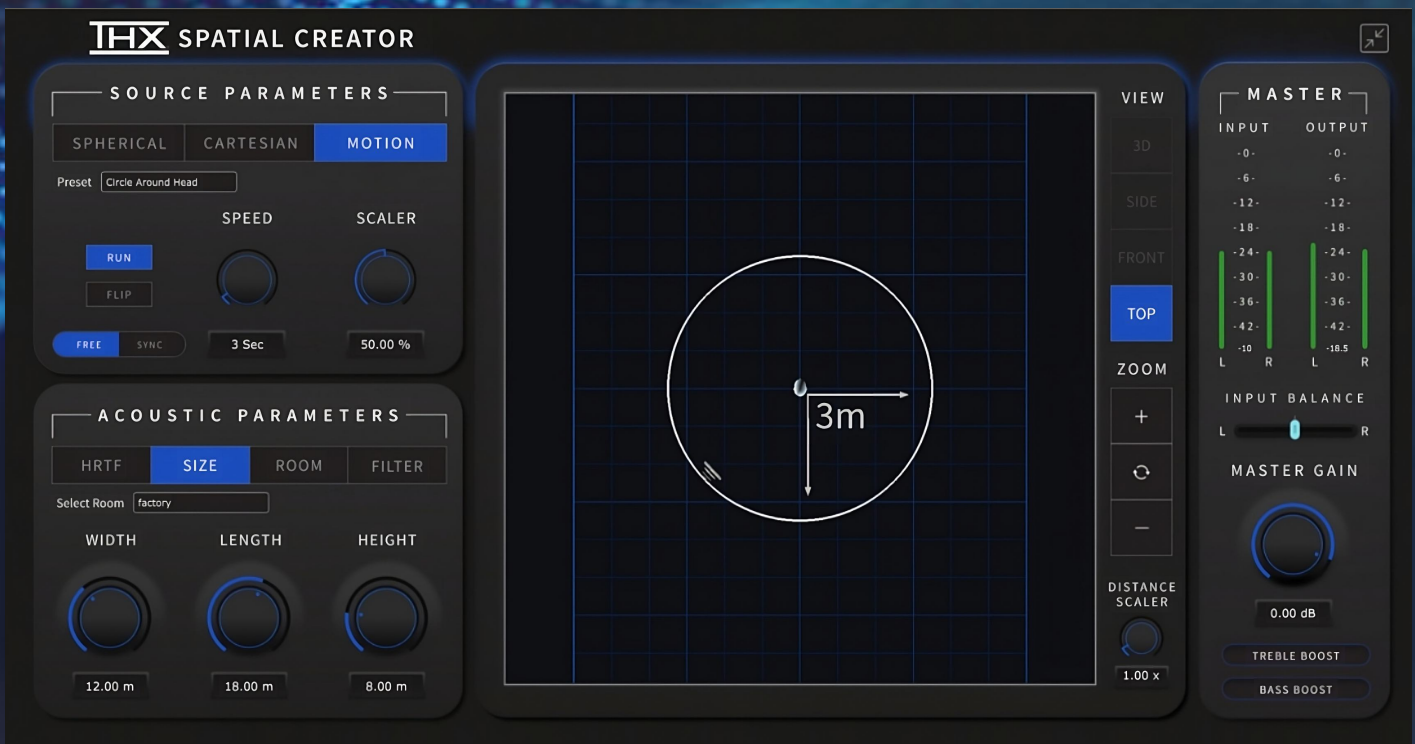


THX

THX[®] SPATIAL CREATOR



DAW Plugin User Manual

 Plugin Alliance

by Native Instruments

ABOUT THX® SPATIAL CREATOR DAW PLUGIN

THX Spatial Creator is a DAW plugin for musicians, mix engineers, sound designers, and media content creators to produce spatial audio mixes, or add spatial audio elements to their content, rendered in binaural (stereo 2.0) with no special codec or proprietary playback system needed. Using this plugin gives you the power to create immersive binaural mixes that can be played back on any device or software that uses audio file formats like WAV, AIFF, MP3, FLAC, etc. To properly listen to binaural mixes, it's essential to use headphones or speaker systems capable of binaural playback. THX Spatial Creator can be used to add immersive, virtual surround sound elements in virtual acoustic environments using a combination of physics-based HRTF modeling and high-quality room simulation with spatialized reflections and reverb.

