

# NEUTRON 5

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# 1. Introduction

Bring out the best in your mix with Neutron 5, a flexible, fully-equipped suite of 10 intelligent tools. Add power while reclaiming headroom with the multiband Clipper module, give your audio more presence, detail, and fullness with intuitive upward compression in the new Density module, and fix tedious phase issues with the Phase module.

Shape your sound faster with the improved Mix Assistant, precisely target your processing with mid/side and transient/sustain channel modes across the Neutron suite, and make more informed decisions with beautiful, refreshed visualizations. Achieve the mix you're imagining, whether it's your first mix or your next big hit.



## Included Plug-ins

PLUG-IN	
Neutron 5	Improved!
Neutron 5 Clipper	New!
Neutron 5 Compressor	Improved!
Neutron 5 Density	New!
Neutron 5 EQ	Improved!
Neutron 5 Exciter	Improved!
Neutron 5 Gate	Improved!
Neutron 5 Phase	New!
Neutron 5 Sculptor	Improved!
Neutron 5 Transient Shaper	Improved!

**PLUG-IN**

Neutron 5 Unmask	Improved!
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Visual Mixer	
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Relay	
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Tonal Balance Control 2	
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## 2. Neutron Elements

Neutron Elements features the Assistant plugin from Neutron 5. The Assistant helps you achieve your creative intent for individual elements of your mix, helping you finish your project with confidence. We highly encourage you to use Neutron Elements for individual track processing.



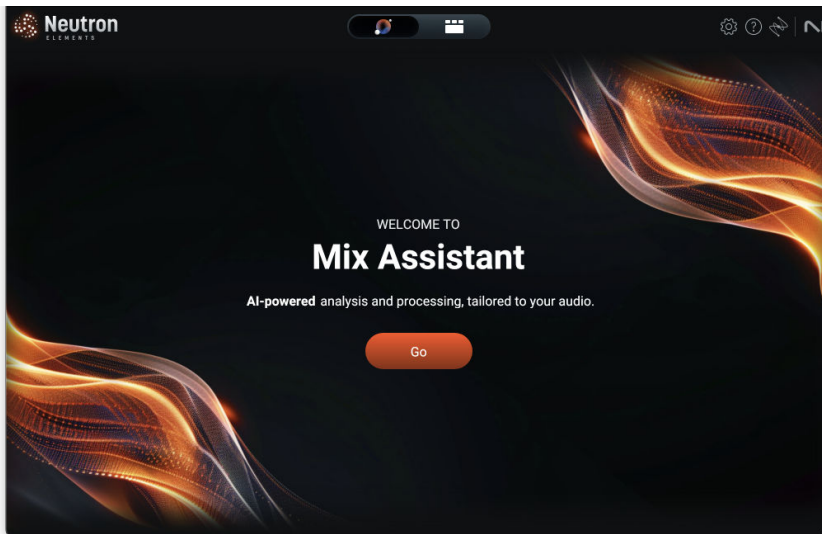
Learn more about Neutron 5 and how to upgrade from Neutron Elements on our website: <https://www.izotope.com/en/products/neutron.html>



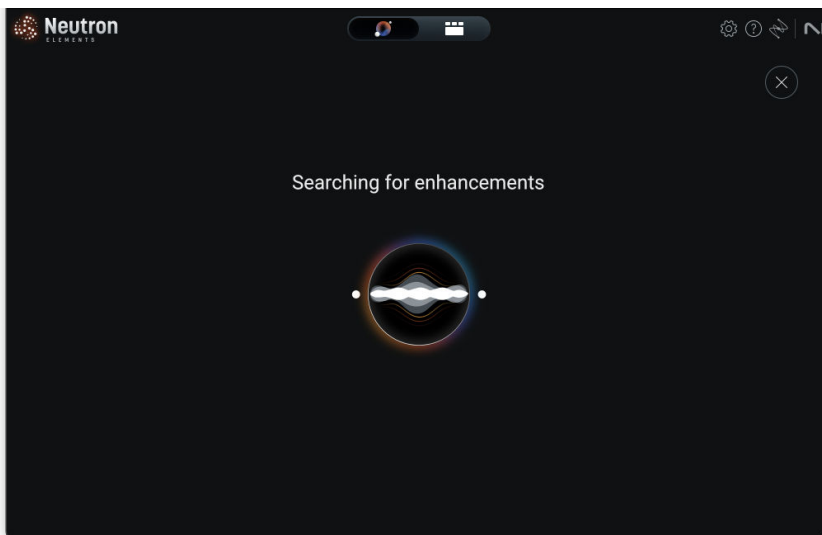
### Workflow

Add Neutron Elements to a track in your session.

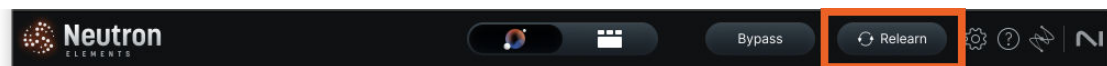
Click the "Go" button in the start page to run the Assistant.



Neutron Elements will listen to your track and suggest a starting point.



To run the Assistant again, click the Assistant button in the header of the plug-in.



## Assistant View Interface



1. Intent Controls
2. Target Library
3. Meters

### Intent Controls

Intent controls are parameters that allow for broad control over early decisions in your mixing workflow. They work together with Neutron's intelligent analysis and Targets to give you a simple workflow for tonal, dynamics, character, and width decisions in your mix.

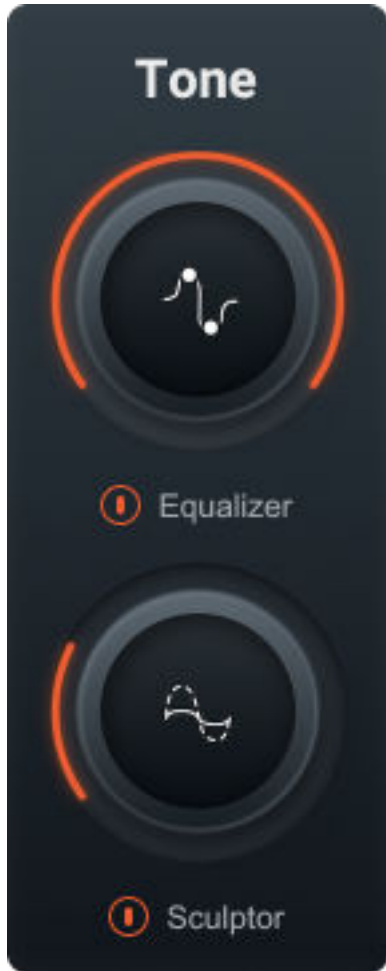
The following Intent control sections are available:

- Tone
- Dynamics
- Saturation
- Width

Intent controls are linked to deeper controls in the Detailed View that are only accessible in Neutron 5.



## Tone



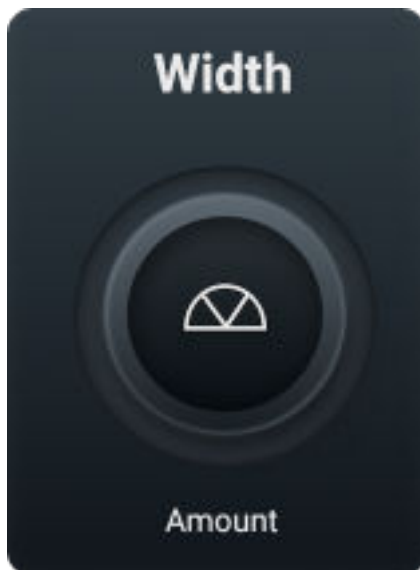
- **Equalizer:** Blends the EQ shape that Mix Assistant suggested after its analysis. You can increase or decrease the effect of this processing with this control.
- **Sculptor:** This parameter adjusts the amount of spectral tone shaping aimed at matching the selected target curve. The target curves are the idealized tonal of the selected instrument based off analysis of thousands of professional mixes.

## Dynamics



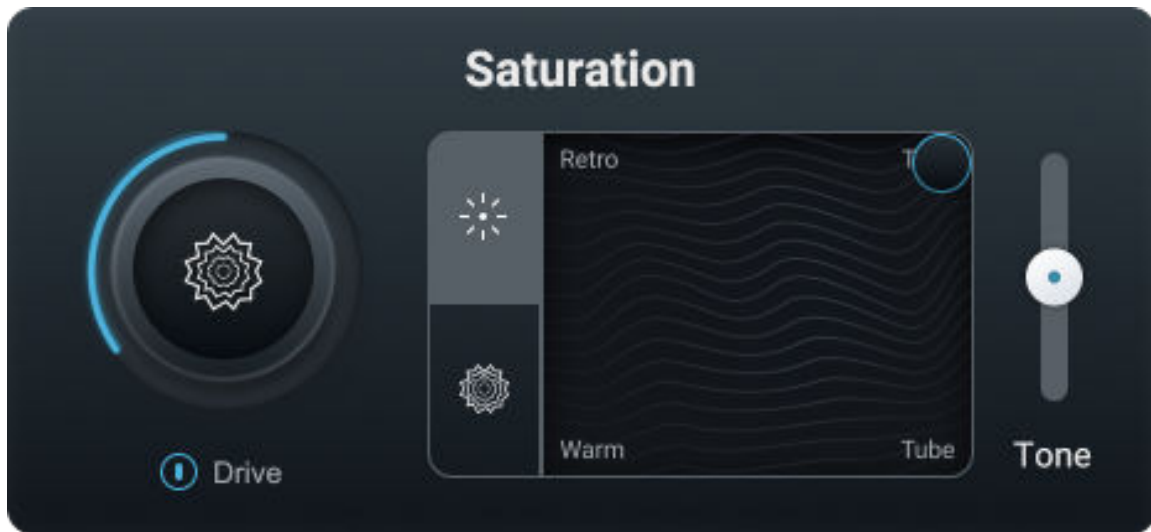
- **Density:** Adjusts the Range of the upward compression applied as signal falls below the threshold. Threshold and other controls are available in the Density module in Neutron 5.
- **Compressor:** Adjusts the blend of Compression.

## Width



- **Width:** Adjusts the global Width of Neutron. You can widen or narrow stereo signals by adjusting this control.

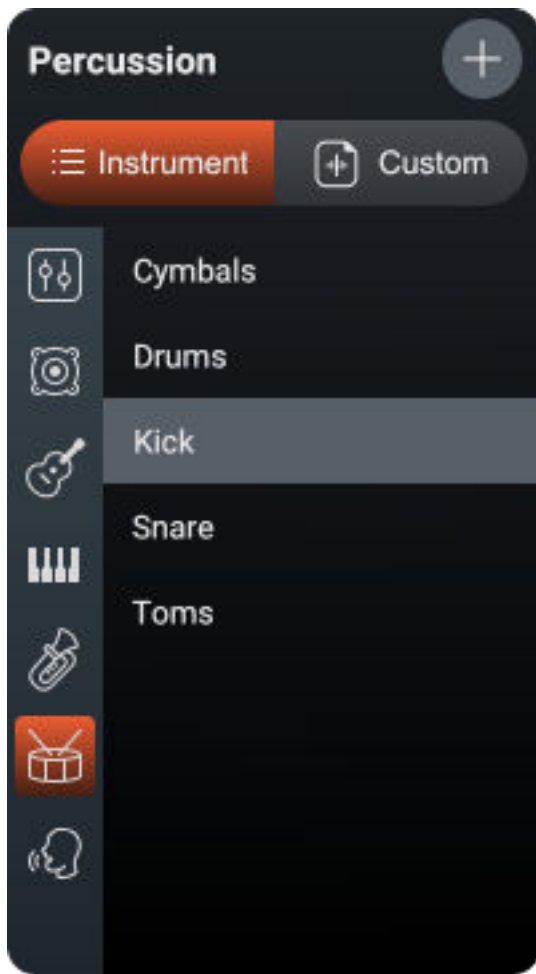
## Saturation



- **Drive:** Adjusts the amount of distortion applied to the input signal.
- **Processing Modes:** The processing mode in the Exciter changes the style of distortion between subtle and dramatic harmonic profiles per band. Classic processing mode (top) provides four modes for subtle excitation use cases. Trash processing mode (bottom) provides four modes for dramatic distortion use cases.
- **XY Pad:** Blends different harmonic profiles to achieve the sound you want to hear.
- **Tone:** Tone adjusts the balance of distortion applied to low and high frequency content in the Exciter. Values between -100 and 0 emphasize low frequency content; Values between 0 and 100 emphasize high frequency content.

## Target Library

The Target Library contains instrument targets and user generated reference targets. Setting a target provides helpful starting points for the Intent controls in the Assistant.



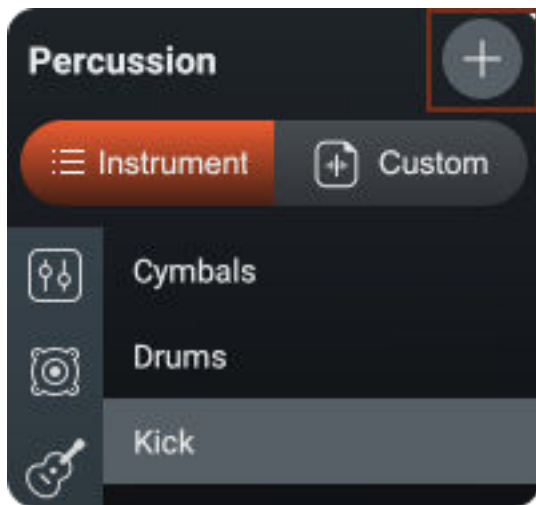
## Instrument Target

Instrument targets are intelligent starting points for your audio. This dramatically changes the sound of the processing applied to the input signal. A recommended starting point will be suggested after Neutron listens to your audio.

## Reference Targets

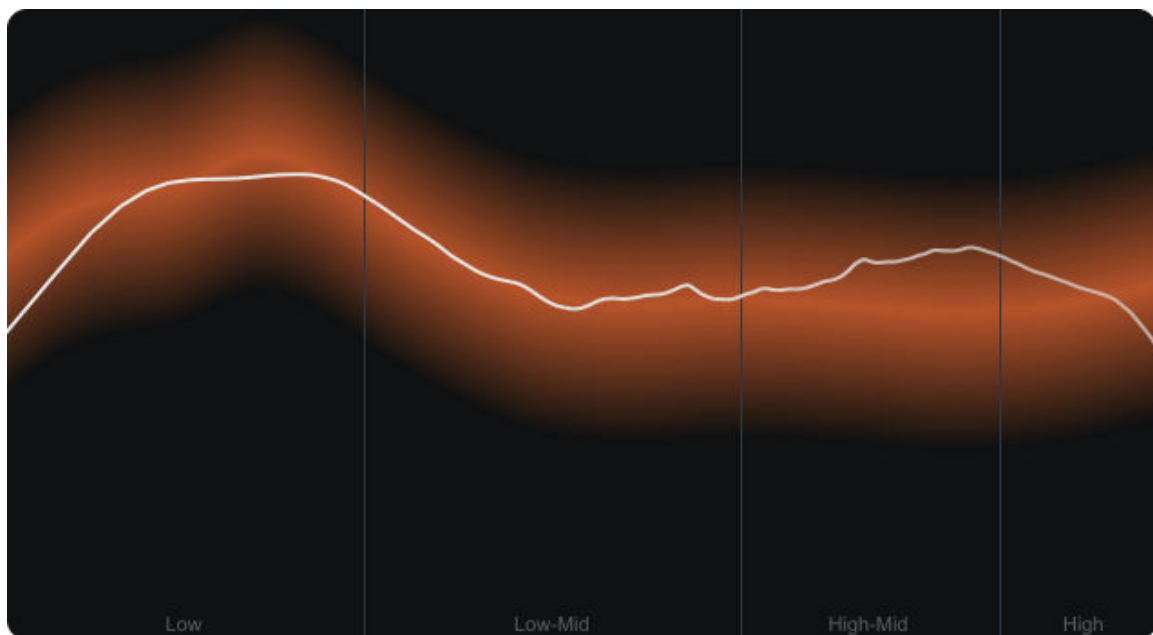
You can create and manage your own custom reference targets by importing audio files from your computer.

Press the (+) button to open a system dialog and select audio files on your computer to add to your custom Target Library.



Selecting a sound, clip, or stem will copy the name and that file into the Custom target area of Neutron's Target Library. Targets from Audiolens will appear in this area of the Target Library.

## Meters



The Tonal Balance Target Meter displays audio as a frequency spectrum, providing a helpful visualization of the selected Instrument Target's intended shape against the output signal. Switching targets will change the shape of the Tonal Balance Target Meter.

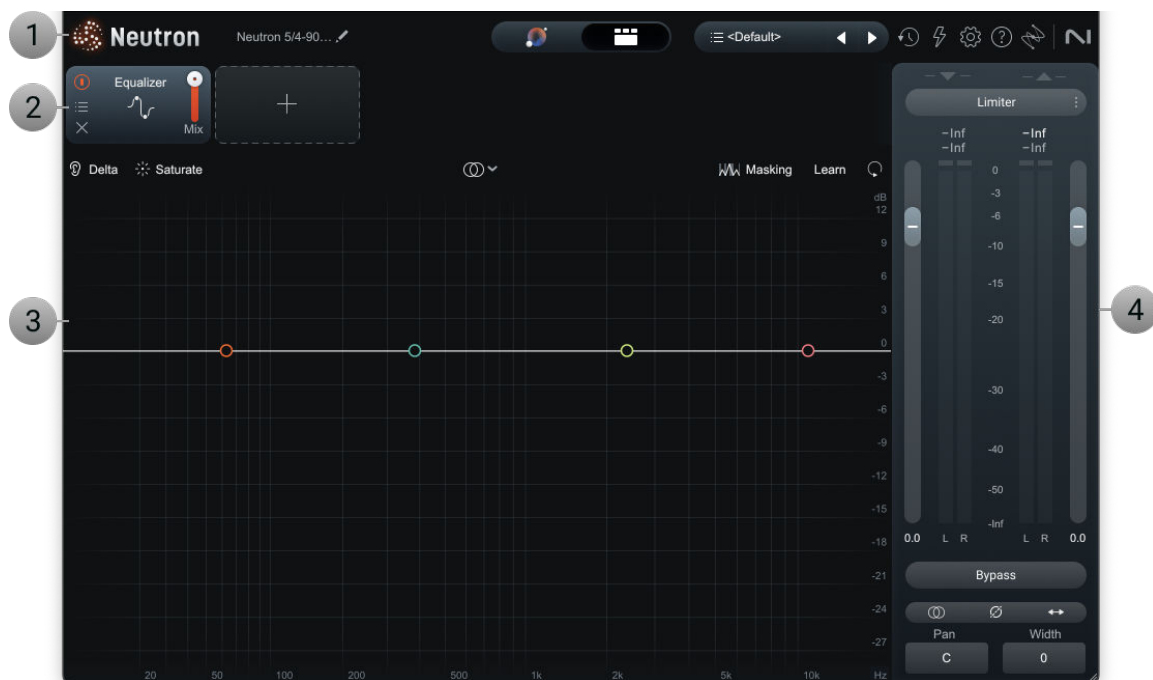
## 3. Getting Started

Welcome to Neutron 5! If you have never used an iZotope product or want to know more about Neutron, then this is the right chapter for you. The topics include:

- [Navigating the Detailed View](#)
- [Navigating the Assistant View](#)
- [Signal Flow](#)
- [Working with the Signal Chain](#)
- [Working with Neutron Plug-ins](#)
- [Workflow Suggestions](#)
- [Working with IPC](#)

### Navigating the Detailed View

The Neutron 5 Detailed view is divided into four main areas as seen in the image below:



1. **Global Header:** The global header area provides access to: the IPC plug-in name editor, Mix Assistant, the Preset Manager, Undo History, Zero Latency, Options, and Help.
2. **Signal Chain:** The Signal Chain allows you to add or remove modules and adjust the processing order of modules included in the chain. The Signal Chain area is exclusive to the Neutron 5 mothership plug-in, Neutron 5 component plug-ins do not include the Signal Chain because they only include one processing module. See the Signal Chain section for more information.
3. **I/O Panel:** The Input/Output (I/O) panel area includes: global I/O gain controls, I/O metering, channel operations controls, and global bypass. See the [I/O Panel](#) section for more information.)
4. **Module Interface:** The module panel area includes all controls and meters associated with a specific processing module.



**i** Visit the [General Controls](#) chapter to learn more about the I/O panel and global header controls.

## Navigating the Assistant View

The Neutron 5 Assistant View is divided into three main areas as seen in the image below:



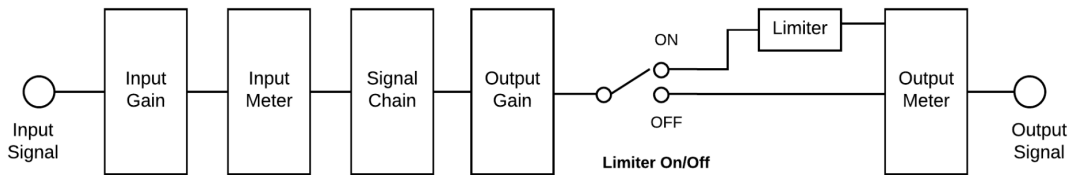
- 1. Controls:** The Controls provide broad control over the amount of tonal, dynamics, saturation, and width processing in Neutron 5. These are intelligently set when you access the Assistant for the first time in Neutron 5.
- 2. Target Library:** The Target Library lists all available targets that Neutron 5 uses to generate an intelligent starting point for input audio. These are organized by instrument type and provide a Custom Folder for user-generated targets.
- 3. Metering:** The metering in the Assistant View shows you input audio against the frequency balance of the currently selected reference Target or Reference file.

**i** **LEARN MORE: NEUTRON 5 ASSISTANT**

You can learn more about working with the Neutron 5 Assistant in the [Assistant](#) chapter.

## Signal Flow

The following diagram represents the signal flow in the Neutron plug-in.



1. Input Gain
2. Signal Chain (Mothership plug-in only)
3. Output Gain
4. Limiter (Mothership plug-in only)

## Working with the Signal Chain

You can add, remove, and reorder modules in the Signal Chain area of the Neutron 5 mothership plug-in. By default, the Neutron 5 Signal Chain includes the [Equalizer](#) module.

**i** For more information about working with the Signal Chain, visit the [General Controls](#) chapter.

## Working with Neutron Plug-ins

Throughout this manual, the terms “Mothership” and “Component” are used to describe plug-ins included with Neutron 5.

- **Mothership plug-in:**
  - Refers to the main Neutron 5 plug-in.
  - Offers multiple processing modules in a single plug-in instance.
- **Component plug-in:**
  - Refers to the plug-in equivalent of any individual module included in the Neutron Mothership plug-in. i.e. Compressor, Equalizer, etc...
  - Offers focused control over an individual processing module.

## Mothership and Component Plug-in Feature Differences

Some features included in the Neutron 5 mothership plug-in are not available in the Neutron 5 component plug-ins. Differences include:

- The Limiter is only available in the Neutron mothership plug-in.
- The Mix Assistant is only available in the Neutron mothership plug-in.


## Workflow Suggestions

There are a number of different ways to approach working with Neutron plug-ins. We’ve included some workflow suggestions you can use if you aren’t sure where to start. These workflows are merely suggestions and any workflow is valid if it works for you.

## Using the Assistant


The Neutron 5 mothership plug-in and Neutron 5 Visual Mixer plug-in offer intelligent assistive features aimed at helping you find a starting point for your track or entire mix based on an analysis of your audio.


Use the Assistant to build a starting point for an individual track. You can access the Assistant by inserting the Neutron 5 mothership plug-in on a track and clicking the Assistant button to the left of the Presets button in the global header area.

 See the [Assistant](#) chapter for more information about working with the Assistant.

## Using Presets

Neutron 5 plug-ins include a built in preset manager with a wide variety of factory presets to get you started. Open the Preset Manager by clicking the Presets button in the global header area of any Neutron 5 plug-in (except for Visual Mixer). Load a preset by selecting it in the preset manager window or quickly try out different global presets by clicking the left and right arrow buttons directly to the right of the Presets button in the global header area.

 Learn more about working with the Neutron Preset Manager in the [Presets](#) chapter.

 The Neutron mothership plug-in includes a global preset manager and a module preset manager. You can load presets that apply to a single module by clicking the Preset button in the module's Signal Chain selector.

## Working with IPC

Wouldn't it be cool if all of the iZotope products that you owned talked to each other? Well, it's a dream come true! With iZotope's Inter Plug-in Communication (IPC) technology, different iZotope plug-in instances on separate tracks can send data back and forth to each other.

Neutron 5 includes the following IPC functionality:

- The [Masking Meter](#) feature, included in the [Equalizer](#) module, uses IPC technology to highlight masking occurring between tracks with IPC compatible plug-ins. See the [Masking Meter](#) chapter for more information.
- The [Assistant](#) feature included in the [Visual Mixer](#) plug-in uses IPC technology to provide a starting point for your mix by grouping and adjusting levels of IPC compatible plug-ins in your session. See the [Assistant](#) chapter for more information.

## 4. General Controls

The general controls in Neutron can affect the entire plug-in or individual modules only.

The following general controls affect the **entire plug-in**:

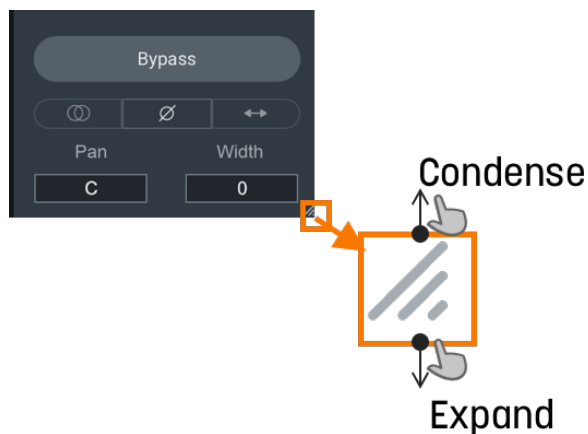
- [Resize Window](#)
- [Global Controls](#)
- [Signal Chain](#)
- [I/O Panel](#)

The following controls affect **individual modules**:

- [Multiband Crossover Spectrum View](#)
- [Detection Filter View](#)
- [LFE \(Low-frequency effects\)](#)

### Resize Window

You can resize the main window by clicking and dragging the bottom right corner of the plug-in window. The Neutron 5 mothership, Visual Mixer, and component plug-ins are all resizable.



