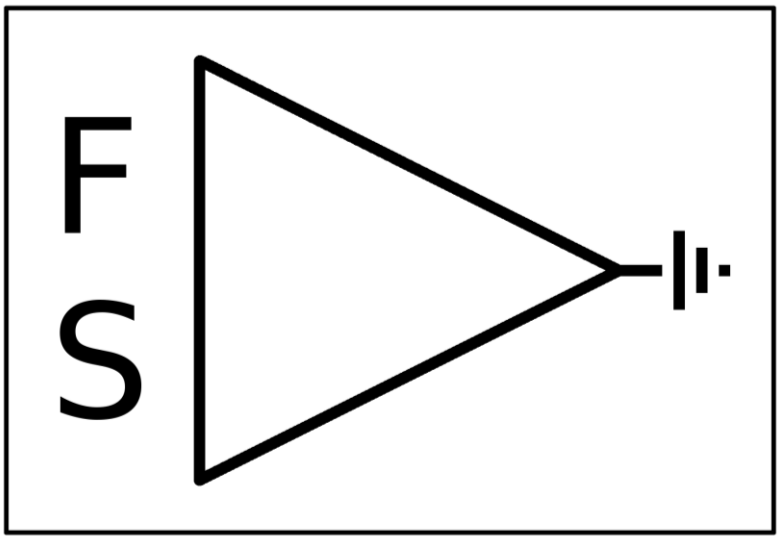
FORGOTTEN WAVESHAPER 2 USER MANUAL

by Forgotten Clank Studios



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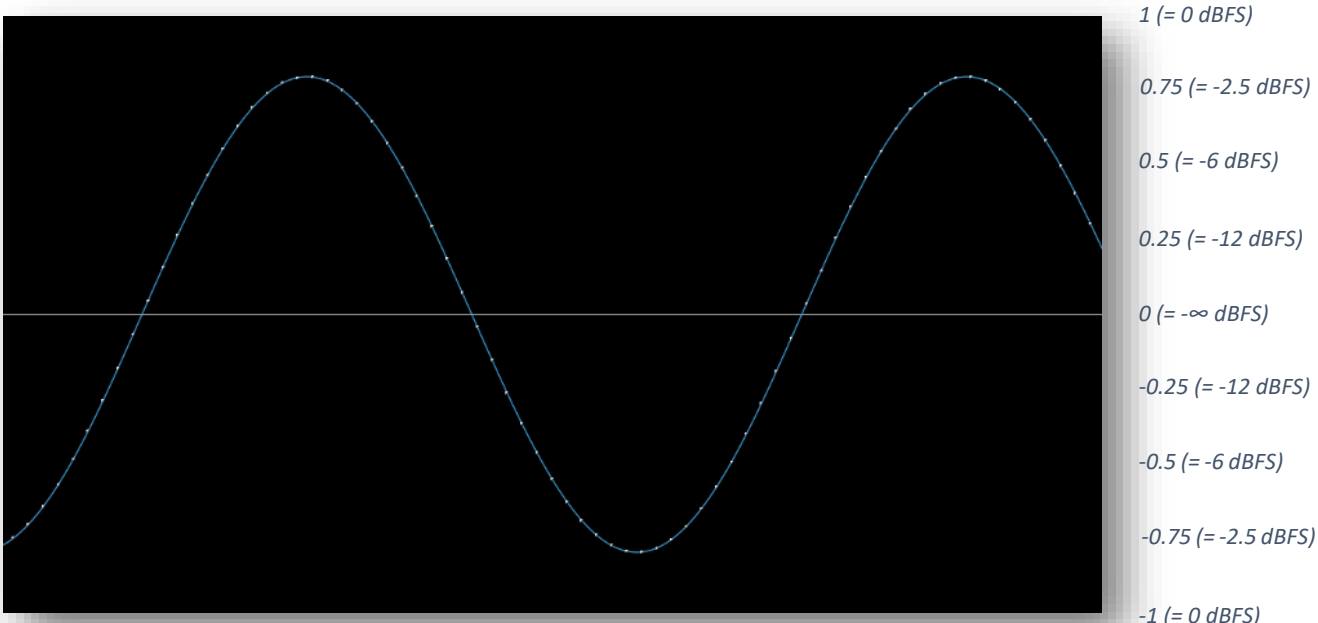
WAVE SHAPING

Wave shaping is just a fancy name for distortion but a very descriptive one. All distortion devices rely on some sort of wave shaping – it is what creates those harmonics many people are looking for. The difference is that most plugins hide the actual wave shape curve from the user and give them just one or two controls to change the curve shape or just to change the input gain. But wave shaping can be very interesting when you get full control.

The concept of wave shaping is fairly simple but we need to talk a little bit about digital audio to fully grasp it. Digital audio consists of samples. These are small values that tell us if the waveform is going up or down. These samples have an amplitude, which is usually measured in dBFS. You may have seen peak meters that tell you that your track peaks at some negative value, like -3 dBFS. However, dBFS is just a different scale and you can just as well measure the amplitude with a unit-less number between -1 and 1. This is what most plugins are working with. If you are wondering how to convert from this unit-less amplitude to dBFS, here is the formula: $\text{dBFS} = 20 \times \log_{10} |x|$. The issue with dBFS

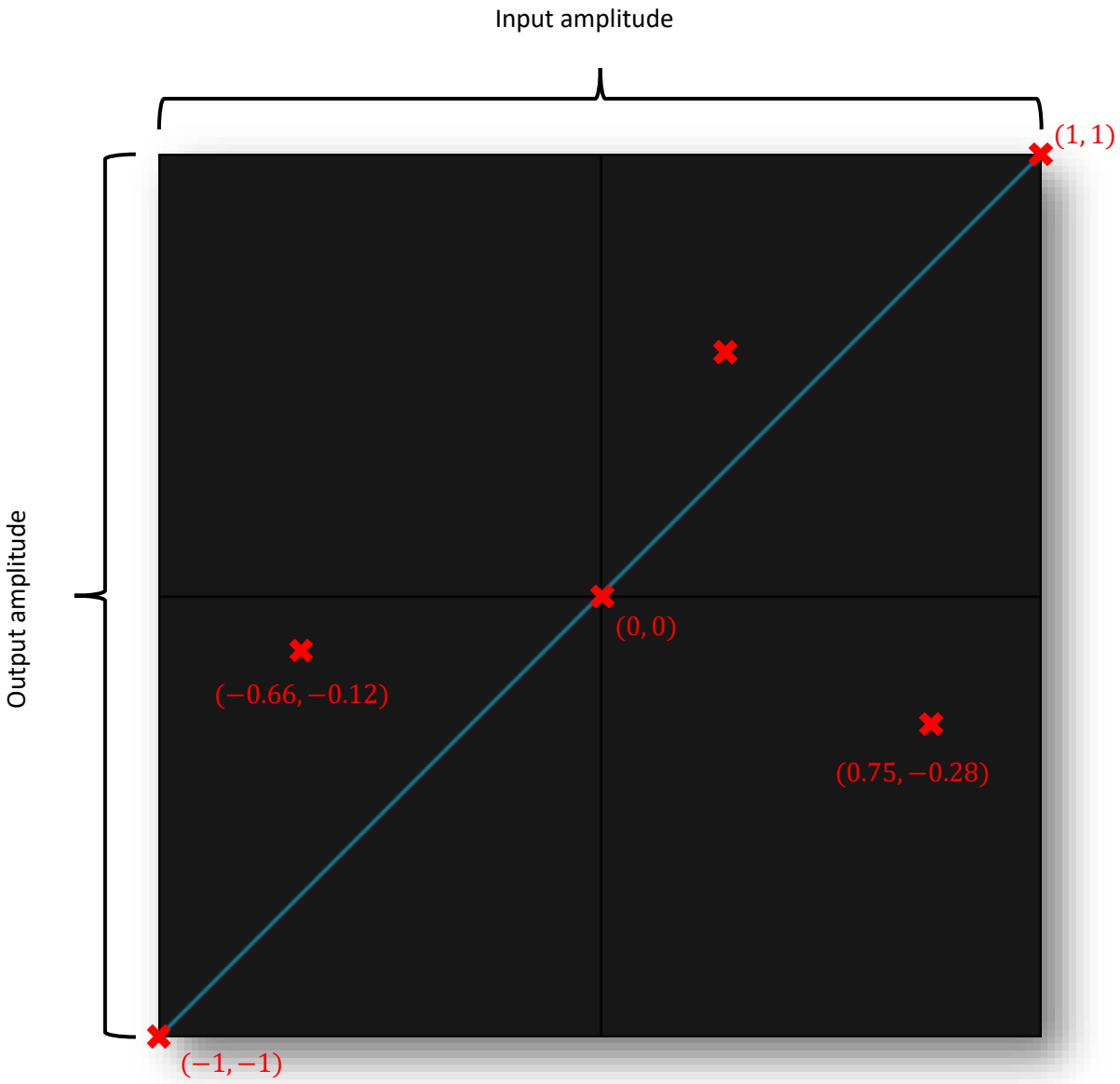


The blue line is the actual waveform and the yellow dots are the samples we're working with.

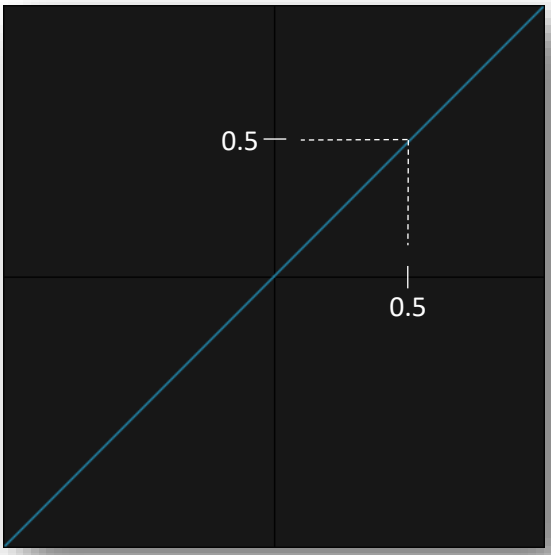
is that you do not know whether the unit-less sample value is negative or positive: Both 0.5 and -0.5 correspond to -6 dBFS. That is valuable information that is being lost, you'll see why in a minute.

Wave shaping is just a mapping, a function, like in maths at school. You put a value into the function, it spits another one out. That's it. And that is what creates the distortion, the immediate change in amplitude.

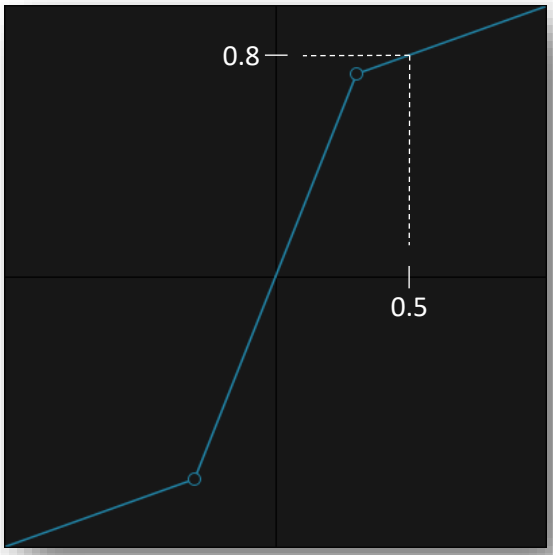
Let's take a look at the most important part of the device, the wave shape display. This is the place where you can create your own custom mapping. The horizontal axis is the input value and vertical axis is the output value. To find out what you get when you put in 0.5 look at the corresponding part of the horizontal line and read off what the height of the blue line is. This is what the *Forgotten Waveshaper 2* does as well. Let's look at some mappings in the wave shape display and then how the sine wave from before is altered by five different wave shapes.



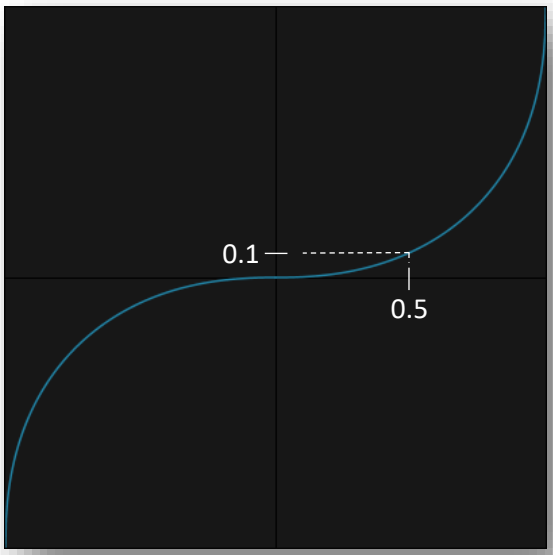
The input/output relationship of the wave shape display (with "Logarithmic Points" turned off). This is just like a Cartesian coordinate system.



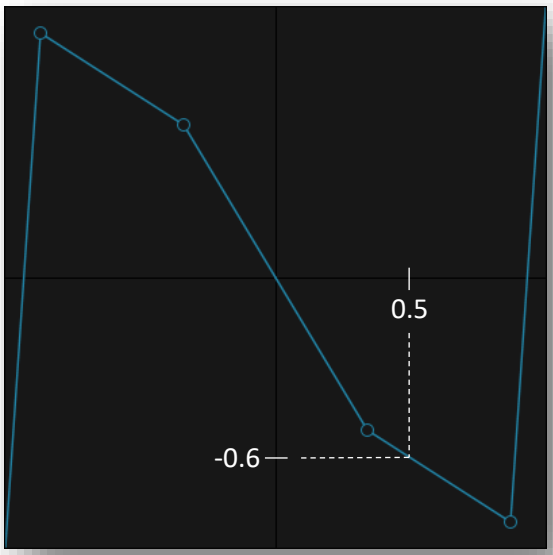
0.5 is mapped to 0.5 → no change for this wave shape



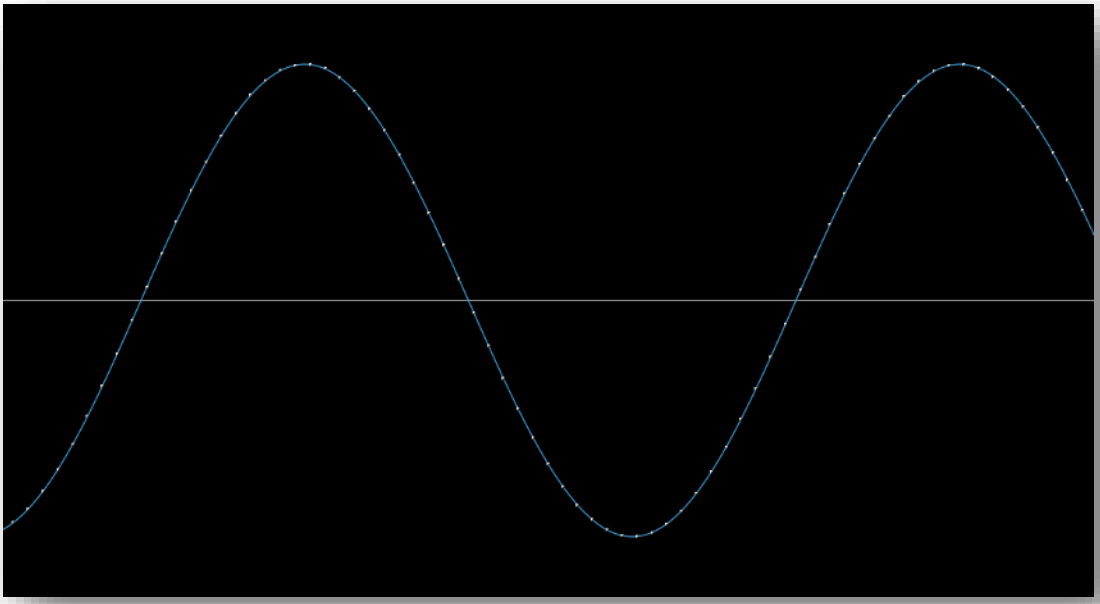
0.5 is mapped to 0.8 → the sample is louder than before

