SPECTRE

1.5

COLOR YOUR SOUND

INTRODUCTION

Spectre is a sound-shaping tool that combines the best features of an enhancer coupled with a graphical equaliser. Spectre enables the user to introduce harmonic content from a variety of saturation algorithms based on classic recording hardware. Adjust any of the five bands to add the audio process to just one or up to five bands, with adjustable Q the effect can go from broad to razor sharp. Spectre can be used on individual tracks, sub-mixes, the entire mix and is ideal for mastering.

Spectre does not work like a conventional equaliser, EQs cut or boost the volume of a band based on the audio being presented. Spectre introduces harmonic content that was not in the original recording, bringing colour and life to the sound not possible with a conventional EQ, this ability to offer almost phantom content across the audio spectrum led us to the name Spectre.

Enhancer with five parallel boost-only parametric bands:
▸ Low-shelf.
▸ Peak.
▸ Peak.
▸ Peak.
▸ High-shelf.

Spectre is more versatile than a simple enhancer as you can choose where and how the process occurs with the included EQ and with ten different saturation algorithms to get different colours:
▸ Solid.
▸ Tape.
▸ Tube.
▸ Warm Tube.
▸ Class B.
▸ Diode.
▸ Bit.
▸ Digital.
▸ Rectify.
▸ Half Rectify.
▸ Additional "Clean" channel that converts Spectre into a parallel boosting EQ.

Optional 4x and 16x oversampling modes offer pristine audio quality with no aliasing even with aggressive settings.

Spectre can process:
▸ Mono / Stereo signals.
▸ Only left or right channels.
▸ Mid or side channels.

GETTING STARTED

SPECIFICATIONS

▸ Multi-band enhancer.
▸ 5 bands parametric EQ with graphical display.
▸ Stereo, left or right, mid or side processing modes.
▸ 10 saturation algorithms.
▸ HQ oversampling.
▸ 3 modes: subtle, medium, aggressive.
▸ Preset system.
▸ Vector graphics that fit any screen resolution with pristine render quality.
▸ Formats: VST, VST3, AU, AAX (32/64 bit).
▸ Platforms: OSX, Windows.

SYSTEM REQUIREMENTS

Mac OSX 10.7 or superior.
Windows 7 or superior.

INSTALLATION

Mac
Double-click on the PKG file downloaded from Wavesfactory.
Follow the steps to install the plugin.
The installer will place the different plugin formats in the right folders for you:
▸ **AU**: Library/Audio/Plug-Ins/Components/Spectre.component
▸ **VST**: Library/Audio/Plug-Ins/VST/Spectre.vst
▸ **VST3**: Library/Audio/Plug-Ins/VST3/Spectre.vst3
▸ **AAX**: Library/Application Support/Avid/Audio/Plug-Ins/Spectre.aaxplugin
The installer will also create a folder in Library/Application Support/Wavesfactory named Spectre that will contain all the necessary files like presets, user manual and license.

Windows
Double-click on the EXE file downloaded from Wavesfactory.
Follow the steps to install the plugin.
The installer will place the different plugin formats in the right folders for you:
▸ **VST 64 bit**: C:\Program Files\Steinberg\Vstplugins\
▸ **VST 32 bit**: C:\Program Files (x86)\Steinberg\Vstplugins\
▸ **VST3 64 bit**: C:\Program Files\Common FIles\VST3\
▸ **VST3 32 bit**: C:\Program Files (x86)\Common FIles\VST3\
▸ **AAX 64 bit**: C:\Program Files\Common Files\Avid\Audio\Plug-Ins
▸ **AAX 32 bit**: C:\Program Files (x86)\Common Files\Avid\Audio\Plug-Ins
The install will also create a folder at C:\Users\'username'\AppData\Wavesfactory named Spectre that will contain all the necessary files like presets, user manual and license.

