

# **Lookahead Limiter**

*Version 1.0.0*

# Welcome

Thank you for downloading this fine plug-in. **Lookahead 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 **Lookahead Limiter**, please spend a few moments reading this brief manual.

## License

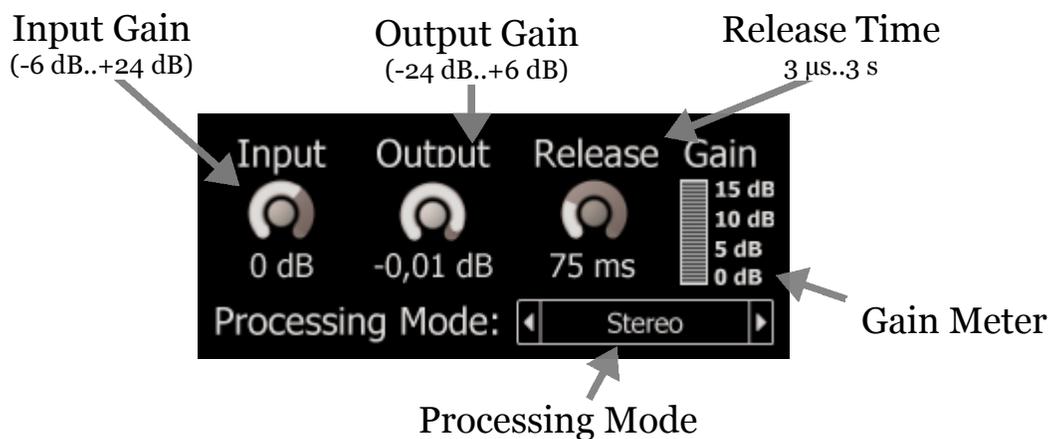
The pre-compiled **Lookahead Limiter** has a very simple license:

1. **Lookahead 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 averaged applied gain. There are no further peak/level 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 parameters**

This plugin features four adjustable parameters in the two categories 'I/O' and 'Time Constants'. Furthermore two additional parameters are available exposed as host parameters only. They may be changed, but are not covered in detail in this manual as a change is not recommended.

## ***Input***

Use the input dial to adjust the input level. Positive values will boost the signal and will likely push the audio into limiting (which occurs internally at a fixed threshold of 0 dB)

## ***Output***

After the limiting is performed a final maximum output level can be adjusted that is never exceeded.

Keep in mind that intersample peaks may still occur. However, they should be covered by the headroom of today's DA converters and might only lead to problems in some older audio codecs. By reducing this level to -0.1 dB, most cases should be covered.

## ***Release***

The release dial controls the release time. In case this value is very short, a natural limit is given by the fixed attack time of 64 samples. Due to the internal design, the attack phase is also present for the release, but often not significant as it is far shorter. The default attack time is set to 64 samples.

## ***Processing Mode***

This plugin features 3 different processing modes all related to stereo processing. In mode 'stereo', both channels contain a separate peak detection and gain reduction stage. To preserve the stereo image, while remaining a good limiting, the maximum gain reduction is used for both channels. In mode 'peak mono' there is only one stage fed by the maximum of both channels. These two modes will likely to be very similar, but differences may occur in certain cases. The last mode 'dual mono' processes the signal completely independent. A maximum of gain is achieved at the expense of preserving the stereo image.

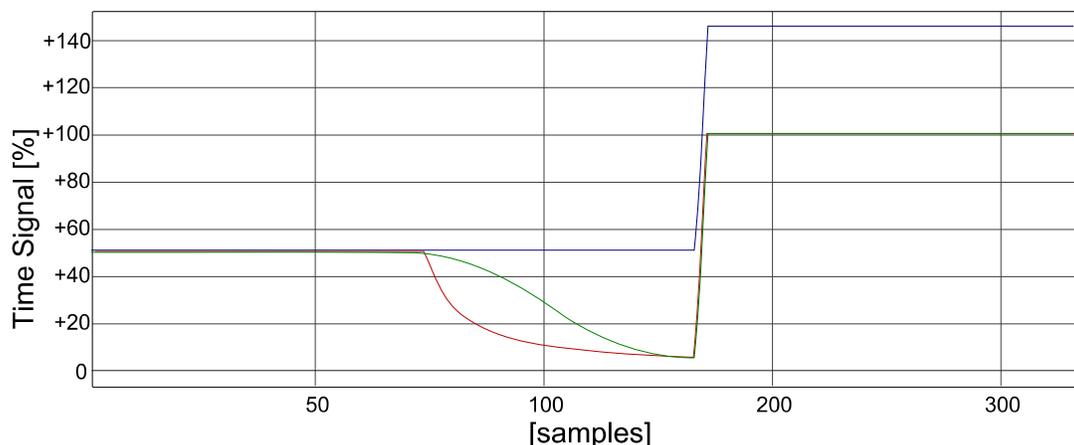
# About look-ahead limiting

Even though the principle of look-ahead limiting seems to be simple in the first place it is tricky to implement in a smooth way. As soon as a new peak occurs on the horizon, the gain reduction has to be adjusted to catch the peak properly.

Often this adjustment is solved by reducing the gain very rapidly to catch the peak in any case. On the other hand a too slow time might miss clipping signals, that are slightly lower than the maximum peak and occur before the maximum peak gain reduction covers the case.

While reducing the gain rapidly the no clippings will occur, but this rapid fading is likely to cause audible broadband artefacts. In case of a short release time it will also result in heavy intermodulations (including aliasing artefacts). By slowing down the gain reduction speed to the slowest and softest possible time within the look-ahead frame, these artefacts will be less audible. In static test cases, the average harmonic distortion was down to -130 dB with intermodulation products around -72 dB. Even though these values could be reduced even further, the process is not optimized for a static application, but to a dynamic.

The below plot shows how the lookahead limiter will adapt the attack shape to compensate the peak.



**Blue is the original signal exceeding the limits at 100%. Red is a typical look-ahead limiter with rapid gain reduction. Green is this look-ahead limiter with a smooth gain reduction making use of the whole look ahead window of 64 samples.**

# **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](mailto:Christian@aixcoustic.com)

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

# **Version History**

1.0.0      First release!

# **Credits**

- Programming: Christian W. Budde
- Additional Framework Programming: Tobias Fleischer, Maik Menz
- Special Thanks: Swen Müller, Duncan Parsons, Laurent de Soras
- Greetings to Jarle Bernhoft for his wonderful music.
- Documentation based on a template by Greg Pettit

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