

Ambisonic Audio

If you're looking into recording and processing surround sound audio, be it for a VR project or some other immersive experience, this chapter provides some helpful insights for recording, processing, and mixing ambisonic audio.

- [Ambisonic Plug-ins](#)
- [Ambisonic Equipment](#)

Ambisonic Plug-ins

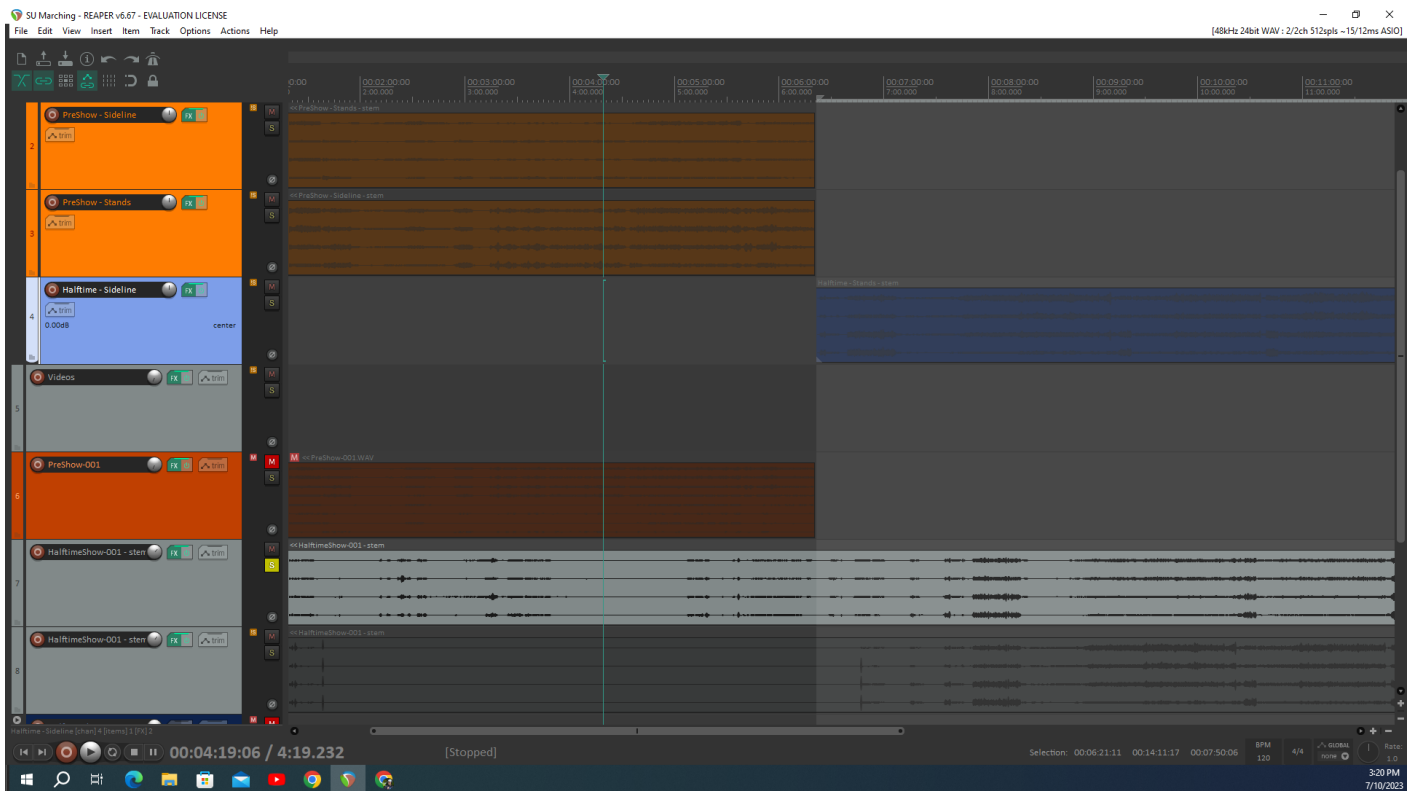
This page references an ARVR Alumni's senior capstone project. The project is an immersive experience of the SU Marching Band's first performance at Shentel stadium. Two GoPro Max's and 4-channel Ambisonic mics were used to capture video and 360 audio.