PRODUCT CAPABILITIES AND BENEFITS

THX Spatial Creator accurately renders mono or stereo sound sources into binaural stereo to deliver a virtual 360-degree surround sound experience with sounds simulated all around you. The plugin can be used to create stereo binaural audio mixes for music and video, or binaural soundbeds for use in video games or other interactive media. THX Spatial Creator can simulate many different room and acoustic environments that can be used to create a unique listening experience that mimics the real world. Adding THX Spatial Audio elements to speech (podcasts, movies, audiobooks) can create a more natural listening experience that makes the listener feel more connected with the speaker.

WHATS NEW IN V1.1?

- Motion Tempo Sync: motion presets can now be synched to BPM
- High Resolution Display Mode: allows the THX Spatial Creator plugin to be properly displayed using high resolution monitors (4K+ monitors).
- New Motion Presets: five more motion presets have been added for even more convenient motion without the need for automation.
- New Room Presets: six more spaces added for convenient selection without the need to edit room parameters.

THX BRANDING FOR CREATORS

Creators who use THX Spatial Creator for content creation are eligible to use the THX Spatial Creator logos for promotion (see examples below). These files can be found in the same file directory as this manual.

If you use THX Spatial Creator to make content and want help sharing it with the world, feel free to tag THX in any of the following social channels. We can't wait to hear what you create!

<https://twitter.com/THX>

<https://www.instagram.com/thxLtd/>

<https://www.linkedin.com/company/thx-ltd-/>

<https://www.facebook.com/thxLtd>



SPATIAL CREATOR

COMPATIBILITY

- AAX (ProTools Mac & PC), AU (Mac), and VST3 (Mac & PC) formats
- Apple Intel and Native Silicon, PC (x64-compatible CPU)
- OSX 10.14 (Mojave) or greater, Windows 10 and 11

Note: *Offline rendering is not supported (for any workstation)*

Thinking of skipping the manual? Here are some quick and important tips to help you dive in with confidence.

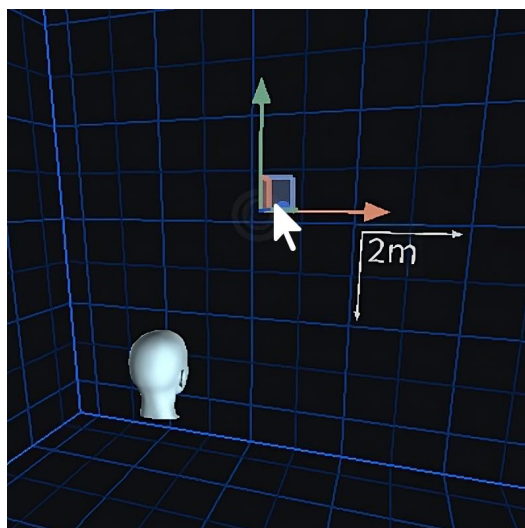
LISTENING EXPERIENCE:

- THX Spatial Creator is a binaural rendering plugin so be sure to wear headphones to ensure the proper experience.
- Make sure your headphones are correctly on the left and right ears.
- Be careful about listening at high volumes for too long. Practice safe hearing techniques to prevent fatigue or hearing damage!

STANDARD QUALITY vs HIGH QUALITY PROCESSING:

- There are two modes to process the signal: Standard Quality (SQ) and High Quality (HQ) rendering
- High Quality has very accurate room reflections that are precisely calculated by the dimensions of the room. This means that every time the sound source position changes, the reflections will be recalculated. This recalculation briefly mutes the audio and is therefore not recommended for moving sound sources. For moving sound sources, it is recommended to use the Standard Quality processing mode which uses a more computationally efficient method for room reflections.
- When using the motion feature, it will automatically switch to SQ mode.

MOVING THE SOUND SOURCE POSITION:



If you want to quickly move the sound position around, choose a Camera view (3D, Side, Front, or Top) and then grab the Gizmo widget and drag around the sound. By grabbing and moving different arrows of the Gizmo, you can move things in one plane at a time or fully in 3D.

MOTION FEATURE IS QUICKER THAN AUTOMATION:

- If you're interested in moving your sound source around to create unique movements, normally you'd have to automate these parameters. Instead of using complicated automation, enable the Motion feature to quickly choose basic sound movements and quickly dial in the sound you want, instantly adding dynamism to your mix!