### Global Controls

The following controls are included in the header area of the Neutron 5 mothership plug-in:

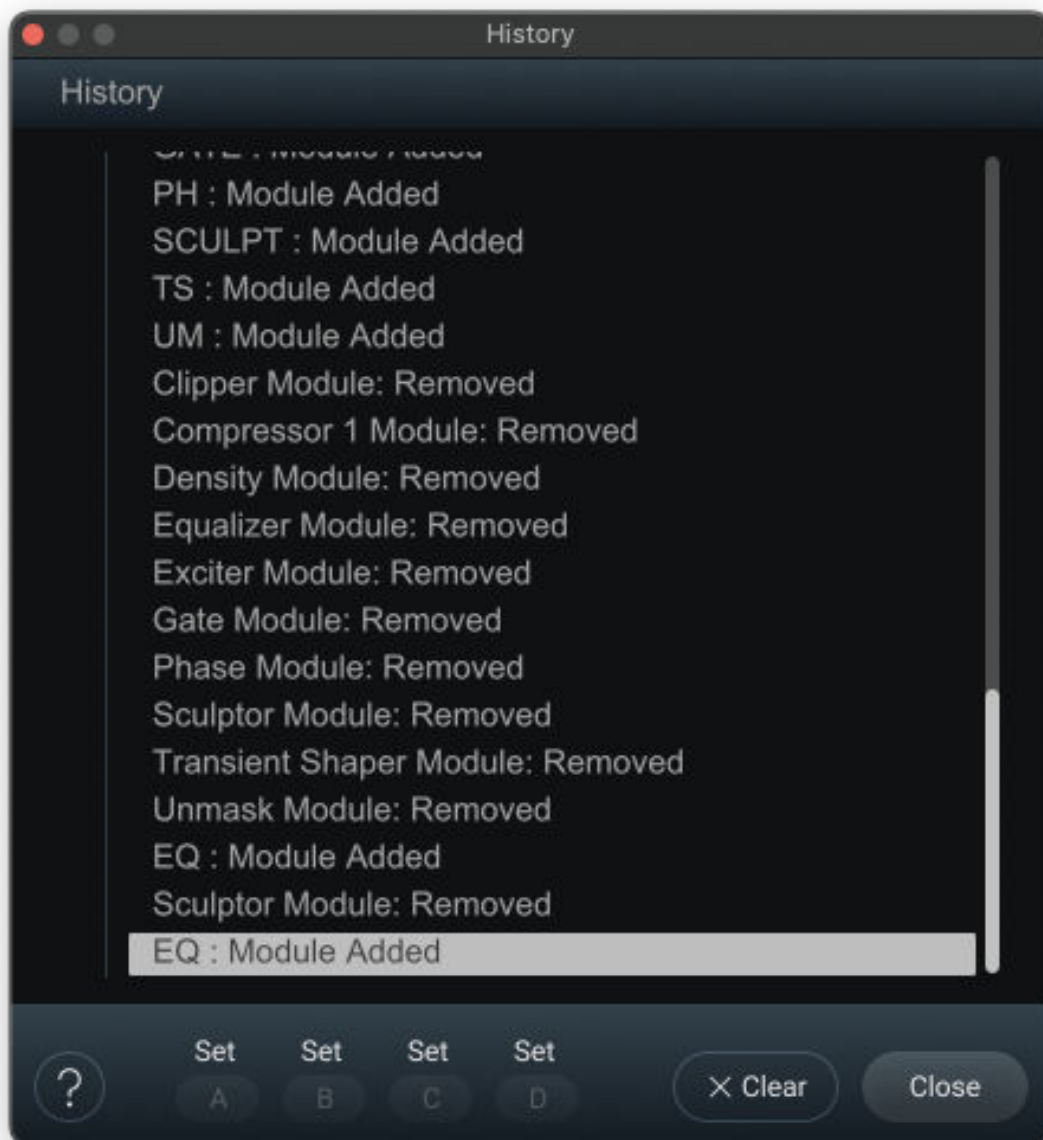


1. **Plug-in Instance Name:** Displays the name of the current instance as it appears in IPC lists in supported iZotope plug-ins.
2. **Assistant View:** Opens the Assistant view. See the [Assistant](#) chapter for more information.
3. **Detailed View:** Opens the Detailed View, allowing you to access deeper controls in the modules.
4. **Preset Manager:** Opens the Preset Manager window. See the [Presets](#) chapter for more information.
5. **Undo History:** Opens the **Undo History** window. Undo History allows you to compare settings you've adjusted. See the [Undo History Controls](#) section below for more information.

6. **Zero Latency:** Enables Zero Latency processing. When enabled, some processing options will be automatically adjusted: Disables Limiter mode selection, disables the Sculptor module, disables the Unmask module, locks the crossover type in the multiband modules (Compressor 1 & 2, Transient Shaper, Exciter) to the “Zero Latency (Analog)” option.
7. **Options:** Opens the Neutron Options window. See the [Options](#) chapter for more information.
8. **Help:** Opens the Neutron help documentation in your default web browser.

## Undo History Controls

The **Undo History** window allows you to compare controls you’ve adjusted in the current Neutron instance. You can revert settings to audition a specific parameter change by clicking on one of the **history list** items. The following controls are available in the Undo History window:



Controls	Description
<b>CLEAR</b>	Clears all events from the current history list.
<b>CLOSE</b>	Closes the History window. Processing resumes from the point you had last selected, so you can continue building on the History list from an earlier point.
<b>SETS</b>	You can assign up to four points in the History list to sets A, B, C, or D. This is useful for comparing a collection of different settings at once. <b>To assign a History item to a Set:</b> Select an item in the history list you want to capture. Click on the A, B, C, or D text labels to assign the selected history item to the button. Click on the assigned A, B, C, or D buttons to quickly toggle between set events in the history list.

## Signal Chain

You can add, rearrange, and move the following modules in the Signal Chain:

- [Gate](#)
- [EQ](#)
- [Compressor \(x2\)](#)
- [Exciter](#)
- [Transient Shaper](#)
- [Sculptor](#)
- [Unmask](#)
- Density
- Phase
- Clipper





**i** Most modules can only be added to the Signal Chain once. If a module has been added to the Signal Chain already, the option in the module list will be greyed out. **Only the Compressor module can be added to the Signal Chain twice.**

Use the signal chain controls outlined in the table below to customize your Signal Chain.

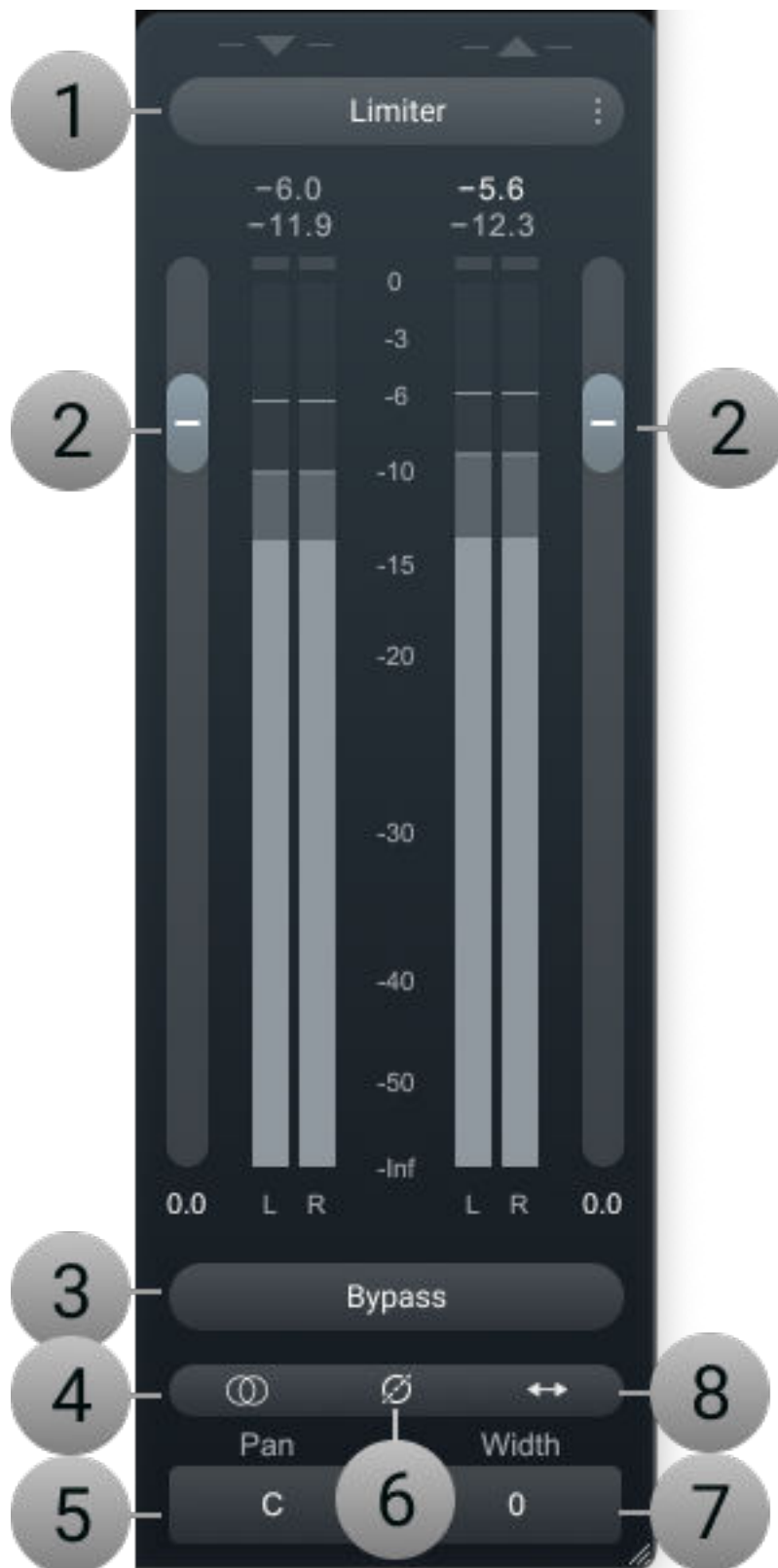
Icons	Control	Description
	<b>Add</b>	Click the + button in the Signal Chain to open the module menu. Select a module from the list to add it to the last slot in the Signal Chain.
	<b>Power Button</b>	Click the power button the upper left corner of a module tile to bypass processing of that module.
	<b>Module Presets</b>	Opens the module preset manager for the associated module. See the <a href="#">Presets</a> chapter for more information.
	<b>Remove</b>	Click to remove the associated module from the Signal Chain.



Icons	Control	Description
	<b>Reorder</b>	Click and drag a module panel left or right within the Signal Chain to change its order in the signal flow.
	<b>Wet/Dry Mix</b>	Adjust the slider to balance between the dry (unprocessed) and wet (processed) signals.

## I/O Panel

The I/O (input/output) Panel allows you to monitor levels and adjust gain, stereo width and pan, limiter settings, and channel operations.

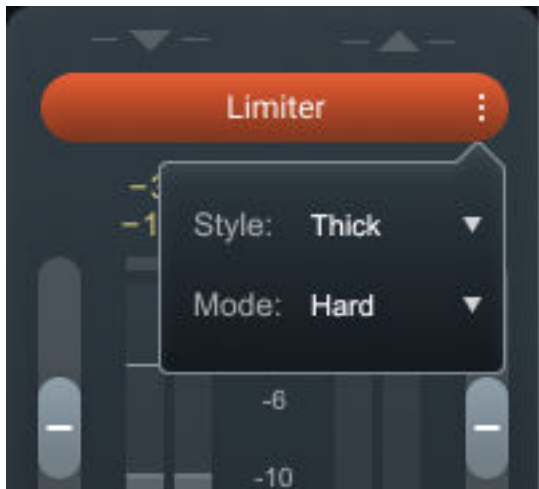


1. **Limiter:** Enable to apply transparent limiting while preserving transients in the output. See Limiter section below for more information.

2. **Gain (Input/Output):** Adjusts the input or output gain. Output gain level comes before the Limiter in the signal flow.
3. **Bypass:** Toggle to either turn processing on (Bypass disabled) or off (Bypass enabled). When you toggle Bypass ON (processing disabled), you will not be able to modify module controls.
4. **Sum To Mono:** Toggle on to sums the left and right channels from the stereo signal into a mono output signal.
5. **Pan:** Pans the output signal to the left or right channel. Only functional in stereo instances of Neutron.
6. **Invert Phase:** Enable to invert the polarity of the signal.
7. **Width:** Adjusts the amount of stereo widening. Decreasing this control results in a narrowing effect (-100% is equivalent to mono), increasing this control widens the apparent stereo field. Only functional in stereo instances of Neutron.
8. **Swap Channels:** Enable to route the left channel to the right channel output and the right channel to the left channel output.

## Limiter

Enable to allow the BS.1770-2/3-compliant [1](#) True Peak Limiter to process digital loudness maximization of your output signal while preventing True Peak overflows across all of your mono, stereo, and surround channels.



The limiter comes *after* the output gain slider in the signal flow. You can use the output gain slider to increase or decrease the level of the signal going into the limiter.

When the limiter is enabled, gain reduction activity is drawn in orange on top of the output meters.

The limiter includes the following controls:

### Ceiling

Determines the maximum output level of your audio. All peaks above this point will be limited. You can set the Ceiling of the Limiter via the Ceiling slider overlaid on the output meter, within a range of 0 to -20 dB.

There are two ways you can adjust the Ceiling slider:

- Click and drag the Ceiling slider UP or DOWN to the desired value.
- Hover over the Ceiling readout, and click and drag the mouse UP or DOWN to the desired value.

## Limiter Style

You can choose from one of three user-definable character options for more direct control over the adaptive, transparent nature of the limiting algorithm.

Character	Description
<b>Clear</b>	The Limiter will respond more quickly in order to better present fast-moving transient material in the mix.
<b>Smooth</b>	Smooth is the most common, best-sounding middle ground between Clear and Thick. It's the most appropriate algorithm for the majority of program material, including most vocals and dialogue.
<b>Thick</b>	The Limiter will respond to audio more slowly, useful for louder, slower-moving sounds like a big explosion sound effect, or a bass/low-frequency swell, where you wouldn't want an aggressive limiter to break the sound up.

## Limiter Mode

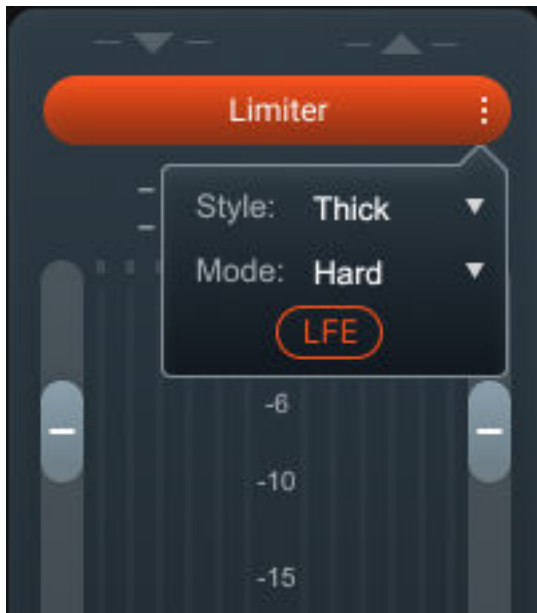
You can configure the Limiter in four different ways using the algorithms described in the table below. Each algorithm has a different latency that will affect the sonic quality.

Limiting Algorithm	Latency Requirement
<b>IRC II</b>	3446 samples at 48 kHz
<b>IRC LL</b>	120 samples at 48 kHz
<b>Hard</b>	198 samples at 48 kHz
<b>Zero-L</b>	Zero Latency

**i** Low latency is important to avoid lag or loss of sync when mixing to picture, dealing with limited latency compensation, or a control surface that needs to remain responsive.

## Limiter LFE

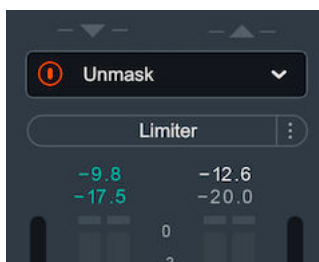
Appears when Neutron is inserted on a 5.1 or 7.1 surround track. The limiter applies gain reduction equally to all channels when the peak level of any given channel exceeds the Ceiling value. It may be desirable to exclude the LFE channel from triggering gain reduction or from being affected by the limiter.



- **Enabled:** LFE channel is included in limiter input and will be processed by the limiter.
- **Disabled:** LFE channel is excluded from the limiter input and not affected by limiter gain reduction.

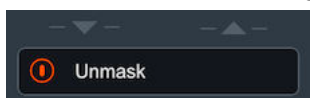
## Vocal Unmask Controls

When Neutron is selected in the Vocal Unmask source menu in Nectar and masking is detected by Vocal Assistant, an EQ cut curve will be applied to the output of Neutron to unmask the vocal track. An Unmask control box will appear above the I/O meters in the Neutron interface that is unmasking the vocal track.

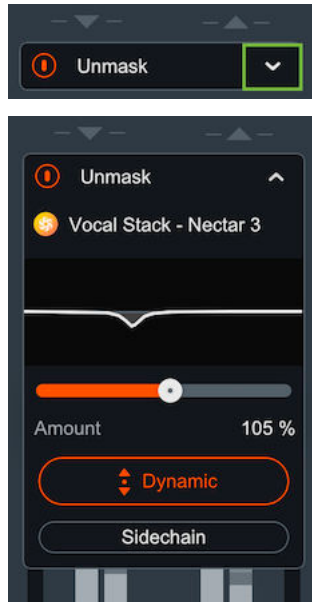


Depending on the edition of **Nectar** you are using, different Unmask controls will be available in Neutron:

- Using **Nectar Standard** edition: An Unmask EQ power button will appear in the Neutron instance that is unmasking the vocal.



- Using **Nectar Plus** edition: The Unmask box in Neutron will include a power button and an expandable advanced controls panel. The Advanced unmask controls panel includes: the **Nectar Plus** instance **name** that Neutron is unmasking, an Unmask EQ curve display, EQ amount control, Dynamic Unmask EQ on/off, and an external sidechain option when Dynamic mode is enabled.



## I/O Panel Meters

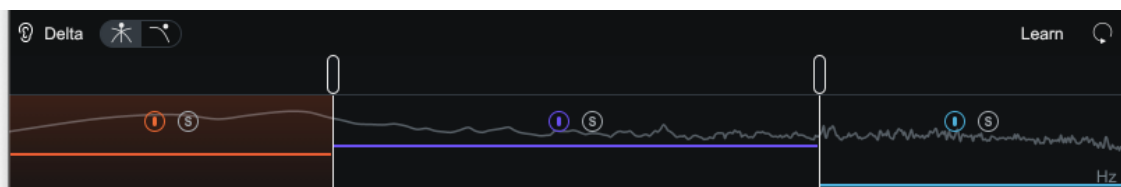
The Input and Output meters display **Peak** and **RMS** metering information.


- The current **Peak value** is displayed in white.
- The current **RMS value** is displayed in light grey.

The text readouts directly above the meters display the current Peak and RMS values.




## Multiband Crossover Spectrum View

You can use the Multiband Crossover Spectrum View to select, adjust, and audition processing bands in multiband modules. The following modules include multiband processing: [Compressor](#), [Exciter](#), [Gate](#), [Clipper](#), [Density](#) and [Transient Shaper](#). Each multiband module supports up to three adjustable processing bands.



Icons	Control	Description
	<b>ADD</b>	To add Crossover Cutoff nodes, hover over the Crossover Cutoff node bar and click on the + button that appears. You can add up to 3 crossover regions.




Icons	Control	Description
	<b>REMOVE</b>	To remove Crossover Cutoff nodes, hover over the band area and click the x button.
	<b>POWER BUTTON</b>	Toggle ON/OFF to enable/disable processing for the cutoff section.
	<b>SOLO</b>	Enable to hear only the band selected.

## Adjusting Crossover Cutoffs

You can manually adjust the multiband crossover points in the crossover spectrum view using the following methods:

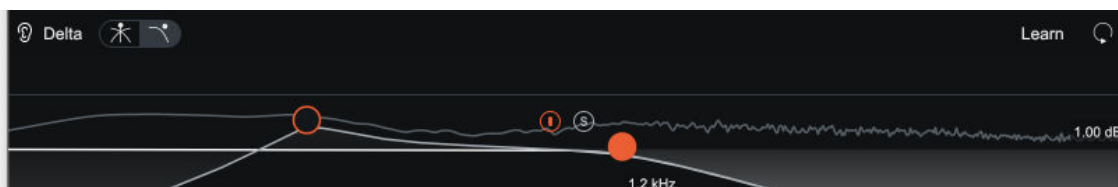
- **CLICK & DRAG CUTOFF HANDLES**
  1. Hovering over the crossover handle.
  2. Left-click and drag the handle left or right to the desired position.
  3. Use the frequency readout at the bottom of the handle while dragging as a reference to where the crossover point is in relation to frequency.
- **ENTER TEXT INPUT**
  1. Double-click on a crossover handle to open the readout as a text edit field.
  2. Type the desired frequency value for the crossover cutoff into this field.
  3. Hit the **enter** or **return** key to update the value.


 Crossover cutoff points are not shared across multiband modules. Adjusting a crossover point in one module will not affect the crossover points in other multiband modules.



## Detection Filter View

Enable the Detection Filter to adjust the frequency response of the detection circuit in the [Compressor](#) or [Gate](#) modules. When the Detection Filter is active, you can access the controls outlined below.

When enabled, the Detection Filter gives you access to the following controls:



Icon	Control	Description
	<b>Power Button</b>	Toggle ON to enable the Sidechain Filter. By default the Detection Filter is OFF.

Icon	Control	Description
	<b>Solo</b>	Enable to audition the output of the Detection Filter. This can be useful to enable when adjusting the Detection Filter nodes.
	<b>Resonant Filter Nodes</b>	Adjusts gain and center frequency in lowpass bands and highpass bands.

## Resonant Filter Node Adjustments

The Resonant Filter Nodes are displayed within the the Detection Filter view. You can use these to tailor your frequency response:

- Click and drag the resonant filter nodes **UP** or **DOWN** to increase or decrease gain.
- Click and drag the resonant filter nodes **LEFT** or **RIGHT** to adjust the center frequency.



Making adjustments to the Detection Filter allows you to tailor the sensitivity of the Compressor to different frequencies. This is useful when using the Compressor in single band mode.

For example: If you want the Compressor to react more to sibilant or harsh frequencies rather than low-frequency content, you can filter out low frequencies using the high-pass filter and boost sibilant frequencies using the resonant low-pass filter to adjust the signal that the Compressor treats as the input signal.

## LFE (Low-frequency effects)

The LFE (Low-Frequency Effects) button only appears when Neutron is loaded on 5.1 or 7.1 surround tracks. For more information on surround sound support, see the [Surround Sound](#) section below.

You can find the LFE button for modules in the module header.



- Enable to include LFE in the audio processing. This is the default setting.
- Disable the LFE button to exclude low frequencies when passing audio through the Low Frequency Effects (LFE) channel with the relative latency compensation.

## LFE Rolloff Filter

If you are mixing to a surround sound specification that requires a band-limited LFE signal, the 24 dB/octave LFE rolloff filter helps you achieve this. You can enable the filter and select a cutoff slope value in the Options under the [Metering Options](#).)



This option only appears in the Options when Neutron is instantiated on a 5.1 or 7.1 surround track.

## Surround Sound

Neutron supports the following surround sound formats in the following hosts. Neutron processes all channels equally unless LFE processing is bypassed in any particular module.

DAW	Surround Format	Channel Configurations
<b>Pro Tools</b>	Film	1.0, 2.0, 3.0 (LCR), 4.0 (Quad), 5.0, 5.1, 7.0, 7.1
<b>Logic Pro</b>	DTS, ITU/SMPTE, SDDS	1.0, 2.0, 4.0 (Quad), 4.0 (LCRS), 5.1 (ITU/SMPTE)
<b>Cubase</b>	ITU/SMPTE	1.0, 2.0, 3.0 (LRC), 3.0 (LRS), 4.0 (Quad), 4.0 (LCRS), 5.0, 5.1
<b>Nuendo</b>	DTS, ITU/SMPTE, SDDS	1.0, 2.0, 4.0 (Quad), 4.0 (LRCS), 5.0, 5.1, 7.0 (cine), 7.0 (music), 7.1 (cine), 7.1 (music)



Surround Sound configuration in Neutron includes the LFE button and surround sound meters in the I/O panel.

## 5. Assistant

Neutron 5 includes an Assistant that helps you achieve your creative intent for individual elements of your mix, helping you finish your project with confidence. The Assistant works together with the Assistant View and Detailed View to help you make broad adjustments early in your workflow and refine your choices as you get deeper into your mix. We highly encourage you to use the Assistant in the Neutron mothership plug-in for individual track processing or use the Assistant in the Visual Mixer plug-in for a multiple track starting point.

### Assistant: Neutron mothership plug-in

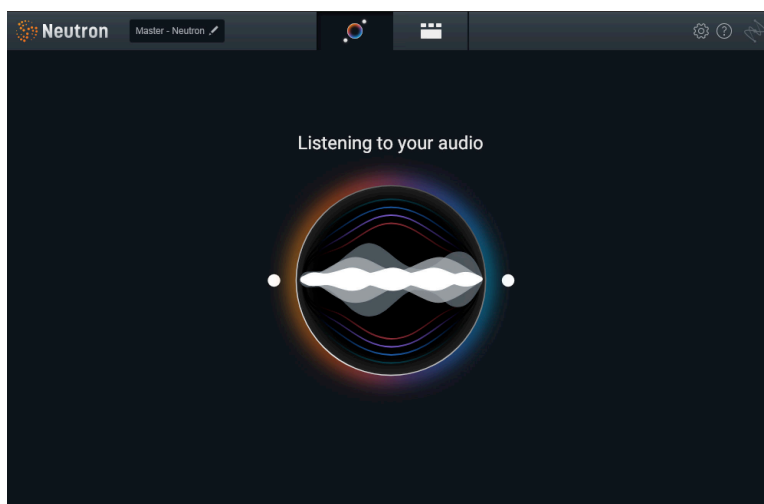
Neutron's Assistant in the mothership plug-in helps you make broad mixing decisions early in your mix workflow with streamlined control and visual aids to help you reach your outcomes fast.

### Recommended Assistant Workflow: Neutron mothership plug-in

To access the Assistant, click the Assistant button in Neutron's header.



This will begin listening to the input signal and generate a starting point for your track. Once analysis is completed, the Assistant view will become available.



The Assistant view is a real-time environment that works with the detailed controls included in the modules present the module chain.

### Assistant View Interface

The following image outlines the key sections of the Assistant View:



1. Intent Controls
2. Target Library
3. Meters and Displays

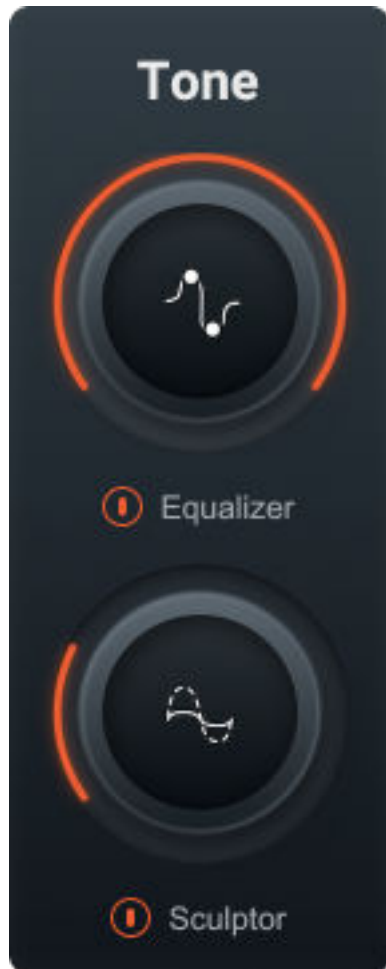
## Assistant Controls

The controls on the Assistant Page allow for broad control over early decisions in your mixing workflow. They work together with Neutron's intelligent analysis, Targets and the Signal Chain to give you a simple workflow for tonal, dynamics, character, and width decisions in your mix. Intent Controls are exclusive to the Assistant View in the mothership plug-in and are not available in the Neutron component plug-ins or the Visual Mixer plug-in.