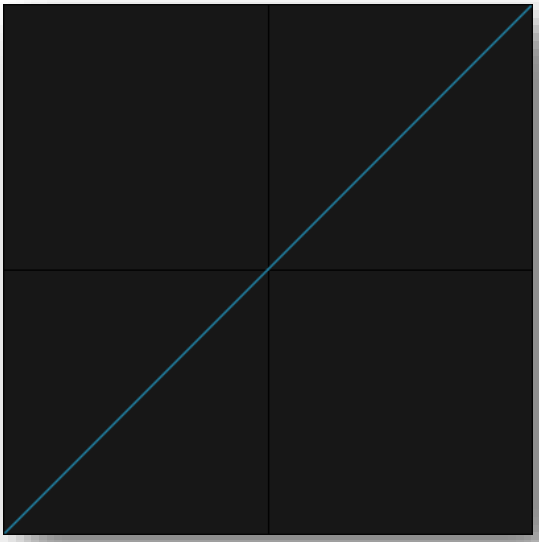


0.5 is mapped to 0.1 → the sample is quieter than before

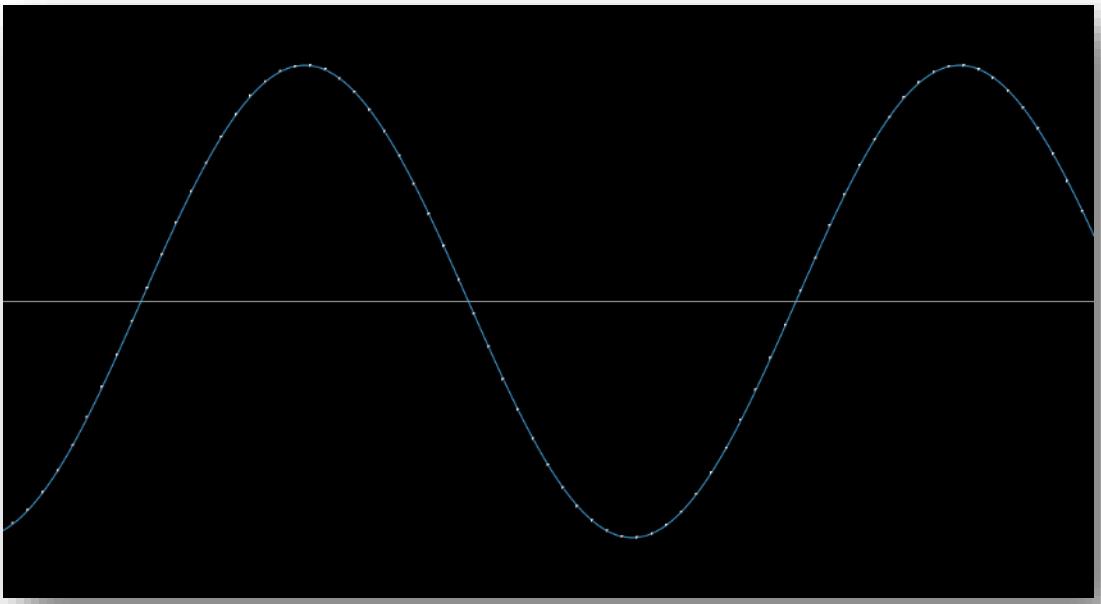


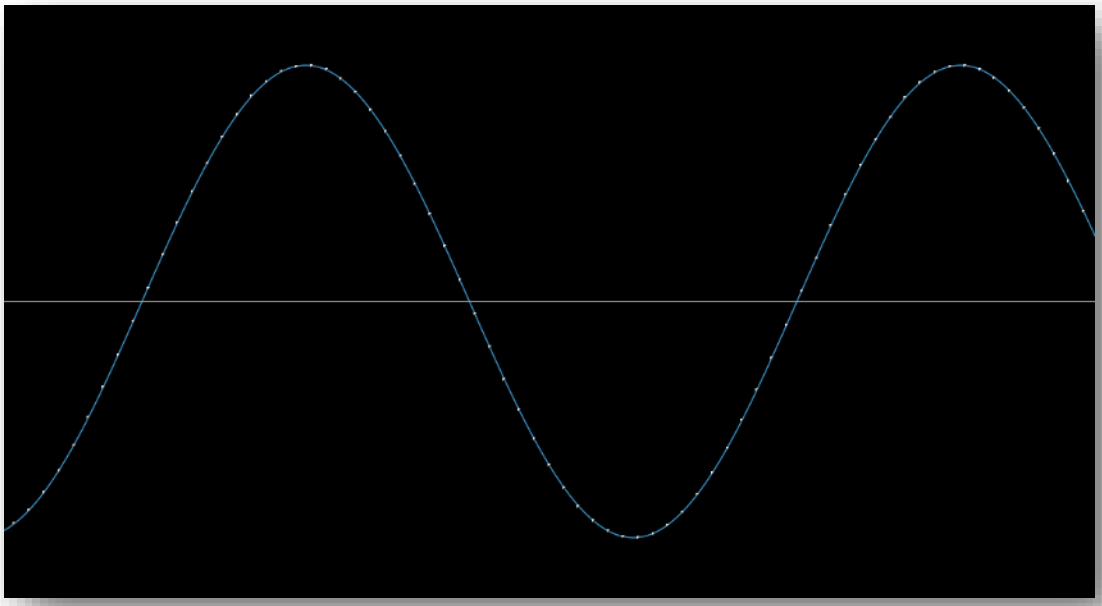
0.5 is mapped to -0.6 → the sample is louder (0.6 > 0.5) but is negative.

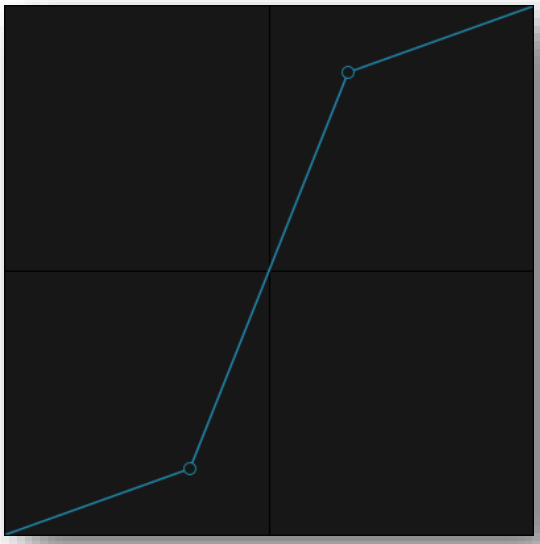




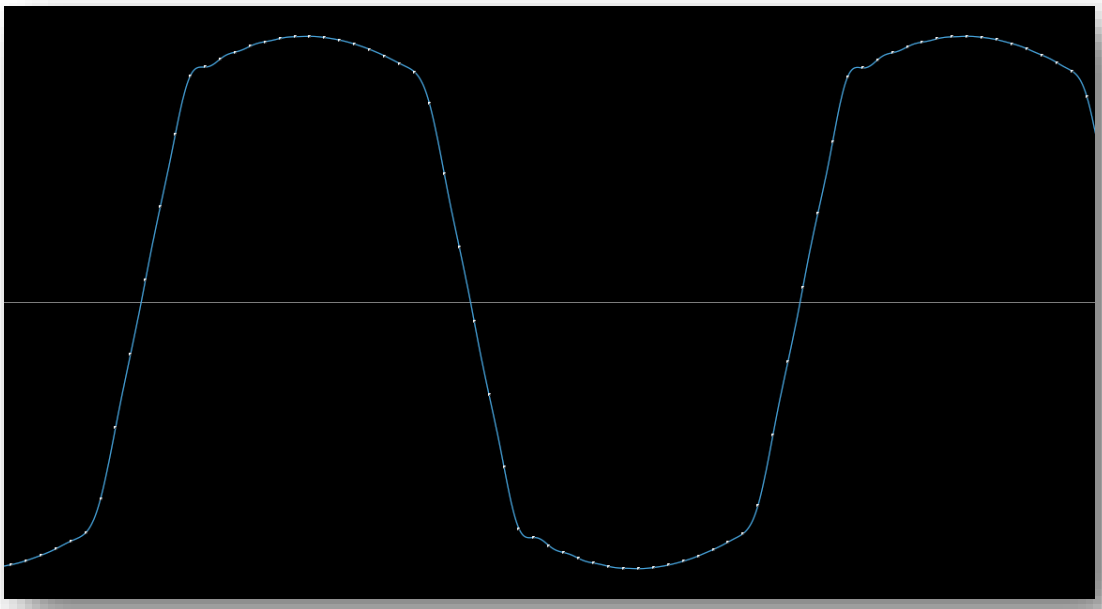
As expected, there is no difference. The straight 45° degree diagonal line means input = output so there is no change for any of the sample values.

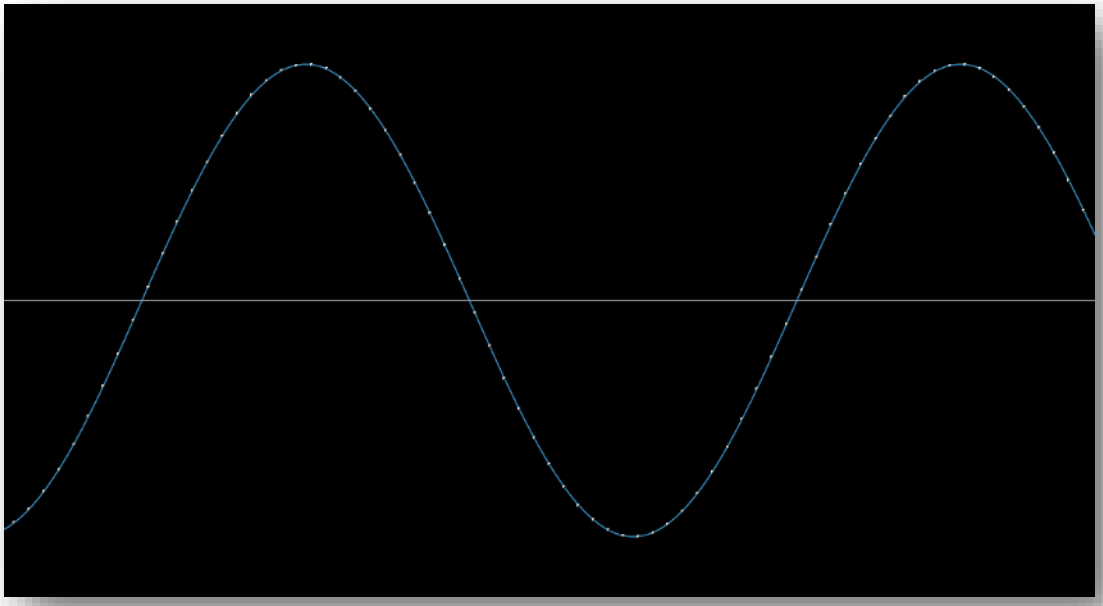


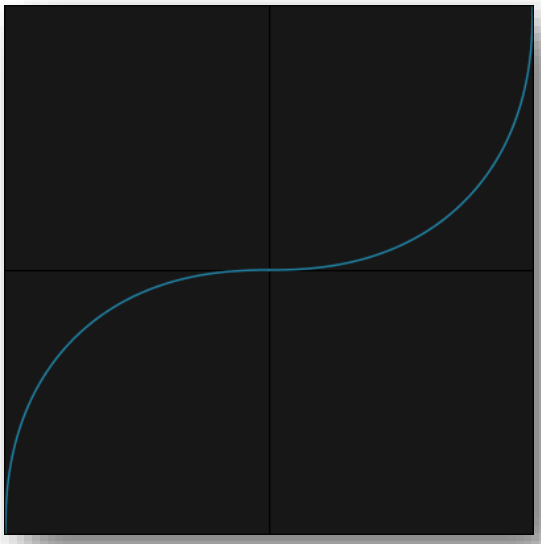




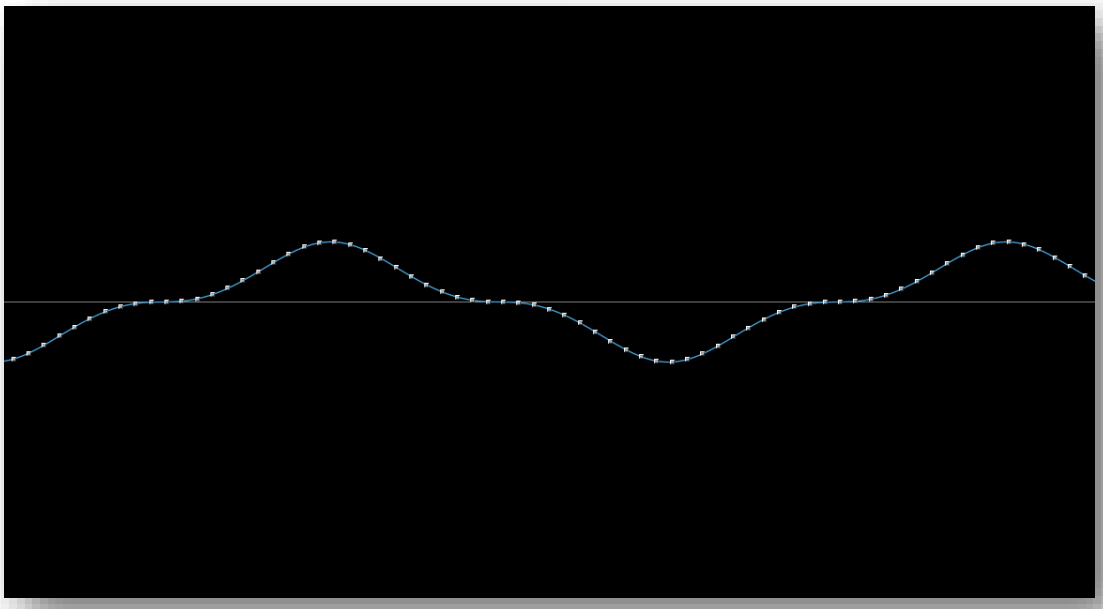
With this wave shape, samples near 0 are being boosted by a lot, which is what we can see reflected in the sine wave. Samples that previously were near 0 are now closer to the peak of the sine wave.

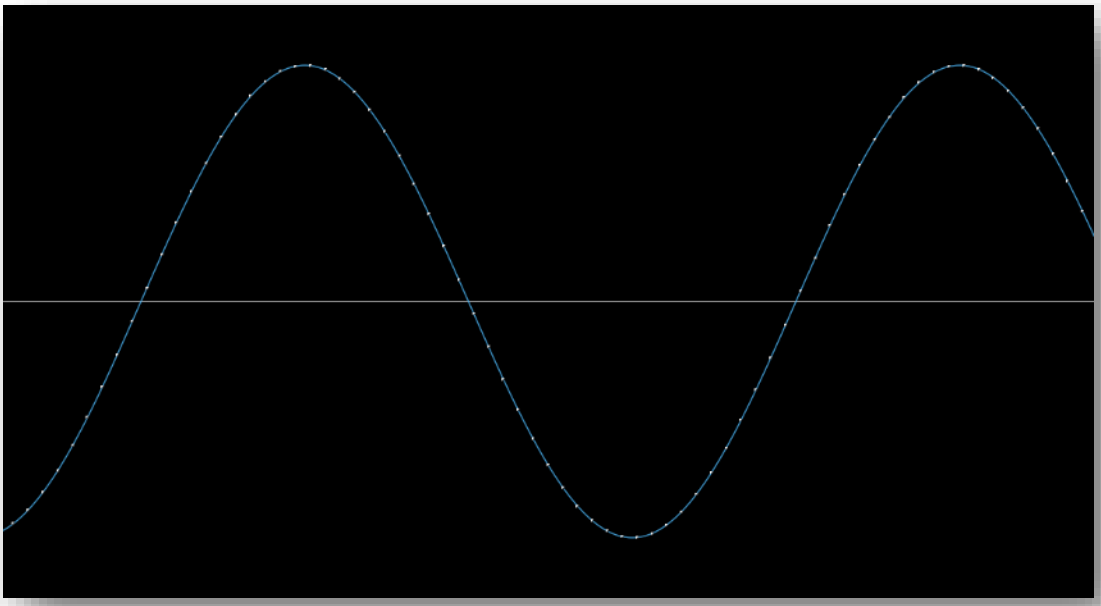


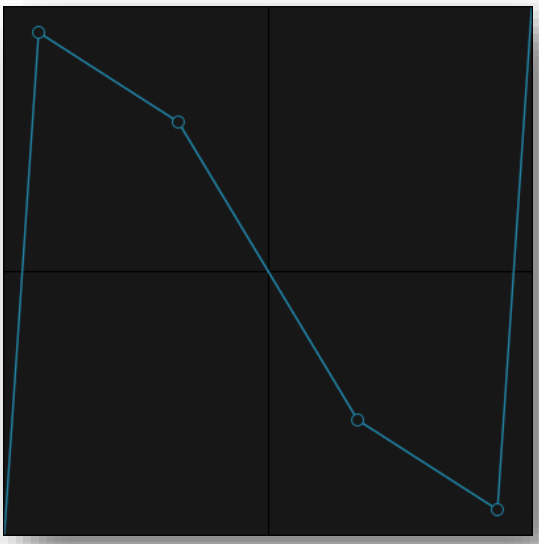




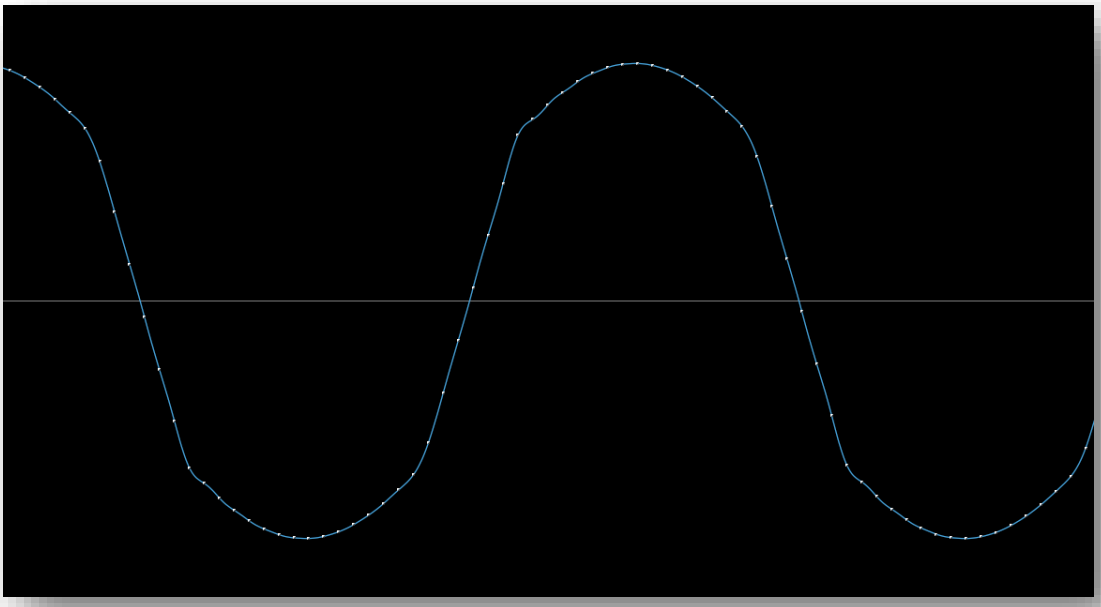
Here, samples near 0 are being lowered even more and the curve spends quite a lot of time mapping to low sample values. Since the peak of the original sine wave is at -3 dBFS ($= \pm 0.7$) it is still in the area where the wave shape reduces the amplitude. This is why the peak of the processed sine wave is also lower.

