MDWDRC2-Native V2 & DRC3-Native
Dynamic Range Controllers User Guide

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Chapter 1:

MDWDRC2-Native V2 & DRC3-Native Introduction

01 Introduction

Introducing MDWDRC2-Native V2 & DRC3-Native Dynamic Range Controller

Massenburg DesignWorks® (MDW) was founded in 1999 by Grammy® award-winning designer engineer/producer/lecturer and audio industry legend, George Massenburg. Building on a foundation of analog classics like the GML-8200 Parametric Equalizer and GML-8900 Compressor, George and a team of dedicated DSP engineers have enhanced and extended his benchmark analog designs into the digital domain, delivering *truly* state-of-the-art performance to plug-ins for the Professional Audio Engineer.

For the past two decades, an enduring goal for MDW has been the design of a comprehensive dynamic range controller unlike anything previously available in the digital or analog realms. All compressors rely on detectors which react to the *level* of an audio signal as it passes through a user-defined threshold. Nearly all detectors all share fundamental flaws: a crude approximation of human hearing to determine loudness and reaction time (averaging designs); a seeming disregard for psychoacoustics (designs based solely on peak electrical signals); and a corresponding increase of distortion as compression deepens.

Overcoming these flaws led MDW to the invention of a new paradigm for sensing audio loudness -- the "Variable Exponent Averager" (VEA). This patented technology allows the detector's sensitivity to range continuously from averaging-responding, to RMS-responding, to peak-responding detection. As well, the detector is tuned to model human hearing more faithfully than previous designs -- more sensitive to perceived (psychoacoustic) loudness than to electrical peak or average values (digital or analog) . The most remarkable aspect of this design is a possible dynamic control over a very wide dynamic range (40 or more dB range) that is sonically far less audible than with *any other "automatic level" devices.*

01 Introduction

MDWDRC2-Native V2 & DRC3-Native Plug-In Features

Massenburg DesignWorks® (MDW) Dynamic Range Controller plug-ins (DRC2-V2 & DRC3-Multi-Channel) are mono, stereo and multi-channel native plug-ins that defines the state-of-the-art in digital dynamic range controller. With its unprecedented, unique processing the MDW® Dynamic Range Controller is designed for unequaled sonic performance.

The **AVERAGE** and **PEAK** Exponent knobs set the math used to evaluate signals. You may raise the average sum to the power of 1 to 8. The **AVERAGE > Exponent** default setting of 2 equals the square root of averaged signals squared, (more commonly known as RMS, or root mean square) and will more closely track the energy of a signal.   Higher **PEAK > Exponent** values have faster attack rates which could be useful for capturing faster transients.

MDW Dynamic Range Controller is implemented in double-precision 64-bit floating-point processing to take advantage of the maximum capability of your Pro Tools®, Logic, Nuendo and other DAW using AAX64 Native, AudioUnit and VST3. This plug-in can even emulate George Massenburg's legendary GML 8900 Dynamic Gain Controller - the industry-standard reference in dynamic range controllers - and take it much further.

This guide provides information on installing and using the **MDWDRC2-Native V2 & DRC3-Native** plug-in in Avid's Pro Tools and other major DAWs.

MDWDRC2-Native V2 & DRC3-Native Plug-In Features

- Revolutionary, patented detection processors that track signals more like people perceive sound.
- High-resolution processing with support for sample rates from 44.1kHz to 192kHz.
- Accurate, wide-range TrueRMS Signal Detection.
- Double-precision 64-bit processing throughout for unprecedented clarity and low noise.
- Wide-range, wide-bandwidth logarithmic processing for balanced control over wide dynamic range.
- Built-in selectable EBU BS1770_3 Loudness Normalization filtering in the side-chain.
- Look-ahead control enabling a delay setting. It can be integrated with the host's Delay Compensation (if available in a given DAW).
- Pro Tools AAX64 Native plug-in format as well as AudioUnits (MacOS) and VST3 for non-Pro Tools DAWs.
- Intel and Apple Silicon (M1/M2) support in all hosts.

Chapter 2:

Installation and Authorization

02 Installation and Authorization

System Requirements and Compatibility

To use the MDWEQ plug-in, you need the following:

- An iLok USB Smart Key (iLok 2 or 3 required)
- An iLok.com account for managing iLok licenses
- The latest iLok License Manager application
- A qualified Pro Tools system for AAX-Native. For non-Avid Pro Tools DAWs should be the latest available version. MDW can only test and guarantee the full installation and operation on the most recent versions of Pro Tools (or the latest version of other DAWs) and the iLok License Manager.

Activate Your Plug-in

In order to activate your plug-in, you will need to install the latest "iLok License Management Application" and iLok USB Smart Key 2 or 3 (shown below).

An iLok can hold hundreds of licenses for all of your iLok-enabled software. Once a license for a given piece of software is placed on an iLok, you can use the iLok to authorize that software on any computer.

An iLok USB Smart Key is not supplied with plug-ins or software options. You can use the iLok included with certain Pro Tools systems or purchase one separately.

Operating System:

This is the minimum system requirement to run MDWDRC2-Native V2 & DRC3-Native

Mac OS:

Monterey (12.7.4^)
Ventura (13.6.6^)
*Sonoma (14.4.1^): must have at
least 14.4.1 installed

Hardware Requirements:

Apple Silicon or Intel that is able to run the latest Monterey or better.

Windows:

Windows 10 or 11

Hardware Requirements:

ARM based or Intel (i5 or above) that is able to run the latest Win 10 or later.

02 Installation and Authorization

Installation Destinations

Each plug-in format will be installed to its own destination as below:

MacOS:

AAX: /Library/Application Support/Avid/Audio/Plug-Ins

VST3: /Library/Audio/Plug-Ins/VST3

AudioUnit: /Library/Audio/Plug-Ins/Components

Windows:

AAX: C:\Program Files\Common Files\Avid\Audio\Plug-Ins

VST3: C:\Program Files\Common Files\VST3

Removing Plug-Ins

If you need to remove a plug-in from your Pro Tools system, follow the instructions below for your computer platform.

Mac OS X:

1) Locate and open the Plug-Ins folder on your Startup drive (see previous page for the installation destination for each format).

2) Do one of the following:

- Drag the plug-in to the Trash and empty the Trash.
- Drag the plug-in to the Plug-Ins (Unused) folder

Windows:

1) Choose Start > Control Panel.

2) Click Programs and Features.

3) Select the plug-in from the list of installed applications.

4) Click Uninstall.

5) Follow the on-screen instructions to remove the plug-in.

Chapter 3:

MDWDRC2-Native V2 & DRC3-Native Parameters

Massenburg DesignWorks
MDWDRC3-Native
The Ultimate Transparent Multichannel Dynamics Range Controller

MDWDRC3 PLUGIN CONTROLS 1 OF 2

Loudness Steering Master
Sets the extent to which either or some of both the DISCRETE and LOUDNESS detectors control the COMPOSITE Control Section's final gain

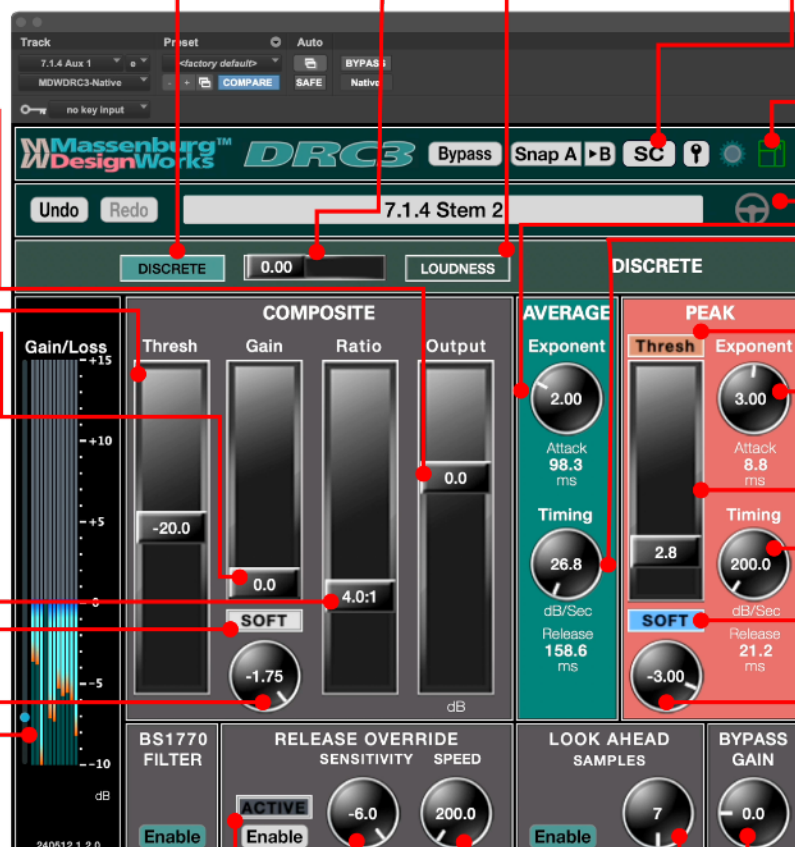
Sidechain In/Out

Resize the UI

SHOW ADVANCED PANELS
Shows/Hides Loudness and Steering Panels

DISCRETE Threshold Indicator
Green indicates that the DISCRETE Detector is contributing to the gain control

LOUDNESS Threshold Indicator
Blue indicates that the LOUDNESS Detector is contributing to the gain control



Output
Output Gain or Loss (if not bypassed) in dB

COMPOSITE Thresh
Sets the Threshold for both DISCRETE & LOUDNESS detectors. Both detectors go to the STEERING Control. The COMPOSITE Threshold control (also called the 'Rotation Point') sets the lowest overall threshold

COMPOSITE Gain
Higher values increase gain below threshold

COMPOSITE Ratio
The 'delta' between input and output of the DRC after both detectors, DISCRETE & LOUDNESS, have been compared

DISCRETE AVERAGE SOFT Knee Indicator
Lights BLUE when active

COMPOSITE SOFT Knee Control
Expressed as dB gain reduction at the Rotation Point. Adjusts the breadth of the transition between no control and full control for both DISCRETE & LOUDNESS detectors. Higher (larger) minus values are 'softer'

GAIN/LOSS MULTICHANNEL METER
The line between the **vertical dark green bar** and the **vertical gray bar** is the actual instantaneous gain (or loss) of the DCA (shown at "0" in white)
Blue - Gain Reduction, **Blue Gradient** - MAIN Soft Knee
Orange - PEAK Reduction
Orange Gradient - PEAK Soft Knee
Blue Meter Zoom Slider to the left

High-Pass Filter
Enables the DRC Detector's Loudness Normalization filtering per EBU BS1770_3

DISCRETE AVERAGE Detector Exponent
Attack Time of 2 = True RMS
Attack Time of 3 = 3rd root of of averaged signals, each raised to the 3rd power. Higher exponents result in faster Attack times, but retain the same Release rate.

DISCRETE AVERAGE Detector Release Rate
Expressed in dB/second release rate.
Also increases the Attack Time along with increasing the Release Rate.

DISCRETE PEAK Indicator
ORANGE when DISCRETE PEAK detector overrides the DISCRETE AVERAGE detector

DISCRETE PEAK Detector Exponent
Attack Time of 3 = 3rd root of of averaged signals, each raised to the 3rd power. Attack Time of 2 = True RMS. Higher exponents result in faster Attack times, but at the same Release rate.

DISCRETE PEAK Threshold (override)
In dB above DISCRETE AVERAGE detector. Lower values increase sensitivity to peaks. DISCRETE PEAK override happens before the STEERING and RATIO Controls.

DISCRETE PEAK Detector Release Time
DISCRETE PEAK detector Release rate, expressed in dB/second release rate. Also increases the Attack Time along with increasing the Release Rate.

DISCRETE PEAK SOFT Knee Indicator
Lights BLUE when 'Soft Knee' is active (signal is between the DISCRETE AVERAGE detector and full override of the PEAK detector). Expressed as dB above DISCRETE AVERAGE threshold.

DISCRETE PEAK SOFT Knee Control
Expressed as dB gain reduction at the Rotation Point. Adjusts the breadth of the transition between DISCRETE AVERAGE and DISCRETE PEAK Control. Higher (larger) negative values are 'softer'

RELEASE OVERRIDE Active
RED when AUTO-RELEASE is ACTIVE

RELEASE OVERRIDE Speed
The rate at which Release Override will override the DISCRETE AVERAGE and DISCRETE PEAK detectors and accelerate gain recovery

LOOK AHEAD
Look-Ahead control audio for all detectors in the DRC, expressed in samples

Bypass Gain
Output Gain or Loss if bypassed in dB. Match the DRC bypassed output to the unbypassed output.
(For DAWs that support this)

RELEASE OVERRIDE Enable
Turns on the AUTO-RELEASE function

RELEASE OVERRIDE Sensitivity
Expressed in dB, is the reverse sensitivity to the dynamics of the signal. Specifically how much the signal must drop in a short time to trigger accelerated release timing.

LOOK AHEAD Enable
Enables the Delay Compensation for DAWs that support this function

MDWDRC3-Native

Supports Mono - Multichannel up to 9.1.6

MDWDRC2-Native

Supports Mono & Stereo

Same features as MDWDRC3 with the new Discrete and Loudness detectors, Loudness Steering & Weighting

Free upgrade for all MDWDRC2 owners

MDWDRC2 and MDWDRC3 plugins support AAX Native, VST3 & AU formats Mac and Windows

Featuring Loudness Dynamics™

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The Ultimate Transparent Multichannel Dynamics Range Controller

MDWDRC3 PLUGIN CONTROLS 2 OF 2

Loudness Steering Master
Sets the extent to which either or some of both the DISCRETE and LOUDNESS detectors control the COMPOSITE Control Section's final gain

Channel Loudness Weighting Enable
Enables individual channel's threshold offset

Loudness Threshold Master
Increases (+) or decreases (-) the sensitivity of ALL Enabled Channel's Loudness Thresholds

DISCRETE Threshold Indicator
Green indicates that the DISCRETE Detector is contributing to the gain control

LOUDNESS Threshold Indicator
Blue indicates that the LOUDNESS Detector is contributing to the gain control

Channel Loudness Weighting (Offset)
Increases (+) or decreases (-) individual channel's weighting offset

LOUDNESS Limit LUFSA
Not Yet Implemented

Output
Output Gain or Loss (if not bypassed) in dB

COMPOSITE Thresh
Sets the Threshold for both DISCRETE & LOUDNESS detectors. Both detectors go to the STEERING Control. The COMPOSITE Threshold control (also called the 'Rotation Point') sets the lowest overall threshold

COMPOSITE Gain
Higher values increase gain below threshold

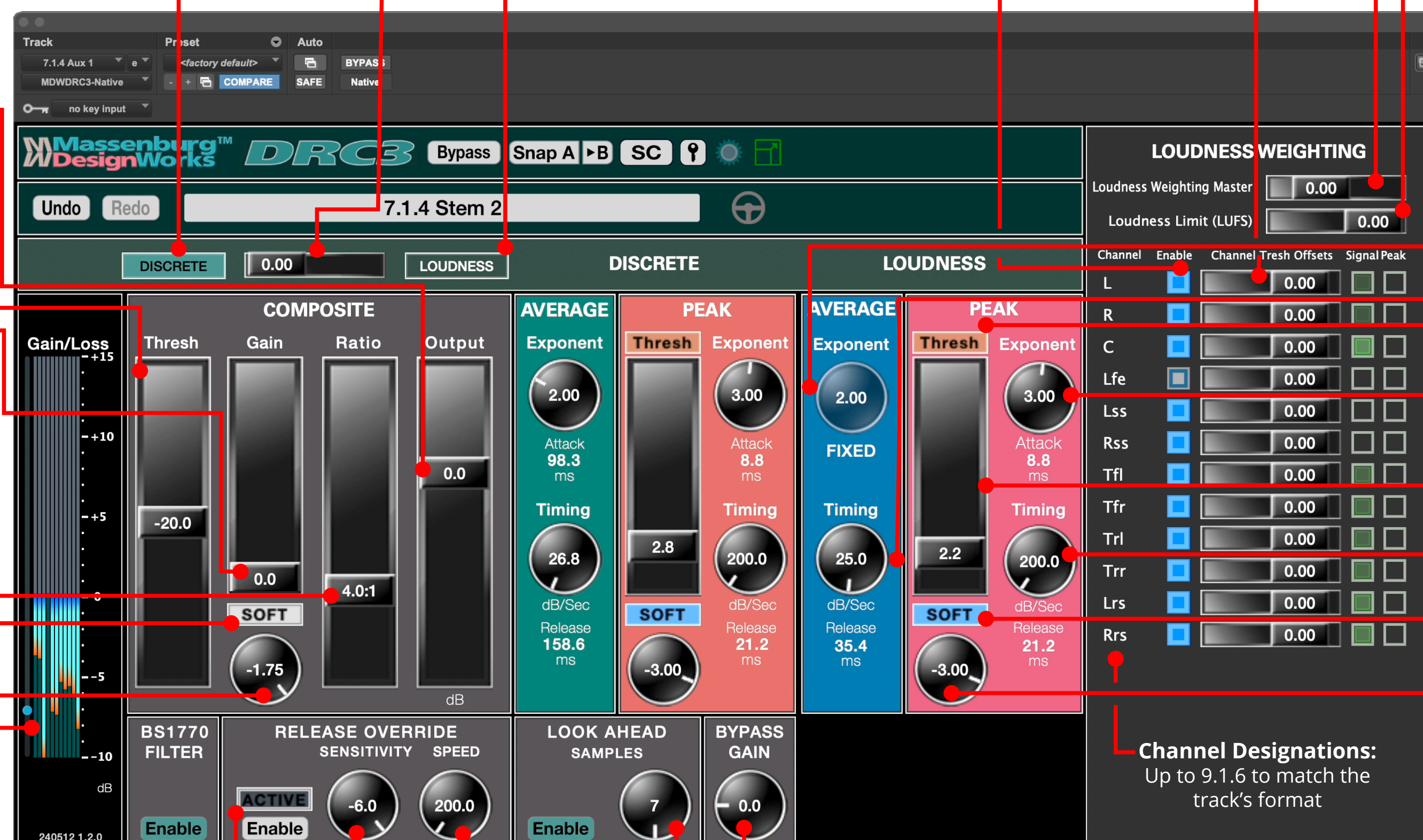
COMPOSITE Ratio
The 'delta' between input and output of the DRC after both detectors, DISCRETE & LOUDNESS, have been compared

DISCRETE AVERAGE SOFT Knee Indicator
Lights BLUE when active

COMPOSITE SOFT Knee Control
Expressed as dB gain reduction at the Rotation Point. Adjusts the breadth of the transition between no control and full control for both DISCRETE & LOUDNESS detectors. Higher (larger) minus values are 'softer'

GAIN/LOSS MULTICHANNEL METER
The line between the **vertical dark green bar** and the **vertical gray bar** is the actual instantaneous gain (or loss) of the DCA (shown at "0" in white)
Blue - Gain Reduction, **Blue Gradient** - MAIN Soft Knee
Orange - PEAK Reduction
Orange Gradient - PEAK Soft Knee
Blue Meter Zoom Slider to the left

High-Pass Filter
Enables the DRC Detector's Loudness Normalization filtering per EBU BS1770_3



LOUDNESS AVERAGE Detector Exponent
FIXED at 2.0 (True RMS)
Exponent (Attack Time) of 2 = True RMS. Higher exponents result in faster Attack times, but retain the same Release rate.

