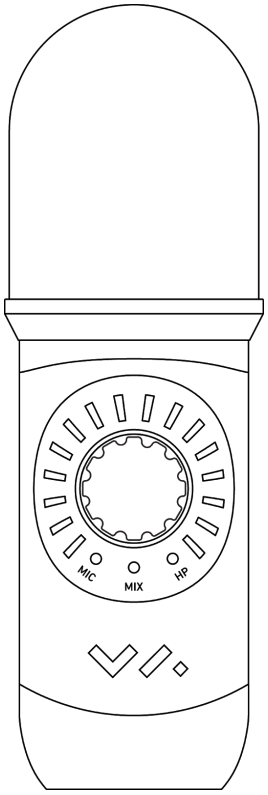
voyage audio

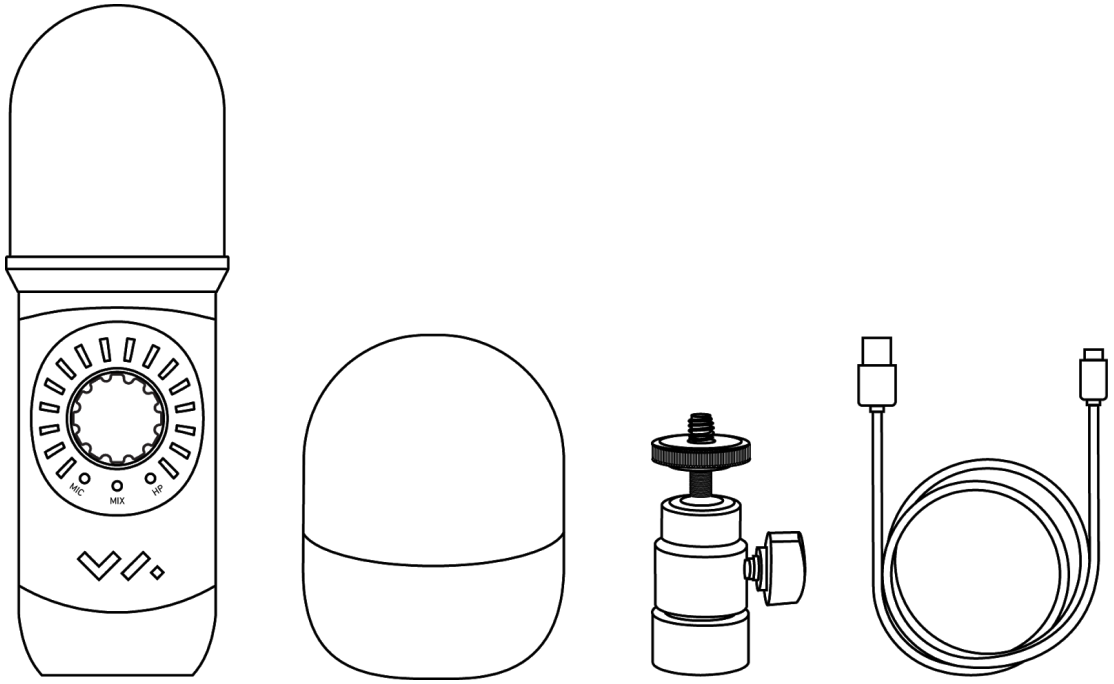
Spatial Mic



User Guide
Version 1.8

Package Contents

- Spatial Mic
- One (1) USB C to C and one (1) USB C to A cable, 3 meter, black nylon braided
- ¼-20 to ⅝'' mini swivel ball hard-mount
- Foam windscreen
- Quick-start guide
- For Download: Spatial Mic Converter VST® plugin (Mac OSX & Windows) and AAX (Mac OSX)
- For Download: Spatial Mic Control standalone app (Mac OSX & Windows)
- For Download: User Manual



Introduction

Thank you for purchasing Spatial Mic! With 8 high-quality capsules, digital connectivity, live monitoring and a dedicated DAW plugin for output conversion, Spatial Mic helps you capture immersive 3D audio, surround sound, rotatable stereo and beyond.

Spatial Mic records the entire sound-field with precision. Signals from 8 capsules, encoded with Spatial Mic Converter plugin result in a second order ambisonics representation of your audio scene. This allows for stunning spatial resolution, engaging listeners as immersive sound moves

around their heads. Additionally the plugin can be used to create virtual mono or stereo microphones which can be aimed anywhere in the sound-field.

Designed for audio engineers, producers for AR/VR, game sound-designers and 3D audio pioneers, Spatial Mic is a next generation 360 microphone. Spatial Mic and the included Spatial Mic Converter plugin (VST and AAX) offer substantial improvements over existing solutions:

- Enhanced spatial resolution, pattern decoding, directivity & optimal listening area vs first order microphones and less phase issues than with spaced arrays.
- Future-proof output — may be decoded to any listening format live or in post and is not locked to one specific configuration like 2-channel binaural microphones.
- Output may be head-tracked and used natively with content delivery tools from YouTube, Facebook and Google Resonance SDK.

Streamlining the recording workflow when dealing with multi-channel microphone arrays was a top priority during the development of Spatial Mic. With built-in USB and ADAT connectivity, no external mic preamps, multi-channel cables carrying analog signals or converters are needed. Along with purity of signal, an individual calibration profile stored within each mic ensures consistent quality.

We are excited for you to start recording with Spatial Mic. Please read this user manual and get to know everything this microphone package has to offer. Happy recording!

Requirements

- Host device supporting multichannel USB Audio 2.0 or ADAT lightpipe input.
- USB bus power via USB-C jack or external 5v / 500mA source via micro-USB
- DAW supporting multi-channel audio tracks like Reaper, Pro Tools Ultimate or Nuendo
- Spatial Mic Converter plugin and Spatial Mic Control app have been tested to work on Mac OSX 10.11 and higher or Windows 10

Background

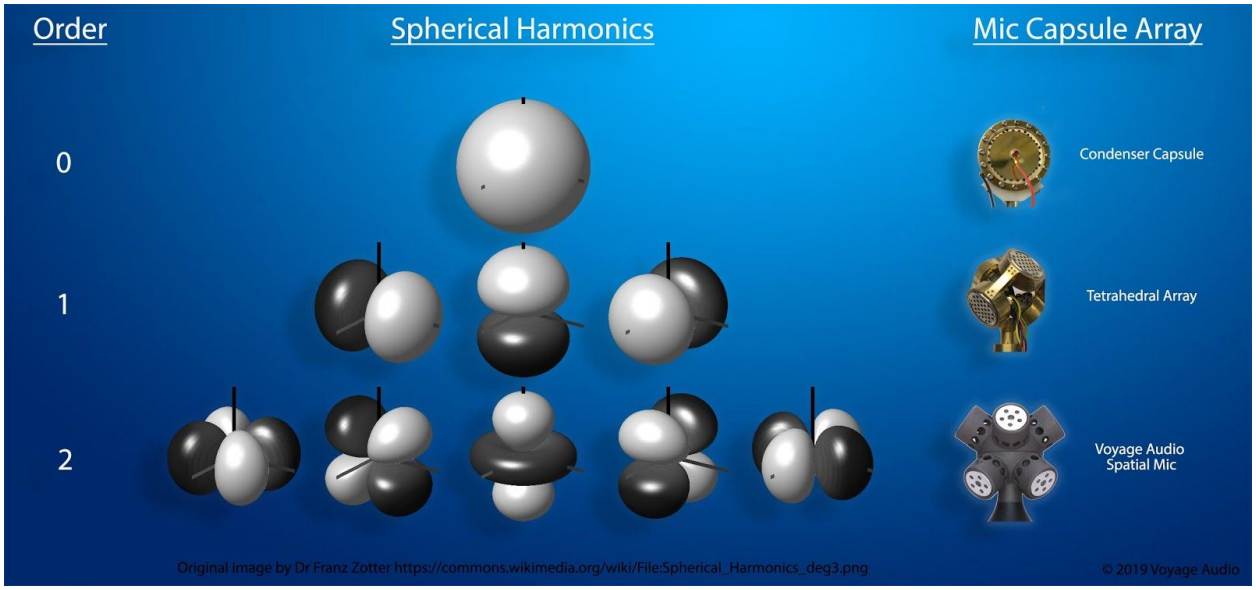
When we record the signal from a traditional microphone, we put this on a track and assign it to a playback channel. We can play this back on one speaker and call it mono, or send it to two speakers, pan it left, right or center and call it stereo. We can also expand this to a larger 5.1 or even 22.1 surround system. In all of these cases we are relying on a channel based system to record and playback audio.

Channel based systems require the same number and configuration of loudspeakers to be used in production and playback. **Ambisonics** enables audio production and playback without using

a channel based methodology, thus enabling reproduction on any number of speakers in varying configurations. The advantage of using ambisonics vs channel-based audio (i.e. mono, stereo, 5.1, etc) is that the signals are not related to speaker feeds. Because of this, ambisonics is a future-proof way of recording.

Ambisonics was first developed in the 1960's and '70's by passionate researchers as a way to ***encode*** a 3D sound field. To do this, the sound-field is decomposed into a series of spherical harmonics. While a spherical harmonic series goes indefinitely, we are most interested in the first few "orders", which will give us enough spatial resolution to encode a realistic sounding representation of a soundfield. The encoded audio on DAW tracks will represent these spherical harmonics, instead of speaker feeds.

In the figure below, you can see that, as order increases, more spherical harmonics are needed. For example, a second order spherical harmonic representation of a sound field contains 9 components - all of the harmonics from the zeroth and first order, plus 5 more.



At the **zeroth order**, you can see that a single, omni-directional microphone capsule is capable of recording this harmonic. But what about the first and second order? To create these harmonics, the sound field must be sampled by a microphone array and then encoded. For **first order**, the traditional way is to use crossed figure-eight microphone capsules and was first pioneered by Michael Gerzon and Peter Craven in the 1970's. The 8 microphone capsules in the Spatial Mic array are encoded by the Spatial Mic Converter plugin to create the 9 spatial harmonics needed to represent a soundfield as **second order**. Any ambisonic soundfield representation greater than one is referred to as Higher Order Ambisonics (HOA).

When working with ambisonics, sometimes the raw capsule signals, pre-encode, are collectively called **A-Format**, while encoded signals are called **B-Format**. Ambisonics encoders, decoders and processors vary in the expected sequencing of the spatial harmonics and their encoded level (sometimes called weighting). The two most common are **AmbiX** and **FuMa**. Make sure the expected format for a given ambisonic processor matches the audio being sent to it.

Spatial Mic Converter encodes the raw capsule signals from Spatial mic to second order (9 channels) B-Format. Once in B-Format, audio can be sent to numerous sound crafting plugins. Here are some that work with Higher Order Ambisonics:

- SSA
- Blue Ripple Sound
- Nosiemakers
- IEM Plugin Suite
- SPARTA

Ambisonics may be ***decoded*** to almost any format desired (including channel-based) and stored in formats like MPEG-H. The most common decoding method for ambisonics is called binaural, which is played back on stereo headphones. When decoding to binaural a Head Related Transfer Function (HRTF) is used to approximate how human anatomy affects spatial perception. For example, how does the frequency response of a single sound source change as you rotate your head in front of it? An HRTF aims to take this into account.