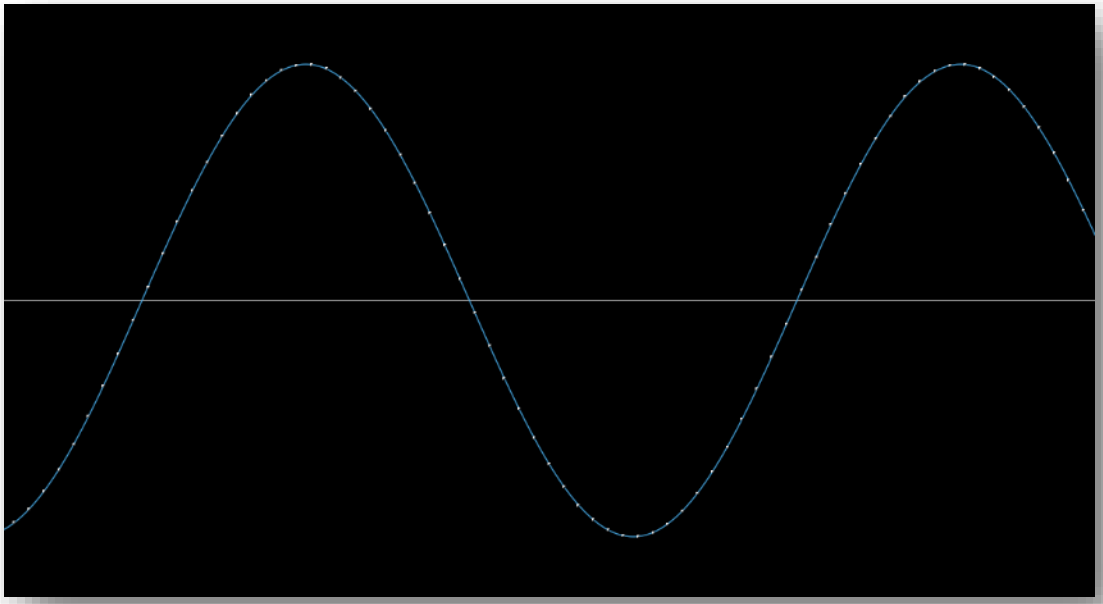


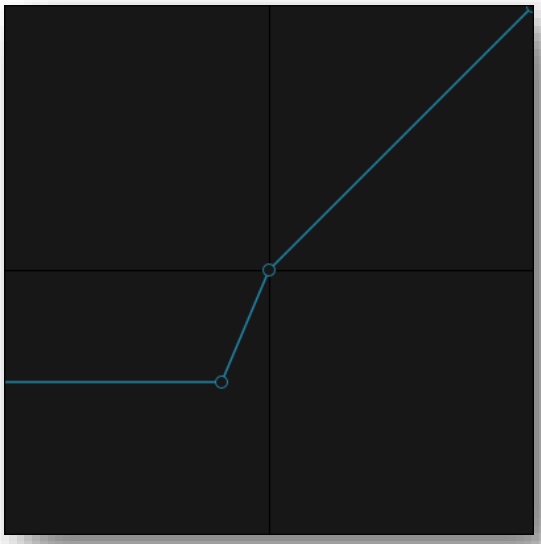




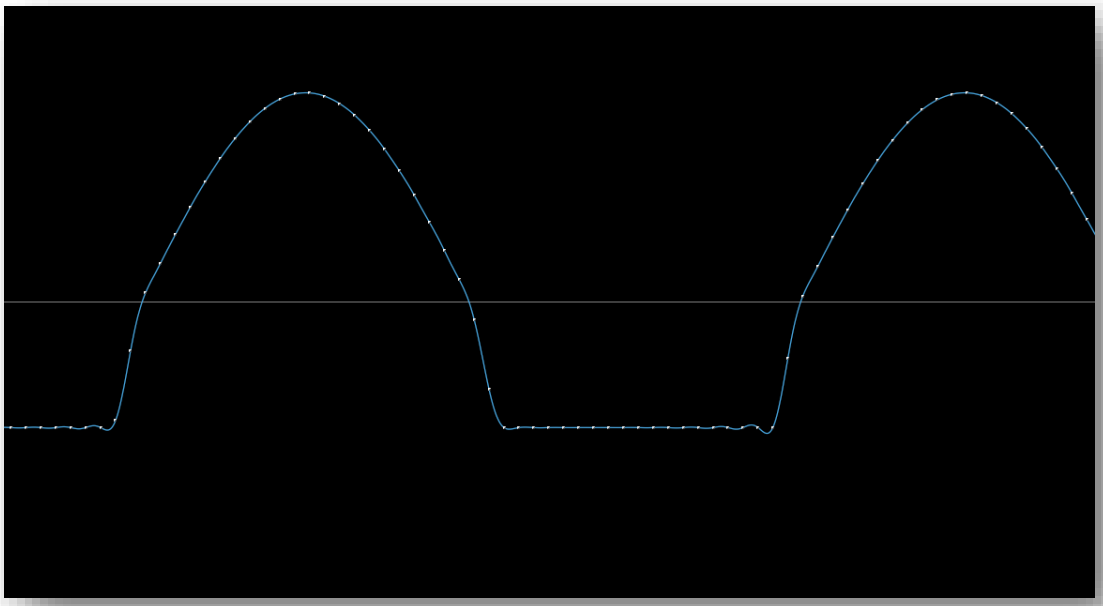
This wave shape maps negative values (left half) to positive values (top half) and positive values (right half) to negative values (bottom half). Only at the very edges of the wave shape the mapping returns to its original sign and positive values stay positive while negative values stay negative - but our sine wave is not loud enough to reach into this area. There is also some slight distortion happening because the curve is not completely straight.





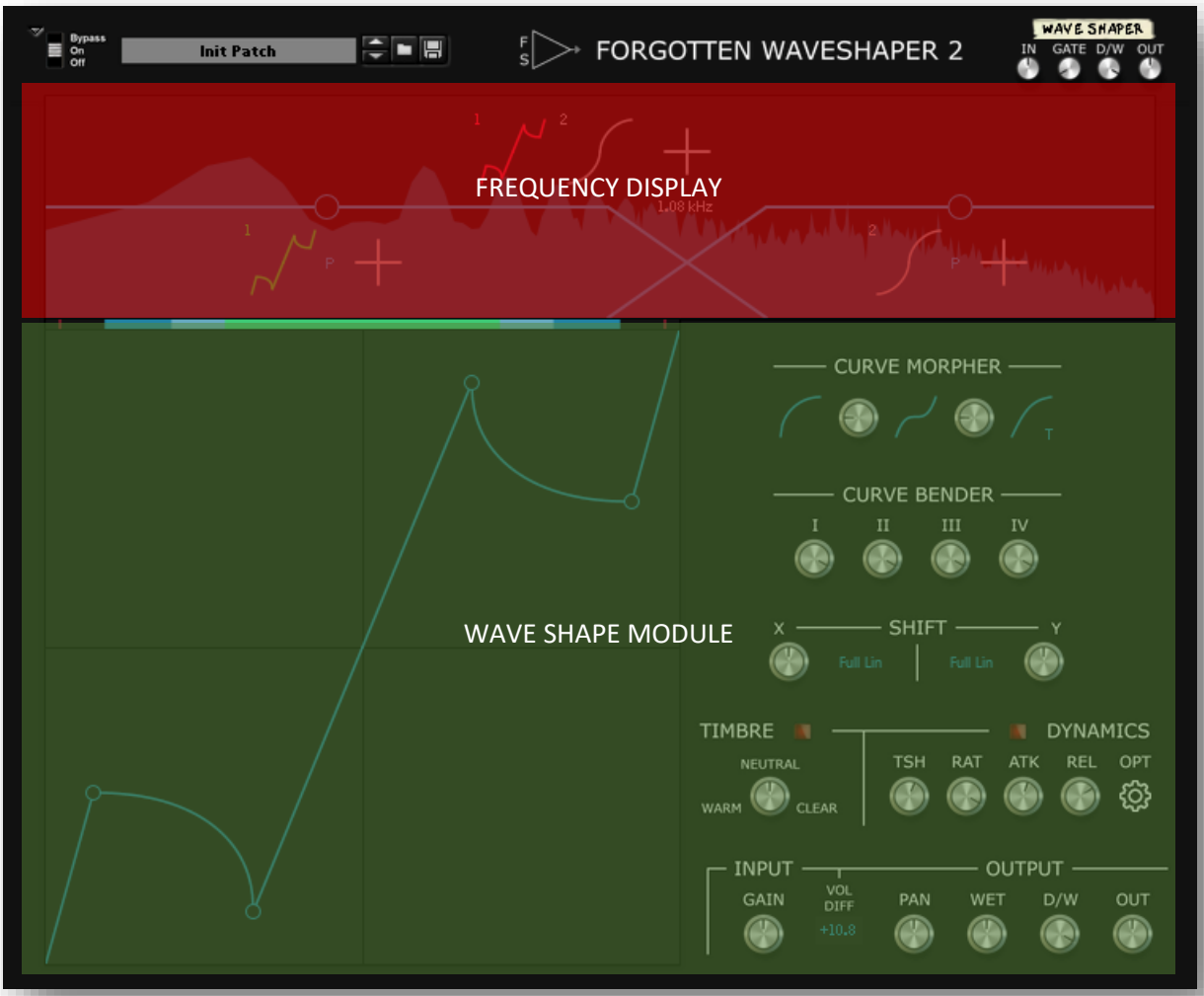


Here's one more wave shape that we haven't looked at yet. The right half (positive input values) is a straight 45° diagonal line (input = output) so the positive part of the waveform is not affected. The left half of the wave shape (negative input values) boosts negative values near 0 and maps all values $< \sim -0.15$ to a constant value.

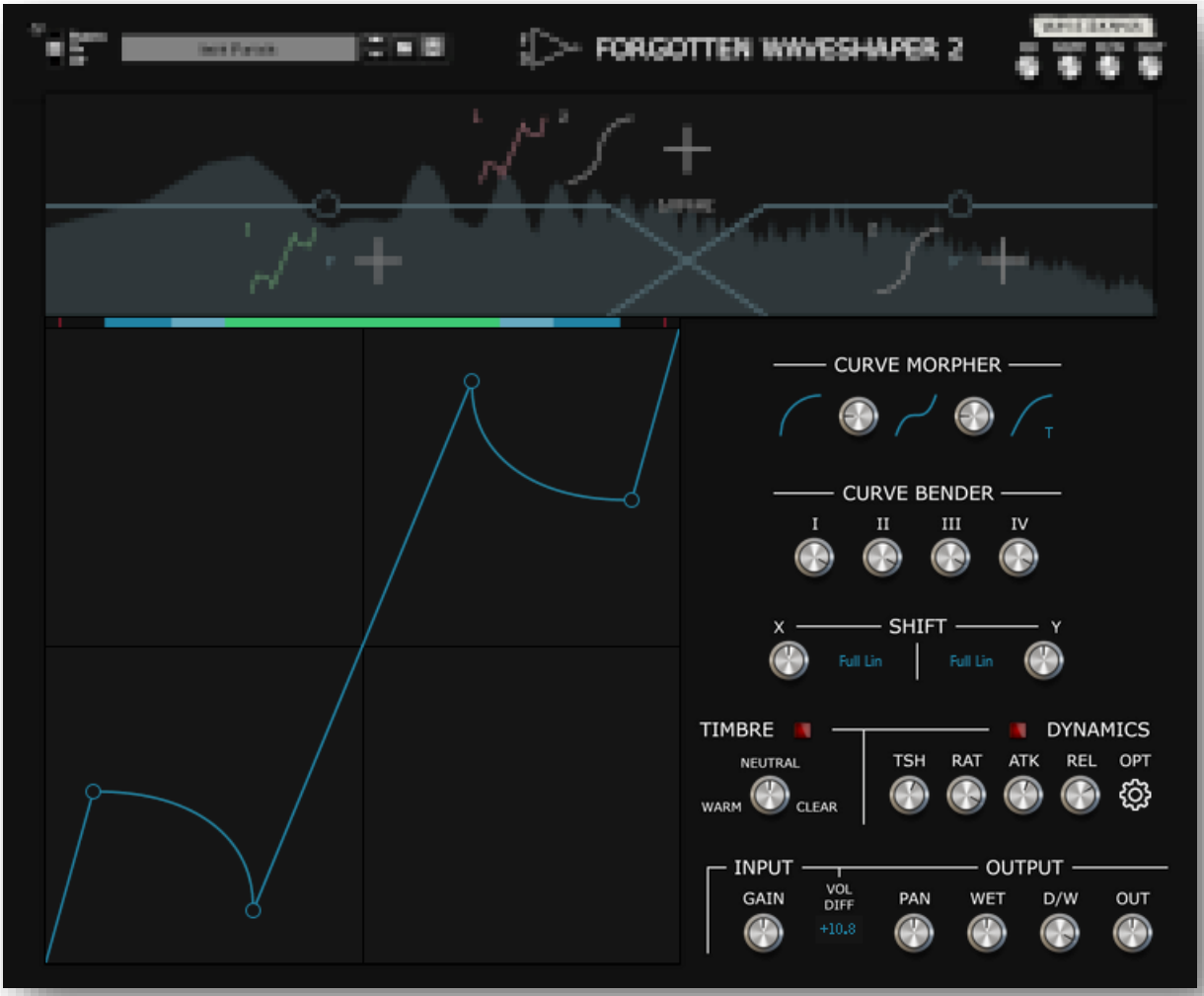


GENERAL STRUCTURE

The *Forgotten Waveshaper 2* is split into two parts, the frequency display and the wave shape module.



Wave Shape Modules



NOTE: There are many hotkeys to make editing the wave shape display easier. They are not all listed here. Refer to the chapter "Hotkeys" instead.

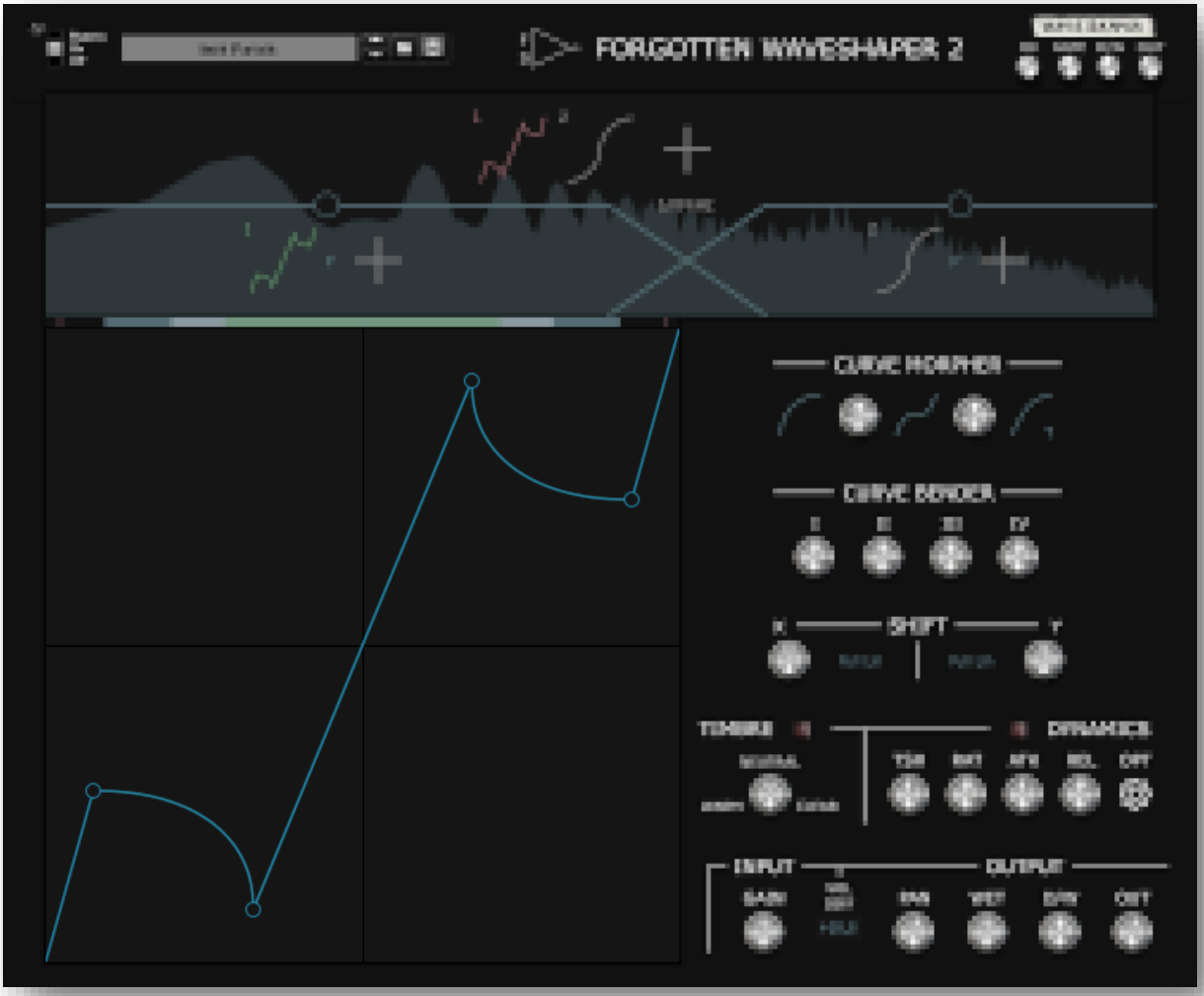
The Forgotten Wave Shaper 2 is based around the concept of so-called "wave shape modules" which are little distortion devices. They do not do anything on their own but instead you have to insert them into the signal flow. You can put them in either of the two slots of a frequency band. The way the signal is fed into the wave shape modules is determined by the processing and stereo mode of the frequency band. Refer to the chapter about frequency bands if you want to learn more.

