



# MIX & MONITOR

## AMBISONICS



# USER MANUAL

## v1.9.3

Please read this manual carefully before using the software.

Using headphones requires responsible listening!

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## Quick Start Guide

### Download & install dearVR AMBI MICRO

- To download the plugin, you have to create a free account on [dear-reality.com](https://dear-reality.com).
- Login and go to your account. Download the installers from the FREE DOWNLOAD section within your account.
- Double-click the .mpkg (Mac) or .exe (Win) file.
- Follow the installation instructions
- Open the plugin in your DAW of choice.

For more information, please visit [dear-reality.com](https://dear-reality.com).

### System requirements and supported platforms

Supported sample rates:

44.1, 48, 88.2, 96, 176.4, and 192 kHz.

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



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# 1 Introduction

Thank you for downloading dearVR AMBI MICRO. This manual will help you understand the dearVR AMBI MICRO Plugin and how to use it in your projects.

**Have fun!**

## 1.1 About Ambisonics Audio

Ambisonics is based on the spherical harmonic decomposition of a sound field. The theory behind is a logical extension of Blumlein's work, saying that when using the two figure-of-eight capsules positioned perpendicular to each other, any other figure of eight response could be created.

As an example, 1st order Ambisonics can represent a sound field using four signals (collectively known as B-Format). The W signal is an omni-directional pressure signal that represents the zeroth order component of the sound field and X, Y and Z are figure of eight microphones used to record the particle velocity in any one of the three dimensions.

The basic principle of Ambisonics is to describe the whole three-dimensional sound field theoretically at a single point in space. All directional information at this point is captured by a suitable microphone – for example a four-capsule first order microphone like the Sennheiser AMBEO VR mic.

The captured signal is decoded later into multichannel loudspeaker signals or a binaural stereo signal for headphones. The important thing to note is that there is no need to consider the actual details of the reproduction system during the original recording or synthesis. The two parts of the system, encoding and decoding, are completely separate.



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. The power of this concept is that these loudspeaker-independent signals may be manipulated to drive a variety of loudspeaker arrangements.

In a nutshell: Ambisonics encodes direction as a property of the recorded sound.

### **A-format**

In the beginning, there are A-format signals. These are the signals which emanate from the microphones. A-format signals are not used in signal processing or transmission. They are only used for recording within the Ambisonics system.

### **B-format**

Instead the A-format signals are matrixed to B-format according to linear and aperiodic equations. In former times this was handled by hardware modules, provided by the microphone manufactures together with their microphone, but today almost by a software plugin.



## 2 dearVR AMBI MICRO

### 2.1 Overview



The dearVR AMBI MICRO plugin is made up of three processing units:

1. Input Module
2. Positioning & Rotation
3. Output Module

The signal flow starts in the Input Module, passes through the Positioning & Rotation section and ends with the Output Gain in the Output Module.

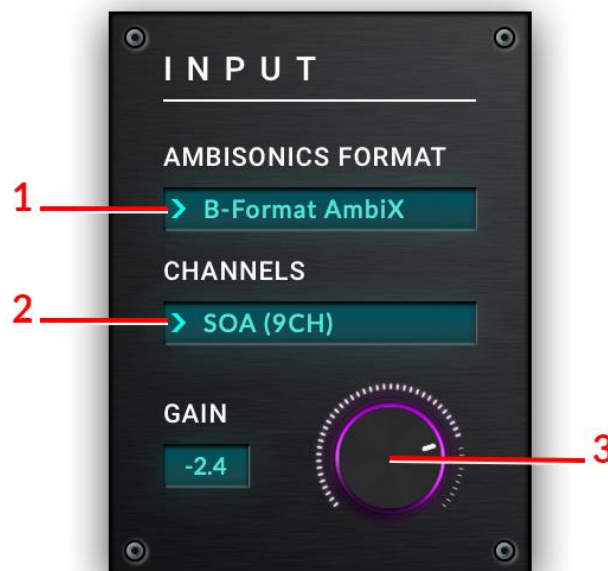


## 2.2 Input Module

The Input module let you choose between A-Format and B-Format Ambisonics.

A-Format is supported as a generic input without any individual correction filter for different types of first order Ambisonics microphones and recordings. For the Sennheiser AMBEO VR microphone, an optimized correction filter is already integrated in dearVR AMBI MICRO.