Assistant controls are linked to deeper controls in the Detailed View of the mothership plug-in. Here is what each intent control is mapped to in the Detailed View:

Assistant Page Parameter	Connected Module Control
Equalizer	Equalizer Mix (found in the module tile in the Signal Chain)
Sculptor	Sculptor Amount
Density	Density Range
Compressor	Compressor Mix (found in the module tile in the Signal Chain)
Drive	Exciter Drive
Processing Mode (Classic/Trash)	Exciter Processing Mode
XY Pad	Exciter XY Pad
Tone	Exciter Tone
Width Amount	Width (found in the I/O Panel)

## Tone



- **Equalizer** Controls the Mix parameter of the Equalizer module. Neutron's Track Assistant intelligently analyzes the input signal and sets the shape of the EQ module. You can increase or decrease the effect of this processing with this control.
- **Sculptor** This parameter adjusts the amount of spectral tone shaping aimed at matching the selected target curve. The target curves are the idealized tonal of the selected instrument based off analysis of thousands of professional mixes.

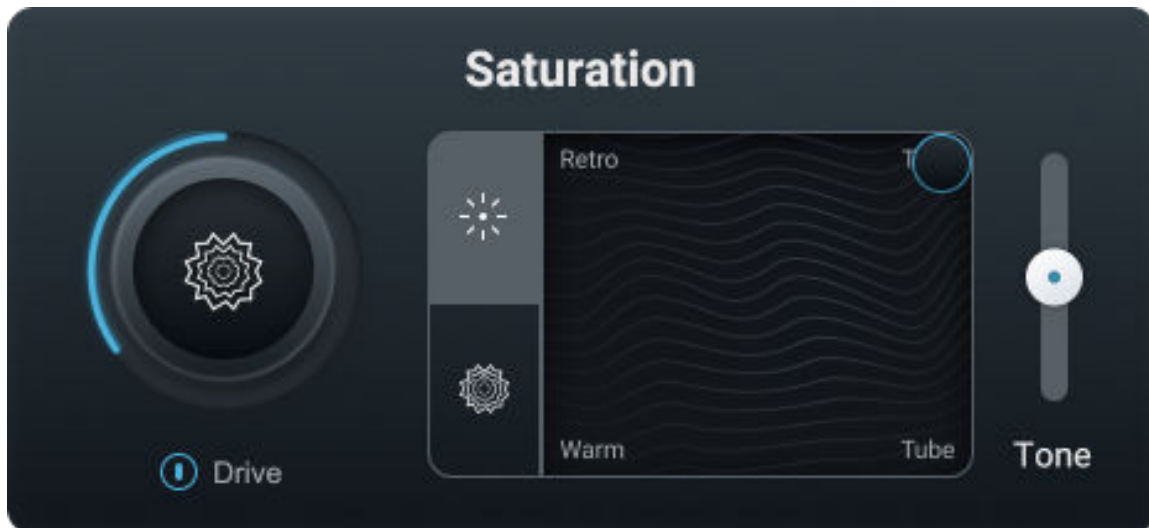
## Dynamics



- **Density:** Adjusts the Range of the upward compression applied as signal falls below the threshold in the Density module.
- **Compressor:** Adjusts the Mix of the Compressor module.


To learn more about Dynamics in Neutron, go to the Compressor and Density chapters.

## Saturation



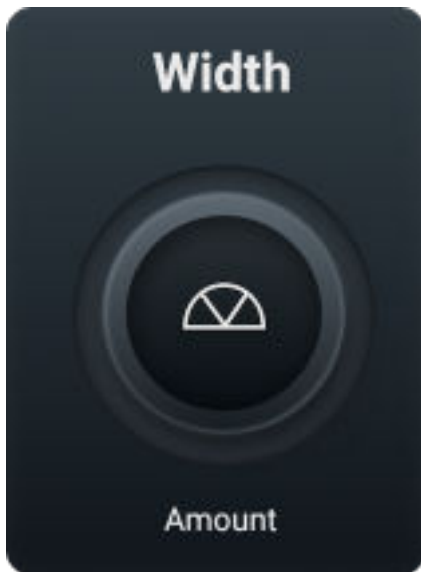
- **Drive:** Adjusts the Drive parameter for all three bands in the Exciter module. Adjusts the amount of distortion applied to the input signal.
- **Processing Modes:** Adjusts the processing mode for all three bands in the Exciter module. The processing mode in the Exciter changes the style of distortion between subtle and dramatic harmonic profiles per band. Classic processing mode (top) provides four modes for subtle excitation use cases. Trash processing mode (bottom) provides four modes for dramatic distortion use cases.
- **XY Pad:** Controls the XY pad for all three bands in the Exciter module. Blends different harmonic profiles to achieve the sound you want to hear.

- **Tone:** Adjusts the Tone control in the Exciter module. Tone adjusts the balance of distortion applied to low and high frequency content in the Exciter. Values between -100 and 0 emphasize low frequency content; Values between 0 and 100 emphasize high frequency content.

 To learn more about the harmonic profiles in Neutron, go to the [Exciter](#) chapter.

## Width

Adjusts the global Width control in the I/O panel of the Neutron mothership plug-in.



 To learn more about the I/O panel, go to the [General Controls](#) chapter.

## Target Library

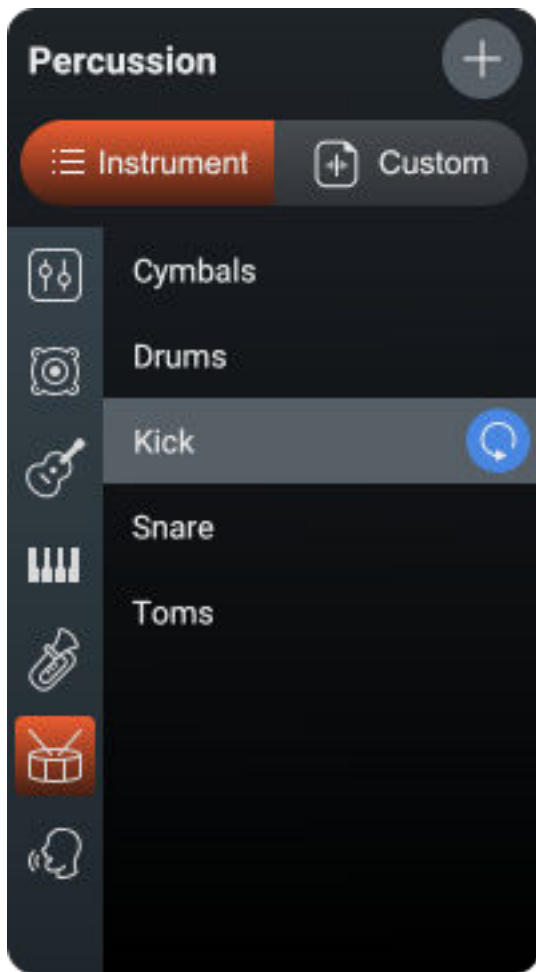
The Target Library contains instrument targets and user generated reference targets. Setting a target provides helpful starting points for the Intent controls in the Assistant View and the modules in signal chain in the Detailed View.

### Instrument Targets

The Tonal Balance Targets are directly connected to the Sculptor module in the Detailed View. Changing a Target in the Assistant changes the Target Curve Menu in the Sculptor module. This dramatically changes the sound of the processing applied to the input signal.





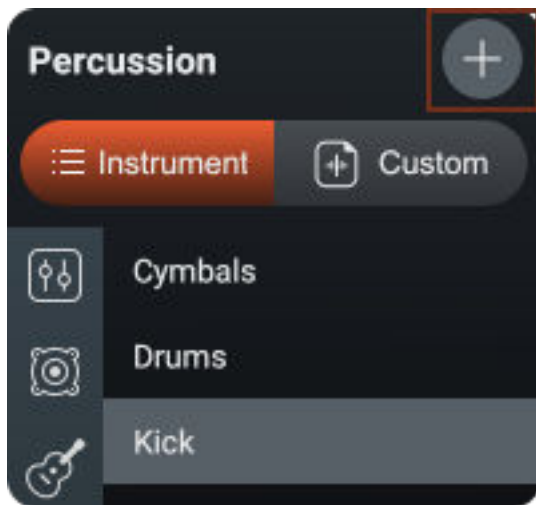


**i** When a Target enters a dirty state it means that changes have been made that are outside assistant-recommended settings.

### Reference Targets

You can create and manage your own custom reference targets by importing audio files from your computer.

Press the (+) button to open a system dialog and select audio files on your computer to add to your custom Target Library.

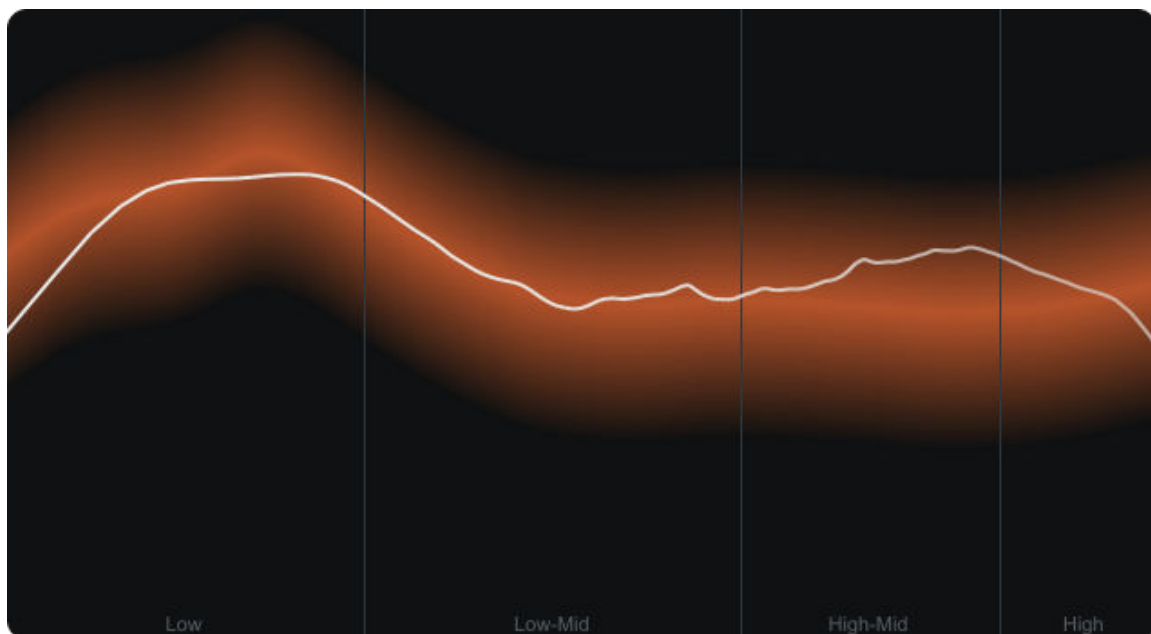


Selecting a sound, clip, or stem will copy the name and that file into the Custom target area of Neutron's Target Library.

## Meters and Displays

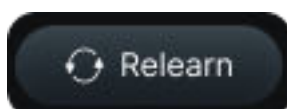
### Tonal Balance Target Metering

The Tonal Balance Target Meter displays audio as a frequency spectrum, providing a helpful visualization of the selected Instrument Target's intended shape against the output signal. Switching targets will change the shape of the Tonal Balance Target Meter.



The thin gray line represents the output signal of Neutron, visualizing what the input signal looks like after it's passed through the module chain in Neutron.

### Relearn



Select this to re-run the Assistant and analyze new audio.

## Assistant: Visual Mixer plug-in

The Assistant in Visual Mixer helps you automatically set static level in all the tracks with Neutron 5 mothership, Neutron 5 components, and Relay. For best possible results, use the Assistant in Visual Mixer after you've imported raw stems (tracks) into a new session.

- You can access the Assistant from the Neutron 5 Visual Mixer plug-in.
- The Assistant can listen to and adjust the following IPC-compatible iZotope plug-ins: Neutron 5 mothership, Neutron 5 Compressor, Neutron 5 Equalizer, Neutron 5 Exciter, Neutron 5 Gate, Neutron 5 Transient Shaper, Neutron 5 Sculptor, Neutron 5 Unmask, and Relay.

The table below outlines which plug-ins are compatible with the Assistant in Visual Mixer.

## Recommended Workflow: Visual Mixer plug-in

The Assistant in Visual Mixer helps you automatically set static level in all the tracks with Neutron 5 mothership, Neutron 5 components, and Relay. For the best possible results, use the Assistant in Visual Mixer after you've imported raw stems (tracks) into a new session.



Before you run the Assistant in Visual Mixer, check that the DAW faders are set to **unity gain**, i.e. don't touch your DAW faders. The less you have set up, the easier it is for the Assistant in Visual Mixer to help you.

If you want Visual Mixer (exclusively) to set all your pans and faders, make sure to put Relay in the last insert on your tracks.

1. Import all tracks needed for your session. The more tracks you include, the more time the Assistant will save you!
2. Add Visual Mixer on your master bus. Know that Visual Mixer does not process audio, it just needs to know at least that there is activity occurring.
3. Click on the Assistant button in Visual Mixer and begin using the Assistant.

## Visual Mixer Assistant Stages

The Assistant in the Visual Mixer involves the following stages:

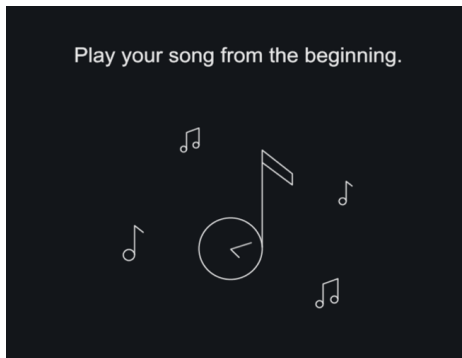
1. [Setup](#)
2. [Waiting](#)
3. [Listening](#)
4. [Audition and Adjust](#)
5. [Accept](#)

In each stage, you need to perform an action that will help the Assistant provide you the most accurate results.



Use buses or individual tracks but don't use both. While the Assistant can work on buses and individual tracks, you only need to exclusively use *either* buses or individual tracks. If you have Neutron 5 and Relay on the same track, you should only select **one** of these to represent the track.



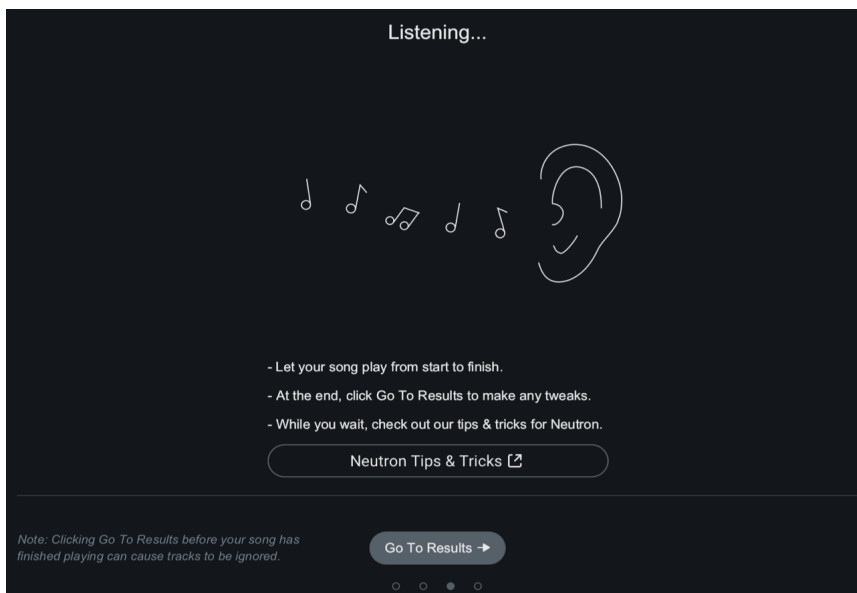


The Assistant can't do anything without listening to your music. So, make sure you play your audio from where your audio starts wherever you want the Assistant to begin listening.

**i** If your transport is playing when you enter the Listening page, the Assistant will not begin listening automatically. You need to stop your audio and start the transport at the beginning of the song for best results. If using a large session, there may be a slight delay, try to start, rewind, and restart again.

## Listening Stage

When you reach the end of your session, click Go To Results to proceed to the results. If you don't, the Assistant will never stop listening.



The Assistant listens to the overall level of each audio source and categorizes each instrument into groups.

## Audition And Adjust Stage

Now that the Assistant has listened and has categorized your audio, you can now:

- Audition the Assistant's suggestions.
- Adjust the [Group Sliders](#) to what sounds best to you.

- Compare the Assistant's results with your original session by clicking on the [Bypass Assistant](#) button.
- [Edit](#) the classifications of the Group Sliders and the Focus.

## Group Sliders

Adjust the Group Sliders to your preference and audition the differences.

The group sliders are created as a result of the Assistant listening to your audio. The Assistant gathers up all the information it has learned about your music and it sub-mixes these into the groups.

The Assistant determines a target level for the following groups:

- **Focus:** What you choose as the focus of your mix.
- **Voice:** Tracks selected with vocals.
- **Bass:** Tracks selected with bass.
- **Percussion:** Tracks selected with drums/percussion instruments.
- **Musical:** Other tracks that may not relate to the groups above.

Each group has an associated, adjustable level slider. The slider itself represents the overall gain differences of the groups relative to *each other*. When you adjust these sliders, you are making gain changes *relative* to the Assistant's initial target level suggestion. **The Assistant will try to apply gain adjustment to each track within that group so that their combined levels achieve the target mix level set by the Group Slider.** The range of adjustment is +/- 12 dB for the Group Sliders.



If you don't like the way your mix sounds with the group sliders at their starting positions, they are not final— you can always experiment until you get the right level balance for your song.



Group Sliders will be disabled if there is no content recognized for that group. If all your audio sources are selected as the Focus, then only one slider (Focus slider) will be available. With that, any audio source that is **not** used or classified is disabled.

## Bypass Assistant

This button will disable the sliders and allow you to listen to your session pre-Assistant suggestions.

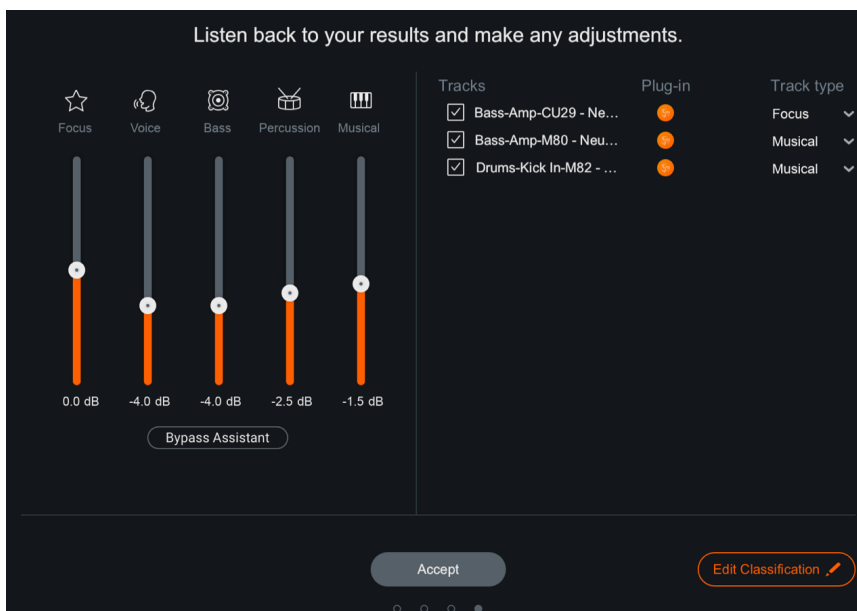
When auditioning the Assistant's results, the unprocessed mix will be gain-matched to the processed mix. By gain matching, you can better discern the differences in balance.



To avoid clipping, we try to turn things down when trying to go for an overall mix, so the levels that Mix Assistant suggests may be lower than the original levels.

## Edit

Edit which tracks are categorized for each Group by clicking on the **Edit Classifications** button in the lower right-hand corner. You can adjust the tracks in focus or reclassify the tracks. The Assistant adjusts the Groups to reflect your categorization decisions.



Any plug-ins that you did not select in the Setup stage will not appear in the Assistant's plug-in list editor. You cannot add any plug-ins to that list. Additionally, if you add a compatible iZotope plug-in to your session *while* the Assistant was in the Learning stage, it will not show up in the plug-in editor.



## Accept Stage

When you're happy with the level balance of your mix, click **Accept** and your level settings will be applied to each source plugin using iZotope's Inter-plugin Communication Technology (IPC).

- If you didn't like results, close out of the Assistant window to revert the changes.
- If you auditioned the results, you can't click Accept unless you disable **Bypass Assistant**.



You can see the adjustments made to the output gain sliders in all affected plug-ins shown in the results list. These changes are easiest to view in the Visual Mixer component plug-in.

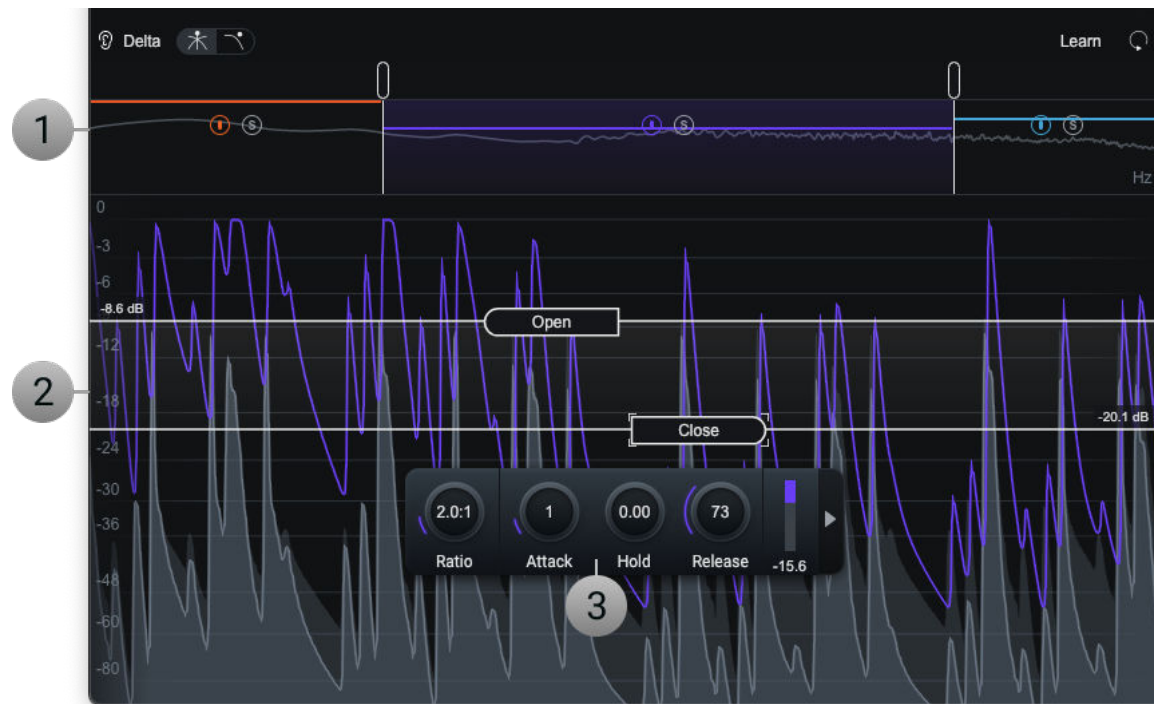


Once you close out of the Assistant, you cannot go back to the same screen to make group level changes. To make any Group Level changes, you will have to restart the Assistant from the beginning. The Assistant will re-learn everything unless you have overwritten a class which we will not alter.

## 6. Gate

You can use the Gate module to eliminate or attenuate unwanted signal content when the input signal falls below a given threshold level.

### Module Interface

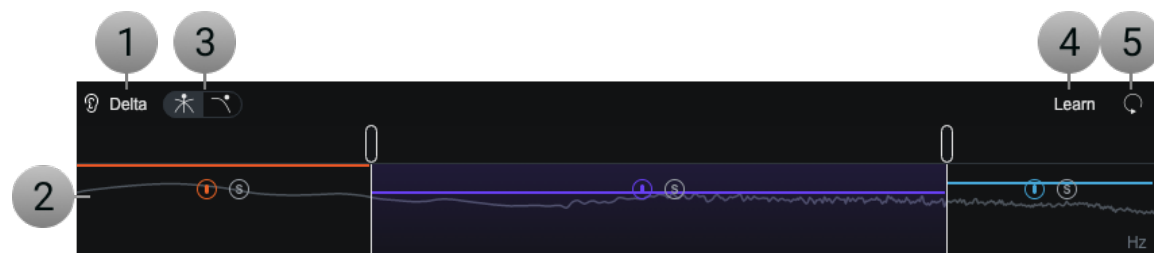


The Gate module includes the following sections:

1. [Module Header](#)
2. [Meters and Displays](#)
3. [Controls](#)

### Module Header

The controls in the module header affect the entire Gate module.

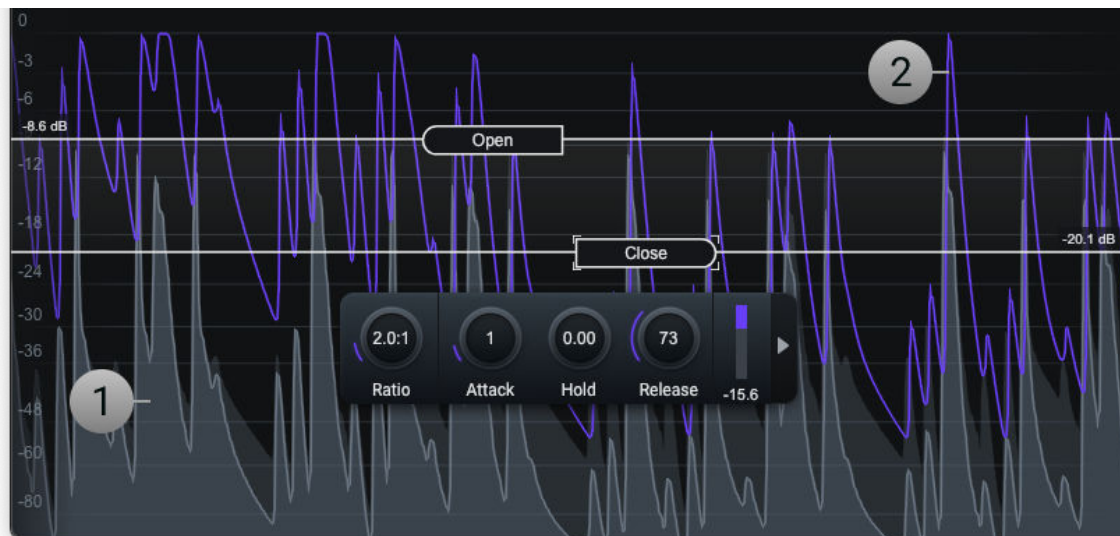


1. **Delta:** Monitors the difference in the signal before and after the Gate module, enabling you to hear exactly how the module is changing your sound.

2. **Multiband Crossover Spectrum View:** Access the Multiband Crossover view and controls. See the [Multiband Crossover Spectrum View](#) section in the General Controls chapter.)
3. **Detection Filter View:** Access the Detection Filter view and controls.
4. **Learn:** Enable to allow Neutron to search for natural crossover cutoff points for multiband processing using a few criteria, including identifying minima in the frequency spectrum of the incoming audio. When it has determined and set the ideal values for the crossover cutoffs, it will turn itself off automatically. You can also manually disable learning when it is active by clicking the Learn button again.
5. **Reset:** Returns all controls in the Gate module to their factory default values. If you wish to return to settings you were using before clicking the Reset button, you can use the Undo History window to revert to the settings before the Reset event.
6. **LFE:** (*Not pictured, surround instances only.*) This option appears when Neutron is inserted on a 5.1 or 7.1 surround track. When enabled, the LFE channel will be processed along with all other channels. When disabled, the LFE channel will not be processed by the associated module. If necessary, latency compensation is applied to the LFE channel when it is disabled, to ensure timing is maintained between all channels.

