

WAVES

BSS[®] DPR-402

COMPRESSOR / PEAK LIMITER / DE-ESSER



USER GUIDE



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Chapter 1 – Introduction

1.1 Welcome

Thank you for choosing Waves. In order to get the most out of this Waves processor, please take some time to read through this manual.

We suggest that you visit the Waves support site: <http://www.waves.com/support>. There you will find an extensive answer base, the latest tech specs, detailed installation guides, software updates, and current information about authorization and registration.

By signing up at www.wavesupport.net, you will receive personalized information about your registered products, notifications when updates are available, and information about your authorization status.

1.2 About BSS[®] DPR-402

The Waves BSS DPR-402 plugin is a software model of the DPR-402 Compressor/Peak Limiter/De-Esser hardware originally manufactured by BSS Audio. This dynamics processor provided the punchy, explosive signature sound for drum machines in the 1980s, and was featured heavily in dance pop, electronic and hip-hop music. But it had many other versatile uses in the studio, and was also a massively popular favorite on stage.

Working in collaboration with BSS Audio and Harman International, Waves has now modeled this landmark dynamics processor and created a digital tool with the unique sound, functionality and flexibility of the original.

1.3 The Original Hardware

BSS DPR-402 was designed in response to the demand for a versatile, compact stereo unit that provides the three most commonly used dynamic functions in a single 1-unit rack space. Its internal architecture, including two independent insert-accessible side chains per channel, allows great flexibility and scope.

A dedicated de-esser control with a variable filter provides wideband sibilance control along with compression and peak limiting. There are three modes of de-essing: full-spectrum attenuation, HF-only attenuation, and a mix of de-essing and compression.

The compressor section affords full control over all the normal parameters, and offers “auto” time constants for general-purpose use. It can be switched to operate at high frequencies only, resulting in a dynamically controlled tunable HF filter. The control and subtract sidechain insertion points allow for versatile dynamic tonal modification. Gain reduction is achieved using a voltage controlled attenuator that is capable of reducing the input signal by up to 30 dB.

A calibrated peak limiter provides absolute control without compromising the dynamics setting of the compressor. This can yield less dynamic distortion for an equivalent amount of compression.

1.4 Features Added to the Plugin

In addition to modeling the above features of the original hardware, Waves has added five features to the plugin for extra flexibility, control, and ease of use:

- 1 INPUT GAIN CONTROL Controls the input level going into the compressor
- 2 MIX CONTROL Controls the balance between the processed and the unprocessed signal. This enables very quick parallel compression within the plugins.
- 3 NOISE CONTROL Adds hardware-modeled noise.
- 4 MS MATRIX Provides separate compression between the mid and sides of (stereo component only) the stereo signal: Mid is compressed on one channel and sides on the second.
- 5 MONITOR Select the source of the monitor output – Mono, Stereo, Left or (stereo component only) Right. (In MS mode, Left monitors the mid while Right monitors the sides.)

1.5 Components

WaveShell technology enables Waves processors to be split into smaller plugins, which we call components. A choice of different components for a particular processor allows you to choose the configuration best suited to your material. Waves BSS DPR-402 includes the following components:

- BSS DPR-402 Mono
- BSS DPR-402 Stereo

Chapter 2 – Interface and Controls

2.1 Interface



2.2 Controls

IN GAIN

Increases or decreases the gain of the input signal.

Range: -20 dB to 20 dB in 0.1-dB increments

Default: 0 dB

Reset: 0 dB

DE-ESS

Determines the amount of de-essing applied to the signal when Mode is set to “Compress.”

Range: Out (0 dB) to 9 dB of gain reduction in 0.1-dB increments

Default: Out

Reset: Out

FREQ

Determines the frequency that will trigger the selected frequency-dependent dynamic processes.

Range: 800 Hz to 15 kHz in 0.01-kHz increments

Default: 15 kHz

Reset: 15 kHz

De-Esser Meter

Indicates the operation of the de-esser.

1. Off – DeEsser not active
2. Green – Shows that gain reduction is active, even at low values such as below 1 dB.
3. Orange – approximately 15 dB of Gain Reduction

THRESHOLD

Determines the level above which dynamic processes occur.

Range: Out (0.0 dB) to -50 dB in 0.1-dB increments.

Default: Out

Reset: Out

RATIO

Determines the ratio of compression, expansion or de-essing, depending on the selected Mode and Jumper settings.

Range: Out (1:1) to inf:1 in 0.1:1 increments

Default: 4:1

Reset: Out (1:1)

MODE

Determines the function of the dynamic processing operation.

1. COMPRESS – Broadband compression
2. DE-ESS Wide – Assigns Thresh/Ratio/Attack/Release controls to broadband de-essing. The DE-ESS control is inactive in this mode.
3. DE-ESS HF – Assigns Thresh/Ratio/Attack/Release controls to frequency-specific de-essing. De-ess and Peak Limiter controls are inactive in this mode.