B-Format is supported up to third order in the AmbiX format.



*Illustration 2.1 - Input module*

**1 – Ambisonics Format** Use the dropdown menu to switch between three different Input Formats:

### 1. A-Format AMBEO

This Input Format is exclusively for recordings done with the Sennheiser AMBEO VR Microphone.

An Ambisonics correction filter - individual designed for the AMBEO VR Microphone by the Sennheiser Team - is active and optimizes





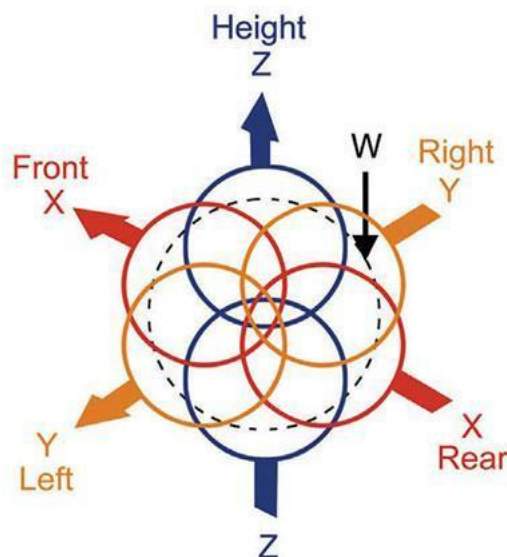
the 360° sound image of a recording.

## 2. A-Format

Use this Input Format for any type of first order Ambisonics microphone. It supports generic A-Format without a correction filter.

## 3. B-Format AmbiX

B-Format is supported up to third order in the AmbiX format.



*Illustration 2.2 - B-Format signals*

## 2 - Channels

Chose B-Format Input up to third order with the Channel dropdown menu.

### 1. FOA (4CH)

First Order Ambisonics (FOA) is a 4-channel format.

**Note:** Selected track format has to support 4 audio channels.

### 2. SOA (9CH)

Second Order Ambisonics (SOA) is a 9-channel format.



**Note:** Selected track format has to support 9 audio channels.

### 3. TOA (16CH)

Third Order Ambisonics (TOA) is a 16-channel format.

**Note:** Selected track format has to support 16 audio channels.

### 3 – Input Gain

Sets the level of the audio source input signal.

**Values:** -96dB ⇔ +24dB.

#### Info:

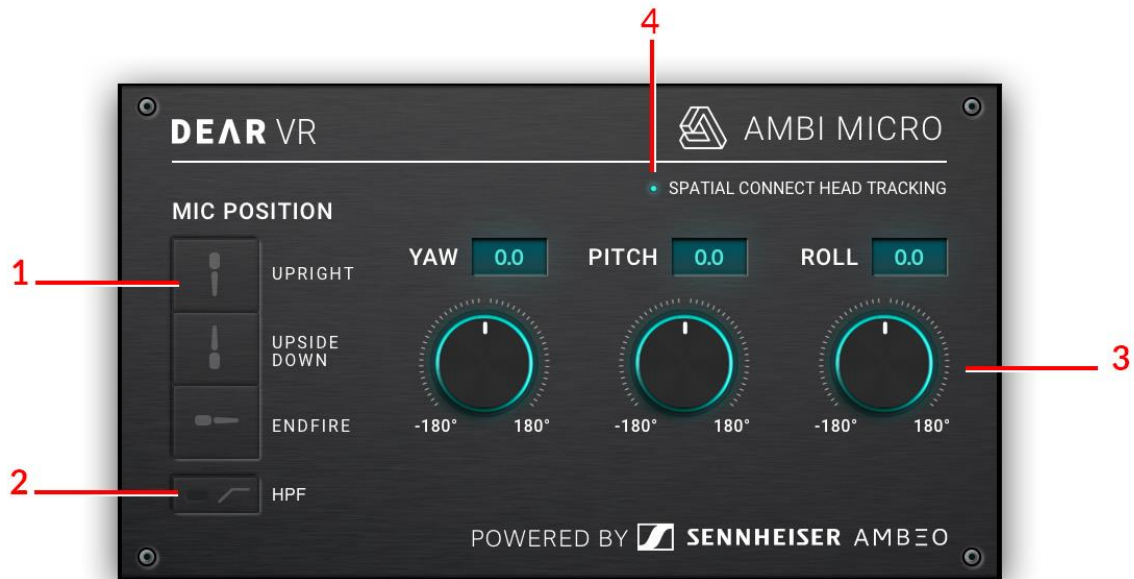
There are two main B-Format standards in Ambisonics: **FuMa** and **AmbiX**:

