# Feature Guide

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Description & User Story

Mach1 Spatial Format Explained

Mach1 Spatial is a VVBP (Virtual Vector Based Panning) or SPS spatial audio format that encourages users to have complete freedom with their post production mixing process by not forcing the user to use any sonic signal altering processing. The user is free to apply their own DSP/ASP to their audio during the mixing process to avoid proprietary DSP algorithms for spatial audio seen in other formats or tools. With this in mind the user is completely in control of their creative mix process and can make any decision they want whether it results in realistic spatial fields or more creative spatial sound fields.

Decoding Explained

The Mach1 Monitor allows users to preview and monitor the mix as though you were head tracking in your target device/app/project. The audio outputting from the channel containing Mach1 Monitor is not intended for exporting (unless using the StereoSafe mode) and is only intended for aiding in the process of mixing and mastering your spatial audio mix. This process takes the multichannel of Mach1 Spatial and down mixes them with our Mach1 Spatial VVBP algorithm to output the correct stereo image based on your simulated orientation angles (Yaw, Pitch, Roll).
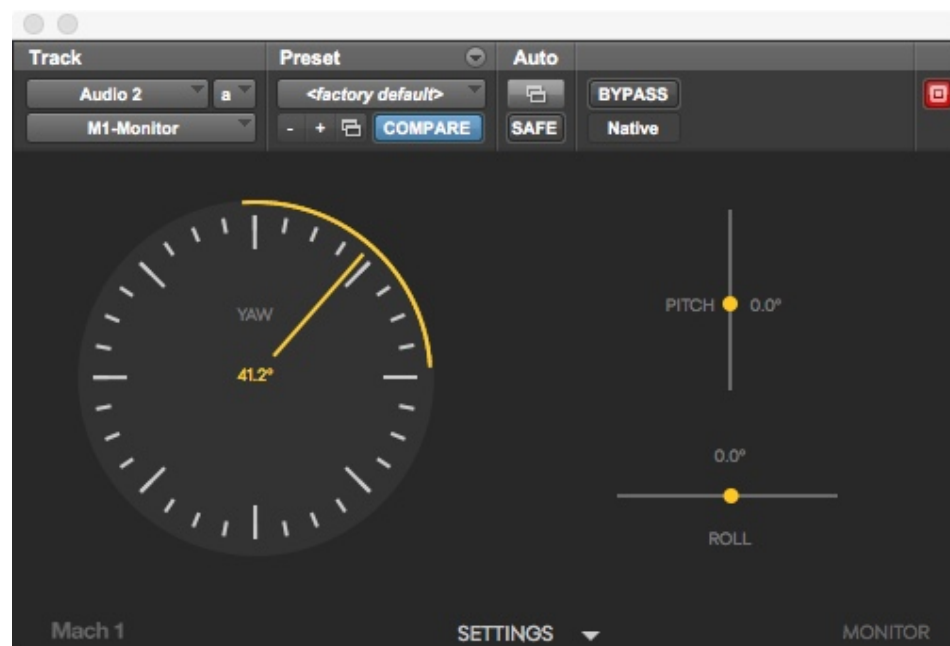
Headlocked/Static Stereo

Stereo audio that is intended to be headlocked or static (example: music mix) should not be processed by the Mach1 Monitor and instead should be in a buss/track that sums with the output of Mach1 Monitor for the correct mixing reference.

Software Notes

UDP Ports

The Mach1 System software utilize automatic communication between all plugins and standalone applications via a background service managed by your operating system named "**m1-system-helper**". Additionally another background service may also exist and be launched by the Mach1 Monitor plugin named "**m1-orientationmanager**" this is a service to discover and manage known 3rd party IMU sensor devices.

To learn more about the "**m1-orientationmanager**" service please visit the project page: https://github.com/mach1studios/m1-orientationmanager

The following ports are potentially used in the background on launch of plugins and standalone applications:

9901: M1-MNTRCTRL iOS App sending orientation data to M1-Player
10001->10100: M1-Panner instances to send data to M1-Monitor

Ports are searched and configured on launch for these ranges on localhost of the user's computer and establish working on connections using unused ports within range.

Orientation OSC Data

For custom orientation transmission we expect the following Euler YPR angles with the address **/orientation**

float [0] = Yaw | 0.0 -> 360.0 | left->right ++
float [1] = Pitch | -90.0 -> 90.0 | down->up ++
float [2] = Roll | -90.0 -> 90.0 | left-ear-down->right-ear-down ++

https://dev.mach1.tech/#mach1-internal-angle-standard

Plugin Features

The following explains all the current possible encoding modes of the Mach1 Monitor in your common DAW/Editor.

General Parameters

Yaw
Range: 0 -> 360 (clockwise)
Allows users to simulate head-tracking on the yaw axis (rotating head horizontally)

Pitch
Range: -90 -> 90 (bottom to top)
Allows users to simulate head-tracking on the pitch axis (nodding head up/down)

Roll
Range: -90 -> 90 (top of head to left -> top of head to right)
Allows users to simulate head-tracking on the roll axis (tilting head toward a shoulder)

Settings

When activated allows access to more advanced features during the Mach1 Spatial mixing process, de-activate to shrink UI window size when not needed

Monitor Modes
Allows different decoding modes, these modes will be described on the next page

> ***Mach1 Spatial Mode*:** The default mode for full Mach1Spatial mixing support and full Yaw/Pitch/Roll controls of the M1-Monitor.

> ***StereoSafe Mode*:** When this mode is enabled all Panner's process audio with Mono output so that the user can quickly export a stereo version that is spatially safe in all directions for 360 audio/video players that do not support spatial audio yet. The Diverge values during the mix are instead

used to correct the gain ratio between all spatial components so that the mix is roughly retained to avoid full re-mix scenarios.

Front/Back FoldDown: When enabled this mode sums channels Front/Back/Top/Bottom left channels together and Front/Back/Top/Bottom right channels together to allow the user to quickly reference any front to rear differences during the mix.

Timecode Offset
Allows the user to add offset to the Mach1 Player (M1-Player) to correctly align the video on our video player to match the video's sequence start time on your DAW

Upcoming Features