ATTACK

Determines the attack time of the compression, expansion, or de-essing, depending on the selected Mode and Jumper settings.

Range: 50 μ s to 100 ms in 11 predetermined states

Default: 1 ms

Reset: 50 μ s

RELEASE

Determines the release time of the compression, expansion or de-essing, depending on the selected Mode and Jumper settings.

Range: 5 ms to 4 sec., or Auto for program-dependent Attack and Release times.

The ATTACK control is inactive in this mode.

Default: 100 ms

Reset: 5 ms

BELOW TH Meter

Indicates how far the signal is below the set threshold. When the “TH” LED is illuminated, the threshold has been reached.

Range: -18 dB to threshold.

GAIN REDUCTION Meter

Indicates the amount of gain reduction applied to the signal.

Range -3 dB to -27 dB of gain reduction

METER IN/OUT

Toggles the meter display between input and output.

Range: Input /Output

Default: Output

Reset: Output

Out Gain

Increases or decreases the gain of the output signal.

Range: -20 dB to 20 dB in 0.1-dB increments

Default: 0 dB

Reset: 0 dB

Mon S.C.

Lets you monitor the sidechain signal that triggers the VCA dynamic process.

Range: On/Off

Default: Off

Reset: Off

Input/Output Level Meter

Indicates the signal level at the plugin’s input or output, according to the state of the Meter In/Out button.

Range: -44 dB to 0 dB

PEAK LIM

Determines the threshold of the Peak Limiter. Peak level limiting occurs after Output Gain, so changing output gain will affect output level, not the peak level. The ratio of the Peak Limiter is fixed at 20:1.

Range: Out (0 dB) to -16 dB in 0.1-dB increments

Default: Out

Reset: Out

Peak Limiter Meter

This meter indicates when limiting begins (Green) and when heavy limiting occurs (Red).

PEAK LIM FAST/SLOW

Sets the attack and release times of the Peak Limiter. It is generally preferable to use the Fast response setting. However, if this results in audible artifacts, try the Slow response.

Range: Fast /Slow

Default: Fast

Reset: Fast

CH IN

This button is an internal bypass button that enables you to quickly bypass all functions of the selected channel in the DPR-402. When the button illuminated, the channel is active. When the button is off, the channel is bypassed.

Range: In (active) / Out (bypass)

Default: In

Reset: In

LINK LED

When illuminated green, this LED indicates that the two channels are linked together as a stereo pair.

COLLAPSE / EXPAND

Exposes or hides the bottom panel of the BSS DPR-402 interface. When the plugin loads, the interface is “collapsed” and the button displays “Expand.”

Range: Expand / Collapse

Default: Collapsed

Reset: Collapsed

JUMPER SETTING L/R

This drop-down menu provides a choice of 11 jumper settings modeled from the original BSS DPR-402 hardware unit.

Range: 1-11 jumper settings (see [section 3.4](#))

Default: 1 (Normal Compression)

Reset: 1 (Normal Compression)

(?) Jumper Setting Description

Displays a short description of the currently selected jumper setting.

EXT S.C.

Assigns an external key input to the VCA. This mode must be selected in order for the VCA to “listen” to the external side chain. By driving the control s/c with an external signal, the amplitude of the main signal will be modulated by the envelope of the external control signal. DE-ESS controls, Peak Limiter controls, and Jumper menu are inactive in this mode.

Range: On/Off

Default: Off

Reset: Off

MIX L/R

Controls the balance between the processed and unprocessed signals.

Range: 0% to 100% (0.1% increments)

Default: 100%

Reset: 100%

NOISE

Controls the amount of modeled noise and hum added to the processed signal.

Range: Off to 100

Default: Off

Reset: Off

MONITOR (Stereo Component Only)

Selects the source of the monitor output.

- **Left** – Left output is sent to both sides (in MS Mode this monitors the mid).
- **Mono** – Left and Right outputs are summed to mono and trimmed down by 6 dB.
- **Stereo** – Stereo mode.
- **Right** – Right output is sent to both sides (in MS Mode, this monitors the sides).

Default: Stereo

Reset: Stereo

STEREO MODE (Stereo Component Only)

Selects the stereo processing mode. There are three modes:

- **Stereo** – All controls are in Link mode. When you set a control on one side (L or R), the other side changes by the same value. Any difference in the settings between sides (created using the Duo or MS mode) are preserved when you move back to Stereo mode.
- **Duo** – Controls can be set independently for each side, L and R.
- **MS** – Applies an MS encoding matrix to the input of the plugin, allowing you to separately compress and level the Mid (sum) and Sides (difference) signals. In this mode, the letters M and S will be added at the header of the channels (M at the top left, S at the top right). In MS mode, the left side controls affect the “Mid” signal in the matrix, while the right side controls affect the “Sides” signal in the matrix.

