



IMMERSIVE MUSIC
3D SOUND JUST GOT REAL



USER MANUAL

v1.10

Please read this manual carefully before using the software.

Using headphones requires responsible listening!

Last updated: Mar 2022

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Quick Start Guide

Install and Authorize Your new Plugin:

- If you do not have an account, register for free on the [Plugin Alliance website](#).
- Double-click the .mpkg (Mac) or .exe (Win) file
- Follow the installation instructions.
- Open the plugin in your DAW of choice and click on the interface to activate
- If your computer is connected to the internet, click the "I'm Online" button and enter your Plugin Alliance credentials on the following page.

Alternatively:

For offline activation instructions and additional information, please refer to the activation manual included in the installation folder of this plugin.

You may also follow this link to the online version of the manual.

For more information, please visit: www.plugin-alliance.com

System Requirements and Supported Platforms

Supported sample rates:

44.1, 48, 88.2, 98, 176.4 and 192 kHz, in both mono and stereo.

Supported Buffer Sizes:

128 Samples or higher

For latest system requirements & supported platforms, please check the product list page on the Plugin Alliance website to see particular details for your product.



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1 Introduction

Thank you for purchasing our dearVR PRO Plugin and welcome to the next step of immersive audio production. With the dearVR 3D audio technology you are able to design fantastic new music mixes for headphones or create deep auditory worlds and sound design within your DAW.

This manual will help you understand the dearVR PRO Plugin and how to use it in your projects.

Important Note:

dearVR is a 3D audio technology for headphones. Any kind or brand will do, but if the output format is set to “Binaural”, you have to use a headphone for the plugin to work properly. Please check that your left and right earpieces are properly placed and let’s get started...

Have fun!

1.1 About Binaural 3D Audio

Binaural 3D audio is a technology that simulates the human spatial hearing via headphones. If you listen to common stereo audio with headphones, the perception of all sound sources is located inside your head - between your left and your right ear. With 3D audio you get the sound outside of your head where it belongs. A sound appears to emanate from a specific point - anywhere within a full 360° three-dimensional sphere.

This gives you the ability to position a sound object all around the listener - behind, in front of, to the right or to the left of and even below or above.

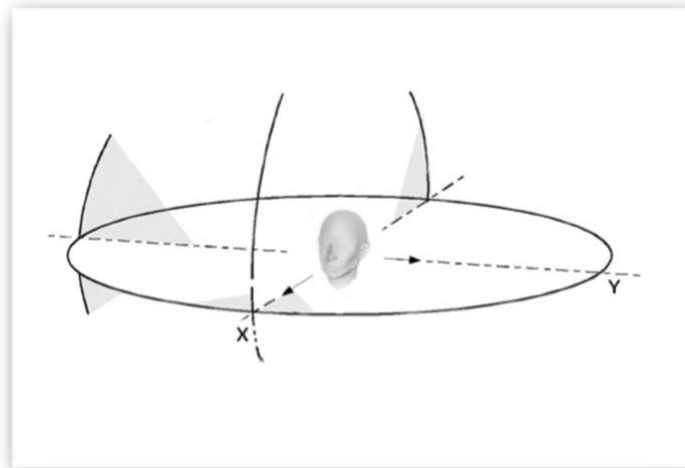


Illustration 1.1 - Full 360-degree 3D audio sphere

The quality of a 3D Audio rendering process depends on many factors - primarily the shape of our body, our head and our ears. That's why a mix with 3D Audio can sound different to different people. Our uniqueness as human beings is actually a limitation for practical 3D Audio technology.

Another typical problem that occurs with binaural 3D Audio is the front-back confusion. Our natural hearing uses small micro-movements of our head to optimize the localisation of a sound source. The head tracking technology, which is part of virtual reality devices, offers a solution to this problem.

Binaural 3D Audio is not made for listening via stereo speakers. Although in general the playback is possible, you will have to face strong colorations of the sound depending on your playback system. The reason for this is crosstalk, meaning a large portion of the left speaker signal will also go to the right ear of the listener. Similarly, a large portion of the right speaker signal will go to the left ear of the listener. With headphones this is different: both the left and the right channel signal reaches its respective ear.



1.2 dearVR Audio Reality Engine

We call our dearVR technology an audio reality engine because it can produce stunningly realistic auditory worlds, comparable to our natural listening. For this, we listened back to our modelling technology over and over again and tweaked every parameter with our own ears.

The acoustic modelling of an environment needs more than just 3D spatial location. It combines distance, motion, reflections and reverb to complete a simulation of an acoustic scene.

All these phenomena can now be utilized for your sound design with just one plugin:

The dearVR audio reality engine!

2 Overview dearVR Engine

The dearVR MUSIC Plugin is a 3D audio processor, enabling you to virtualize many different kinds of three-dimensional acoustic settings within your mix with a great amount of realism.

The virtualisation of an acoustic environment with object-based sound sources refers to combining 3D spatial location cues with distance, motion, and ambience. All these parts are needed to achieve a realistic simulation of an acoustic scene - far beyond simple 3D positioning.

For this reason, the dearVR Engine combines object-based 3D positioning with real time generated reflections depending on the room positioning and late diffuse reverberation.



2.1 Reflections

A signal being reflected once or twice from parts of a listening space - walls, ceilings and floor - arrives shortly after the direct signal at the listener's position. Such early reflections can be seen as a transition period before the reverberant field has built up.