3D CAMERA CONTROLS:

- When in 3D Camera view, click in the Camera window with the Alt key held down and then with the mouse, re-orient the camera position.
- Use the scroll wheel on the mouse to zoom in and out smoothly.

DISTANCE AND ROOM DIMENSIONS:

- The sound source position can never be beyond the room dimensions so you will see the plugin adjust the Distance or Distance Scaler value to always have the source position be within the active room dimensions. When using the Motion feature, the plugin will also clamp the maximum distance in the same manner.

DISTANCE AND AUTOMATION:

- If you've automated the distance value but want to quickly change the distance to a new value without having to edit or recreate the automation, use the Distance Scaler knob to bring the distance closer or farther away. This lets you dial in the best sounding distance without having to alter the automation.

AUTOMATION:

- Due to the nature of binaural processing, where many elements of the spatial audio process are not interpolated or cannot be changed without refactoring complex room reflections or other binaural calculations, some parameters will not be automatable.
 - **Note:** *The following parameter controls cannot be automated: HRTF Standard and High Quality, Room dimensions (width, length, height), independent wall reflection values, Distance Scaler, and the two high shelf filter controls. All of the gain and source position values are automatable, smoothly interpolated, and will be free of audio artifacts.*
- Depending on what DAW you're using, the list of automatable parameters may differ.
- The VST3 and AAX plugins only expose automatable parameters to the DAW whereas AU exposes all parameters including UI buttons.
- When using the AU plugin, be sure to limit automation to only the allowed parameters to limit issues when using the plugin.

- The three positional values for Spherical and Cartesian modes are linked together. Even though the plugin UI only shows one mode at a time, behind the scenes both A,E,D and X,Y,Z values are being set. If you automate A,E,D (Azimuth, Elevation, Distance) parameters, some DAWs will automatically record the connected X,Y,Z values. The result of this is upon playback both A,E,D and X,Y,Z values will be sent to the plugin resulting in “fighting” between the controls. It’s advisable to simply remove/delete the X,Y,Z automation lanes so that solely the A,E,D values are controlling the plugin.
- Automating spherical values behind the head. While X,Y,Z positional values can be smoothly automated in all 360-degrees around the center listening position, automating the source position behind the head using Spherical A, E, D controls can introduce an issue when crossing the +180 degree/-180-degree position. The resulting automating has to “flip” from one side to the other yielding a visual UI issue and resulting audio processing artifact during this transition. To smoothly move the sound source behind the head and automate this, use the Motion feature or automate solely using Cartesian X, Y, Z positions.

TABLE OF CONTENTS

SECTION 1: INTRODUCTION AND THX SPATIAL AUDIO® OVERVIEW	8
SECTION 2: CAMERA VIEWS AND CONTROLS	9
SECTION 2.1: CAMERA WINDOW	9
SECTION 2.2: VIEW CONTROLS	10
SECTION 2.3: ZOOM CONTROLS	10
SECTION 2.4: DISTANCE SCALER	10
SECTION 2.5: HIGH RESOLUTION DISPLAY MODE (NEW)	11
SECTION 3: SOURCE PARAMETERS	12
SECTION 3.1: SPHERICAL	12
SECTION 3.1.1: AZIMUTH	12
SECTION 3.1.2: ELEVATION	12
SECTION 3.1.3: DISTANCE	12
SECTION 3.2: CARTESIAN	13
SECTION 3.3: MOTION	13
SECTION 4: MOTION	14
INTRODUCING MOTION SYNC	14
SECTION 4.1: PRESET	14
SECTION 4.2: RUN	15
SECTION 4.3: FLIP	15
SECTION 4.4: FREE (NEW)	15
SECTION 4.5: SYNC (NEW).....	15
SECTION 4.6: SPEED	15
SECTION 4.5: SCALER	15
SECTION 5: ACOUSTIC PARAMETERS	16
SECTION 5.1: HRTF	16
SECTION 5.2: SIZE	17
SECTION 5.3: ROOM	17
SECTION 5.4: FILTER	17
SECTION 6: MASTER PARAMETERS	18
SECTION 6.1: METER	18
SECTION 6.2: INPUT BALANCE	18
SECTION 6.3: MASTER GAIN	18
SECTION 6.4: TREBLE & BASS BOOST	18

INTRODUCTION AND THX SPATIAL AUDIO® OVERVIEW

THX Spatial Creator, based upon THX Spatial Audio technology, is a professional-grade, high quality binaural rendering solution to create fully immersive mixes or add spatial audio elements to your content. Our proprietary rendering engine uses accurate, physics-based processing utilizing both direct path HRTF, wall reflections, and virtual room simulations to create a myriad of acoustic environments.