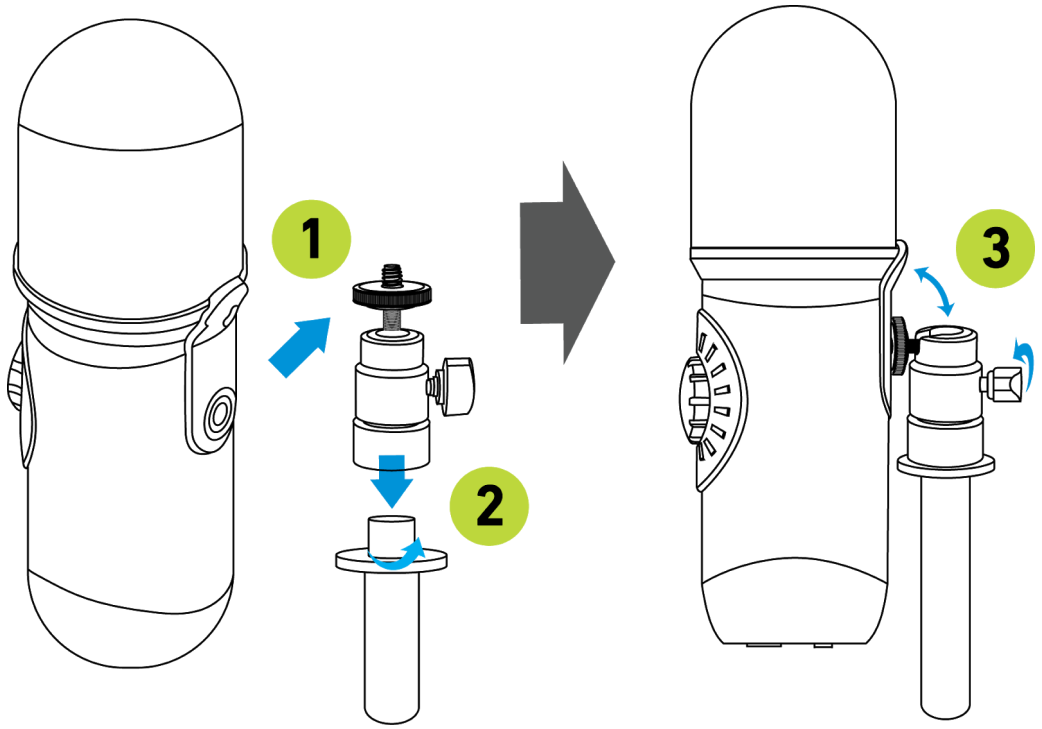
Ambisonics moves us beyond what has been possible with channel based formats, enabling applications in Augmented and Virtual Reality, music production, broadcasting and immersive environments. While ambisonics can be used in nearly any type of audio production, adoption is becoming more widespread. Here are some useful resources:

- Reaper Ambisonics User Forum
- Oculus - Spatial Audio How-To
- YouTube 360
- Facebook 360 Spatial Workstation (also check out how to livestream)
- Resonance Audio - Spatial Audio SDK for Unity, Unreal, FMOD, Wwise, Web, Android and iOS
- Ambisonics in Pro Tools

Getting To Know Spatial Mic

Mounting

A ¼-20 thread mount on the back of the mic allows for hard-mounting to a standard microphone stand. Screw the included ¼-20 to ⅝'' mini swivel ball hard-mount into the ¼-20 threads on the back of Spatial Mic. Screw the other end into your microphone stand. Note that this method does not provide acoustic isolation from the mic stand.



For acoustic isolation, use a Rycote InVision shockmount (sold separately). Place Spatial Mic in the shockmount so the bottom of the mic is flush with the inner shockmount ring and tighten the screws around the mic. Ensure microphone cannot slip out of shockmount and knob can be accessed.

Powering

Spatial Mic can be bus powered through the same USB-C jack used for data transfer. Operation with a hub is not guaranteed (and beyond the scope of this user manual) due to the number and variety available. If attempting to use Spatial Mic with a hub, please ensure that it is self-powered and can provide 500mA to the mic.

When using the ADAT lightpipe digital output, power to Spatial Mic must be applied via USB-C jack or micro-USB.

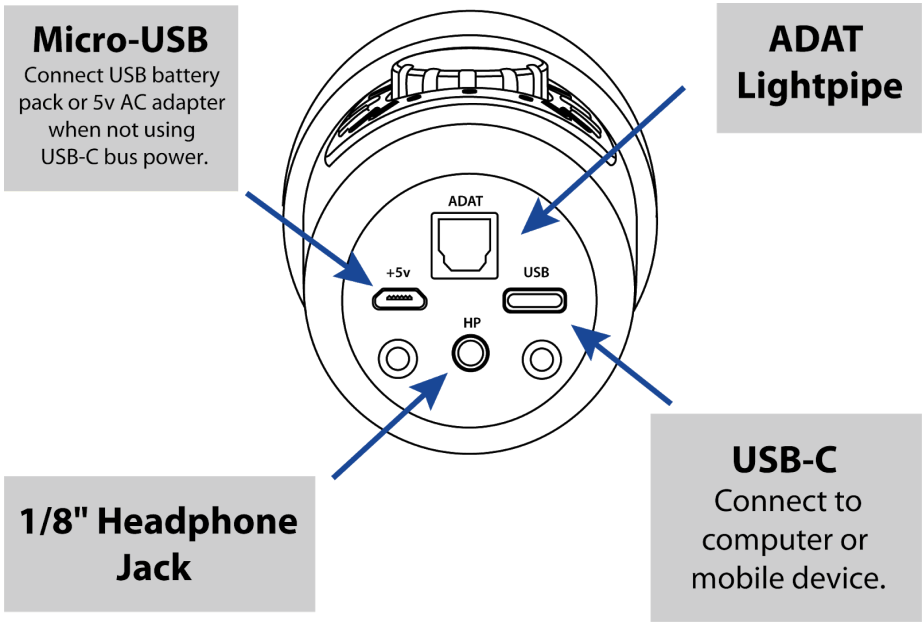
Some mobile devices connected via USB may require power to be applied through the micro-USB jack. Using a USB battery or 5V AC adapter will also help to extend the battery life of your mobile device while recording.

Outputs

ADAT Lightpipe
The ADAT Lightpipe output provides 8 channels of digital 24-bit / 48kHz uncompressed audio over a fiber optic cable. Connect a TOSLINK optical cable to the ADAT receptacle on the bottom of Spatial Mic and the other end to an ADAT lightpipe input. Follow the setup instructions for the connected device to receive 8 channels of audio from Spatial Mic.

USB
Connecting Spatial Mic via a USB cable offers single wire connectivity to Windows, Mac OSX or mobile USB Audio 2.0 compatible host devices. Connect a cable with a USB-C plug into Spatial Mic and the other end into a USB port on the host device.

Headphones
Plug headphones into the ⅛-inch (3.5mm) stereo jack on the bottom of the microphone to monitor capsule array in binaural (44.1kHz and 48kHz) or mid-side (88.2kHz and 96kHz) and host device playback in stereo. Note that the live headphone output uses a frequency independent first order ambisonics matrix and is intended for confidence monitoring only. For full fidelity, the microphone output should be encoded with the Spatial Mic Converter Plugin in a DAW.

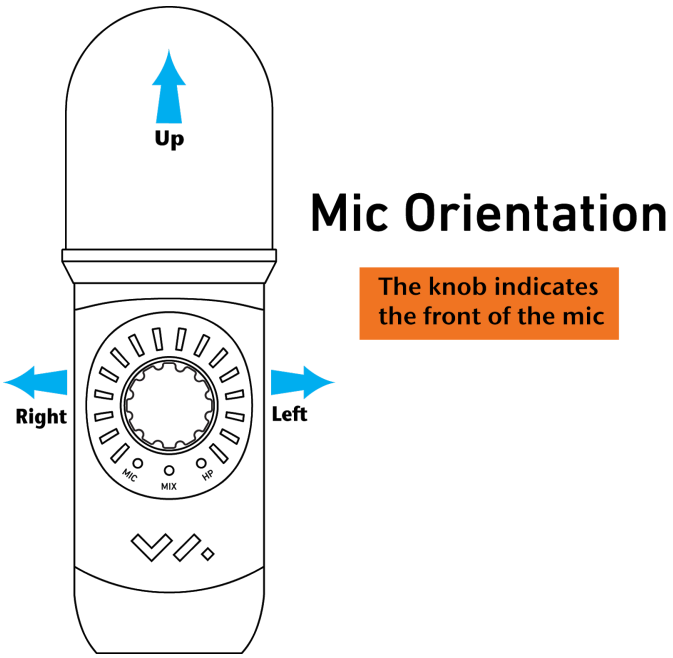


Controls

Knob

The anodized aluminum knob on the front of Spatial Mic indicates the front of the microphone and is used to change various aspects of the recording and monitoring configuration.

- **Push** the knob to cycle through modes:
  METERING ➜ MIC GAIN ➜ MIX ➜ HP LEVEL
- **Rotate** the knob to adjust selected mode
- **Push & Hold** knob to mute or unmute capsule signals



Metering Mode

When powering up Spatial Mic for the first time, the LED display will show a turn-on sequence and then default to metering mode showing individual capsule level. Default metering mode may be changed with the Spatial Mic Control app. The metering modes that may be selected are:

- **Off** - no metering or LEDs on
- **Monitor** - LEDs display stereo L-R mix of Live binaural monitoring and host device playback.
- **Capsule** - LEDs display signal level for the 8 capsules. If audio from a capsule clips, it's corresponding LED will turn red for 3 seconds. This is an indication that you may need to decrease capsule gain.

Mic Gain

Push the knob while in metering mode to enter Mic Gain mode as shown by the blue LED. Current Mic Gain will now be displayed and can be adjusted by rotating the knob. Mic Gain adjusts the gain of capsules before analog to digital conversion. Optimize mic gain so that the capsule signal is not clipping.

Turning the mic gain to the lowest position enables 'pad mode'. In this mode, the microphone ADC (analog to digital converter) clips at 131dB SPL — useful for recording loud sound sources.

Mix

Push the knob while in mic gain mode to enter mix mode as shown by the blue LED. Current mix balance will now be displayed and can be adjusted by rotating the knob. Rotating the knob to the left increases the amount of live capsule signal in the mix, while rotating the knob to the

right increases the amount of stereo host playback in the mix. This adjustment only affects the stereo audio signal sent to the headphone output.

HP Level
Push the knob while in mix mode to enter HP level mode as shown by the blue LED. Current headphone level will now be displayed and can be adjusted by rotating the knob.

While in HP mode, pushing the knob will cycle back to metering mode.

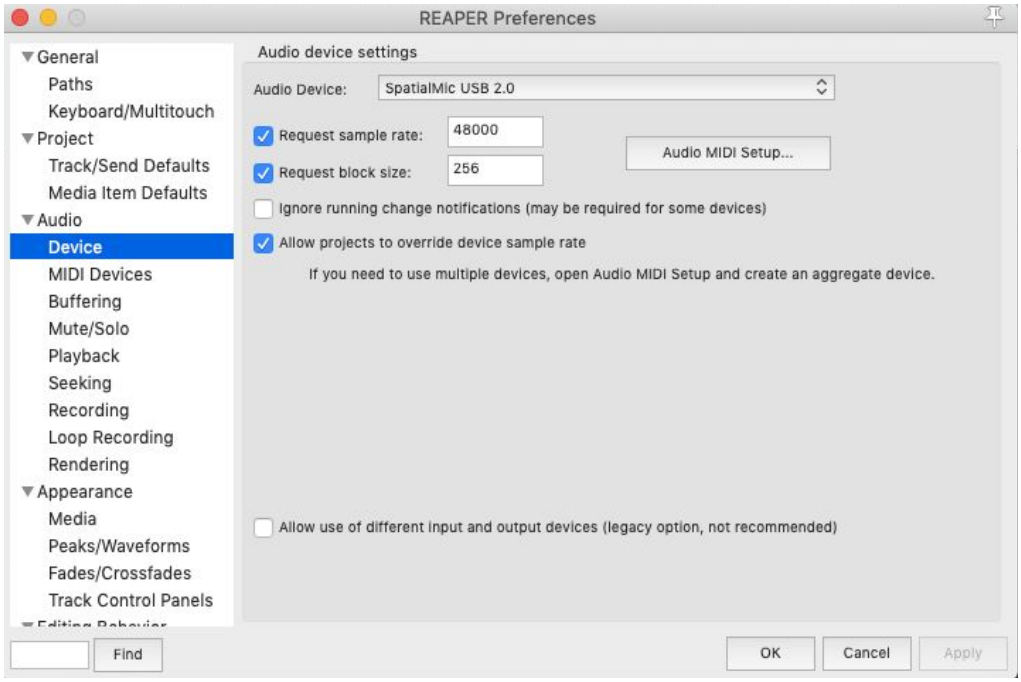
USB Audio Recording

While various Digital Audio WorkStations (DAW) like Reaper , Pro Tools or Nuendo may be used with Spatial Mic and Spatial Mic Converter plugin, we will focus on showing how to use Spatial Mic with Reaper on Mac OSX and Windows 10.