First reflections are responsible for our impression of the general character and the size of a room. These reflections are of great importance in binaural rendering in order to create a realistic localisation and the impression of sounds coming from outside of your head.

Early reflections can be modelled by considering acoustic boundaries as acoustic mirrors. Depending on the listener's position in a room and his distance to the boundaries, the time a reflection takes to arrive at his ears varies. Reflections also vary depending on the position of the sound source in the room.

2.2 Reverb

Reverb itself is an extremely complex reflection and diffusion pattern that builds up to a dense thickness from the moment you hear the original dry sound. For the dearVR Engine we captured the acoustic characteristics of different rooms or locations. The dearVR MUSIC plugin contains a selection of 18 virtual acoustic presets for music production. You can easily adapt these reverb characteristics for your mix by changing the reverb size or applying a reverb filter.

3 Control Panel

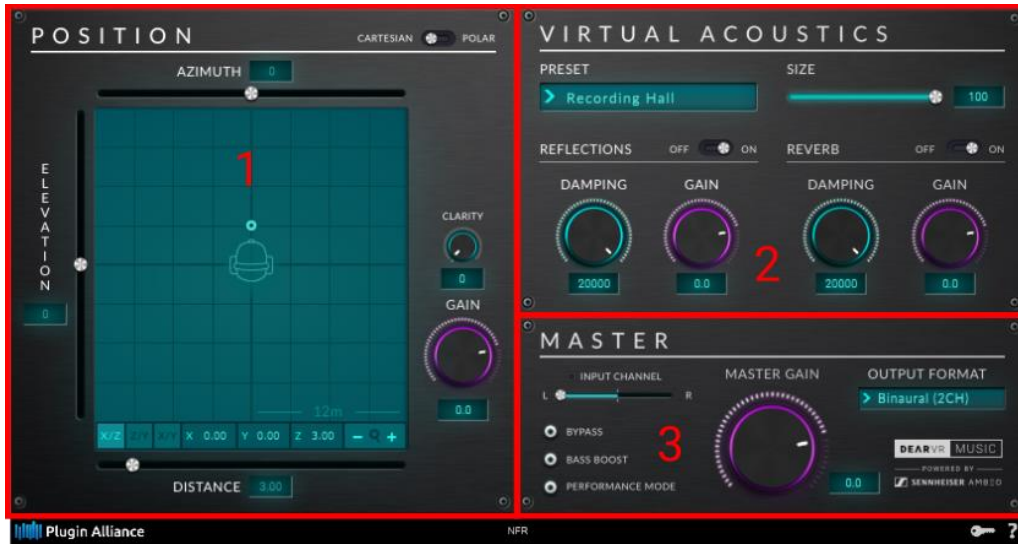


Illustration 3.1 - Overview processing units

The dearVR MUSIC plugin is made up of three processing units:

1. Position
2. Virtual Acoustics
3. Master

The signal flow starts in the Position Module, passes through the Virtual Acoustics module, i.e., the Reflections and Reverb sections and ends with the Output Format in the Master Module. Each module has a Gain controller before the signal enters the following section.

3.1 Position

The Position module renders distance, listening angle and elevation relative to the listener. It is possible to enter values as Polar or Cartesian coordinates.

Important: Azimuth, Distance and Elevation sliders (polar coordinates) are only active in Polar Mode (see 4 – Input Mode)

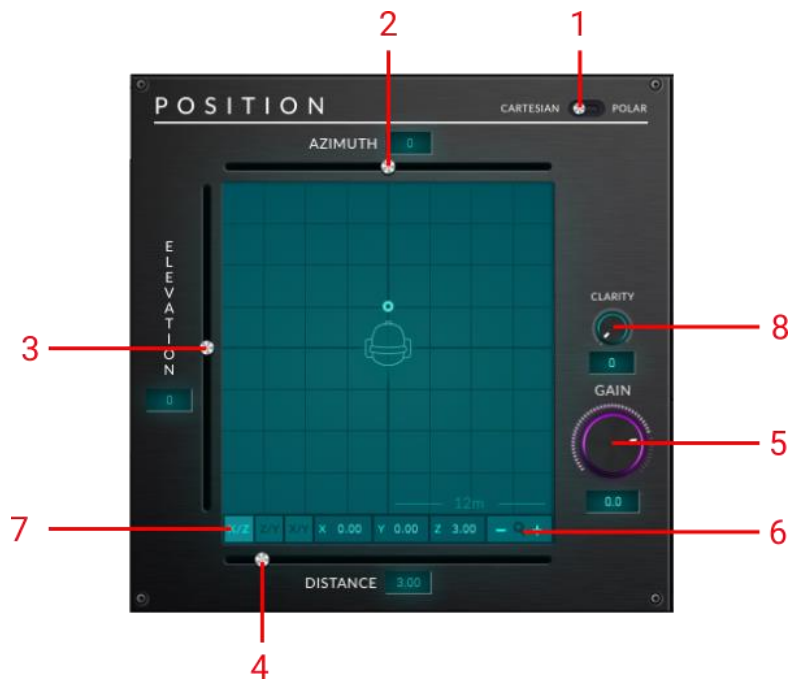


Illustration 3.2 - Position module

1 - Input Mode

Use toggle to switch between **Cartesian** or **Polar Mode**.

1. Cartesian Mode

Cartesian Coordinates X, Y, Z represent distances from the listener.

