of the **AMP** envelope to silence after the end of the hit or at note-off.

resonator (Particles)

The tuned band (frequency and Q) that the collisions ring. It sets the material.

resynthesis

Rhythmica measures a sample and makes a zone of layers that plays the same sound. Refer to Resynthesize.

route

One modulation: a modulation source, a target parameter, a depth and a mode. The screen calls a velocity route a link (**+ VELOCITY LINK**).

segment

The part of a curve between two adjacent points.

selection box

The box around 2 or more selected points of a curve. Its handles scale the points.

slice

The part of a sample from one slice marker to the next.

source

The sound generator of a layer: Osc, Analog, Noise, Partials, Metal, Sampler, Particles or Struck. Refer to Sources.

spectrogram

A picture of the frequencies in a sound over time.

stack (Metal)

The group of square-wave oscillators of the Metal source.

stage (Analog)

One part of a generic Analog circuit: **PITCH**, **BODY**, **2ND** or **NOISE**.

start phase

The position in its cycle where a tone starts at the hit. Partials that start in phase make a click.

step

One position in a pattern.

step lock

A parameter value that applies on one step only.

step record

Recording while the sequence is stopped: each note you play fills one step.

submix

A shared FX chain and level for a set of zones of the kit.

sustain point

A point of a curve where a held note stops and holds the value.

template

A named starting formula for one column of a table.

time bend

A curve that moves the steps of a pattern earlier or later in time.

transient

The short, loud start of a hit, for example the click of a kick.

zone

One drum of the kit, played by its MIDI note or a range of notes. It has its own layers, buses, master and 8 macros.

zone master

The master of one zone in a kit.