The optimal way to create a high-quality binaural mix is to individually process each of the tracks in your mix using a single instance of the plugin. You can place the plugin on an individual channel, or an entire buss, either mono or stereo, but note that the signal is downmixed to mono so that the sound source can be placed in a discrete location in space. If you want to preserve stereo files to simulate virtual speakers in space (left and right, front and back, etc.), convert your stereo track into two mono files for individual processing, or duplicate your stereo track and use the Input Balance control to select the two sides of the stereo channel you want to process.

More information on this topic can be found in the Input Balance section.

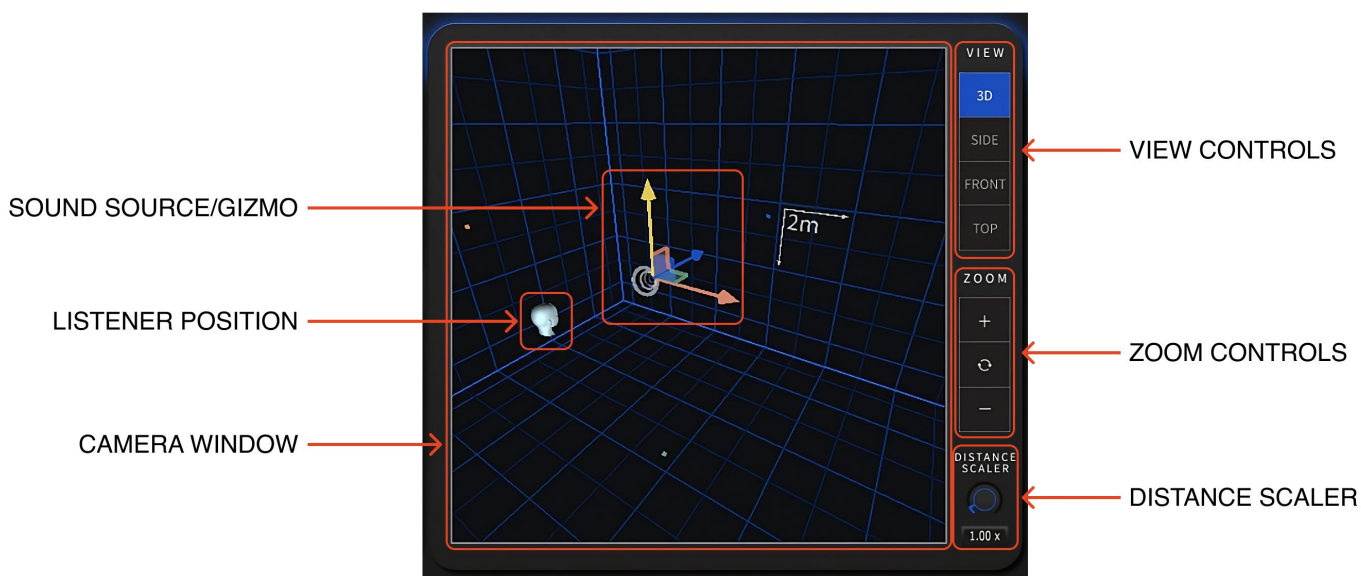
To get started quickly, choose a factory preset or load a room preset on the Size/Acoustic Parameters panel. Choosing a preset will load up different sized rooms, a variety of wall reflections settings, how loud the room reflections/reverb is, and other characteristics of the acoustic environment. Then you can customize using the controls to further dial in the sound you want. Use the Spherical or Cartesian control to move the sound position to a new location or grab the Gizmo in the Camera window to easily move the sound position to a new location in space.

If you are using the plugin on a track where you don't need to have the sound source moving, choose High Quality rendering in the HRTF/Acoustic Parameters panel; otherwise select Standard Quality if you will be automating the motion of the sound source.

Lastly, if you want to quickly set up simple sound source movement, without recording or editing DAW automation, select the Motion/Source Parameters panel to choose from basic motion presets. Here you can quickly load basic motions like around your head, left to right, front to back, with intuitive controls over speed and direction. See the Motion Section for more details on this feature.