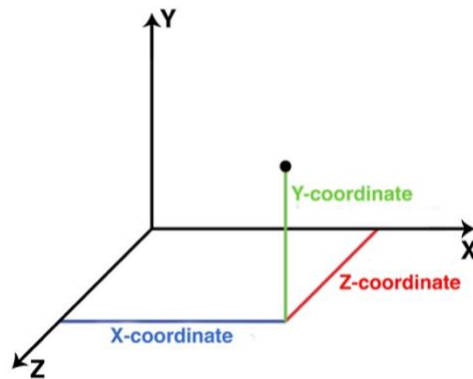


Illustration 3.3 - Cartesian coordinates

In Cartesian Mode, change position by dragging the audio source icon with the mouse in the XYZ-Pad. You can also enter numeric value into the XYZ display field.

2. Polar Mode

Azimuth and Elevation parameter describe an angle in degree, whereas Distance is set in meter (length of vector r)

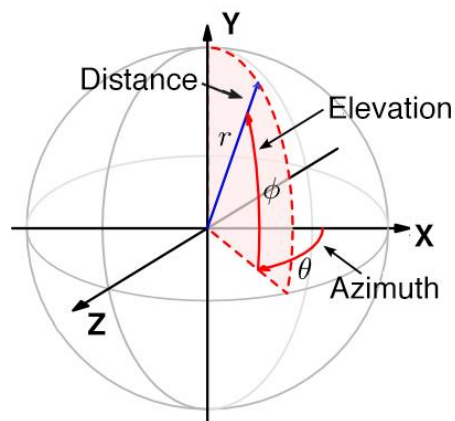


Illustration 3.4 - Polar coordinates

In Polar Mode, change position with the Azimuth, Elevation and Distance sliders. You can also enter numeric value into the display fields next to the sliders.



Note: It is not possible to drag the audio source icon with the mouse while being in Polar Mode. A red position marker together with the note "POLAR" will appear.

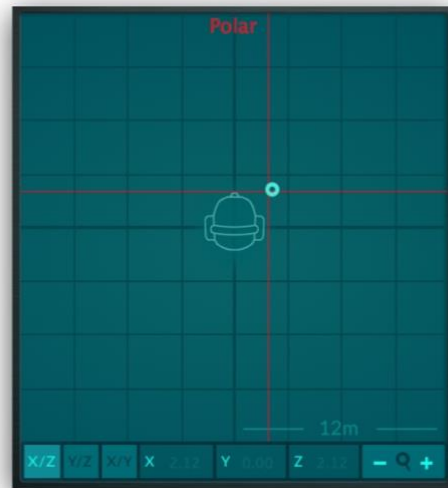


Illustration 3.5 - XYZ-Pad input disabled

2 - Azimuth

Set Input Mode to Polar and use the Azimuth Slider to enter the left/right position in degrees ($\pm 180^\circ$).

Use display next to the Azimuth slider to enter numeric values.

Note: Slider is disabled if Input Mode is set to Cartesian!

3 - Elevation

Set Input Mode to Polar and use the Elevation Slider to enter the object height in degrees ($\pm 90^\circ$).

Use display next to the Elevation slider to enter numeric values.

Note: Slider is disabled if Input Mode is set to Cartesian!



4 - Distance

Set Input Mode to Polar and use the Distance Slider to enter the object distance (max. 30 meter).

Use display next to the Distance slider to enter numeric values.

Note: Slider is disabled if Input Mode is set to Cartesian!

5 - Gain

Sets the level of the audio source direct signal - independent of reflections and reverb gain. (-96dB ↔ +24dB)

Note: Values for direct, reflection and reverb levels influence the distance perception.

6 - Zoom +/-

Use plus / minus buttons to zoom In or Out.

There are six different zoom stages:

3m / 6m / 12m / 18m / 24m / 30m

7 - Display Mode (X/Z Y/Z X/Y)

Switch between three different Display Modes:

X/Z is a top view.

Y/Z is a side view.

X/Y is a rear view.

Note: The Icon in the middle of the Display gives a quick overview of the chosen mode.

8 - Clarity

Clarity is an algorithm by the Sennheiser Ambeo team, which lets you control the amount of HRTF influence that is being applied to your binaural output signal. The Clarity feature is only available in binaural output mode.

Note:

Value 0: maximal localization and externalization



Value 100: minimal coloring due to HRTF, but less stable localization and externalization



Illustration 3.6 – Clarity Visualization

Note:

For our spatialization several HRTFs are used. As a graphical simplification only one HRTF is shown in the visualization of the Clarity feature.

Tip – Shortcut Reset Position

Press ALT and double-click into the XYZ display to reset the source position to default values.

3.2 Virtual Acoustics

The Virtual Acoustic module adds reflections and reverb to the signal.



Illustration 3.6 - Virtual Acoustics module

- 1 - Preset** Menu to select different acoustic room presets.
For an overview and detailed description of all presets see chapter 4. Preset List.
- 2 - Size** Slider to decrease the reverb time of the selected room preset.
Values (50% ⇔ 100%)
- 3 - Reflections on/off** Switch to turn ON/OFF the Reflections rendering.
- 4 - Reflections Gain** Adjusts the overall gain of the Reflections section.
Values (-96dB ⇔ +24dB)
- 5 - Reflections Damping** Applies a low-pass filter to the Reflections signal.
Set frequency values between 500 Hz to 19999 Hz.



