

Waves C360° SurroundComp

Software Audio Processor

User's Guide



Introduction and Overview

Introducing **Waves C360°**, a Surround Soft Knee Compressor for 5 or 5.1 channels. C360°'s controls are the same as those of the L360° and the functions are similar, but the sound is different. It begins attenuating before the level reaches the threshold and attenuates more as the level reaches and passes the threshold. The output signal will not exceed the specified ceiling, so it also functions as a limiter and keeps the sound from digital clipping.

C360° supports operation at sample rates up to 96kHz.

BRIEF OVERVIEW

C360°'s Compressor has a look-ahead mechanism (using 64 samples of delay) to anticipate levels approaching the threshold, so in fact, its Attack time is negative. It also incorporates Waves ARC – Auto Release Control. This technology sets the optimal program-sensitive release time for the applied gain attenuation.

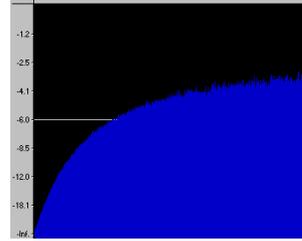
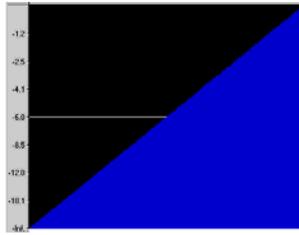
The C360° allows linked dynamics processing for preserving the cross-channel balance and phantom imaging. It allows flexible link modes to fit right in with the preferred grouping scheme that you wish to follow, or the one you think sounds best. This is done on a single 5 or 5.1 Insert without the need to split to Multiple stereo and mono groups. You get all the options on the same multichannel insert.

HOW DOES C360° WORK?

C360° is a soft-knee compressor that has an auto-makeup scheme. However low you set your threshold, the gain is made up automatically. We call this Peak reference compression. The Out Ceiling in this case defines peak output, though the actual peak output will probably be lower than the Ceiling.

Any dynamics processor essentially “rides” the track’s gain automatically according to a set of rules. In this case, the track’s gain will be attenuated as the sound gets louder, allowing the overall gain to be boosted by the same amount that the threshold is lowered. The result is that the dynamic range is compressed: the lower passages get louder and the louder passages are relatively softer.

For example, the following image shows the compression curve for a single channel. The left image shows a linear ascending level from $-\infty$ to full scale and the right shows the compressor’s effect when set to a -12dB threshold.



C360° is useful when you have low-gain 5.1 material that needs to be boosted or material with extreme dynamics that need to be tightened.

C360° PLUG-IN COMPONENTS.

The C360° Surround Compressor consists of components for 5 or 5.1 (6) Channel Inserts. When working on a surround mix in a DAW environment, the C360° should be listed in the insert menus of any 5 or 5.1 tracks, auxiliary inputs and master fader tracks.

LINKED FUNCTION OF C360°.

C360° supports flexible and versatile linked functionality. Parameter linking is easily carried out by using global threshold and ceiling controls. Dynamic process linking is subject to a user-selected Link Mode, where certain channels are linked to a common sidechain.

Parameter linking is important for the general settings. In this case, the user can use a master threshold or master ceiling control to specify the same threshold or ceiling value for all audio channels, assuring a common general makeup or level maximization value. For example, specifying a common -6dB threshold and a 0dB ceiling to all channels will result in a general uniform 6dB boost.

Another type of link can be described as *linked dynamics processing*. In this case, we link several channels to a common process sidechain. All of the channels linked to a common sidechain will get the same gain attenuation when the level in any of them exceeds the specified threshold. This type of link is critical for the preservation of the cross-channel balance and direction of phantom images. For example, in a stereo image, if we apply different attenuation to the Left and Right channels, the Stereo image symmetry appears distorted. The C360° offers up to 3 sidechains, which equal to 3 stereo compressors. The Dynamics process link is user selected in the *Link Mode* control right under the 3 attenuation meters. A straightforward color code helps you keep track of which channels are linked to which sidechain.

For a detailed description of the dynamic process link modes, see Chapter 3 – Link Modes in C360°.