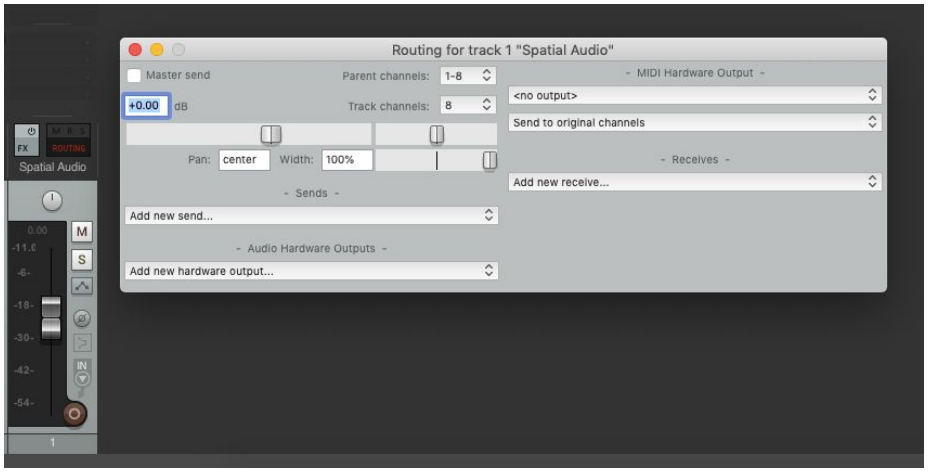
Mac OSX

1. Plug the free end of the USB cable to the USB port on your host device. Spatial Mic will go through an LED start-up sequence to indicate the device is receiving power. Your Mac OSX computer will automatically recognize the USB device.
2. Download and install the 64-bit version of Reaper for Mac OSX.
3. Open Reaper and create a new project.
4. Press **Command + ,** or open **Options ► Preferences…** and select the **Device tab**.

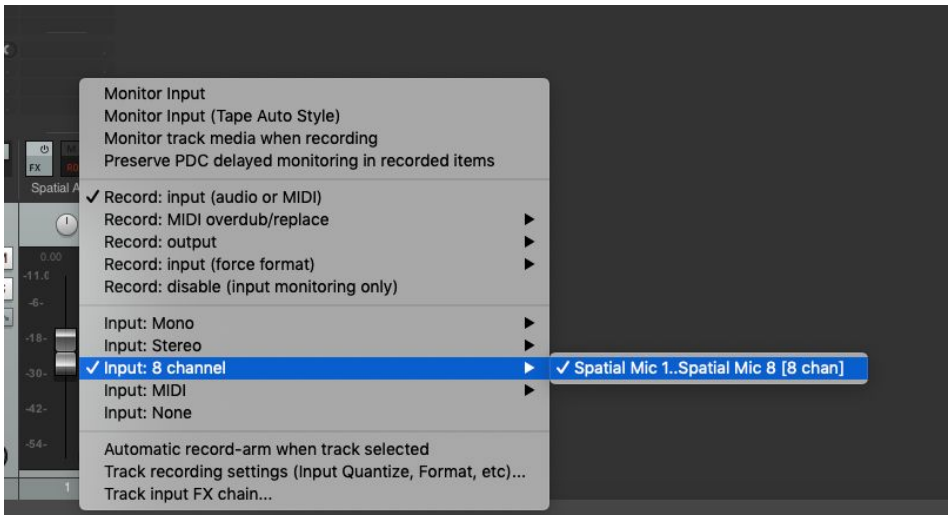
5. Select **SpatialMic USB 2.0** from the **Audio Device** dropdown as shown and press **Apply** in the bottom right hand corner.



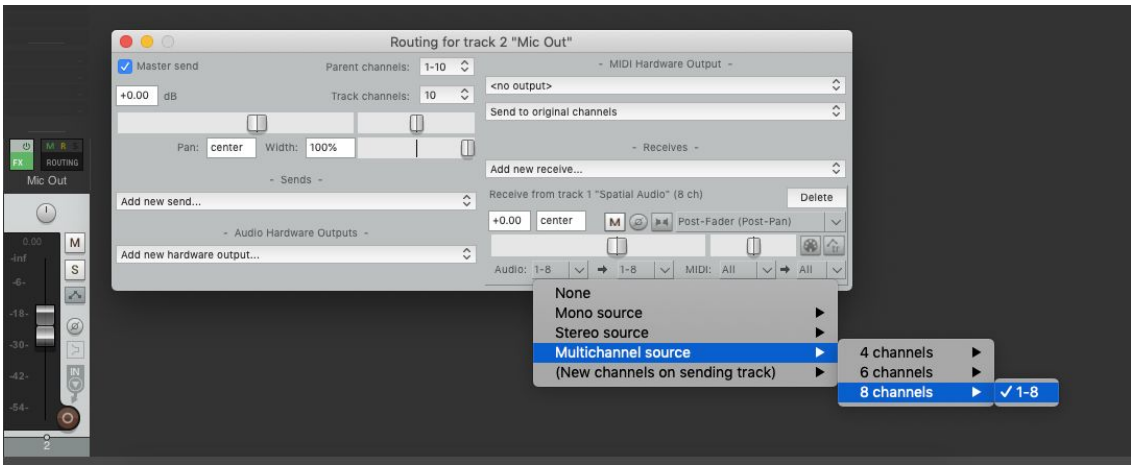
6. Press **Command + t** to create a new track and label it Spatial Audio.
7. Open the track **Routing** as shown, change **Track Channels** to 8 and de-select **Master Send**.



8. **Right click** on the **Record Arm/Disarm button** and select **Input:8 channel ► Spatial Mic 1...Spatial Mic 8[8 chan]** as shown.

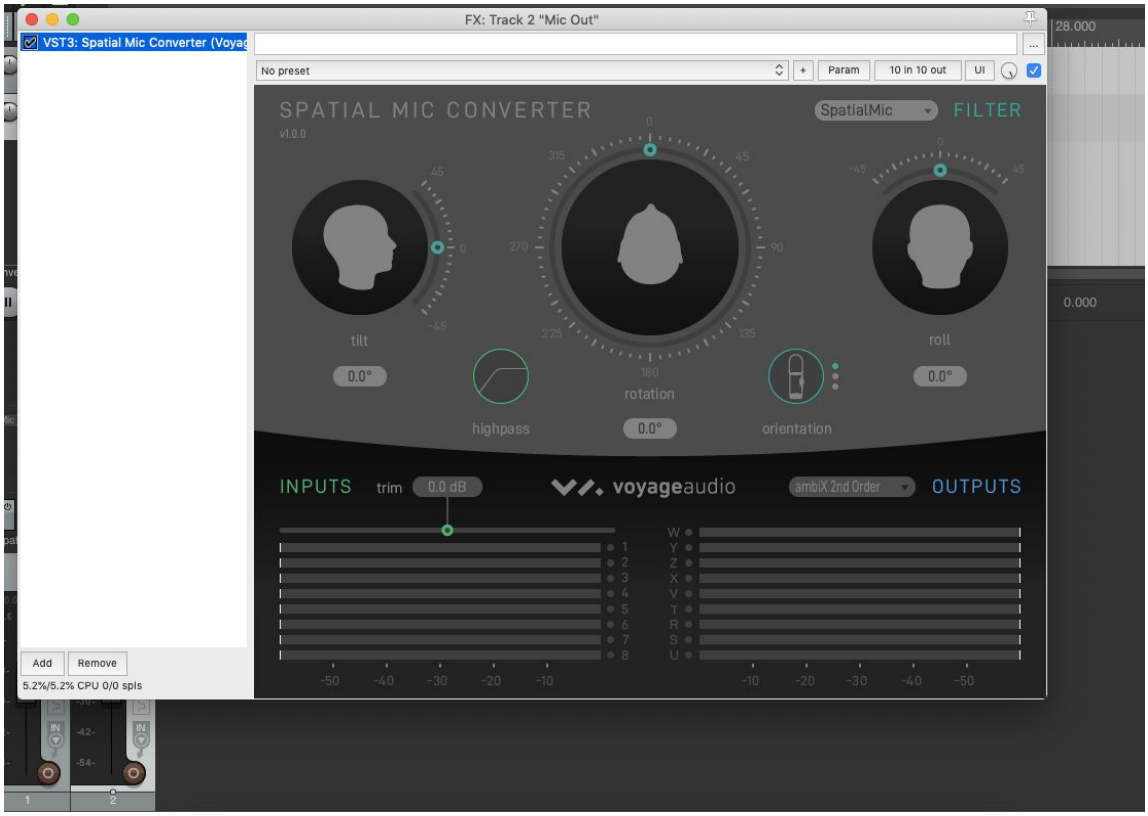


9. Enable recording by clicking the red **Record Arm/Disarm button**. The meter on the track should now be showing signal from Spatial Mic.
10. Create another track by pressing **Command + t** and label it Mic Out.
11. Open the track **Routing** as shown, change **Track Channels** to 10 and select **1: Spatial Audio** from the **Receives** drop down as shown. For the receive, make sure 1-8 is selected under **Multichannel Source** from the **audio** dropdown menu as shown.



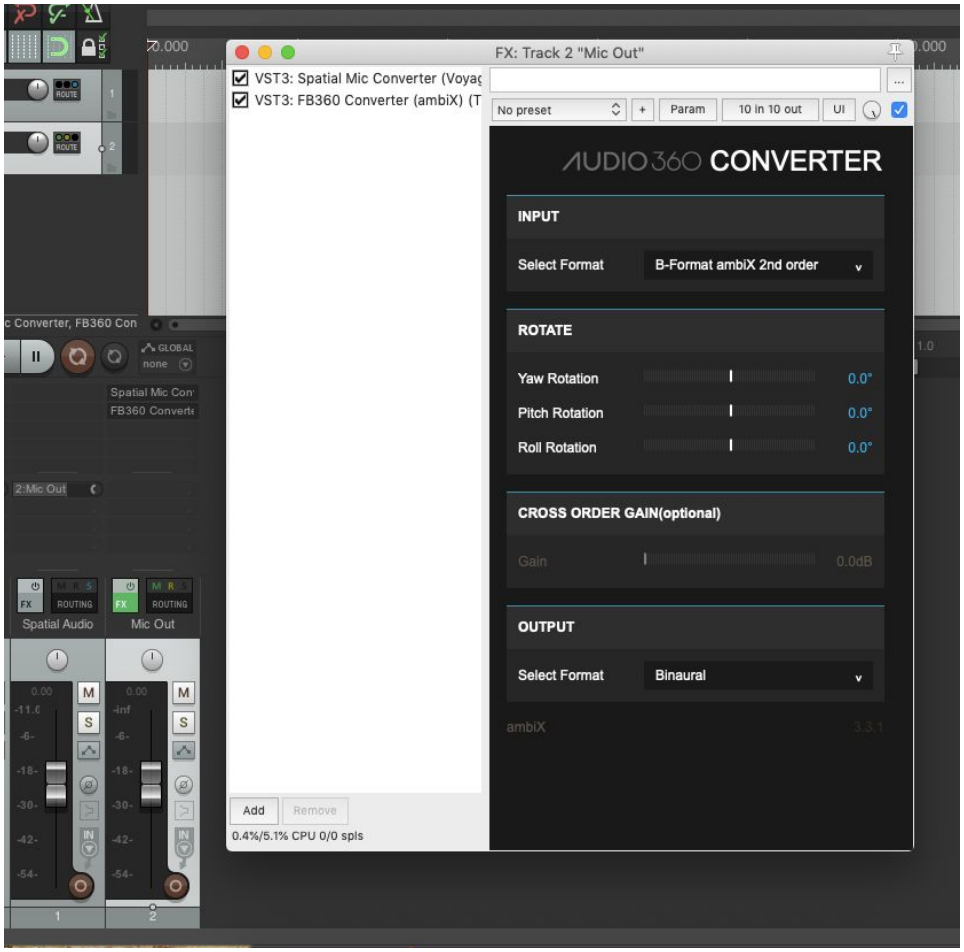
12. Click the **FX button on the Mic Out Track** and insert the **Spatial Mic Converter Plugin** (plugin installation and use is explained later in the user manual). Your screen should

now look similar to this:



13. Next, click **Add** and insert the **FB360 Converter plugin** (available for download here). To listen to mic playback in binaural stereo, setup plugin as shown (note that after closing and reopening a session, check to make sure the correct output is still selected

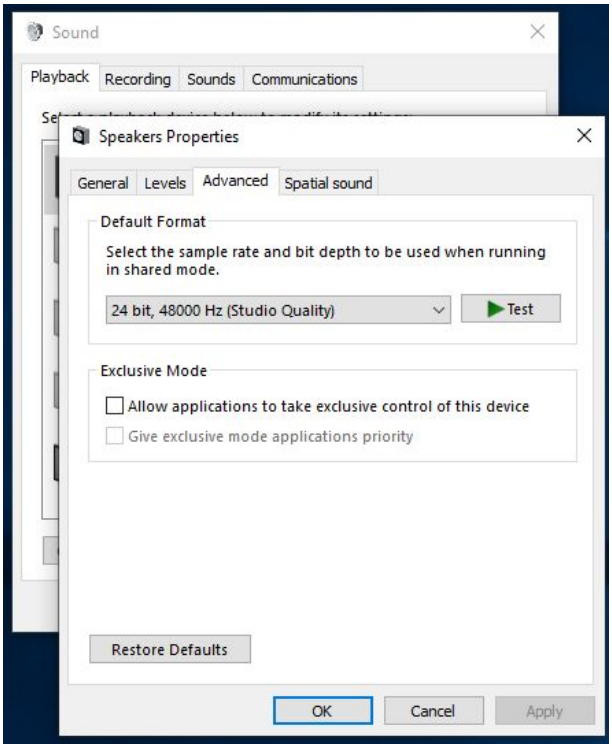
in this plugin):



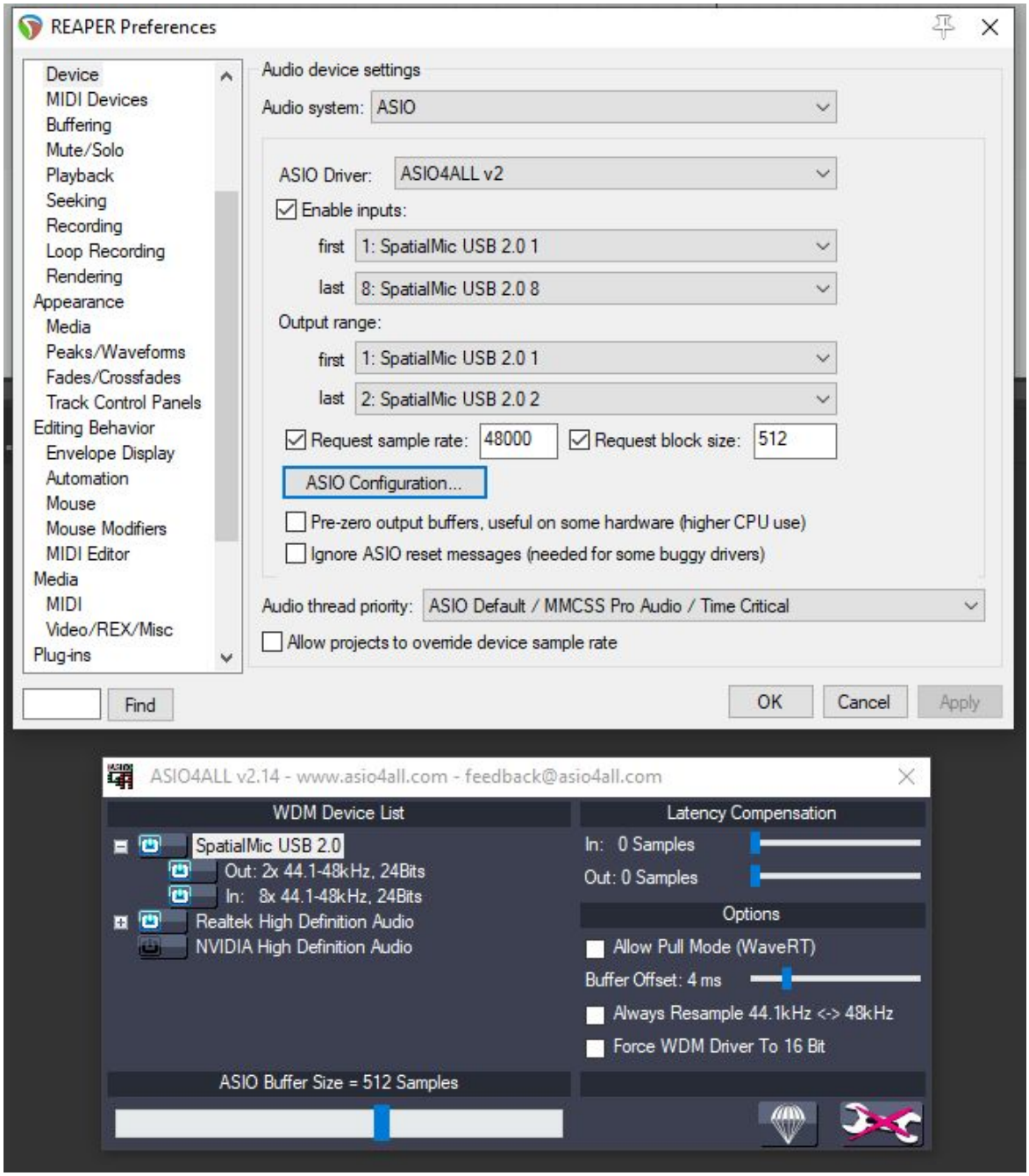
14. You may now press the **record button** or press **command + r** to begin recording audio. Press the **space-bar** stop and press the space-bar again to playback.

Windows 10

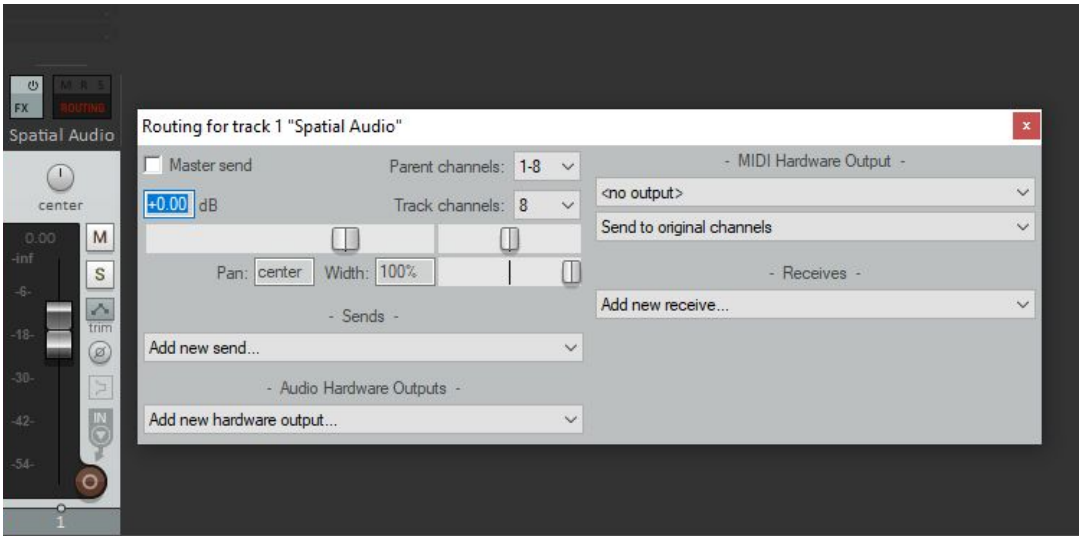
1. First, download ASIO4ALL drivers from http://www.asio4all.org/ and run the Setup Wizard to install.
2. Plug the free end of the USB cable to the USB port on your host device. Spatial Mic will go through an LED start-up sequence to indicate the device is receiving power.
3. Windows may install audio drivers, which is fine, however for these instructions we will be using the ASIO4ALL drivers.
4. In the Windows **Sound** control panel, double click on Spatial Mic in the **Playback** tab and make sure “Allow applications to take exclusive control of this device” is unchecked as shown. Do this for Spatial Mic in the **Recording** tab also.



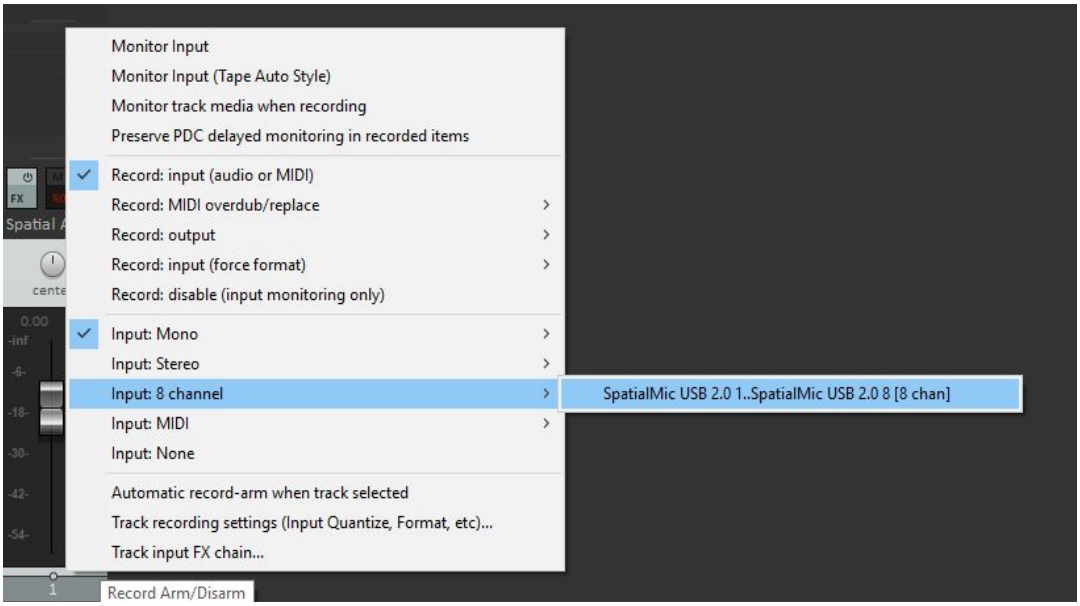
5. Download and install the 64-bit version of Reaper for Windows.
6. Open Reaper and create a new project.
7. Press **Ctrl + P** or open **Options ► Preferences…** and select the **Device tab**.
8. Select **ASIO** from the **Device** dropdown as shown and make sure ASIO4ALL is selected as the **ASIO Driver** and that the **first** and **last** inputs correspond to all 8 channels coming from Spatial Mic. A sample ASIO Configuration screen is also shown.



9. Press **Ctrl + t** to create a new track and label it Spatial Audio.
10. Open the track **Routing** as shown, change **Track Channels** to 8 and de-select **Master Send**.