You can have up to 8 wave shape modules, which corresponds to the 4 available frequency bands with 2 slots each to place wave shape modules in.

Wave shape modules consist of:

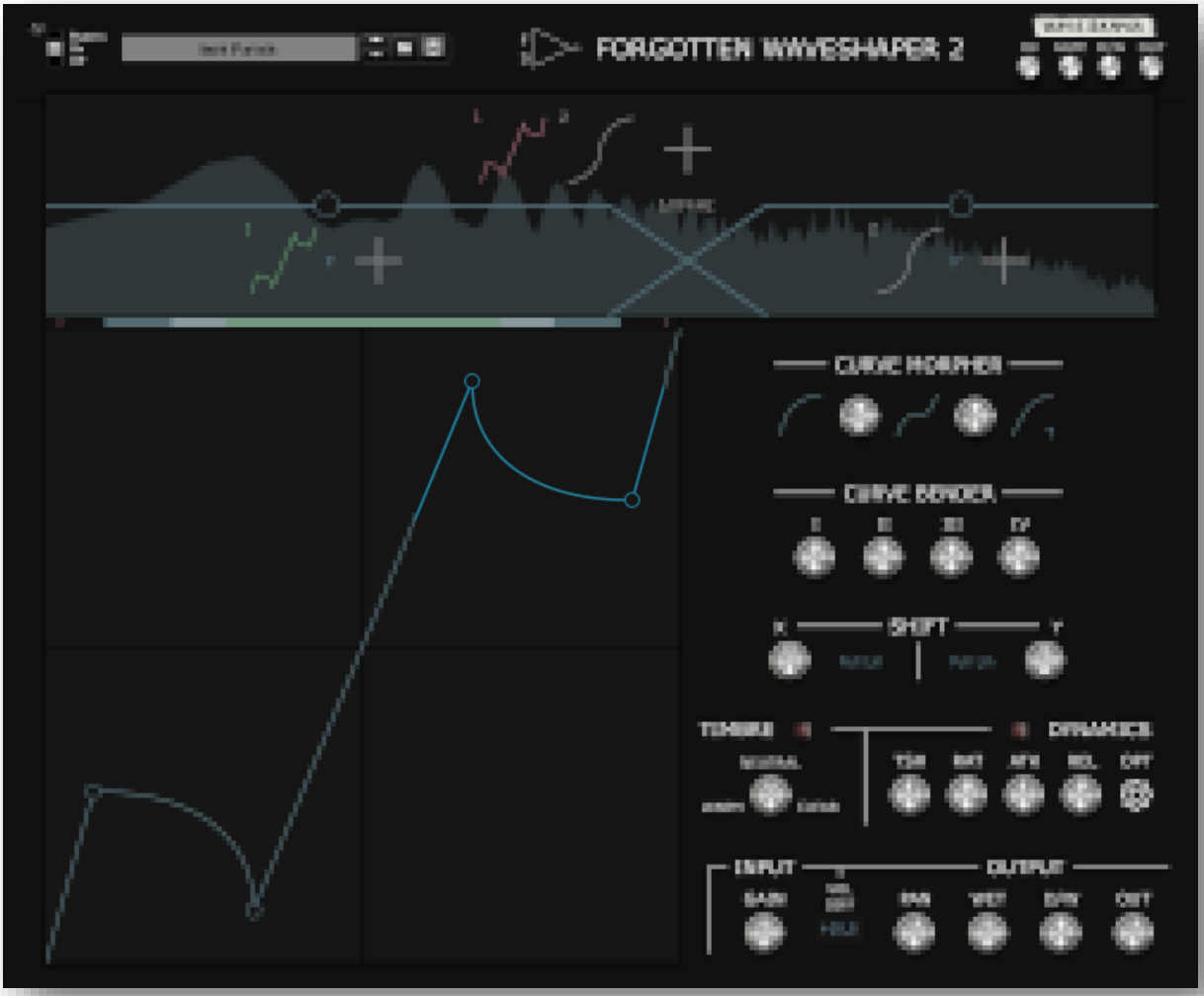
- the wave shape itself, which determines the type and sound of the distortion (see chapter "Wave shaping" and "Wave shape display")
- modifiers, which let you change the shape of the wave shape or change the way the input signal is fed into the wave shape (see "Wave shape modifiers" and "Other sections").

Wave Shape Display



The wave shape display is the most important part of a wave shape module. Its shape is the main ingredient for getting a nice sounding distortion. To get the exact shape you want you have the option of using point and curves. These two elements can be modified by the "wave shape modifiers". Further options can be found in the menu "global properties".

Points and Curves



The points and curves in the wave shape display are the tools to making a specific wave shape. There are two points that are not displayed as points and which you cannot change directly. They are positioned…

a) Symmetric mode:
   - at the origin (0, 0)
   - at the positive ceiling (1, 1)
   - at the negative ceiling (-1, -1)

b) Asymmetric mode:
   - at the positive ceiling (1, 1)
   - at the negative ceiling (-1, -1)

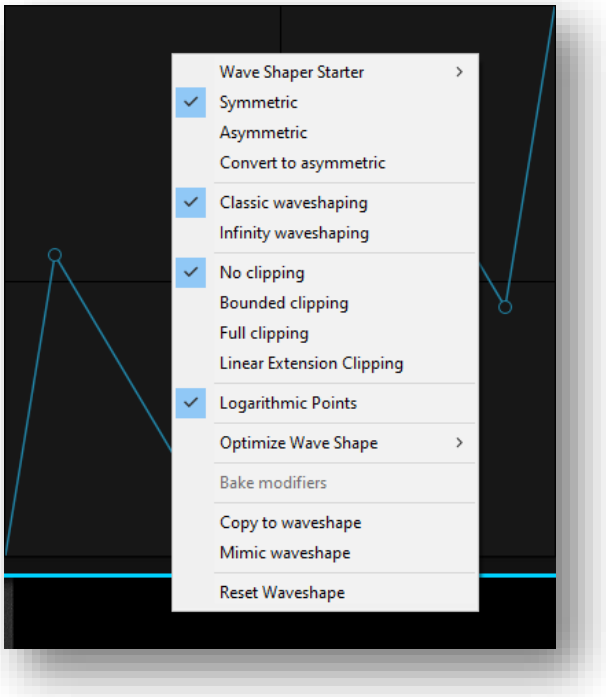
Adding new points with the hotkey “Alt + Left Click” gives you more control and more curves. You can reposition points and change the intensity (i.e. curvature/slope) of curves by drag-n-dropping. Points are affected by the shift section while curves are affected by both the curve morpher and curve bender. Curves have three curve types that can be chosen on a curve-to-curve basis. Refer to the chapter discussing the curve morpher if you would like to learn more.

Both points and curves have menus available that you can open. Use the hotkey “Shift + Left Click” while hovering over a point or curve to open their respective menu. All the entries in the point’s menu are accessible via the displays in the shift section. Conversely, some of the entries in the curve’s menu are not accessible anywhere else. These are:

Resist curve morpher	Lets the curve only be affected by curve type 1.
Curve Bender	This menu lets you choose which of the four knobs in the curve bender section affects the curve.

Global Properties

Each wave shape has some global properties that further define its behaviour. To access and change these properties use the hotkey “Shift + Left Click” while hovering over an empty part of the wave shape display, i.e. any part that is not a point or near a curve.

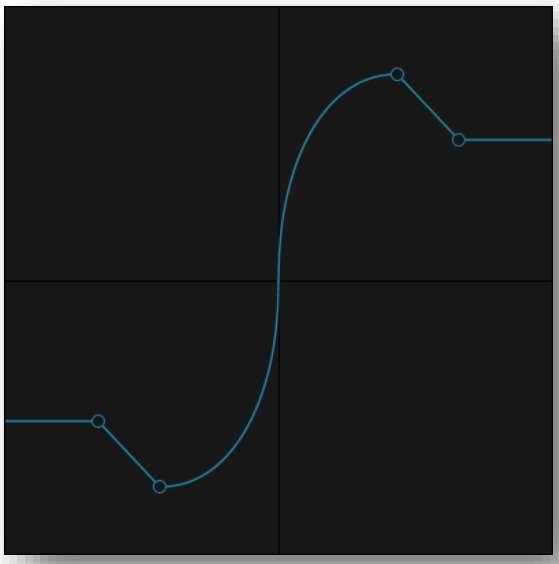


Wave Shape Starter	Contains various wave shapes that are useful as wave shapes themselves and as a starting point for creating more complex wave shapes
Symmetric	Sets the wave shape to “symmetric mode”, see “Symmetric and asymmetric wave shaping”
Asymmetric	Sets the wave shape to “asymmetric mode”, see “Symmetric and asymmetric wave shaping”
Convert to asymmetric	Tries to change to asymmetric mode while preserving the wave shape so one can modify the two halves separately. This does not always work as some curve types are inherently non-symmetric but for the most part, it will yield good results.

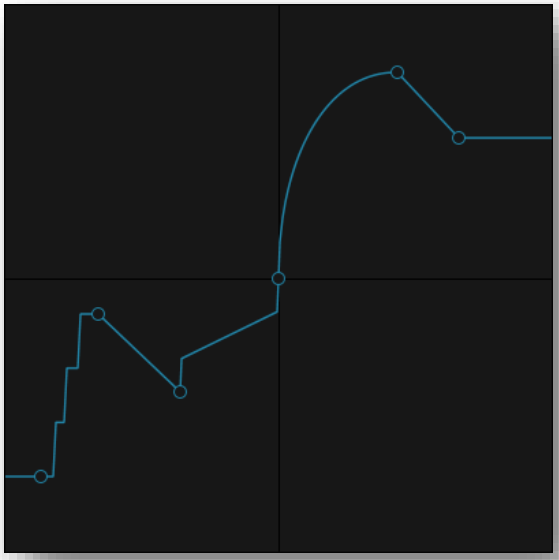
<table>
<tr><td>Classic wave shaping</td><td colspan="2">What you see is what you get, if a signal exceeds 0 dBFS it is not affected (unless the clipping mode is set to “Full” or “Linear Extension”</td></tr>
<tr><td>Infinity wave shaping</td><td colspan="2">When this mode is used, samples above 0 dBFS are affected. The wave shape is extended by repeating it.</td></tr>
<tr><td>No clipping</td><td colspan="2">The wave shape behaves as expected</td></tr>
<tr><td>Bounded clipping</td><td colspan="2">The wave shape clips the signal when it goes past the points that are closest to the left and right side. It does not affect the signal if it exceeds 0 dBFS.</td></tr>
<tr><td>Full clipping</td><td colspan="2">Same as “Bounded clipping”, except it does affect the signal if it exceeds 0 dBFS.</td></tr>
<tr><td>Linear Extension clipping</td><td colspan="2">Extends the line between the two points that are closest to the left and right side to create clipping. In fact, this can also be used for an expansion type effect but the slope is limited in that case as to not boost a signal by more than the device can handle. This should not be a limiting factor, however, as the limitation of the slope is set very conservatively.</td></tr>
<tr><td rowspan="3">Optimize wave shape</td><td>-</td><td>These two options optimize the DSP usage of the wave shape. They do not make it more efficiently to display.</td></tr>
<tr><td>Optimize for single curve</td><td>Optimizes the wave shape by taking the most prominent curve type for all the curves and turning on curve morpher. This can significantly improve performance, as the wave shape module will not calculate values that are not very relevant. Note that this can affect the sound, depending on how the curve morpher is set. In general, it is recommended only using this optimization when only one of the three curve types is used.</td></tr>
<tr><td>Optimize for straight lines</td><td>This is an even more extreme optimization and goes a step further than “Optimize for single curve” as it changes the curve type when the curve is already a straight line. This can also change the sound of the wave shape module as some curve types are not straight, even when their intensity 0. Curve types that show this behaviour include “Tangens Hyperbolicus” and “Stairsteps”.</td></tr>
<tr><td>Logarithmic Points</td><td colspan="2">This option makes the wave shape interpret points logarithmically, giving you more resolution close to the origin. This is generally very useful as our perception of sound is also logarithmic but can be useful to experiment with, especially when designing compressors/expanders. Note that the meter above the wave shape display also adjusts to show logarithmic values so it corresponds to the points’ positions (which do not change visually). However, curves are not shown logarithmically so when using the meter to decide on what curve should be used,</td></tr>
</table>

	be aware that the shape you see may not be the shape you get. This is especially apparent when using the curve type “Stairsteps”.
Bake modifiers	This bakes in the effects of the curve bender” and shift section into the wave shape.
Copy to wave shape	Copies the wave shape to another wave shape module of your choice. Note that it only copies the wave shape itself and the three modifier sections (the curve bender, the curve morpher and the shift section).
Mimic wave shape	Makes the currently selected wave shape module mimic another wave shape module. This means that it adopts only the wave shape itself and does retain its independent modifier sections.

Symmetric and Asymmetric Wave Shaping



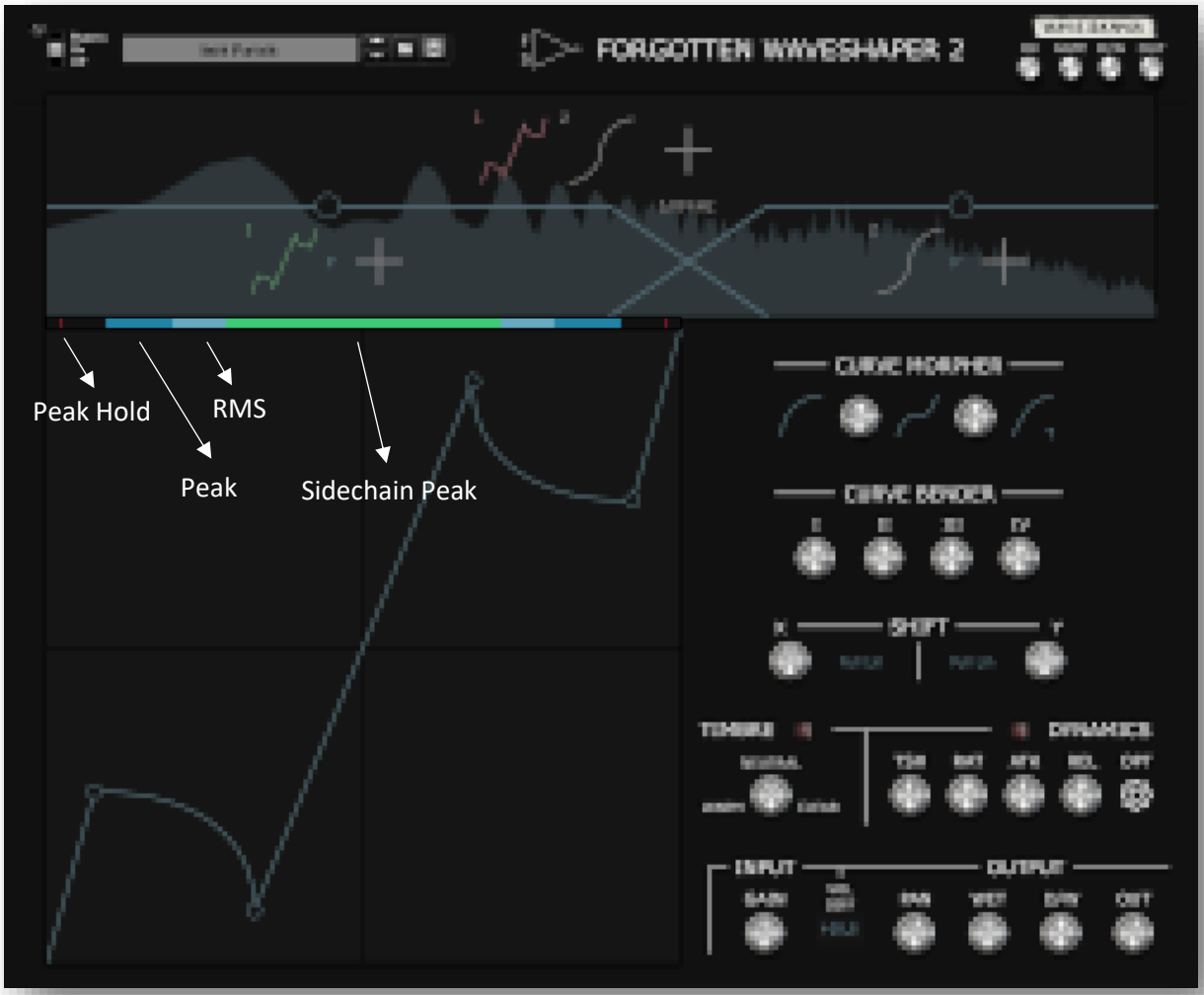
Symmetric wave shape



Asymmetric wave shape

Symmetric and asymmetric wave shaping are two different approaches to distortion. Symmetric wave shaping automatically mirrors points and curves across the origin while asymmetric wave shaping lets you control both halves independently. Symmetric wave shaping adds odd-order harmonics only while asymmetric wave shaping adds both even-order and odd-order harmonics. They sound fundamentally different so it is important to choose carefully between the two and experiment.