Default: Stereo

A note on automation: When you automate settings in Stereo mode, your settings will be saved for the specific channel (L or R) that you have selected, but will affect *both* L and R. When you automate L and R to different values in Duo mode, you will need to delete your settings for one of the channels (L or R) before you return to Stereo mode in order to avoid conflicting values.

Chapter 3 – Suggested Settings for Initial Setups

The original BSS DPR-402 had no such thing as a “standard setup”; some settings, however, provided a good starting point for certain uses. The original unit, as well as the plugin, has four basic modes of operation. Here are some suggestions for getting started with each.

3.1 Compression

The DPR-402 compressor will be very comfortable for anyone familiar with dynamics processors. The following settings provide a good starting point for basic compression.

Initial Settings:

MODE SWITCH – Compress

THRESHOLD – Out

RATIO – 4:1

ATTACK – Irrelevant when RELEASE is set to Auto

RELEASE – Auto

OUTPUT GAIN – 0 dB

CHN IN – In (illuminated)

DE-ESS THRSHL D – Out

FREQ – When de-esser THRESHOLD is Out, the FREQ is irrelevant.

PK LIM THRSHL D – Out

1. Rotate the THRESHOLD control counterclockwise until the BELOW THRESHOLD meter is fully illuminated and an appropriate amount of gain is indicated on the GAIN REDUCTION meter. This will result in a drop in output level, as indicated by the OUTPUT METER.
2. The output GAIN CONTROL should now be adjusted to reinstate the output level. The levels of the uncompressed input signal and the compressed output signal can now be compared on the output meter by operating the METER INPUT switch.
3. Final adjustments of the controls (RATIO, ATTACK, RELEASE and others) can be made to suit particular requirements. The “Auto” position of the RELEASE control allows program-related operation of the dynamics of the unit, and will be acceptable for most general-purpose applications. In case a tighter or looser result is needed, the ATTACK and RELEASE controls can be set individually.

3.2 De-Essing

The DPR-402 has three modes of de-essing available. The choice of mode depends on the source material and the goals of the processing.

De-Essing Wide with Full Dynamic Control

In this mode, the de-esser detects only high frequencies, using a filter on the sidechain, but it compresses the entire wide band of the signal. Usually this produces a natural-sounding compression, but it can also result in compressing parts of the signal that are below the set frequency. This may cause unwanted information to be attenuated. Should you encounter undesired effects or artifacts, it is likely that the attack and release settings need to be adjusted.

De-Essing HF with Full Dynamic Control

In this mode, the de-esser splits the signal into the sibilance part and the non-sibilance part of the audio. The sibilance part is sent to compression while the non-sibilant part is not. After compression, the two parts are summed to recreate the wideband signal with attenuated sibilance. This method provides more control over sibilance compression. This also allows more compression of the sibilant part without changing the other ranges of the signal. However, introducing a filter may create a phase shift, which can result in artifacts when the two signals are summed together.

De-Essing Wide with Simultaneous Compression

In this mode, the de-esser detects only high frequencies, using a filter on the sidechain, but it compresses the entire wide band of the signal. Usually this produces a natural-sounding compression, but it can also result in compressing parts of the signal that are below the set frequency. In this mode, the de-esser's ratio, attack and release are pre-determined.

3.2.1 De-Essing Wide with Full Dynamic Control

Initial Settings:

MODE SWITCH – De-Ess Wide

THRESHOLD – Out

RATIO – Infinity

ATTACK – 50 μ s

RELEASE – 100 ms

OUTPUT GAIN – 0 dB

CHN IN – In (illuminated)

DE-ESS THRSHLD – Out

FREQ – 4 kHz

PK LIM THRSHLD – Out

1. Rotate the THRESHOLD control counterclockwise until the BELOW THRESHOLD meter is fully illuminated and an appropriate amount of gain reduction is indicated on the GAIN REDUCTION meter.
2. Listen to the program and fine tune the FREQ and THRESHOLD controls to achieve the desired effect. Gain compensation is normally not required when de-essing.
3. Although fast attack and release times are most appropriate, they should be adjusted to achieve the best results. The Auto position should NOT be used.
4. The source program can be monitored through the internal de-ess filter by clicking the MON SC switch. This replaces the normal signal at the output connector with the output of the de-ess filter and aids in setting the FREQ control in relation to the audible sibilance. If desired, the peak limiter can be used simultaneously with wideband de-essing.