## Meters and Displays

The meters illustrate how the Gate is responding to and processing the input signal. The meters included are outlined in the image below.



### 1. Waveform Displays

- **Scrolling waveform:** displays the amplitude of the input and output signals over time. The meter scrolls from right to left, with the most recent information on the right.
  - **Input signal waveform:** **dark gray** waveform displayed behind the output signal waveform.
  - **Output signal waveform:** **light gray** waveform displayed in front of the input signal waveform. When the signal is gated, you can monitor the difference in the gain reduction applied to the output signal versus the input signal.

## 2. Gain Reduction Trace

Draws a line that represents the gain reduction applied to the selected band over time. Use the **Gain Reduction Trace** to monitor and to set the response times (attack and release) and gain reduction envelope applied over time.

## Controls

### Threshold Controls

You can control gating by setting the **Open Threshold** and **Close Threshold**. Click and drag the Threshold handles and place them where you want to apply gating.



- **Open Threshold:** Sets the level above which the gate will open, allowing the signal to pass through. When the input signal falls **ABOVE** the Open threshold level, attenuation will stop.
- **Close Threshold:** Set below the Open threshold level at which the gate will close. This is also called *hysteresis*. When the input signal falls **BELOW** the Close threshold, it will be attenuated. Moving the Close threshold either **UP** or **DOWN** will affect your gating. By setting Close threshold lower than Open threshold, more of the decay will pass without affecting the trigger threshold.



In some situations, undesirable signals that are near the level of the open threshold can cause the gate to "chatter" by crossing the threshold level too often. The Close threshold helps to eliminate this chattering effect. When a signal has dropped below the Close threshold, it will not trigger the gate to open again until it exceeds the level of the Open threshold.

### HUD Controls

The HUD in the Gate Module includes:

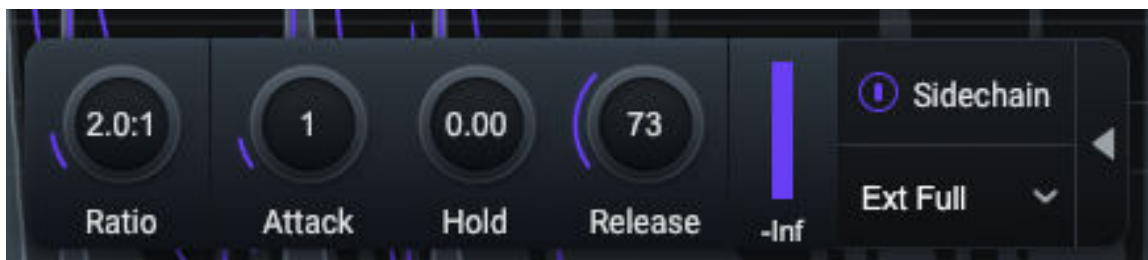


- **Ratio:** Determines the amount of gain reduction applied to signals that fall below the Threshold.
- **Attack:** Determines the amount of time (in milliseconds) it takes for the gate to transition from closed to open when a signal exceeds the Open threshold.
- **Hold:** Sets the amount of time (in seconds) the gate will stay fully open after a signal falls below the threshold. The hold length will vary when the release period begins.

- **Release:** Determines the amount of time (in milliseconds) it takes to transition from open to closed when a signal falls below the Close threshold.
- **Gain Reduction Meter:** Displays the current average amount of gain reduction in decibels (dB) applied to the signal.

## Advanced Controls

The Sidechain controls for the currently selected band are located in the Advanced panel of the HUD. To access the Advanced Panel, click the arrow button on the right hand side of the band HUD.



## Sidechain

Allows you to trigger the amount of gain reduction in the Gate from a signal other than the input to the Gate. The signal is routed into the **detection circuit** of the Gate. You can choose either an internal or external input signal to trigger the Gate band's dynamic behavior. By sidechaining, you can dynamically link elements of a mix to provide an adaptive balance between tracks.

### Enabled Sidechain

When you enable Sidechain, you have the option to sidechain with an internal band or an external band. The sidechain dropdown menu will display active internal bands and active external instances categorized under internal or external as described in the list below.

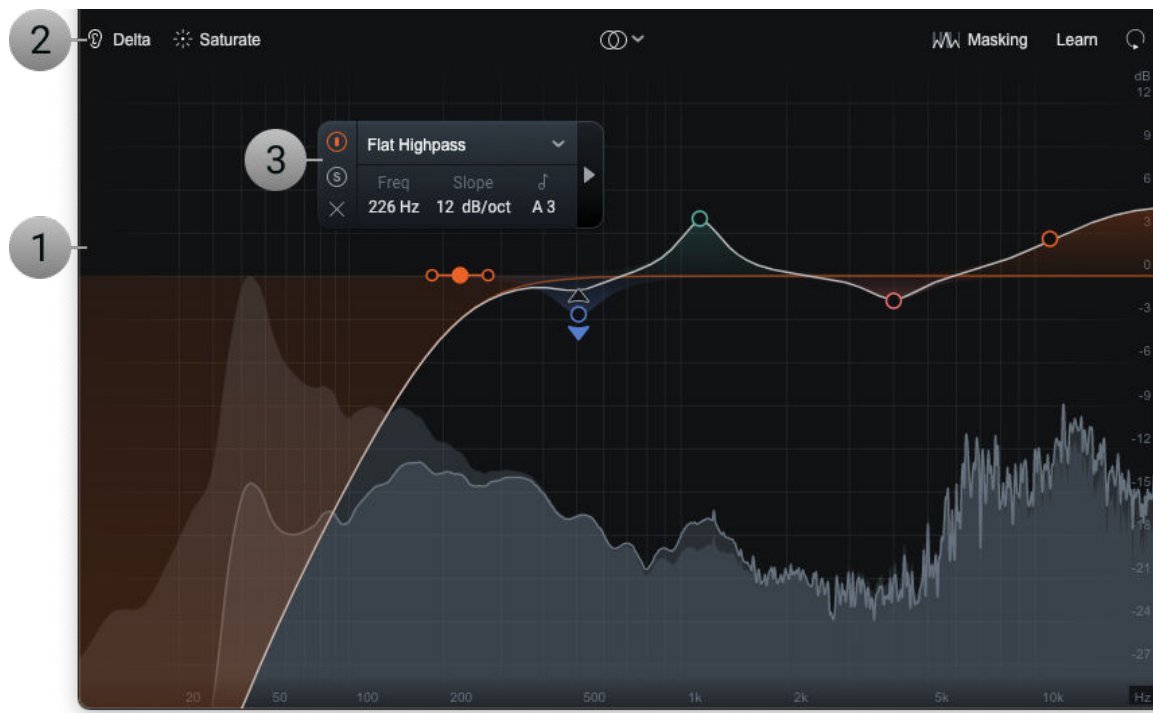
- **INTERNAL (INT.):**
  - Choose from any band currently placed in the Gate module.
  - Using an internal sidechain input allows you to trigger gain reduction in the selected band from the amount of energy in a different band. For example, you can accentuate perceived low end energy by reducing high end any time the lowest band exceeds a defined threshold.
  - Internal Full allows you to trigger gain reduction taking the sonic information from all active bands.
- **EXTERNAL (EXT.):**
  - Choose from any audio from another track or bus.
  - Using an external sidechain input will help balance a signal with other tracks.
  - The external audio source can also be filtered through any of the bands in the Gate module by choosing any of the External bands (for example, Ext. Band 1).

# 7. Equalizer

An equalizer can be used to give you control over different parts of the frequency spectrum, independently allowing you to make character or corrective alterations by applying additive EQ or subtractive EQ.

## Module Interface

The Neutron Equalizer module controls and features are outlined in the image below.



1. [Meters and Displays](#)
2. [Module Header](#)
3. [Controls](#)

## Meters and Displays

The following meters and displays included in the EQ are outlined in the image below.



1. Spectrum Analyzers
2. Composite Curve
3. Filter Response Curve
4. Meter Scales

## Spectrum Analyzers

Displays the magnitude (amplitude, in decibels) of the input signal across the frequency spectrum in real-time. Two spectrum analyzers are displayed in the EQ module to compare the effect of processing.

- **Input signal:** The input signal to the EQ module is shown as a dark grey spectrum with no border.
- **Output signal:** The processed output spectrum is drawn in the foreground with a white border.

## Composite Curve

Displays the combined filter response of all enabled bands. Represented by a thick white line drawn across the display. Adjusting EQ nodes will contribute to the overall shape of the composite curve.

## Filter Response Curve

Displays the filter response of the currently selected node. Represented by a highlighted line and filled area under the band which appears when you select a node. If there are no nodes selected, the filter response curve is hidden and you will only see the composite curve.

## Meter Scales

The Meter Scales are located on the left, right, and bottom of the spectrum window display. You can use these meter scales as a reference while making adjustments.

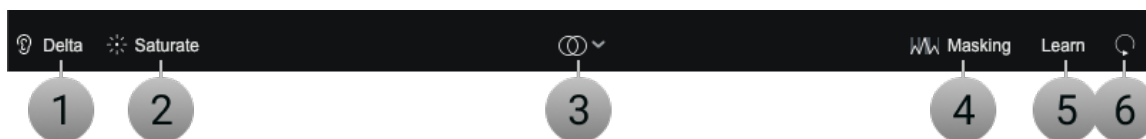
- **Gain Scale (dB):** displayed on the right side of the spectrum window.
- **Spectrum Frequency Scale (Hz):** displayed along the top of the spectrum window.

You can change the **Frequency Scale** measurements using the Scale menu, located in the [Module Header](#) or in [Options](#) under the EQ tab. Choose one of the **Frequency Scale** options to help you see different frequency distributions when placing your EQ nodes. The default scale is Extended Log.

SCALE TYPE	DESCRIPTION
<b>LINEAR</b>	Displays an even view across all frequencies. This scale emphasizes the higher frequencies which can be useful for dialing in 'air' bands or EQ brightness.
<b>MEL</b>	Displays a frequency scale based on human perception of sound that visually corresponds to how we hear differences in pitch.
<b>LOGARITHMIC, (FLAT, EXTENDED) LOGARITHMIC</b>	Displays non-linear scales that offer detail on the low end and midrange, useful for the vast majority of EQ tasks.
<b>PIANO ROLL</b>	Uses default Extended Logarithmic scale while displaying a Piano Roll at the bottom of the EQ display to show the frequency and musical note relation.

## Module Header

The controls in the module header affect the overall resulting EQ module signal processing, but does not affect an individual band. The image outlines the controls in the Module Header.



1. Delta
2. Soft Saturation
3. Channel Modes
4. Masking Meter
5. Learn
6. Reset

### Delta

Monitors the difference in the signal before and after the Equalizer module, enabling you to hear exactly how the module is changing your sound.

### Soft Saturation

Enable **Soft Saturation** mode to excite the input signal generating subtle harmonics resulting in a fuller sound and subtle coloration by your EQ shaping.



## Channel Modes

- **Stereo:** Stereo Processing in the EQ allows users to process the audio content to the Left and Right audio channels equally.
- **Mid/Side (M/S):** Mid/Side (M/S) Processing in the EQ allows users to shape the spatial characteristics of a mix by controlling the mid (center) and side (stereo) audio elements separately. M/S processing lets users fine-tune center-panned elements like vocals or bass independently from the stereo width of effects and ambient sounds.
- **Transient/Sustain (T/S):** Transient/Sustain processing allows users to adjust the transient and sustain portions of an audio signal separately. The Transient represents the initial attack of a sound, like the hit of a drum or pluck of a string and enhancing this can add definition and punch to rhythmic elements. The Sustain refers to the resonant, longer-lasting part of the sound that follows the transient, capturing depth and tonal qualities.

## Masking Meter

Enable to enter EQ into Masking Meter mode. Visit the [Masking Meter](#) chapter for more detailed information about the Masking Meter.

## Learn

Enable **Learn** to quickly have EQ node placement suggestions based on intelligently identified areas of sonic importance in your audio signal such as sibilance, resonance, and rumble.



**Learn** will never remove or create an EQ band. **Learn** will only suggest adjustments for bands that are already present in the EQ module. **Learn** suggestions also do not affect Gain or Q. Once nodes are placed, you can hold the **Shift** key to preserve the frequency placement, and then move the gain up or down to determine if your track sounds better with that specific area of interest boosted or cut.

## Reset

Returns all controls in the Equalizer module to their factory default values. If you wish to return to settings you were using before clicking the **Reset** button, you can use the Undo Historywindow to revert to the settings before the reset event.

## LFE

This option appears when Neutron is inserted on a 5.1 or 7.1 surround track. When enabled, the LFE channel will be processed along with all other channels. When disabled, the LFE channel will not be processed by the associated module. If necessary, latency compensation is applied to the LFE channel when it is disabled, to ensure timing is maintained between all channels.

## Controls

### Node Interactions

You can adjust bands by adding or removing nodes.

### Add Bands

You can add bands in three different ways:

- **Add on the Composite Curve:** Hover over the white composite curve for a **+** button to appear. Click on the **+** button to add a node at the specific frequency on the composite curve.
- **Add with Keyboard Shortcut:** Hit **command + return** (Mac) or **ctrl + return** (Windows) to add a new node to the center of the EQ spectrum.
- **Add anywhere on the Spectrum:** Double-click anywhere in the EQ spectrum to add a new node at the location of the mouse.

**i** Depending on where you add a node, the node will appear with a pre-determined filter shape. There are three default contextual filter shapes that will be used when you add a new node:

To the far left: Flat Highpass or High Shelf

To the far right: Flat Lowpass or Low Shelf

In the middle: Proportional Q

The Flat High Pass and the Flat lowpass will only be added once because you will typically only use one of each in either end of the spectrum. Otherwise, the node will default to a Shelf or Proportional Q filter shape.

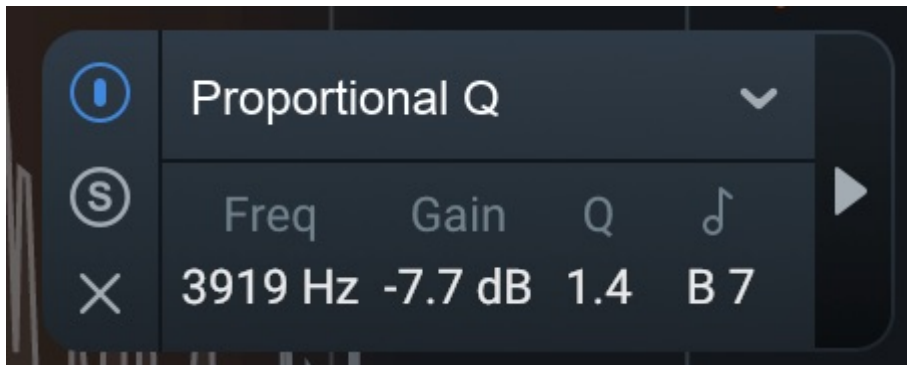
### Remove Bands

You can remove bands in three different ways:

- **Remove Single band:** Select a node and click the **X** button in the HUD to remove it.
- **Remove Multiple bands:** Click and drag to select multiple nodes. Use the **delete** or **backspace** key to remove all selected nodes.
- **Remove with modifier keys:** **Shift**+click to select multiple nodes. Use the **delete** or **backspace** key to remove all selected nodes.

### HUD Controls

You can access a band's HUD by selecting the band's node.



## General Band Controls

The left side of the HUD includes parameters for enabling/disabling, soloing, and removing the currently selected band.

Icon	Control
	<b>Power Button:</b> Enables or disables processing of the currently selected band.
	<b>Solo:</b> Enables the selected filter to be listened to in isolation.
	<b>Remove:</b> Removes the band.

When a band is disabled, the filter response curve will still be displayed in the EQ module panel. Disabled bands are displayed in grey to clearly differentiate them from enabled bands.

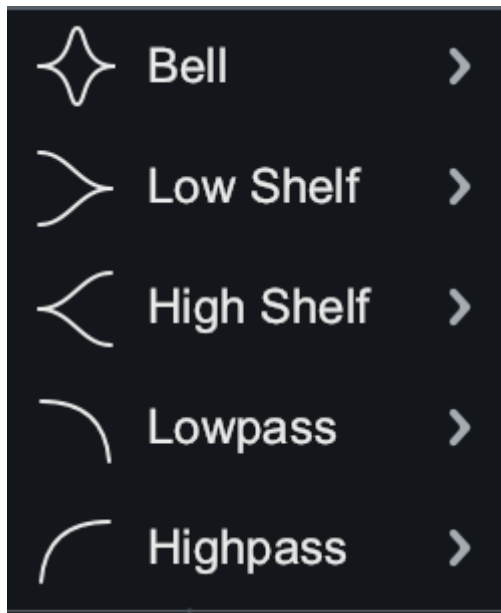
Use the following methods to solo a specific band or area of the frequency spectrum:

**Band Solo:** Filters per-band. To access Band Solo, alt (Windows) or option (Mac) key and click on a node to solo the band. You can also use the Solo button in the HUD display to solo the selected band.

**Alt-Solo:** Creates a moveable filter window allowing you to easily focus on the frequencies surrounding the location of the click. To access Alt-Solo hold the alt (Windows) or option (Mac) key and click anywhere on the frequency spectrum.

## Band Filters

Use the table below to refer to the types of filters and associated filter shapes in the **Filter Shape** menu.



## Filter Types

The EQ module features 13 different [filter shapes](#), each one belonging to one of the following filter type categories: Pass Filter, Peak Filter, Shelf Filter.

Filter Type	Description
<b>Pass Filter</b>	Used to attenuate frequency content that is below (for highpass) or above (for lowpass) a specified cutoff frequency. In the Lowpass and Highpass menu: <b>Flat, Resonant.</b>
<b>Peak Filter</b>	Used to boost or cut a specific center frequency level. In the Bell menu: <b>Bell, Proportional Q, Band shelf.</b>
<b>Shelf Filter</b>	Used to boost or cut the frequency content above or below a specified frequency. In the Low Shelf menu and High Shelf menu: <b>Analog, Vintage, Baxandall.</b>




**i** Adjustment to the bandwidth (Q value) will determine the amount of boost/cut applied to frequencies around the center frequency. The slope of the filter defines the degree of applied attenuation.

## Filter Shapes

Choose from the Filter Shape menu to assign the filter shape of the selected band. The filter shape dropdown menu organizes the filter shapes into the following sub-menus: [Bell](#) , [Low Shelf & High Shelf](#) , and [Lowpass & Highpass](#).




### Bell

The Bell sub-menu includes the following Peak type filters:

Shape	Description
<b>Proportional Q</b> 	Unique filter that varies shape in proportion to the amount of boost or cut applied. As you increase or decrease the gain, the change is proportional to bandwidth where you will see the shape of the curve tightens with more extreme values of gain. Tight, precise corrective cuts-the bigger gain adjustment, the tighter the cut will become.
<b>Bell</b> 	Smoothly boosts or cuts an adjustable region around a specific frequency. Looks like a bell, come on what do you want from me. At larger gain adjustments (boost or cut), will change the overall color or texture of the sound. This will be a more noticeable change than Proportional Q.
<b>Band shelf</b> 	Bell filter with wide, flat top. To change the relation between the harmonics in your audio. Useful for boosting or attenuating a block of frequencies.


### Low Shelf and High Shelf


The Low Shelf sub-menu and High Shelf sub-menu includes the following Shelf type filters:

Shape	Description
<b>Analog</b> 	Efficient shelf filter for simple boosts and cuts. Similar to standard shelf in an analog EQ. To make noticeable boosts for making large changes in how bright or how bassy the content is.
<b>Baxandall</b> 	Inspired by the Baxandall EQ, with the addition of freely adjustable frequency. <b>Low shelf:</b> Gentle low frequency shelf <b>High Shelf:</b> Gentle high frequency shelf. Transparent way of addressing extreme lows and extreme highs for a more natural, gentle sounding effect.
<b>Vintage</b> 	Inspired by the renowned Pultec analog equalizer. Exhibits a complementary frequency dip, creating a complex slope with one node. To fatten up low end without introducing muddiness.

### Lowpass and Highpass

The Lowpass sub-menu and Highpass sub-menu includes the following Pass type filters:

Shape	Description
<b>Flat</b> 	Butterworth filter; optimized for maximum flatness without ripple or resonance in the passband or stopband (stability). To transparently remove low end or high end frequency information without disturbing the character of the signal. Provides a clean, even, and natural sound.

Shape	Description
<b>Resonant</b> 	Filter equipped with a resonance control to emphasize the cutoff frequency with positive gain. Boosting content at the cutoff frequency to add character and emphasize the lowest or highest part of the signal.




- i** Baxandall filter shape does not allow for Q adjustment.  
 Lowpass and Highpass filter shapes do not allow for Gain adjustments.

## Filter Shapes

Choose from the Filter Shape menu to assign the filter shape of the selected band. The filter shape dropdown menu organizes the filter shapes into the following sub-menus: [Bell](#) , [Low Shelf & High Shelf](#) , and [Lowpass & Highpass](#).


### Bell



The Bell sub-menu includes the following Peak type filters:

Shape	Description
<b>Proportional Q</b> 	Unique filter that varies shape in proportion to the amount of boost or cut applied. As you increase or decrease the gain, the change is proportional to bandwidth where you will see the shape of the curve tightens with more extreme values of gain. Tight, precise corrective cuts-the bigger gain adjustment, the tighter the cut will become.
<b>Bell</b> 	Smoothly boosts or cuts an adjustable region around a specific frequency. Looks like a bell, come on what do you want from me. At larger gain adjustments (boost or cut), will change the overall color or texture of the sound. This will be a more noticeable change than Proportional Q.
<b>Band shelf</b> 	Bell filter with wide, flat top. To change the relation between the harmonics in your audio. Useful for boosting or attenuating a block of frequencies.

### Low Shelf and High Shelf



The Low Shelf sub-menu and High Shelf sub-menu includes the following Shelf type filters:

Shape	Description
<b>Analog</b> 	Efficient shelf filter for simple boosts and cuts. Similar to standard shelf in an analog EQ. To make noticeable boosts for making large changes in how bright or how bassy the content is.

Shape	Description
<b>Baxandall</b> 	Inspired by the Baxandall EQ, with the addition of freely adjustable frequency. <b>Low shelf:</b> Gentle low frequency shelf <b>High Shelf:</b> Gentle high frequency shelf. Transparent way of addressing extreme lows and extreme highs for a more natural, gentle sounding effect.
<b>Vintage</b> 	Inspired by the renowned Pultec analog equalizer. Exhibits a complementary frequency dip, creating a complex slope with one node. To fatten up low end without introducing muddiness.

### Lowpass and Highpass

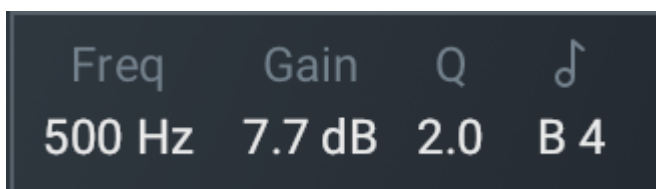
The Lowpass sub-menu and Highpass sub-menu includes the following Pass type filters:

Shape	Description
<b>Flat</b> 	Butterworth filter; optimized for maximum flatness without ripple or resonance in the passband or stopband (stability). To transparently remove low end or high end frequency information without disturbing the character of the signal. Provides a clean, even, and natural sound.
<b>Resonant</b> 	Filter equipped with a resonance control to emphasize the cutoff frequency with positive gain. Boosting content at the cutoff frequency to add character and emphasize the lowest or highest part of the signal.

**i** Baxandall filter shape does not allow for Q adjustment.  
 Lowpass and Highpass filter shapes do not allow for Gain adjustments.

### Readouts

Use the HUD Readouts to see and adjust where the node is located within the EQ. The table below describes the readouts available with each readout's respective units.



Readout	Units	Description
<b>Frequency</b>	Hz	Shows the center frequency (or cutoff frequency) of the currently selected node. The EQ supports frequency values ranging from 20 Hz to 20 kHz.
<b>Gain</b>	dB	Shows the amount of gain applied by the selected filter. The EQ supports gain adjustments ranging from -30 dB to +15 dB.

Readout	Units	Description
<b>Q</b>	(cF/Bandwidth)	<i>(Parametric/Bell Filters)</i> Shows the width or slope of the selected filter.
<b>Slope</b>	(dB/octave)	<i>(Highpass/Lowpass Filters)</i> Shows the cutoff slope of the filter.
<b>Musical Note</b>	Note	Shows where the node is on the frequency spectrum in relation to the musical note.

## Adjust Frequency, Gain, and Q

There are 3 ways to adjust the Frequency, Gain, and Q:

1. Click and drag EQ node or handles (for Q only).
2. Manually enter the value.
3. Use arrow keys.

Below outlines the three types of adjustments you can apply for altering the Frequency, Gain, and Q values.

Value	Types of Adjustments
<b>Frequency</b>	Click and drag EQ node <b>left</b> to decrease the frequency or <b>right</b> to increase the frequency. Manually enter the value as described below. Use LEFT and RIGHT arrow keys.
<b>Gain</b>	Click and drag EQ node <b>down</b> to decrease the gain or <b>up</b> to increase the gain. Manually enter the value as described below. Use UP and DOWN arrow keys.
<b>Q</b>	Click and drag EQ node handles <b>toward</b> node to narrow the bandwidth or <b>away</b> from the node to widen the bandwidth. Manually enter the value as described below. Use <b>alt/option</b> + arrow keys.

To **manually enter the value** for Frequency, Gain, or Q:

1. Double click on the value readout of the metric you wish to change.
2. Type in the value desired in the text edit field.
3. Hit **enter** or **return** to save the value adjustment.



Hold Shift key while clicking and dragging the node to lock the movement to the horizontal axis (for frequency) and vertical axis (for gain).

Hold Shift while using the arrow keys to make coarse value adjustments.

Hold the command key (Mac) or ctrl key (Windows) while using the arrow keys to make fine value adjustments.



You can reset all parameters for a particular band to their default values by double clicking on the node.



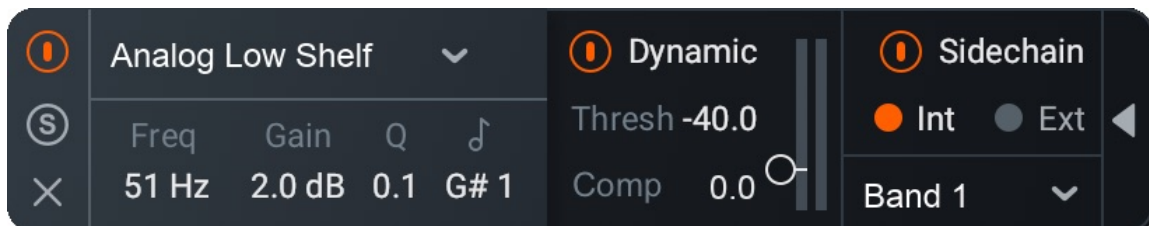
Use the EQ Gain scale, located on the right edge of the EQ module display to reference dB magnitude while adjusting nodes.



## Advanced Panel

To access the Advanced Panel, select a node and click the Advanced Panel arrow on the right hand side of the band HUD. The Advanced Panel includes the following Advanced controls for the EQ module:

- [Dynamic Mode](#)
- [Sidechain](#)



**i** If no Advanced Controls are active, the Advanced Panel arrow displays white. If you actively engage the Advanced Controls (Sidechain or Dynamic Mode), you can click the white arrow to close or minimize the Advanced Controls Panel. In this case, the the Advanced Panel arrow displays orange.