CAMERA VIEWS AND CONTROLS

The Camera view and related UI lets you visualize and easily control the placement of the sound source and lets you understand its positional relationship to the center listener position. The head icon at the center is what you hear in your headphones with the sound source position being binauralized to accurately hear the sound from that virtual position in space.



Camera View & Controls

SECTION 2.1: CAMERA WINDOW

This window is the main view of the virtual space, letting you visualize the position of the sound source in relation to the center listener position. Depending on what view setting and the zoom state, you can understand the size of the room and the sound source position within that space. With your mouse positioned anywhere over the plugin window, you can use the mouse wheel to smoothly zoom in and out. While in 3D view, if you place your mouse pointer in the Camera View window and hold down the alt key, you can rotate the room around in various ways.

The blue grid lines on the wall will let you know the size of each gridline is as you zoom in and out.

To move the sound source position, grab the center of the Gizmo or the three axis arrows to move the sound position location in 3D space or on 2D planes. Depending on whether you're viewing the Spherical or Cartesian panel to the left, you'll see those values updating based on where you move the sound position to.

SECTION 2.2: VIEW CONTROLS

Select one of these views to best see the room dimensions, position of the sound source, and center listener position.

- **Note:** *When the Motion feature is active, the default View state will be Top as the sound source motion is aligned on the azimuth axis and the Top view is best to visualize its size and motion elements.*

SECTION 2.3: ZOOM CONTROLS

Use the + and – buttons to zoom the camera in and out based on fixed distances. Use the center Snap button to reposition the camera view back to its default state. This button is most handy when in 3D view and you need to reorient the camera back to its default position.

SECTION 2.4: DISTANCE SCALER

This parameter is unique because it doesn't directly have to do with camera controls but is closely associated with the Distance parameter found in the Source Parameters panel. Normally, this control is set to its default 1.00x state meaning that the Distance value is not being modified. By lowering or raising the scaler value, you can nudge the sound source position closer or farther away from the listener position, all without having to change the Distance value.

This function is most useful when the Distance value is automated by your DAW, but you still want some control over how far or close the sound source is. For instance, a common automation usage would be to move the sound source around to create an interesting panning or spatial movement effect, which would include automating the Distance value. Then, with that automation in place, if you wanted to adjust the sound source distance just a bit, you could utilize the Distance Scaler to make this change, all without having to re-record or edit the Distance automation values.

Because the distance scaler is mathematically adjusting the Distance value, and the Distance value cannot go below 1m or outside the walls themselves, both the Distance value and Distance Scaler value will clamp based on room dimensions

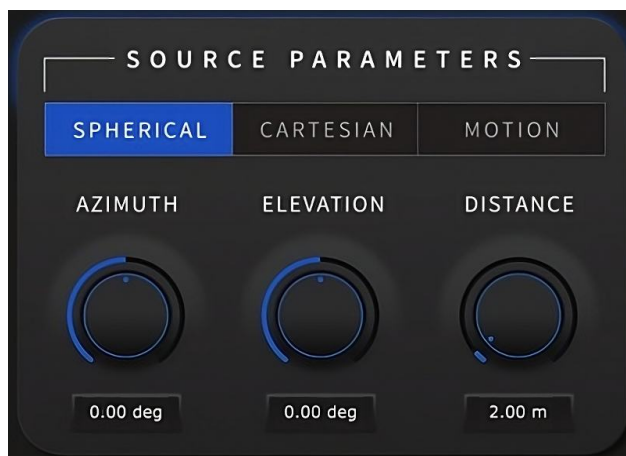
SECTION 2.5: HIGH RESOLUTION DISPLAY MODE (NEW)

In v1.1, we introduce the ability to toggle between sizes, allowing proper display of the plugin for high resolution monitors (4K or higher), or for lower resolution displays (lower than 4K). The toggle is to the top right above the master section.



SOURCE PARAMETERS

This section describes the three main sets of controls for the positional location of the sound source: Spherical, Cartesian, and Motion. These controls are the primary way you can position the sound source within the virtual room. Spherical and Cartesian features give you controls to set a single position in 3D space, while the Motion feature offers the ability to animate and move the sound source position, with presets for the animation type as well as controls for how fast the sound source moves, which direction it moves, and other relevant controls.



SECTION 3.1: SPHERICAL

With Spherical controls selected, the sound source position in 3D space is described in degrees for its position on the horizontal azimuth plane around the head and its elevation position above or below the head. The third control is distance which is represented in meters and controls how close or far the sound source is from the central listening position.

