

Barricade Pro

Multi-factor limiter VST plug-in

User manual v1.0.3
January 2009

1. Contents

1.	Contents	2
2.	Description.....	3
3.	Demo limitations	3
4.	Installation.....	3
5.	Usage	4
5.1	Graphical User Interface	4
5.2	Envelope limiting	4
5.3	Side gain and correlation limiting	5
5.4	Soft clip.....	5
5.5	RMS limiting	6
5.6	Input drive and output trim	6
5.7	Output meters.....	6
5.8	Dithering	6
5.9	Bypass.....	7
6.	Schematic overview.....	8
7.	Disclaimers	9

2. Description

Barricade Pro is a stereo multi-factor limiter Virtual Studio Technology (VST) plug in, that can analyze and control the following properties:

- Instantaneous saturation (soft clipping)
- Envelope limiting
- Loudness (RMS) limiting
- Correlation limiting

Additional features are:

- Fully controllable limiting processing
- Professional level meters with simultaneous peak level and RMS meters
- Variable metering scales according to the Katz metering system
- 64 bit internal processing
- Precise input and output level control
- Output dithering at variable bit depths (8 to 64 bits)
- Sample rates supported of up to 192 kHz

3. Demo limitations

The DEMO version of Barricade Pro has the following limitations:

- Inter Sample Peak (ISP) function is disabled;
- The parameter display is disabled;
- Output scales K14 and K20 are disabled.

The full version does not have these limitations.

4. Installation

Barricade Pro comes without installation program. The installation can be performed manually by the following two steps:

- Extract the file 'jb_barricade_pro.dll' from the corresponding zip file, using an (un)zip program or using the build-in functionality from Microsoft Windows XP or Vista;
- Store the dll file in the directory where your host program stores all VST plugins. This directory depends on the host program. Please refer to the manual of your host program to determine the correct directory.

If you have used the demo version of this plugin (with the word 'demo' in the file name) and would like to install the full version, or if you have earlier beta versions, you are strongly advised to delete all earlier versions of Barricade Pro before installing newer versions.

5. Usage

5.1 Graphical User Interface

The Graphical User Interface (GUI) of Barricade Pro is shown in Figure 1. The GUI is split in several parts:

- An envelope limiting part (indicated by 'ENVELOPE');
- A side gain and correlation limiting part (indicated by 'XCORR');
- A softclip part (indicated by 'SOFTCLIP');
- An RMS-level limiting part (indicated by 'RMS');
- A parameter display indicating current parameter values;
- Input drive and output trim sliders;
- A metering section with meters for limiter level reduction, correlation monitoring and RMS / peak output level monitoring.