- 6 - Reverb On/Off** Switch to turn ON/OFF the Reverb rendering.
- 7 - Reverb Gain** Adjusts the overall gain of the Reverb section.
Values (-96dB ⇔ +24dB)
- 8 - Reverb Damping** Applies a low-pass filter to the Reverb signal.
Set frequency values between 500 Hz to 19999 Hz.

3.3 Master



Illustration 3.7 - Master module

- 1 - Input channel** Sets dearVR input signal from a stereo audio clip.
Left channel, Right channel or a mix.
Note: The green LED is illuminated if an input signal is detected.
- 2 - Output format** Choose the Output format:
 - **Binaural**
2 channel binaural output for playback via headphones.



- **FOA YouTube**

4 channel first order Ambisonics output in AmbiX format.
Format used by YouTube.

- **2.0 Stereo**

2 channel stereo output for playback via stereo speaker setups. 3D positioning rendering is disabled.

Note: Higher Order Ambisonics output is only available in the dearVR PRO version.

3 - Master Gain

Sets the overall output gain.
Values (-96dB ↔ +24dB)

4 - Bypass

Bypass all dearVR processing.

5 - Bass Boost

Enable bass enhancement on the input signal.

6 - Performance Mode

Use Performance Mode for static audio sources to reduce processing load.

Note: Only enable for static objects.

7 - Input Signal

The green LED is illuminated if an input signal is detected.

Tip – Stereo Sources

Using dearVR MUSIC creates a 3D audio object as a point source. In case you want a stereo audio signal to spread within the 3D space, you have to create two separate tracks for the stereo file - each with an instance of dearVR MUSIC plugin. Set one input slider to Left and the other to Right. Position both audio objects together and adjust their distance between each other by ear.



4 3D Audio Formats and When to use What

Our plugin dearVR MUSIC offers two different kinds of 3D audio formats:

1. Binaural
2. Ambisonics

To give you an overview about when to use which one, we briefly describe how they work and what kind of setup an end user needs to listen to the formats. In the following chapters you will find examples on how to use our plugin with each workflow.

4.1 Binaural

In our introduction we already covered a lot about binaural audio. The essence is, that binaural audio is ONLY working when listening to it on headphones. It is a two-channel audio format and therefore the workflow is as if you would make a stereo mix.

4.2 Ambisonics

The Ambisonics format is a more abstract one. Without going into the technical details, the most important details are that there are multiple orders of Ambisonics. The higher the order, the better the resolution of the 3D audio space. DearVR MUSIC is only able to do 1st order Ambisonics. When mixing in Ambisonics, an Ambisonics decoder is necessary to listen to the mix (e.g., our plugin dearVR AMBI MICRO). The end user would also need an encoder for his/her setup to listen to the mix. Facebook and Youtube already offer a native 1st order Ambisonics support and convert it back to binaural 3D audio, so you can deliver 1st order Ambisonics to these platforms without taking any further steps.



5 Binaural Workflow

Since the Binaural workflow is very similar in all DAWs, we will describe this once with Reaper as an example.

1. Create a track and put an audio file on it.
2. Load dearVR MUSIC plugin on the track
3. Position your sources, add reverb and reflections
4. Sum all binauralized stereo signals on one stereo bus
5. Listen to that bus with headphones.

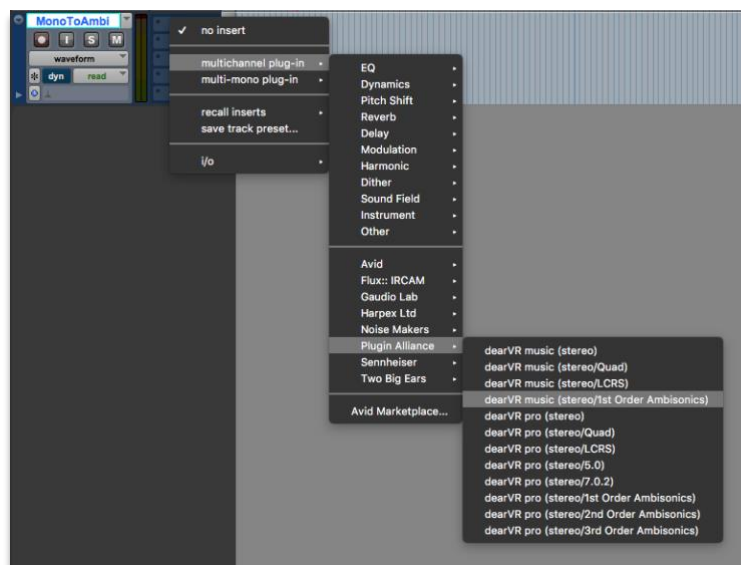




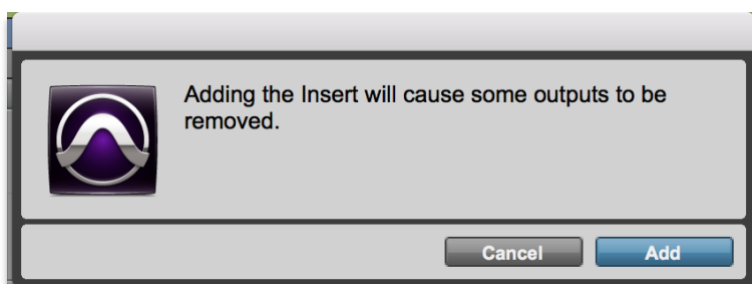
6 Ambisonics Workflow

6.1 Pro Tools

1. Create a mono/stereo track. Add dearVR MUSIC plugin (FX category "Reverb") with (Mono/stereo to Ambisonics 1st order) to the track.