LOUDNESS AVERAGE Detector Release Rate
Expressed in dB /second Release Rate. Also increases the Attack Time along with increasing the Release Rate.

LOUDNESS PEAK Indicator
ORANGE when LOUDNESS PEAK detector overrides the LOUDNESS AVERAGE detector

LOUDNESS PEAK Detector Exponent
Attack Time of 3 = 3rd root of of averaged signals, each raised to the 3rd power. Attack Time of 2 = True RMS. Higher exponents result in faster Attack times, but at the same Release rate.

LOUDNESS PEAK Threshold (override)
In dB above LOUDNESS AVERAGE detector. Lower values increase sensitivity to peaks. LOUDNESS PEAK override happens before the STEERING and the RATIO Controls

LOUDNESS PEAK Detector Release Time
PEAK Detector Release rate, expressed in dB/second release rate. Also increases the Attack Time along with increasing the Release Rate

LOUDNESS PEAK SOFT Knee Indicator
Lights BLUE when the "Soft Knee" is active (signal is between the LOUDNESS AVERAGE detector and full override of the PEAK detector). Expressed as dB above LOUDNESS AVERAGE Threshold.

LOUDNESS PEAK SOFT Knee Control
Expressed as dB gain reduction at the Rotation Point. Adjusts the breadth of the transition between LOUDNESS AVERAGE and LOUDNESS PEAK Override.
Higher (larger), negative values are 'softer'.

Channel Designations:
Up to 9.1.6 to match the track's format

RELEASE OVERRIDE Active
RED when AUTO-RELEASE is ACTIVE

RELEASE OVERRIDE Speed
The rate at which Release Override will override the DISCRETE AVERAGE and DISCRETE PEAK detectors and accelerate gain recovery

LOOK AHEAD
Look-Ahead control audio for all detectors in the DRC, expressed in samples

Bypass Gain
Output Gain or Loss if bypassed in dB. Match the DRC bypassed output to the unbypassed output.
(For DAWs that support this)

RELEASE OVERRIDE Enable
Turns on the AUTO-RELEASE function

RELEASE OVERRIDE Sensitivity
Expressed in dB, is the reverse sensitivity to the dynamics of the signal. Specifically how much the signal must drop in a short time to trigger accelerated release timing.

LOOK AHEAD Enable
Enables the Delay Compensation for DAWs that support this function

03 MDWDRC2-Native V2 & DRC3-Native Parameters

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GAIN/LOSS MULTICHANNEL METER
The line between the **vertical dark green bar** and the **vertical gray bar** is the actual instantaneous gain (or loss) of the DCA (shown at "0" in white)
Blue - Gain Reduction, **Blue Gradient** - MAIN Soft Knee
Orange - PEAK Reduction
Orange Gradient - PEAK Soft Knee
Blue Meter Zoom Slider to the left

03 MDWDRC2-Native V2 & DRC3-Native Parameters

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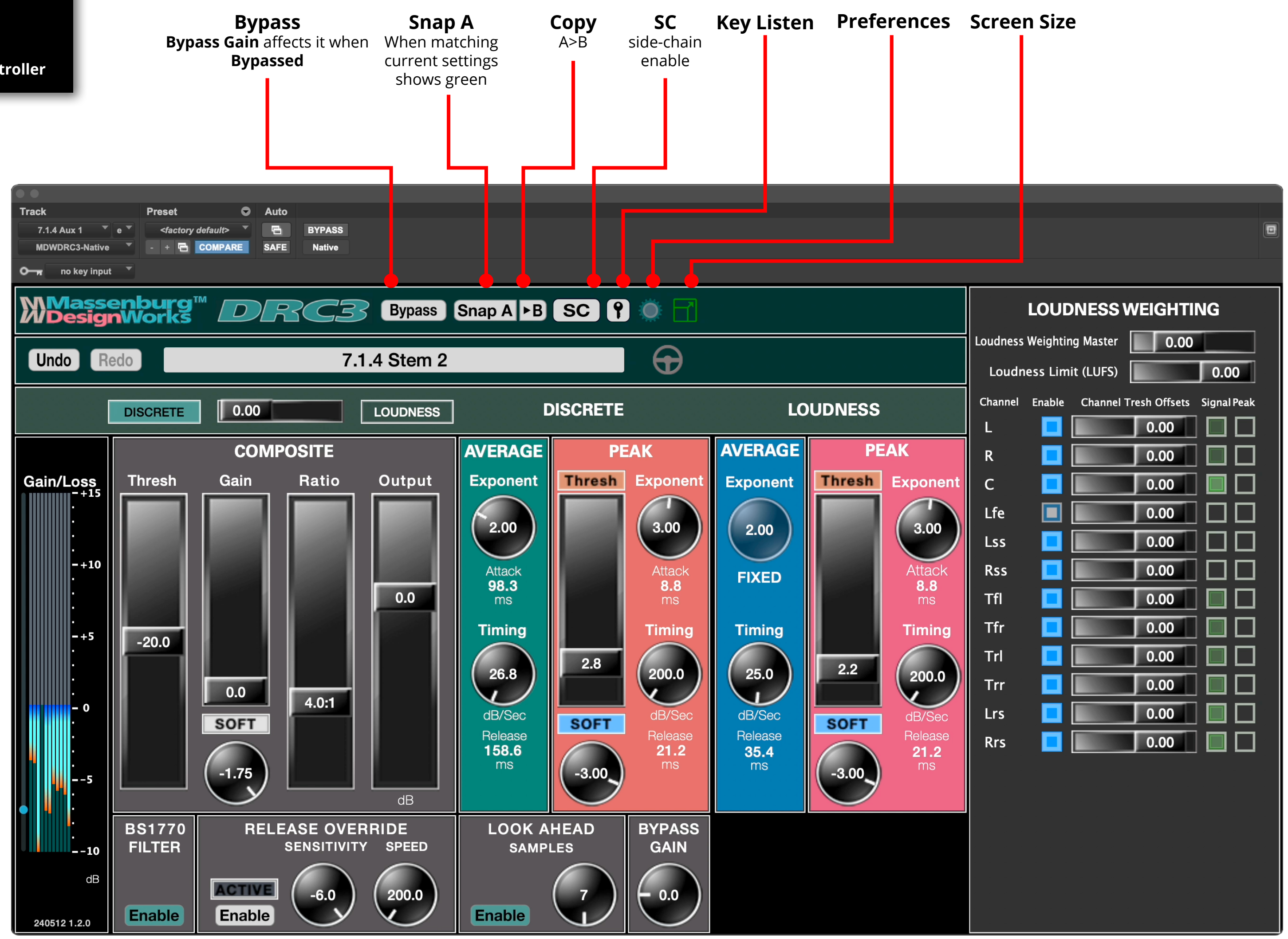


Plug-in Window – Basic Controls (description)

COMPOSITE > Thresh sets the AVERAGE detector's real threshold. This also sets the position of the Rotation Point (see page 33 for more explanation) where it interacts with the Soft Knee and Ratio settings.

COMPOSITE > Gain Compression Gain. Higher values increase the amount of gain added to a signal below threshold. When the signal is above threshold, it adds no *additional* gain.

PEAK > Thresh Compression override sensitivity, in dB *above* the **COMPOSITE > Gain** detector. Lower values increase sensitivity to peaks, all outputs from both the **AVERAGE** and **PEAK** detectors (as well as the **Release Override** function) are then are provided to the **Ratio** control.

PEAK Compressor Active: Orange when **PEAK** detector is overriding COMPOSITE detector.

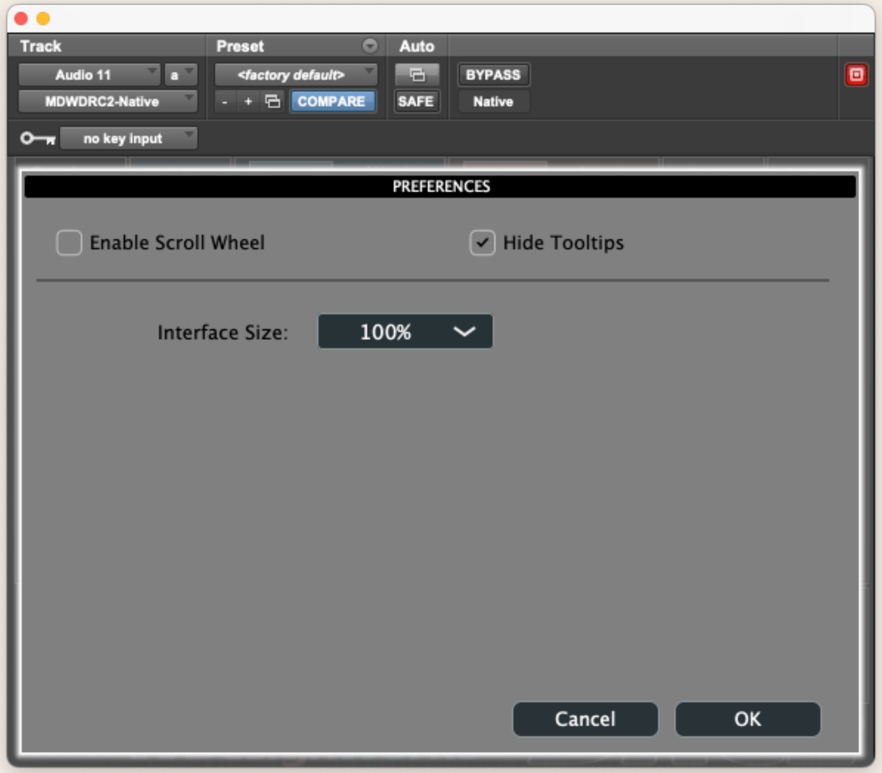
Bypass: Bypasses the plug-in. The Bypass Gain is active when bypassed.

Copy Snapshot A->B, B->A: While A is selected, duplicate all settings to Snapshot B and vice versa. You'll then have 2 settings to compare. Snapshots are not saved with the host. Only the active snapshot is saved.

SC (sidechain): Engage Sidechain signal. Active when green.

SC Key: Allows to listen to the sidechain key signal only. Active when green.

Gear Symbol: User Preference (see figure right) such as Mouse Wheel enable and Tooltips on/off. Also allows users to change the interface size



Screen Size: Allows users to change the plugin window size to 100%, 125% or 150% without going into the preference menu (see figure above)

Core Concepts and First Steps

The primary design objective of the **MDWDRC2 and MDWDRC3** is *transparency of action*, starting with a detector that responds as would a tireless, authoritative “hand on the fader”. To achieve this transparency, new concepts are introduced, and many familiar terms take on deeper meanings due to the unique, interactive nature of the controls. Although the plugin can be used and abused for creative purposes, to dive into the deep-end blindly will lead to unexpected results.

The plugin interface is organized into three main sections: **Composite, Average, and Peak**. Composite houses the **primary threshold, gain, and ratio controls**. **AVERAGE** is the main detector, responding to the long-term energy of the signal. **Peak** is a secondary detector that can override **AVERAGE** when short transients exceed a set threshold. Throughout this guide, controls are identified using the convention

With that in mind, start by loading up an instance of **MDWDRC2/3** with its default settings. For the purposes of setup, set the **Ratio** control to 100:1 and the **PEAK > Thresh** control to 18.0 (or off, more or less). Our preliminary focus is to observe *what* is happening with the source dynamic range, rather than how “musical” the result is, without listening to “compression artifacts”.

- Play an un-mastered full-range track or dynamically complex instrument like an acoustic guitar or piano, or even voice, through the plugin.
- Pull the **COMPOSITE Thresh** control down until the **Gain/Loss** meter starts showing a few db of activity at the “quietest” point of the source signal.
- Now push the **COMPOSITE Gain** control up slowly. A powerful aspect of the design will become immediately apparent: under the threshold you’ll see a simple increase in level, and track density will increase as levels below the threshold are pushed *up* towards the threshold (same as **Ratio** at 100:1). Simultaneously, an internal makeup gain pushes levels above the threshold *down*. The threshold then can be thought of as a “**Rotation Point**", like the center of a teeter-totter.
- Now, pull the **Ratio** control down from 100:1 to 4:1 and notice the track “opens up” dynamically, while maintaining its *average, long-term loudness*. The user-defined threshold still acts as the **Rotation Point**, while an internal threshold shifts to maintain overall *long-term loudness*. The **Ratio** determines the steepness of the tilt and the “width” or “range” of the dynamics.

03 MDWDRC2-Native V2 & DRC3-Native Parameters

The **AVERAGE > Exponent:** The default Value is **2 = RMS (Root-Mean-Square) =** best matches **how human hearing actually weighs loudness sound.** This represents hearing the average loudness in both quiet and loud moments.

The **AVERAGE > Timing** control (default = 25dB/sec release rate) adjusts the response to the **AVERAGE** exponential detector. When set to “**2**” the detector is “true-RMS” responding, closely tracking the actual energy of the signal. This detector’s timing is symmetrical - changing the **AVERAGE > Timing** control changes both the “**Attack ms**” and “**Release ms**” times displayed - note that these times are approximate.

While playing the source track, adjust the **AVERAGE > Timing** control noticing that the **Attack ms** indicator changes. You’ll hear a “sweet spot” that retains musical openness and usefulness versus the amount of control, ultimately allowing the engineer to focus on *listening to dynamics*, rather than “crush”. In fact, except for edge-cases (or intentionally bringing out the **MDWDRC2/3**’s euphonic growl), dynamic control can be achieved purely through refinements in **AVERAGE > Timing**, leaving **AVERAGE >Exponent** controls at their default settings.

These behind-the-scenes interactions make it child's play to control a track's dynamics without changing relative mix balances; avoid being caught out by the trap of "louder is better"; effortlessly control punch and presence. All further refinements branch from this solid foundation and are fully explained in the following sections, from most esoteric to most conventional.