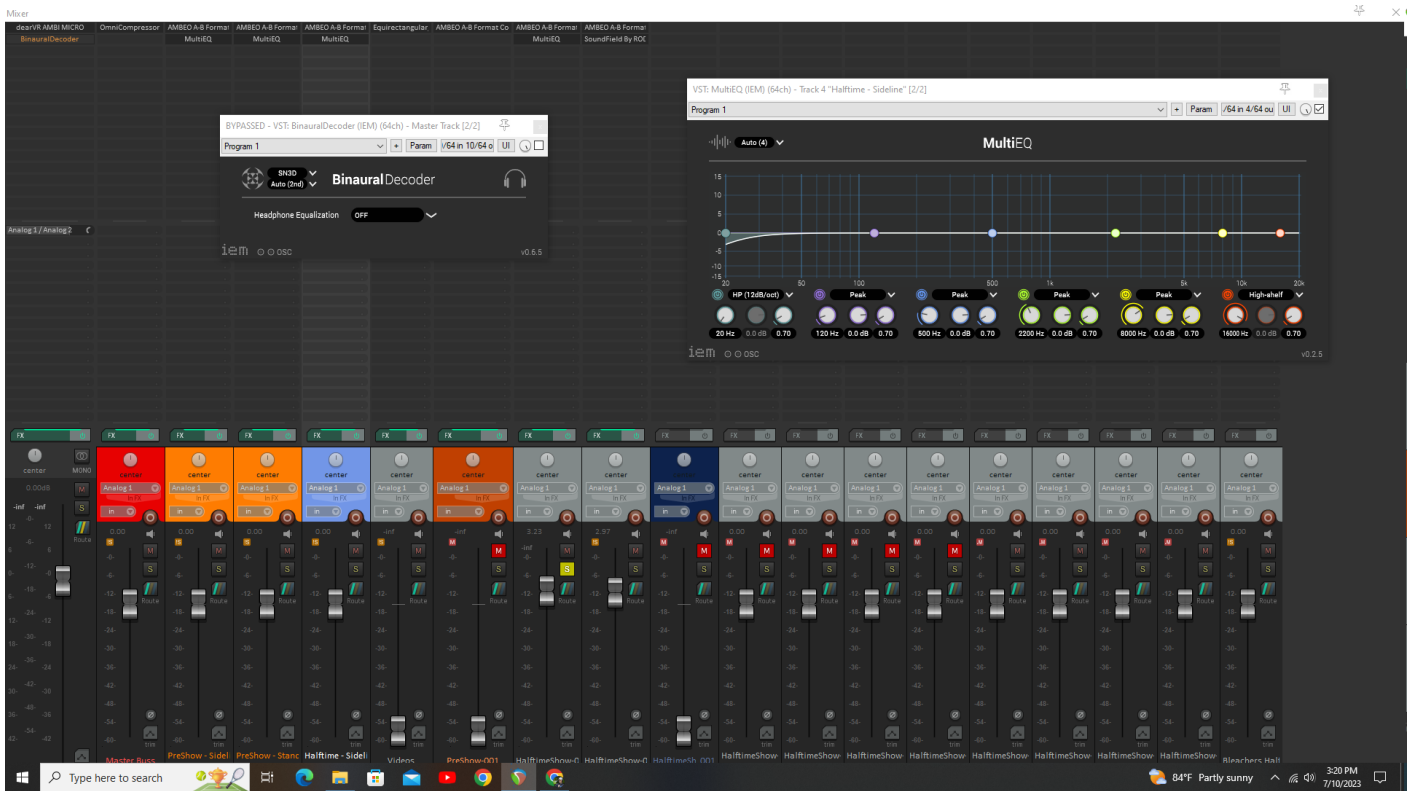
Words that are highlighted like **this** will be defined in the **DICTIONARY** dropdown menu at the top of this page.

DICTIONARY

Ambisonic: A surround sound format, providing audio sources in a full sphere for the listener.

AmbiX: The modern standard for ambisonic audio formats, used widely and distributed to media platforms, like YouTube.