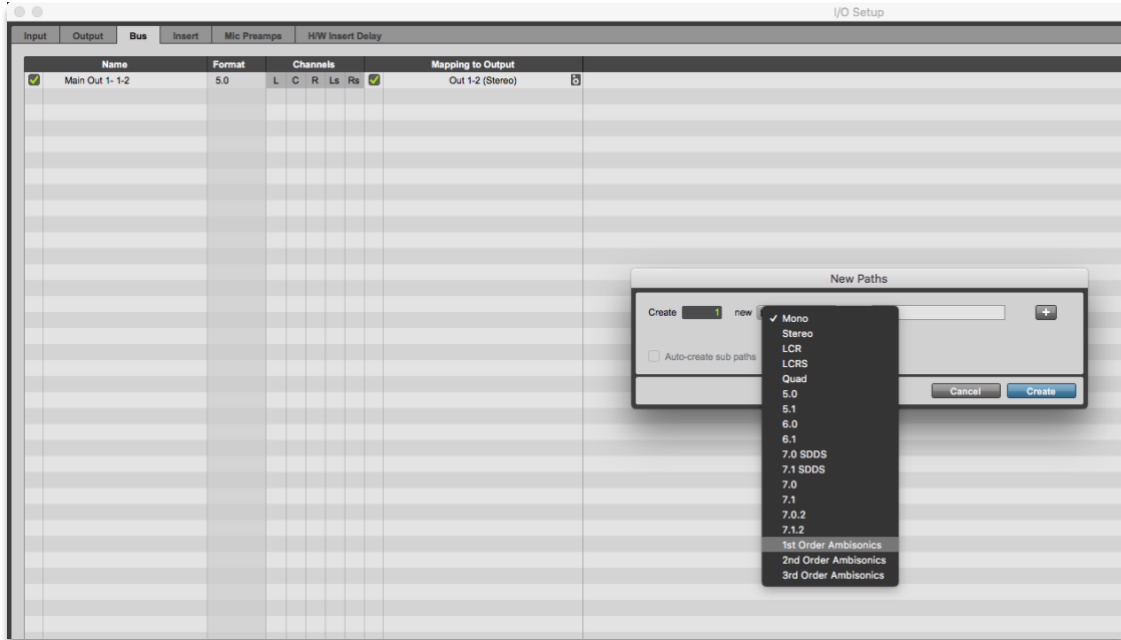


Accept the following warning:

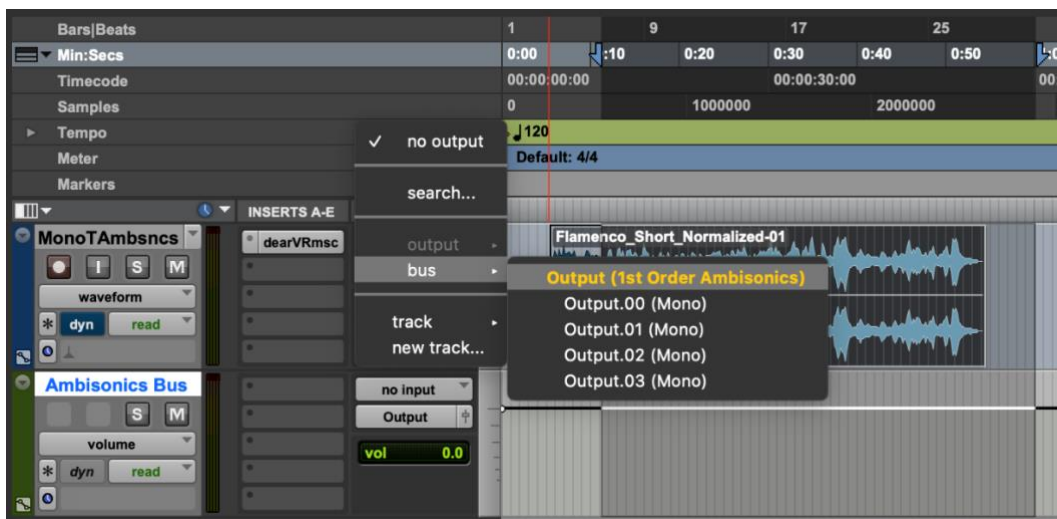




2. Create a new bus (1st Order Ambisonics)



3. Route dearVR tracks output to the Ambisonics bus



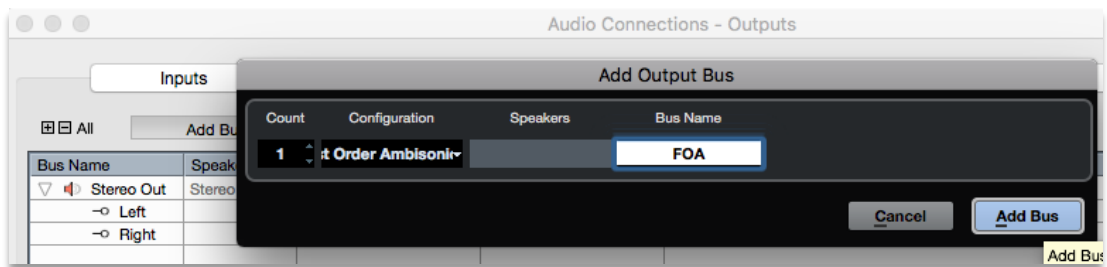
Notice

To monitor the Ambisonics bus with headphones please check out the **dearVR AMBI MICRO** plugin at www.dear-reality.com