Using C360°

C360° has two main sections -

- **Threshold:** Sets the peak reference point to which all compression will relate. For example if you set the threshold to -6dB, the compressor will begin attenuating when level gets around -12dB and then more and more.
- **Ceiling:** Sets the output gain for the overall compression. Since the compressor has auto makeup, the output may become louder than you want. Use the Out Ceiling to set your desired output level.

As you take the threshold downward, the volume boost will be the most obvious audible effect. Using the Master compression control the way we recommend in the L360°, however, will not preserve the relative loudness and will instead introduce a drop in the gain. The reason for this is that the soft knee response begins attenuating long before the level reaches the threshold. The compression effect of C360° is, however, more obvious than the limiting effect of the L360°, and the goal is not necessarily to preserve transparency and gain loudness —so listen carefully.

BASIC OPERATION

To operate C360°, insert it on the Multichannel track you wish to compress. Begin to drag down the Master compression control and listen to the sound. The overall track gain will be boosted as you take the threshold down. As the threshold gets close to the level in any of the linked channels, attenuation will occur. When you feel that your surround image is appropriately tight you can leave the threshold and use the Output ceiling control to set the overall compressor output to suite your balance with other sources.

If you are looking for a simple rule to follow, we recommend picking a louder passage of the program and setting the threshold just 2dB below it. This recipe is limited in its results but it's sure to keep you in a safe setting range that won't ruin your audio. It may, however, present lighter compression than what you need or want. Eventually you will have to trust your ears, which is always the recommended way to go. Whatever sounds good, *sounds good*.

Link Modes in C360°.

When we apply dynamics to a Stereo mix, we try to keep our stereo image stable by applying the same gain attenuation to the left and right channels. For this reason, we use a *linked Dynamics process*. The detector works on an L+R linked sidechain and applies the same gain attenuation to both channels, preserving their relative level and intended Stereo Image.

In Surround there are different approaches in the perception of the sound stage. It may be regarded as a complete 360° sound field, while in other cases, channels may be divided into sub stages. An example typical to Film post production is to use the center speaker for direct dialog, the front L&R for general soundtrack, and the back channels for sound effects and ambience. The acronym for the LFE channel stands for Low Frequency Effects. The LFE in today's Home Theater electronics is typically played by a Subwoofer speaker, which is generally used for reproduction of all Low frequencies in the program redirected from the other channels by a Bass Management system.

C360° offers 5 Link Modes that let you use up to 3 separate sidechains. The following section will describe the different link modes and the sound stage disciplines they represent.

ALL LINKED

In this mode all channels are linked. As a result, you get uniform attenuation preserving the whole surround image of the material, preserving even the balance between the 5 main channels and the LFE channel. This link mode may be preferred when re-mastering existing surround material, especially if preservation of the complete mix balance is a defined goal.

5 LINKED | SUB

In this mode a separate sidechain is dedicated to the LFE or Subwoofer channel. The sound stage is divided into the directional or main sound field consisting of the 5 channels, and the Non-directional LFE channel. This will fully preserve the direction of the surround image phantoms but it won't introduce attenuation in conjunction with high peaks in the LFE channel. For example, if you have a soundtrack that introduces an earth-shattering kaboom, you don't necessarily want your whole 5 channel directional sound stage to duck its level. Surround music production is a good application for this link mode.

FRONT | REAR | SUB

This mode uses all 3 sidechains. One sidechain for the front stage links the Left, Center and Right channels, detecting and applying the same attenuation to all 3. Another sidechain for the rear stage links the Rear Left and Rear Right channels, Ls and Rs. The last sidechain goes to the Non-directional Subwoofer, or LFE

channel. This mode can be useful in film soundtrack mastering when any ambience and FX in the rear stage shouldn't necessarily duck in conjunction with Music or dialog events.

CENTER | QUAD | SUB

This mode uses all 3 sidechains. One for the Center channel independently: we can consider this as the dialog sound stage. Another for the quad stage linking Left, Right, Left surround, and Right surround to a common detection and attenuation, fully preserving quadrasonic Phantom images. The last sidechain goes to the Non-directional Subwoofer or LFE channel. This mode is again useful in film soundtrack production where it is more critical to preserve the spatial sound stage and leave maximum focus to dialog.