You may be familiar with Reaper and have done recording or mixing on a project, but doing the same thing for **ambisonic** audio requires different tools and knowledge. This page goes over helpful plug-ins, providing their use cases, how to acquire them, and getting them to appear in a Reaper project.

Many of these plugins are a part of the IEM Suite download, which you can find through the link [here](#).

AMBI MICRO

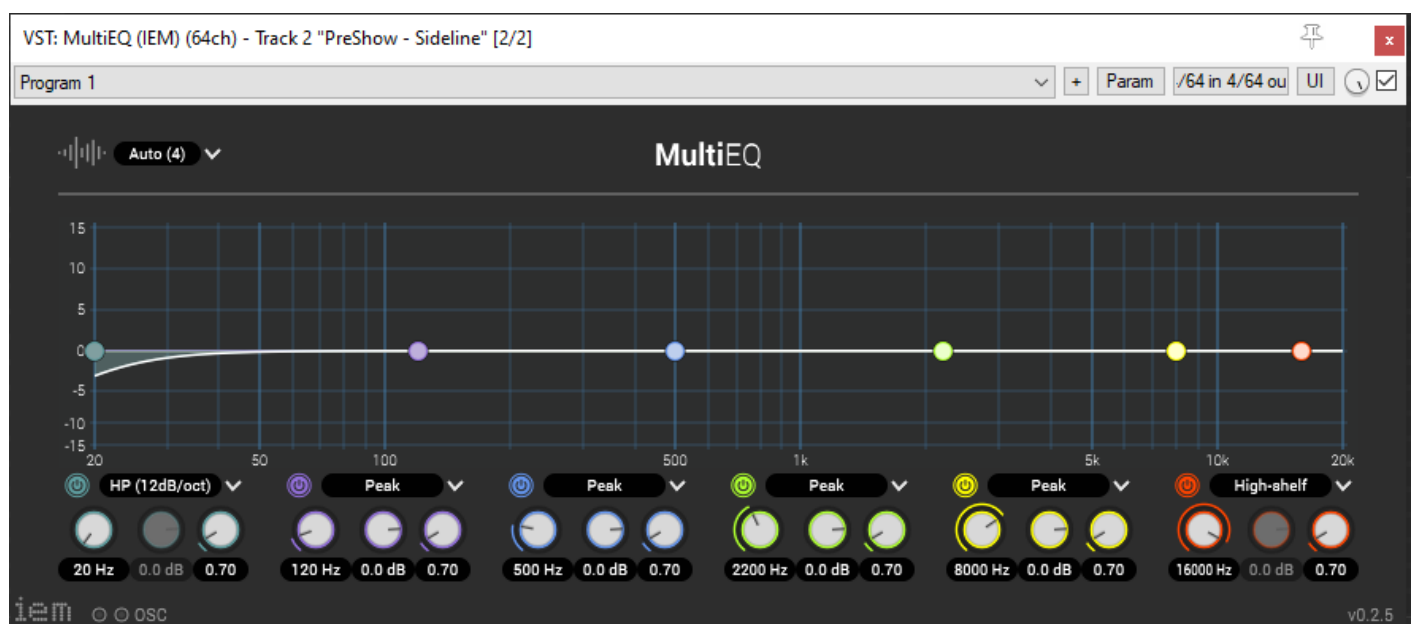


AmbiX or *B-Format* is an ambisonic audio file format that possesses the spatialized properties of surround sound audio. A-Format and B-Format are two standard formats for ambisonic audio,

which you can learn more about [here](#). In short, we recorded with a four channel mic and the raw audio is in A-Format, but must be converted to possess the needed spatial properties, which can only be understood in B-format. To convert the recorded audio into the correct format, you click the drop down in the top-left where it says **Ambisonics Format**, then select "B-Format (AmbiX)." *Furse-Malham* is an older format of ambisonic format that achieves ambisonic quality with a different configuration. Under **Channels**, we know that a 4-channel mic was used, so FOA (4CH) is what we select.