3.2.2 De-Essing HF with Full Dynamic Control

Initial Settings:

MODE SWITCH – De-Ess HF

THRESHOLD – Out

RATIO – Infinity

ATTACK – 50 μ s

RELEASE – 100 ms

OUTPUT GAIN – 0 dB

CHN IN – In (illuminated)

DE-ESS THRSHL D - Out

FREQ – 4 kHz

PK LIM THRSHL D – Out

1. Rotate the THRESHOLD control counterclockwise until the BELOW THRESHOLD meter is fully illuminated and an appropriate amount of gain reduction is indicated on the GAIN REDUCTION meter.
2. Listen to the program and fine tune the FREQ and THRESHOLD controls to achieve the desired effect. Gain compensation is normally not required when de-essing.
3. Although fast attack and release times are most appropriate, they should be adjusted to achieve the best results. The Auto position should NOT be used.
4. The source program can be monitored through the internal de-ess filter by clicking the MON SC switch. This replaces the normal signal at the output connector with the output of the de-ess filter and aids in setting the FREQ control in relation to the audible sibilance. The peak limiter should NOT be used in the HF mode.

3.2.3 De-Essing Wide with Simultaneous Compression

Initial settings: Set all compressor controls as required. For optimal de-essing effect, do not exceed 10-15 dB of compression. If compression is not required, set THRESHOLD to OUT.

Initial Settings:

DE-ESS THRSHLD – Out

FREQ – 4 kHz

PK LIM THRSHLD – Out

1. Use the standard controls for compression: THRESHOLD / RATIO / ATTACK / RELEASE. Gradually rotate the DE-ESS THRESHOLD control counterclockwise until the desired de-essing effect is achieved.
2. Adjust the FREQ control to ensure that frequencies lower than those causing concern do not trigger de-essing.
3. Remember: In this mode the de-essing is wideband and may cause distortion or pumping effects if the source program contains significant low frequencies.

3.3 Peak Limiting

The peak limiter is designed to be used in conjunction with compression and/or any wide band de-essing. It cannot be used simultaneously with HF de-essing.

Initial Settings:

PEAK LIM THRESHOLD – As required

PEAK LIM FAST / SLOW – FAST

1. If the red LED indicator remains ON other than for occasional peaks, the GAIN control should be lowered in order to reduce the signal going to the peak limiter.
2. If this produces an unwanted decrease in overall output level, then the amount of compression should be increased either by reducing the compressor threshold, or by increasing the compressor ratio and then reestablishing the gain.

3.4 Additional Jumper Settings

Num	Setting	Description	Inactive Controls
1	Normal Comp	Compression occurs equally at all frequencies.	—
2	HF Re-Emph Comp	Compression is higher at LOW frequencies. This arrangement will make heavily compressed signals sound brighter, compression triggered by low frequencies modulates the high frequencies. This setting removes low frequencies from the side chain, eliminating this unwanted modulation.	—
3	HF Re-Emph Comp +	Compression is much higher at LOW frequencies. This arrangement will make heavily compressed signals sound brighter as it lessens the effect of heavy low frequencies modulating the treble.	—
4	LF Re-Emph Comp	Compression is higher at HIGH frequencies. This is useful for controlling harsh or shrill components of a signal, allowing faster ATTACK and DECAY to be used before LF distortion becomes a problem.	—
5	LF Re-Emph Comp +	Compression is much higher at HIGH frequencies. This is useful for controlling harsh or shrill components of a signal, allowing faster ATTACK and DECAY to be used before LF distortion becomes a problem.	—
6	Wide LF Cntrl Comp	This mode compress the entire audio spectrum based on the frequencies below the setting of the FREQ control. The modulation of HF signals by the LF signals is an effect which may be desired.	—
7	Narrow LF Cntrl Comp	Only frequencies below that set on the FREQ control are compressed. Low frequencies are compressed without modulating the high frequencies, which pass unattenuated. Normally, the PEAK LIMITER and DE-ESSER should not be used in this mode.	Peak Limiter, De-ESS
8	Expander Wide	When input signals exceed the set threshold, expansion occurs. Normally, the DE-ESSER should not be used in this mode. The PEAK LIMITER may be used for effect.	De-ESS

Num	Setting	Description	Inactive Controls
9	Expander LF Only	When input signals exceed the set threshold, expansion occurs, but only to those frequencies below that set by the FREQ control. Normally, the DE-ESSER should not normally be used in this mode. The PEAK LIMITER may be used for effect.	DE-ESS
10	Expander LF Cntrl	Expansion occurs over the entire audio bandwidth. However, it is under the control of either low or high frequencies, as set by the links and FREQ control.	Mode Switch fixed on Compress
11	Expander HF Cntrl	Expansion occurs over the entire audio bandwidth. However, it is under the control of either low or high frequencies, as set by the FREQ control.	Mode Switch fixed on DE-ESS Wide