1. The **FuMa B-Format** lists the channels in the order W, X, Y, Z with the W channel attenuated by 3 dB.
  2. The **AmbiX B-Format** lists the channels in the order W, Y, Z, X and the channels use SN3D normalization. For Ambisonics first order 1 that means the four channels have a uniform gain normalization.
- Most current plugins as well as platforms like Facebook and YouTube use the AmbiX B-format.
  - It is quite simple to switch from AmbiX to FuMa and vice versa by means of plugins.



## 2.3 Position & Rotation

The Position & Rotation module allows to adjust the orientation of the Ambisonics sound sphere.



*Illustration 2.3 - Position & Rotation module*

### 1 – Mic Position

Select the position according to the orientation of the microphone on the stand during recording:

#### 1. Upright

Microphone basket directed upward.

#### 2. Upside Down

Microphone basket directed downwards.

#### 3. Endfire

Microphone basket directed forward.

**Note:** Mic Position is only available if the Input Format is set to A-Format or A-Format AMBEO. The default setting is Upright.



## 2 – HPF Filter

Applies a high-pass filter to the Input signal.

**Values:** -12dB / 30Hz

**Note:** HPF Filter is only available if the Input Format is set to A-Format or A-Format AMBEO.

## 3 – Yaw - Pitch - Roll

Allows the rotation of the Ambisonics sound sphere in all three dimensions.

### 1. YAW

Use knob to correct the horizontal orientation of the signal. Enables left or right motion about an axis running up - down (vertical axis). Positive motion moves to the right.

**Values:** -180° / +180°

### 2. PITCH

Use knob to correct the vertical orientation of the signal. Enables up or down movement about an axis running left - right (transverse axis). Positive motion moves to up.

**Values:** -180° / +180°

### 3. ROLL

Use knob to correct the vertical orientation of the signal. Enable left or right movements about an axis running front - back (longitudinal axis). Positive motion moves to the right.

**Values:** -180° / +180°

## 4 – Head Tracking

LED is ON if head tracking is enabled via connection to dearVR SPATIAL CONNECT software.

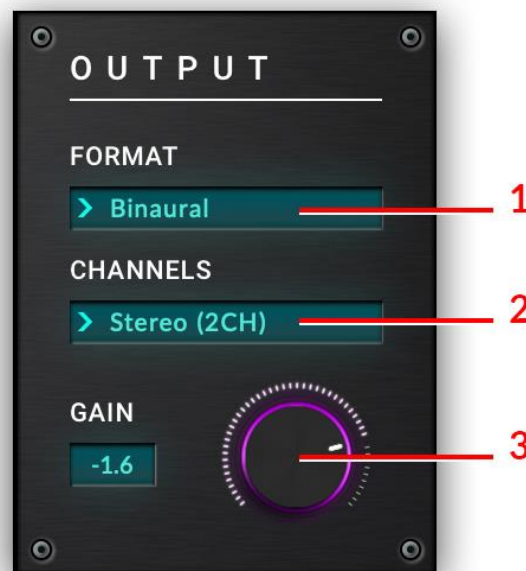


## 2.4 Output Module

The output module let you choose between binaural or Ambisonics output format.

Binaural is always a 2-track stereo format. You can choose between four different HRTF renderings.

Ambisonics output supports up to third order B-Format AmbiX. Depending on the selected order, the output channel configuration has to support 4 channels (FOA), 9 channels (SOA) or 16 channels (TOA).



*Illustration 2.4 - Output module*

### 1 –Format

Use the dropdown menu to switch between binaural or Ambisonics output formats:

#### 1. Binaural (dearVR)

Using the original HRTF rendering from dearVR PRO or dearVR MUSIC plugin.

#### 2. Binaural (You Tube VR)

Using the original HRTF rendering from You Tube.



### 3. Binaural (Facebook360)

Using the original HRTF rendering from the Facebook360 platform.

### 4. Binaural (KU 100)

Using the original HRTF rendering from the famous Neuman KU100 dummy head.