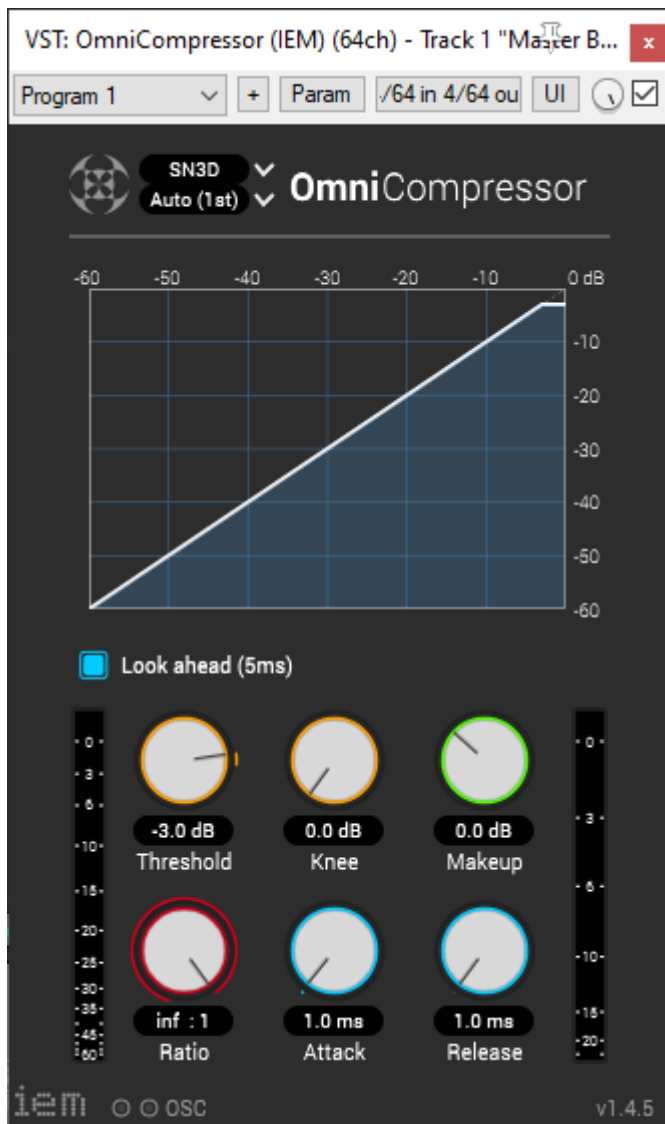
For the **Output** "Binaural (dearVR)" will take our ambisonic input and feed it to stereo output with spatialized properties. **Channels** should stay set on "Stereo (2CH)". If the alignment of audio does not sound right when you do this, you will have to move over to the *dearVR AMBI MICRO plugin*, or the *Binaural Decoder* plugin to adjust the rotation properties of audio. To help with properly adjusting the audio space, have the 360 video pulled up with the audio file and use your ear to figure out where the audio should align.