03 MDWDRC2-Native V2 & DRC3-Native Parameters

Plug-in Parameters – AVERAGE and PEAK Detectors (description)

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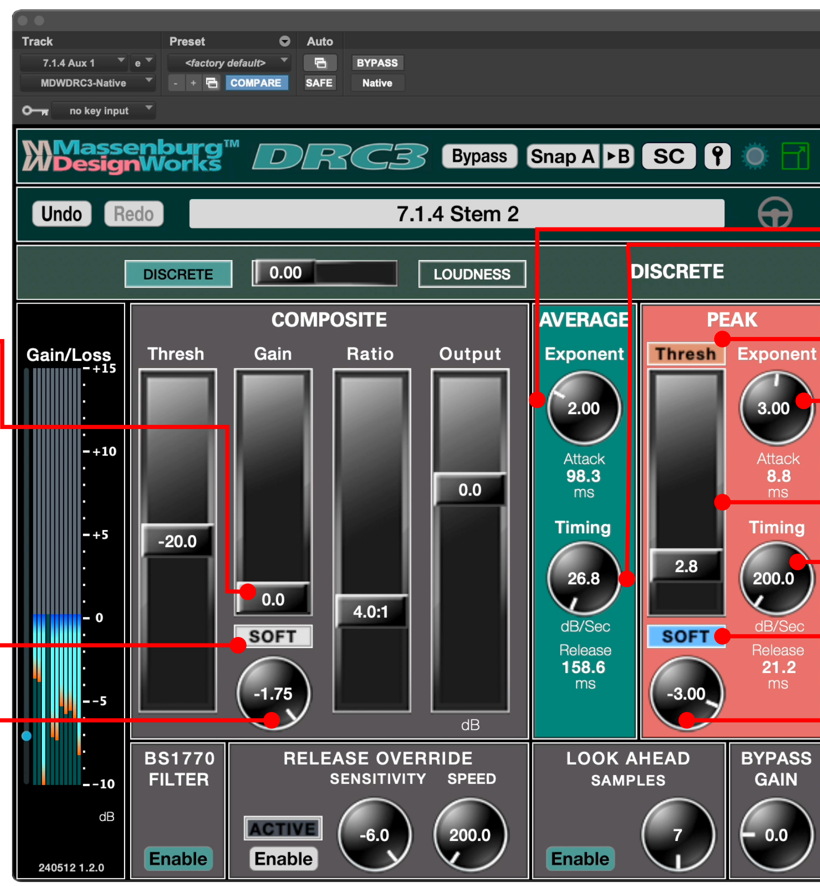
MDWDRC3 PLUGIN CONTROLS 1 OF 2

COMPOSITE Gain
Higher values increase gain below threshold

DISCRETE AVERAGE SOFT Knee Indicator
Lights BLUE when active

COMPOSITE SOFT Knee Control
Expressed as dB gain reduction at the Rotation Point.Adjusts the breadth of the transition between no control and full control for both DISCRETE & LOUDNESS detectors. Higher (larger) minus values are 'softer'



DISCRETE AVERAGE Detector Exponent
Attack Time of 2 = True RMS
Attack Time of 3 = 3rd root of of averaged signals, each raised to the 3rd power. Higher exponents result in faster Attack times, but retain the same Release rate.

DISCRETE AVERAGE Detector Release Rate
Expressed in dB/second release rate.
Also increases the Attack Time along with increasing the Release Rate.

DISCRETE PEAK Indicator
ORANGE when DISCRETE PEAK detector overrides the DISCRETE AVERAGE detector

DISCRETE PEAK Detector Exponent
Attack Time of 3 = 3rd root of of averaged signals, each raised to the 3rd power. Attack Time of 2 = True RMS. Higher exponents result in faster Attack times, but at the same Release rate.

DISCRETE PEAK Threshold (override)
In dB above DISCRETE AVERAGE detector. Lower values increase sensitivity to peaks. DISCRETE PEAK override happens before the STEERING and RATIO Controls.

DISCRETE PEAK Detector Release Time
DISCRETE PEAK detector Release rate, expressed in dB/second release rate. Also increases the Attack Time along with increasing the Release Rate.

DISCRETE PEAK SOFT Knee Indicator
Lights BLUE when 'Soft Knee' is active (signal is between the DISCRETE AVERAGE detector and full override of the PEAK detector). Expressed as dB above DISCRETE AVERAGE threshold.

DISCRETE PEAK SOFT Knee Control
Expressed as dB gain reduction at the Rotation Point. Adjusts the breadth of the transition between DISCRETE AVERAGE and DISCRETE PEAK Control. Higher (larger) negative values are 'softer'

Plug-in Parameters – AVERAGE and PEAK Detectors (description)

AVERAGE Detector Exponent: Default is 2 - see more on page 40.

PEAK Detector Exponent: Default is 3 - see more on page 40.

AVERAGE Detector Timing: Expressed in dB/sec release rate - See more on page 40.

PEAK Detector Timing: Expressed in dB/sec release rate - See more on page 40.

PEAK Compressor Active: Orange when **AVERAGE** detector output is causing gain reduction.

COMPOSITE Soft Knee Control: Expressed as dB gain reduction at the *Rotation Point* (see page 48). Adjusts the shape of the transition of the AVERAGE detector. Higher negative values are "softer" knees.

COMPOSITE Soft Knee Active: Lights up blue when active

PEAK > Thresh override sensitivity (threshold) in dB above the **AVERAGE** detector. Lower values increase sensitivity to peaks, **PEAK** override happens before the **RATIO**.

Peak Soft Knee Control: Adjusts control smoothly between no Peak override (of the **AVERAGE** detector) and full override. Negative values are "softer" knees.

Peak Soft Knee Active: Lights blue when active

Plug-in Parameters – Extra Controls Section

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MDWDRC3 PLUGIN CONTROLS 1 OF 2

High-Pass Filter
Enables the DRC Detector's Loudness Normalization filtering per EBU BS1770_3

RELEASE OVERRIDE Active
RED when AUTO-RELEASE is ACTIVE

RELEASE OVERRIDE Enable
Turns on the AUTO-RELEASE function

RELEASE OVERRIDE Speed
The rate at which Release Override will over-ride the DISCRETE AVERAGE and DISCRETE PEAK detectors and accelerate gain recovery

RELEASE OVERRIDE Sensitivity
Expressed in dB, is the reverse sensitivity to the dynamics of the signal. Specifically how much the signal must drop in a short time to trigger accelerated release timing.

LOOK AHEAD
Look-Ahead control audio for all detectors in the DRC, expressed in samples

LOOK AHEAD Enable
Enables the Delay Compensation for DAWs that support this function

Bypass Gain
Output Gain or Loss if bypassed in dB. Match the DRC bypassed output to the unbypassed output.
(For DAWs that support this)

03 MDWDRC2-Native V2 & DRC3-Native Parameters

BS1770 FILTER: Enables Loudness Normalization filtering per ITU BS1770-3.

Release Override (dB control): Level in dB is the sensitivity to the dynamics of the signal, specifically how much the signal must drop in a short time to trigger accelerated release timing.

Release Override Speed (dB/Sec control): The rate at which **Release Override** will accelerate recovery when overriding the **AVERAGE** and **PEAK** detectors.

Release Override (Active): RED when **Release Override** is active.

Release Override (Enable): GREEN when

Release Override function is on.

LOOK-AHEAD: The input signal is delayed by the look-ahead length, and the host's Delay Compensation is likewise adjusted in samples. **Delay Comp Enable** enables the **LOOK-AHEAD** delay setting to adjust the Delay Compensation in the host (only when supported by the given DAW)

Bypass Gain: Output Gain or Loss if bypassed in dB.

Plug-in Parameters – Loudness and Steering Panels

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The Ultimate Transparent
Multichannel Dynamics Range Controller

SHOW ADVANCED PANELS
Shows/Hides Loudness and Steering Panels

Channel Loudness Weighting Enable
Enables individual channel's threshold offset

Channel Loudness Weighting (Offset)
Increases (+) or decreases (-) individual channel's weighting offset

Loudness Threshold Master
Increases (+) or decreases (-) the sensitivity of ALL Enabled Channel's Loudness Thresholds

LOUDNESS Limit LUFSA
Not Yet Implemented

LOUDNESS AVERAGE Detector Exponent
FIXED at 2.0 (True RMS)
Exponent (Attack Time) of 2 = True RMS. Higher exponents result in faster Attack times, but retain the same Release rate.

LOUDNESS AVERAGE Detector Release Rate
Expressed in dB /second Release Rate. Also increases the Attack Time along with increasing the Release rate.

LOUDNESS PEAK Indicator
ORANGE when LOUDNESS PEAK detector overrides the LOUDNESS AVERAGE detector

LOUDNESS PEAK Detector Exponent
Attack Time of 3 = 3rd root of of averaged signals, each raised to the 3rd power. Attack Time of 2 = True RMS. Higher exponents result in faster Attack times, but at the same Release rate.

LOUDNESS PEAK Threshold (override)
In dB above LOUDNESS AVERAGE detector. Lower values increase sensitivity to peaks. LOUDNESS PEAK override happens before the STEERING and the RATIO Controls

LOUDNESS PEAK Detector Release Time
PEAK Detector Release rate, expressed in dB/second release rate. Also increases the Attack Time along with increasing the Release Rate

LOUDNESS PEAK SOFT Knee Indicator
Lights BLUE when the "Soft Knee" is active (signal is between the LOUDNESS AVERAGE detector and full override of the PEAK detector). Expressed as dB above LOUDNESS AVERAGE Threshold.

LOUDNESS PEAK SOFT Knee Control
Expressed as dB gain reduction at the Rotation Point. Adjusts the breadth of the transition between LOUDNESS AVERAGE and LOUDNESS PEAK Override.
Higher (larger), negative values are 'softer'.

Channel Designations:
Up to 9.1.6 to match the track's format

03 MDWDRC2-Native V2 & DRC3-Native Parameters

Show Advanced Panels: Shows/hides Loudness and Steering Panels.

Channel Loudness Weighting Enable: Enables individual channel's threshold offset

Channel Loudness Weighting (Offset): Increases (+) or decreases (-) individual channel's weighting offset

Loudness Threshold Master: Increases (+) or decreases (-) the sensitivity of ALL Enabled Channel's Loudness Thresholds

LOUDNESS Limit LUFSA: Yet to be fully implemented*

Channel Designations: Up to 9.1.6 to match the track's format**

LOUDNESS AVERAGE Detector Exponent: FIXED at 2.0 (True RMS)

Exponent (Attack Time) of 2 = True RMS. Higher exponents result in faster Attack times, but retain the same Release rate.

LOUDNESS AVERAGE Detector Release Rate: Expressed in dB /second Release Rate. Also increases the Attack Time along with increasing the Release Rate.

LOUDNESS PEAK Indicator:ORANGE when LOUDNESS PEAK detector overrides the LOUDNESS AVERAGE detector

LOUDNESS PEAK Detector Exponent: Attack Time of 3 = 3rd root of of averaged signals, each raised to the 3rd power. Attack Time of 2 = True RMS. Higher exponents result in faster Attack times, but at the same Release rate.

LOUDNESS PEAK Threshold (override): In dB above LOUDNESS AVERAGE detector. Lower values increase sensitivity to peaks. LOUDNESS PEAK override happens before the STEERING and the RATIO Controls

LOUDNESS PEAK Detector Release Time: PEAK Detector Release rate, expressed in dB/second release rate. Also increases the Attack Time along with increasing the Release Rate

LOUDNESS PEAK SOFT Knee Indicator: Lights BLUE when the ”Soft Knee” is active (signal is between the LOUDNESS AVERAGE detector and full override of the PEAK detector). Expressed as dB above LOUDNESS AVERAGE Threshold.

LOUDNESS PEAK SOFT Knee Control: Expressed as dB gain reduction at the Rotation Point. Adjusts the breadth of the transition between LOUDNESS AVERAGE and LOUDNESS PEAK Override.Higher (larger), negative values are ‘softer’.

*LUFSA - Yet to be fully implemented but scheduled for future releases

** The Channel Configuration and Channel Names display may be different depending on the DAW.

Keyboard Controls for Each Parameter

macOS:

Option + Click : Reset the parameters to default.

Command + Drag : High resolution adjustments

Windows:

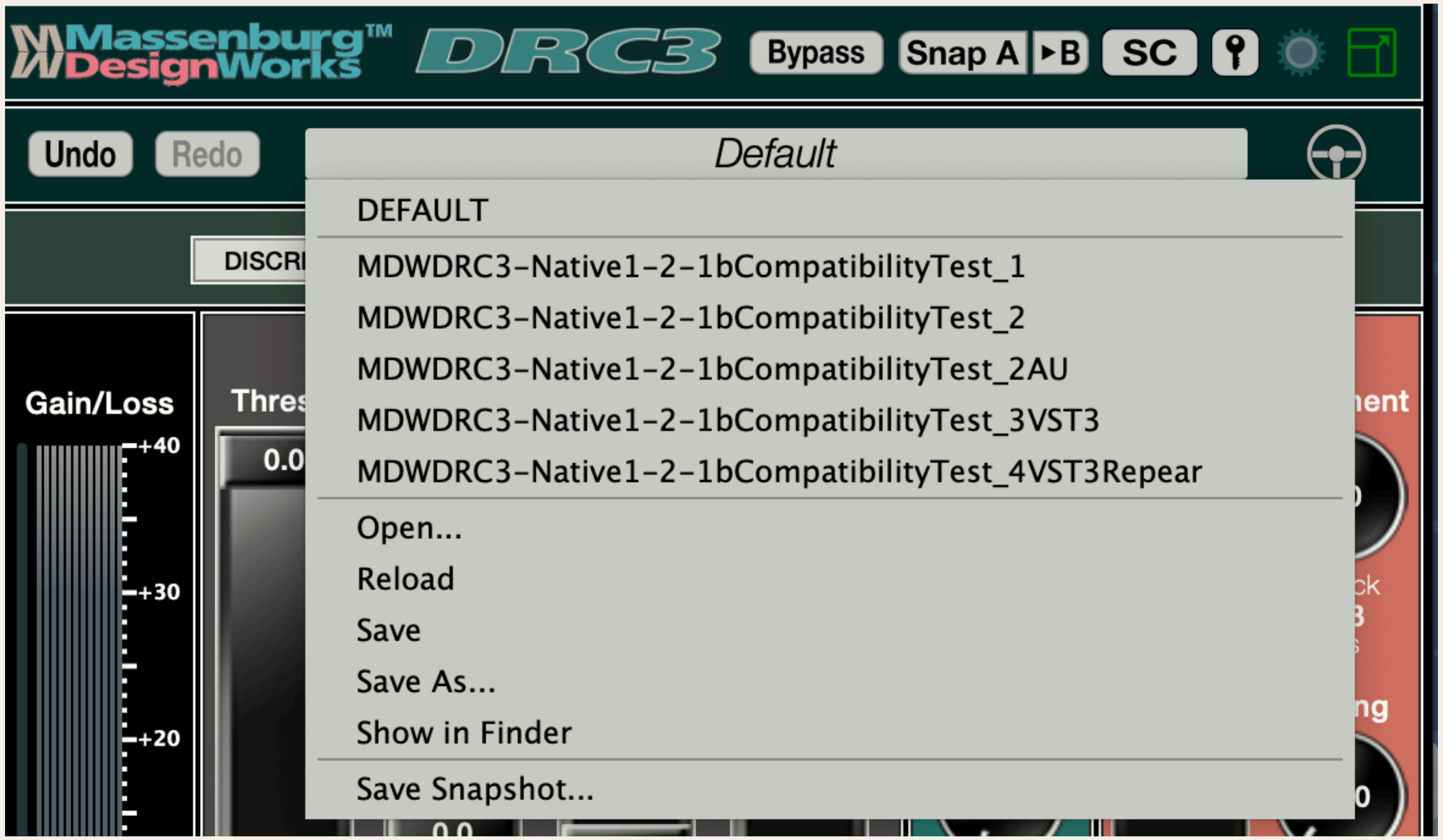
Alt + Click : Reset the parameters to default

Control + Drag : High resolution adjustments

03 MDWDRC2-Native V2 & DRC3-Native Parameters

Save/Load Plugin Presets

With the latest build of **MDWDRC2/DRC3**, the plug-in now offers the **Save and Load Preset** function as well as Save Snapshot and Undo/Redo. This menu is available when you click **Default** at the top of the plug-in window. Presets are cross-compatible between AAX/AU/VST3.



03 MDWDRC2-Native V2 & DRC3-Native Parameters

Save and Load Preset allows non-AAX users to save/load their own presets within the plug-in. The default location for the Presets are:
$(home)/Documents/MDW/MDWDRC2-Native/Presets
$(home)/Documents/MDW/MDWDRC3-Multichannel/Presets

Save Snapshot will take a screenshot of the current settings and save it to your desired destination.

Undo/Redo allows users to cancel or reverse the last settings.

⚠️*Note: Due to JUCE default implementation,* ***when you load a preset it clears the Undo buffer****. This means if you switch between A/B it clears the Undo buffer.*

Chapter 4:

MDWDRC2-Native V2 & DRC3-Native Theory of Operation

The following controls and indicators let you adjust the parameters, and monitor performance, of an **MDWDRC2-Native V2 & DRC3-Native** plug-in inserted on a track or input. These parameters are independently controlled but many affect each other in a way that no other dynamic range controller does.

Introducing Discrete and Loudness (Steering) Control

A Current Explanation of Loudness: For some years the audio production community has had its attention drawn to control of the loudness (expressed in dB, and measuring Sound Pressure Level as perceived by the human ear). Originally motivated to measure and perhaps control excess "loudness" in broadcast television commercials, among other applications it's been expanded to measure and control loudness in other areas, particularly music.