## 2 – Channels

Select the number of output channels:

### 1. Stereo (2CH)

Binaural format uses common 2 channel stereo signals and is compatible with any type of headphone.

### 2. FOA (4CH)

First Order Ambisonics (FOA) is a 4-channel format. Only available if Format is set to Ambisonics.

**Note:** Selected track format has to support 4 audio channels.

### 3. SOA (9CH)

Second Order Ambisonics (SOA) is a 9-channel format. Only available if Format is set to Ambisonics.

**Note:** Selected track format has to support 9 audio channels.

### 4. TOA (16CH)

Third Order Ambisonics (TOA) is a 16-channel format. Only available if Format is set to Ambisonics.

**Note:** Selected track format has to support 16 audio channels.

## 3 – Gain

Adjusts the overall output gain of the plugin.

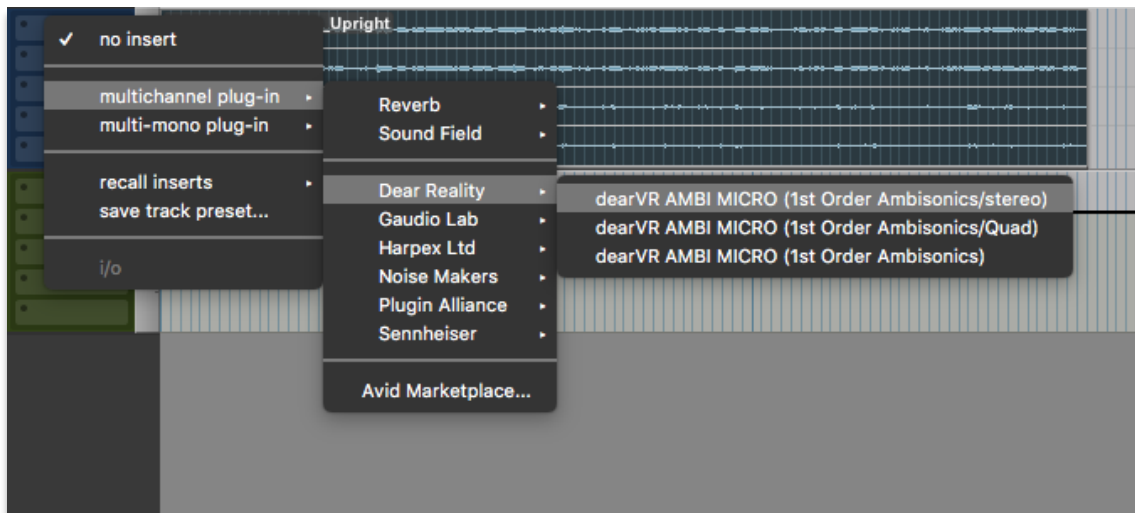
**Values:** -96dB ⇔ +24dB



## 3 Ambisonics Workflows

### 3.1 Pro Tools

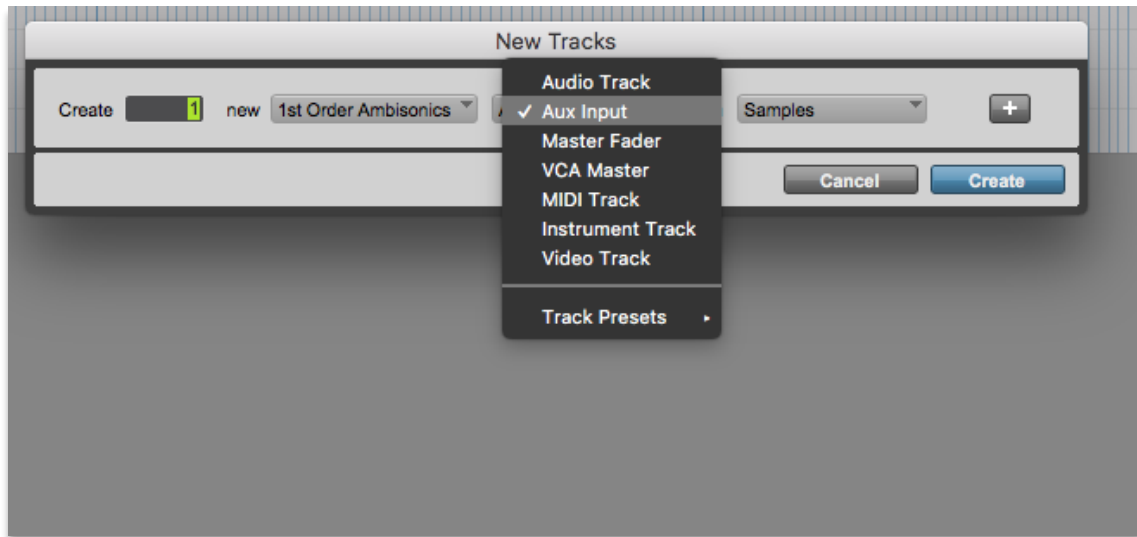
1. Create a 1<sup>st</sup>/2<sup>nd</sup>/3<sup>rd</sup> order Ambisonics track
2. Add your audio material and the desired dearVR AMBI MICRO configuration to the track