## Dynamic Mode

Enable to apply dynamic variable gain to the selected node in relation to the threshold setting. Enables you to either to boost or to attenuate the signal once the signal crosses the threshold. The threshold defines the point at which attenuation or boosting can occur.

**i** All filter types except for Highpass and Lowpass filter types support dynamic mode. When using either Highpass or Lowpass filter shapes, the Dynamics menu in the HUD will be greyed-out and not accessible.

## Threshold

Sets the signal level at which dynamic gain adjustments will be triggered for the selected EQ node. You can set the Dynamic threshold in three ways:

1. Click and drag the slider to the desired value.
2. Click on the slider and use the UP or Down arrow keys to increase or decrease the value.
3. Double-click on the Threshold readout and type the value into the inline edit field.

## Threshold Meters

There are two meters associated with the **Threshold** control:

- **Input Level Meter:** Displays the input signal of the selected node.
- **Band Reduction/Band Addition Meter:** Displays the amount of dynamic level adjustment applied by the selected band.

## Dynamic Mode Direction

When you enable Dynamic mode, you can control the **Dynamic Mode Direction** which determines the direction of gain change (UP or DOWN) using the Up/Down controls. The Up/Down controls will appear directly above and below the associated EQ node.

### UP

Select the Up arrow to *increase* the gain of the filter when signals exceed the **Threshold** level.

- When the EQ node is placed **above** the zero line, the filter will be set to 0 dB of gain until it is triggered. When it is triggered by incoming signals exceeding the threshold, the gain of the filter will be increased in the direction of the node
- When the EQ node is placed **below** the zero line, the gain of the filter will be increased toward the zero line when it is triggered by incoming signals exceeding the threshold.


### DOWN

Select the Down arrow to *decrease* the gain of the filter when signals exceed the **Threshold** level.

- When the EQ node is placed **above** the zero line, the gain of the filter will be reduced toward the zero line when triggered.
- When the EQ node is placed **below** the zero line, the filter will be set to 0 dB of gain until it is triggered. When it is triggered by incoming signals exceeding the threshold, the gain of the filter will be reduced in the direction of the node.

## Sidechain

Controls the amount of compression or expansion by choosing either an internal or external input signal to trigger the EQ node's dynamic behavior. By sidechaining, you can alter or improve the relationships between the elements of the mix so that they work together.

 The default Sidechain input, when you first enable the sidechain, is the band you have currently selected. For example, node 5 would default to a sidechain of Internal Band 5. This processing is equivalent to Dynamic mode with Sidechain disabled.

## Enabled Sidechain

When you enable Sidechain, you have the option to sidechain with an internal band or an external band.

- **INTERNAL (INT.):** Choose from any band currently placed in the EQ module.
  - Using internal sidechain will help balance a signal within itself.
  - Internal Full will take the full bandwidth of the audio signal.
- **EXTERNAL (EXT.):** Choose from any audio from another track or bus.
  - Using external sidechain will help balance a signal with other tracks.
  - The external audio source can also be filtered through any of the bands in the EQ module by choosing any of the External bands (for example Ext. Band 1).

**i** Even if a node is bypassed, it can be used as a sidechain to any other node—set its frequency and Q as you would for any enabled band.

## 8. Masking Meter

Neutron's Masking Meter can be used to quickly and easily see where there are tracks competing for space in your mix, potentially contributing to a lack of clarity, a muddy sound, or "masking".

**i** By definition, masking is a psychoacoustic phenomenon that occurs when two sounds occupy the same (or similar) frequency ranges and become indistinguishable. When masking appears in a mix, masking can cause your tracks to lose definition and clarity due to multiple sounds fighting for attention in a similar frequency range.

### Problem with Masking

Masking can make it difficult to discern audio that needs sonic separation or space. In general, masking can be either *encouraged* or *problematic* (but not bad) depending on its context:

- **Encouraged masking:** when two sources blend there is likely some overlap in a frequency range, and therefore some amount of masking happens. This is similar to the use of distortion in mixing.
- **Problematic masking:** when two sources blend, but their frequencies tend to obscure rather than compliment each other. This can be frustrating because it is difficult to listen, analyze, and understand where tracks compete across an entire mix.

### Using The Masking Meter

Dedicated iZotopians took the time to establish a proprietary psychoacoustic masking hypothesis of what problematic masking might be, and subsequently how to visualize potential problem areas for you to consider when equalizing (Please see **(AES 141, Paper 53)** at the bottom of the page for more details.).

Neutron includes our Masking Meter technology which shows you in real time:

1. Areas of the frequency spectrum where masking is occurring ([Masking Meter](#)).
2. Frequency regions in which there are multiple instances of masking over time and that are worthy of attention ([Masking Histogram](#)).

These tools simply show where masking is occurring. It is up to you to determine when this masking is problematic and requires further action.

### Measuring Problematic Masking

In simple terms, Neutron's Masking Meter takes two audio inputs:

1. A source (the active plug-in instance).
2. An external input "masker" (the plug-in selected in the Masking Meter drop-down menu).

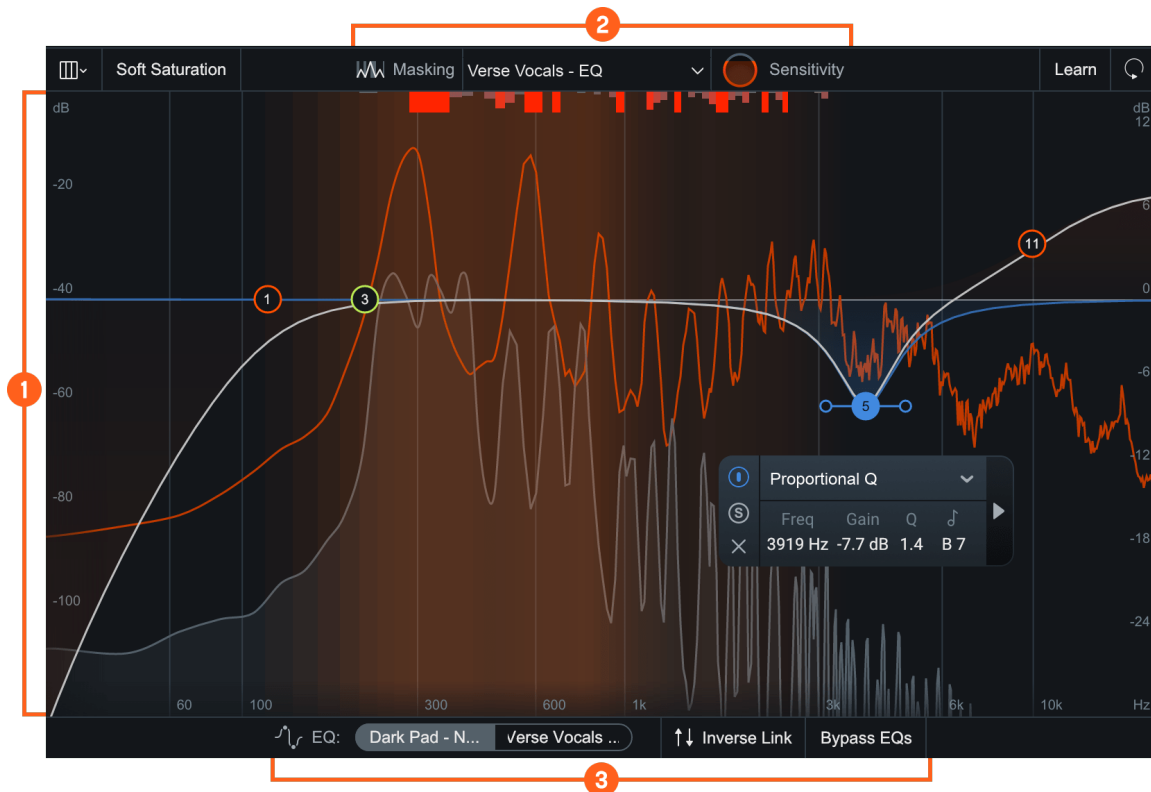
The Masking Meter uses a model of the outer/middle ear to calculate perceptual loudness of each signal, as well as their loudness relative to one another. The source's loudness loss due to the masker is then calculated as:

$$\text{Loudness Loss} = \text{Perceived loudness [phons]} - \text{Perceived partial loudness [phons]}$$

This calculation is strictly based on the intricacies of human hearing and perception. For more information on this calculation, please see **AES 141, Paper 53** at the bottom of the page.

## Masking Meter Interface

The Masking Meter includes the following sections:



1. [Meters and Displays](#)
2. [Masking Meter Controls](#)
3. [EQ Masking Controls](#)

## Meters and Displays

The meters and displays show how the Masking Meter is responding to and processing the input signal:

### Spectrum Displays

The spectrum displays of the Masking Meter are the same as those in the Equalizer module. See the [Meters and Displays](#) section in the Equalizer chapter for more information.)

### IPC Spectrum Displays

This display only appears when connected to another Neutron instance. Depending on the IPC instance you choose to compare with your current Neutron instance, you will see two different displays:

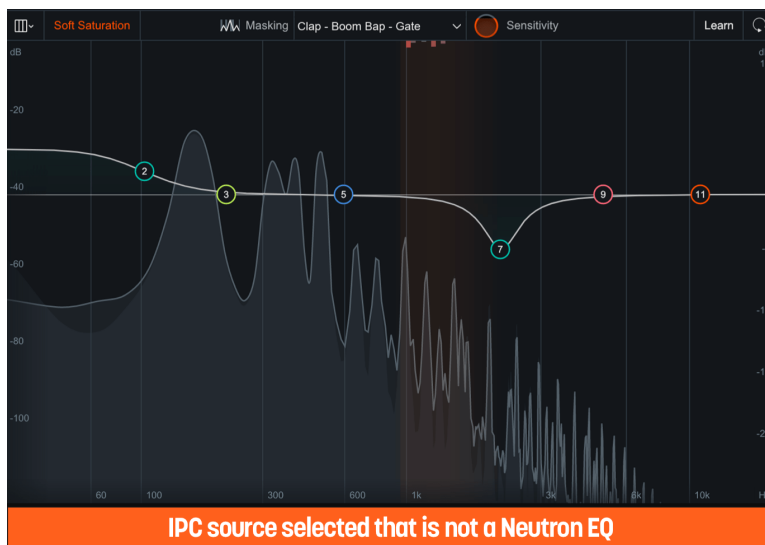
### Neutron EQ IPC Source Selected

Any Neutron instance with an EQ in the signal chain. Displays Masking Meter, Masking Histogram, EQ Masking Controls, and an EQ Composite Curve.



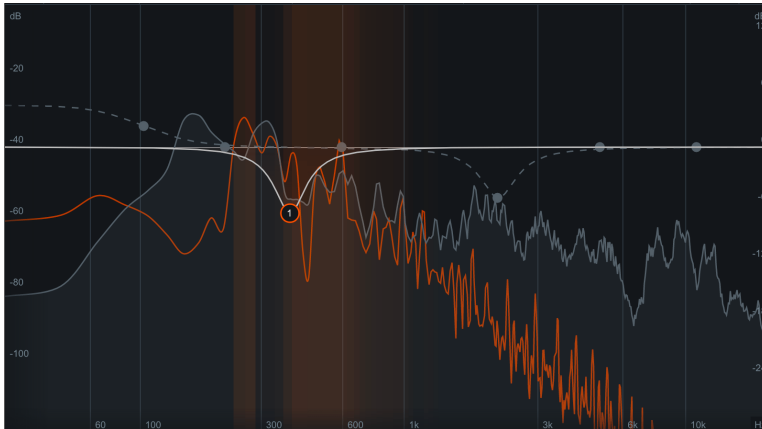
### Non-Neutron EQ IPC Source Selected

Any compatible iZotope IPC plug-in. Displays **Masking Meter** and **Masking Histogram** with no EQ controls.



### Masking Meter

Displays the highlighted areas of the spectrum to indicate where there is momentary masking (loudness loss) in the frequency domain.



The brighter the highlights, the more masking is occurring in that area.

## Masking Histogram

Displays a cumulative representation of frequency collisions—points of extreme masking—occurring in each critical band over time by filling in the histogram meter with a red color.



The more collisions, the more the histogram meter is filled. This provides a zoomed out view of where masking occurs most over a longer period of time.

## How the Masking Histogram Works

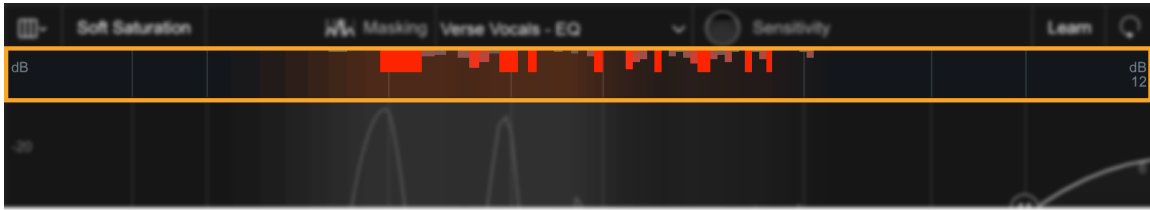
Masking Histogram counts the number of frequency collisions in each critical band. When the loudness loss in a particular frequency band is over a pre-determined threshold, we consider it extreme masking and tag it as a **“collision.”** These collisions are represented as a bar extending from the top of the module view. The further they extend down, the more collisions are occurring in those bands.

**i** Use the results of the Masking Histogram as a suggestion of where there is masking occurring rather than a prescriptive message that you need to fix that area. Masking does not always need to be eliminated, but it is helpful to know where it is when making EQ decisions.

**i** The **Masking Histogram** is a real-time meter. The peak hold times (found in the [Options](#) window) adjust the calculation window between three values of 400 ms, 3,000 ms (default), and Infinite. )

## Clearing collisions and events

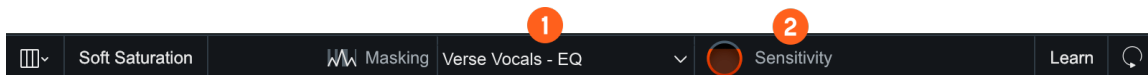
Click once anywhere in the **Histogram Area** to clear all events in the Masking Histogram.



The Masking Histogram can act like a clip indicator—for each frequency band, it shows whether or not extreme masking has occurred. However, unlike a clip indicator, the Masking Histogram counts the *number of collisions* rather than just showing that at least one instance of clipping has occurred. The more collisions that have occurred in a band, the more its bar grows to bring your attention to problem areas.

## Masking Meter Controls

The main masking meter controls in both non-Neutron EQ as a Masker and Neutron EQ as a Masker are outlined in the image below.



### 1. Masking Meter Dropdown Menu

Displays all compatible iZotope plug-ins in your session. When you select one of these instances, the Masking Meter and Masking Histogram will compare the amount of masking (loudness loss) between the selected instance and your current track.



When making changes to the target EQ, it's actually sending those changes to the other plug-in. For this reason, adjustments to this second EQ may behave unpredictably with automation. That's why we recommend not applying automation on a remote EQ instance.

### 2. Masking Sensitivity

Scales the threshold used to determine whether loudness loss is extreme enough to count as a collision (and therefore show up in the Masking Histogram).


- **At high sensitivity**, smaller amounts of loudness loss count as collisions and it will appear that more masking is occurring since the Masking Histogram will fill up more quickly. If you're seeing no masking but hearing muddiness, it could help to turn the sensitivity up until you see some activity in these meters.
- **At low sensitivity**, fewer collisions will appear on the **Masking Histogram** since the loudness loss thresholds will be much higher. Turning down the sensitivity will help show you the most extreme amounts of masking between your tracks.


The range of loudness loss displayed in the Masking Meter is similarly affected by the **Masking Sensitivity** control.

- **At higher sensitivity**, a lower amount of loudness loss appears on the meter.



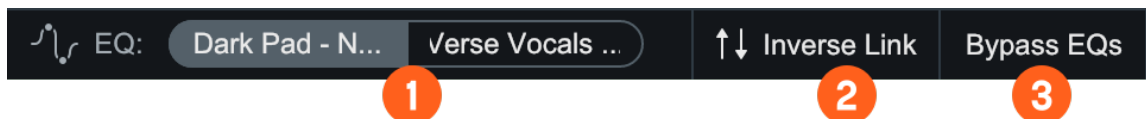
- **At lower sensitivity**, a larger loudness loss is required to show high amounts of masking (brighter colored lines).

 Any adjustments to **Masking Sensitivity** will not affect processing. Even though it may seem that masking has decreased when the masking sensitivity is turned down, it is merely that the sensitivity of the meter has been adjusted.


 Masking calculations are sensitive to the levels of each track. If you apply a DAW's track pre-fader, a Neutron instance *will not know* about this gain change. This directly affects Neutron's masking calculations. To get the most accurate masking calculations, we recommend setting each Neutron instance's **Gain Offset** amount to the *same value* as the DAW's track pre-fader. It will not in any way affect the audible gain of Neutron, simply the levels at which masking is calculated.


## EQ Masking Controls

The EQ masking mode controls are outlined in the image below.



1. **EQ Toggle:** Switch between your active Neutron instance and the other IPC EQ instance to view and alter the EQ settings in the selected view.
2. **Inverse Link:** Links a node's Gain and Frequency to another node that is relatively close in frequency from the comparing EQ instance. If Inverse Link chooses a node with a different filter shape, Inverse Link will set the shape of that node to match.
3. **Bypass EQs:** Enable to bypass both the source and the target EQ modules. This is particularly useful to check as you make changes across more than one track, to ensure the EQ adjustments are helping, not hurting, your mix.

 Rather than making big, sweeping changes to one track, the goal is to achieve optimal separation with subtle changes to each individual track, such as boosting and cutting each by 1.5 dB rather than boosting or cutting just one track by 3 dB.

 Inverse Link does not control any other aspect of that particular node (e.g. Q, Filter type, Dynamic/Static). Although you may wish to share cuts, boosts and frequency positions, it's rare that you'd also want to use identical Q in both tracks. It's best practice to cut with narrower Qs and boost with broader, more gentle shapes, to avoid resonance.

► [AES 141, Paper 53 \(09/2016\)](#)

## 9. Compressor

A compressor can be used to reduce dynamic range, maintain consistent levels, and shape the tone and character of your audio.

### Module Interface

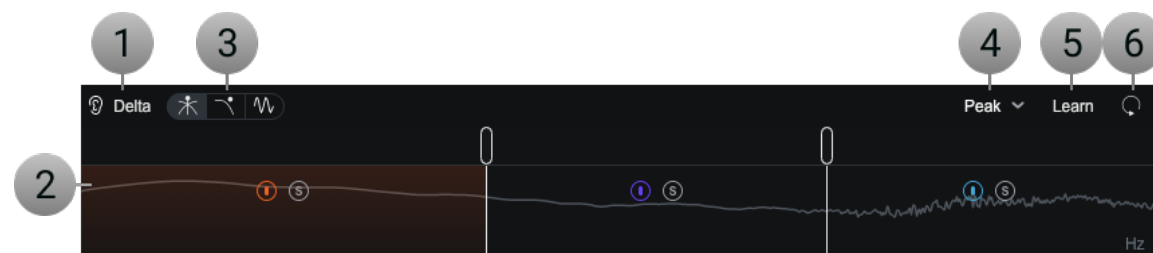
The Neutron Compressor module includes the following sections:



1. [Module Header](#)
2. [Controls](#)
3. [Meters and Displays](#)

### Module Header

The controls in the module header affect all enabled bands in the Compressor module.



1. Delta
2. Multiband Crossover Spectrum
3. Detection Filter

4. Level Detection mode
5. Learn
6. Reset
7. LFE : *(Not pictured, surround instances only.)*

## Delta

Monitors the difference in the signal before and after the Compressor module, enabling you to hear exactly how the module is changing your sound.

## Views

You can switch between the following views in the Compressor:

### Multiband Crossover Spectrum

Access the Multiband Crossover Spectrum View and controls. For more information, see the [Multiband Crossover Spectrum View](#).)

### Detection Filter

Access the Detection Filter view and controls. For more information, see the [Detection Filter View](#) section.)

The Detection Filter view is only available when Modern or Vintage Processing Mode is selected.

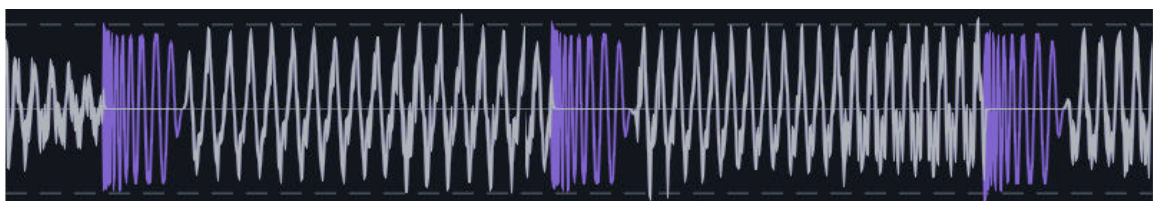
### Oscilloscope

Displays the waveform of the compressed output signal over time. This can be used to visualize how compression affects the shape of the audio in real time.



The oscilloscope is synced to the host tempo and the time axis represents one bar (four beats).

When the sidechain is activated, the oscilloscope will display the channel signal along with the sum of the sidechain signal with the channel signal in purple. This can be useful when dialing in the interaction between kick drum and bass, for example.




## Level Detection Mode

Determines how input levels are calculated by the compressor. Adjusting the level detection mode will alter the level that is considered by the threshold, which will affect when or how often the input level will trigger compression. The Compressor includes three level detection modes:

- **RMS (Root Mean Square)**: Determines input level to the compressor by averaging levels of the incoming signal. RMS detection is useful when you are trying to increase the overall volume level without changing the character of the sound.
- **PEAK** Determines the input level to the compressor using instantaneous peak levels of the incoming signal. In general, this setting is useful when you are trying to even out sudden transients in your music.
- **TRUE** Similar to RMS mode, True peak mode determines input level to the compressor by averaging levels of the incoming signal, but produces even levels across all frequencies. True mode will not produce aliasing or artifacts- a common side-effect of RMS detection.

## Learn

Enables the Compressor to search for natural crossover cutoff points for multiband processing. The Learn button will be disabled if only one band exists in a multi-band capable module.

 After Learn determines and sets the ideal values for the crossover cutoffs, it will turn itself off automatically. When Learn button is toggled OFF the button is grey instead of orange. You can also manually disable Learn when it is active by clicking the Learn button again.

## Reset

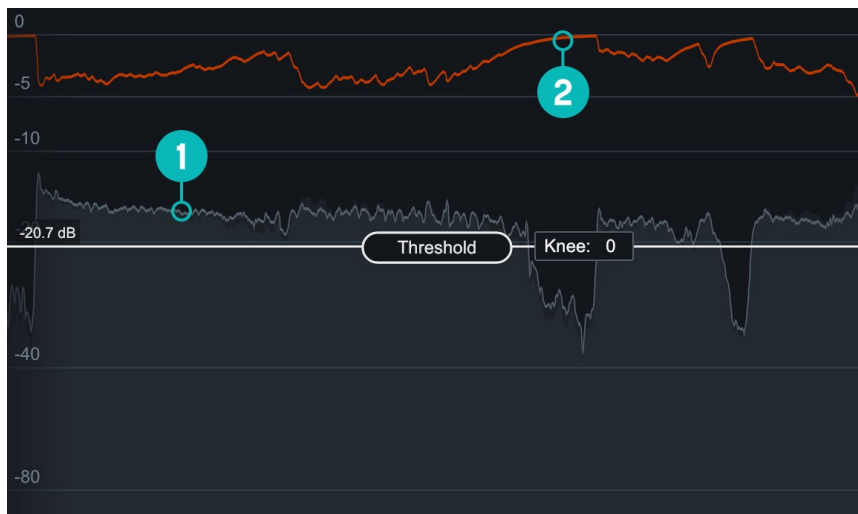
Returns all controls in the Compressor module to their factory default values. If you wish to return to settings you were using before clicking the **Reset** button, you can use the Undo History window to revert to the settings before the reset event.)

## LFE

This option appears when Neutron is inserted on a 5.1 or 7.1 surround track. When enabled, the LFE channel will be processed along with all other channels. When disabled, the LFE channel will not be processed by the associated module. If necessary, latency compensation is applied to the LFE channel when it is disabled, to ensure timing is maintained between all channels.

## Meters and Displays

The following meters and displays are available in the Compressor module:



### 1. Waveform Displays:

- **Scrolling waveform:** displays the amplitude of the input (uncompressed) and output (compressed) signals over time. The meter scrolls from right to left, with the most recent information on the right.
- **Input waveform:** the **dark grey** waveform displayed behind the output (wet) signal waveform.
- **Output waveform:** the **light grey** waveform displayed in front of the input (dry) signal waveform. When the signal is compressed, you can monitor the applied gain reduction compared to the input.
- **Sidechain waveform:** When Sidechain is enabled, the **purple** waveform is displayed in addition to the input (dry) signal waveform and output (wet) signal waveform. This waveform is necessary to set the threshold control when compressing via a sidechain signal.



2. **Gain Reduction Trace:** Draws a line that represents the gain reduction applied to the selected band over time. Use the **Gain Reduction Trace** to monitor and to set the response times (attack and release) and gain reduction envelope applied over time.

## Controls



### Threshold

Determines the signal level at which the compressor begins processing. **Threshold is only available when Modern or Vintage processing mode is enabled.**

### Knee

Adjusts a range around the threshold to control how abruptly processing is applied to the input as it approaches the threshold. **Knee is only available when Modern processing mode is enabled.**

- Higher values create a “soft knee” effect, which gradually introduces processing as the signal approaches the Threshold level. This provides subtler, more natural sounding compression.
- Lower values create a “hard knee” effect, which abruptly begins processing when the signal crosses the Threshold level. This offers more aggressive sounding compression and is often used on individual tracks, such as kick or snare drum.

### Auto Gain

Enables the Compressor to calculate the level difference between the input (uncompressed signal) and output (compressed signal) and automatically apply the calculated gain adjustment.

**i** Auto Gain adjusts the level of the compressed signal to compensate for any level difference between the uncompressed and compressed signals. The gain change introduced by auto gain is reflected in the output waveform, which may make it more difficult to differentiate between the input and output waveforms. **The gain reduction trace meter can be useful for monitoring gain reduction over time when Auto Gain is enabled.**

## Output Gain

Allows you to adjust the amount of gain applied to the signal after compression, to make up for any loss or increase in level caused by dynamics processing.