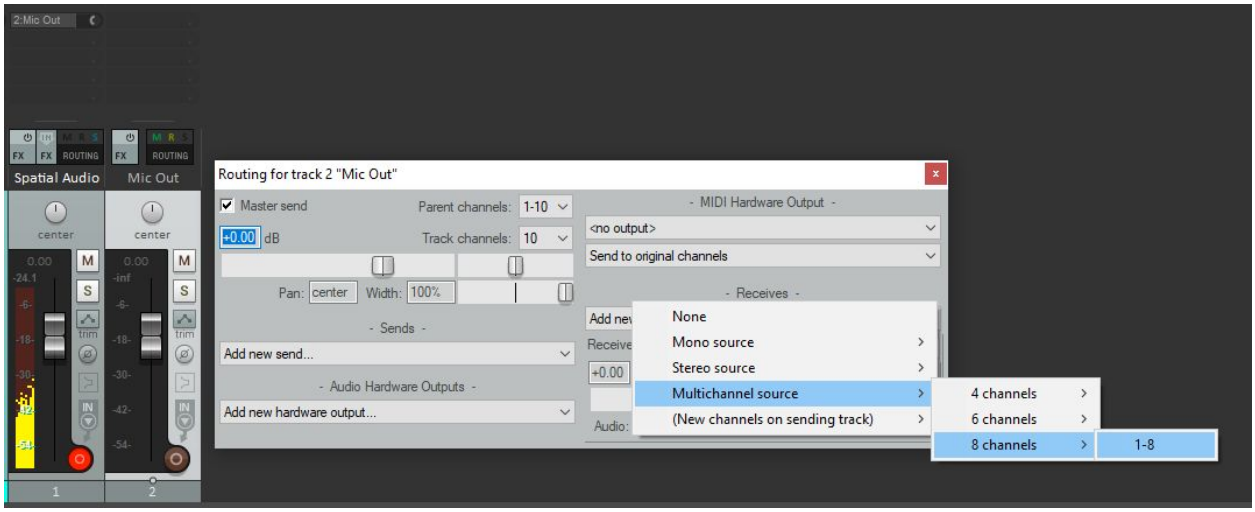


11. **Right click** on the **Record Arm/Disarm button** and select **Input:8 channel ► Spatial Mic 1...Spatial Mic 8[8 chan]** as shown.

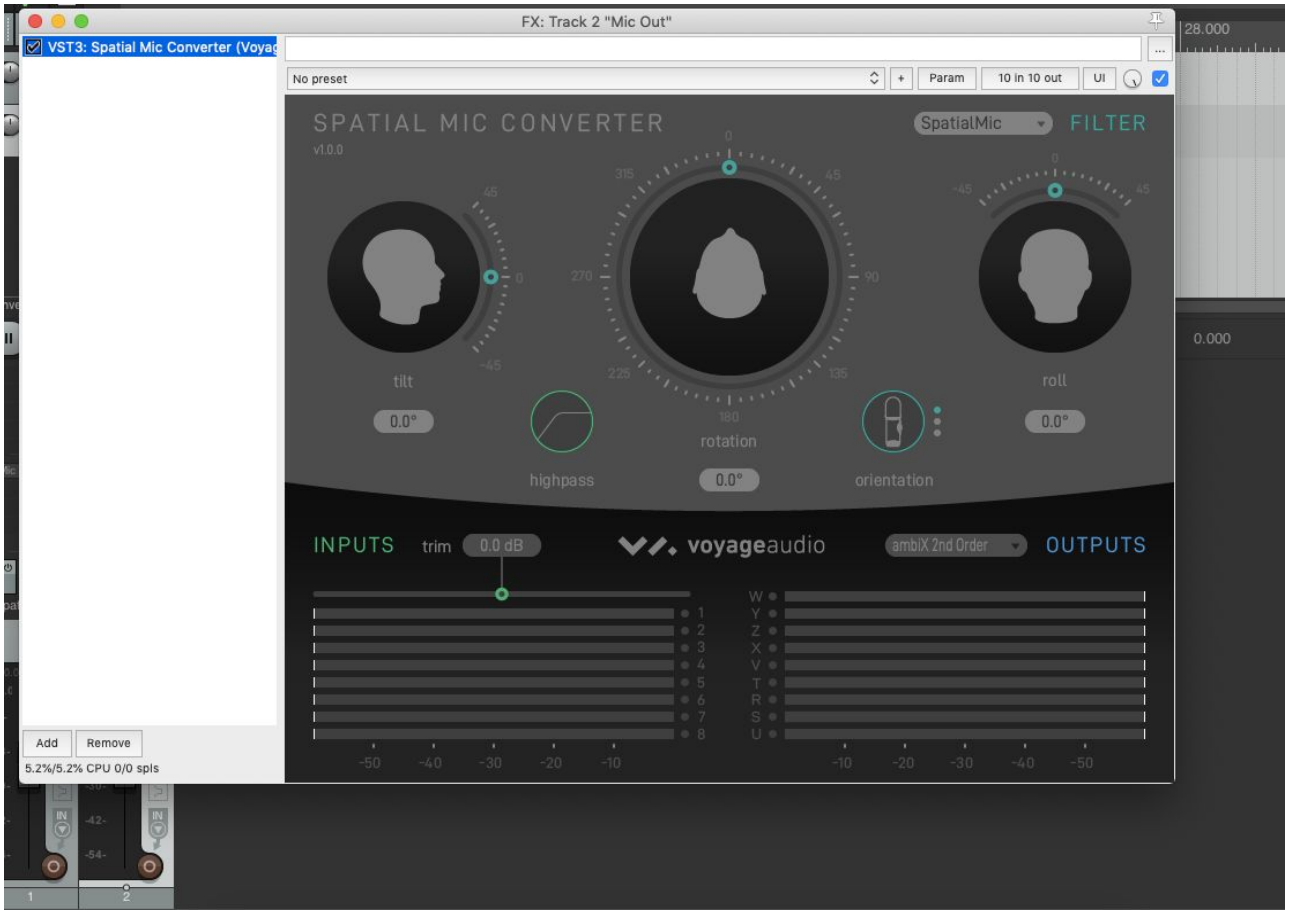


12. Enable recording by clicking the red **Record Arm/Disarm button** on the Spatial Audio track. The meter on the track should now be showing signal from Spatial Mic.
13. Create another track by pressing **Ctrl + t** and label it Mic Out.
14. Open the track **Routing** as shown, change **Track Channels** to 10 and select **1: Spatial Audio** from the **Receives** drop down as shown. For the receive, make sure 1-8 is

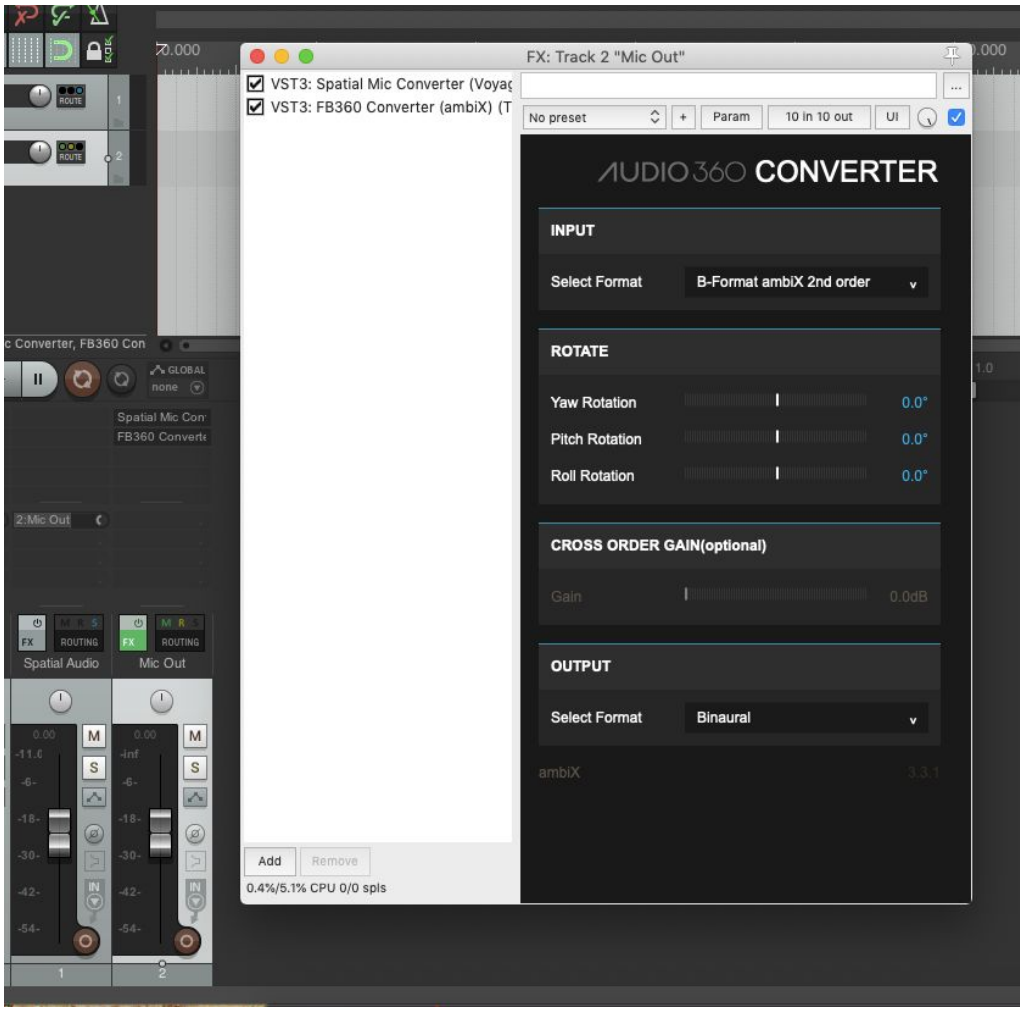
selected under **Multichannel Source** from the **audio** dropdown menu as shown.



15. Click the **FX button on the Mic Out Track** and insert the **Spatial Mic Converter Plugin** (plugin installation and use is explained later in the user manual). Your screen should now look similar to this:



16. Next Click **Add** and insert the **FB360 Converter plugin** (available for download here). To listen to mic playback in binaural stereo, setup plugin as shown:



17. You may now press the **record button** or press **command + r** to begin recording audio. Press the **space-bar** stop and press the space-bar again to playback.

Mobile Devices

iOS

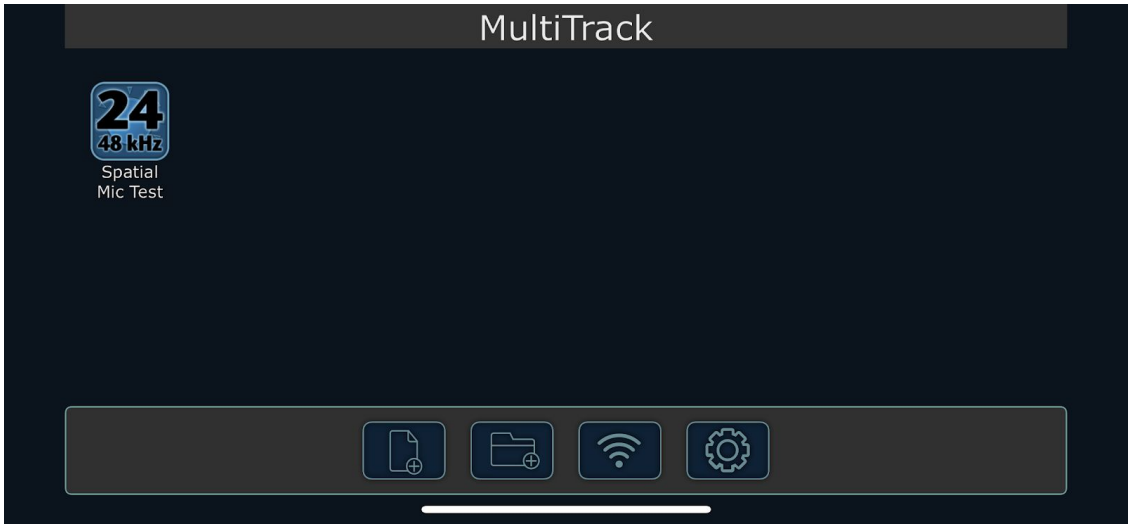
Spatial Mic has been tested to work with iOS by means of the Lightning to USB 3 Camera Adapter. While several recording apps exist for iOS like Auria and Audio Evolution Mobile, we will focus on using multiTrack DAW.