TROUBLESHOOTHING

If Spectre doesn't appear in your DAW plug-in list you can try following these steps:
- ‣ Re-scan all plug-ins.
- ‣ If you're on Windows make sure that the plug-in is in the correct folder as the installer will place it in the default VST location but your DAW may be using a custom one.
- ‣ Make sure that your OS version is 10.7 minimum on Mac and Windows 7 minimum on Windows.

If Spectre crashes your DAW on start-up or while using it please delete it from the folder and reinstall it.

Make sure that you have the latest version by downloading the installer from the website:
https://www.wavesfactory.com/spectre

If the crashes continue, contact support with any available crash reports, specifying your OS version, DAW version and any other valuable information that you may have.
https://www.wavesfactory.com/contact

DEMO EVALUATION

Spectre will run in demo mode by default. It will output a short burst of noise every 45 seconds, parameters won't be recalled when saving the session and preset saving is disabled. All other features will be available for full evaluation with no specific time expiration.

While in demo mode the plugin will show the authorisation panel every time you open the UI, if you still want to evaluate it you have to click on "Continue evaluation" at the bottom of the pop-up".

AUTHORISATION

When purchasing Spectre from Wavesfactory you'll receive an e-mail containing the username and serial number formatted like this:

Username: john@doe.com
Serial: 1234567890987654321

You have to copy this to the clipboard by selecting it and either
▸ Right-click and select "copy".
▸ Press Ctrl + C on Windows or Cmd + C on Mac.
Make sure that you copy them without empty spaces as it will result in a not valid authorisation.

Then open the plug-in and the authorisation panel will appear. Insert your username and serial. Press "paste" and the contents of the clipboard will be copied accordingly. Finally, press the Activate button. If the information is correct he plug-in will save your serial number in Wavesfactory/Spectre/License/. If the information is not correct the panel won't disappear and the version will still be in demo mode.
In order to de-authorise you can simply delete the file inside Wavesfactory/Spectre/License.

HOW DOES IT WORK

An enhancer (also called harmonic exciter) is an audio signal processing technique used to enhance a signal by dynamic equalisation, phase manipulation, harmonic synthesis of (usually) high frequency signals, and through the addition of subtle harmonic distortion.
The first and most famous enhancer was the Apex Aural Exciter. This effect was developed in the mid-1970s by Aphex Electronics. The unit blends the dry signal with a high passed distorted version of the dry signal, generating new content on the high frequencies and thus making the signal sound brighter. More modern approaches also let you add low frequencies to the mix making a track sound fuller on small speakers.

SIGNAL CHAIN

Spectre works in a different way. Spectre processes each band of the EQ separately in parallel with the saturation algorithm of choice by distorting only the difference in EQ between the dry and wet signal. This generates new harmonic content that wasn't present in the original signal. Then, it combines all the bands and mixes them in parallel with the original signal. The result is much more natural and effective than with a traditional EQ processor. You can choose what, where and how in the spectrum you want to be processed and with the variable Q for each band you can go broad or surgical.

SATURATION ALGORITHMS

One of the features that make Spectre very special is the ability to choose between ten different saturation algorithms giving you different colours for your mix. Here you have a small description of each:

- ▸ **Tube**: valve-type soft clipping symmetric distortion. It's the most versatile one and a safe bet for almost any situation.
- ▸ **Warm Tube**: darker version of the Tube. Not recommended to be used in higher frequencies.
- ▸ **Solid**: transistor type soft clipping asymmetric distortion.
- ▸ **Tape**: tape like punchier and muffled saturation. Perfect for bass or kick drum enhancement. Not recommended to be used in the high frequencies.
- ▸ **Class B**: special type of soft clipping / symmetric distortion, also known as "crossover distortion". Perfect for transient heavy material like drums or percussion.
- ▸ **Diode**: soft clipping symmetric distortion similar to the tube but with more high frequency content.
- ▸ **Digital**: hard clipping digital distortion.
- ▸ **Bit**: bit crusher. Unlike the others, this algorithm reacts more on lower inputs than on higher ones.
- ▸ **Rectify**: makes all negative values of the signal go positive, giving a higher pitched signal.
- ▸ **Half Rectify**: gets rid of all negative values of the signal.
- ▸ **Clean**: bonus mode that adds no distortion, it simply passes the difference in EQ with the dry signal so Spectre acts like a boosting parallel EQ.