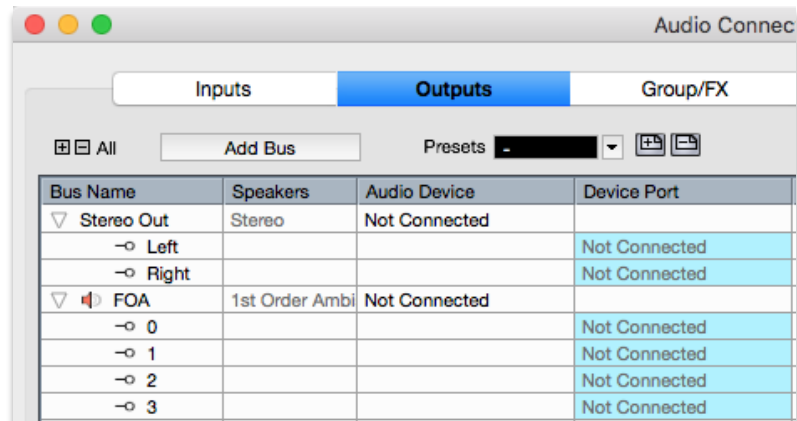


6.2 Cubase 11 / Nuendo 11

1. Head to Studio -> Audio Connections and create an Ambisonics-Bus by clicking Add Bus and choosing e.g. 3rd Order Ambisonics under Configuration.

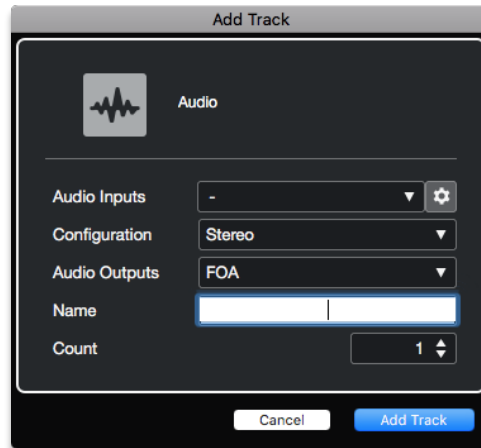


2. Right-click your new Ambisonics Bus and click specify it as the Main Mix. The Ambisonics Bus should now appear in a red color in your Audio Connections.

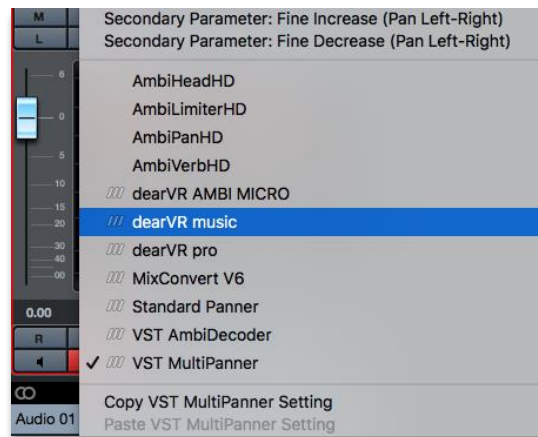




3. Close the *Audio Connections* Window and create a new track with **stereo** configuration. Select your Ambisonics Bus under *Output Routing*.



4. right click on the Panner field of Nuendo and select dearVR MUSIC from the dropdown menu:



5. For every new track, just repeat steps 3 and 4 or duplicate your audio track.

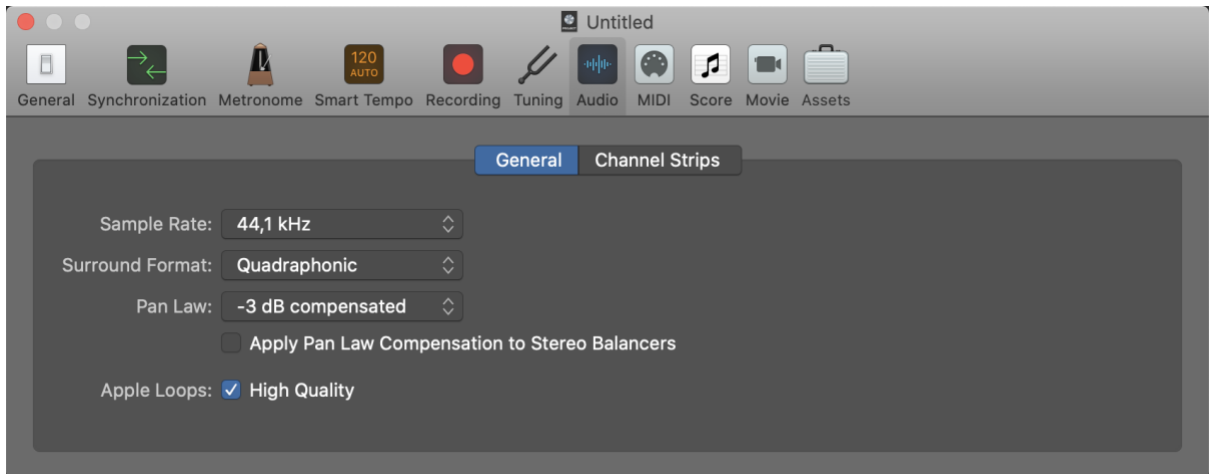
Notice

To monitor the Ambisonics bus with headphones please check out the **dearVR AMBI MICRO** plugin at www.dear-reality.com