Defining how to measure "Loudness" is particularly challenging when the broad range of sound sources is considered. Nevertheless, committees in the US (A85) and Europe (PLoud) have suggested standard measurement techniques which had been formalized and refined. The current "Gold Standards" of Loudness measurements have been gathered in EBU/ITU documents BS1770-4 & etc which are available as PDFs at **https://www.itu.int/rec/R-REC-BS.1770**.

An Explanation of Steering and MDW Loudness Dynamics™: The MDWDRC3-Native Plugin implements this new feature, MDW Loudness Dynamics™ processing. This new "LOUDNESS" workflow evaluates the overall loudness of group of channels (as per BS1770-4), from 2 channels to 16 channels (currently) and presents the result to the "Steering Control".

If any of the 16 individual controls are "Enabled" this master control then chooses from the outputs of two different groups of detectors…either from the selected 16 individual DISCRETE detectors or from the LOUDNESS detector, which is an RMS (arithmetic) sum of all 2-16 inputs. The "Steering Control" then manages all 16 output gain controllers to achieve the desired results.

Introducing Discrete and Loudness (Steering) Control

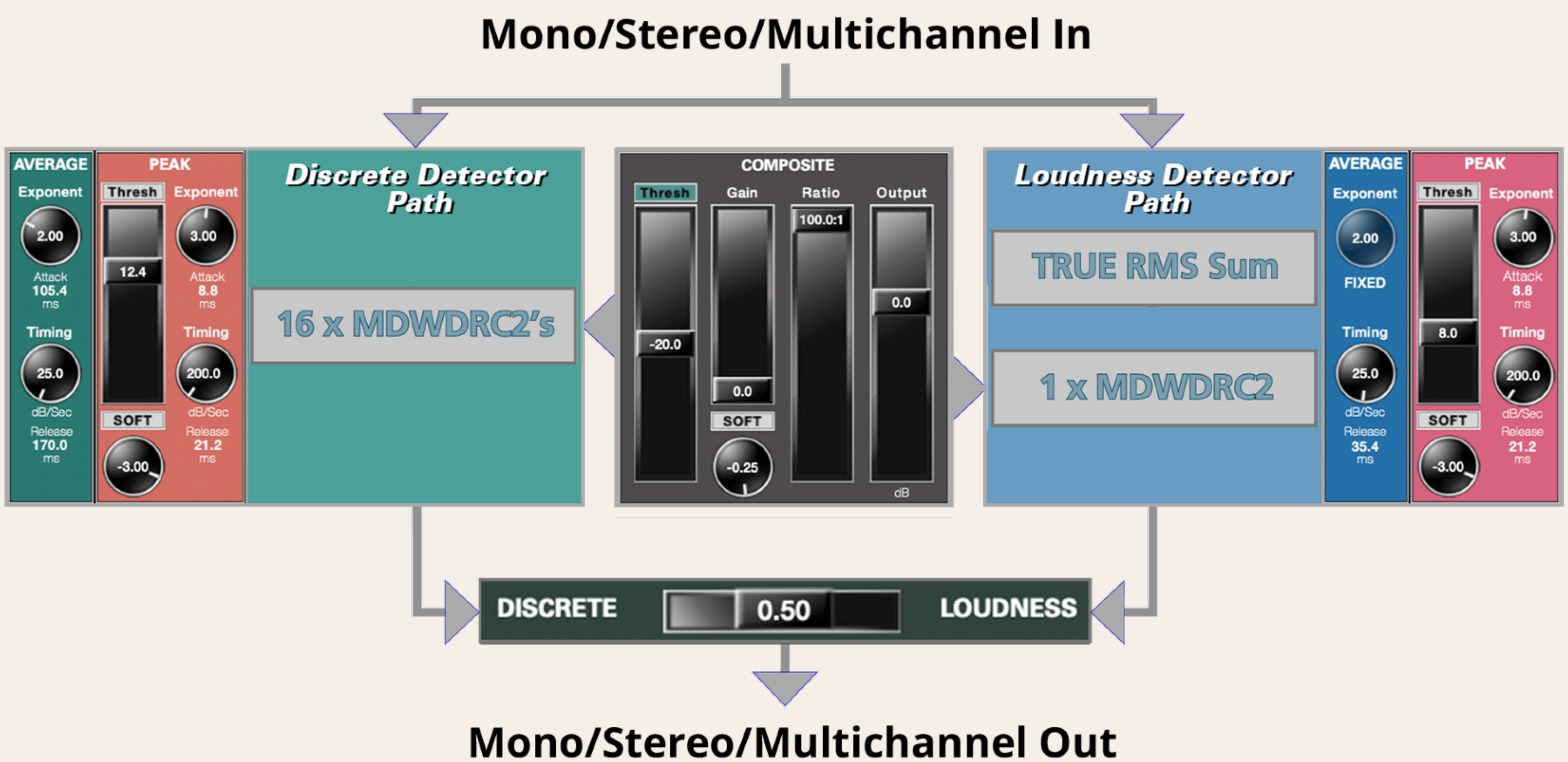
Discrete mode means each channel is analyzed independently. Each channel has its own Average and Peak detectors running in parallel, and each channel's gain is controlled by its own detector's read of that channel's signal. The result is maximum dynamic control per channel, but because each channel is being managed independently, *the relative balance between channels - the stereo image, the spatial placement of sounds in a surround mix - can shift as compression acts differently on each one*.

Loudness mode means all channels are summed together into a single loudness measurement (calculated per the BS1770-4 standard), and that *combined reading drives the gain control for all channels simultaneously*. Because every channel's gain moves together by the same amount, the balance between channels is preserved exactly. The stereo image and spatial placement stay locked.

The tradeoff is that the overall loudness reading is less sensitive to what any individual channel is doing moment to moment.

The Steering Control blends between these two modes continuously. Turned fully toward Discrete, you get maximum per-channel control at the cost of some image stability. Turned fully toward Loudness, you get maximum image and balance preservation at the cost of some per-channel sensitivity. In the middle, both detector outputs are contributing simultaneously - you can dial in exactly how much of each behavior you want for a given source.

For stereo music mixing, a position closer to **Loudness** typically preserves the mix balance and stereo width more naturally. **For individual instruments or stems** where per-channel control matters more than spatial relationships, leaning toward **Discrete** gives the detectors more to work with.



Using DRC2-Native V2/DRC3-Native in Mono: As the previous paragraph explains how Steering Control works, Using DRC2-Native V2 in Mono instantiation will disable Steering Control and work only in Discrete mode. This is to reflect the workflow being exactly the same for Loudness as Discrete. Note that **all the "MDW Presets" are all compatible between DRC2 and DRC3.**

Gain/Loss Meter

The deceptively simplistic Gain/Loss meter provides a wealth of visual information. Owing to the transparency of **MDWDRC2/DRC3**, the meter should be thought of more as a bird's eye view than a tool to micro-manage compression amounts down to the nth decimal.

The meter is scaled in decibels from -10 to +40. 0 is calibrated to -20dBFS. In its resting state, the meter is divided into two zones: gray and dark green which slide in relation to the amount of **COMPOSITE > Gain** applied.

COMPOSITE dynamics activity glows light green with a dark blue gradient overlayed to reflect its **SOFT** knee setting. **PEAK** dynamics activity glows orange which visually crossfades to light green to reflect its **SOFT** knee setting.

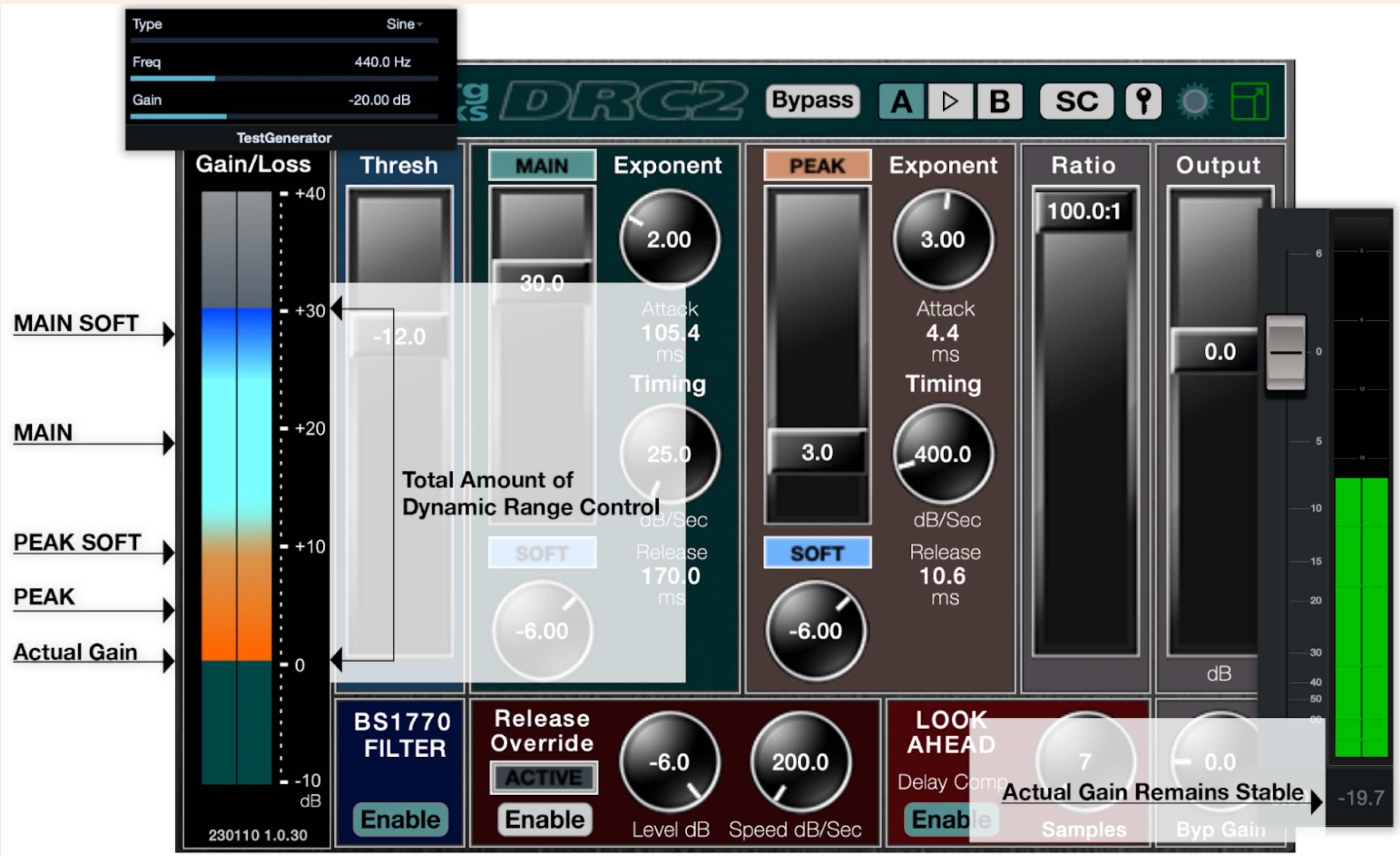
The aggregate height of these colors indicates the total amount of dynamic range control occurring. The demarcation between dark green and the other colors, always represents the gain of the control output relative to 0 on the scale.

The scaling of the meter and the **Output** provide important context for setting **COMPOSITE >Thresh** to tickle the meter, then utilizing **COMPOSITE > Gain** and **Ratio** to achieve the desired amount of dynamic control. Balancing **COMPOSITE > Thresh**, **Gain**, and **Ratio** to hover around 0 will ensure unity gain through the plugin, something that will quickly become second-nature in use.

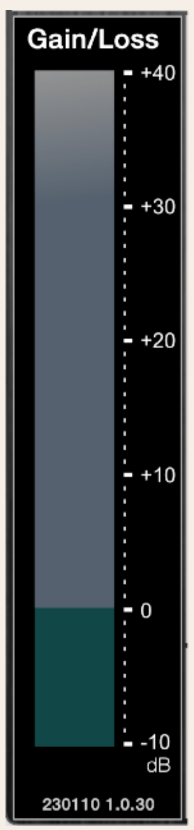
04 DRC2-Native V2 & DRC3-Native Theory of Operation

When **AVERAGE > Gain** is left static, and only **Thresh** and **Ratio** are used to control dynamics, Gain/ Loss will respond like a traditional gain-reduction meter. Importantly, the **Output** gain will then be needed to manually compensate any apparent gain or loss in loudness.

All of this can easily be understood by spending a few minutes with a tone generator plugin set to -20dBFS feeding an instance of DRC2 and experimenting with the controls.



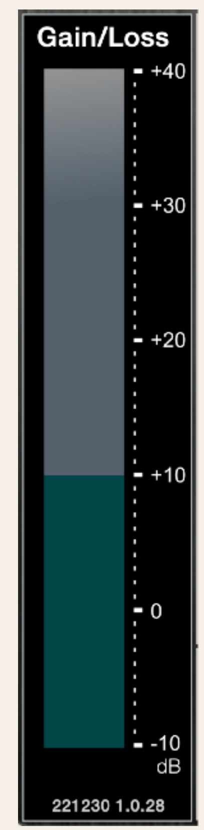
Dark Green / Dark Gray The *gain/loss* of the plugin is indicated by the division between the top of the dark green and the bottom of the dark gray, and always represents the instantaneous *static* gain of the plugin. *If there are no other colors, there is no automatic gain control active. Gain/Thresh mentioned here is from COMPOSITE section otherwise noted.*



No signal

Gain = 0dB

Gain/Loss = 0dB



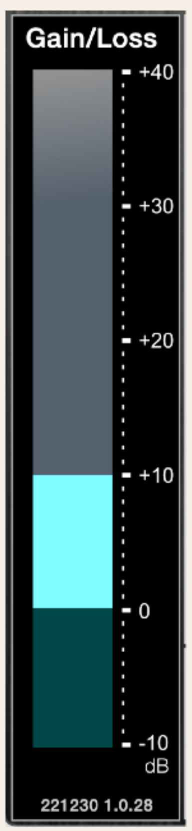
No signal

Gain = **10dB**

Gain/Loss = +10dB

04 DRC2-Native V2 & DRC3-Native Theory of Operation

Blue = Gain Reduction

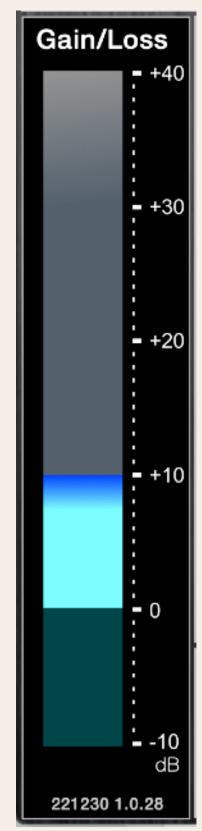


-10dBFS sine in

Thresh = -10dB
Gain = 10dB

Soft = -0.25
Gain/Loss = 0dB

Blue (gradient) = COMPOSITE Soft Knee

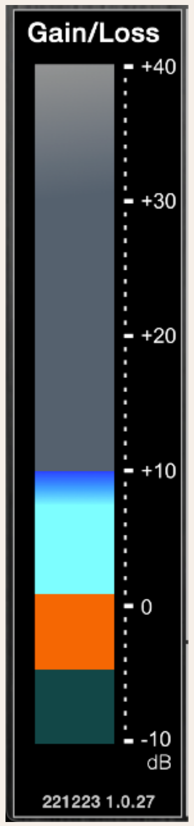


-10dBFS sine in

Thresh = -10dB
Gain = 10dB

Soft = -3.00
Gain/Loss = 0dB

Orange = Peak Reduction



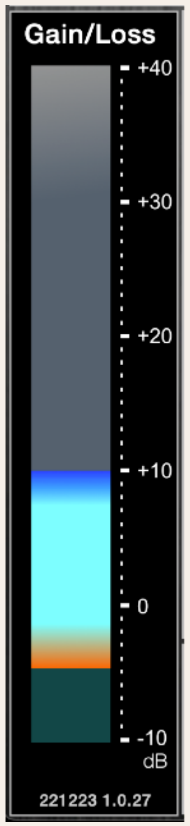
-4dBFS pulse in

Thresh = -10dB
Gain = 10dB

PEAK = 6dB
SOFT = -0.25

(transient only - 100ms)

Orange (gradient) = PEAK Soft Knee



-4dBFS pulse in

Thresh = -10dB
Gain = 10dB

PEAK = 6dB
SOFT = 3.00

(transient only - 100ms)

The **PEAK** section's **Peak Compressor Active** Indicator lights up orange when a peak exceeding the **AVERAGE** detector is detected.

The Two Detectors – AVERAGE and PEAK

Timing and Exponent

Conventional compressors, digital and analog, are more or less *non-linear* designs. Put simply, as compression levels deepen, distortion usually increases and *actual* release times often become faster and more unpredictable. This is why 20db of compression on a snare drum sounds drastically different than 2db of compression. Musically useful, perhaps, but transparent? Emphatically not.