USER INTERFACE

Spectre has the look and workflow of a regular parametric graphical EQ, so the basic usage should already be familiar to you, although what it does is completely different behind the scenes.
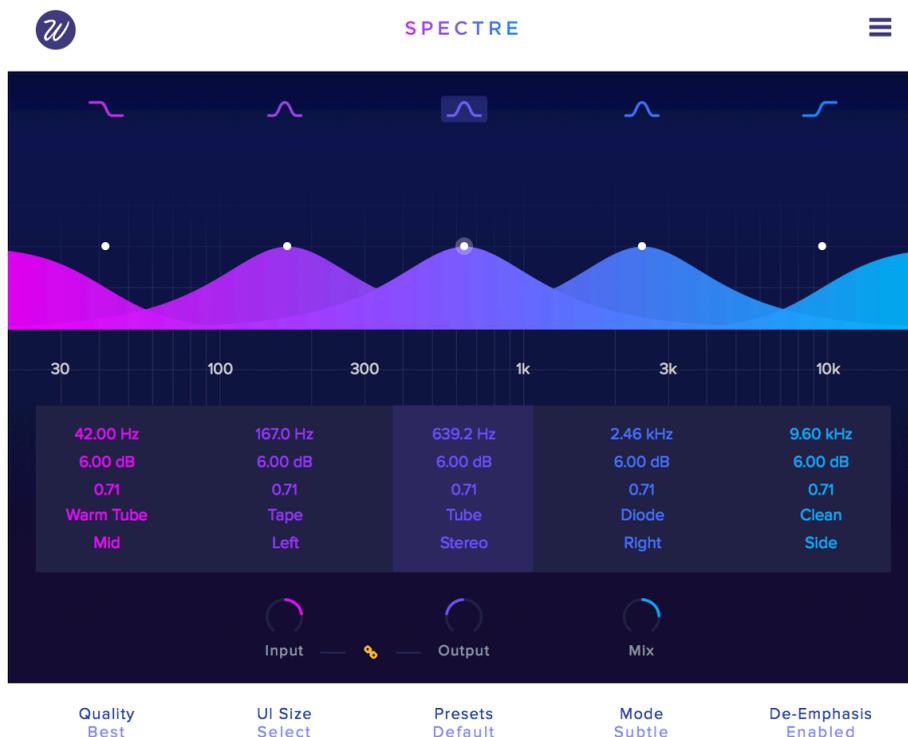
GRAPHICAL DISPLAY
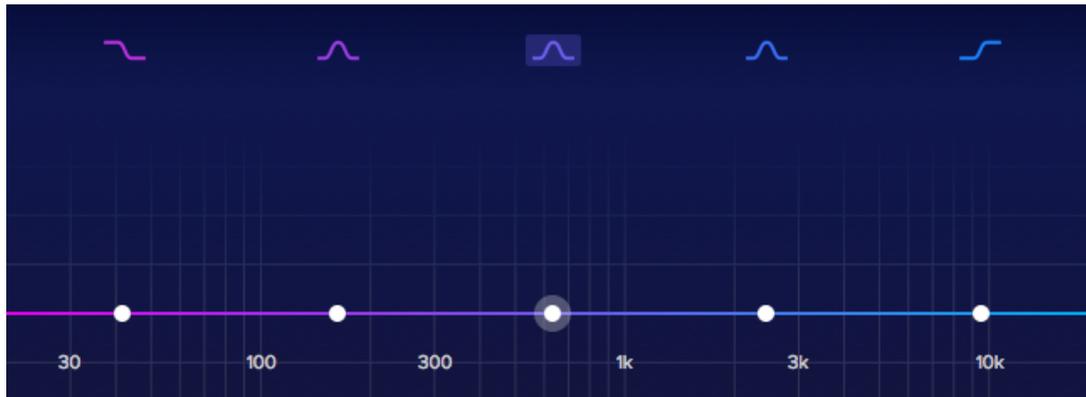
This is the main part of the interface. In this graphical display you see how each filter affects the incoming audio and you can also interact with it using the white dots in order to change the gain, frequency and Q.