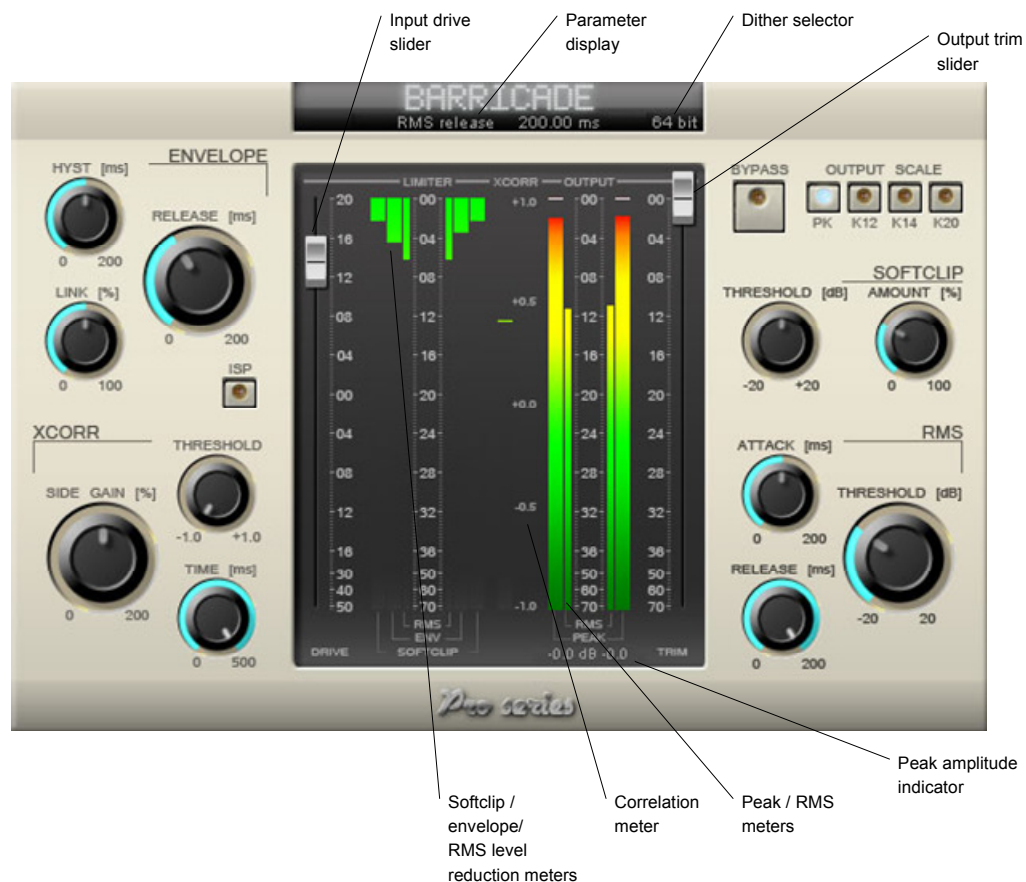


Figure 1 - Graphical User Interface of Barricade Pro.

5.2 Envelope limiting

Envelope limiting represents the 'classic' peak limiter that is found in many conventional limiters. The envelope of the signal is estimated by a short-term analysis (typically in the order of a few milliseconds or less). If this envelope exceeds the maximum allowed value (a so-called 'over'), the level of the signal is attenuated automatically.

The **'Release'** knob determines the speed (or time in milliseconds) that is required to recover to a unity gain. When using this knob, the current parameter value will be displayed in the parameter value display (as with all other knobs).

The **'Link'** knob determines whether the attenuation is applied independently to the left and right channel (link set to 0%) or is always identical (link set to 100%). In the latter case, the channel with the largest 'overs' determines the gain for both channels. For settings in between, attenuation in one channel has a limited (controllable) effect on the other channel. In this way, the stereo image can be fully maintained at the expense of envelope reduction (if the link is set to 100%), or the signal level can be maximized at the expense of a correct spatial image (if the link is set to 0%).

The **'Hyst'** knob determines the amount of hysteresis that the limiter employs. If set to zero milliseconds, every 'over' is treated independently. For larger values, however, 'overs' that occurred in the past will be taken into account in the current release curve of the limiter. Said differently, the limiter will try to learn the statistical behavior of the current audio content. If many overs were observed in the past, the release curve will be adjusted automatically to reduce pumping artifacts. The time constant for learning audio signal statistics can be set by the Hyst knob.

The **'ISP'** switch determines whether Inter-Sample Peaks (ISP) will be taken into account in the limiter (if set to 'on'). Digital-to-Analog (D/A) converters often employ up-sampling and interpolation of audio signals. During this process, new audio samples are inserted in-between current audio samples. These samples may extend the full digital scale, even if the original samples are all within the full digital scale. When the ISP switch is on, the envelope limiter will protect against potential clipping that may occur in D/A converters. The use of ISP is only necessary if Barricade Pro is used as limiter operating on the master bus.

The amount of level reduction (in dB) that is applied is visualized by the 'ENV' level reduction meter.

5.3 Side gain and correlation limiting

The **'Side gain'** knob determines the amount of gain (or attenuation) that is applied to the side (left minus right) signal. This determines the stereo 'width' of the audio signals. A setting of 100% indicates no change; a setting of 0% corresponds to fully mono (zero side signal). A value beyond 100% corresponds to a relative increase in the side level compared to the original input signal.

Widening of the audio signals by a side-signal gain may sometimes give undesirable, 'hollow' sound stages, especially if the side signal level of the input was already quite substantial. Furthermore, for some types of media (such as vinyl), a strong side signal is undesirable. The correlation limiter allows precise control of the minimum correlation (or side signal level relative to the main signal level) that can be allowed. The **'Threshold'** knob allows to set a correlation threshold. If the actual (measured) correlation falls below this threshold value, the limiter will process the signals to increase the correlation (by automatically lowering the level of the side signal). The speed of adaptation of this process is determined by the **'Speed'** knob.

The current correlation value as well as any corrections made by the correlation limiter are visualized by the correlation meter.

5.4 Soft clip

Soft clipping reduces the level of the output signal by an instantaneous non-linear transformation applied to the waveform. This often provides a certain 'warmth' to the sound,

but may also result in audible distortions. The soft clip **'Threshold'** determines the signal level at which the signal is processed by the non-linear (compressive) transform. Below this value, the signals are virtually untouched, while above that signal level, the waveforms are compressed. The amount of non-linear transformation that is employed is controlled by the **'Amount'** knob.

The amount of signal level reduction induced by soft clipping is visualized by the soft clip level reduction meter.

5.5 RMS limiting

Envelope limiting and soft clipping are typically processes that are based on instantaneous or short-term signal properties. The Root-Mean-Square (RMS) limiting allows level adjustment based on longer signal segments (up to 200 ms). The RMS value is often associated with the current loudness of the signal (although this is an oversimplified representation). RMS limiting allows to control (maximize) the loudness of the signal. The maximum allowed RMS value is set by the **'Threshold'** knob. The **'Attack'** and **'Release'** knobs determine the speed (time) of level reduction (attack) and recovery (release).

