

Lightweight Limiter

Version 1.0.2

Welcome

Thank you for downloading this fine plug-in. **Lightweight Limiter** is a dynamic processor VST plugin optimized for low CPU usage maintaining the highest precision in signal processing. With a free adjustable knee it is unique in this class.

In order to get the most out of the **Lightweight Limiter**, please spend a few moments reading this brief manual.

License

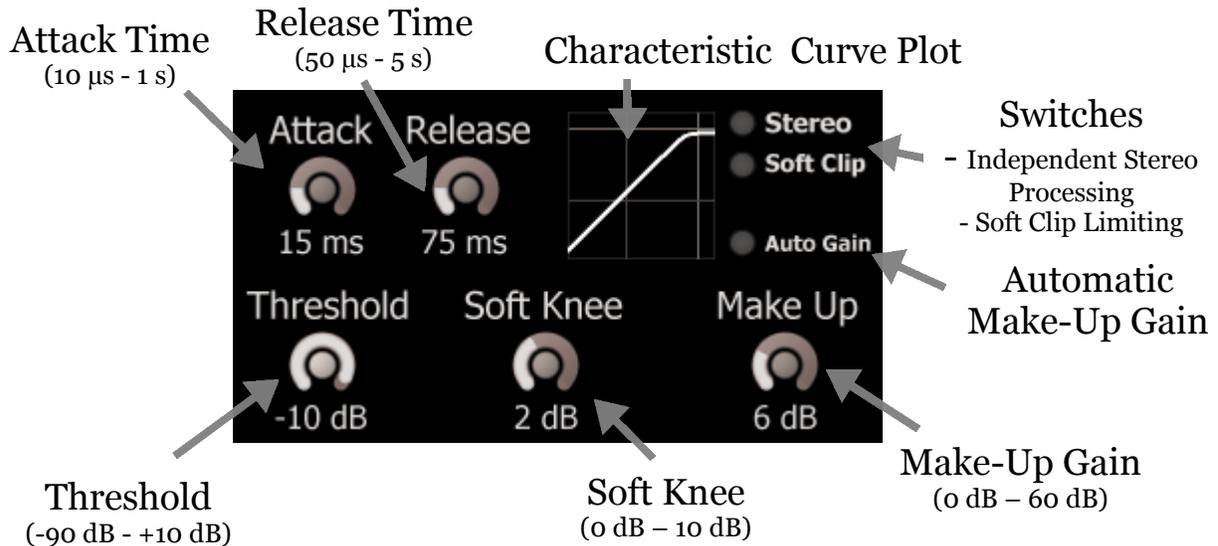
The pre-compiled **Lightweight Limiter** has a very simple license:

1. **Lightweight Limiter** is freeware. This means that you are free to distribute it, give it to friends, or otherwise share it around. However, only the entire unaltered archive, including this document, may be re-distributed.
2. Copyright of the code and the finished plug-in remain the property of the *Delphi ASIO & VST Project* and namely *Christian-W. Budde*.
3. This plug-in is provided at no cost; therefore the author *Christian-W. Budde* assume no responsibility for any negative effects that may occur to the end user or the equipment used to run the plug-in.
4. Magazine editors are welcome to include the plug-in on cover mount discs or similar media; however, I request that am informed about it via [e-mail](#). A few copies of the publication are always appreciated, but not expected.

User Interface

The user interface shows all adjustable parameters and a readout for the characteristic curve. There are no meters available to maintain the lowest possible CPU usage without wasting too much CPU cycles. Either a dedicated analyse plugin or the build in meters can be used for this task.

Here is a commented screenshot:



The dials can be adjusted by clicking and dragging up and down on a dial. To reset the dials to their defaults hold the [Ctrl] key while clicking on the dial. Holding the [Shift] key enters the fine tune mode.

Below any dial a read out shows the exact value of a parameter.

The switches can be toggled by simply clicking the LED or the text.

NOTE: When the plugin is in 'Auto Gain' mode it is not possible to manually adjust the make up gain.

The parameters

This plugin features eight adjustable parameters in three categories. The categories are **'Time Constants'** containing the *'Attack'* and *'Release'* parameter, **'Characteristic'** containing *'Threshold'*, *'Soft Knee'* and *'Make Up'* and the last category **'Mode'** contains the switches *'Auto Gain'*, *'Stereo'*, *'Limit'* and the yet unexposed *'Mix'*.