Metering



To dial in the distortion just right you can use the meter that is located above the wave shape display. Notice that you must enable metering first by clicking on a wave shape module that is assigned to a frequency slot. A green colour indicates metering is enabled. Since you can assign a wave shape module to multiple slots, the device needs to know which specific instance of the wave shape module you would like to monitor.

There are three meters enabled by default:

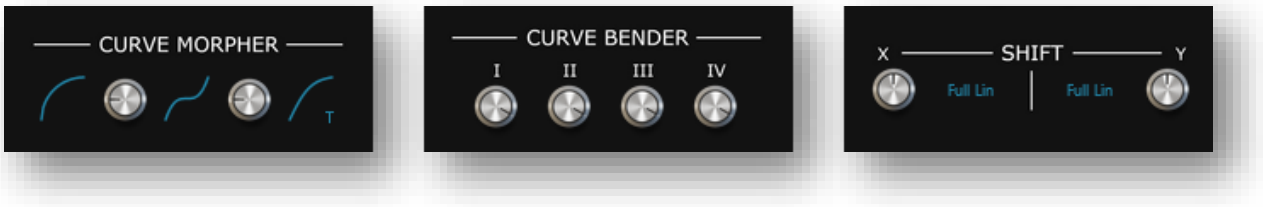
Peak Hold	Shown in red
Peak	Shown in turquoise
RMS	Shown in grey (appears to be light grey or white when peak value is laid on top)
Sidechain Peak	Shown in green (only shown when there is a signal coming into the sidechain input)

You can change between different combinations of these three by clicking on the meter itself.

The effect of the dynamics section is also only shown on wave shape modules that have metering enabled so don't be confused if you're looking at the frequency display and none of the assigned wave shape modules are reflecting the impact of the dynamics section.

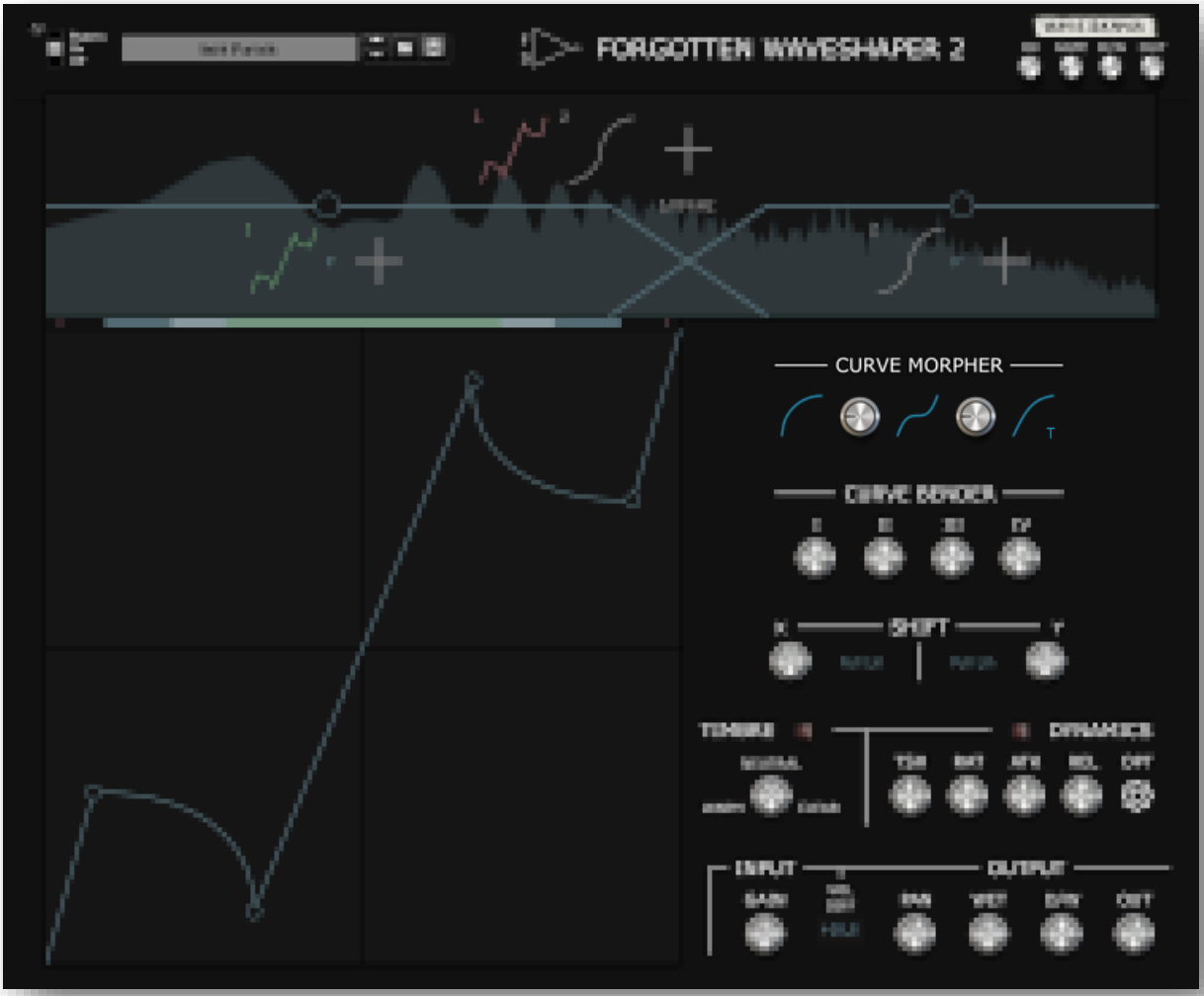
Metering can be very useful for setting the position of points, especially when using clipping. However, be aware that when the wave shape is told to use "Logarithmic Points" (see "Global properties") the metering does match with the position of all the points but may not match with the shape of all the curves, as curves are not drawn logarithmically to avoid confusion.

Wave Shape Modifiers



The three wave shape modifiers change the way the wave shape looks and therefore how it sounds.

Curve Morpher



The curve morpher lets you morph between three different curve types. You can select the three curve types by clicking on them and it works similarly to selecting algorithms in the shift section:

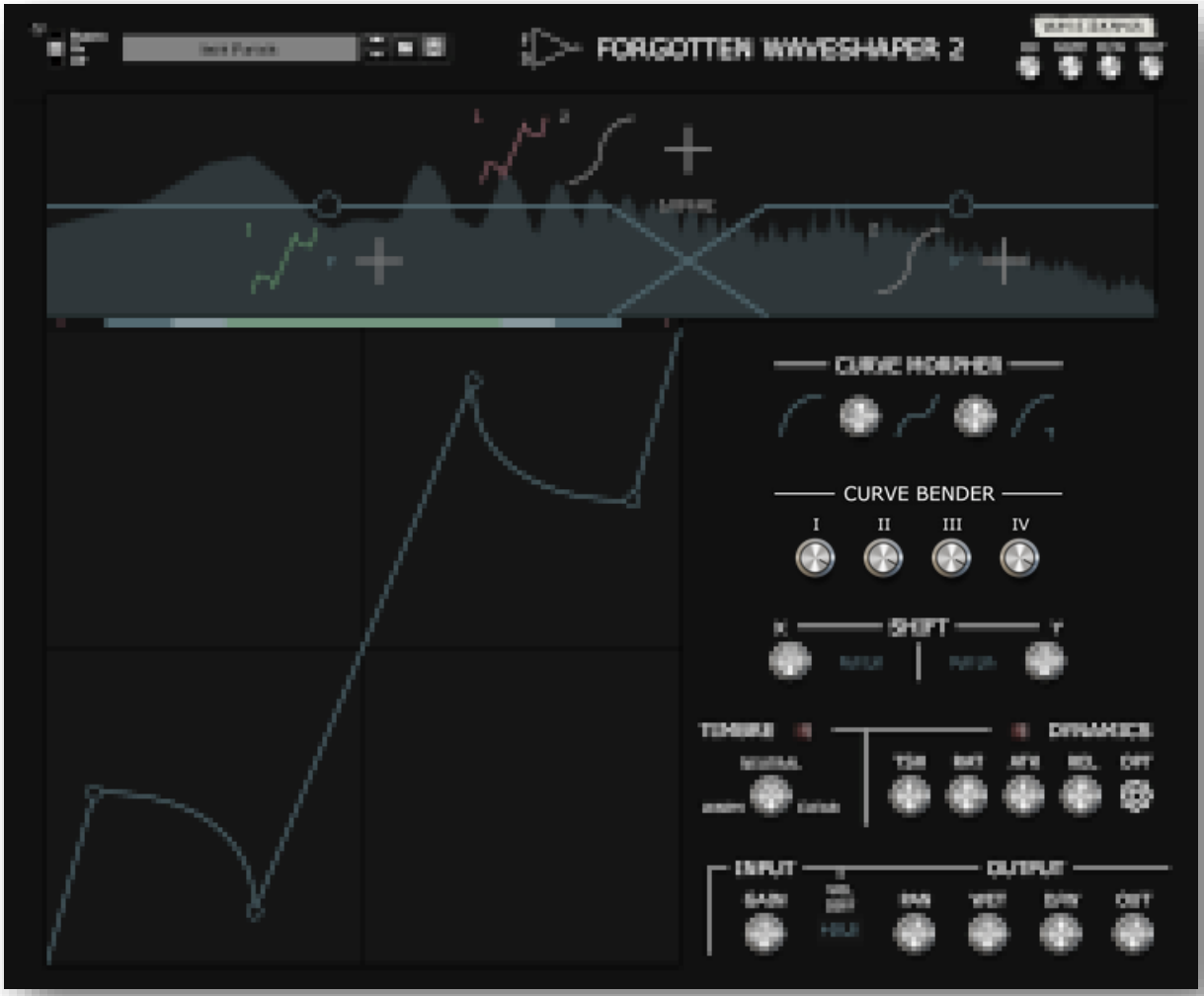
- Selecting a curve type when no curve is selected changes the curve type for all currently existing curves
- Selecting a curve type when a curve is selected changes the curve type for only that curve. This can also be done by opening the curve's menu and selecting the curve types from there.

When different curves use different curve types, the display shows "vari." (short for "various"). The curve types are mixed according to the following rule:

- Mix curve type 1 and curve type 2 according to the knob value of knob 1
- Mix that mix of curve type 1 and curve type 2 with curve type 3 according to the knob value of knob 2

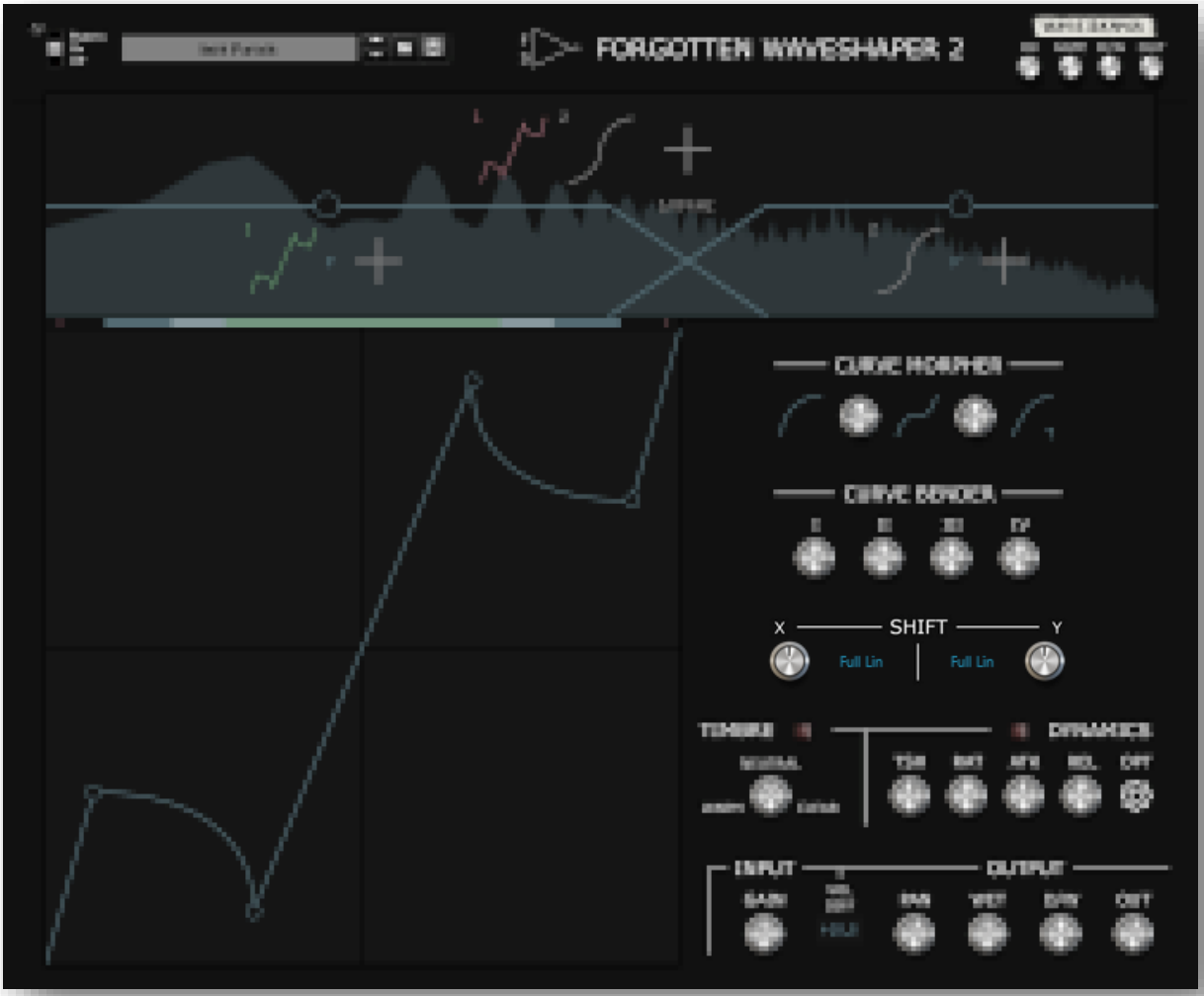
There is also the option to let a curve not be affected by the curve morpher at all. To enable that option, open the curve's menu (hotkey "Shift + Left Click") and select "Resist curve morpher".

Curve Bender



The curve bender changes the curve's intensity. There are four knobs available that you can assign to different curves. To do that, you have to open the menu of a curve (hotkey "Shift + Left Click") and select the knob you want it to react to. Notice that the curve bender does not determine the absolute value of the curve's intensity but instead multiplies it, similar to a dry wet knob.