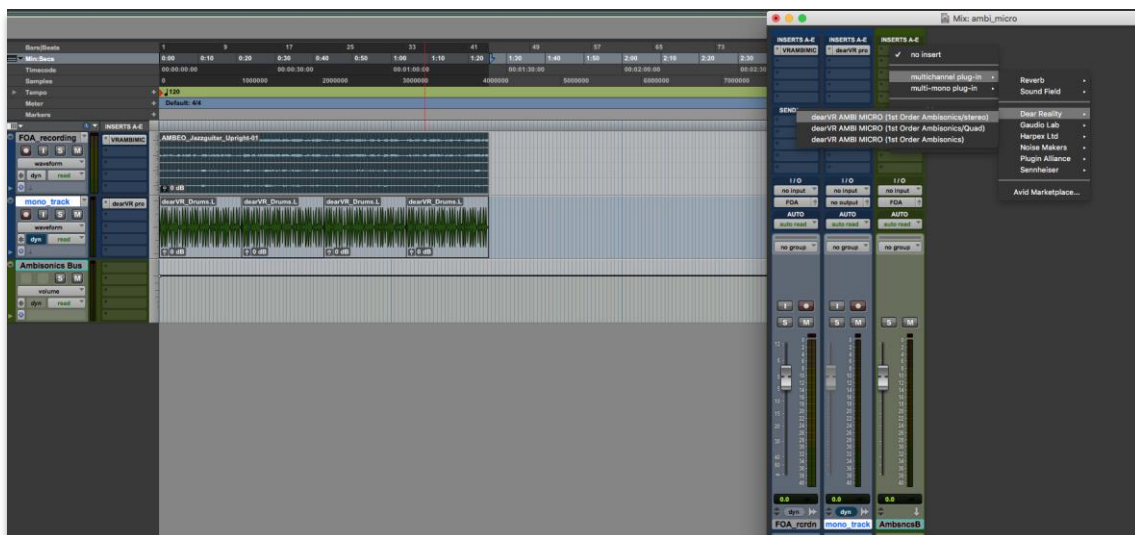
3. If you want to mix Ambisonics material with synthesized Ambisonics Material created with dearVR PRO/MUSIC, please refer to the dearVR PRO/MUSIC manual first and then continue with step 4!



4. After setting up your B-Format Ambisonics output using the Ambisonics Bus, create a 1<sup>st</sup>/2<sup>nd</sup>/3<sup>rd</sup> order Ambisonics Aux track:



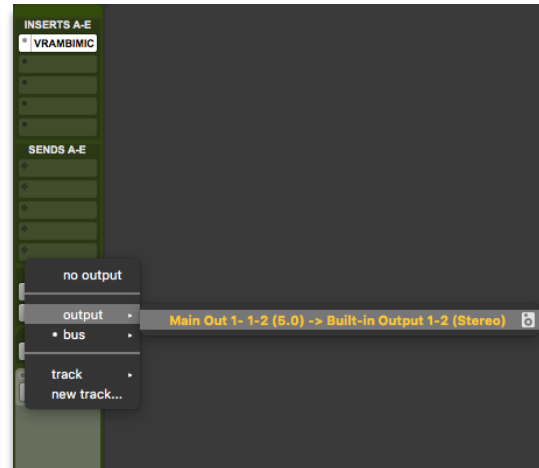
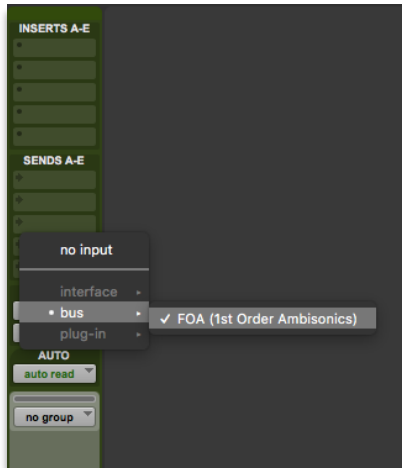
5. Add dearVR AMBI MICRO stereo out configuration to the Aux track