The **MDWDRC2/DRC3**'s "Variable Exponent Average" detectors are uniquely *linear* designs, operating in a fashion more sensitive to psychoacoustic loudness (human hearing), rather than slavishly following electrical peak or average signals. Two identical VEA detectors, labeled **AVERAGE** and **PEAK** run in parallel. At their default settings, they behave nominally like **True-RMS and peak detectors**. This is where the similarity ends however, and why we need more precise terms to encapsulate their function.

04 DRC2-Native V2 & DRC3-Native Theory of Operation

Massenburg™ DesignWorks
MDWDRC2&3-Native
The Ultimate Transparent
Multichannel Dynamics Range Controller

DISCRETE AVERAGE Detector Exponent
Attack Time of 2 = True RMS
Attack Time of 3 = 3rd root of of averaged signals, each raised to the 3rd power. Higher exponents result in faster Attack times, but retain the same Release rate.

DISCRETE AVERAGE Detector Release Rate
Expressed in dB/second release rate.
Also increases the Attack Time along with increasing the Release Rate.

DISCRETE PEAK Indicator
ORANGE when DISCRETE PEAK detector overrides the DISCRETE AVERAGE detector

DISCRETE PEAK Detector Exponent
Attack Time of 3 = 3rd root of of averaged signals, each raised to the 3rd power. Attack Time of 2 = True RMS. Higher exponents result in faster Attack times, but at the same Release rate.

DISCRETE PEAK Threshold (override)
In dB above DISCRETE AVERAGE detector. Lower values increase sensitivity to peaks. DISCRETE PEAK override happens before the STEERING and RATIO Controls.

DISCRETE PEAK Detector Release Time
DISCRETE PEAK detector Release rate, expressed in dB/second release rate. Also increases the Attack Time along with increasing the Release Rate.

DISCRETE PEAK SOFT Knee Indicator
Lights BLUE when 'Soft Knee' is active (signal is between the DISCRETE AVERAGE detector and full override of the PEAK detector). Expressed as dB above DISCRETE AVERAGE threshold.

DISCRETE PEAK SOFT Knee Control
Expressed as dB gain reduction at the Rotation Point. Adjusts the breadth of the transition between DISCRETE AVERAGE and DISCRETE PEAK Control. Higher (larger) negative values are 'softer'

04 DRC2-Native V2 & DRC3-Native Theory of Operation

MDWDRC2/DRC3 Native utilizes two VEA (Variable Exponent Averaging) detectors, **AVERAGE > Exponent** (defaults to exponent = **2**, or **RMS** detection) and **PEAK** > **Exponent** (defaults to exponent = 4, or VEA detection). All detectors (including **Release Override**) send instantaneous control parameters to a single digitally-controlled gain block.

AVERAGE > Exponent and **PEAK** > **Exponent** knobs set the math used to evaluate signals in each detector. You may raise the sum of the averages of exponentiated signals to the power of 1 up to 6, although it is recommended to retain the **AVERAGE** default setting = **2** (True RMS) and to retain the **PEAK** default setting = 4 (VEA) for these instructional discussions, and for most purposes.

Lower Exponent→ Listening to Average - smooth, slower to react, less rattled by brief spikes

Higher Exponent → More sensitive to louder transients - faster to grab transients, more alert to peaks

The **Timing** and **Exponent** controls combine to create secondary indicators: "*Attack ms*"*, and "Release ms"*. They provide a frame of reference to better-known, conventional release rates, expressed in milliseconds. You cannot set the Attack ms or Release ms directly, they are *estimated* timings.

Changing the setting of **Timing** (both **AVERAGE** and **PEAK**) alters both Attack ms and Release ms. Changing the setting of the **Exponent** (both **AVERAGE** and **PEAK**) *visually alters only Attack ms*.

04 DRC2-Native V2 & DRC3-Native Theory of Operation

Timing is a concept first introduced in the venerable GML 8900 Dynamic Range Controller. Further refined from the hardware, the **MDWDRC2/ DRC3** attack and release envelopes are primarily determined by single **Timing** controls: *turn clockwise to increase response time to loudness changes and speed of recovery; turn counter-clockwise to decrease sensitivity to loudness changes and slow the speed of recovery*. In other words, to tighten or relax the timing, or musical feel.

Unlike the GML 8900, **MDWDRC2/ DRC3** exposes the mathematical aspect of the **Timing** controls to user input via the **Exponent** control. The decimal values themselves are quite literally the exponents used in the math to determine a range of detection, from average to True RMS, to degrees of peak loudness in a musically useful way. A more technical explanation can be found in the Appendix.

These two independent detectors, **AVERAGE** and **PEAK**, are in theory exactly the same code and controls, but used differently in application.

The two **Timing** controls are calibrated in the number of decibels per second required to return to their resting state.

The **Exponent** control defaults to 2.00 for the **AVERAGE** section; an exponent of 2 (square root of averaged signals squared) means that an True RMS (Root-Mean-Square) detector is tracking changes in loudness. The **PEAK** section's **Exponent** control defaults to 4.00 (or VEA) as it tracks *short* peak transients more faithfully than a True RMS detector.

For purely invisible dynamic range control, the two **Exponent** controls can be left at their default positions. Roaming further afield with the **Exponent** controls allows for more flexible envelope control, adapting to a particular groove of a track or for usage in mastering contexts.

You may directly enter a specific **Timing** by typing in a value in the center of the **Timing** control knobs, and the Attack ms and Release ms times will change accordingly.

You are invited to experiment with increased **Exponent** settings for special effects. Higher settings can increase artifacts and it is recommended that you start with these two controls at their defaults (you can reset these and other controls to their default value using the ‘factory default’ preset).

When the **AVERAGE > Exponent** is at **2 (RMS)**, changing the **Timing** control yields release times from 8500.0ms to 10.6ms, and attack times from 5720ms to 6.6ms.

When the **PEAK** > **Exponent** is set to 4 (VEA) the **PEAK > Timing** control yields Release times from 8500.0ms for **Timing** set to 0.5, 10.6ms for **Timing** set to 400, and 2.1ms for **Timing** set to 2000.

Should you wish for a slower Release time, you might dial in a longer **Timing** (with a longer release time).

For faster release times at a given, slower **Timing**, it is recommended to enable the **Release Override** function.

04 DRC2-Native V2 & DRC3-Native Theory of Operation

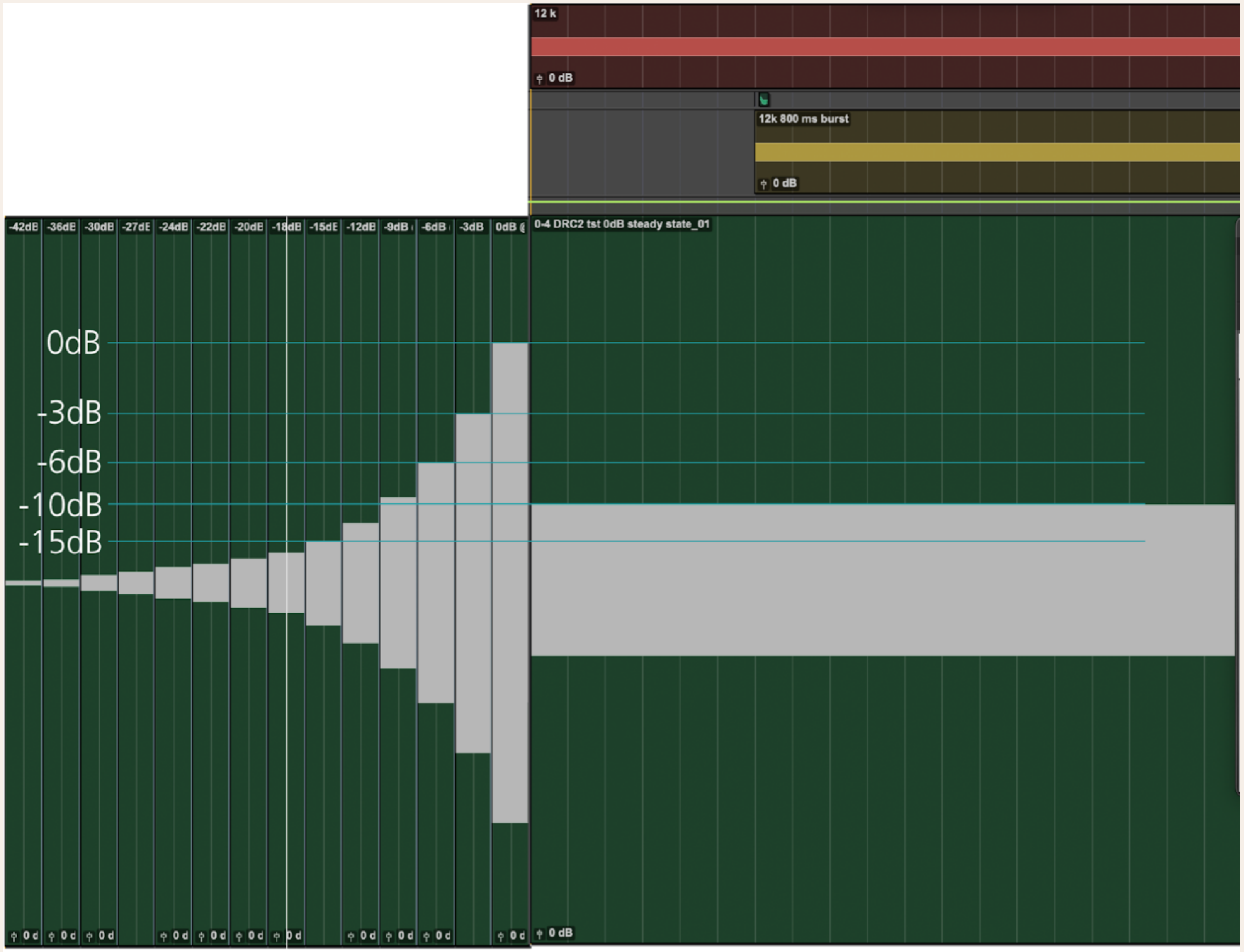
Mastery of the **MDWDRC2-Native V2 & DRC3-Native** can be hastened by understanding that both **AVERAGE** and **PEAK** detectors, with the exception of internal scaling differences, use identical VEA (**AVERAGE Exponent** = 2.00, **PEAK Exponent** = 4.00) detectors running in parallel. Both of these detectors are constantly handing off to each other to present a single value to the **RATIO** control. The same holds true If the **Release Override** is active.

Both **AVERAGE** and **PEAK** detectors are fed by the **COMPOSITE > Thresh** and **Gain** sliders whose basic functions are described here. The **PEAK** > **Thresh** detection slider is expressed in decibels relative to this aggregate threshold. The **PEAK** detector can essentially be turned off by setting the **PEAK** > **Thresh** slider to its maximum.

04 DRC2-Native V2 & DRC3-Native Theory of Operation

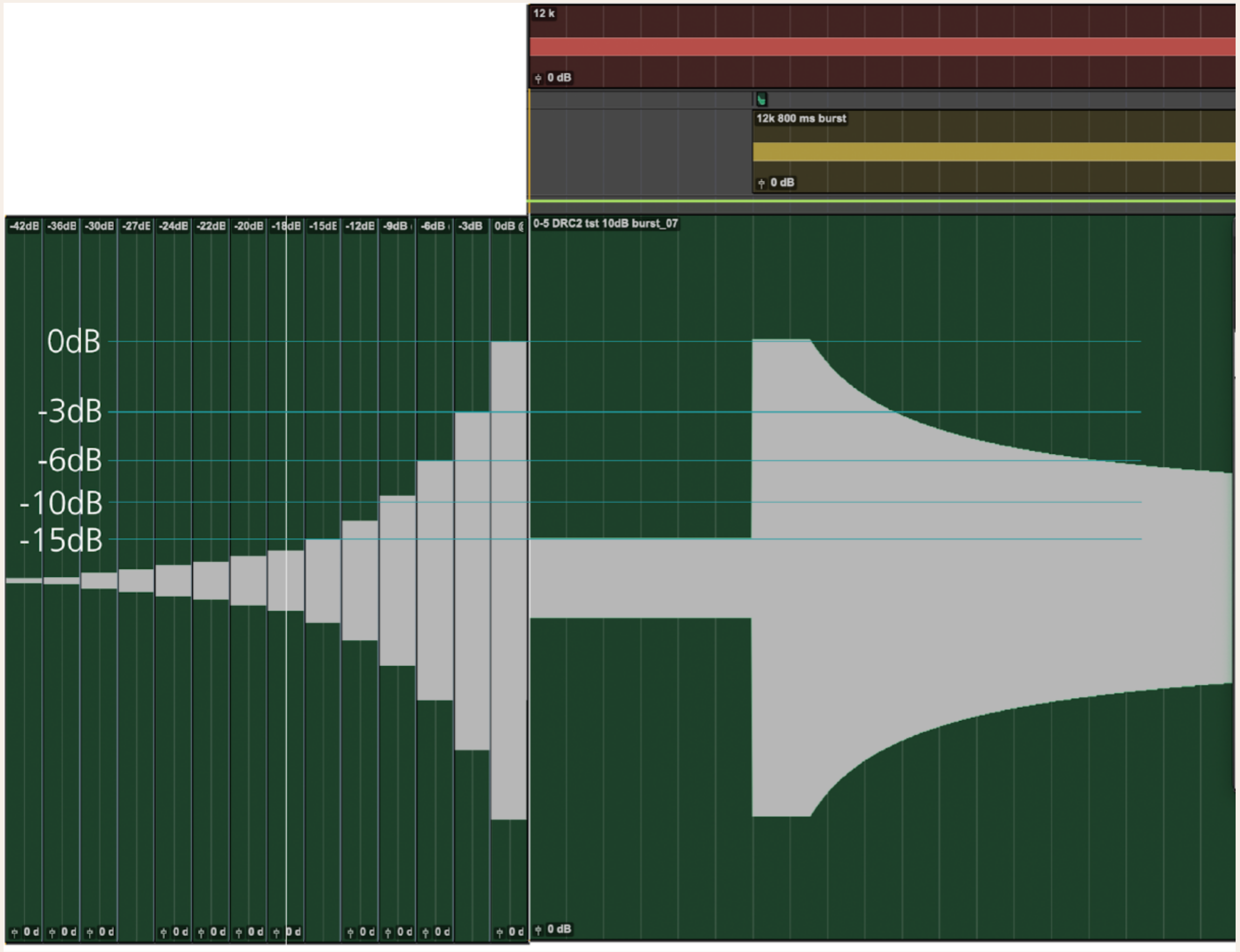
Below are some graphics to demonstrate the sample operation of the two detectors in the **DRC2-Native V2 & DRC3-Native**; the following measurements start with the **AVERAGE** section active only.

The following is a graphic (**DRC2-Native V2 & DRC3-Native** output level vs time) with *MDWDRC2/DRC3 Bypassed* of a basic test condition: a steady-state 12kHz tone (-10dB in/out).



04 DRC2-Native V2 & DRC3-Native Theory of Operation

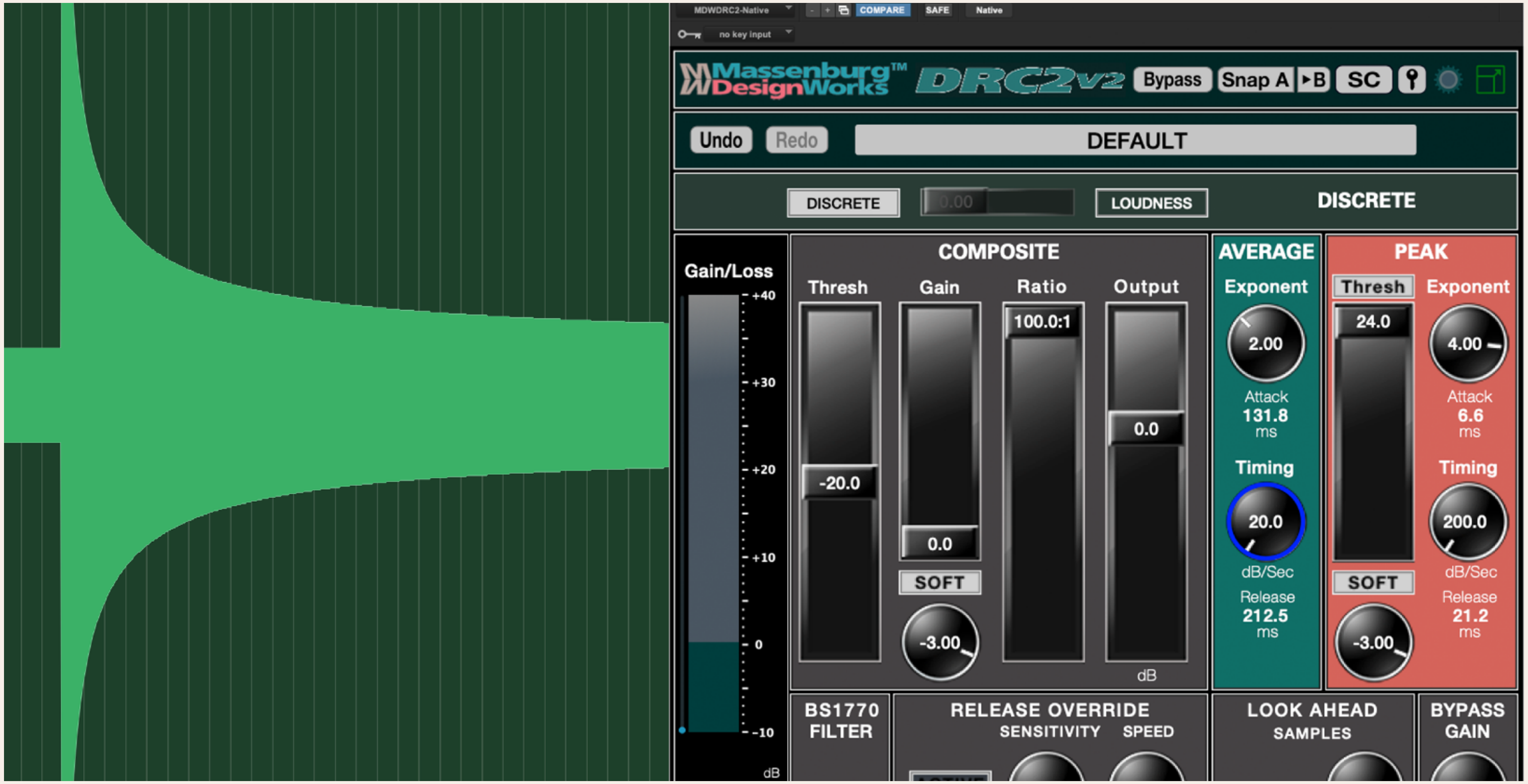
Gain reduction results when a steady-state tone is interrupted by a *10dB higher burst*, resulting in a 10dB gain reduction. (Timing = 25, -20dBFS steady state in, a -*10dBFS pulse*, 10dB gain reduction)



The bars on the left are a graphical representation of the actual levels below 0dB Full Scale in Pro Tools.