## Processing Modes

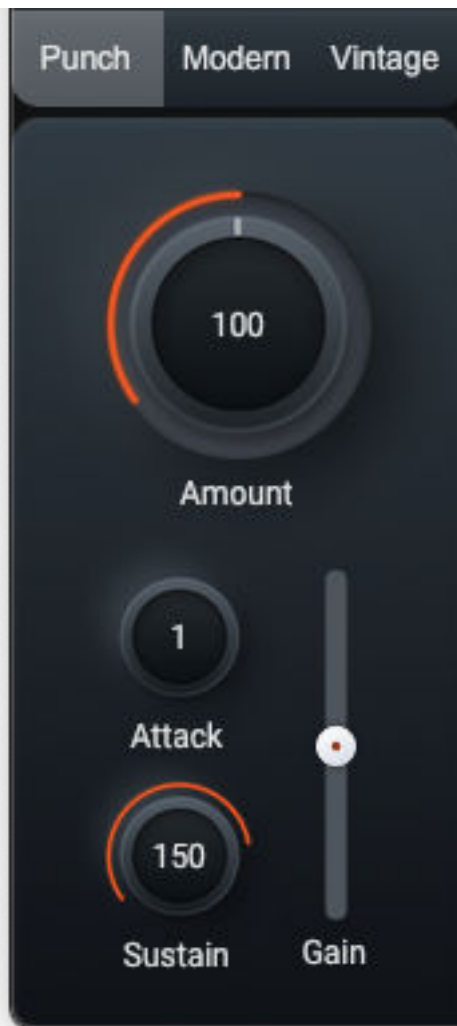
The Processing Mode affects the sound of dynamics processing for all bands in the Compressor. You can switch between the following processing modes:



1. **Punch:** Punch mode is an intent-based processor that provides direct control over dynamics with fewer knobs than a typical compressor. The term punch refers to the word musicians, producers, and engineers use to describe the sound of a musical element that has a fairly sharp transient shape like a Kick or Snare drum. Punch is designed to provide specific control over this sound in audio material.
2. **Modern:** Modern mode offers a transparent and clear dynamic processing sound. Much like the name describes, this mode reflects the sound of a modern digital compressor.
3. **Vintage:** Vintage mode offers less transparent, more lively and colorful sound.

## Punch

The Punch panel controls work together to directly increase or decrease the dynamic range of the input signal.



This mode streamlines settings to a single amount control and attack and release ballistics without the need of a threshold. The following controls are available:

- **Amount:** The Amount control is a single control for dynamics processing. Adjust this control to increase or decrease the dynamic range of musical hits. Settings below 100% decrease dynamic range, creating a consistent compression effect. Settings above 100% increase dynamics range, creating a punchy effect.
- **Attack:** Adjusts the rise time of the punch processing.
- **Sustain:** Adjusts the fall time of the punch processing.
- **Makeup Gain:** Determines the amount of static gain applied to the output signal *after* compression.

### Modern and Vintage

Modern and Vintage processing modes share many of the same controls.





- **Attack:** Determines the amount of time it takes (in milliseconds) for the signal to become fully compressed after exceeding the threshold level.
- **Release:** Adjust the amount of time (milliseconds) it takes for the Compressor to return to unity gain (recovers gain) when the input signal falls below the threshold, according to the rules set by the **Level Detection Mode**.
- **Auto Release (A): *Modern mode only.*** Enables the Compressor to analyze the input signal in order to automatically scale the Release time to values that will help to avoid pumping and maintain desired loudness in the processed signal.
- **Ratio:** Determines how much gain reduction will be applied to the entire signal or entire band when the threshold is crossed, according to the rules set by the **Level Detection Mode**.
  - A ratio setting of **1:1** will cause no attenuation to signals that exceed the **threshold**.
  - Ratio settings of **10:1** or greater will cause the compressor to function as a limiter.
  - A ratio above **1.0** will cause compression. But, if you have a ratio below 1.0, it will cause the module to function as an Expander. When performing expansion in this way, the Gain Reduction Meter will show an inverted meter display.



By applying high ratios, you can achieve a pumping effect. Although not always desired, this can be used to add character to your audio. This effect is particularly useful on room mics.

- **Gain Reduction Meter:** Displays the current instantaneous amount of gain reduction in decibels (dB) applied to the signal.
- **Makeup Gain:** Determines the amount of static gain applied to the output signal *after* compression.
- **Mix:** Adjust this slider to control the dry/wet mix of the direct, unprocessed signal with the processed signal for the associated band.

## Sidechain

Allows you to trigger processing based on a signal other than the input to the compressor. You can choose either an internal or external sidechain input.

- When sidechain is enabled, Neutron will automatically adjust attack, release, ratio, and threshold controls; set the input to external full, disable auto-gain, and set the level detection mode to peak.
- You can select the type of sidechain input signal using the sidechain dropdown menu. Options include:
  - **Internal (INT.):** Choose from any band currently placed in the Compressor module. Using an internal sidechain input allows you to trigger gain reduction in the selected band from the amount of energy in a different band. For example, you can accentuate perceived low end energy by reducing high end any time the lowest band exceeds a defined threshold. Internal Full allows you to trigger gain reduction using the sonic information from all active bands.
  - **External (EXT.):** Choose from any audio from another track or bus. Using an external sidechain input will help balance a signal with other tracks. The external audio source can also be filtered through any of the bands in the Compressor module by choosing any of the External bands (for example, Ext. Band 1).

# 10. Transient Shaper

Transient Shaper can be used to transparently alter and shape your sound's attack and sustain characteristics while enhancing the sound's presence without affecting the overall level.

## Module Interface

The Transient Shaper module includes the following sections:



1. [Meters and Displays](#)
2. [Module Header](#)
3. [HUD Controls](#)

## Meters and Displays

Meters and displays illustrate how the Transient Shaper is responding to and processing the input signal.



## Multiband Crossover Spectrum View

Access the Multiband Crossover Spectrum View and controls. For more information, see the Multiband Crossover Spectrum View chapter.

## Waveform Displays

- **Input signal** waveform is displayed in **dark gray**, behind the output signal waveform.
- **Output signal** waveform is displayed in **light gray**, in front of the input signal waveform.

## Gain Envelope Trace

Displays the incoming signal with a superimposed colored curve that indicates the amount of gain adjustment applied in real time when you're shaping an envelope.



Use the **Gain Envelope Trace** to monitor and to set the response times (attack and release) and gain reduction envelope applied over time. It can show the effect of changing envelope modes can have on allowing audio to return to 0 dB of gain before the next transient, is an important tool when seeking to achieve maximum transparency.

## Module Header



1. Delta
2. Channel Modes
3. Envelope Modes
4. Learn
5. Reset
6. LFE (*not pictured, surround instances only.*)

## Delta

Monitors the difference in the signal before and after the Transient Shaper module, enabling you to hear exactly how the module is changing your sound.

## Channel Modes

- **Stereo:** Stereo Processing in Neutron allows users to process the audio content to the Left and Right audio channels equally.
- **Mid/Side (M/S):** Mid/Side (M/S) Processing in Neutron allows users to shape the spatial characteristics of a mix by controlling the mid (center) and side (stereo) audio elements separately. M/S processing lets users fine-tune center-panned elements like vocals or bass independently from the stereo width of effects and ambient sounds.

## Envelope Modes

Determines the type of ADSR envelope settings to apply. Choose from three different Envelope modes:

- **PRECISE:** Fastest recovery time to next transient. Most accurate and responsive when adding or removing attack to a signal.
- **BALANCED:** Middle of all three modes. Quick attack and a medium release time when recovering from one transient to the next.
- **LOOSE:** Slowest transient recovery time and adds large amounts of sustain.

## Learn

Enable **Learn** in the multiband mode to quickly have natural crossover cutoff points using a few criteria and minima in the spectrum. Placement suggestions are based on intelligently identified areas of sonic importance in your audio signal such as sibilance, resonance, and rumble.

**i** After Learn determines and sets the ideal values for the crossover cutoffs, it will turn itself off automatically. When Learn button is toggled OFF the button is grey instead of orange. You can also manually disable Learn when it is active by clicking the Learn button again.

**i** For learning to behave as expected, the module must be receiving audio input while Learn is engaged. The Learn button will be disabled if only one band exists in a multi-band capable module.

## Reset

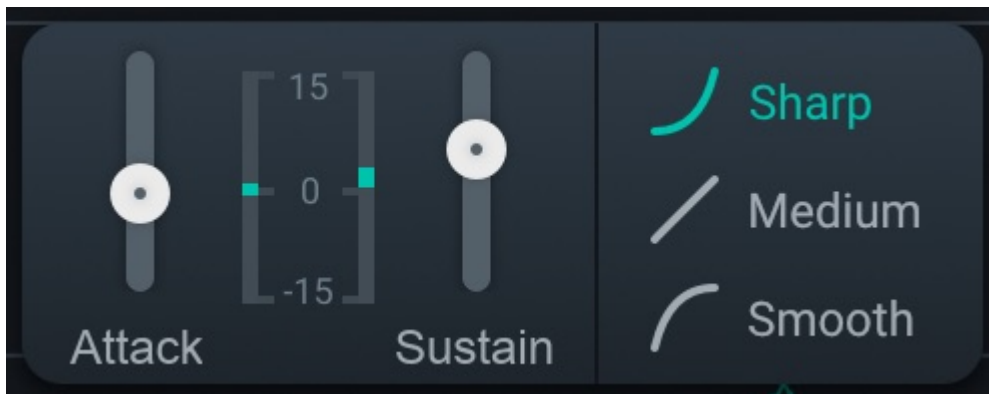
Enable **Reset** to revert the entire Transient Shaper module back to factory default. If you wish to return to settings you were using before clicking the Reset button, you can use the Undo History window to revert to the settings before the Reset event.

## LFE

This option appears when Neutron is inserted on a 5.1 or 7.1 surround track. When enabled, the LFE channel will be processed along with all other channels. When disabled, the LFE channel will not be processed by the associated module. If necessary, latency compensation is applied to the LFE channel when it is disabled, to ensure timing is maintained between all channels.

## HUD Controls

The controls in the Transient Shaper module work together to customize your sound's shape. The following controls are available in the Transient Shaper HUD:



### Attack

Adjusts the amount of level (decibels) applied to the initial transient.

- Increasing Attack results in an exaggerated and punchy sound.
- Decreasing Attack results in a softer, warmer sound.

### Gain Difference Meter

Displays the current average amount of gain in decibels (dB) applied to the signal.




### Sustain

Adjusts the amount of level (decibels) applied to the sustain of the transient.

- Increasing Sustain results in a dense, airy sound.
- Decreasing Sustain results in tighter, more aggressive sound.

### Contour

Control the per-band response across a multiband spectrum of Transient Shaper:

Shape	Icon	Description
	<b>SHARP</b>	Fast and tight release time. Useful for short and staccato audio.
	<b>MEDIUM</b>	Transparent and linear release envelope. Useful on most audio.
	<b>SMOOTH</b>	The slowest envelope of all modes and allows more of the initial transient through to affect Sustain in a gentle way. Useful for sustained audio.

# 11. Exciter

The Exciter can be used to add subtle or dramatic harmonic distortion to enhance and accentuate elements in your audio.

## Module Interface

The Exciter module includes the following sections:



1. [Module Header](#)
2. [Meters and Displays](#)
3. [Controls](#)

## Module Header



1. Delta
2. Tame
3. Oversampling
4. Pre-Emphasis Modes
5. Learn
6. Reset




7. LFE : (Not pictured, surround instances only.)


## Delta

Monitors the difference in the signal before and after the Exciter module, enabling you to hear exactly how the module is changing your sound.

## Tame

When Tame is enabled, the input signal's original dynamics are restored and distortion is applied evenly to performances with varying dynamics. When Tame is disabled the Exciter acts as a typical stompbox effect, where distortion is applied based on the level of the original signal, amount of applied gain, and the distortion profile.

 In instances where gain boosts occur due to liberal use of distortion the Tame button will drop the volume of the signal to restore the original dynamics of the input signal.

 Tame is best used in situations where you want to maintain the original musical expression of an input signal. For example, applying the Exciter to a vocal part that has soft and loud dynamic material may result in reducing the dynamic range of the part entirely. Adding Tame will provide an evenly distributed distortion effect and maintain that vocal part's dynamics.

## Oversampling

Oversampling in the Exciter improves sound quality by temporarily increasing the sample rate during audio processing. Processing audio at a higher sample rate reduces aliasing, or unwanted artifacts, which can occur when new high-frequency harmonics exceed the Nyquist frequency. After processing, the signal is downsampled back to the original rate to preserve a cleaner and more accurate output. This applies 4x oversampling. The rate is not adjustable.

## Pre-Emphasis Modes

Used to apply subtle harmonic emphasis to saturation in different areas of the frequency spectrum. These differences allow mild changes to the low-mids (vocal thickness or body) or high-mids (vocal presence). The types of Pre-Emphasis Modes available to you are:

- **FULL:** low-mid frequency bump.
- **DEFINED:** high-mid frequency bump.
- **CLEAR:** gentle, low-mid frequency attenuation.
- **FLAT:** no Pre-Emphasis is applied.

## Learn

Enable Learn to allow the Exciter to quickly identify natural crossover cutoff points and provide cutoff placement suggestions based on intelligently identified minima in the spectrum.

## Reset

Enable Reset to revert the entire Exciter module back to factory default. If you wish to return to settings you were using before clicking the Reset button, you can use the Undo History window to revert to the settings before the Reset event.

## LFE

This option appears when Neutron is inserted on a 5.1 or 7.1 surround track. When enabled, the LFE channel will be processed along with all other channels. When disabled, the LFE channel will not be processed by the associated module. If necessary, latency compensation is applied to the LFE channel when it is disabled, to ensure timing is maintained between all channels.

## Meters and Displays

Meters and displays illustrate how the Exciter is responding to and processing the input signal.



1. **Multiband Crossover Spectrum View:** Access the Multiband Crossover Spectrum View and controls. For more information, see the [Multiband Crossover Spectrum View](#) in the General Controls chapter.)
2. **Spectrum Analyzer:** displays the magnitude (amplitude in dB) of the input and output signals across the frequency spectrum in real-time.
  - **Input signal spectrum:** displayed as a dark gray spectrum, behind the output spectrum.
  - **Output signal spectrum:** displayed as a light gray spectrum, in front of the input spectrum.

## Controls

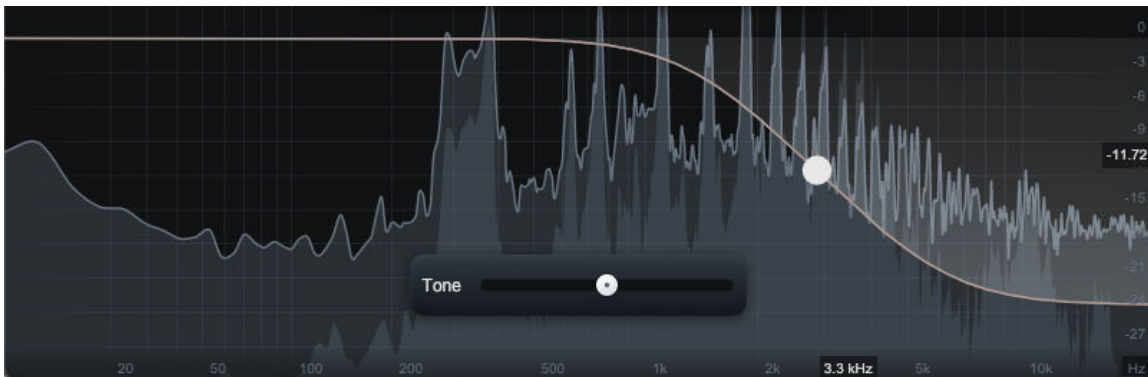
### Tone



Adjusts the balance of distortion applied to low or high frequency content. Settings between -100 and 0 emphasize low frequency content and settings between 0 and 100 emphasize high frequency content.

**i** The Tone slider affects the entire wet signal which allows for powerful control over the Exciter Module's entire frequency response.

### Post Filter



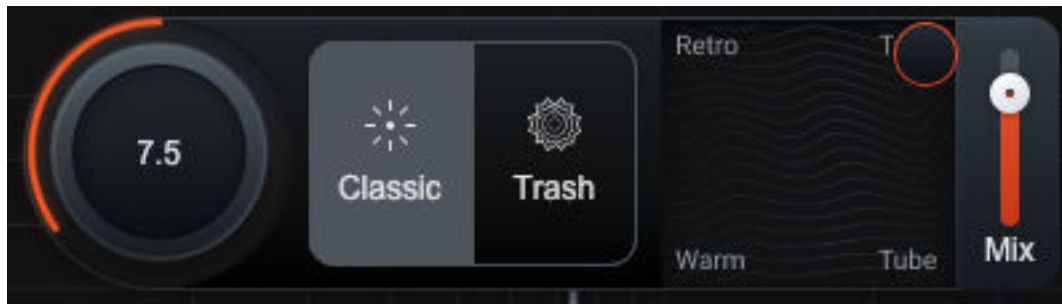
Applies gentle shelving for attenuation. Displayed as a high shelf icon as high shelf icon overlaid on the multiband spectrum view. Drag the Post Filter node to adjust the frequency and the gain of the filter.

Post Filter Adjustments	Ranges
Maximum Attenuation	-12dB
Frequency Range	1kHz to 20kHz

**i** The Post Filter will affect the entire wet signal which can help adjust/attenuate/tame the Exciter module's high end frequency response.

### HUD Controls

The following controls are available in the Exciter module HUD:



## Drive

Adjust to control the amount of excitation applied to the signal.

## Processing Mode

The processing mode in the Exciter switches the style of distortion between subtle and dramatic harmonic profiles per band. Classic processing mode provides four modes for subtle excitation use cases. Trash processing mode provides four modes for dramatic distortion use cases. The Trash name refers to the Trash 2 distortion product made by iZotope. You can choose between **Classic** or **Trash** modes.

- **Classic:**
  - **Retro:** Edgy, biting, transistor-based fuzz with a slow decay of odd harmonics.
  - **Tape:** Bright, emphasis on odd harmonics without adding damaging artifacts.
  - **Tube:** Clear tonal excitation with emphasis on dynamics and transient attacks with a less harsh result than Tape or Retro.
  - **Warm:** Similar to Tube, but with quickly decaying even harmonics that add color and character.
- **Trash:**
  - **Overdrive**
  - **Scream**
  - **Clipper**
  - **Scratch**

## X/Y Pad

Blends different harmonic profiles to achieve the sound you want to hear.

## Mix

Adjusts how much of the wet (processed) signal is applied to the dry (unprocessed) signal. The processing on the signal is dictated by the X/Y pad settings. Using the mix slider for a different blend of signals can have varying results:

- **For a more extreme effect:** set the blend to the maximum amount.
- **For a less distinct and more integrated effect:** set the blend to the middle of the slider or lower.

## 12. Sculptor

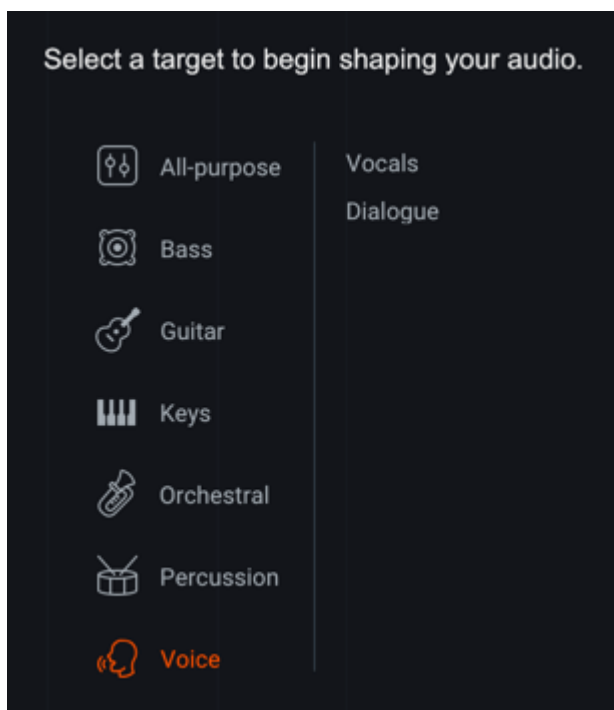
Sculptor is a spectral-shaping tool that brings clarity and polish to your tracks. This means removing muddiness, reducing harshness, and helping shape your tracks into better versions of themselves. Spectral shaping is multiband compression taken to the extreme. Instead of compressing four frequency bands, spectral shaping compresses the signal in up to 32 frequency bands, allowing for a control that is more tailored for the signal. Compression thresholds can be set toward a desired spectral shape or remain adaptively adjustable to compress the signal “toward itself”, i.e. its own time-averaged spectral shape.

Sculptor will apply dynamics processing to areas within the frequency spectrum based on a threshold aimed at hitting the selected **target curve**. The target curves are the idealized spectral version of the selected instrument. When using this with multiple instrument tracks, this results in greater instrumental separation.

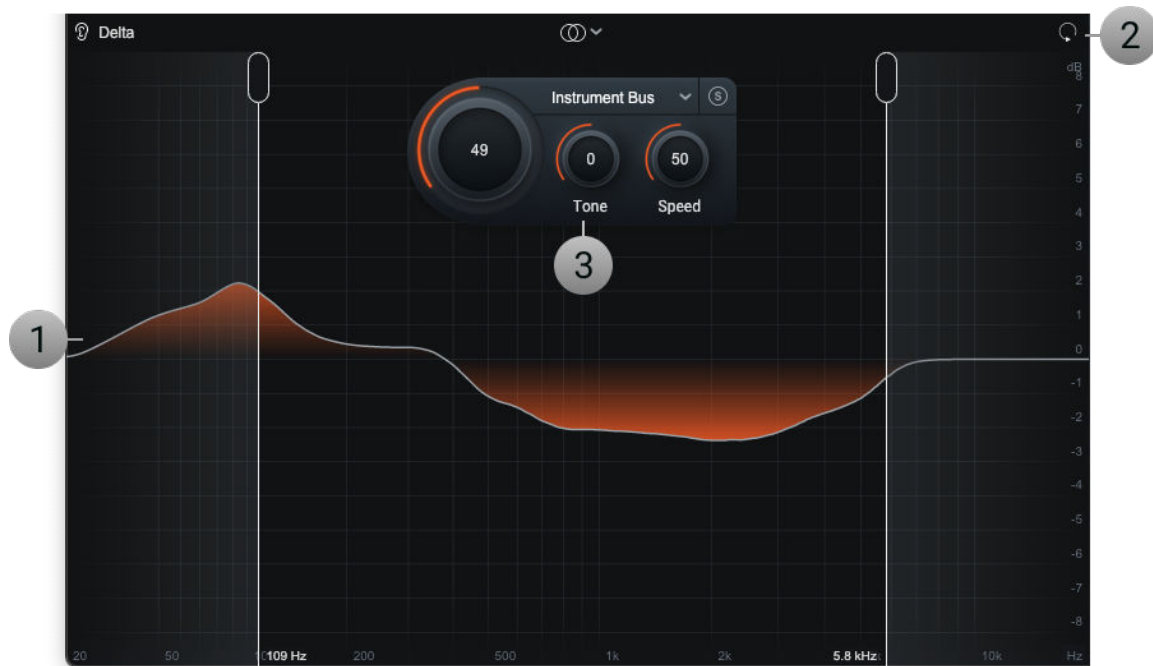
**i** Sculptor is designed specifically to not add any distortion, preserving the integrity of the original signal as transparently as possible.

### Module Interface

Upon opening Sculptor, or after pressing the Reset button, you will be prompted to select a target curve. Choose a target curve that best reflects the instrument you are working on to load it.



After selecting a target curve, you will be able to interact with the Sculptor module controls.



The Sculptor module includes the following sections:

1. [Meters and Displays](#)
2. [Module Header](#)
3. [Controls](#)

## Meters and Displays

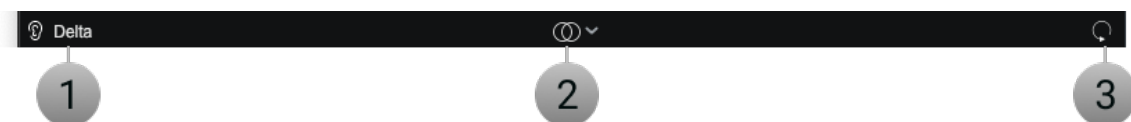
The following meters and displays are included in the Sculptor module:



- **Difference Meter:** Displays the amount of gain that is being added or removed by dynamics processing in order to match the selected frequency range to the target curve.

## Module Header

The following controls are included in the module header area of the Sculptor module:



1. **Delta**
2. **Channel Modes**
3. **Reset**
4. **LFE (not shown):** When enabled, the LFE channel will be processed along with all other channels. When disabled, the LFE channel will not be processed by the associated module. If necessary, latency compensation is applied to the LFE channel when it is disabled, to ensure timing is maintained between all channels. **Only appears in surround instances with LFE channels (i.e. 5.1 or 7.1).**

### Delta

Monitors the difference in the signal before and after the Sculptor module, enabling you to hear exactly how the module is changing your sound.

### Channel Modes

- **Stereo:** Stereo Processing in the Sculptor allows users to process the audio content to the Left and Right audio channels equally.

- **Mid/Side (M/S):** Mid/Side (M/S) Processing in Sculptor allows users to shape the spatial characteristics of a mix by controlling the mid (center) and side (stereo) audio elements separately. M/S processing lets users fine-tune center-panned elements like vocals or bass independently from the stereo width of effects and ambient sounds.
- **Transient/Sustain (T/S):** Transient/Sustain processing allows users to adjust the transient and sustain portions of an audio signal separately. The Transient represents the initial attack of a sound, like the hit of a drum or pluck of a string and enhancing this can add definition and punch to rhythmic elements. The Sustain refers to the resonant, longer-lasting part of the sound that follows the transient, capturing depth and tonal qualities.

## Reset

Returns all controls in the Sculptor module to their factory default values. If you wish to return to settings you were using before clicking the Reset button, you can use the Undo History window to revert to the settings before the Reset event.)

## Controls

The Sculptor module includes the following controls:

### Range Selectors

You can adjust the area of applied processing by moving the Range Selector handles.



Move the Range Selectors left or right across the display.

- With a **narrow range**, you can surgically apply spectral shaping to areas with too much or too little energy by limiting processing to meet target curve on a specific range.
- With a **wide range**, you can address coloration similar to an EQ by applying processing on the whole spectrum to adjust overall balance.



## HUD Controls

The controls in the Sculptor module work together to influence the shape, speed, and target of the spectral shaping applied to the input signal. The following controls are available in the Sculptor HUD:



- **Amount:** Adjusts the amount of processing applied to meet your selected target.
- **Target Curve Menu:** Determines the baseline target curve for Sculptor to apply to your track. We designed a variety of target curves to specifically address different instrument types. Each target curve represents an idealized version of that instrument's spectral characteristics.
- **Tone:** Adjusts the timbral characteristics of the signal.
- **Speed:** Adjusts the ballistics of the applied compression.
- **Solo:** Enable to hear processing on only the range selected.