On the top you have the icons of the five filters: low-shelf, three peak filters and a high-shelf. These can be clicked to disable / enable each filter for easy A/B.

Drag and dropping each dot from left to right you change the frequency of the filter, going in the vertical axis you change the gain and using the mouse wheel you can adjust the Q. Double-click on the dot to disable / enable the filter.

Enabled

Disabled
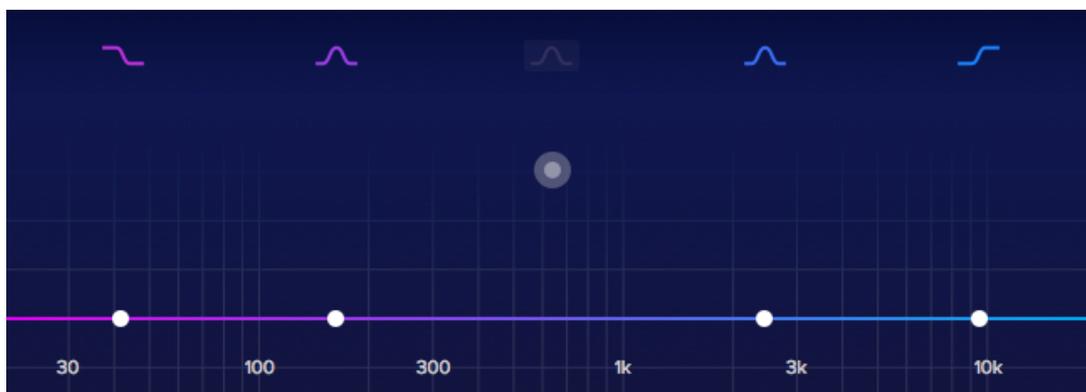
FILTER CONTROLS

42.00 Hz	214.7 Hz	639.2 Hz	2.46 kHz	9.60 kHz
6.00 dB	6.00 dB	6.00 dB	6.00 dB	6.00 dB
0.71	0.71	0.71	0.71	0.71
Warm Tube	Tape	Tube	Diode	Clean
Mid	Left	Stereo	Right	Side

Just below the filter curves you'll find a set of three labels for each filter and two drop down menus. From top to bottom these labels show information about the filter: frequency in hertz, gain in decibels, Q or resonance, type of saturation for the selected band and output processing modes. Spectre lets you process stereo and mono signals like any other audio plug-in, but with this drop down menu you can also set each band to process only the left or right, mid or side channels only.

You can also control each filter by dragging and dropping directly on these labels, using the mouse wheel or by double clicking and entering the desired value directly. If you press the shift key while dragging the labels will be in fine tuning mode.

In order to reset the filters and labels you can press ctrl / cmd / alt and click on the desired parameter.