Shift Section



The shift section changes the position of the points. There is one control for the horizontal position (labelled “X”) and one control for the vertical position (labelled “Y”). There are different algorithms to choose from and it works similarly to the curve morpher:

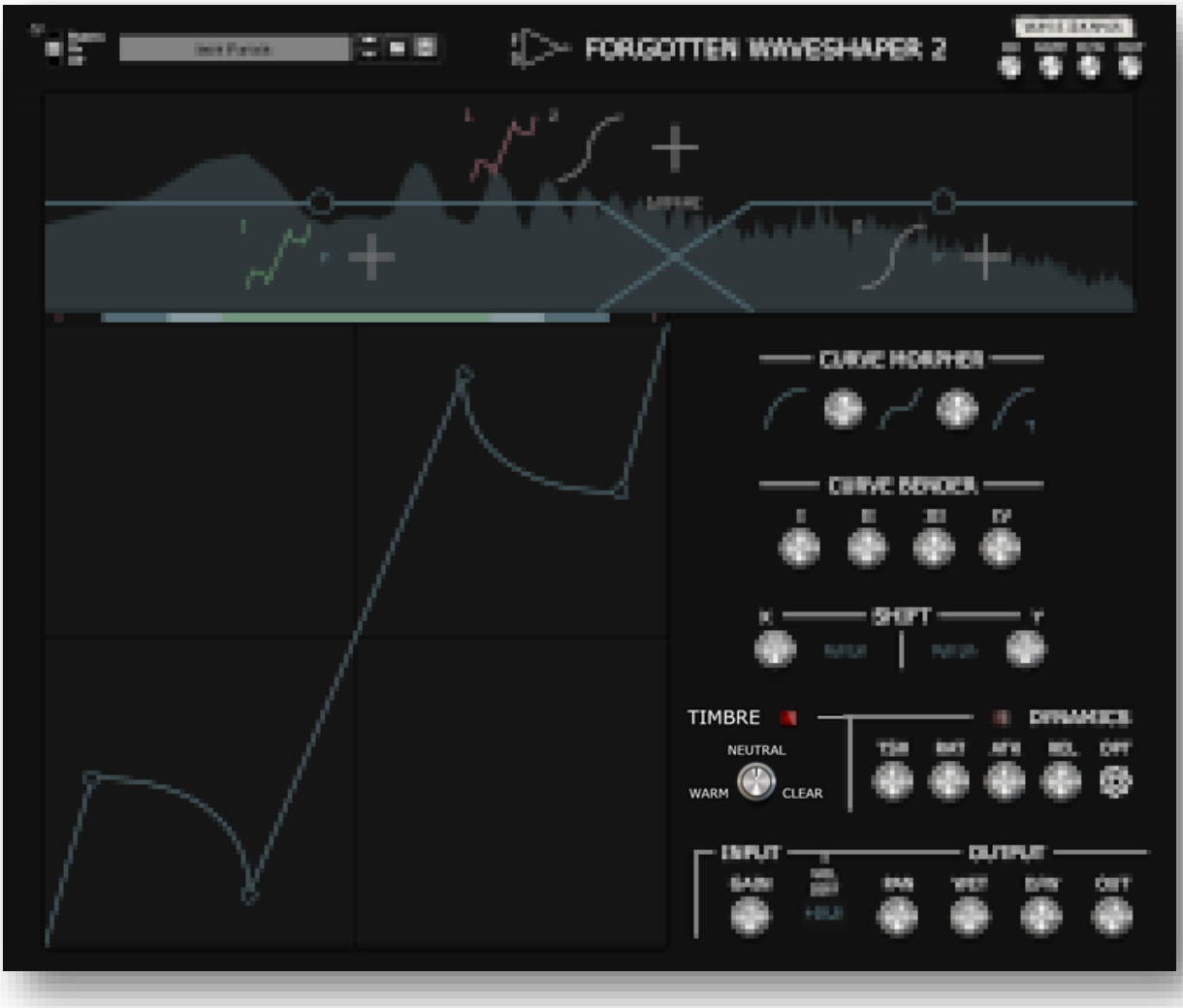
- Selecting an algorithm without any points selected sets the algorithm for all points currently on the display
- Selecting an algorithm with a point selected changes the algorithm for just that one point

When different points use different algorithms, the display shows “vari.” (short for “various”).

Other Sections

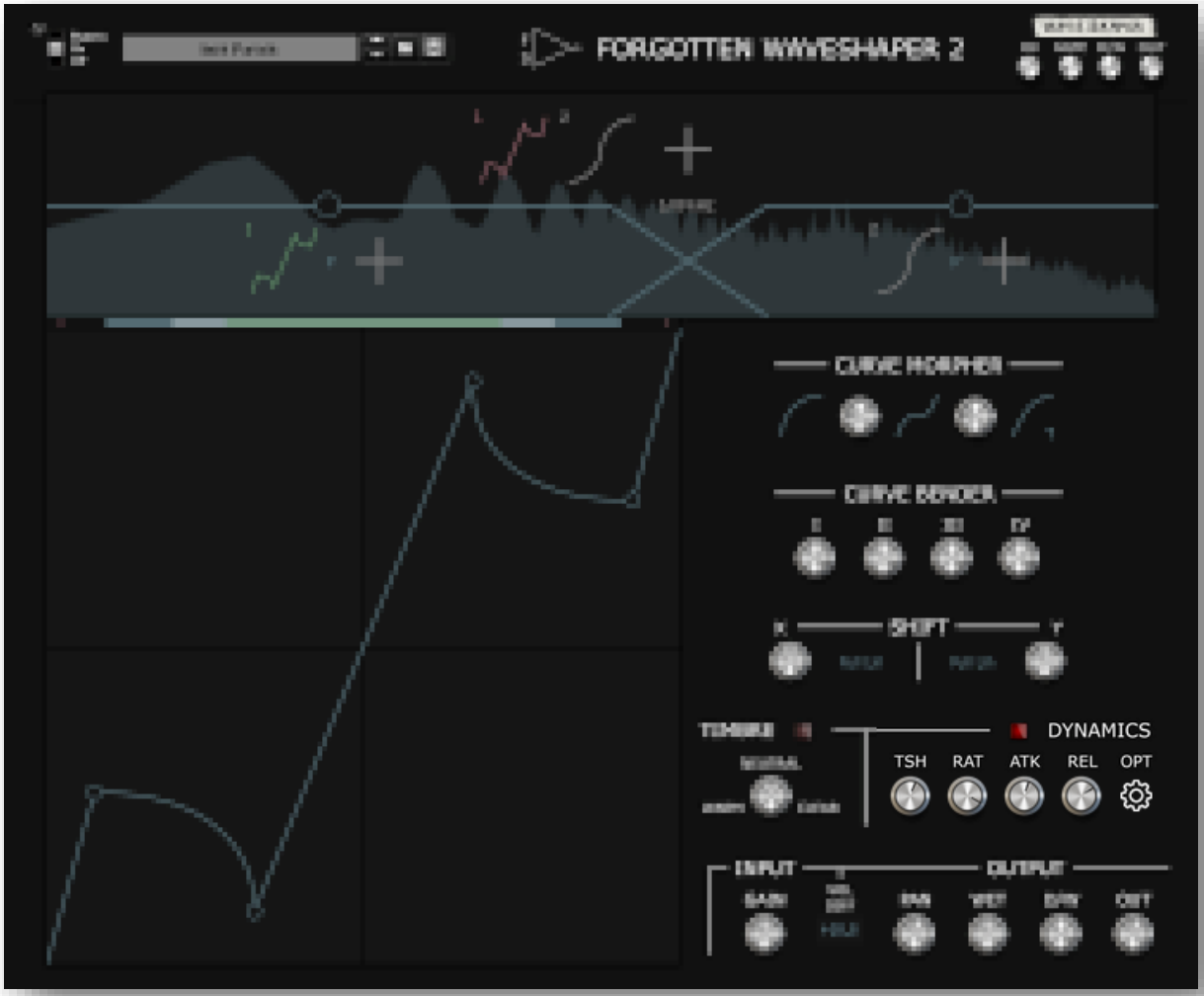
A few sections cannot be classified as modifiers as they do not affect the wave shape itself but rather affect how it handles different signals or apply pre- or post-processing.

Timbre



After enabling it with the on/off-toggle button, this is a one-knob highshelf filter giving you +10dB/-20dB of control over the high frequencies.

Dynamics



The dynamics section implements a versatile envelope follower like you would find in a compressor or in the Reason-native distortion device “Pulveriser Demolition”. In practice, it is an automated dry/wet-knob, which is important to keep in mind when using the wet-gain knob in the output section. The controls are as follows:

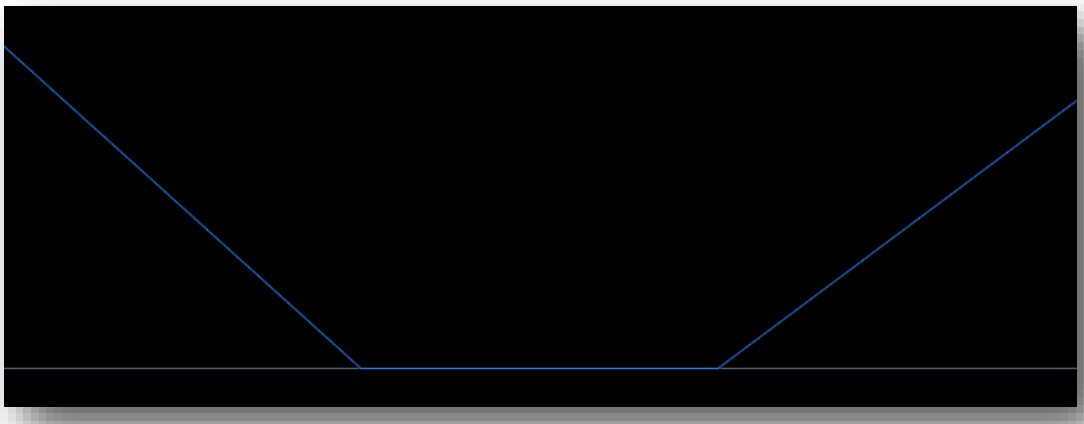
Toggle	Toggles the “Dynamics” section on or off.
Threshold	The threshold at which the behaviour of the envelope follower changes. By default, the dynamics section makes the wave shape distort the input signal when it crosses the threshold but this behaviour can be inverted with the “Invert” switch.
Ratio	The amount the signal is distorted when it crosses the threshold. A ratio of $\infty:1$ means that the amount of distortion applied only depends on the attack and release values, ratios below that scale down the amount of distortion based on by how much the signal is above the threshold. The whole concept is similar to a compressor but the definition has been extended to make sense for all types of wave shaping.

<table>
<tr><td>Attack</td><td colspan="2">The time it takes the dynamics section to reach the target distortion amount (which depends on the threshold and ratio).</td></tr>
<tr><td>Release</td><td colspan="2">The time it takes the dynamics section to reach no distortion after having hit the target distortion amount (which depends on the threshold and ratio).</td></tr>
<tr><td>Invert</td><td colspan="2">Inverts the behaviour of the dynamics section, distorting signals that are below the threshold and not distorting signals above the threshold.</td></tr>
<tr><td rowspan="4">Options</td><td>Invert Dynamics</td><td>Inverts the behaviour of the dynamics section, distorting signals that are below the threshold and not distorting signals above the threshold.</td></tr>
<tr><td>Attack and Release Curves</td><td>Sets attack and release curves to pre-defined settings that have been tested to sound good.</td></tr>
<tr><td>Attack Curve</td><td>Sets the curve for the attack parameter.</td></tr>
<tr><td>Release Curve</td><td>Sets the curve for the release parameter.</td></tr>
</table>

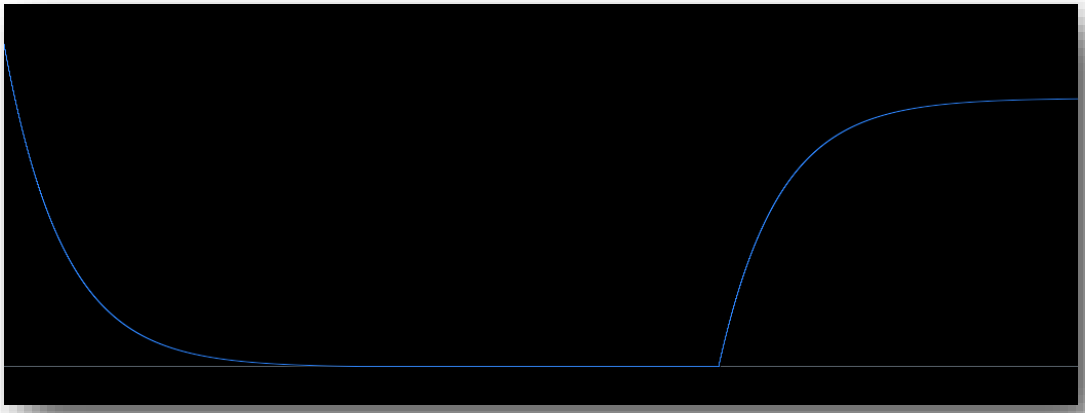
At the back of the rack are inputs for feeding in a sidechain signal that dynamics section listens to instead. The index of the wave shape module is shown in the frequency display so you know which input you have to connect a signal to.

Attack and Release curves

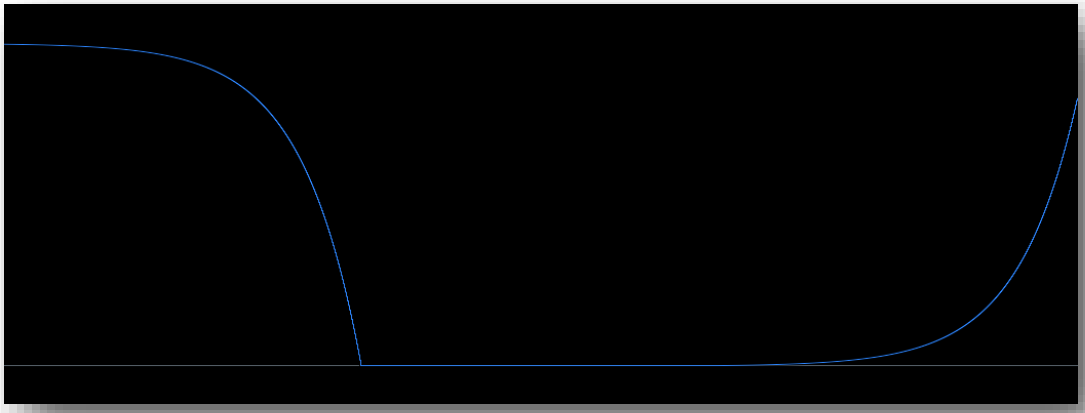
Since version 1.1 you can choose different curves for the attack and release parameter. Previously, there was one curve that you could not change, the “Linear” curve. This means that when the signal crossed the threshold, the distortion would increase linearly from 0% to 100% over the attack time interval. Similarly, when the signal dipped below the threshold again the release parameter would decrease the distortion from whatever percentage it was linearly to 0%. With the new curves, you can change this behaviour to let the attack increase faster from 0% to 30% and then more slowly from 30% to 100%, for example. You cannot set the curves however you want but there are 4 preset curves that give you all the control you probably need.



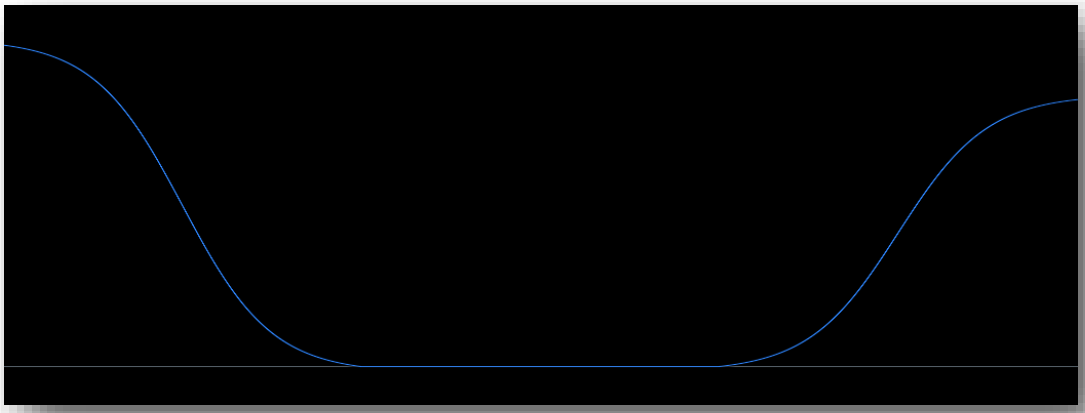
Curve: Linear (the default)