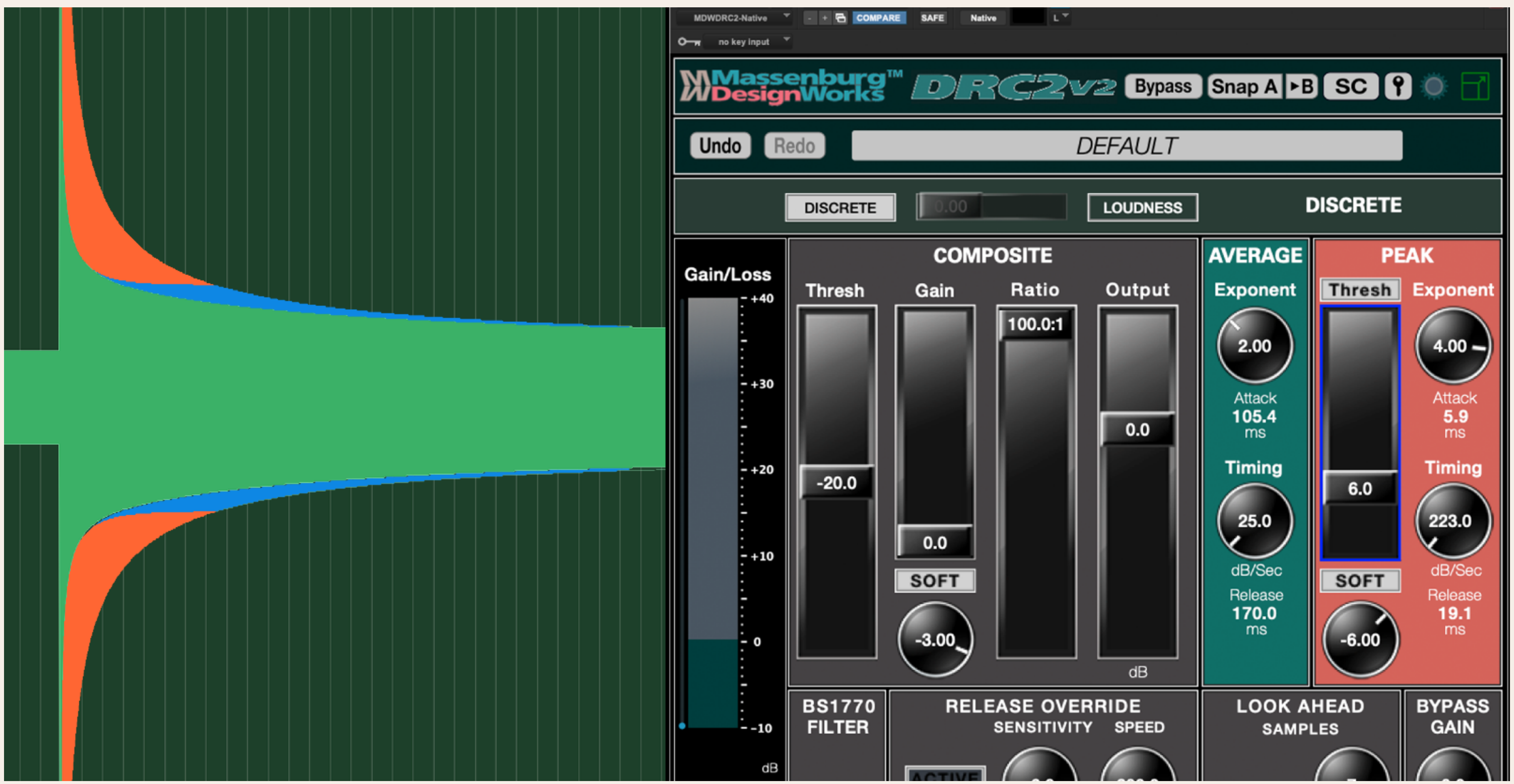
04 DRC2-Native V2 & DRC3-Native Theory of Operation

In the following example the **Timing** control is set to 20, resulting in a significantly long attack overshoot, as shown here:



The **PEAK** section might then be asked to *override* these “overshoots” that have been that allowed past the **AVERAGE** detector.

Finally, to soften the transition between **COMPOSITE** control and **PEAK** control, you could increase the **Soft Knee** of the **PEAK** section (shown in blue).



BS1770 Filter

The BS1770 Filter button engages a sidechain filter that changes what the detectors listen to when deciding how much gain control to apply. When enabled, the button glows green.

To understand what it does practically, it helps to know one thing about how the detectors work: they respond to whatever signal is fed into the sidechain. Without the filter, that means they react equally to everything - a heavy kick drum at 60Hz triggers just as much response as a vocal at 2kHz, even though your ear perceives those two things very differently in terms of loudness. The BS1770 filter corrects for this by shaping the sidechain signal to more closely match how human hearing actually works.

It does this in two stages. First, a high-pass filter rolls off content below 80Hz, reducing the detector's sensitivity to low-frequency energy - bass, kick, and sub content that your ear perceives as less loud than its raw electrical level suggests. Second, a gentle shelf boosts the upper midrange around 1–4kHz, the frequency range where human hearing is most sensitive. The result is a detector that weighs loudness much more like a listener would, rather than reacting to raw electrical peaks.

This is the same weighting curve used in broadcast and streaming loudness measurement - LUFS meters use it for exactly this reason. Applying it in the sidechain means the DRC2/DRC3 is making gain decisions based on perceived loudness rather than raw level.

BS1770 Filter - When To Apply

Full mixes and stereo buses: Enable it. Low-frequency content in a full mix - kick, bass, sub - can easily dominate an unfiltered detector and drive more compression than the overall perceived loudness warrants. With the filter on, the detector ignores that low-end weight and responds to the mix the way a listener's ear does. The result is typically more even, more natural-sounding control.

Vocals, guitars, keyboards, and mid-forward sources: Enable it. These sources live in the frequency range the filter emphasizes, so the detector stays well-calibrated to what you're actually hearing.

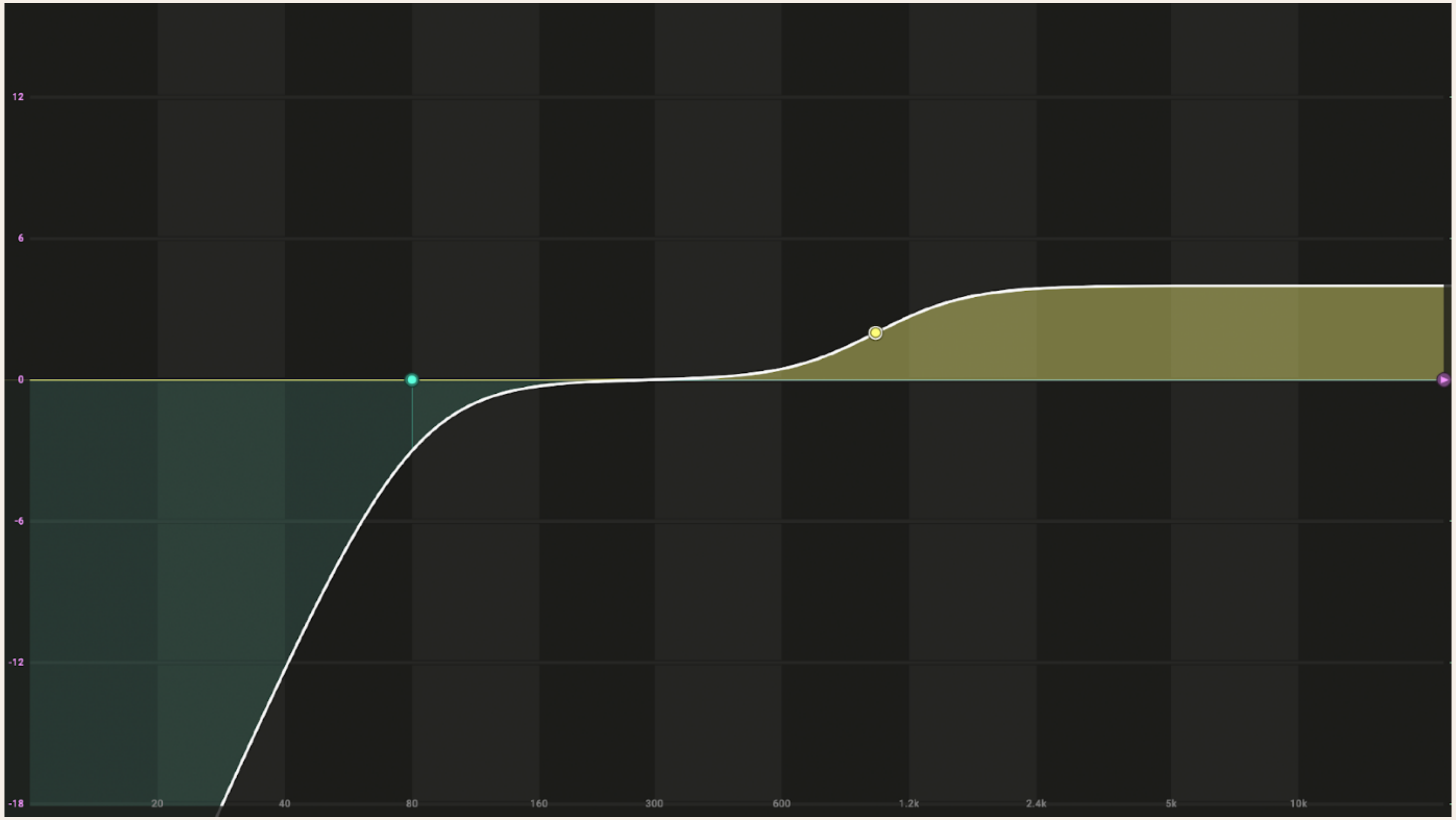
Solo kick drum, bass, or heavily sub-dominant sources: Try it both ways. The filter's high-pass stage reduces the detector's sensitivity to the fundamental of these instruments. With the filter on, the detector may react less aggressively to the peaks that matter most for these sources. A quick A/B will tell you which gives you the control behavior you're after.

Mastering: Enable it as a starting point. The filter's weighting aligns the detector with streaming platform loudness targets (which are also BS1770-based), which helps the DRC2/DRC3 make gain decisions that translate consistently to how the finished master will be measured and delivered.

A useful way to audition the difference: set the plugin to a moderate amount of control, then toggle the filter on and off while watching the Gain/Loss meter. You'll see the meter settle differently - with the filter on, low-frequency transients will drive noticeably less gain reduction, and the overall control will feel less reactive to the bottom end of the signal.

04 DRC2-Native V2 & DRC3-Native Theory of Operation

Mixing music has always placed a premium on artistic intent. Mixing for picture and broadcast, these specifications are well understood and scrupulously adhered to. The principles are the same though -- balancing audibility and impact. **MDWDRC2/DRC3** has been designed from the outset to bridge both disciplines.



Further description can be found in the Appendix.

Rotation Point

One of the resurrected control concepts employed in the design of **DRC2-Native V2 & DRC3-Native** is that of a ‘Rotation Point’.

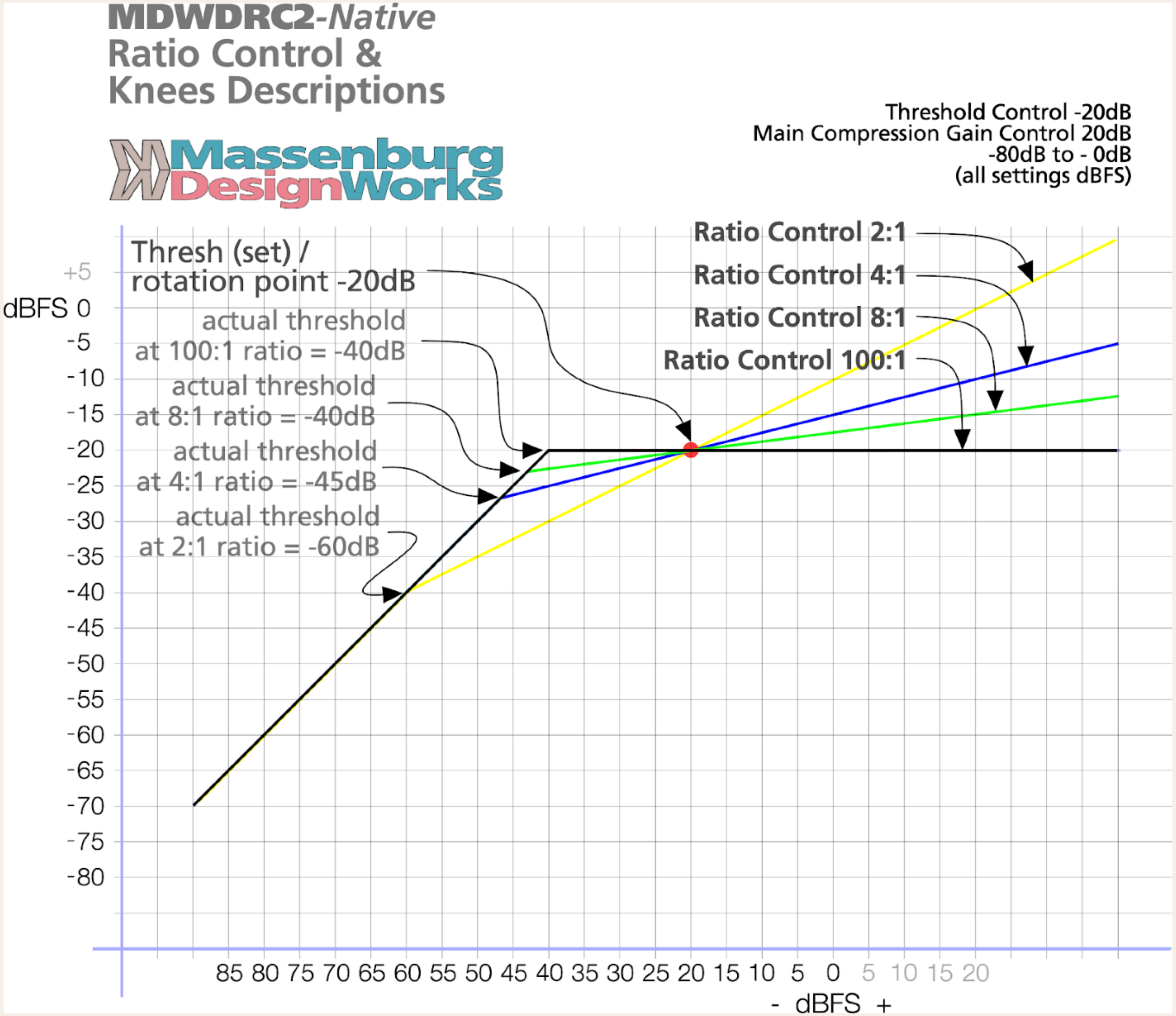
Most compressors work like a simple ceiling: loud signals hit a threshold and get pushed down. The threshold is a one-way door.