1. Plug the free end of the Lightning to USB 3 Camera Adapter into your iOS device.
2. Plug a USB battery or power adapter into the lightning receptacle on the Lightning to USB 3 Camera Adapter.

3. Connect Spatial Mic to Adapter using a USB C to USB A cable. If your battery has a power switch, turn it on. The completed setup should look similar to this:

Note that the battery may also be plugged directly into Spatial Mic, however plugging the battery into the Adapter as shown will also charge the mobile device.

4. Launch multiTrack DAW app and create a new Song as shown.



5. Open the song and create 4 stereo tracks. Set the input to each track so that track one receives Spatial Mic 1-2, track two receives Spatial Mic 3-4 and so on. Name the tracks for easy reference later.

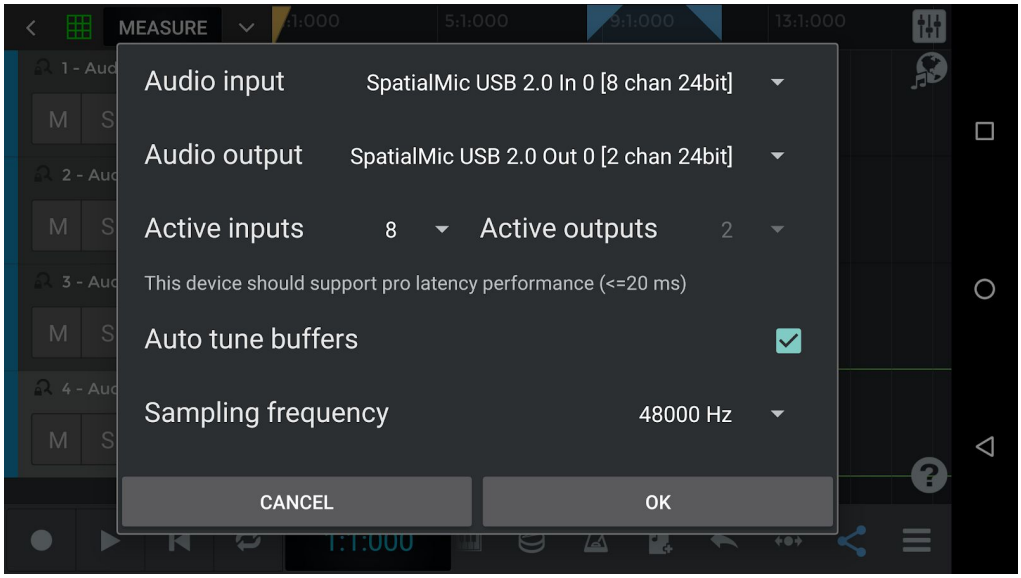
6. MultiTrack DAW should now be ready to record as shown:

7. When you are finished recording, close the song and export the files according to the multiTrack DAW instructions.
8. Import the files into a program like Reaper, and route the audio into Spatial Mic Converter plugin. Take care to ensure audio track routing is correct. For example, track one, exported from multiTrack DAW, should be routed to channel 1 and 2 of the Spatial Mic Converter plugin and so on for the other tracks.

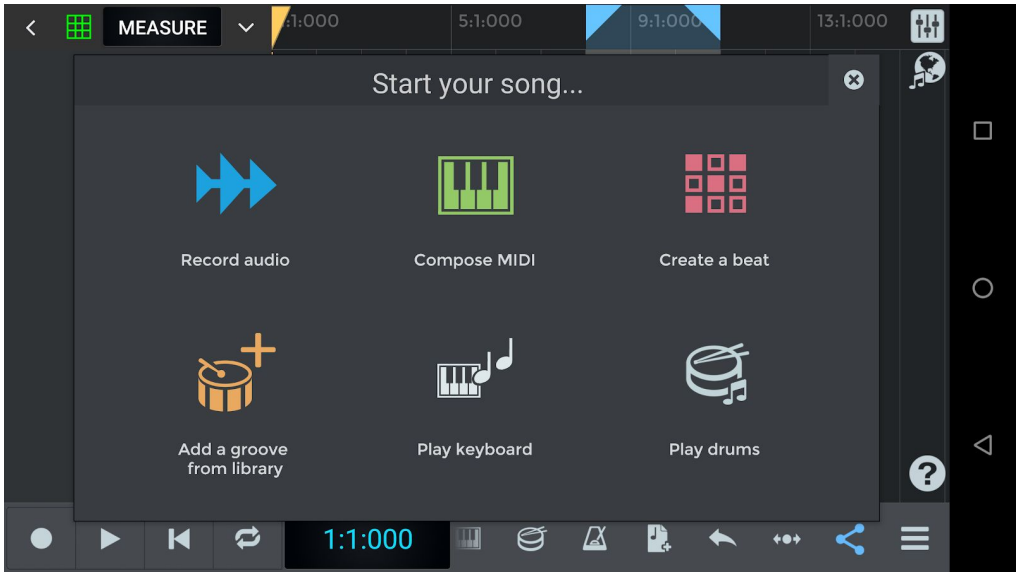
Android

Spatial Mic has been tested to work with Android using the USB-C to C cable as well as a USB on-the-go cable if your mobile device has a micro-USB port. While several recording apps exist for Android like Audio Evolution Mobile, we will focus on using N-Track.

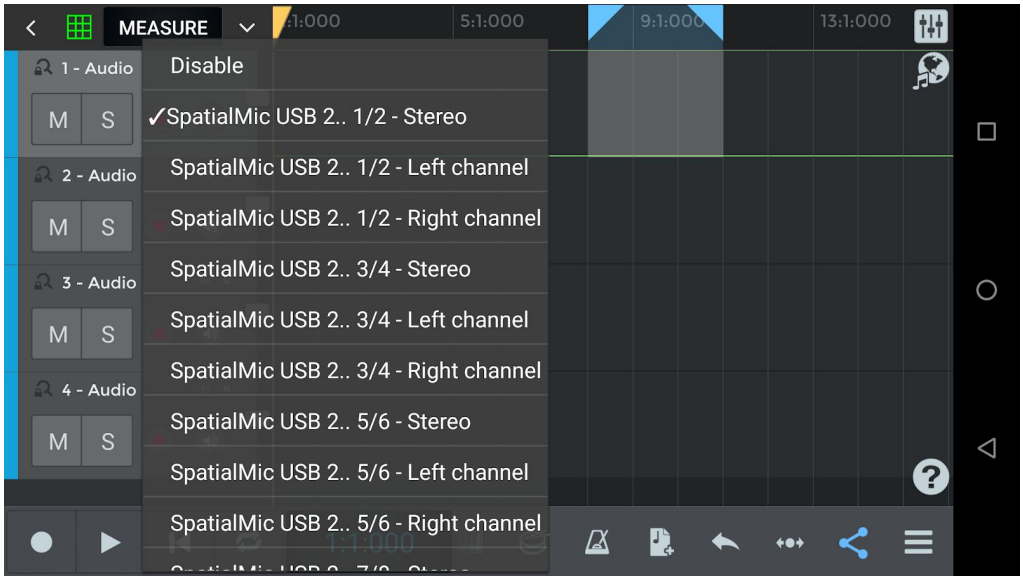
1. Plug the free end of the USB Cable into your Android device.
2. To save battery power on your device plug a USB battery or power adapter into the +5V micro-USB port on the bottom of Spatial Mic.
3. Launch n-Track Studio Music DAW app and select the driver you wish to use. We suggest trying both the n-Track USB driver and the Android USB driver to see which performs best with your device.
4. Android system will ask for permission to access the USB device. Select OK
5. An audio device window will automatically open as shown below. Select Spatial Mic for audio input and audio output in the drop down menus. Change the number of Active inputs to 8, change the Sampling frequency to the desired rate and then press OK.



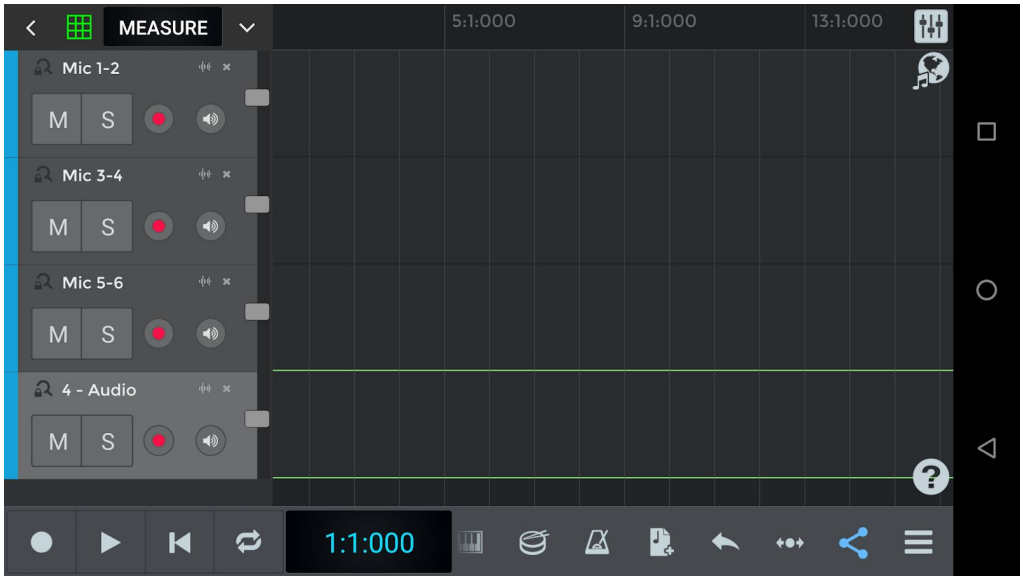
6. Select the menu icon in the lower right corner and create a new song. Choose Record audio for the session type.



7. Create 4 Audio tracks and then press the round record icon on the first track to select the audio input. Set the input to each track so that track one receives Spatial Mic 1/2-Stereo, Track Two receives Spatial Mic 3/4-Stereo and so on. Name the tracks for easy reference later.



8. n-Track Studio Music DAW should now be setup and ready to record as shown:



9. When you are finished recording, save the song and export the files according to the n-Track Studio Music DAW instructions.
10. Import the files into a program like Reaper, and route the audio into Spatial Mic Converter plugin. Take care to ensure audio track routing is correct. For example, track one, exported from multiTrack DAW, should be routed to channel 1 and 2 of the Spatial Mic Converter plugin and so on for the other tracks.

USB Notes & Troubleshooting:

If playback errors occur:

1. Try raising the ‘Request Block Size’ under the Device tab and ASIO4ALL control panel to higher values like 1024. Make sure Spatial Mic is selected on the left hand side. (Windows only)
2. Try raising ‘Buffer Offset’ on the ASIO4ALL control panel. Make sure Spatial Mic is selected on the left hand side while doing this. (Windows only)
3. Bypass any USB hubs and try plugging Spatial Mic into a different USB port. For example, sometimes USB ports on the front case of a computer are actually a hub.
4. Ensure mic is receiving adequate power.
5. Ensure that system wide sound correction or other audio effects are deactivated.
6. Ensure ‘Spatial Mic’ is enabled in ASIO4ALL settings and any other hardware devices are disabled. Do this by clicking on the device in the ASIO4ALL settings panel so that it is illuminated blue. (Windows only)

Using Your Microphone

Positioning

The knob on Spatial Mic indicates the front or ‘zero’ degree position. This corresponds to the direction the ‘head’ image is facing in when Spatial Mic Converter Plugin when in it’s default state. When recording audio for 360 video, you will probably want to orient the front of the microphone to correspond to the front of the camera (normal orientation), but please note that the Spatial Mic Converter plugin ‘orientation’ button can change the orientation of the mic after recording to be ‘end-fire’ or ‘inverted’.

As with any microphone, experimentation is the key to great sound capture. If recording audio for video, a ‘slate’ tone or simple hand clap may help to time align the sound with video in post-production.