Multi - EQ



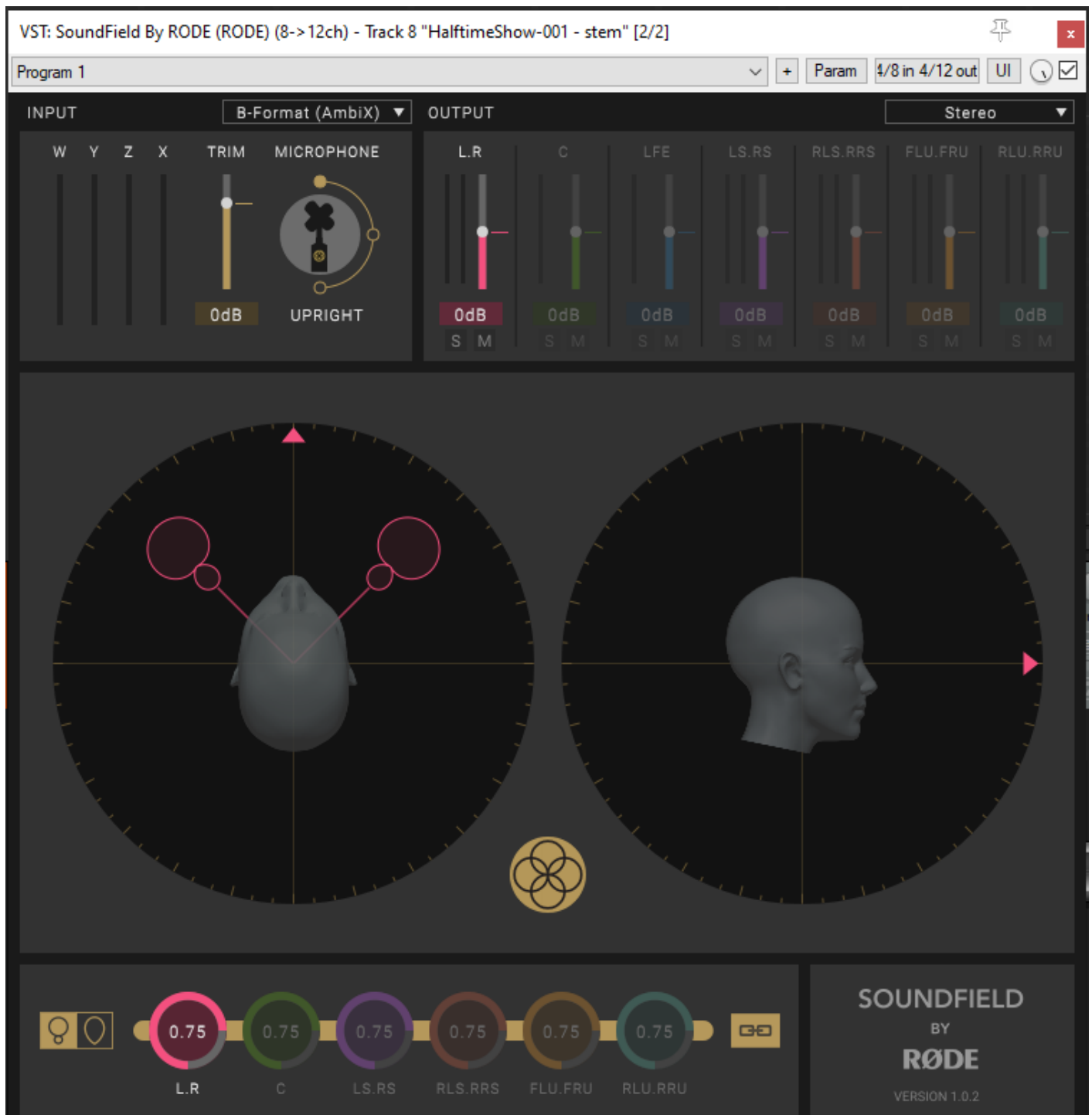
If you have ever scene an Equalizer before, that is essentially what this is, just for ambisonic audio. The only catch is that when you playback audio, there is no visualizer to show how the low/mid/high frequencies fluctuate. You will have to use your ear and play with the nodes to remove a range of frequency you believe needs changing. (ex. removing a low hum by lowering the purple node, muffling any low frequencies in the audio clip.)