The MDWDRC's **Rotation Point** is different. Think of it like a see-saw balanced at a pivot. The pivot is the threshold you set by adjusting **COMPOSITE > Thresh**. Here's what makes it unusual:

When dynamics control is active, this pivot stays fixed while the signal tilts around it: levels below the Rotation Point are lifted, and levels above it are reined in - simultaneously, in a single coordinated motion. The **Ratio** determines how steep that tilt is.

At 100:1, the tilt is nearly flat above the pivot - a near-hard ceiling, similar to a traditional limiter. At 4:1 (the default), the tilt is gentler: the natural shape of the dynamics is preserved, but rotated around that center point. Crucially, because both sides of the teeter-totter move together, your average long-term loudness stays naturally balanced **without needing manual makeup gain adjustments**.

The **DRC2-Native V2 & DRC3-Native**’s default compression ratio is 4:1.


MDWDRC2-Native
Ratio Control &
Knees Descriptions
Massenburg DesignWorks
Threshold Control -20dB
Main Compression Gain Control 20dB
-80dB to - 0dB
(all settings dBFS)
Thresh (set) /
rotation point -20dB
actual threshold
at 100:1 ratio = -40dB
actual threshold
at 8:1 ratio = -40dB
actual threshold
at 4:1 ratio = -45dB
actual threshold
at 2:1 ratio = -60dB
Ratio Control 2:1
Ratio Control 4:1
Ratio Control 8:1
Ratio Control 100:1
+5
dBFS 0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
-75
-80
85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20
- dBFS +

Soft Knees

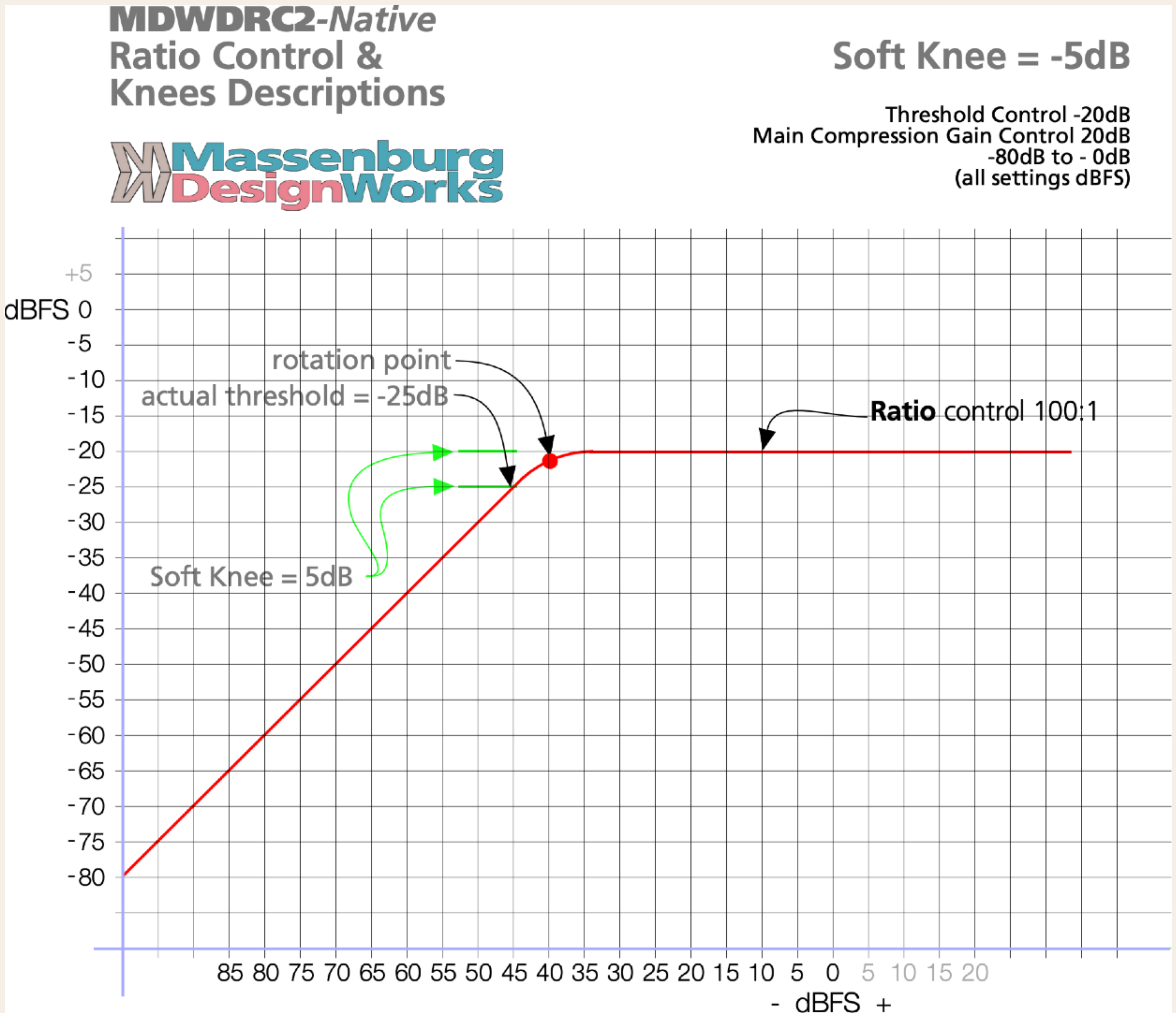
The **SOFT** Knee controls in the **COMPOSITE** and **PEAK (Discrete/Loudness)** sections are functionally similar to other compressor designs, smoothing the transition into compression. However, it is important to understand the implications of their use, as they *do alter the internal threshold*, but do not internally compensate for any gain added or lost. Higher **COMPOSITE > Gain** settings mitigate this level change, but it's worth a listen any time a Soft Knee value is changed significantly.

At a **Ratio** control setting of 100:1 the **Thresh** value set by the user defines the Rotation Points of the **COMPOSITE > SOFT** Knee arc. The **PEAK > SOFT** Knee control controls the transition between *gain control* coming from the **COMPOSITE** Detector, and *gain control* coming from the **PEAK** Detector. Turning the **SOFT** Knee controls *clockwise straightens the arc of each knee and raises the internal thresholds*. Turning the controls *counter-clockwise, rounds the arc of each knee, and lowers the internal thresholds*. Settings from -12 to -16 mimic the broader soft knee behavior of the GML 8900.

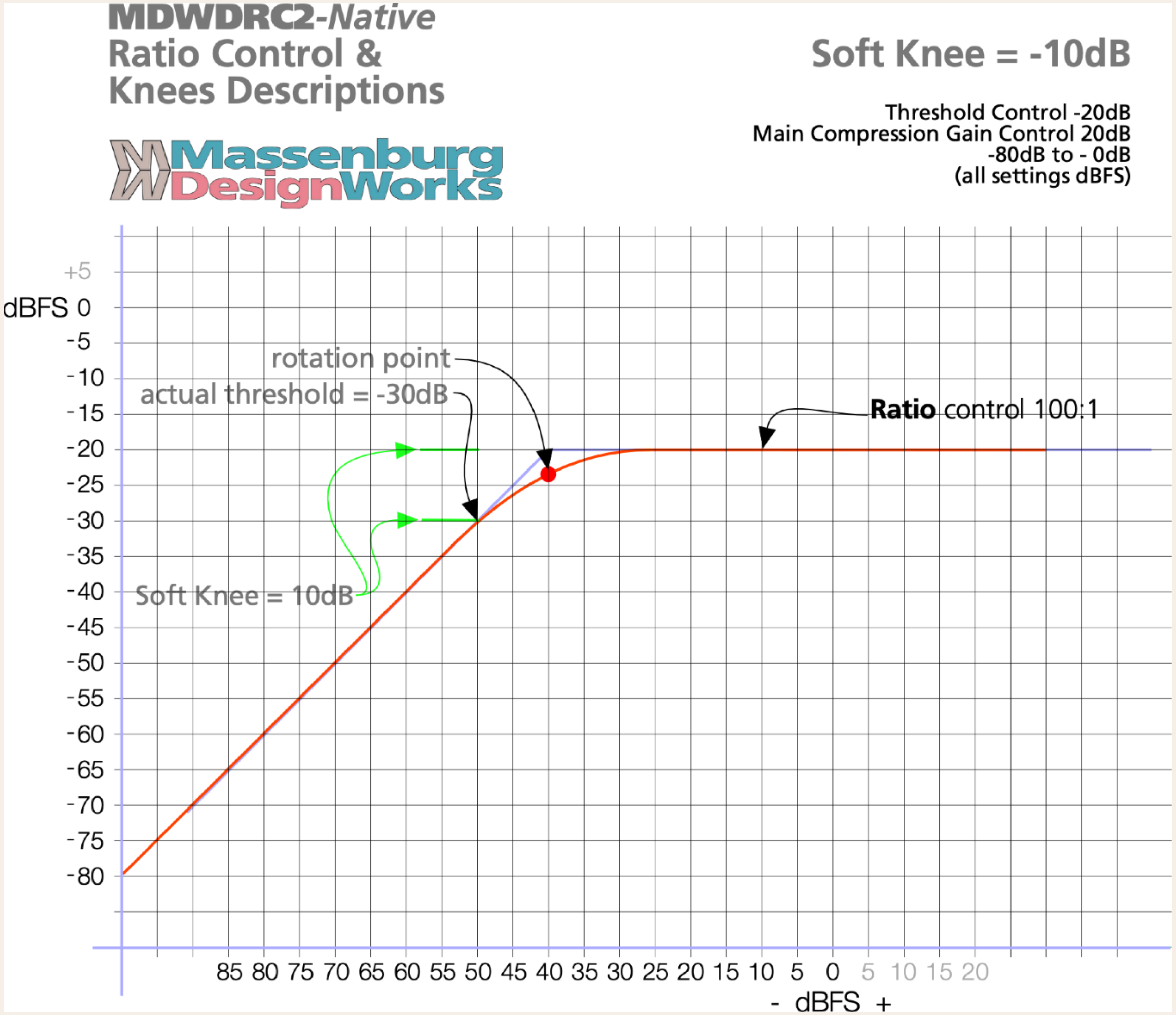
Decreasing (i.e. setting more negative) values of the **Soft Knees** are one of the main tools available to further reduce the severity of artifacts once you have established a reasonable **Ratio**.

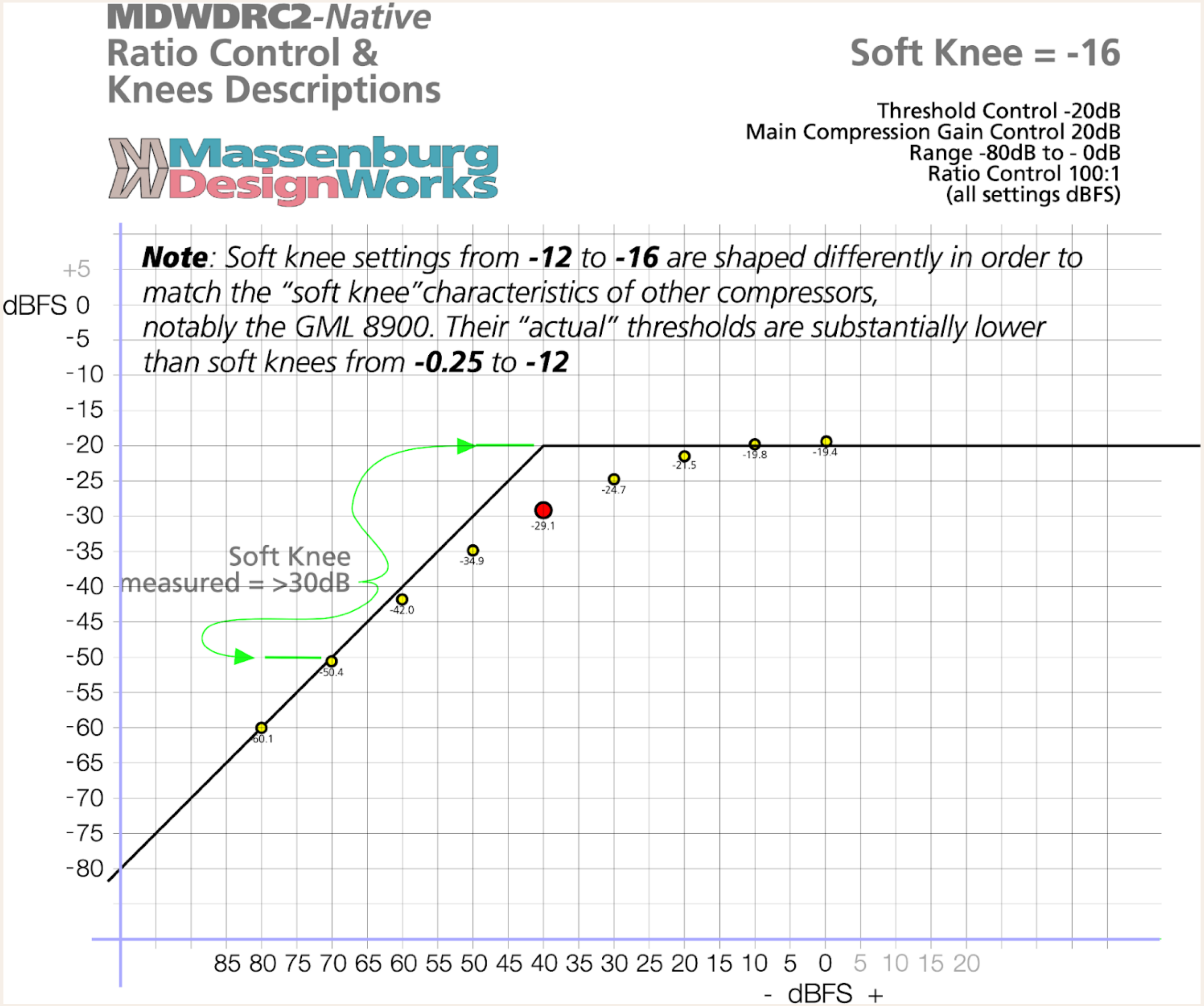
Plotted on a graph that shows input level on the X axis and output level on the Y axis, the transfer function of a hard knee compressor at Ratio 100:1 is a two-segment line: it rises at 45 degrees up to the threshold and is flat after exceeding it. As the knee value is progressively softened, the threshold of the “bend” – the transfer function ceases to be a sharp one and starts to resemble an arc.

The softer the knee, the wider the arc. In **MDWDRC2/DRC3** In "MDW speak", the rotation point is the midpoint of the Soft Knee "curve" (as below). The **Thresh** control in **MDWDRC2/DRC3** Native sets the position of this rotation point for *minimum* Soft Knee - meaning, unlike the threshold control on most compressors, it interacts with the knee setting.



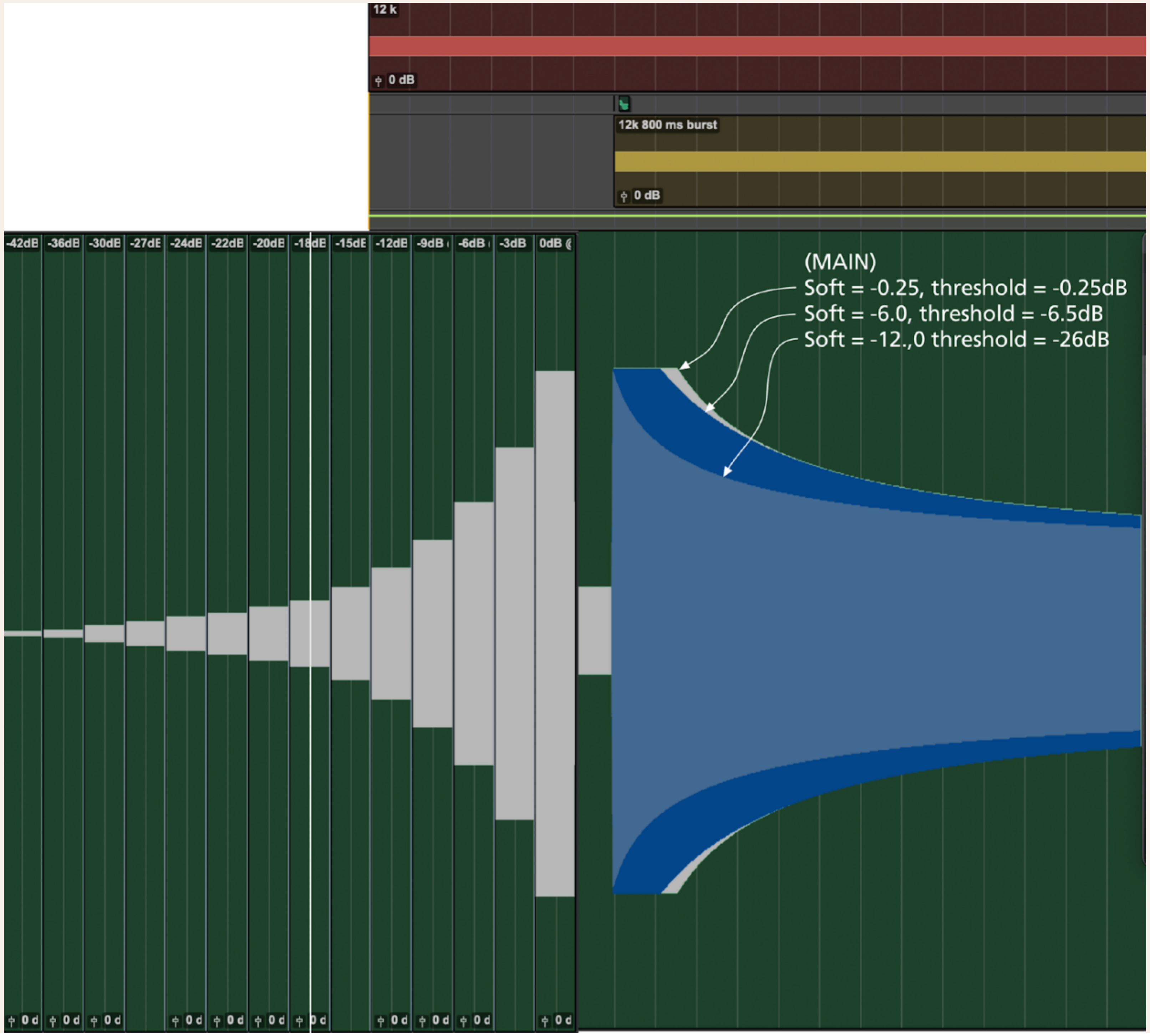
Measured Soft Knees




MDWDRC2-Native
Ratio Control &
Knees Descriptions
Massenburg DesignWorks
Soft Knee = -16
Threshold Control -20dB
Main Compression Gain Control 20dB
Range -80dB to - 0dB
Ratio Control 100:1
(all settings dBFS)
Note: Soft knee settings from -12 to -16 are shaped differently in order to match the "soft knee" characteristics of other compressors, notably the GML 8900. Their "actual" thresholds are substantially lower than soft knees from -0.25 to -12
Soft Knee
measured = >30dB
+5
dBFS 0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
-65
-70
-75
-80
-60.1
-50.4
-42.0
-34.9
-29.1
-24.7
-21.5
-19.8
-19.4
85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20
- dBFS +

04 DRC2-Native V2 & DRC3-Native Theory of Operation

The following graphic shows the effect of varying the **COMPOSITE** detector Soft Knee settings, and showing actual thresholds.