5.6 Input drive and output trim

The **'Input drive'** slider allows modification of the level of the input signal(s) before processing. The **'Output trim'** slider defines the maximum signal level at the output of the limiter by means of a gain adjustment.

5.7 Output meters

Barricade Pro features RMS, Vu and Peak output meters. Four different output scales can be used:

- **'PK'**: A full-scale digital signal corresponds to 0 dB on the meters.
- **'K12'**: A full-scale digital signal corresponds to 12 dB on the meters. This scale is typically used for broadcast applications.
- **'K14'**: A full-scale digital signal corresponds to 14 dB on the meters. This scale is also typically used for CD mastering.
- **'K20'**: A full-scale digital signal corresponds to 20 dB on the meters. This scale is typical for DVD authoring.

The aim of these various scales is to control the amount of headroom for peaks in the audio content with respect to the RMS or loudness level. The proper use of these metering systems is beyond the scope of this manual. The reader is referred to other resources (for example on the internet) for more information on the Katz metering system (for example <http://www.soundonsound.com/sos/oct03/articles/bobkatz.htm>).

The peak values indicated by the peak meters and peak amplitude indicator can be reset by clicking on the peak amplitude indicator (which provides the peak values in dB just below the output VU meters).

5.8 Dithering

The internal processing of Barricade Pro operates on a signal representation that is more accurate than most audio storage or distribution formats (which typically use 16 or 24 bits to represent individual audio samples).

Barricade Pro allows to 'convert' the accurate internal signal representation to distribution formats using a process referred to as 'dithering'. Dithering is a combination of bit-depth reduction and noise shaping to minimize the audibility of the bit reduction.

The 'Dither selector' allows to specify the bit-depth of the output signals (ranging from 8 to 32 bits). The highest value (64 bits) maintains the current signal accuracy and does not apply any bit-depth reduction or dithering. This setting (64 bits) is suggested if Barricade Pro is **not** used as mastering plug in.

If Barricade Pro **is** used for mastering purposes to create a distribution format with a limited bit depth, Barricade Pro should be the **last** processing step in the whole processing chain (as is the case for **any** mastering limiter that employs bit-depth reduction and dithering). For example, if Barricade Pro is set to 16 bits for CD material, the host may safely truncate the output of Barricade Pro to 16 bits (without further processing) to ensure the highest possible sound quality.

5.9 Bypass

The '**Bypass**' knob allows to bypass the audio processing. When bypass is enabled, the plug in will not modify the audio signals while the various meters will continue to operate.

6. Schematic overview

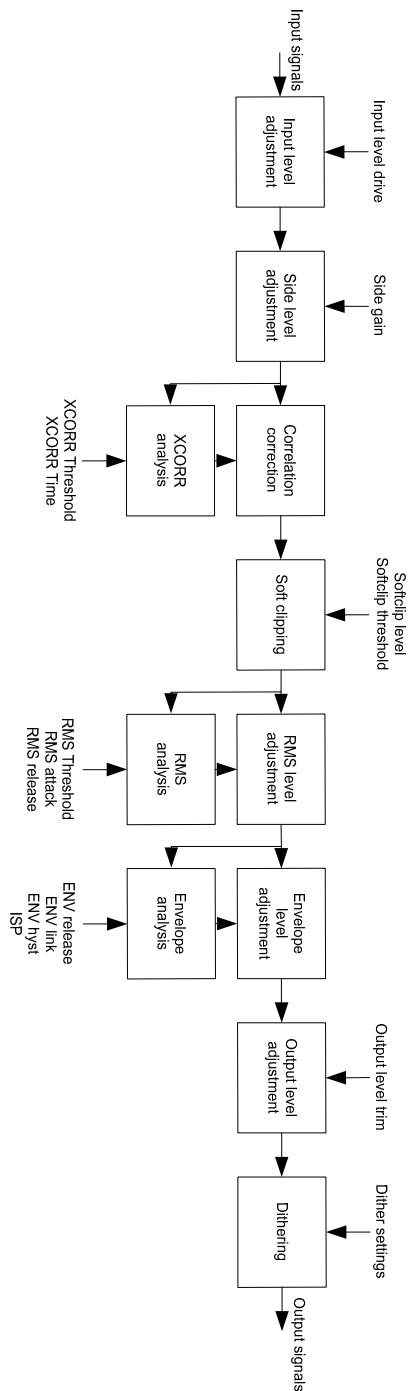


Figure 2 - Schematic overview of processing blocks in Barricade Pro.

7. Disclaimers

VST is a trademark of Steinberg Media Technologies GmbH.

8. Change log

Version 1.0.3

- Improved default value of vertical slider
- Slightly improved algorithm for better performance using low-frequency signals.

Version 1.0.2

- New feature: possibility to reset peak hold values by clicking on peak amplitude value indicator.
- Fixed wrong range issue with parameters from scale selector.