6. Change the input to your Ambisonics Bus and the output to your stereo monitoring output:



### ***Tip – universal Ambisonics bus***

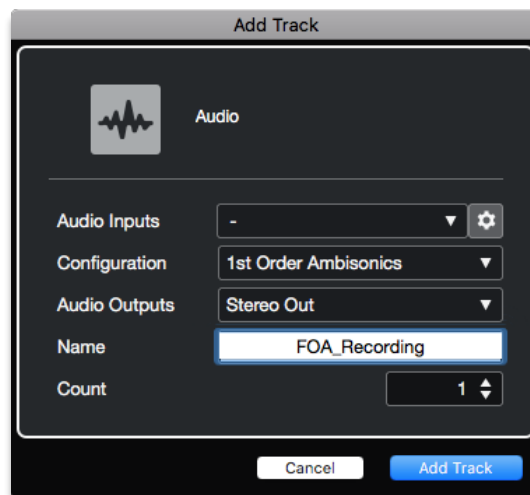
If you find yourself mixing first order Ambisonics files with synthesized third order Ambisonics tracks from dearVR PRO, you can use a single third order Ambisonics Bus and a third order Aux track with dearVR AMBI MICRO set to *B-Format* in its input to monitor your whole Ambisonics mix at once.

Just make sure that you convert every A-Format Recording into B-Format first using dearVR AMBI MICRO before routing it to your Ambisonics Bus.

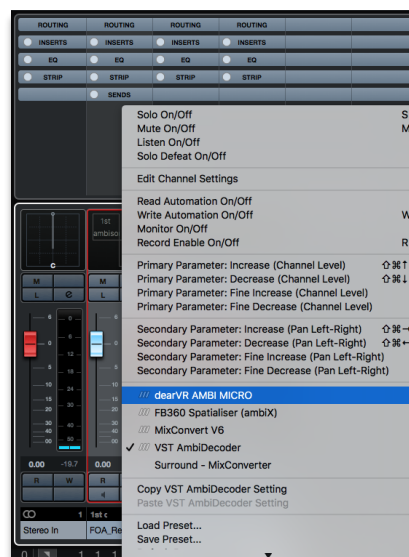


## 3.2 Cubase 10 Pro / Nuendo 10

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



2. right click on the Panner field of Nuendo and select dearVR AMBI MICRO from the dropdown menu:





3. If you want to mix Ambisonics material with synthesized Ambisonics Material created with dearVR PRO/MUSIC, please refer to the dearVR PRO/MUSIC manual first and then continue with step 4!
4. After setting up your B-Format Ambisonics output using the Ambisonics Bus, head to the Control Room.
5. In the headphone-monitoring insert effects slot, select dearVR AMBI MICRO:



6. Every track routed to your Ambisonics Bus will now pass through dearVR AMBI MICRO

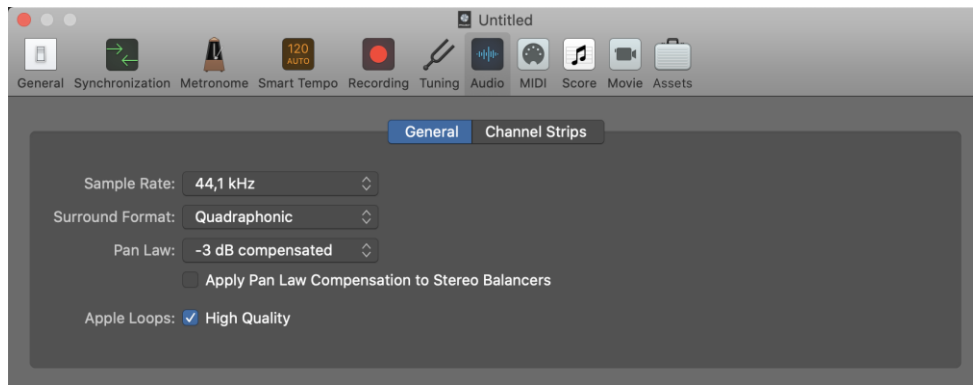
***Tip – universal Ambisonics Bus***

If you find yourself mixing first order Ambisonics files with synthesized third order Ambisonics tracks from dearVR PRO, you use a single dearVR AMBI MICRO in your control room set to *B-Format* at its input to monitor your whole Ambisonics mix at once. Just make sure that you convert every A-Format Recording into B-Format first using dearVR AMBI MICRO before routing it to your Ambisonics Bus.



### 3.3 Logic Pro X

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



2. Switch to or create a surround track.
3. Add dearVR AMBI MICRO to your master channel as an insert effect:

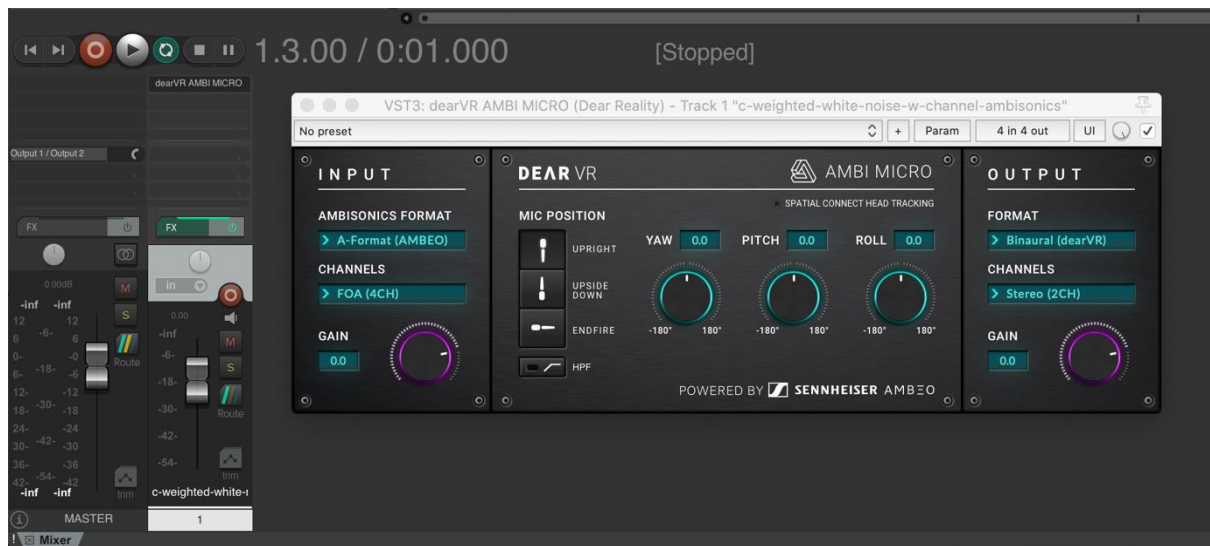


Please note that the dearVR AMBI MICRO Audio Unit will only show up in the context menu when the audio track is receiving a 4-channel input.



## 3.4 Reaper

1. Create a new track.
2. Add your audio material to the track. Reaper will automatically adapt the track's number of channels to the audio material.
3. Add an instance of dearVR AMBI MICRO to the track.





## 4 Troubleshooting / Known Issues

### 1. Minimum Buffer Size.

A minimum buffer size of 256 is recommended.

### 2. Ableton Live, Samplitude, cakewalk, Cubase Artist, Cubase Elements - multichannel Ambisonics outputs.

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

### NOTICE:

Logic Pro X is restricted to 1<sup>st</sup> order Ambisonics only!

## 5 Changelog

### v1.7.1:

- fixed a bug, where the output gain was dependent on the sample rate.

### v.1.9.1:

- Maintenance update
- minor bugfixes

### v.1.9.2:

- fixed a regression bug on Windows

### v.1.9.3:

- minor bugfixes



## 6 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](mailto:support@dear-reality.com)

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

[www.dear-reality.com](http://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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