AZIMUTH

The range of the azimuth control is -180 degrees to +180 degrees around you on the horizontal plane. Azimuth is the same as the X control in Cartesian mode.

ELEVATION

The range of the elevation control is -90 degrees to +90 degrees above or below the listener position. Elevation is the same as the Y control in Cartesian mode.

DISTANCE

The range of the distance control is 1 meter to approximately 21 meters. The distance range is never smaller than 1 meter and the maximum distance is determined by the dimensions of the virtual room. The sound source can never be outside the walls of the room. Distance is the same as the Z control in Cartesian mode.

- **Note:** *If the Distance Scaler is being used, and has a value other than 1.00 x, you'll see the Distance value turn red. This is a reminder that some other control is affecting the distance value which is being multiplied by the Distance Scaler value.*

SECTION 3.2: CARTESIAN

Similar to the Spherical controls, Cartesian coordinates are an alternate way to describe a position in 3D space, using X, Y, and Z positions, determined in meters. X is the left to right control on the horizontal azimuth plane, Z is the forward to backward control, and Y is the elevation control for placing the sound source above or below the listener position.

- **Note:** *When changing the Distance Scaler value, you are affecting the distance your sound source in Cartesian positional values. If Distance Scaler is being used, and has a value other than 1.00 x, you'll see the 3 Cartesian values turn red. This is a reminder that some other control is affecting their positions which is being multiplied by the Distance Scaler value.*

SECTION 3.3: MOTION

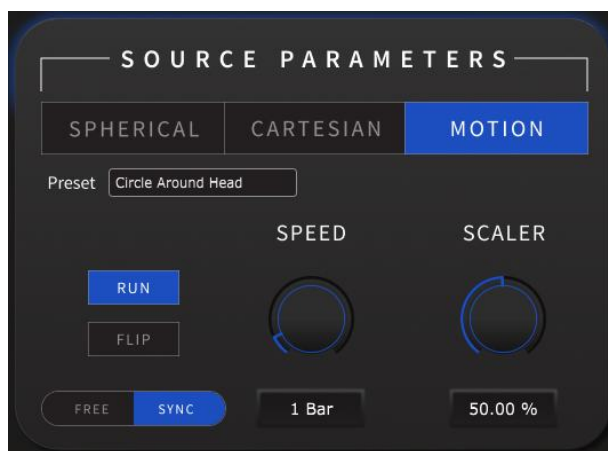
If you're interested in moving your sound source around to create unique movements, normally you'd have to automate these parameters in other DAW plugins. Instead of using complicated automation, THX Spatial Creator enables the Motion feature to quickly choose basic sound movements and quickly dial in the sound you want. See section four for more details on Motion controls.

The Motion feature is a unique and efficient way to quickly add dynamic motion to your sound source position to create interesting spatial audio effects. Some examples would be moving a sound source slowly around your head, having your track move forward and backward, or other more complex motions. Normally, to create these effects, you would need to record and edit complex automation values for the X, Y, and X coordinates. With the Motion feature, you can bypass those tasks and instantly add some motion to your spatial audio mixes.

- **Note:** *When using the Motion feature, several controls of the plugin may reset and be overridden. If you had your sound source in a specific location, it will be moved in space to be on one of the preset motion patterns. These patterns are only on the azimuth plane, so if your source position had any elevation value, this will be moved down to the horizontal plane. Additionally, HRTF Quality mode will be set to Standard, the camera view will be set to Top view, and the Distance Scaler value will be set back to 1.00x. The rest of your spatial audio parameters (size, room, filter, master) will be retained and unaffected.*

INTRODUCTION TO MOTION TEMPO SYNC

In v1.1, THX Spatial Creator allows you to synchronize any motion preset to bars/beats at any tempo!



SECTION 4.1: PRESET

Using this pull-down menu, you can select different pre-configured patterns to choose from. The sound source will automatically follow these preset patterns, like a circle or oval around your head, or left-to-right or front-to-back auto-panning.