CENTER | FRONT LR | REAR (LFE IS BYPASSED)

This mode uses all 3 sidechains and leaves the Subwoofer or LFE channel idle of processing. This mode makes the maximum split to different possible sound stages. One is for the Center channel independently. We can consider this as the dialog sound stage. Another is for the front Left and Right channels, or the front stereo stage. The last sidechain goes to the Rear Left and Rear Right channels. The Subwoofer output or LFE channel is also independent and is actually passed through the C360° without being affected. We derived this link mode from the track grouping routines of some surround mixing professionals setups, again in the field of film soundtrack postproduction.

The default "All Linked (5ch)" and "All Linked | Sub", are good places to start. Then you can easily toggle between link modes to hear their sound.

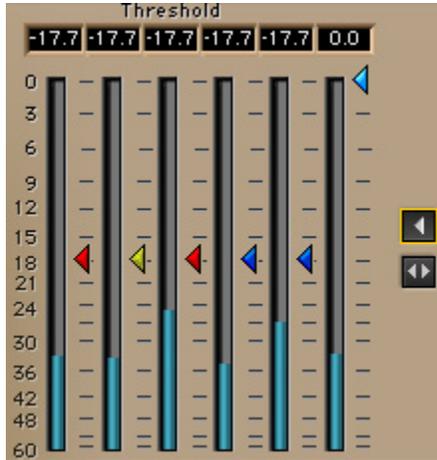
LINK MODES, SIDENCHAINS AND COLOR CODES.

C360° has up to 3 sidechains. This is equivalent in process power to 3 stereo compressors. Each sidechain can detect level and apply gain attenuation to any number of channels linked to it. To make it easier to know which channels are linked to which sidechains we created a color code that will help you associate a certain channel with its sidechain and attenuation meter at a glance.

In the Attenuation section, there are 3 attenuation meters – Yellow | Red | Blue. Directly under the Attenuation meter is the Link Mode Selector control. The selected link mode is displayed beneath the attenuation meters, listing the Groups that are linked in their group color under the relating attenuation meter. This meter also shows the attenuation for a certain group in its color. The Threshold and Ceiling arrow controls will get their group's team colors. So if you are setting the threshold with a red arrow control, look for the red attenuation. Controls with the same color will move together, linked in both control and process.

C360° Controls and Displays

THRESHOLD CONTROLS



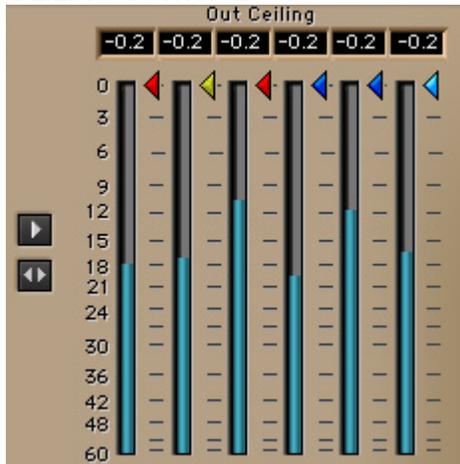
Range: 0 to -48dB , default 0dB.

The Threshold is the peak reference point for the operation of the C360° Compressor. Whenever the level in a certain channel approaches the specified threshold, gain attenuation will be applied, thereby reducing the gain.

The Threshold controls are represented by little arrows next to a channel's input meter. Some channels will be grouped or linked to a common sidechain, the Threshold controls are assigned a color by the sidechain they are linked to, in conjunction with the selected Link Mode. Channels that are linked and have the same color, will move together. It is not possible to define separate threshold values to linked channels.

A Global Threshold control is located between the Threshold and Attenuation meters -  showing an arrow directed toward the threshold section. This control will move all the threshold controls at once, preserving any offsets between the different linked groups. The range and value of this control is subject to the actual Threshold controls. The highest and lowest threshold values set boundaries for the control of the Global Threshold, so if you have one threshold at 0dB and another at -48dB , the Global Threshold control will not make any adjustment.