ADDITIONAL KNOBS
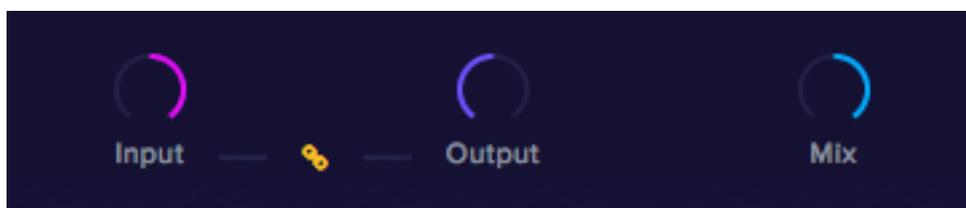
This is the master section where you can control the input volume, output volume and the mix. Since the saturation algorithms have non-linear behaviour, it's crucial to set the gain correctly in order to get more or less distortion. By increasing the input you're driving more saturation, then you can compensate for the gain boost by lowering the output. If you enable the "link" button between the input and output knobs they'll   maintain the same volume while the saturation amount changes. Spectre was built to be subtle, that's how you'll get that analog flavour on lows and shimmering high end that we all like. If you drive it too hot the effect will be too noticeable and the distortion will be too present, but if that's what you're looking for then go for it!
The output control adjusts the overall output volume of the entire signal.
The mix control works a bit differently than what we all are used to. When set to 50%, both wet and dry signals are set at maximum level. This is done so the levels stay constant during the mixing process and you don't loose any volume when working with Spectre.
The values of each knob will be shown in the label when you hover on them. You can also reset to the default value by pressing ctrl / cmd / alt and click, and you can also enter the desired value directly by double-clicking on the label and pressing enter.

BOTTOM SECTION

| Quality	UI Size	Presets	Mode	De-Emphasis
Best	Default	Default	Subtle	Enabled

This is the bottom section where you can control:

‣ **Quality**: sets the oversampling ratio between Normal (no oversampling), Medium (4x oversampling) and Best (16x oversampling). In signal processing, oversampling is the process of resampling a signal with a sampling frequency significantly higher than the Nyquist rate. This is important in order to get pristine sound quality for two reasons: with oversampling there will be no curve distortion, the filters will exactly resemble their analog counterparts and the analog-like curve will be preserved. Also, the aliasing produced by the saturation algorithms will be greatly reduced, if not completely gone.
Have in mind that at higher oversampling ratios the CPU usage will also increase. It shouldn't be a problem since the algorithm is highly optimised, but if you're having CPU spike issues try lowering the quality setting.

‣ **UI Size**: This menu lets you change the size of the user interface. Default is set to 650x560px and you can choose any size between 50% and 200%.

‣ **Presets**: load and save presets from this drop down menu. More on this in the next chapter.

‣ **Mode**: lets you choose between subtle, medium and aggressive settings. This works like a drive parameters for the saturation.

‣ **De-Emphasis**: This feature works by subtracting from the final signal the boost in EQ that Spectre applied in the first stage, leaving only the saturation of each band. It can be enabled or disabled.

MENU
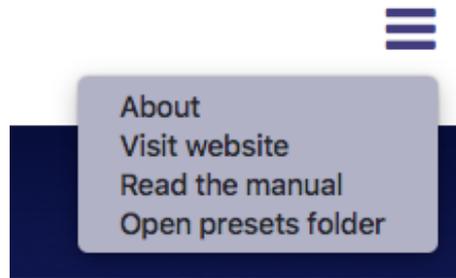
The menu on the top right contains these elements:

‣ **About**: this will open a pop up panel showing the version number and credits.

‣ **Visit website**: this will open https://www.wavesfactory.com/spectre in your default browser.

‣ **Read the manual**: the folder containing the user manual will be opened.

‣ **Open presets folder**: this will open the presets folder so you can manage the preset structure.