Omni Compressor



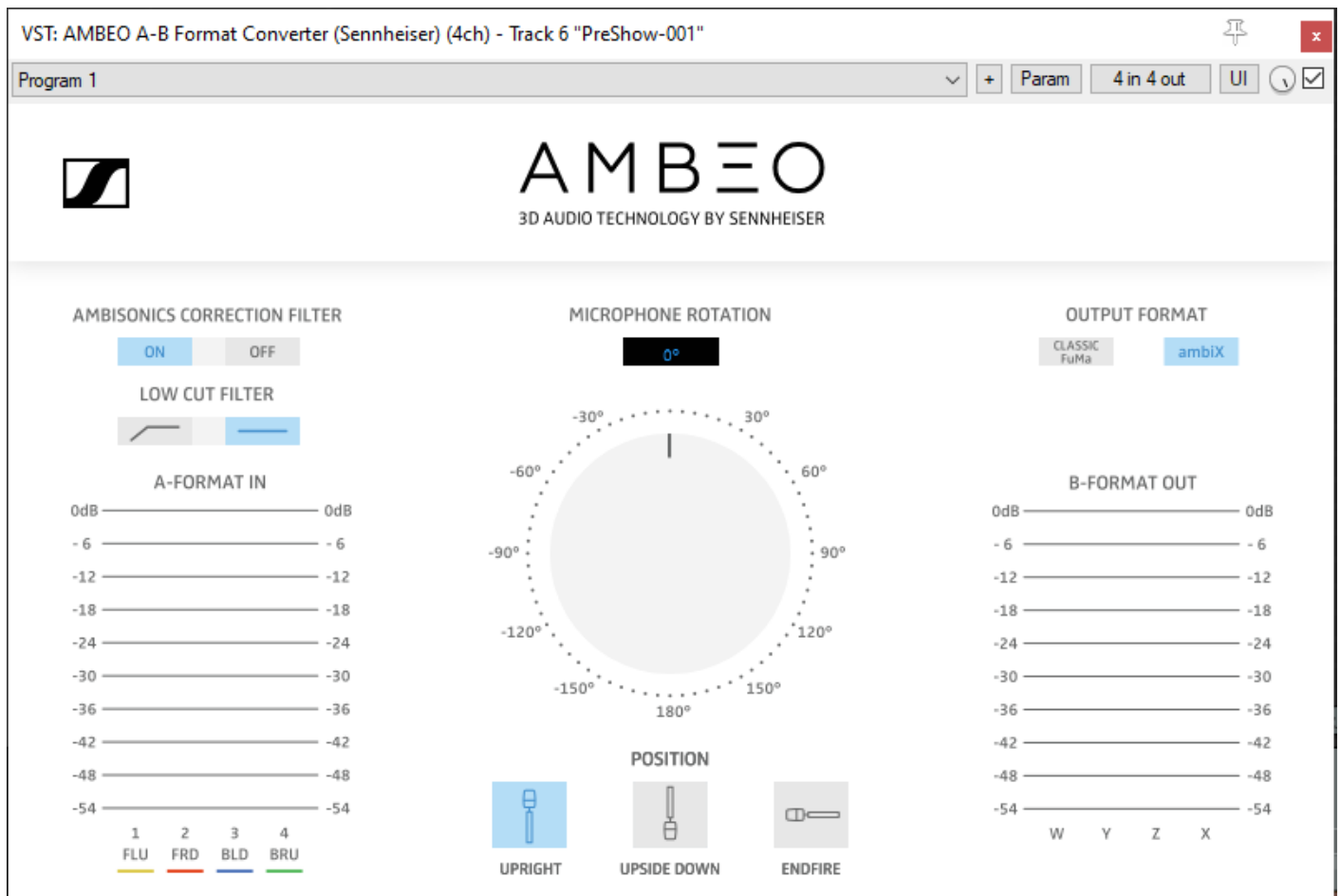
The Omni Compressor is like a compressor, but for ambisonic audio. You can put a gain threshold on the audio, like done in the image above with the top left knob, to prevent audio levels from peaking over a specific decibel value.

RODE SoundField



Firstly, make sure at the top you have the Output set to "Stereo" and Input to "AmbiX", if this is for the marching band Reaper project. SoundField can be used to tweak the audio spatialization of your different channels (remember, we captured four channels of audio with the ambisonic mic).