CEILING CONTROLS



In the Output or Ceiling section, each channel has a meter and beside the meter, an arrow control that sets and indicates the Ceiling or maximum peak value for that channel and other channels linked to the same sidechain. The Ceiling controls behave exactly the same as the Threshold controls. Range: 0 to -48dB , default 0dB.

A Global Ceiling control is located between the Attenuation and Ceiling meters. It shows an arrow pointing toward the Ceiling section - .

This control will move all the Ceiling controls simultaneously, preserving any existing offsets and bounded by the highest and lowest threshold values.

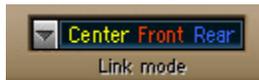
GLOBAL COMPRESSOR CONTROL –



The Global Compressor control is located under both the Global Ceiling and the Global Threshold controls.

This control will move all Threshold controls and all Ceiling controls, simultaneously preserving all current offsets with the highest and lowest Threshold or Ceiling values bounding its effective range.

LINK MODE SELECTOR



The Link Mode Selector allows the selection of one of five available link modes. It is located directly under the Attenuation meters section. A Link Mode defines which channels are linked to which side chain. Selecting a certain link mode will also affect the colors of the Threshold and Ceiling controls which will change to the appropriate group color of the related sidechain. To better understand Link Modes, read section 3— Link Modes in C360°.

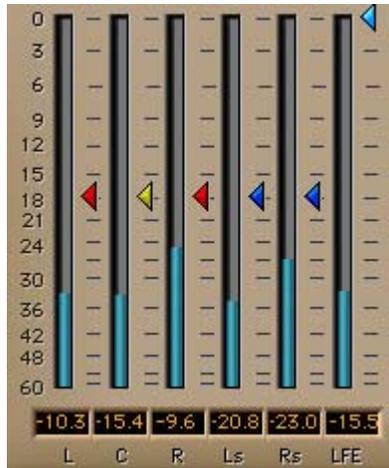
DITHER

Dither

On/Off – default on.

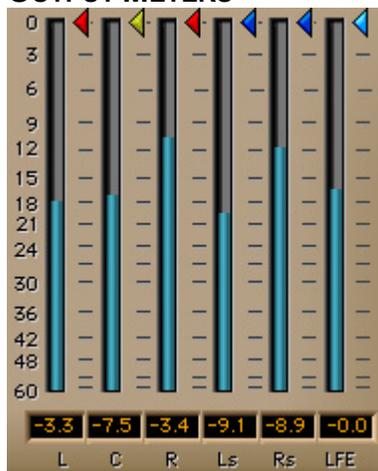
The Dither adds low level random noise and forces any quantization error noise to become part of the dither noise. It is used to get the highest perceived resolution when taking the 48-bit double-precision process back to 24-bit.

INPUT METERS



The input meters are the ones in the Threshold section. The Threshold arrow controls were placed beside the meter for easy adjustment of the threshold value in conjunction with the level in the related channel. Below the Input Meters are peak indicators that show the peak level; they can be reset by clicking on them. Input meters show 0 to –60dBfs.

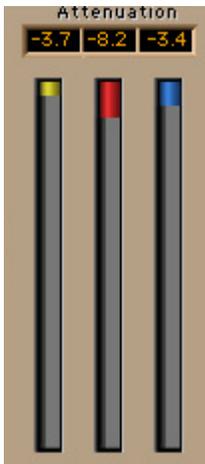
OUTPUT METERS



The Output meters are the meters in the Ceiling section. The Ceiling arrow controls were placed next to their associated output meters for easy adjustment of the output peak value. Below the Output Meters are peak indicators that show

the peak level for the related channel; they can be reset by clicking on them. Output meters show 0 to -60dBfs.

ATTENUATION METERS



The 3 attenuation meters show the gain attenuation for each of the 3 possible sidechains according to the selected Link Mode. Attenuation will show only for active sidechains whenever the level in one or more of the channels linked to it exceeds the specified Threshold. Above the Attenuation meters there are numeric peak attenuation indicators. These will show the maximum attenuation applied to a certain group until reset by clicking on it. The meter can show down to 30dB of attenuation.