Here is the updated list of motion presets in v1.1:

- Circle Around Head
- Wide Oval
- Long Oval
- Front auto-pan near
- Front auto-pan far
- Rear auto-pan near
- Rear auto-pan far
- Left auto-pan near
- Left auto-pan far
- Right auto-pan near
- Right auto-pan far
- Square (NEW)
- Angle-pan F/R (NEW)
- Angle-pan F/L (NEW)
- Angle-pan R/L (NEW)
- Angle-pan R/R (NEW)

SECTION 4.2: RUN

The Run control lets you manually start and stop the Motion feature. When automating this parameter you can create more interesting motion effects, where sometimes the sound source is static and other times actively moving.

SECTION 4.3: FLIP

The Flip control lets you decide which direction the motion pattern will follow. For instance, use this control to have the sound move clockwise around your head rather than counter-clockwise (also available in both free and sync modes.)

SECTION 4.4: FREE (NEW)

In the default “Free” mode, any motion preset will run without syncing to tempo, with one complete cycle of motion occurring according to the value set by the speed knob in seconds.

SECTION 4.5: SYNC (NEW)

As mentioned in the Motion intro section, Sync mode allows for the powerful ability to synchronize motion to bars/beats of your workstation. To engage the Sync capability, simply press the “SYNC” button which enables the plugin to use your workstation’s tempo (bars and beats) to determine the speed of the motion presets.

SECTION 4.6: SPEED

When in free mode, the Speed control determines how fast or slow the sound sources travel on the preset Motion path in seconds (minimum of one second, maximum of 30 seconds). For faster movement, use speeds to the left-side of the knob, and for slower speeds turn the knob clockwise for more gradual movement.

In sync mode, the speed knob ties one full revolution to whatever the speed value (in sync mode, it's in bars and beats.) For example, if set to one bar (or 4 beats) and your workstation is set to 4/4 time, one full rotation (from the preset starting point and back) will take one bar to complete (or ¼ rotation for every beat.)

SECTION 4.7: SCALER

The Scaler control gives you quick access to the relative size of the animation. For instance, a larger Scaler value will have the sound source farther away from the listener position as it animates. When in Sync mode, the scalar knob is used to increase/decrease the size of the preset. So, for this example below, if the scalar knob was set to 100%, this would expand the “Circle Around Head” preset to the maximum possible size (given the room boundaries); for example, if your speed is set to one bar, one full revolution would move slightly faster to complete the revolution in one bar compared to a scalar set to 50%.)

- **Note:** *The motion feature may become inactive in some DAWs if the track is muted or if the DAW playback is stopped. This is normal as the Motion will resume once unmuted or playback has resumed.*

ACOUSTIC PARAMETERS

This section describes the four sets of controls for the acoustic parameters: HRTF, Size, Room, and Filter. These controls allow for customization and fine-tuning of the virtual room, gain controls, room presets, and tonal characteristics of the spatialized content.



In v1.1, we've updated the list of rooms to include the following:

- Factory (default preset)
- Bathroom
- Small Dark Room
- Bright Studio
- Dry Studio
- Vocal Chamber
- Live Drum Room
- Wine Cellar
- Small Club
- Large Club
- Hall
- Tunnel
- Medium Hall
- Concert Hall
- Parking Garage
- Giant Tank
- Cooling Tower
- Claustrophobic Space (NEW)
- Cathedral (NEW)
- Podcast Speech (NEW)
- Dark Chamber (NEW)
- Anechoic Chamber (NEW)
- Resonant Room (NEW)
- Custom (when editing/customizing acoustic parameters, this preset name is used)

SECTION 5.1: HRTF

On this panel you can access and control two important elements of the HRTF. This can also be thought of as the “direct path” controls for how the audio reaches the listener position before room acoustics and reflections are factored in.

The HRTF Gain control allows you to raise and lower the gain of the direct path signal processed through the HRTF. Use this control to add more or less direct path signal compared to the virtual room and reflections.

The High and Standard Quality buttons are used for different purposes. If the source position moves, use Standard Quality. If the position does not move, use High Quality mode, which when selected, performs real-time reflections calculations to accurately and optimally represent the room acoustics; this should be used when your sound source is statically placed within the room and not moving around. Each time the sound source is moved, either manually or by automation, the reflections must be recalculated and may cause a brief mute in the audio while this update is performed. Standard Quality, on the other hand, does not perform real-time reflections calculations and is optimal when you want your sound source to move dynamically around the scene during playback.

- **Note:** *When Motion feature is enabled, Standard Quality playback is automatically selected as the sound source will be moving around. If Motion feature is disabled, Standard Quality mode will still be active and will not go back to the state it was in prior to the Motion feature being used.*

SECTION 5.2: SIZE

The Size controls allow you to customize the virtual room dimensions.