AMBEO A-B Format Converter

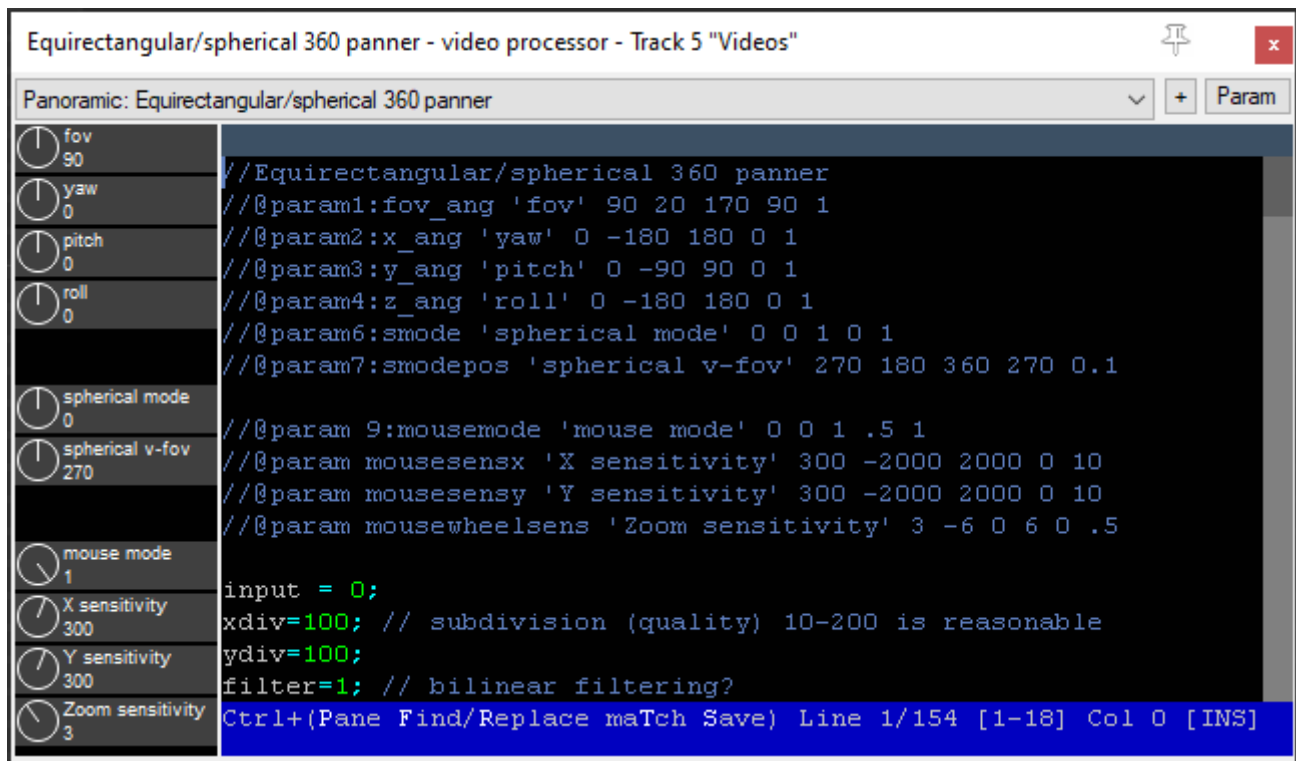


Part of how you configure this plug-in is determined by what was done during the recording process. When the marching band performance was recorded, the mic was facing upright with the logo pointed towards the bleachers. each go pro was facing frontwards as well, so when we convert the audio on this plug in, the location of the marching band audio should be right in front of us, just like in the video recorded with the GoPro Maxes.

The **Ambisonic's Correction Filter** should be turned on. This keeps track of any changes in the HRTFs from our Binaural Decoder. To reiterate, the filter will recognize changes in audio details and make sure they make it to the output format, such as pitch, yaw, and rotation.

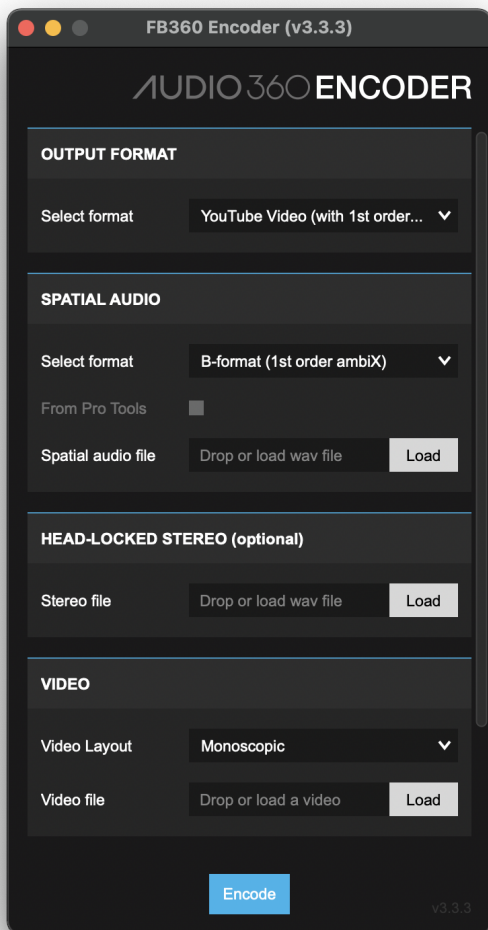
If the 4-channel mic and GoPro was not aligned during the marching band performance, we could look at a playback of the video to see where audio instances should be occurring, then adjust the knob on this plug-in to pan the audio to the appropriate position.