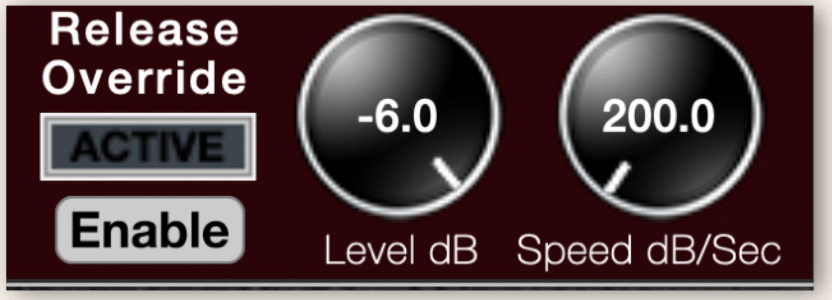
Release Override

The **Release Override** provides a secondary release that can more gracefully account for wide and rapid changes in level. It is a further refinement of the "Hysteresis" control on the GML 8900.

It is based on *another, faster* detector (fast-averaging responding) which is compared to the other detectors to identify rapidly dropping signal levels, which are presumably slower than the **Release Override** Detector, and may be set to force a faster release at the speed set by **Release Override Speed**. **Release Override's** job is to watch for sudden, significant drops in level. When it sees one - a gap between vocal phrases, the space between drum hits, a note drop from tremolo guitar - it steps in and forces the gain to recover at a *faster rate than the primary* ***Timing*** *controls* would allow. As soon as the signal comes back up and the primary detectors catch up, **Release Override** steps back out. It is not a permanent change to your release time; it is a conditional one that only fires when the signal genuinely drops away.

One extremely important application for the **Release Override** is for musically-varying sources such as electric tremolo guitar – a Fast RMS Release within the dynamic envelope of the guitar's tremolo effect would squish the effect - but you would at the same time wish to release rather quickly when an actual level drop happens such as might be the case in-between notes.

Use **Release Override** when the application needs <u>faster release time than of either detector's Timing shows</u>.



The **Level** control indicates the number of decibels a signal must change relative to the speed of the two primary **Timing** controls in order to override their settings. Turning *clockwise, the release override will occur more frequently*. Turning *counter-clockwise, more precipitous changes in level are required, and/or slower Timing settings*.

Start around –12 to –15 dB for most sources. At this range it responds to genuine gaps and phrase endings without being triggered by normal dynamic variation within a phrase. If you find it firing too often during the performance itself, move it lower (more negative). If it isn't catching the gaps you want, move it higher.

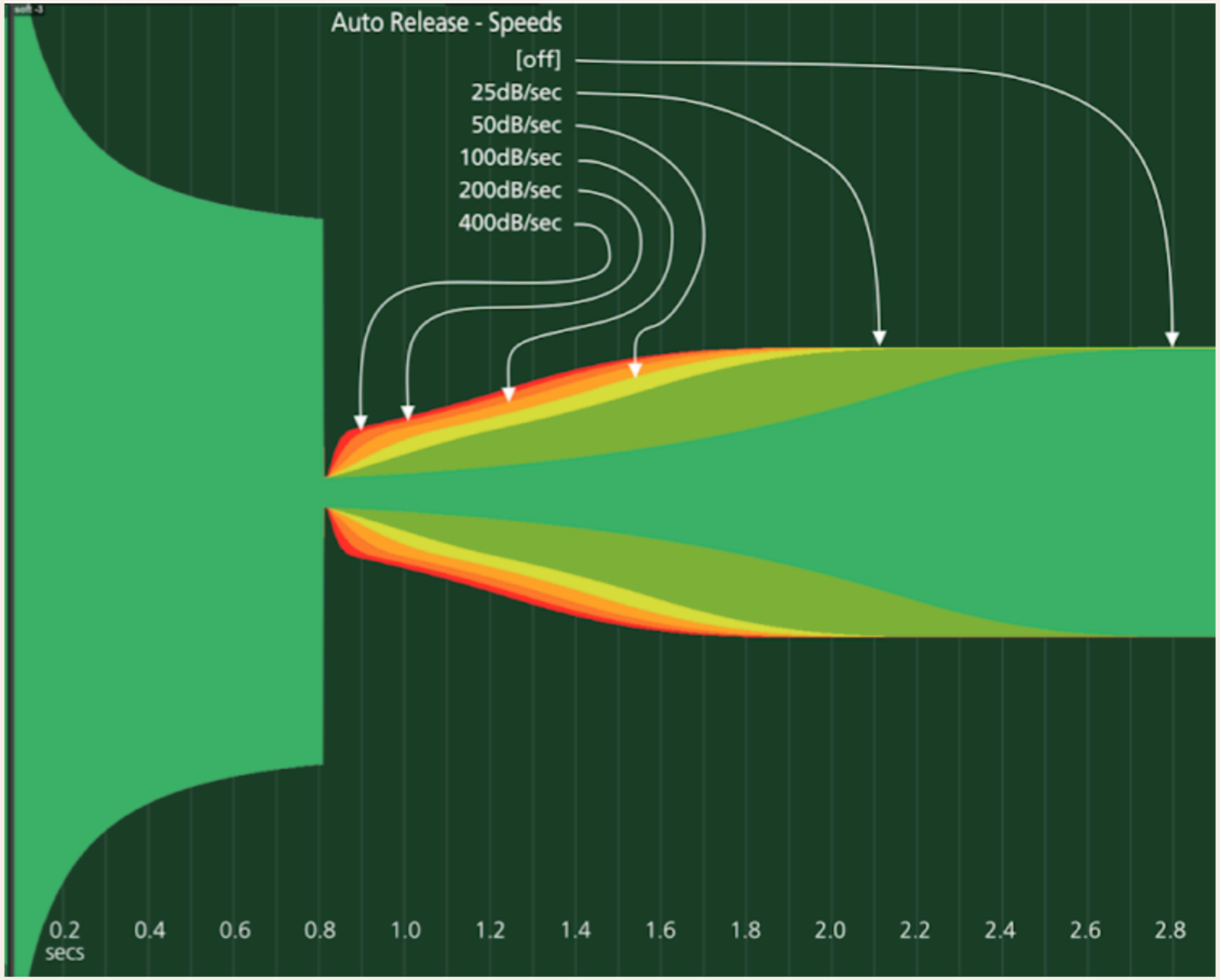
The **Speed** control determines the rate of this secondary release expressed in decibels per second. *Turning clockwise speeds the release. Turning counter-clockwise slows the release*.

Importantly, this secondary release can also be overridden by the primary (**COMPOSITE** and **PEAK**) releases if and when they catch up to the release rate of the Speed control.

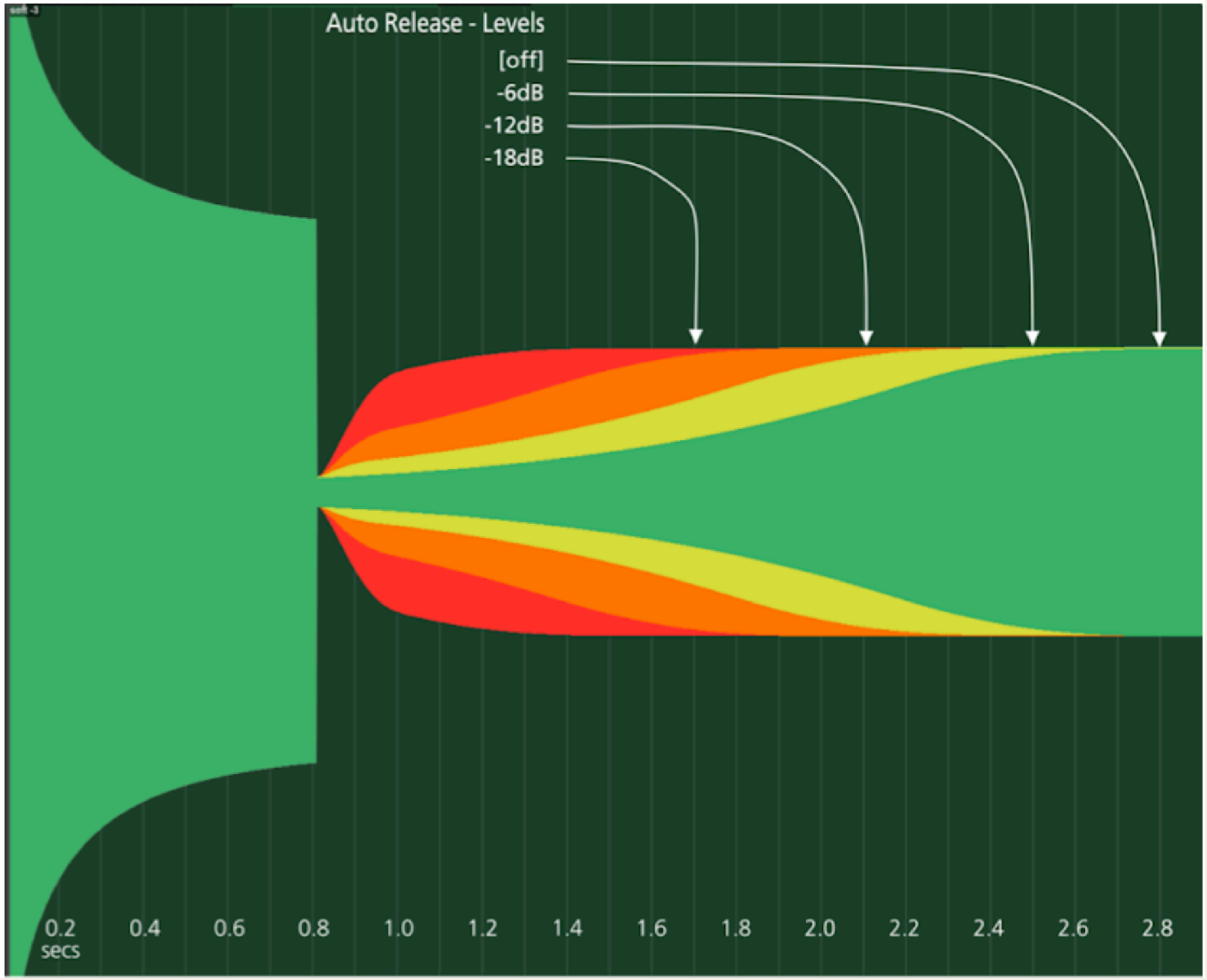
An **ACTIVE** indicator glows red during periods of activity.

Pressing the **Enable** button toggles **Release Override** on and off. When on, the button will be shaded green.

The following graphic shows the relationship between **Release Override Speed** and release rate (**COMPOSITE > Soft Knee** = -3):



The following graphic shows the relationship between **Release Override Level** and release profile (**COMPOSITE > Soft** Knee = -3):



Appendix

Variable Exponent Average

True “RMS” is a long-established and useful measure of average signal voltage, be it in audio or in an electrical power context. A Peak measurement is necessary to measure and control signals that might be in danger of hitting a limit. However, neither one is adapted to the uniquely human task of assessing psychoacoustic loudness. This is where **MDWDRC2/DRC3** stands apart.

VEA is *not* a re-branding of conventional RMS. It is a world-wide, patented, unique concept that has been developed after years of critical listening as our benchmark.

ITU BS1770_3

ref: https://www.itu.int/dms_pubrec/itu-r/rec/bs/R-REC-BS.1770-3-201208-S!!PDF-E.pdf

ref: https://www.itu.int/dms_pubrec/itu-r/rec/bs/R-REC-BS.1770-4-201510-I!!PDF-E.pdf

ref: https://tech.ebu.ch/docs/r/r128.pdf

source: Massenburg DesignWorks DRC2-Native V2 & DRC3-Native

"The MDW VEA is an attempt to increase the sophistication of this calculation, designed to make the level detection in **MDWDRC2-Native & MDWDRC3-Native** more akin to the complex response of the human ear. The idea, in other words, is that gain reduction in **MDWDRC2-Native & MDWDRC3-Native** is triggered not by the level rising above some arbitrary point, but by a measurement of loudness that we would perceive as being subjectively *louder*.

Appendix

This is achieved first by optionally filtering the side-chain using the BS1770 filter (closely akin to the well-known “K-Weighting” filter), which anticipates the dynamic and timbral sensitivity of the human ear, and also by combining two separate detector timing algorithms. The **AVERAGE** detector uses a sophisticated RMS algorithm to identify loud events on a relatively broad scale, but there’s also a second detector labeled **PEAK**. This uses a different RMS calculation and would typically be set up using faster time constants, the idea being that it has the power to override the **AVERAGE** detector when a sharp transient event is detected.

It’s important to note that these are not two separate dynamic control devices placed in series, like for example the compressor and limiter on a Neve 33609. They’re separate methods of analyzing the side-chain signal which are combined to trigger gain reduction in one device."

source: Loudness - Everything You Need To Know | Production Expert

"...we needed a meter that could measure and display loudness, in the same way, our ears hear loudness and to achieve this, the standard loudness measurement BS1770 was developed and has become a single universal standard for measuring loudness and all broadcasters delivery specs being based on this BS1770 standard.”

A number of governments and broadcasters across the world have addressed this problem with legislation. In the USA, the law is called the CALM act supported by the ATSC A/85 standard. France and Spain have also passed laws for the control of all their broadcast channels’ loudness, using the EBU R128 standard.

Appendix

Whereas other countries like Germany, Switzerland, Austria, Norway and the UK have voluntarily implemented EBU R128 recommendations across all their TV broadcast channels. Austria has even made the bold claim that they have reduced their loudness complaints to…ZERO."

source: Leq(m) Loudness - What Is It And When Is It Used? | Production Expert

With BS1770 loudness metering, there are 3 measurements, momentary (M), which is averaged over 400ms, Short Term (S) which is averaged over 3 seconds and Integrated (I), which is the average over the complete program.

⚠️Important Info for the previous MDWDR2-Native license owners⚠️

Those who have purchased MDWDRC2-Native should be aware of the followings:

- DRC2-Native <--> DRC2-Native V2 are compatible (including automations) bidirectionally. **Your original MDWDRC2-Native license WILL work with MDWDRC2-Native V2.**

- DRC2 <--> DRC3 are not upward/downward compatible with automations and settings, however, when presets were saved within the plugin, it can be loaded (bidirectional).

- License for MDWDRC3-Native will not work with DRC2-Native (original and V2), however, **we will deposit a 90-day demo for those who wish to use DRC2-Native version 1** so there is enough time to make a transition. *MDWDR3-Native in stereo and mono function EXACTLY the same as MDWDRC2-Native V2.*

For more information, please visit us on the web:

Home: https://massenburgdesignworks.com

Contact Page: https://massenburgdesignworks.com/about-mdw/

Support & FAQ: https://massenburgdesignworks.com/support-mdwdrc

version: MDWDRC 2.0.50