## 13. Unmask

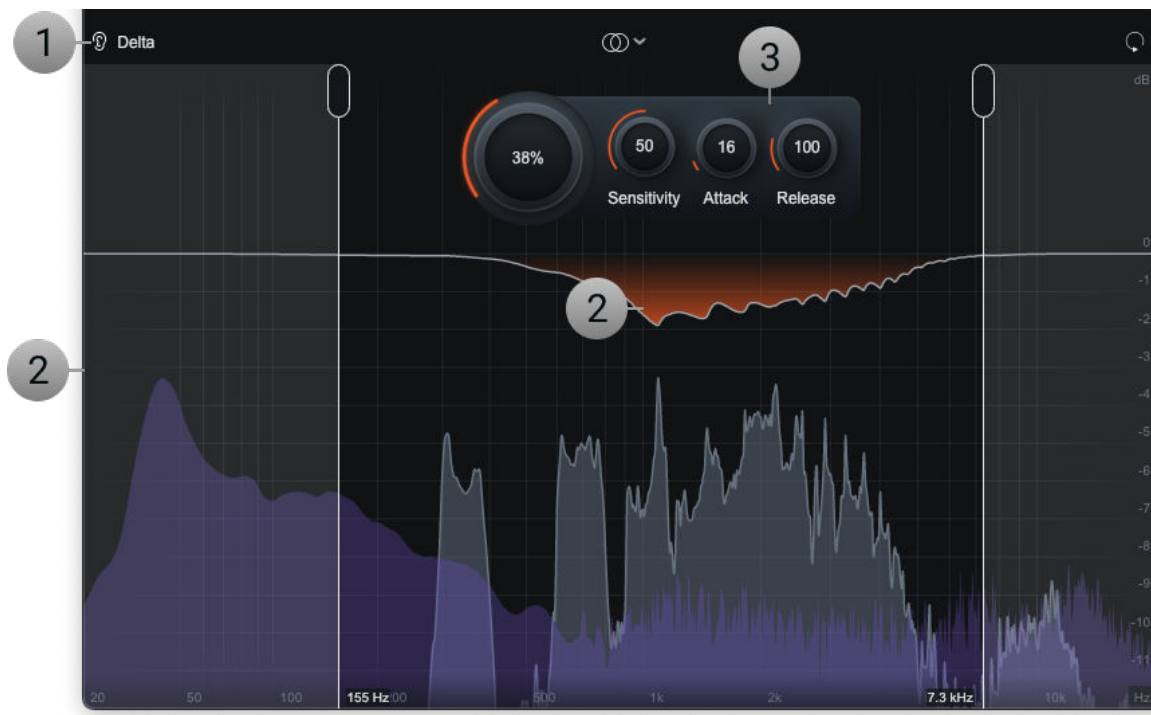
Unmask is a dynamic sidechain tool that provides a fast and high-quality method for creating space between two tracks. For example, this tool gives you the ability to promote a kick drum over a bass or a vocal over a guitar in a mix. Unmask leverages spectral shaping technology and [masking meter](#) technology to identify areas between two tracks that occupy the same (or similar) frequency range and resolve conflicts for you. When a conflict is detected, Unmask applies dynamic spectral attenuation to the input signal to reduce the amount of psychoacoustic masking that the input signal imparts in the sidechain signal. Unmask divides the frequency spectrum into 32 bands, allowing for a more transparent sound when processing audio, unlike a compressor which could be limited to 1–3 bands. The Unmask module is a *dynamic* processing tool, meaning that its processing is applied only during the times when masking occurs, as opposed to a fixed EQ.

Several controls are available to tailor the Unmask processing to your specific use case. They adjust the ballistics of the sound and limit the frequency range of processing.

Upon opening Unmask, you will be prompted to set a sidechain input to start processing two signals. You can set the sidechain input in both the Neutron mothership and the Unmask component plugin.

### Module Interface

The Unmask module includes the following sections:



1. [Module Header](#)
2. [Meters and Displays](#)
3. [Controls](#)

## Module Header

The following controls are included in the module header area of the Unmask module:



1. **Delta**
2. **Channel Modes**
3. **Reset**
4. **LFE (not shown)**: This option appears when Neutron is inserted on a 5.1 or 7.1 surround track. When enabled, the LFE channel will be processed along with all other channels. When disabled, the LFE channel will not be processed by the associated module. If necessary, latency compensation is applied to the LFE channel when it is disabled, to ensure timing is maintained between all channels.

### Delta

Monitors the difference in the signal before and after the Unmask module, enabling you to hear exactly how the module is changing your sound.

### Channel Modes

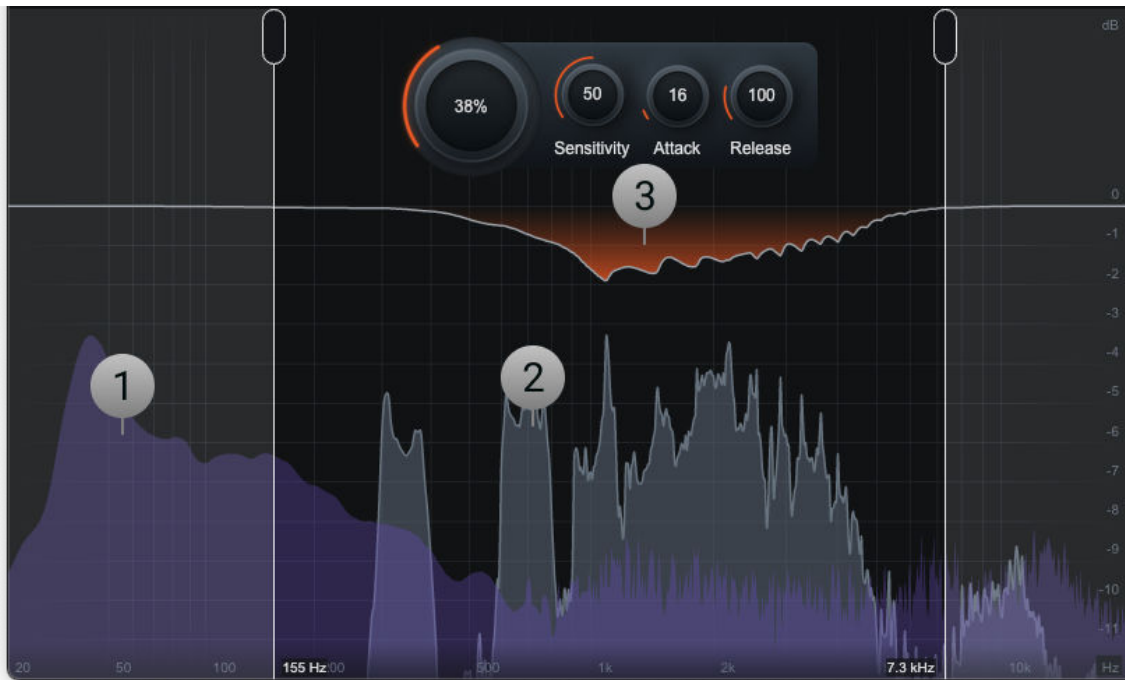
- **Stereo**: Stereo Processing in Unmask allows users to process the audio content to the Left and Right audio channels equally.
- **Mid/Side (M/S)**: Mid/Side (M/S) Processing in Unmask allows users to shape the spatial characteristics of a mix by controlling the mid (center) and side (stereo) audio elements separately. M/S processing lets users fine-tune center-panned elements like vocals or bass independently from the stereo width of effects and ambient sounds.
- **Transient/Sustain (T/S)**: Transient/Sustain processing allows users to adjust the transient and sustain portions of an audio signal separately. The Transient represents the initial attack of a sound, like the hit of a drum or pluck of a string and enhancing this can add definition and punch to rhythmic elements. The Sustain refers to the resonant, longer-lasting part of the sound that follows the transient, capturing depth and tonal qualities.

### Reset

Enable **Reset** to revert the entire Unmask module back to factory default. If you wish to return to settings you were using before clicking the Reset button, you can use the Undo History window to revert to the settings before the Reset event.)

## Meters and Displays

The following meters and displays are included in the Unmask module:



1. **Sidechain Input spectrum:** displays as **purple** spectrum overlaid on the input signal spectrum.
2. **Input signal spectrum:** displays the dry (unprocessed) signal as a **dark gray** spectrum behind the output signal.
3. **Difference Meter:** Displays the amount of gain that is being removed by dynamics processing in order to minimize frequency masking on your input signal from the sidechain signal.

## Controls

The Unmask module includes the following controls:

### Range Selectors

You can adjust the frequency area of applied processing by moving the Range Selector handles.



Move the Range Selectors left or right across the display.

- With a **narrow range**, you can tailor Unmask processing to specific areas in the frequency spectrum, like the low end or midrange. This will exclude Unmask processing of the spectrum outside of the Range Selectors.

- With a **wide range**, you can apply Unmask processing to the whole spectrum to minimize frequency masking for the entire input signal.

## HUD Controls

The controls in the Unmask module work together to influence the shape and speed of Unmask processing applied to the input signal. The following controls are available in the Unmask HUD:



Amount and Sensitivity should be adjusted together to determine the magnitude of masking detected and level of processing needed to minimize masking effects.

- **Amount:** Determines the amount of Unmask processing applied to the input signal from the sidechain signal when masking is detected. This scales the depth of applied spectral attenuation.
- **Sensitivity:** Scales the threshold used to determine whether masking is significant enough to begin processing. This affects how much masking is being detected.

**i** If you are unable to process audio, make sure that you have a signal routed to the sidechain input of Neutron or the Unmask Module.

- **Attack:** Determines how quickly unmasking is applied once the level of masking between the two signals reaches the threshold of action.
- **Release:** Determines how quickly unmasking is stopped once the level of masking between the two signals goes below the masking threshold.

# 14. Clipper

Neutron's Clipper enables you to add power to a signal while reclaiming headroom. Clipper is feature-packed with unparalleled flexibility for intuitive soft clipping across multiple bands, mid/side channels, and transient/sustain content.

## Module Interface

The Neutron Clipper module includes the following sections:



1. Module Header
2. Module Controls
3. Meters and Displays

## Module Header

The controls in the module header affect all enabled bands in the Clipper module.



1. Delta
2. Oversampling
3. Channel Modes
4. Learn
5. Reset
6. Multiband Crossover Spectrum

## Delta

Monitors the difference in the signal before and after the Clipper module, enabling you to hear exactly how the module is changing your sound.

## Oversampling


Oversampling in Clipper improves sound quality by temporarily increasing the sample rate during audio processing. Processing audio at a higher sample rate reduces aliasing, or unwanted artifacts, which can occur when new high-frequency harmonics exceed the Nyquist frequency. After processing, the signal is downsampled back to the original rate to preserve a cleaner and more accurate output. This applies 4x Oversampling and the rate is not adjustable.

## Channel Modes

- **Stereo:** Stereo Processing in Neutron Clipper allows users to process the audio content to the Left and Right audio channels equally.
- **Mid/Side (M/S):** Mid/Side (M/S) Processing in Neutron Clipper allows users to shape the spatial characteristics of a mix by controlling the mid (center) and side (stereo) audio elements separately. M/S processing lets users fine-tune center-panned elements like vocals or bass independently from the stereo width of effects and ambient sounds.
- **Transient/Sustain (T/S):** Transient/Sustain processing allows users to adjust the transient and sustain portions of an audio signal separately. The Transient represents the initial attack of a sound, like the hit of a drum or pluck of a string and enhancing this can add definition and punch to rhythmic elements. The Sustain refers to the resonant, longer-lasting part of the sound that follows the transient, capturing depth and tonal qualities.

## Learn

Enables the Clipper to search for natural crossover cutoff points for multiband processing. The Learn button will be disabled if only one band exists in a multi-band capable module.

 After Learn determines and sets the ideal values for the crossover cutoffs, it will turn itself off automatically. When Learn button is toggled OFF the button is grey instead of orange. You can also manually disable Learn when it is active by clicking the Learn button again.

## Reset

Returns all controls in the Clipper module to their factory default values. If you wish to return to settings you were using before clicking the **Reset** button, you can use the Undo History window to revert to the settings before the reset event.)

## Multiband Crossover Spectrum

Access the Multiband Crossover Spectrum controls. For more information, see the [\[→Multiband Crossover Spectrum View\]](#).)

## Meters and Displays

The following meters and displays are available in the Clipper module:



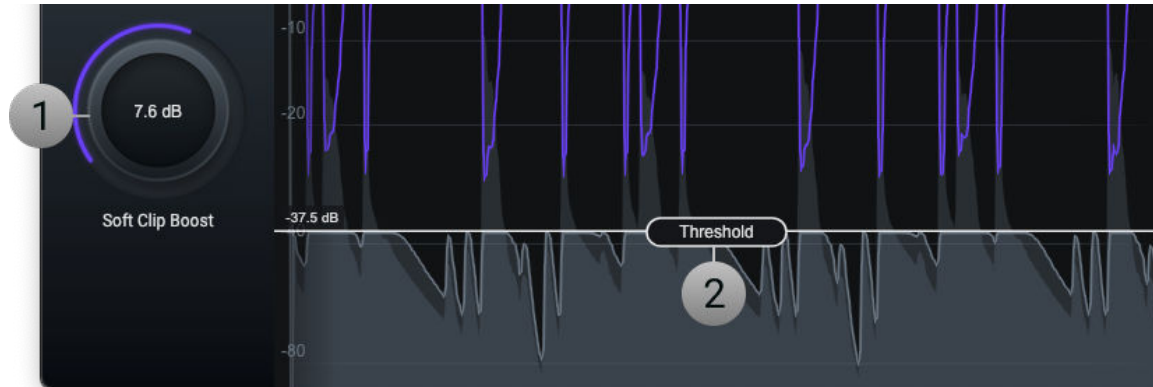
### 1. Waveform Displays:

- **Scrolling waveform:** displays the amplitude of the input (unprocessed) and output (processed) signals over time. The meter scrolls from right to left, with the most recent information on the right.
  - **Input waveform:** the **dark grey** waveform displayed behind the output (wet) signal waveform.
  - **Output waveform:** the **light grey** waveform displayed in front of the input (dry) signal waveform. When the signal has clipping applied, you can monitor the positive gain compared to the input.
2. **Gain Trace:** Draws a line that represents gain reduction or positive gain applied to the selected band over time. Use the **Gain Trace** to monitor and to set positive gain or gain reduction with the Soft Clip Boost and Threshold controls.



## Controls

The following controls are available in the Clipper module:



### Soft Clip Boost

Controls the knee of the soft clipper and works in dB to smoothly boost the signal into the hard clip threshold.

### Threshold

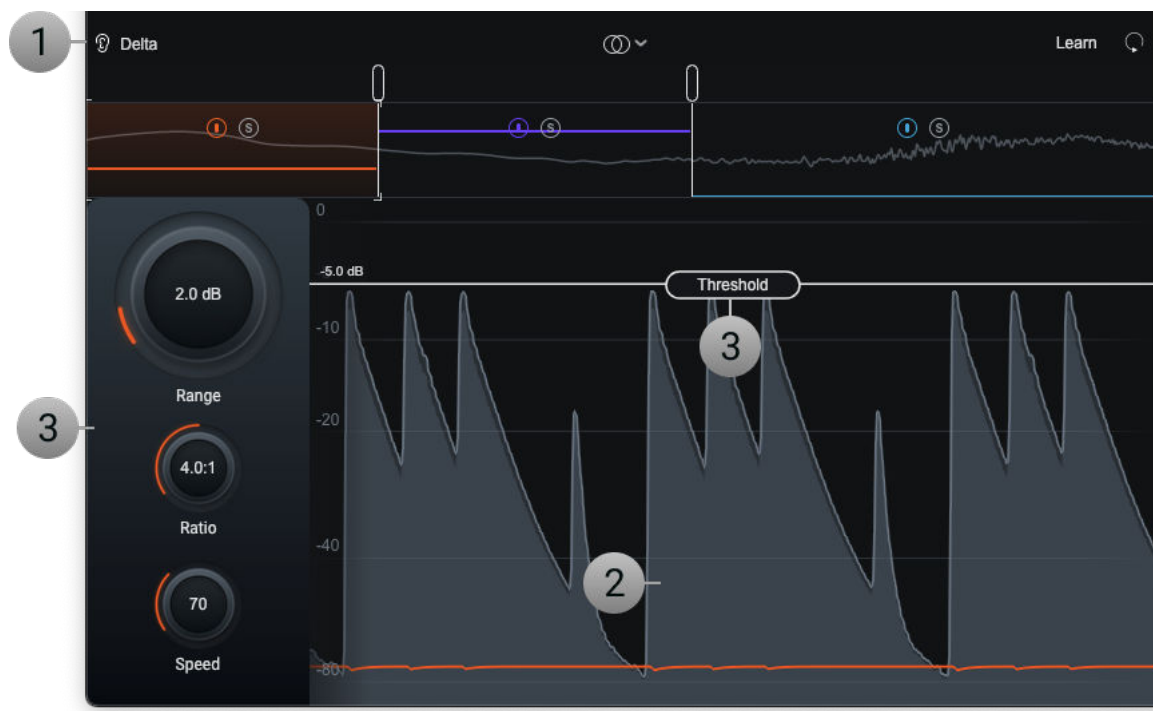
Controls the level where the signal will be hard clipped.

# 15. Density

The Density module is a surgical upward compressor to keep your key elements pinned upfront in the mix. It is designed to effortlessly smooth out dynamics, giving your audio more presence, detail, and fullness. Unlike the Compressor module in Neutron, which reduces the dynamic range by lowering louder signals, Density boosts the softer parts of the audio and leaves any content above the threshold completely unaffected.

## Module Interface

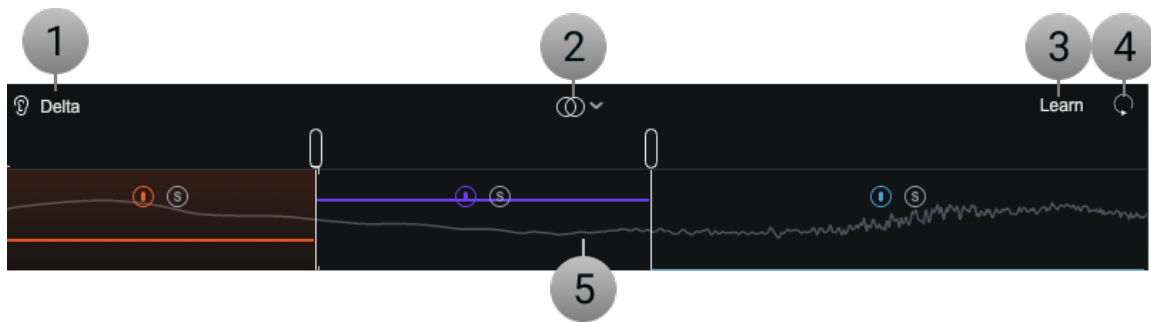
The following sections are available in the Denisty module:



1. Module Header
2. Meters and Displays
3. Controls

## Module Header

The following controls are available in the Density module's header:



1. Delta
2. Channel Modes
3. Learn
4. Reset
5. Multiband Spectrum

## Delta

Monitors the difference in the signal before and after the Density module, enabling you to hear exactly how the module is changing your sound.

## Channel Modes

- **Stereo:** Stereo Processing in Neutron allows users to process the audio content to the Left and Right audio channels equally.
- **Mid/Side (M/S):** Mid/Side (M/S) Processing in Neutron allows users to shape the spatial characteristics of a mix by controlling the mid (center) and side (stereo) audio elements separately. M/S processing lets users fine-tune center-panned elements like vocals or bass independently from the stereo width of effects and ambient sounds.
- **Transient/Sustain (T/S):** Transient/Sustain processing allows users to adjust the transient and sustain portions of an audio signal separately. The Transient represents the initial attack of a sound, like the hit of a drum or pluck of a string and enhancing this can add definition and punch to rhythmic elements. The Sustain refers to the resonant, longer-lasting part of the sound that follows the transient, capturing depth and tonal qualities.

## Learn

Enables the Density to search for natural crossover cutoff points for multiband processing. The Learn button will be disabled if only one band exists in a multi-band capable module.

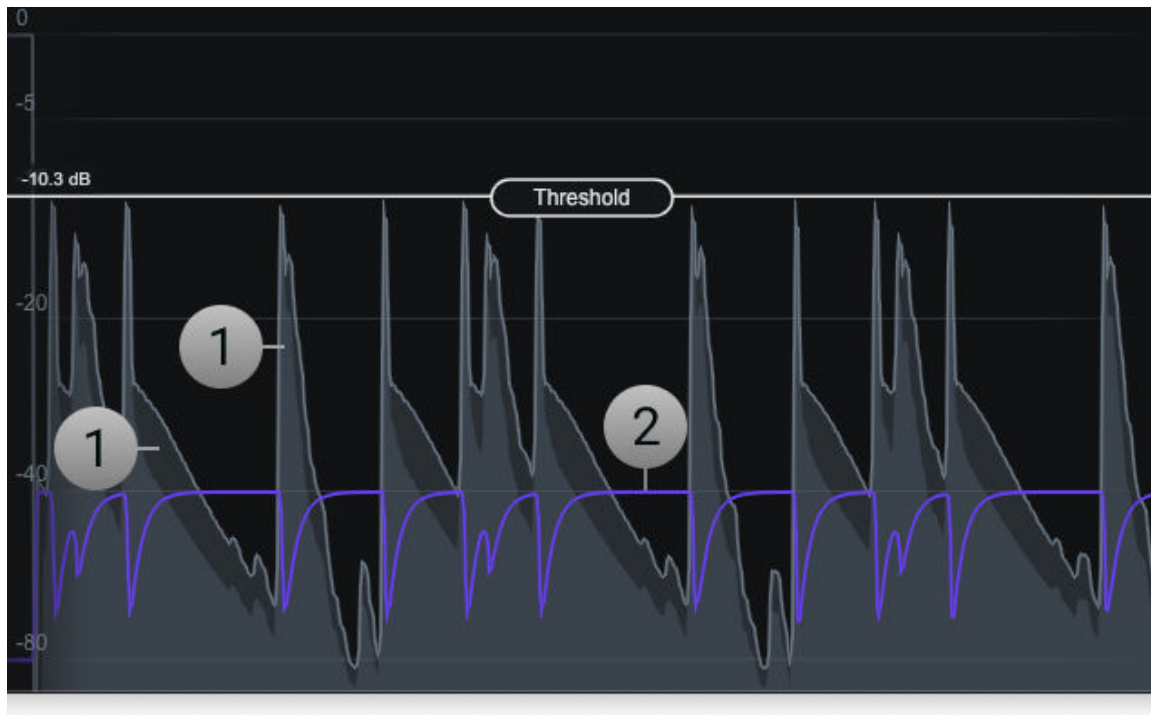
## Reset

Returns all controls in the Density module to their factory default values. If you wish to return to settings you were using before clicking the **Reset** button, you can use the Undo History window to revert to the settings before the reset event.)

## Multiband Spectrum

Access the Multiband Crossover Spectrum controls. For more information, see the [\[→Multiband Crossover Spectrum View\].](#))

## Meters and Displays

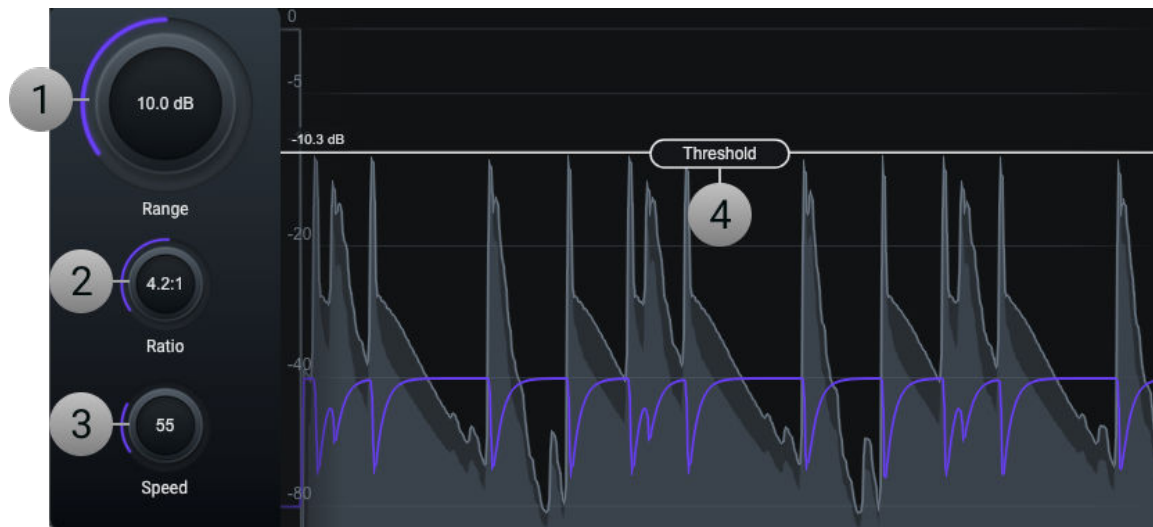


### 1. Waveform Displays:

- **Scrolling waveform:** displays the amplitude of the input (unprocessed) and output (processed) signals over time. The meter scrolls from right to left, with the most recent information on the right.
- **Input waveform:** the **dark grey** waveform displayed behind the output (wet) signal waveform.
- **Output waveform:** the **light grey** waveform displayed in front of the input (dry) signal waveform. When the signal has upward compression applied, you can monitor the positive gain compared to the input.

### 2. Gain Trace: Draws a line that represents changes in gain to the selected band over time. Use the **Gain Trace** to monitor the amount of upward compression applied to your signal.

## Controls



1. Range
2. Ratio
3. Speed
4. Threshold

### Range

Range limits how much positive gain is applied to the signal once it falls below the Threshold. This will set a maximum gain range from 0 to 20dB.

### Ratio

Ratio determines how much quieter signals are increased. Higher Ratio settings will boost the signal more aggressively.

For example, a ratio of 2:1 means that for every 2 dB below the threshold, the output level is increased by 1 dB. In contrast to downward compression (where a higher ratio results in stronger attenuation), here it results in more gain applied to quiet sounds.

### Speed

Speed determines how fast or slow the Density module boosts quiet sounds that fall below the Threshold. A setting of 1ms applies fast and aggressive changes in gain while settings closer to 300ms applies slow and smoother changes to gain. Speed controls an intricate combination of lookahead, attack, and release in order to leave signals above the threshold completely unaffected. As a result, there is a phasey sound as Speed is adjusted. This only happens when the parameter is adjusted.

**Threshold**

Sets the level at which upward compression starts. When the input signal falls below the Threshold the Density module will boost quieter sounds. Unlike the Neutron Compressor, where louder sounds are reduced when signals cross the Threshold, the Density module does the opposite to lift softer elements of your track.

# 16. Phase

Out-of-sync signals sound weak and empty, and asymmetrical waveforms eat up headroom in your mix. Phase learns any asymmetry in a single signal or phase issues with another track in seconds, offering the tools and visualizations to fine-tune as you need.

- **Phase Rotation:** The Phase module can automatically correct asymmetrical waveforms in your mix like dialogue, vocals or brass instruments. Correcting asymmetrical waveforms in your mix can result in more headroom in your mix bus. This can also be used for simpler purposes, such as inverting signal polarity. Adjusting phase will change the input's amplitude characteristics but not result in a time-shift.
- **Time Delay:** The Phase module can automatically time-shift two elements of your mix that are interacting destructively like a multi-mic'd drum recording. This can create punchier and clearer interactions between elements of your mix once they are summed at the mix bus.

## Module Interface

The following sections are available in the Phase module:



- Module Header
- Meters and Displays
- Controls

## Module Header

The following controls are available in the module header:







1. Delta
2. Oscilloscope Type
3. Oscilloscope Time
4. Reset

## Delta

Monitors the difference in the signal before and after the Delta module, enabling you to hear exactly how the module is changing your sound.





### Oscilloscope Type Display

Displays different waveform information for the input signal and sidechain in the Phase module's main metering. The 4 different options are outlined below:

Menu Selection	Meter and Display	Description
Main		Displays the output signal of the Phase module.
SC		Displays the external sidechain signal.
Main & SC		Displays the output signal of the Phase module in gray and the external sidechain signal in purple.
Combined		Displays the sum of the output signal and the external sidechain signal with a single waveform.

### Oscilloscope Time Display

The Oscilloscope time display provides different options of resolution for monitoring the waveform in the main view of the Phase module. This view is tempo synced to your DAW's tempo.

Menu Selection	Oscilloscope Display	Description
1 bar		Displays 1 bar of tempo synced waveform information.
½ Bar		Displays 1/2 bar of tempo synced waveform information.
¼ Bar		Displays 1/4 bar of tempo synced waveform information.
1/8 Bar		Displays 1/8 bar of tempo synced waveform information.



1/16 Bar



Displays 1/16 bar of tempo synced waveform information.

## Reset

Returns all controls in the Phase module to their factory default values. If you wish to return to settings you were using before clicking the **Reset** button, you can use the Undo History window to revert to the settings before the reset event.)