OVERSAMPLING PICTURES

ANALOG EQ CURVES
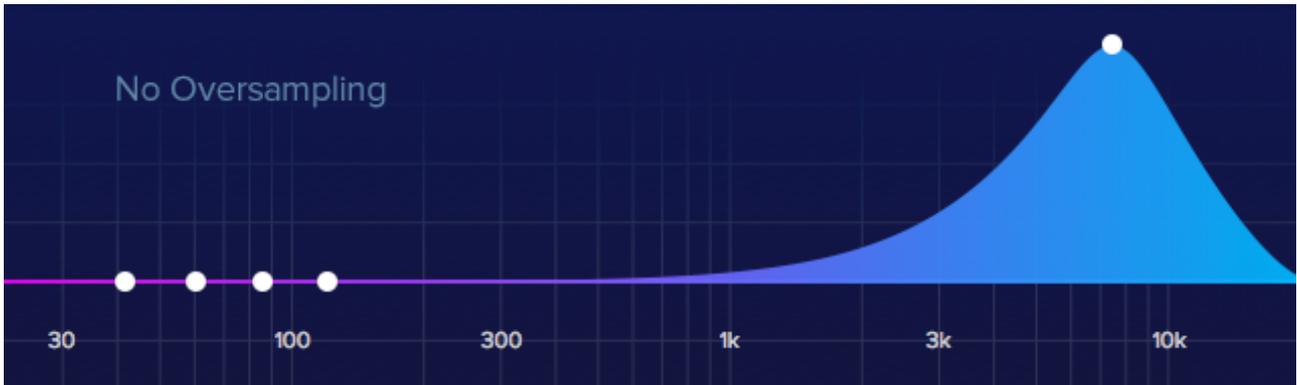
In this example you can see a peak filter set at 7.5KHz, 9dB of gain and 0.707 Q. Peak filters should be symmetrical but you can clearly see how it is not. On the right part of the filter you can see how the curve is distorted and it ends up at 0dB in the Nyquist frequency which is 22.05KHz.
This does not only look bad, it obviously sounds bad too, and this is how 90% of the EQs that we use behave.
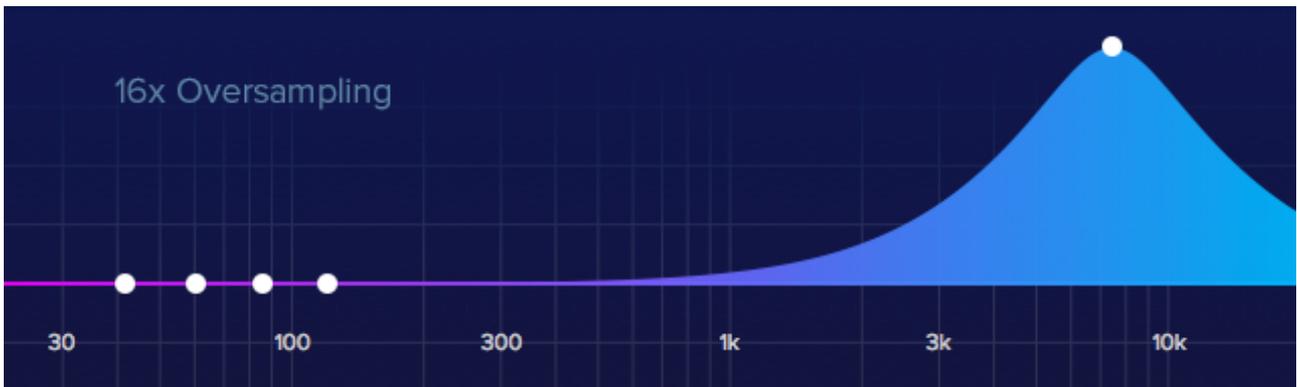
This is the same scenario as the previous picture but with the quality parameter set to "Best", which makes Spectre perform 16x oversampling.
See how the curve is preserved, showing almost perfect symmetry. What Spectre is doing is extending the Nyquist frequency 16 times which it's no more 22 KHz, but 352.8 KHz.

ALIASING

In the next pictures you can see how this also affects the aliasing, reducing greatly the mirrored harmonics that jump back into the spectrum.
This is a sine wave set at 3K with the Tube color and aggressive mode in order to get more harmonics.

See how with oversampling enabled we got rid of all that extra unwanted information and we just ended up with a clean signal containing only the desired harmonics. Spectre maintains pristine audio quality even with aggressive settings.