The Select Room pull-down menu gives you quick options for various useful types of environments, from small rooms to mediums and large concert halls.

The Width, Length, and Height controls let you customize the overall size of the virtual room in all three dimensions. With various Views select, you'll see the room change accordingly in the Camera View window. The minimum size can be 2 meters and the maximum size can be 30 meters.

SECTION 5.3: ROOM

The Room controls let you further customize the characteristics of the virtual space.

Room Gain is used to add or decrease the gain of the room and six wall reflections, while leaving the direct path HRTF signal unaffected.

The six wall controls allow you to change how strong the reflections off each wall are. If you want a particular wall or walls to have strong, present reflections, increase their gain to taste (above 0.80 is recommended). If you want a particular wall or walls to have lowered reflections, select lowered values (below 0.50 is recommended). All six wall levels are controlled by the Room Gain control.

SECTION 5.4: FILTER

The Filter button gives you easy control over a high-shelf EQ to adjust the brightness of the room and reflections. For brighter sounding spaces, leave the High Shelf Gain unaffected. If warmer or darker sounding reverberant spaces are desired, lower the Cut Off Frequency value and then begin reducing the High Shelf Gain value to taste. As the gain decreases, the lower the Cut Off Frequency and the darker the space will become.

MASTER PARAMETERS

The Master section contains metering and controls dedicated to the input and output signals of the plugin.

SECTION 6.1: METERS

These are input and output meters showing the gain of the audio signal entering the plugin (dry) and leaving the plugin (binauralized). Be careful to control the incoming signal level to prevent clipping during the spatial audio process, and that both your input and output levels are not clipping.

SECTION 6.2: INPUT BALANCE

This control handles the incoming audio signal when instantiated on a stereo track. If the plugin is placed on a mono track, this control does not do anything. When placed on a stereo track you can decide what elements of the stereo track get processed. When the fader is hard left or right, you will only be getting signal from the left or right side of the incoming signal. When the fader is anywhere between hard left and right, you will be blending the left and right sides based on the position of the fader.

- **Note:** *If you have a stereo track and want to simulate virtual left and right speakers for the left and right sides of that track, you have 2 options. The first is to split your stereo track into 2 mono tracks and instantiate the THX plugin on both of those tracks. Then you can place a virtual speaker position using the sound source position controls. The other option is to leave your stereo track intact with the plugin active, but then duplicate the track and plugin instance. On the first track, set the Input Balance slider hard left, and on the other track set the Input Balance hard right. Then you will have independent control over the sound source placement for the left and right sides of the stereo track.*

SECTION 6.3: MASTER GAIN

Master Gain controls the final output level of the binauralized signal leaving the plugin. This control gives you up to +6dB of boost and -48dB of cut.

SECTION 6.4: TREBLE & BASS BOOST

Use the Treble Boost and Bass Boost buttons to quickly enable a boost of low frequencies or high frequencies. These simple EQ adjustments affect the fully spatialized signal. These EQ boosts happen pre-Master Control gain.

For more information on THX, please visit [THX.com](https://www.thx.com)

For further information about Plugin Alliance, please visit [plugin-alliance.com](https://www.plugin-alliance.com)

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KNOWN ISSUES

- In Reaper, automating the Azimuth, Elevation, and Distance (AED) source parameters are intrinsically related to XYZ axes. For example, if you automate AED, XYZ lanes will appear and will ‘conflict’ with the AED causing playback glitching. The workaround is to remove the additional lanes added to remove the glitchy behavior (and may require re-editing the AED parameters). If position automation is crucial for your mix, we recommend automating the XYZ parameters rather than AED.
- In some DAWs (for example, Pro Tools), when the plugin is bypassed, the audio pans hard left
- In some cases, the plugin only response to automation when the plugin window is active. In general, performance of automatable parameters are workstation dependent.
- In order to provide the highest quality spatial audio, the plugin processing resources can demand more CPU usage when multiple instances of the plugin are used, leading to reduced UI plugin response (system dependent).
- With odd-sized rooms (very long, not wide for instance) and with Motion Scaler values set to below 20%, the behavior of sound source and spline direction may be affected.
- If any issues arrive, please contact [Plugin Alliance](https://www.plugin-alliance.com) for assistance.