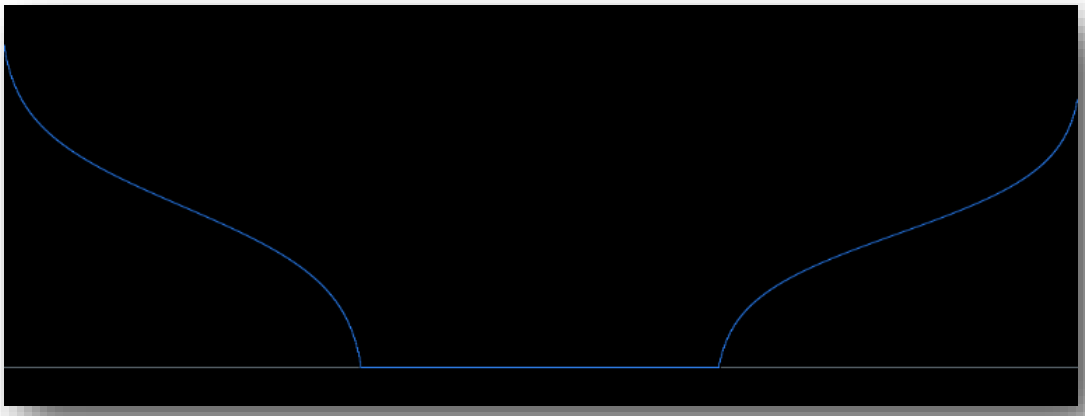
Curve: Fast In / Slow Out



Curve: Slow In / Fast Out

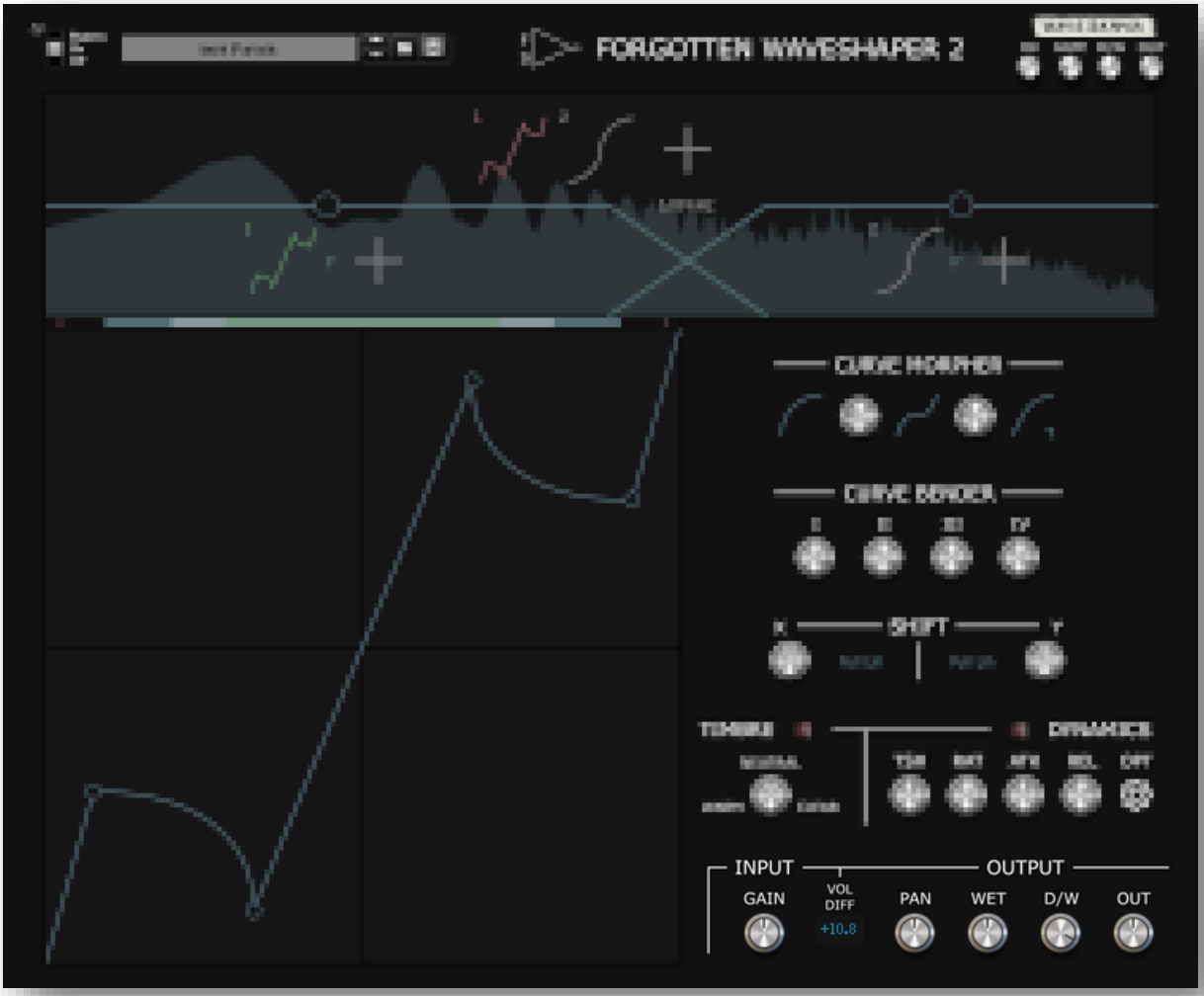


Curve: Slow In / Slow Out



Curve: Fast In / Fast Out

Input and Output Section

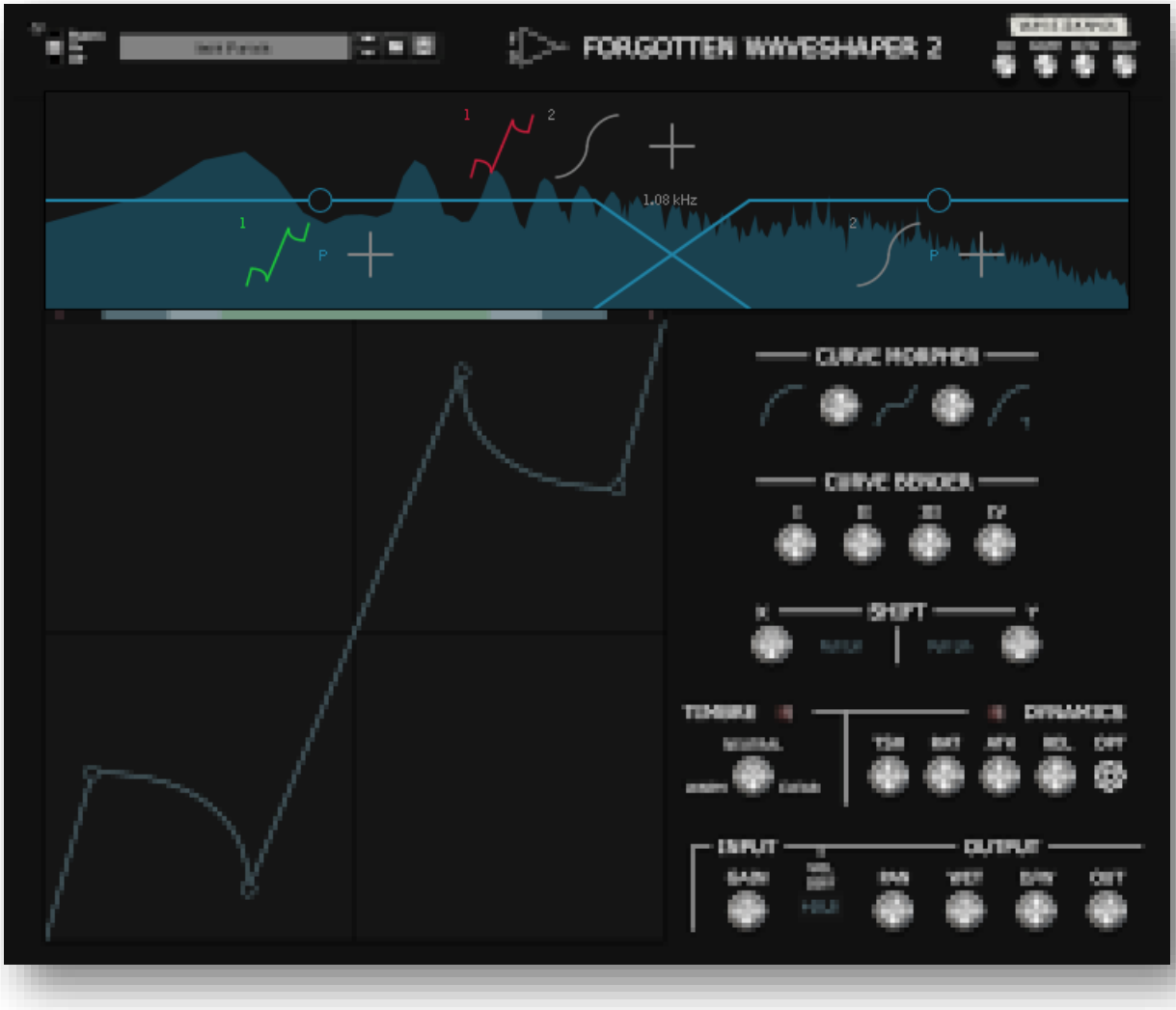


The input and output section is very important to get the most out of a wave shape. For example, clipping is highly depended by how much of the signal is being clipped, i.e. how loud the input signal is so increasing the input gain results in more distortion. The output section makes it easy to level match the distortion and adjust the amount of wet signal.

Input Gain	Adjusts the input gain before it reaches the wave shape.
Volume Difference (Display)	Displays the approximate volume difference between the input gain and fully wet signal. It is not as accurate at showing the perceived volume difference if the signal is very dynamic but for the most part, it gives a good starting point for matching the loudness.
Panorama	Pans the distortion (does not pan the signal itself!). This can be used to have a create a stereo effect by having more distortion on one of the channels or using two wave shape modules to distort the left and right channel separately. Refer to the chapter "Frequency Bands" if you would like to learn more.

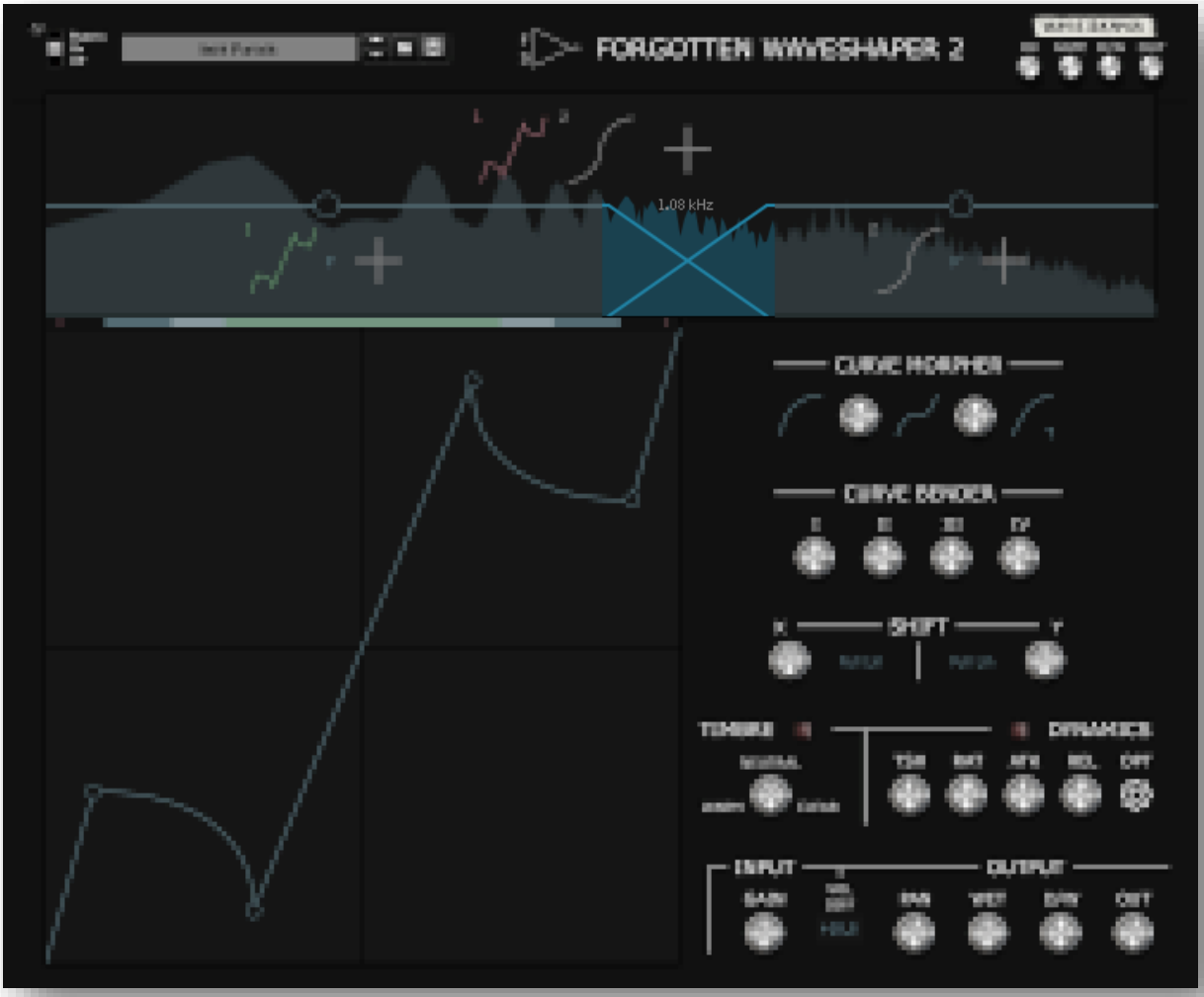
Wet Gain	Adjusts the gain of the signal before it reaches the dry/wet-knob. Since the dynamics section is also seen as a separate dry/wet-knob, it does apply the gain as expected. Use this knob when loudness matching the input signal to the output signal. This way you can use the dry/wet-knob without worrying about changes in volume.
Dry/Wet	Changes the amount of dry signal injected into the wet signal.
Output Gain	Adjusts the output gain after all the processing of the wave shape module. You might want to use this to compensate for increased input gain.

Frequency Display



The frequency displays houses all of the controls for the multiband capabilities of the device. Here you can also see the frequency content of the signal before or after the processing and assign wave shape modules to different frequency bands. Unassigned wave shape modules are shown above the 0 dB frequency response line and can be dragged onto slots of frequency bands to let them process a signal.

Crossovers

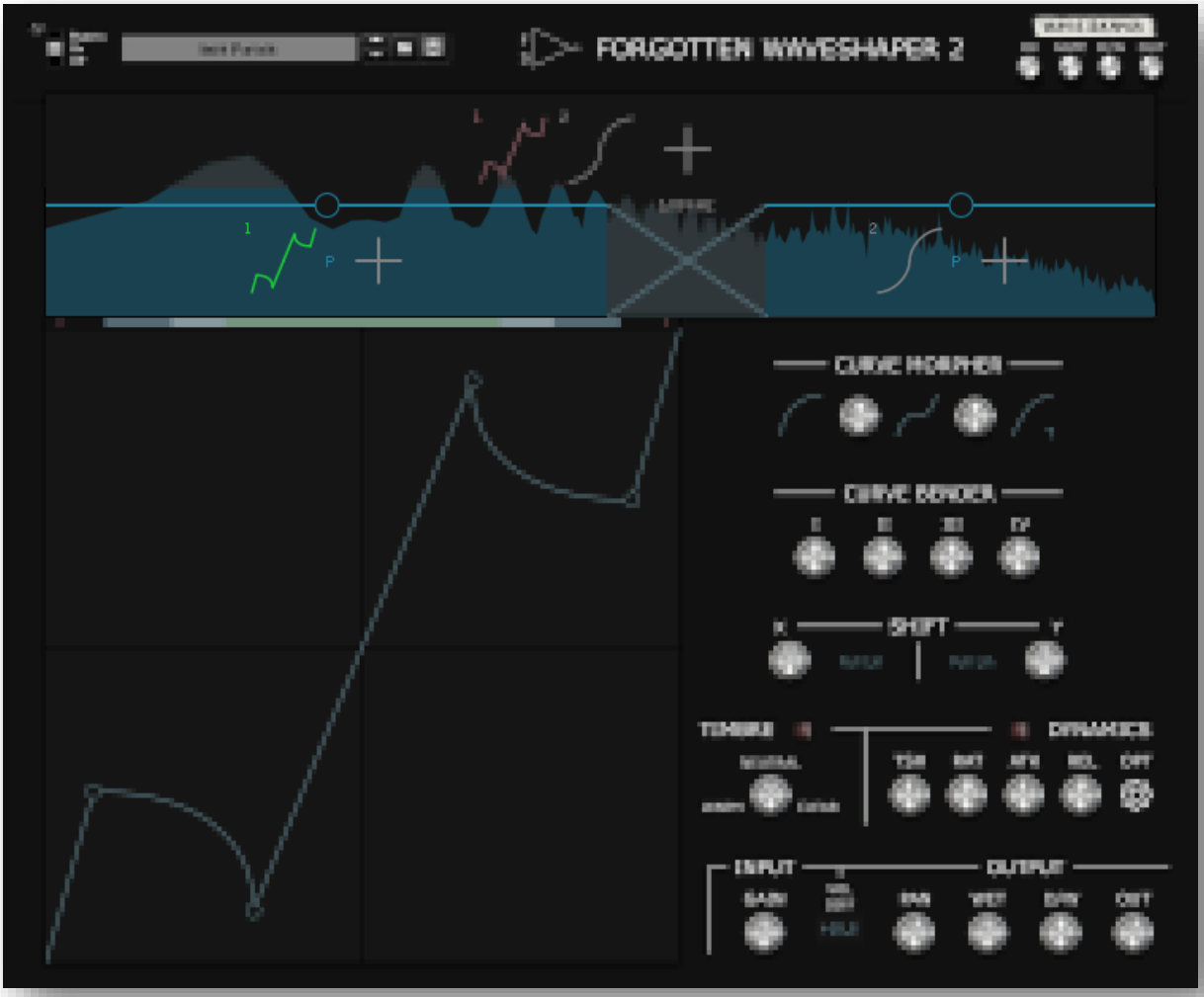


Crossovers are filters that split a signal into two frequency bands. There are 3 available crossovers to split the signal into a maximum of 4 frequency bands. To add a crossover use the hotkey “Alt + Left Click” while hovering below the horizontal 0 dBFS frequency line.

To change the cut-off frequency drag the crossover itself. You may notice that you cannot move crossovers past one another. This is to keep the assigned wave shape modules consistent but you can get around it by automating the cutoff frequency. This is not very useful and when two crossovers move past each other, the whole frequency response turns grey to indicate that the cutoff frequencies are set in a way that cannot be displayed in a clean, meaningful way.

There are three crossover slopes available: 24 dB/oct, 48 dB/oct and 96 dB/oct. To change the slope use the hotkey “Shift + Left Click” while hovering over a crossover and choose the slope you want from the menu.

Frequency Bands



NOTE: There are many hotkeys to make editing the frequency bands easier. They are not all listed here. Refer to the chapter "Hotkeys" instead.

Adding crossovers allows using the device in a multiband configuration, distorting different frequency bands with different wave shape modules. Each frequency band has two slots where you can put a wave shape module. The way these two slots process the signal, depends on what processing mode is used. There are two modes:

Parallel	The two slots are both processed and mixed together according to the parameter "Wave Shape Balance". This can be used to mix two flavours of distortion or to seamlessly morph between two distortion algorithms.
Serial	The two slots are processed in series. The signal is first sent to the first slot and the processed signal is then sent to the second slot. This can be used to create more extreme distortions by stacking them or to create stereo effects using the panorama knob, letting one slot only process the left signal and the

	other slot only process the right signal. In combination with mid/side mode, this can also be used to process the mid and side signal independently.