Recording Tips

- If the LEDs turn red (Capsule or Monitor Metering Modes) your recording may clip. In this case, turn down mic gain until the signal is below clipping. Likewise, observe your DAW input meters and turn down the mic gain if clipping occurs.
- You may wish to mute the live sound from the capsules while playing back audio. To do this, push and hold the knob until the mode LEDs turn red.
- When recording to a mobile device, it is recommended to put your device in Airplane mode for uninterrupted recording. Notifications, along with vibrations and ring-tones may impede the device’s ability to make clear recordings.

- Make sure you have plenty of storage space on your mobile device or your computer hard drive before recording. One minute of 8-channel audio from the Spatial mic at 48kHz uses about 66 MB. Approximate storage space required is as follows:
    - 24 bit / 96 kHz
        - 1 min = 131 MB
        - 5 mins = 660 MB
        - 30 mins = 3955 MB (4GB)
    - 24 bit / 88.2 kHz
        - 1 min = 121 MB
        - 5 mins = 606 MB
        - 30 mins = 3633 MB (3.6GB)
    - 24 bit / 48 kHz
        - 1 min = 66 MB
        - 5 mins = 330 MB
        - 30 mins = 1977 MB (1.9GB)
    - 24 bit / 44.1 kHz
        - 1 min = 61 MB
        - 5 mins = 302 MB
        - 30 mins = 1816 MB (1.8GB)

Care & Maintenance

- Spatial Mic features robust mechanical, however you should always try to handle the microphone carefully and avoid dropping or sudden shocks.
- Clean microphone body with a clean, dry cloth. With the headbasket detached, you may clean both sides with a slightly damp cloth and re-attach when dry.
- Keep working distance at least 6 inches from the microphone.
- Avoid leaving Spatial Mic in extreme temperatures, humidity or direct sunlight for extended periods of time.
- Use the included windscreen to protect the capsule array from wind and moisture as needed.
- Do not over-bend cables as this may cause them to break or become intermittent.
- Make sure jacks, especially the ADAT lightpipe stay clean and free of dust particles.
- Spatial Mic is factory calibrated before shipping.

Spatial Mic Converter

Overview

The Spatial Mic Converter plugin transforms the raw audio signals from Spatial Mic to a format useful for audio production. To accomplish this, Spatial Mic Converter uses an internal 64-channel filter matrix and measurements from an anechoic chamber.

Spatial Mic Converter offers the capability to change the microphone's aim at the point in space where the audio was recorded. This is useful when aligning audio position with 360 video, aiming the mic at specific sounds that should be in front of the listener, or used in combination with the virtual mic output stage to focus directional polar patterns at different parts of the soundfield.

The audio output from Spatial Mic Converter can be first or second order ambisonics in AmbiX or Fuma and as mono or stereo virtual mics. The ambisonic output can be sent to a variety of plugins from Facebook 360, SSA, Blue Ripple Sound, IEM, SPARTA and others for further processing while mono or stereo virtual mic outputs can be used with standard audio production plugins.

Usage

The built-in Spatial Mic Converter filters are specific to the raw signals from Spatial Mic and as such are only valid for Spatial Mic[1]. Spatial Mic Converter should be the first plugin in your signal chain when processing the raw signals from Spatial Mic.

[1] Spatial Mic Converter also offers the ability to load custom filters for any 8-channel second order microphone. 64-channel .wav expected.

Controls & Interface

Controls

Filter
Four built-in filters that transform the raw capsule output are available. Type 1 and Type 2 allow for a tonal choice and both have complimentary low noise versions. In general, the Type 1 filter selection will have a slightly more pronounced mid-range vs Type 2. While Type 1 and Type 2 offer the best spatial resolution, Type 1 LN and Type 2 LN conversion filters offer lower noise alternatives for recording quiet sound sources.

Options: Type 1, Type 2, Type 1 LN, Type 2 LN, Custom (64-channel .wav expected)

Tilt

Tilts the Spatial Mic recording direction up and down. Rotation and roll are maintained when tilting.

Range: ±45°
Default & Reset: 0°

Rotation
Rotates the Spatial Mic recording direction left and right. Tilt and roll are maintained when rotating.

Range: ±180°, continuous
Default & Reset: 0°

Roll
Rolls the Spatial Mic recording direction side to side. Tilt and rotation are maintained when rolling.

Range: ±45°
Default & Reset: 0°

Highpass
Activates a selectable frequency high pass filter, useful to cut wind noise or other low frequency artifacts.

Options: Off, 80Hz, 120Hz, 150Hz

Orientation
It is often desirable for the orientation to correspond with the real-life position of the microphone.

Normal: The Spatial Mic capsule array is aimed up.
End-Fire: The Spatial Mic capsule array is aimed forward.
Inverted: The Spatial Mic capsule array is aimed down.

Trim
Controls input level. Plugin processing may increase the signal level. If output meters clip, you may need to reduce trim.

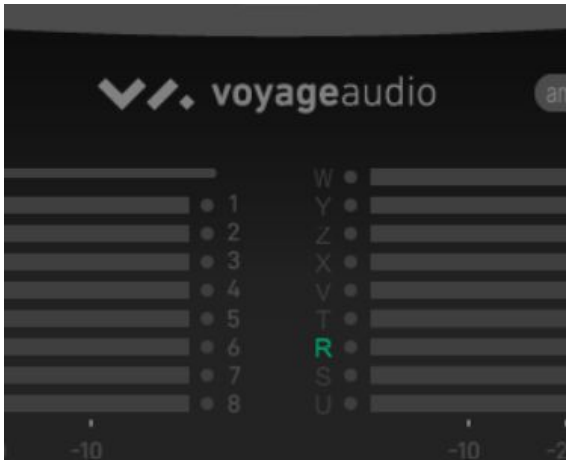
Range: -20dB to +20dB
Default & Reset: 0dB

Outputs

Selects the output type. Match this to the input type of the next plugin in the signal chain. Note that the output types differ in channel count, ordering and level weighting.

Options: ambiX 2nd Order, ambiX 1st Order, FuMa 2nd Order, FuMa 1st Order, Virtual Mic

R Channel Output Note: The ‘R’ channel is silenced by default unless the Tilt control is adjusted. By clicking on the ‘R’ channel label of the output meter, Spatial Mic Converter plugin will generate the R channel from the W channel. When enabled the R icon will change to a green color. This may enhance the presence of height to recordings that are mostly horizontal, however it is best to use your ears to confirm this is the right choice.



Interface

There are 3 main sections to the Graphical User Interface.

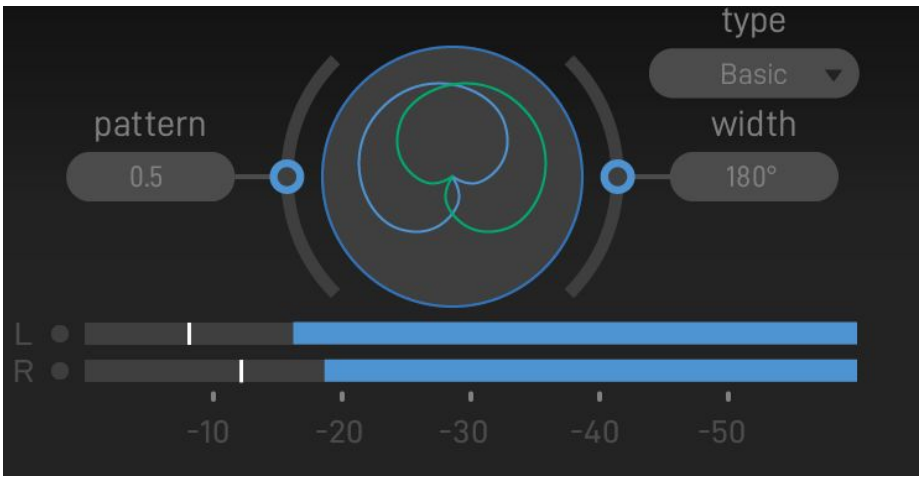
Processing
This section displays and allows user input to change mic orientation, rotation, filter and more.

Inputs
Shows the unprocessed level with clip indication for each of the 8 capsules.

Outputs
Shows the processed output level with clip indication. Channel ordering changes based on output format selection.

Virtual Mic Output

The Virtual Mic output section enables the creation of mono or stereo microphone polar patterns that can be aimed in the soundfield using the plugin tilt, rotation and roll controls. The virtual mic interface is shown on the plugin GUI when it is selected under the Outputs dropdown menu as shown below.

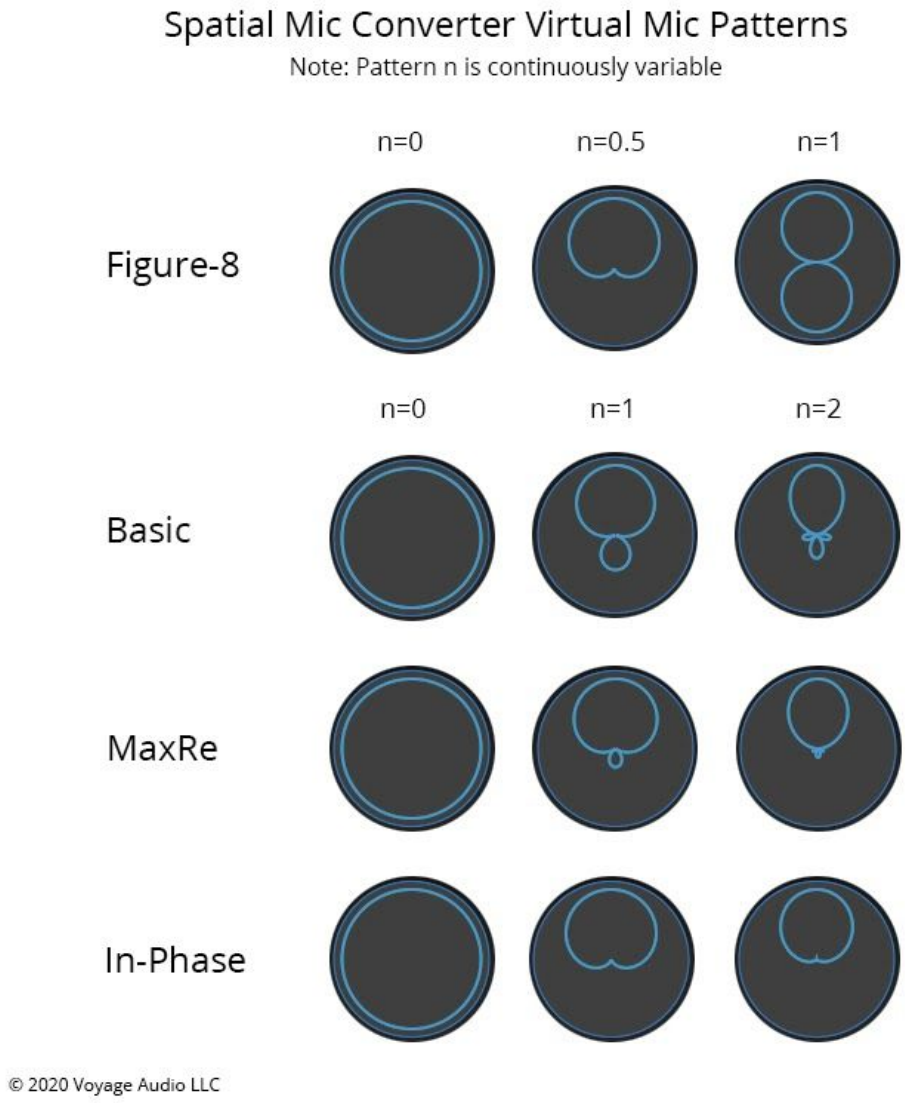


Polar patterns are created using three controls:

Type
Four different types of virtual mic decoding are available: In-Phase, Basic, max rE and Figure 8. Within each type, the pattern and width can be adjusted to manipulate the stereo field and polar pattern shape.

Figure 8: Traditional Omni → Cardioid → Figure 8 microphone patterns
Basic: Virtual mic patterns capable of second order cardioid (pattern = 2)
Max rE: Maximizes energy concentration vector by focusing energy signals in the direction of interest.
In-Phase: Full side-lobe suppression with no out-of-phase components

The following chart shows the characteristics of each virtual mic pattern type.



