DLD TECHNOLOGY

REVOLUTION

Rack Extension for Propellerhead Reason

User Manual

Version 1.0

INTRODUCTION

Revolution is a 3D audio effect for Propellerhead Reason. It allows the user to place a sound anywhere in 3D space, and to move that sound around in real time with the associated Doppler Effect.

Revolution uses a visual display to show and change the position of the sound in relation to the listener, but control via traditional knobs is also supported. All parameters can be automated, and extensive CV control is available.

Revolution also has a feedback control to allow simple echoes to be achieved, and a pre-3D audio output to allow the user to create more complex echoes using multiple instances of the device.

PRIMER ON 3D AUDIO AND HRTF

Revolution uses HRTF (Head Related Transfer Function) algorithms to move audio around in 3D space. A Head Related Transfer Function describes how audio is affected by our own heads, both by the delay caused by the separation of our ears, and the filtering caused by the absorption of sound on the skin and skull.

Our brains use these delays and changes in spectrum to give clues to the position of the audio source – in reality we are more sensitive to changes in position that absolute location – that's why we will sub-consciously move our heads when trying to locate a sound.

Revolution makes use of these changes to trick the brain in to believing that a sound is placed outside of the normal left - right audio field that standard stereo panning allows.

WHY USE 3D AUDIO?

One obvious reason is for effect – a sound coming out of 3D space may surprise the listener and add variation to a track.

Another important use is to extend the stereo field for people listening on headphones. Listening to music on headphones is more common than ever, but normal stereo panning only allows an audio source to be placed between the ears. Using 3D audio can create the illusion of the music coming from speakers around the room, or even a live band.

LIMITATIONS

Unfortunately, every head is different, so Revolution uses a composite of HRTF models recorded using a large group of people to create an 'average' model that produces a usable 3D effect for most people. Some people will find the effect more prominent than others, so test your final mix with multiple listeners.

The HRTF effect is most effective when listened to on headphones. Studio monitors work reasonably well as they have good stereo separation, but the effect may be lost on other speaker setups.

Any stereo input to Revolution is converted to mono to create a single sound source. If you wish to maintain the stereo signal, then 2 instances of Revolution are required.

The stereo output must be maintained throughout the mix chain – that means keeping panning to centre, and ensuring that any compression or limiting is done in stereo linked mode. Any reverb or delay required should ideally be performed before Revolution.

Whilst Revolution offers an elevation control, our brains are less sensitive to locating the height of a sound source. (There are no changes in audio delay due to elevation which is the main cue we use for location.)

The 3D effect will not work with mono speakers (such as mobile phones) although the 3D audio will mix down to mono reasonably well.

The minimum distance from the listener is 2 metres, which gives around 6ms delay. The algorithms cannot produce lower delays without excessive CPU load.

USAGE INSTRUCTIONS – FRONT PANEL

SPEAKER POSITION

The green speaker represents the source of the audio. It can rotate around the listener, and move further or closer to the listener.

Changing the **Angle** knob will rotate the speaker through 360°. Alternatively, grab the speaker on the display with the mouse and move it around the centre position.

Increasing the **Distance** knob will move the speaker further from the centre. Alternatively, grab the speaker with the mouse and move it further from the centre. This increases audio delay (due to the speed of sound), and reduces audio volume. Distance can range from 2 to 100 metres.

Distance Attenuation controls how much the volume is reduced due to being moved further from the listener. At 100% it will give a realistic attenuation, at 0% it will not reduce the volume for any distance.

The **Zoom** slider zooms the centre display in and out. At minimum zoom, the display represents 100 metre radius, at maximum zoom it only shows 10 metre radius.

SPEAKER ELEVATION

The **Elevation** control adjusts the height of the speaker above or below the listener. It ranges from -45° to +45°.

FEEDBACK

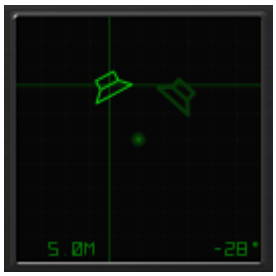
The **Feedback** knob allows a percentage of the delayed audio to be fed back into the source to create simple echo effects. Note that the audio is tapped before 3D algorithms.

DRY – WET

The **Dry – Wet** knob controls the mix of original and 3D audio. This can be useful for creating echo effects where you want the audio to appear to bounce of a nearby object – in this case you would hear both the original audio, and a delayed version of that audio from a point in 3D space.

USAGE INSTRUCTIONS – REAR PANEL

SPEAKER POSITION



The **Angle** and **Distance** CV inputs allow you to offset the position of the speaker. When these CV inputs are used, a second ghost speaker will appear on the front screen. This ghost is the actual position of the speaker used in the 3D calculations.

When you use the mouse to move the speaker, you are moving the brighter reference speaker. The ghost speaker will always use the CV inputs as an offset from the reference.

The **Elev** CV input will offset the elevation of the audio source.

The **Shift Perpendicular** CV input will move the audio source perpendicular to its current position. If the speaker is currently at 0°, then this input will move the speaker left and right. This input is very useful for creating 'fly by' Doppler effects. Again the calculated position is shown using the ghost speaker on the front display.

CV OUT

The **Angle** CV output gives a control signal that represents the current angle of the speaker. One use for this is to pass this signal into the Angle input of a second Revolution device, and then apply an offset using the Angle knob on the front panel.

The **Distance** CV outputs the calculated distance from the listener.

Of course these CV outputs can be used to control many devices in Reason, and you can then use the front display as a unique control surface.

PRE-3D

The **Pre-3D** audio outputs the delayed and attenuated audio before the 3D effect is applied. This is useful for when multiple Revolution devices are chained to make audio appear to bounce around 3D space. See the included *Crazy Echo* combinator patch for an example of this.

AUDIO IN

The **Left** and **Right** inputs are for your source audio. If a stereo signal is used, it will be mixed down to mono before the 3D effect is applied.

AUDIO OUT

The **Left** and **Right** outputs contain the processed 3D audio. It is important that the panning on the mixer for this audio is kept in the centre position. Applying further effects to this audio may reduce the 3D effect.

RECORDING MOTION

By default, Revolution does not create a Reason track. If you wish to record the motion of the speaker, then you must right click on the device and select the 'Create Track for …' option.

Once this is done, you can record the motion of the speaker from either the knobs or by using the mouse on the display. Moving the speaker in the display will automatically create Angle and Distance automation lanes.

REVISION HISTORY

V1.00 Initial Version

CREDITS

Design and coding by Richard Harvie, DLD Technology Ltd – http://www.dldtechnology.com

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Thanks to all that have helped test Revolution on the DLD beta test group.