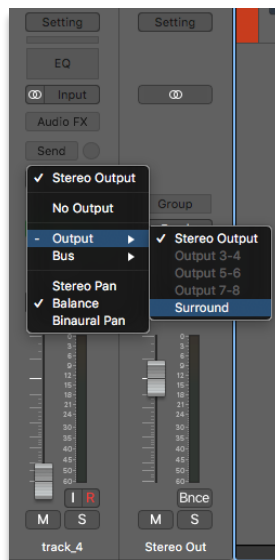


6.3 Logic Pro X

1. Head to File -> Project Settings -> Audio and choose Quadraphonic as your Surround Format



2. Create a new audio track and set the Output to *Surround*





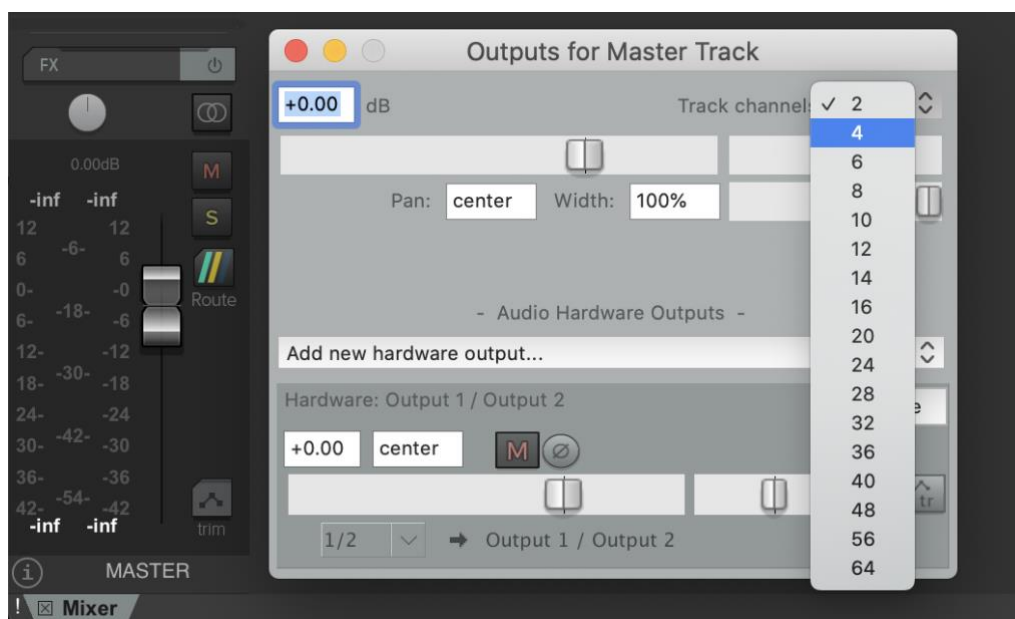
3. Add the dearVR PRO Audio Unit as an insert effect and choose FOA YouTube or FOA FuMa in the Output section
4. For every new track, just repeat steps 2 – 3 or duplicate your audio track

Notice

To monitor the Ambisonics bus with headphones please check out the **dearVR AMBI MICRO** plugin at www.dear-reality.com

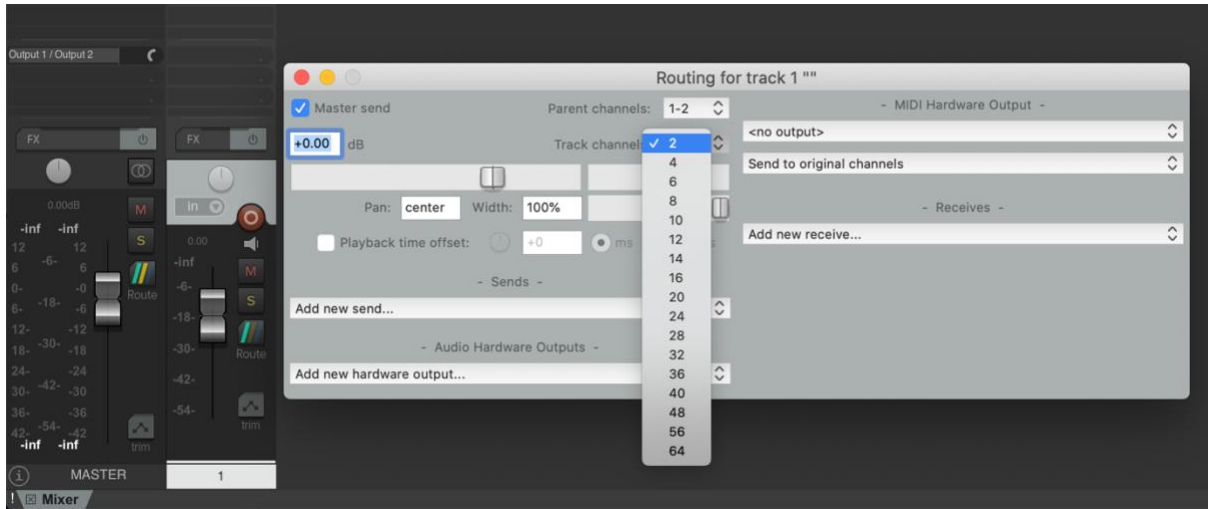
6.4 Reaper

1. Configure your master to have 4 channels by clicking Route on the master channel.





2. Create a new track and also there change the number of track channels to 4.



3. Put dearVR MUSIC on the track and select your Ambisonics format in the plugin as output.
4. For every new track with an Ambisonics output repeat steps 2 and 3.