Equirectangular - Spherical Audio Pan Tool



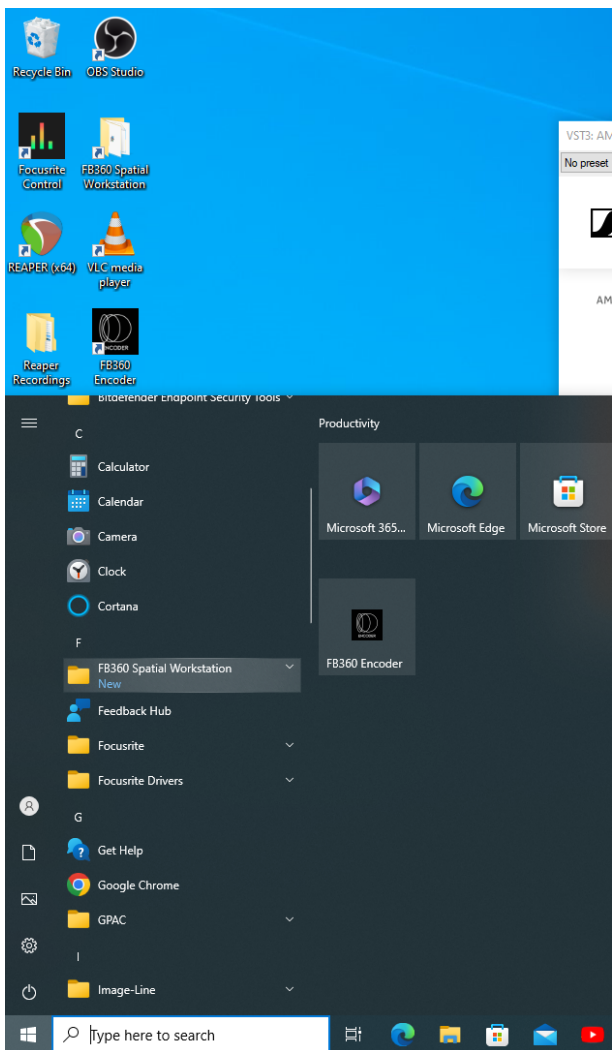
This is another panning tool, like in the A-B Format Converter, that has many options for adjusting the positioning of your audio.

FB360 Encoder



When combining your final audio render with the 360 video, you will use the *FB360 Encoder*. Instructions on downloading it can be found [here](#). Make sure your format is chosen, the rendered audio file is provided, and the video it belongs to is provided, before clicking **Encode** at the bottom.

When you get to the downloading Python step, consider downloading pyenv, if you're downloading python on a lab computer. This application manages different versions of Python and can ensure that having multiple versions of Python on a computer, if there are any, will not mess with anything. ([LINK](#))



When you download *FB360 Encoder*, you can find the application through your desktop and either pin it to your start menu, pin it to your taskbar, or drag and drop it on the start screen to have quicker access to it.

Ambisonic Equipment

Ambisonic Equipment is accessible through SCiL and through Prof.Spice at Ohrstrom Bryant Theatre. Should SCiL want to record audio to be converted into AmbiX format and used in a VR project, this page will go over the equipment used in ambisonic production.

GoPro Max

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All GoPros can be signed out on a clipboard. You must ask a SCiL Lab Employee or SCiL Faculty member to check out GoPros and the accessories that come with one. When you turn it on, you simply make sure your set to record a video in 360 format, then hit the record button at the top.

Afterwards, you can either connect the GoPro to your computer via USB, or can take out the SD card and plug it into an SD card reader to download onto your own storage device. (SD card readers are in the SCiL Lab)

>>Picture<<

When you are recording with the Gopro, keep in mind which direction it is facing and do the same for your ambisonic mic. This information will prove important when you go to import your ambisonic audio into the video and want it to be properly spatialized.

4-Channel Mic

>>Picture<<

This mic will record ambisonics in A-Format, which can be converted into B-Format post-production. (See [Ambisonic Plug-ins](#) page for more information.)