PRESETS

ABOUT

In the middle of the bottom section you'll find the presets menu. It will be set to the "default" preset when you open the plugin for the first time. It works like a regular preset manager where you have a list that let's you pick any item and all parameters will be changed accordingly.
The presets are stored in .wfp (Wavesfactory Preset) format in:
▸ **Mac**: Library/Application Support/Wavesfactory/Spectre/Presets
▸ **Windows**: C:\Users\'username'\AppData\Wavesfactory/Spectre/Presets

You can directly manage the presets in this folder, if you create different sub-folders for drums, bass, guitars, mastering, each containing a set of presets, Spectre will take care of that structure and will show it accordingly using sub-menus.

To open the presets folder you can simply click on the top right menu and select "Open presets folder".

SAVE / LOAD / DELETE

The first three elements in the presets menu are: Default, Save and Save As.
Select the default preset for going back to the initial state. All filters will be enabled with gains set at 0dB, Qs set to 0.71, frequencies set to 42Hz, 164Hz, 632Hz, 2.8KHz and 9.6KHz accordingly. This default preset can't be changed / saved.

In order to save a new preset you first have to tweak the parameters to your taste, then open the presets menu and select "Save As". This will open a native OS window that will let you name the preset and save it in the presets folder.

When you have a preset loaded and you tweak it, the Save label will appear with an asterisk like this: Save*. This means that the preset has been modified and you can save it directly without going through the "save as" dialog.

If you want to save a new preset based on a saved one you can select "Save As" and the save dialog will appear.

Deleting a preset is as easy as deleting a file in your computer. Open the presets folder with the Spectre menu and re-arrange or delete any presets you want.

USE CASES

▸ Enhance dull recordings that have lost their sparkle.
▸ Restore old recordings by simulating lost spectral content.
▸ Boost the low end to create higher harmonics that will make your kicks and basses sound huge on small speakers.
▸ Boost the top end of an acoustic guitar to brighten it up and bring it to life.
▸ Use it as a natural widener on a full mix boosting the top end in "Side" mode.
▸ Change the colour of any guitar synth.

SUPPORT

If you find any bug or you have any questions please get in contact with us following this link:
https://www.wavesfactory.com/contact

FINAL WORDS

A huge thanks to all people involved in this project. Beta testers, video makers, reviewers, artists, designers, composer friends and coding friends!
We hope you like it as much as we do and it helps you take your mixes to the next level.

Thank you very much for supporting Wavesfactory.

CREDITS

- **Production**: Wavesfactory
- **Design**: Zahir Ramos, Jesús Ginard, Pau Obrador.
- **DSP**: Jesús Ginard, Ivan Cohen.

EULA

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CHANGELOG

All bug-fixes, additions and all relevant changes made to Spectre will be documented here.

Version 1.5 - 12 / 06 / 2019
- New: saturation per band.
- New: processing mode per band.
- New: input / output linking.
- New: fine tuning on labels.
- New: mouse wheel control over labels.
- New: de-emphasis filters.
- New: VST3 format.
- Improved: made menu more visible.
- Improved: code optimisation.
- Fixed: user manual typos.
- Deleted: passepartout (white background surrounding the plug-in).

Version 1.0.3 - 25 / 10 / 2018
- New: resize function.
- New: two new kinds of saturation: Rectify and Half Rectify.
- Improved: faster optimisation.

Version 1.0.2 - 06 / 03 / 2018
- Fix: stability of the filters. Changed to State Variable Filter structure.
- Improved: general CPU optimisation.
- Improved: opens the presets folder correctly (one directory deeper).

Version 1.0.1 - 28 / 02 / 2018
- Fix: while in demo mode the central part of the UI was frozen after a while.
- Improved: lower volume for the noise bursts (in demo mode only).
- Improved: longer time between noise bursts (in demo mode only).

Version 1.0.0 - 21 / 02 / 2018
- Initial release.