Time Constants

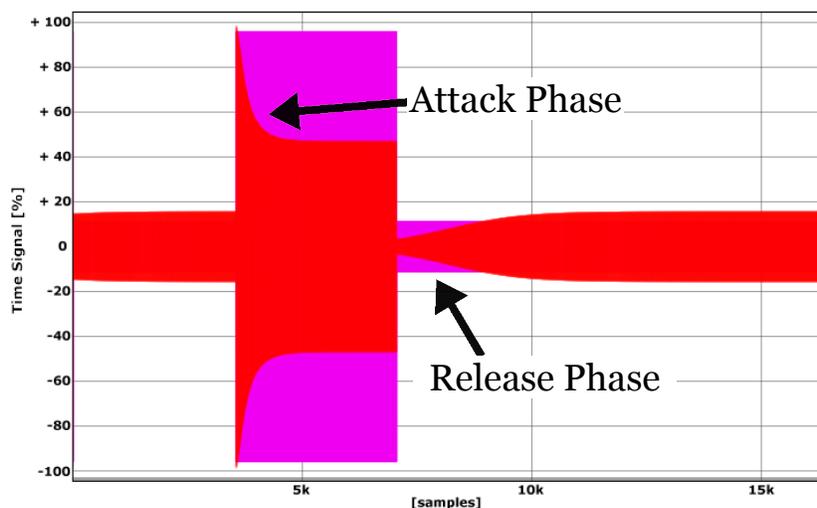
The time constants control the detector stage. The attack and release times are responsible for how fast the limiter reacts and how long it takes to recover.

Attack Time

The attack time controls the duration until the limiter reaches 50% of the limited level. Internally it is implemented as a simple envelope follower based on a first order filter with a very low frequency (tuned by the attack time). Compared to other manufacturers this time may differ, so take care while comparing this limiter with other limiter.

Release Time

The release time controls the duration until the limiter recovers if the input falls below the threshold. It is implemented identical to the attack stage (see above).



Characteristic

The characteristic curve (as directly shown on the GUI) can be controlled independently by 3 dedicated parameters.

Threshold

The threshold is the level above which limiting takes place. A high value (e.g. -5 dB) means that there is hardly any limiting, while a low setting (e.g. -60 dB) means that the signal is nearly limited all the time.

Soft Knee

Around the threshold it is sometimes desired to have a slow transition towards the limiting ratio. In case of a value above the threshold the ratio slowly increases if the level increases. This reduces the audible change from unlimited to limited.

The soft knee parameter in dB is the margin below the given threshold. This usually results in a lower level compared to a rather hard knee. This holds especially if the input signal is around the threshold. Keep this in mind when comparing hard vs. soft knee.

Make Up Gain

To compensate the reduced level, the output level can be adjusted. This gain is called 'Make Up Gain'.

NOTE: Keep in mind that it is not possible to adjust the gain manually if 'Auto Gain' is switched on.

Mode

In the category 'Mode' several miscellaneous switches can be found. Also the yet unused 'Mix' parameter can be found here.

Stereo

If switched off, the limiter uses a combined mono signal (L + R) to detect the peak level. The limiter gain will then be applied independently to the left and right channel.

If switched on, two independent limiters are used. In this operation mode the CPU will nearly double and in case of a true stereo input the stereo imaging will probably suffer from phase effects.

NOTE: It is recommended to only switch this mode on, when necessary. Otherwise CPU cycles will be wasted for a worse sound.

Limit (Soft Clip)

To ensure the signal stays within its bounds a simple waveshaper is used. The function used here is an approximated hyperbolic tangents.

NOTE: This kind of limiting will add a significant amount of harmonic distortion, since transients can not be passed through unlimited as without it. Furthermore it is not oversampled which might lead to alias.

Automatic Make-Up Gain ('Auto Gain')

As explained above a deep limiting will result in a reduced overall gain, which has to be adjusted by the make-up gain. However, while tweaking it is sometimes desirable to keep the upper part of the curve constant (rather than the lower part). The automatic make-up gain switch ensures that the level always equals at 0 dB.

NOTE: Keep in mind that it is not possible to adjust the make-up gain manually if this is switched on.

Feedback / Bug Reports

I am always eager to hear feedback or have bugs reported. The easiest way is to send me a mail to: Christian@aixcoustic.com

Furthermore feel free to download the source code, that can be found in the [Delphi ASIO & VST Project](#) at sourceforge.net.

Version History

1.0.0	First release!
1.0.1	Optimizations, Manual added
1.0.2	Renamed 'Fast' to 'Lightweight'

Credits

- Programming: Christian W. Budde
- Additional Framework Programming: Tobias Fleischer, Maik Menz
- Special Thanks: Swen Müller, Duncan Parsons, Laurent de Soras
- Documentation based on a template by Greg Pettit

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