Pattern

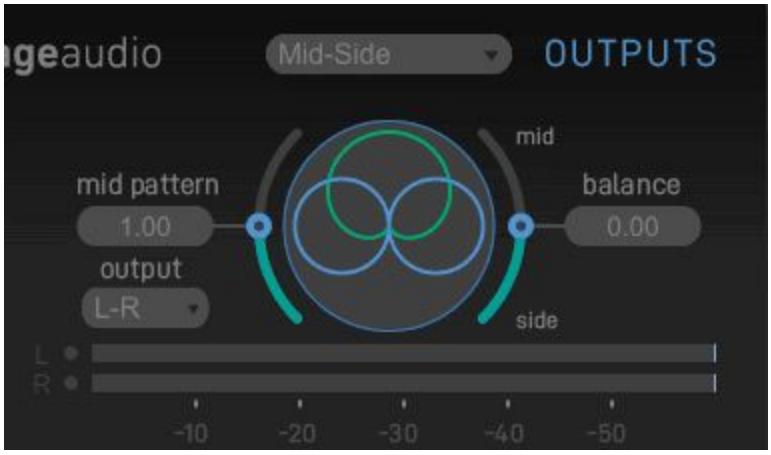
The pattern control is continuously adjustable and changes the focus of the pattern from omnidirectional to a narrow pattern based on the virtual mic type selected. The pattern control can also be thought of as changing the ‘order’ from 0→1 for Figure-8 and 0 → 2 for all other pattern types.

Width

The width control duplicates the polar pattern created and offsets their aim by the selected angle to create a virtual stereo microphone pair. The stereo width angle is continuously variable from 0° → 180°. When Width = 0, a mono signal is created.

Mid-Side Output

Like the other virtual stereo outputs the Mid-Side stereo output is decoded from the 8 capsules and steerable anywhere in the soundfield. The Mid-Side stereo output section also includes pattern, balance and output adjustments.



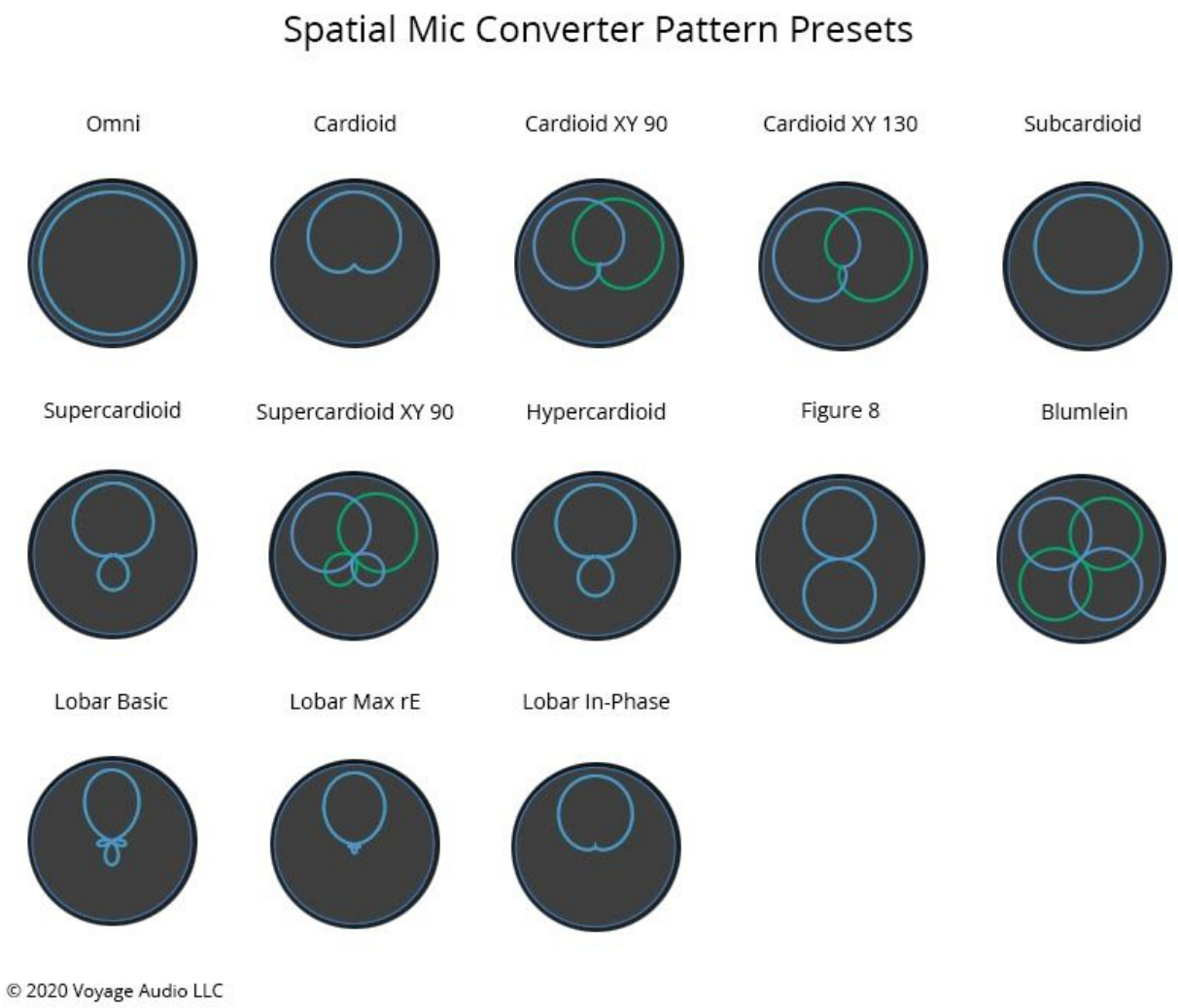
Mid Pattern
The pattern control of the Mid-Side output changes the polar pattern of the mid component from tight cardioid all the way to omni-directional.

Balance
The balance adjusts the level balance between the mid and side components to manipulate the stereo width of the recording.

Output
The can be chosen as post Mid-Side matrix network as left right stereo or pre Mid-Side matrix network as the mid pattern and side pattern each on separate channels to be further decoded later.

Presets

Spatial Mic Converter has 16 built-in presets to quickly audition different configurations. The following chart shows the characteristics of the 12 presets that utilize the virtual mic output stage.



Installation

The installer for the Spatial Mic Converter plugin can be downloaded at https://voyage.audio/downloads/

1. Unzip the downloaded file and run the installation program.
2. After the installation is completed rescan for new plugins in your DAW.
3. Insert the plugin on a multichannel track. The plugin requires at least 9 channels for second order ambisonic output (the plugin can be instantiated directly on an 8 channel, 7.1 track in Pro Tools Ultimate).
4. If required, to uninstall, manually delete the files from your computer.

Spatial Mic Converter Change Log

1.0.0

- Initial Release

1.0.1

- Custom filter sample limit increased to 8192 samples
- R channel muted by default when Spatial Mic is oriented vertically

1.1.0

- Virtual Mic output stage
- Windows and OSX installers
- Mac OSX Catalina support
- High pass filter with selectable cutoff frequency (80 Hz, 120 Hz, 160 Hz)
- Pro Tools Ultimate configurations for stereo track output and 7.1 input
- Type 1 LN and Type 2 LN low noise conversion filters
- Re-sampled conversion filters for sample rates at 96kHz and above
- 15 factory presets

1.2.0

- Mid-Side Stereo output stage
- 16 factory presets

Spatial Mic Control

Overview

The Spatial Mic Control app provides remote manipulation of various hardware parameters on Spatial Mic. Spatial Mic Control communicates with the microphone through the same USB cable used to supply power and stream audio data. Spatial Mic Control replicates the hardware controls found on Spatial Mic itself and adds additional functionality.

Usage

Simply launch Spatial Mic Control when Spatial Mic is plugged into an available USB port on your computer.

Controls & Interface

Controls

Mic Gain
Adjusts the gain of capsules before analog to digital conversion. Optimize mic gain so that the capsule signal is not clipping. Changes made to this control will be reflected in Mic Gain mode on the microphone itself.

Mix
Rotating the control to the left increases the amount of live microphone signal in the mix, while rotating the knob to the right increases the amount of stereo host playback in the mix. This adjustment only affects the stereo audio signal sent to the headphone output. Changes made to this control will be reflected in Mix mode on the microphone itself.

Headphone Level
Adjusts level of headphone signal present on microphone HP output. Changes made to this control will be reflected in HP mode on the microphone itself.

Mute
Mutes the signal coming from microphone capsules. This button functions the same as long pressing the knob on the front of Spatial Mic.

Meter
Changes what is shown on the Spatial Mic LED display (persists when mic is power cycled). When powering up Spatial Mic, the LED display will show a turn-on sequence and then display the last metering mode selected with Spatial Mic Control. The metering modes that may be selected are:

- **Off** - no metering or LEDs on
- **Monitor** - LEDs display stereo L-R mix of Live binaural monitoring and host device playback.
- **Capsule** (Factory Default) - LEDs display signal level for the 8 capsules. If audio from a capsule clips, it's corresponding LED will turn red for 3 seconds. This is an indication that you may need to decrease capsule gain.

Installation

The installer for the Spatial Mic Control app can be downloaded at https://voyage.audio/downloads/

1. Unzip the downloaded file and run the installation program.
2. After the installation is complete simply run the Spatial Mic Control app when Spatial Mic is connected to the computer via USB to gain access to the microphone's settings.
3. If required, to uninstall, manually delete the files from your computer.

Specifications

- Electrical:
  - 8 Channels Streaming to USB 2.0 Audio Host via USB-C Connector / 2 Channels Streaming Playback from Audio Host
  - 8 Channels ADAT Lightpipe Digital Output
  - USB Streaming and ADAT may be used independently or concurrently
  - Sample Rates USB: 44.1kHz, 48kHz, 88.2kHz and 96kHz
  - Sample Rates ADAT: 44.1kHz and 48kHz
  - ADC 110dB SNR per channel, DAC 108dB SNR
  - Bit Depth: 16/24-bit
  - ADC clipping in pad mode: 131dB SPL
  - USB bus powered via USB-C or external 5v source via micro-USB
  - Headphone output: 130mW into 16 ohms via 3.5mm TRS jack
  - Live binaural monitoring using Google Resonance HRTFs (44.1kHz and 48kHz) and live Mid-Side monitoring (88.2kHz and 96kHz)
  - Spatial Mic Converter plugin DSP filter type: 64-element output filter matrix
  - Individual calibration stored in each Mic.
- Capsule & Array:
  - 14mm Prepolarized Condenser
  - SNR: > 72dB-A
  - Frequency Response: 20Hz to 20kHz
  - Max SPL for THD<3%: 120dB @1kHz
  - Array: 8 transducers[2]
  - Array Ordering: Looking at Spatial Mic from the front, as indicated by the knob, Capsule 1 is on the lower right (Roman numeral 'I'). Capsule 5 is on the top ring of the capsule array and inline with microphone knob. The bottom ring contains capsule 1-4 and the top ring contains capsule 5-8.
- Mechanical:
  - Construction: Aluminum & Nylon
  - Spatial Mic Dimensions: Height: 6.75'' Diameter: 2.125''
  - Weight (Mic only): 0.54 lbs
- Included Accessories:
  - USB C to C and USB C to A cable, 3 meter, black nylon braided
  - ¼-20 to ⅝'' mini swivel ball hard-mount
  - Foam windscreen
  - Quick-start guide
  - For Download: Spatial Mic Converter VST® plugin (Mac OSX & Windows) and AAX (Mac OSX)

[2] Based on geometry presented at the 133 AES Convention

    - For Download: Spatial Mic Control standalone app (Mac OSX & Windows)
- Optional Accessories:
    - Rycote InVision shockmount

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2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada ICES-003 Compliance Label: CAN ICES-3 (B)/NMB-3(B)

Note: Testing is based on the use of supplied and recommended cable types. The use of other than shielded (screened) cable types may degrade EMC performance.

Support & Contact

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