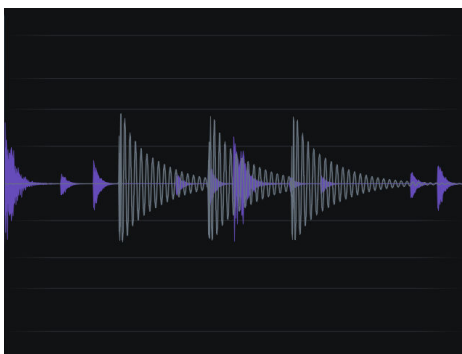
## Meters and Displays

Displays the waveform of the output signal over time. This can be used to visualize how Rotation and Delay affects the shape and timing of the audio in real time.



The oscilloscope is synced to the host tempo and the time axis has 5 options of musical resolution. See Oscilloscope Time Display above.

When the sidechain in Neutron 5 or the Phase Component plugin is setup in your DAW, the oscilloscope can display the channel signal along with sidechain as either an overlapping waveform or a sum of the sidechain signal with the channel signal in purple. This can be useful when viewing interaction of two different mix elements interacting at the same time in your session. See Oscilloscope Type Display above.



## Controls

The following controls are available in the Phase module:



## Learn

The Learn button in the Phase module is capable of automatically setting both the Rotation and the Delay controls. Note that in order for the Phase module to set the Delay control there must be a sidechain signal present and routed to Neutron or the Phase component plugin.



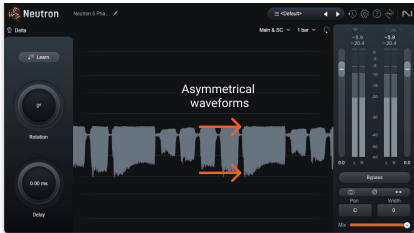

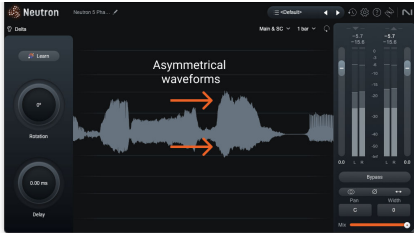

- **Rotation Learn:** The Phase module will analyze a snippet of audio and automatically correct any asymmetry discovered with a static setting. This will result in a suggestion for the Rotation control.

- **Delay Learn:** The Phase module will analyze the sidechain signal if present, compare that to the input of the Phase module and apply a static time-shift in to better align the two audio signals. This will result in a suggestion for the Delay control.

## Rotation

Adjusts the rotation of the waveform in degrees to the left and right channels equally. This can help with waveforms that are asymmetrical like dialogue, vocals or brass instruments. Adjusting phase will change the input's amplitude characteristics but not result in a time-shift.

## Examples of Phase Rotation on Asymmetrical Waveforms

Description	<u>Before</u> Phase Rotation	<u>After</u> Phase Rotation
Trumpet		
Trombone		
Vocals		

## Delay

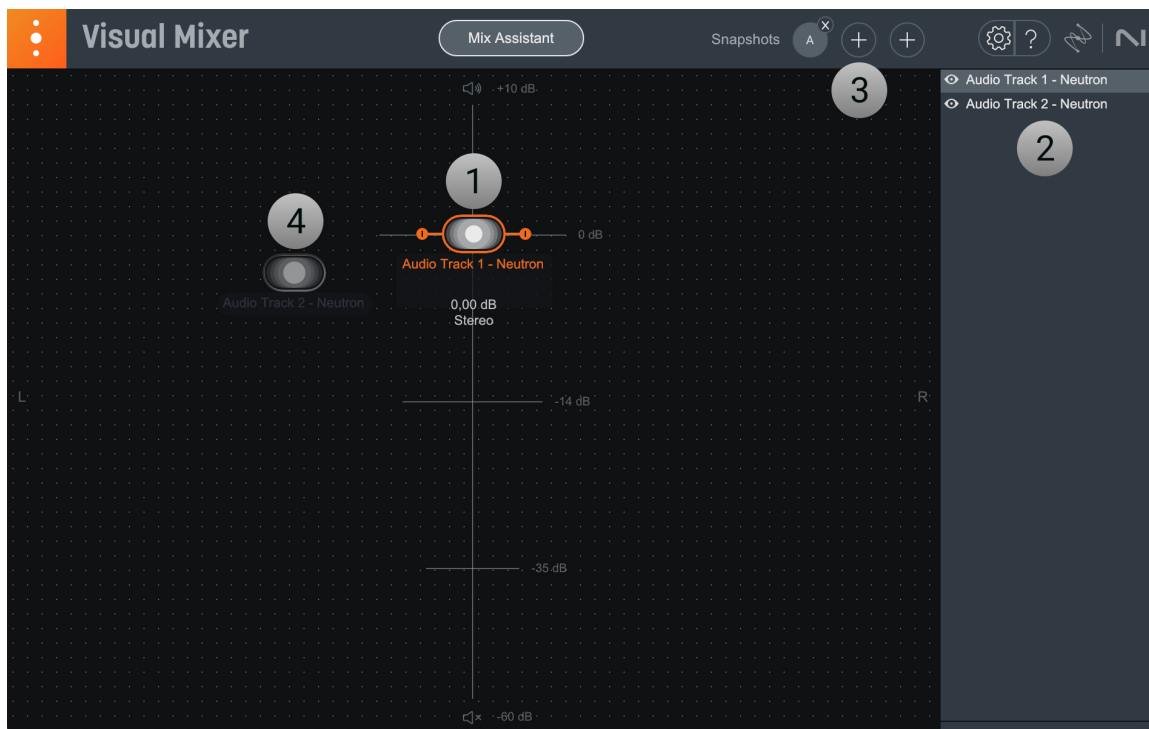
Applies a time-shift in milliseconds to the left and right channels equally.

# 17. Visual Mixer

The Visual Mixer is a controller that uses node-based mixing that connects you to compatible iZotope plug-ins in your session. In Visual Mixer, you can visually place your music in a virtual space. Using iZotope's IPC technology, you can adjust the pan, volume, and stereo width of any Neutron 5 instance in your session. You can also access Assistant from Visual Mixer.)

**i** For more information on how to use the Assistant with Visual Mixer, please visit the [Assistant](#) chapter. )

## Plug-in Interface



1. [Plug-in Controls](#)
2. [Plug-in List](#)
3. [Mix Snapshots](#)
4. [Activity Metering](#)

## Plug-in Controls

### X/Y Pad

Move nodes within the X/Y pad interface to control different elements of your mix remotely.

## Panning


Adjust the stereo pan control of any Neutron plug-in by dragging nodes left or right in the X/Y pad.

## Volume

Adjust the output gain of any Neutron plug-in in your session by dragging nodes up and down in the X/Y pad.

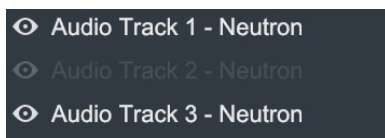
## Width

Adjust the Width amount of any stereo Neutron plug-in in your session by clicking on a node and adjusting the handles that appear on the left and right edges of the node.

 Panning and Width can't be adjusted from the Visual Mixer for mono instances of Neutron plug-ins.

## Plug-in List

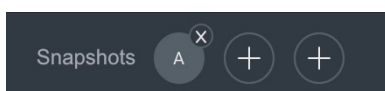
The list on the right side of the Visual Mixer interface displays the names of all Neutron plug-ins in your session. Clicking on the eye button to the left of the instance name will hide or show that instance in the X/Y pad.



You can double-click on an instance name to rename it from the Visual Mixer.

## Mix Snapshots

Save Mix Snapshots to compare different configurations or hide/show states for the nodes in the Visual Mixer.



## Set

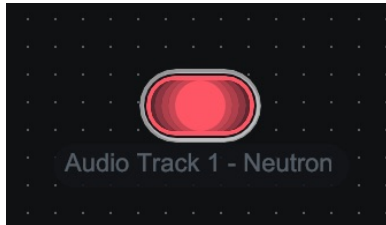
Save a snapshot by clicking on the "Set" button above the A/B/C buttons.

## A/B/C

Toggles the view to display the Mix Snapshot you set for a given button. These are greyed out until a snapshot is set.

## Activity Metering

Nodes display activity metering to indicate if audio is passing through the associated plug-in. When red is displayed in the activity meter for a given node, it is indicating the associated Neutron plug-in output is clipping.



# 18. Glossary

## Band

Short for “frequency band” which is a range or interval in the frequency spectrum often divided into low, mid or high-frequency bands.

## Band shelf

Hybrid filter shape combining attributes of a shelving filter and a peaking filter.

## Bandpass

A type of filter that passes frequencies between two cutoff frequencies and attenuates frequencies outside of the pass range. A band-reject filter operates inversely, attenuating frequencies within the cutoff range and passing frequencies outside of the range.

## Bandwidth

Describes the range of frequencies being affected by a signal processor. Inversely proportional to Q.

## Baxandall

A type of first order shelving equalizer typically found in the tone control of high fidelity home audio components.

## Butterworth filter

A filter shape designed to have a flat frequency response in the passband.

## Component Plug-in

The plug-in equivalent of a processing module included in the Neutron 3 [Assistant: Neutron mothership plug-in](#) plug-in.

## Crossover

A series of filters that separate the frequency spectrum into ranges.

## Detection circuit

The component that evaluates signal amplitude to trigger a processor.

## Envelope

The varying amplitude of sound over time. This can be broken into four stages: attack, decay, sustain, and release.

## FFT (Fast Fourier Transform)

A procedure for the calculation of a signal frequency spectrum. The greater the FFT size, the greater the frequency resolution, i.e., notes and tonal events will be clearer at larger sizes.

## Filter

Audio filters are frequency dependent amplifier circuits that boost (amplify), cut (attenuate), or pass ranges of the audible frequency spectrum.

## Inter Plug-in Communication (IPC)

Inter Plug-in Communication is a feature which enables compatible iZotope plug-ins to send and receive metering data or control adjustments from other compatible iZotope plug-in within a session.

## HUD (Heads-Up Display)

A panel through which you can access module controls.

## Hysteresis

Describes a system or process whose response depends on its current state as well as its history.

## LFE (Low-Frequency Effects)

A band-limited audio channel dedicated to low frequency content (< 120Hz). The LFE channel is sent to a speaker called a subwoofer that is designed to reproduce low frequency content.

## Limiter

A high ratio dynamic range controller used to prevent overmodulation.

## Masking

In the case of two or more signals that share overlapping frequency content, the higher amplitude signal causes the lower amplitude signal to appear quieter.

## Mothership

A term used to describe the main Neutron plug-in. The mothership includes all of the Neutron processing modules in a single plug-in.



## Multiband

More than one band across a spectrum.

## Pre-Emphasis

An emphasis in a frequency band before the saturation is applied to emphasize the effect in that band.

## Q

In an equalizer, it is the center frequency divided by bandwidth.

## Resonant Filter

Has a complex nature of adjustment such that at the cut off point you can increase or attenuate the resonance. Typically is accompanied by significant phase shift or ringing.

## Saturation

A harmonic type of non-linear distortion.

## Sidechain

The signal that feeds the detection circuit in a processor.

## Short Term Loudness

Loudness measurement calculated over the course of 3 seconds. Short-term measurements are useful for monitoring immediate trends in loudness.

## Spectral Shaping

Spectral Shaping can be described as real-time, dynamic adjustment of the frequency spectrum, falling somewhere between dynamic equalization and multiband compression.

## Spectrum Analyzer

A Spectrum Analyzer is a meter that measures amplitude across the frequencies which encompass the spectrum of human hearing. The vertical axis represents amplitude while the horizontal axis represents frequency.

## Waveform

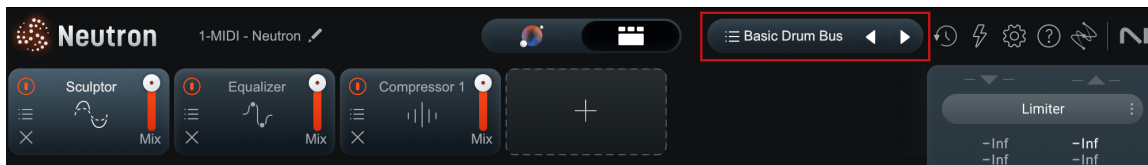
A visual representation of the envelope of the soundwave. (amplitude representation).

# 19. Presets

You can choose from a wide variety of factory presets or save your own custom settings in the Neutron preset manager.

## Global Presets

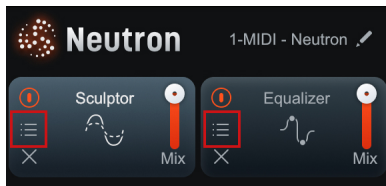
You can open the global preset manager by clicking the presets in the header area of any Neutron 5 plug-in.



You can quickly cycle through presets in the list by clicking the left arrow (*previous preset*) or right arrow (*next preset*) buttons to the right of the preset button.

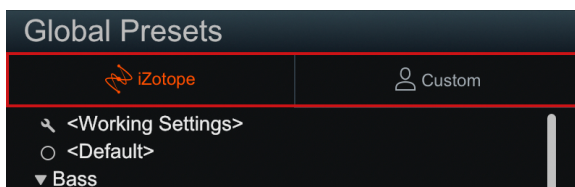
## Module Presets

You can save and load settings in an individual Neutron 5 module using the module preset manager. You can click on the presets button in each module tile to open the corresponding module preset manager window.



## Factory and Custom Presets

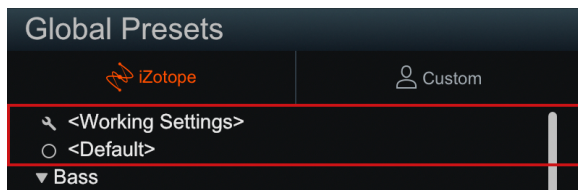
The preset manager windows are divided into two tabs:



- **iZotope:** lists all factory presets installed with Neutron 5.
- **Custom:** lists all custom presets you have saved or modified in Neutron 5.

## Default and Working Settings

There are two common options that are always available at the top of the preset list in the **iZotope** and **Custom** tabs:



- **Working Settings:** Loads your most recent changes that are not otherwise associated with a preset.
- **Default:** Loads the factory default settings.

**i** When you make changes to a preset an asterisk (\*) will be shown at the beginning of the preset name to indicate that it has been modified. You can add a new preset to save your settings or update the preset to dismiss the dirty state indicator.

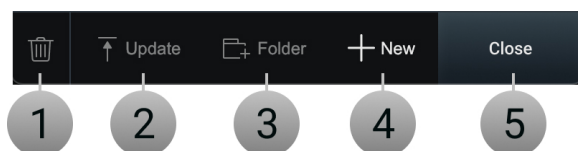
## Custom Preset Names and Comments

You can modify preset file/folder names and preset comments when the **Custom** tab is selected.

- **Edit custom preset name:** Double-click on a preset name to open an inline edit field. Press return to dismiss the inline edit field and save your changes.
- **Edit custom preset comment:** The area below the preset list displays descriptive text about the currently selected preset. Single-click the comment text box to open an inline edit field, press return to save changes to the comment.

## Presets Window Footer

The following buttons are located in the footer of the Presets window:



1. Deletes the currently selected custom preset or preset folder.
2. **Update:** Saves changes to a modified custom preset. Note: Update is only available in the global preset manager, you cannot update module presets.
3. **Folder:** Adds a new custom preset folder.
4. **New:** Creates a new preset based on the current settings.
5. **Close:** Dismiss the Presets window.

**i** In the Custom tab, you can click and drag presets or folders over other folders in the list to move them into that folder.

## Preset Locations

Factory presets are *installed* to the following locations:

- **Windows:** C:\Program Files\iZotope\Neutron Pro\Presets\
- **Mac:** /Library/Application Support/iZotope/Neutron Pro/Presets/

Custom presets are saved to the following default locations:

- **Windows:** C:\Users\Username\Documents\iZotope\Neutron Pro\Presets\
- **Mac:** /Users/Username/Documents/iZotope/Neutron Pro/Presets/



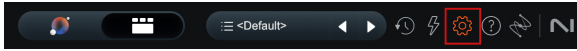
A . . . button will appear in the upper left hand corner of the preset window when the **Custom** tab is selected.

Click the button to open a system dialog and select a new directory to save your custom presets to.

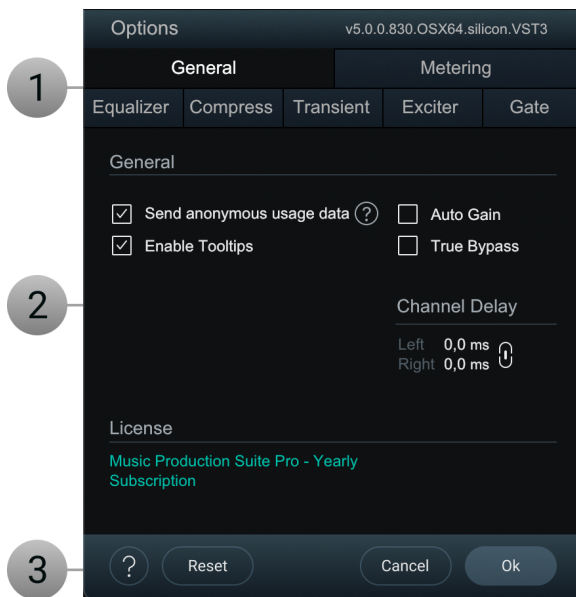
The custom paths for global and per module presets are set individually in their respective preset windows.

## 20. Options

The Options window allows you to manage your authorization, check for updates, and adjust global and module processing controls. Click on the gear button in the upper right corner of the Neutron interface to open the Options window.



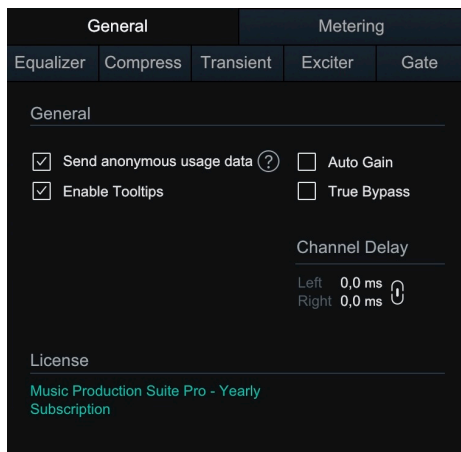
There are three sections to the Options window.



1. **Options Tabs:** Click on the tabs in the header of the options window to view access the different settings.
2. **Per-Tab Options:** Displays the options available for each Options tab.
3. **Options Window Controls:** You can save, cancel or reset all options to factory default states using the buttons in the footer area of the Options window.
  - a. **Question Mark:** Access Help Documentation for Options.
  - b. **Ok:** Saves any changes you have made to the options and closes the window.
  - c. **Cancel:** Reverts changes to options and closes the window.
  - d. **Reset:** Resets all Options to their factory default settings.

### General Options

The general options tab allows you to manage global processing modes, tooltips, licenses, and updates.



- **Send anonymous usage data:** Enables anonymous usage data to be sent to iZotope to help us improve our products.
- **Enable Tooltips:** Select to enable tooltip displays when hovering your cursor over controls in Neutron.
- **Launch Tour:** Opens the first run tour dialog.
- **Auto Gain:** Select to apply gain to the bypassed output signal in order to match the level of the processed output signal.
- **True Bypass:** Allows Neutron to disengage a module's latency when that module is bypassed. This will result in a click when enabling or disabling module bypass but avoids unnecessary latency compensation and CPU usage.

**i** **Auto Gain and True Bypass cannot be enabled at the same time.** Enabling True Bypass will deselect and disable the Auto Gain option.

- **Channel Delay:**
  - **Left & Right:** Adjusts the left or right channel delay amount (in milliseconds).
  - **Link:** Links left and right channel delay amount adjustments.

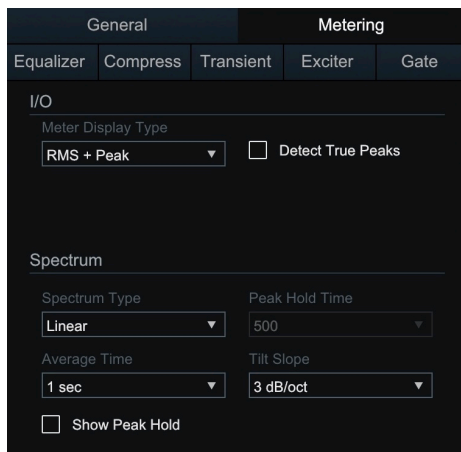
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**i** Check out the [Installation and Authorization Help](#) section of our Support Portal.

## Metering Options

You can alter the following options in the Metering Tab.



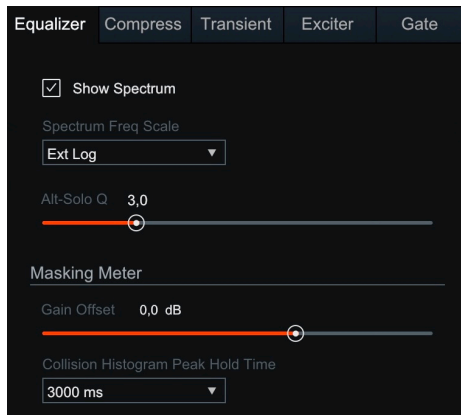
## I/O

- **METER DISPLAY TYPE:** Determines the meter type displayed in the I/O meters.
  - **RMS + Peak:** displays a lower bright bar representing the average level (RMS) and a higher dimmer bar representing peak level. There is also a moving line above the bar representing the most recent peak level or peak hold.
  - **Short Term + Peak:** uses short-term loudness calculation to display a more perceptually accurate measurement than RMS. This measurement is useful in monitoring immediate trends of loudness in your audio.
- **DETECT TRUE PEAKS:** Select to accurately measure the signal that will result from digital to analog conversion. By default, the Input/Output meters will only indicate clipping which occurs within the digital domain.

## Spectrum

- **Spectrum Type:** Determines the display type used by the spectrum analyzer meters. Options include:
  - **Linear:** A continuous line connecting the calculated points of the spectrum.
  - **1/3 Octave:** Splits the spectrum into bars with a width of 1/3 of an octave. Although the spectrum is split into discrete bands, this option can provide excellent resolution at lower frequencies.
  - **Critical:** Splits the spectrum into bands that correspond to how we hear, or more specifically how we differentiate between sounds of different frequencies. Each band represents sounds that are considered “similar” in frequency.
  - **Full Octave:** Splits the spectrum into bars with a width of one full octave.
- **Peak Hold Time:** Determines how long spectrum peaks are displayed after they occur. Options include: **5 ms, 250 ms, 500 ms, 1,000 ms, 5,000 ms, and Infinite.**
- **Average Time:** Adjusts the averaging time of the spectrum calculation. Higher average times can be useful for viewing the overall tonal balance of a mix, while shorter average times provide a more real-time display. Options include: **Real Time, 1 sec, 3 sec, 5 sec, 10 sec, and Infinite.**
- **Show Peak Hold:** Select to show the peak hold display in the spectrum meters.

## EQ Options



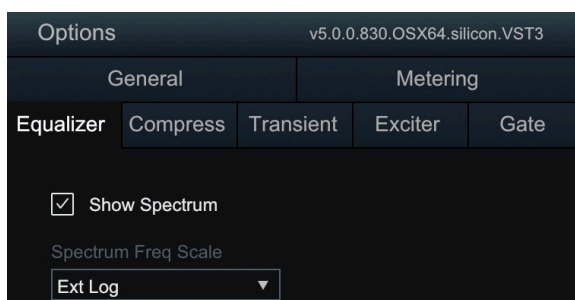
- **SHOW SPECTRUM:** Select to display a real-time spectrum analyzer signal underneath the Equalizer curve. This can be useful in showing the frequency balance of your mix and the changes occurring as you apply equalization.
- **SPECTRUM FREQUENCY SCALE:** Allows you to adjust the scale of the EQ frequency spectrum.
- **ALT-SOLO Q:** Determines the bandwidth (Q) of the Alt-Solo feature in the [Equalizer](#) module.

## Masking Meter

- **GAIN OFFSET:** Adjusts the offset of the input level for the Masking Meter to match the fader level of your current track.
- **COLLISION HISTOGRAM PEAK HOLD TIME:** Choose the calculation window of peaks displayed in the Masking Histogram from the dropdown menu. The following options are available:
  - **400 ms:** Calculates events across a very quickly moving window of 400 milliseconds.
  - **3,000 ms:** Most useful setting. Calculates events across a moving window of three seconds.
  - **Infinite:** Useful if you want to see all masking that occurs over the entire duration of an audio segment from start to end.

## Module Options

The Module Options refer to the Option tabs for the Compressor, Transient Shaper, Exciter, and Gate. The options for each of these modules are the same, but affect the individual module of that Options tab.





## Crossovers

The Compress, Transient, Exciter and Gate tabs contain crossover options for multiband processing. The crossover options include:

- **ZERO LATENCY (ANALOG)**: provides a natural analog character at the expense of some phase distortion.
- **TRANSPARENT (HYBRID)**: provides an IIR (Infinite Impulse Response) analog crossover designed to reduce the phase and frequency distortion commonly found in other analog crossovers without sacrificing efficiency and warmth.

# 21. License Information

## Anti-Grain Geometry

Version 2.4

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## base64

v0.4.0

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## Better Enums

Version 0.11.1

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## C++ Rest SDK

Version 2.10.15

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Bundled Libraries:

\*\*\*\*\* Base 64 Library (base64/base64.hpp) \*\*\*\*\*

base64.hpp is a repackaging of the base64.cpp and base64.h files into a single header suitable for use as a header only library. This conversion was done by Peter Thorson ([webmaster@zaphoyd.com](mailto:webmaster@zaphoyd.com)) in 2012. All modifications to the code are redistributed under the same license as the original, which is listed below.

base64.cpp and base64.h

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René Nyffenegger [rene.nyffenegger@adp-gmbh.ch](mailto:rene.nyffenegger@adp-gmbh.ch)

\*\*\*\*\* SHA1 Library (sha1/sha1.hpp) \*\*\*\*\*

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md5.hpp is a reformulation of the md5.h and md5.c code from <http://www.opensource.apple.com/source/cups/cups-59/cups/md5.c> to allow it to function as a component of a header only library. This conversion was done by Peter Thorson ([webmaster@zaphoyd.com](mailto:webmaster@zaphoyd.com)) in 2012 for the WebSocket++ project. The changes are released under the same license as the original (listed below)

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L. Peter Deutsch

[ghost@aladdin.com](mailto:ghost@aladdin.com)

\*\*\*\*\* UTF8 Validation logic (utf8\_validation.hpp) \*\*\*\*\*

utf8\_validation.hpp is adapted from code originally written by Bjoern Hoehrmann [bjoern@hoehrmann.de](mailto:bjoern@hoehrmann.de). See <http://bjoern.hoehrmann.de/utf-8/decoder/dfa/> for details.

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libFLAC and libFLAC++

Version 1.3.2

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Mesa 3-D graphics library Version: 7.0

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Version 1.2.1

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libmp3lame

Version 3.99.5

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## NLohmann JSON

v3.10.4

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## nanomsg

Version 0.5-beta

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## Netlib numeralgo na10 Aberth's method

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REFERENCE:

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NUMERICAL ALGORITHMS, 13 (1996), PP. 179-200

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- JUNE, 1996

SOFTWARE LANGUAGE:

- FORTRAN

## OGG / Vorbis

libogg and libvorbis

Version 1.3.2

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## readerwriterqueue

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Version 1.9.1

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Version 1.9.0

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## zlib

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