Notice

To monitor the Ambisonics bus with headphones please check out the **dearVR AMBI MICRO** plugin at www.dear-reality.com



7 Preset List

Note: The larger a room the longer the reverb – and the more performance is needed!

Performance Level (**PL**) illustrates the performance load within a range from 1-10.

Level 10 needs the most performance.

A. Rooms & Halls	PL
Concert Hall	5
Recording Hall	7
Church	5
Large Room	5
Small Room	3
B. MUSIC Production	PL
Studio Room	5
Live Stage	7
Heavy Ambience	4
Plate Ambience	3
Small Ambience	2
Vocal Hall 1	7
Vocal Hall 2	7
Vocal Plate	8
Drum Room 1	6
Drum Room 2	6
Percussion Plate	5
String Hall	8
String Plate	8



8 Troubleshooting / Known Issues

1. Minimum Buffer Size.

A minimum buffer size of 1024 is recommended.

2. Multichannel output for Ableton Live, Samplitude, cakewalk, Cubase Elements, Cubase Artist

Due to restrictions within these hosts, no multichannel Ambisonics outputs are available.

3. Cubase/Nuendo behaviour for mono audio tracks

Due to the internal routing of the Cubase/Nuendo mono track, the spatialization processing of dearVR MUSIC is restricted.

This issue arises when a mono -> stereo track is setup in Cubase/Nuendo and dearVR MUSIC is placed on an insert effects slot. In order to avoid this issue please always use dearVR MUSIC with a stereo track in Nuendo/Cubase, even if you're working with mono material.

4. Legacy Incompatibility with Cubase/Nuendo panner slots

Since the introduction of the Nuendo and Cubase Pro panner slots, dearVR MUSIC no longer operates in the insert effects chain, when it's being used to output Ambisonics.

A Nuendo/Cubase session with dearVR MUSIC placed in the insert effects slot is therefore not compatible with the new panner slot setup.

5. Do not open a session created with a version of dearVR MUSIC > 1.2.2, after upgrading to version 1.2.2, as it will reset your dearVR MUSIC settings (plugin parameters, automation).

This issue only persists in the VST3 version of the plugin and you can work around it by deinstalling the VST3 version, and thus forcing Nuendo/Cubase to use the VST2 version of dearVR PRO.



6. Pro Tools user presets

If there are no user presets available, delete the dearVR MUSIC folders in Pro Tools' plugin settings. Reinstall the AAX component afterwards.

WIN: C:\Users\\Documents\Pro Tools\Plug-In Settings

macOS: ~/Documents/Pro Tools/Plug-In Settings

7. DearVR MUSIC does not appear in my DAW on Windows:

DearVR MUSIC does not appear in DAWs, when a Visual C++ Redistributable is missing. Try to install the "Microsoft Visual C++ Redistributable for Visual Studio 2015, 2017 and 2019 Redistributable (x64)" on your machine. You can find the package here:

<https://support.microsoft.com/en-ca/help/2977003/the-latest-supported-visual-c-downloads>

8. DearVR MUSIC in Adobe Premiere

dearVR MUSIC can cause crashes in Adobe Premiere 2022. We recommend using the VST3 version of the plugin, as it works best with Premiere. Due to an incompatibility issue there might occur crashes, when trying to close the application. Make sure to save all changes, before closing Adobe Premiere.



9 Changelog

v1.1

- Support of higher sample rates
88.2 kHz, 98 kHz, 176.4 kHz and 192 kHz, in both mono and stereo.
- Minor Bugfixes

v1.2

- Improved performance
- Smoother transitions when changing virtual acoustics presets.
- UI Update
- Minor Bugfixes

v1.2.2

- FIX - only low-resolution automation for Logic Pro
- FIX - wrong latency was reported if Ambisonics output was selected (Mac/Win, AAX, VST3, VST, AU)
- VST3 category was changed to enable dearVR MUSIC as a panner for Ambisonics tracks in Nuendo (Mac/Win, VST3)
- Minor Bugfixes

v1.4.0

- Up to 60% performance boost in binaural mode
- FIX Reflection delay was dependent on block size in Ambisonics
- FIX where reflections did not work with performance mode and Ambisonics output
- Minor bugfixes



v1.4.1

- Added support for ASIO guard in Nuendo
- Minor bugfixes

v1.7.1

- Minor bugfixes

v1.10.0

- Added Clarity Feature
- Native Apple M1 support
- Minor bugfixes



10 Contact

Support

Please let us know if there are any questions concerning the dearVR Plugin.

If you need further assistance, please send an email to:

support@dear-reality.com

For the latest news concerning dearVR please visit our website at:

www.dear-reality.com



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Caution

Using headphones requires responsible listening. Damage to hearing occurs when listen to loud sounds with headphones over time.

- Set the volume control of your computer to a minimum when connecting your headphones.
- Set the volume in a quiet environment and select the lowest volume at which you can hear adequately.
- Do not turn the volume control to high, as this can cause permanent hearing damage.
- Be aware that you can adapt to higher volume settings over time, not realizing that the higher volume may be harmful to your hearing.

Dear Reality GmbH will in any event not be liable for any damage to hearing caused by loud sounds.

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