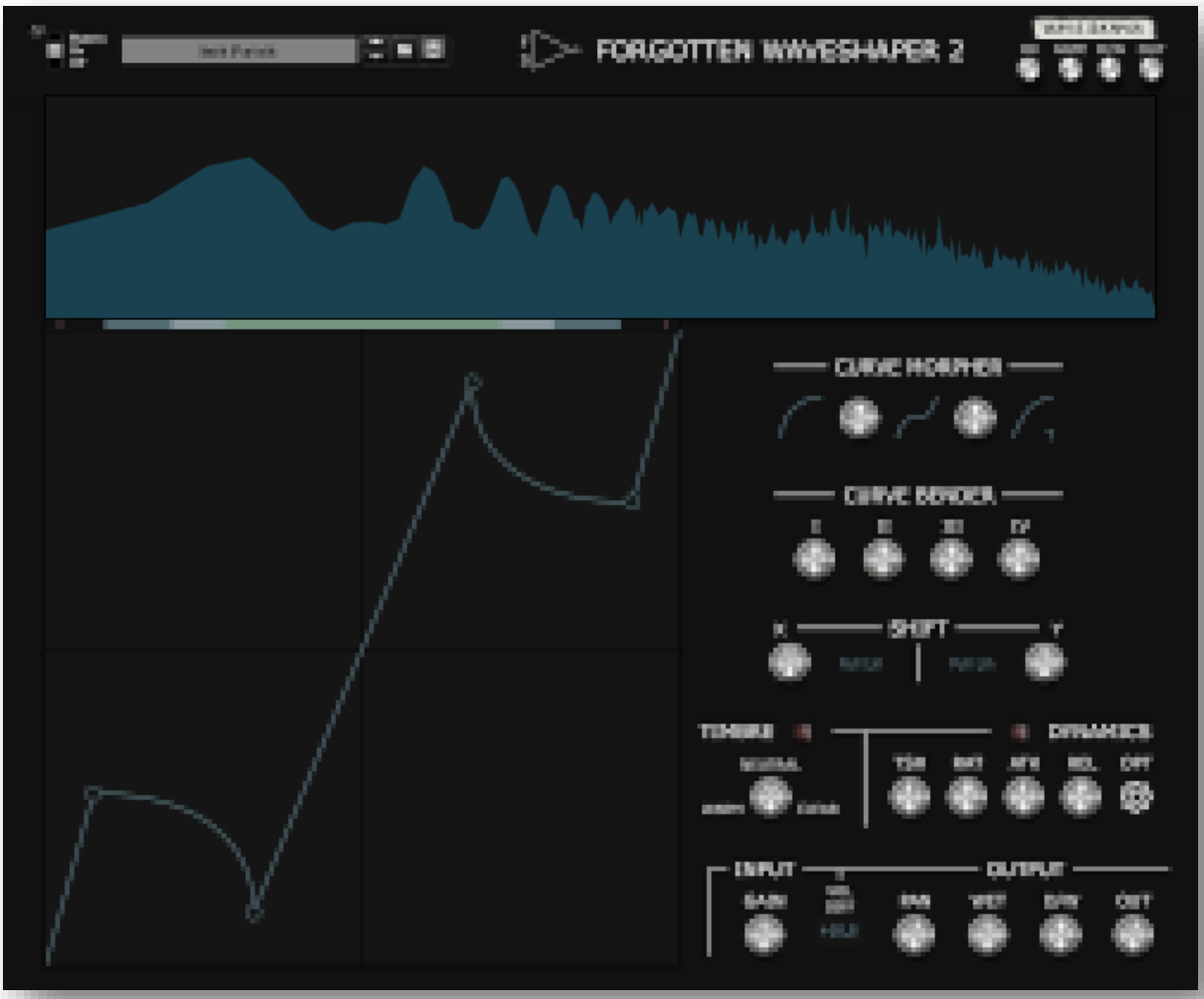
Additionally, you can choose between to stereo modes:

L / R	This is the normal mode, processing the left and the right channel.
Mid / Side	This mode converts the signal into mid/side, processes it with the two slots and then converts it back to L/R. While processing the left channel becomes the mid channel and the right channel becomes the side channel. Switching to this mode can already change the sound of the distortion but you get even more control over the sound using the panorama knob in the wave shape modules. That way you can process more of the mid than the side channel or vice-versa.

You can also directly change wave shapes to starter shapes by using the hotkey “Shift + Left Click” while hovering over a wave shape module. The menu lets you choose between a few starter shapes.

Finally, each frequency band has an output gain parameter, which (admittedly) is a little hidden: Dragging the circle in the middle of the frequency band gives you a final gain control.

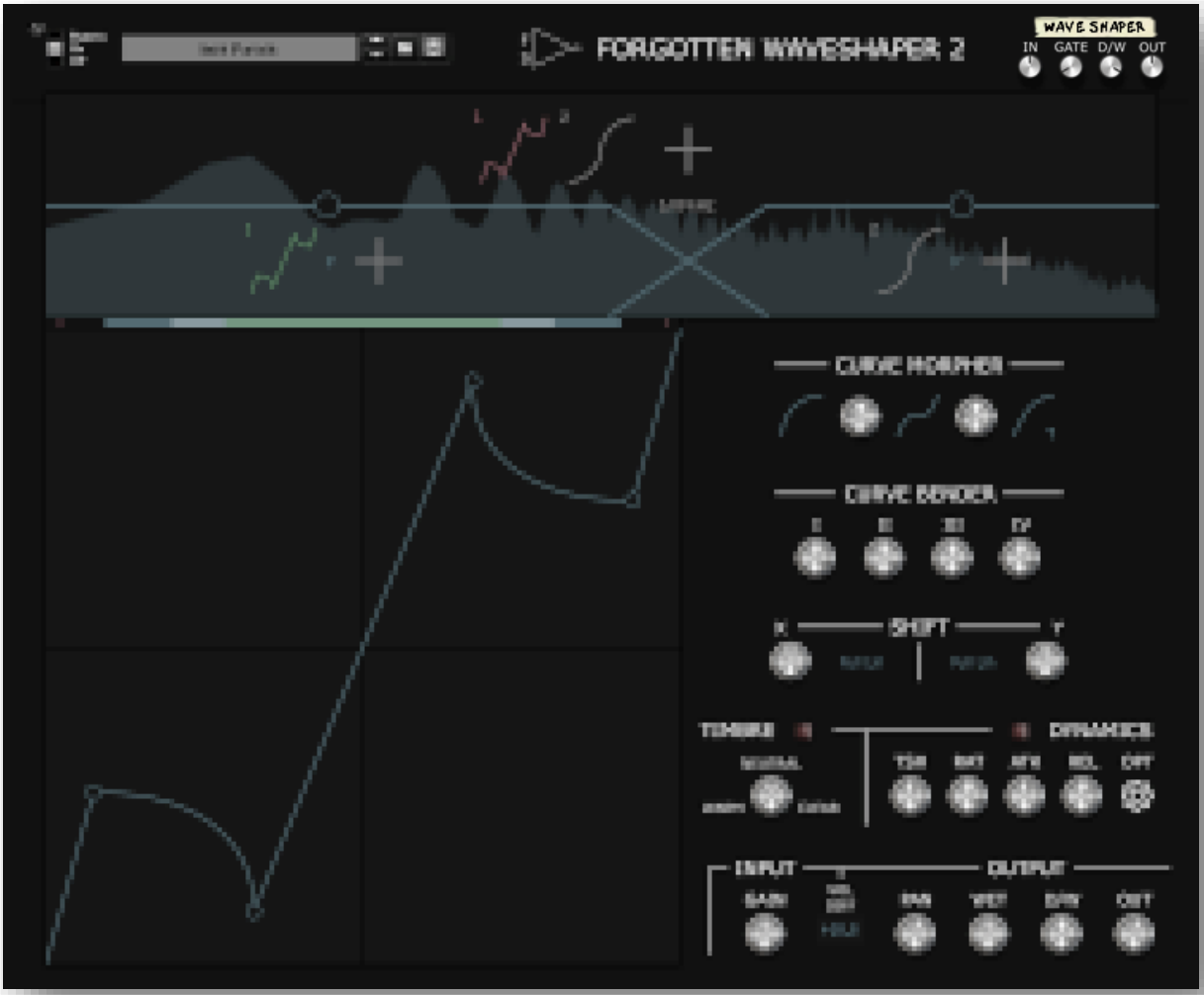
Analyser



The frequency analyser is shown underneath the frequency response and wave shape modules. It gives you a visual representation of the frequency content present in the input signal and can help setting crossover frequencies. In addition, you can also let it show the signal after it has been processed to see which areas have added harmonics and how loud they are. To access the menu use the hotkey “Shift + Left Click” while hovering over any area that would not open a different menu.

Off	Does not show the frequency content of the signal
Pre	Shows the frequency content of the input signal
Post	Shows the frequency content of the output signal

GLOBAL OUTPUT SECTION

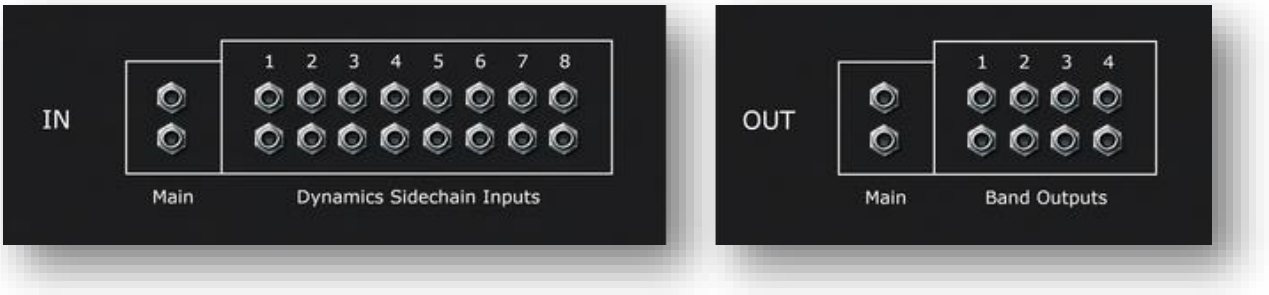


The global output section is primarily used to get the most out of presets. Since the signals used for creating the presets may not match the volume or frequency content of the signal you use it on, it is a good idea to experiment with the controls found here.

Input Gain	Input gain for the signal that is applied before any other processing
Gate	This is not a traditional gate but instead makes wave shape modules ignore samples below a certain threshold. When designing wave shapes that try to change sample values close or equal to 0 you might run into an issue that creates a DC offset and therefore also a click. This has to do with some of the requirements made by Reason Studios and there's nothing I can do about it other than giving you this control to avoid it in the first place.
Dry/Wet	Dry/wet knob that is applied after all the processing. Be aware that the filters used for splitting the signal into separate frequency bands are minimum phase filters, which means using the dry/wet knob in conjunction with more than one frequency band will result in phasing. This can be desirable but is something to be aware of.

Output Gain	Output gain for the signal that is applied at the very end of the processing.

INPUTS AND OUTPUTS



At the back of the device, you can find some inputs and outputs.

Main In	Here goes the signal you'd like to process
Main Out	Here comes out the processed signal
Dynamics Sidechain Inputs	These are the sidechain inputs for the individual wave shape modules. If you want to know which index a wave shape module has, look at the number in the top left corner of the wave shape module in the frequency display.
Band Outputs	These are the band outputs. They output the signals after it has been processed by the two slots.

HOTKEYS

NOTE: Some hotkeys require you to first click and then press Shift, Alt, Ctrl/Cmd or any combination of the three while others require you to first press one of the three keys and then click. Follow the hotkeys in order or some may not work.

Basic operations are done dragging elements with the cursor with no additional keys pressed. That includes:

- moving points
- adjusting the intensity of curves
- changing a crossover's cutoff frequency
- adding new wave shape modules
- assigning to or moving wave shape modules from a frequency band's slot

However, there are many hotkeys that make editing wave shapes and adjusting frequency bands faster and easier. A few hotkeys are the same for both the wave shape display and the frequency display and these are the most important ones to remember. The other ones are a convenience – albeit a fun one.

General Hotkeys

<table>
<tr><td>Alt + Left Click</td><td>Adds a new element.<table><tr><th>Wave shape display</th><th>Frequency display</th></tr><tr><td>adds a point</td><td>adds a crossover (maximum of 3)</td></tr></table></td></tr>
<tr><td>Ctrl/Cmd + Left Click</td><td>Removes an element.<table><tr><th>Wave shape display</th><th>Frequency display</th></tr><tr><td>removes a point</td><td>removes a crossover</td></tr><tr><td>resets a curve</td><td>de-assigns a wave shape module</td></tr><tr><td></td><td>deletes a wave shape module</td></tr><tr><td></td><td>resets the output gain of a frequency band</td></tr></table></td></tr>
<tr><td>Shift + Left Click</td><td>Opens a menu. Depending on which element the mouse is hovering over, a different menu is opened.<table><tr><th>Wave shape display</th><th>Frequency display</th></tr><tr><td>point menu</td><td>analyser menu</td></tr><tr><td>curve menu</td><td>crossover menu</td></tr><tr><td>global menu</td><td>frequency band menu</td></tr><tr><td></td><td>wave shape starter menu</td></tr></table></td></tr>
<tr><td>Left Click + Shift</td><td>Enables fine adjustment of elements.<table><tr><th>Wave shape display</th><th>Frequency display</th></tr><tr><td>finely moves a point</td><td>finely changes a crossover's cutoff frequency</td></tr><tr><td>finely adjusts a curve's intensity</td><td></td></tr></table></td></tr>
</table>

Hotkeys specific to the Wave Shape Display

Alt + Left Click	*[only when hovering over a point]* The point is moved vertically to lie on the 45° diagonal line. If the point is already on that line (and if there is a point to the left and to the right of it), it is moved vertically to lie on the line that would directly connect the two points it is sandwiched between.
Shift + Alt + Left Click	Enables "only-wet" monitoring on the wave shape module. This is especially useful when using the dry/wet knob or dynamics section to hear what the distorted part of the signal sound like on its own.
Left Click + Ctrl/Cmd	Moves points only horizontally
Left Click + Alt	Moves points only vertically
Left Click + Alt + Ctrl/Cmd	Makes points snap to a grid

Hotkeys specific to the Frequency Display

<table>
<tr><td>Alt + Ctrl/Cmd + Left Click</td><td colspan="2">[only when hovering over one of the two slots of a frequency band whose processing mode is set to "Parallel"]
Changes the ratio at which the two slots are being mixed together (an empty slot counts as a dry signal)</td></tr>
<tr><td>Shift + Alt + Left Click</td><td colspan="2">[only when hovering over a frequency band]
solos the frequency band</td></tr>
<tr><td>Shift + Alt + Ctrl/Cmd + Left Click</td><td>when hovering over a slot</td><td>when hovering over a frequency band</td></tr>
<tr><td></td><td>bypass the slot if a wave shape module is assigned to it</td><td>mutes the frequency band</td></tr>
</table>

FAQ

How do I automate parameters that do not have knobs?

Right-click on the device and select “Create Track for [device name]“. Then, click on the button “Track Parameter Automation” in the sequencer and choose from the menu.

What does it mean if the frequency response goes grey?

That means that through automation, two crossovers have crossed their cutoff frequency. Two prevent this creating a visual mess, the frequency response is simply greyed out so you can still assign wave shape modules and have an understanding of which frequency bands are where. Apart from that, it doesn’t make a lot of sense to have a lower crossover with a higher cutoff than a higher crossover so when you see this happening it might be a good idea to adjust the automation points. But as always, trust your ears!

Where are CV inputs?

CV inputs are coming but I am still planning on how to best implement them. For the time being, I have a workaround for you: Put the device in a combinatory and assign the four CV inputs to the parameters you would like to modulate. Then connect your CV modulation source to the CV inputs of the combinatory.

Where is oversampling?

Oversampling is a complicated feature that is also very CPU intensive. Due to the flexibility of the device, it is already fairly CPU hungry, which is why I’m currently looking into more efficient ways of doing oversampling. Unfortunately, these advanced techniques are not only more efficient but also more complicated so I left them for a future update.
I also did some testing to evaluate how much difference oversampling would make and the result was sobering. Most of the time the difference in sound quality was negligible and only it extreme case it made a significant difference.

I think I’ve found a bug. Where can I report it?

You can get in touch via E-Mail, Facebook or Instagram. I’ll try to fix bugs as quickly as possible!

I’ve got this amazing idea for a new feature. Will you implement it?

It depends on many factors. I’m always happy when people that use my devices get in touch, so feel free to say hello! E-Mail | Facebook | Instagram

There’s this awesome thing I can’t do in Reason. Will you code a Rack Extension that does this thing?

There are still many Rack Extensions on my wish list that I would like to get to some time in the future. But I’m always interested in hearing your ideas! E-Mail | Facebook | Instagram

CHANGELOG

v1.1

- Added attack and release curve options. You can now choose between different attack and release curves in the dynamics section. Their exact shape and functionality is discussed in the updated manual.
- Moved the “invert” parameter into a new “options” icon/menu in the dynamics section
- Some bug fixes:
    - Using the “ratio” knob should now sound better and yield more predictable results. Patches you’ve designed can sound different. What has unintentionally happened in v1.0 is that turning down the ratio would extend attack and release times. So if you notice the device behaving differently with this new, fixed version, you just need to turn up the attack and release a bit and will get the same result.
    - The range on the attack and release knobs now correctly shows 1ms to 1s instead of 0.1ms to 1s
    - Fixed a bug where sometimes Linear Extension Clipping would deactivate other processing
    - Fixed a bug where sometimes curves would not be drawn