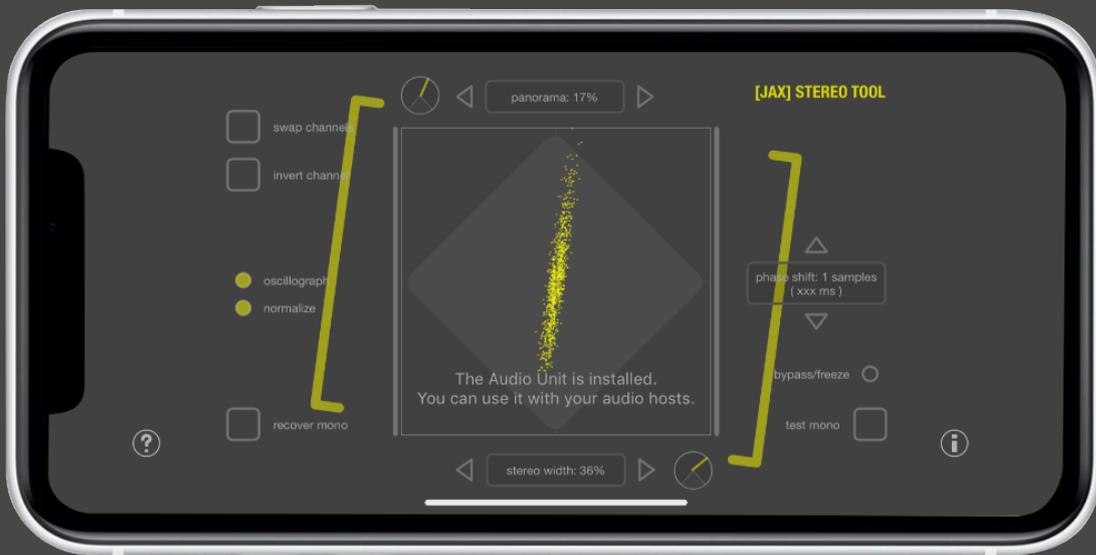# JAX [JUST AN EXTENSION] SERIES

JAX : STEREO TOOL [AUDIO UNIT]
MANUAL

JAX Stereo Tool is a visual Audio Unit plugin for manipulating the stereo image of digital audio. The app comes with enabled microphone input by default. The built-in plug-in (Audio Unit) is available system-wide when you install the app. You can use it with many supporting host applications.

Audio Units are Apple's recommended method for providing shared audio effects for applications and audio editors. You can load the plugin into any host application that supports at least stereophonic audio effect plug-ins (in Audio Units format) with its own user interface.

IMPORTANT NOTE:

We decided to remove all dependencies to IAA (inter app audio) from our distribution apps successively now. This technology is marked deprecated by Apple. We also found that the problems with this stuff outweigh the positive user experience in such a way that this decision did not even hit us. We will concentrate to the Audio Unit technology with our releases.

JAX Stereo Tool has its main use as a mastering effect that allows you to modify the stereo image of your audio by narrowing or widening it in a controlled manner. That is, the stereo output can be continuously adjusted in the basic function of pure mono to very wide stereo. This happens in real time and you can observe the result with the integrated correlograph, controlling and optimizing the audio thanks to this helpful additional visual information.

The phase of the source material is always kept stable with the JAX Stereo Tool and you have perfect control over the mono-compatibility of your material.

Mono-compatibility still plays a big role today, as extremely wide stereo sounds great on high-end stereo devices, but often it is very unsatisfactory on small playback devices such as mobile phones or small Bluetooth speakers, etc. This can lead to complete loss of frequency information and pressure of the audio signal, which will then considerably limit the sound experience.

The plugin is also great for correcting live recordings in real time where phase shifts may be a problem due to wrong microphone placement and distant locations.

JAX Stereo Tool therefore offers the possibility to correct the phase co-relations between the two audio channels up to a certain amount (100 ms). The conversion from mono to stereo is also phase-stable using a simple delay based adjustable (not modulated) sample offset.

With the JAX Stereo Tool, you can perform essential real-time correction actions that you will rarely find in other applications or even mixers. So you can for instance swap the two audio channels at the touch of a button or invert one of the channels, for example, to correct false cabling while recording afterwards or simultaneously (in real time) and combine even multiple actions to the stereo field at ones.

It is also possible to restore fully mono-compatibility from non-mono-compatible stereo in order to completely heal the signals that would be lost by phase cancellation with monophonic playback.

The Parameters:

At the bottom of the correlograph is the main "stereo width" slider control for adjusting exactly that, the stereo width. In the middle position, the audio signal is played unprocessed. The more the slider is moved to the left, the more the stereo signal is limited, that is, gradual converted into a monophonic signal. The resulting pure monophonic signal is what you would hear if the stereophonic audio were played back on a single or narrow speaker device without any modification. If you already notice a significant loss of audio energy while narrowing, then your source material is obviously not perfectly

mono-compatible and has certain phase problems. However, you can "recover" it. The "mono test" switch can give an immediate impression of the resulting mono-compatibility at any time.

On the other hand, moving the "stereo width" slider to the right broadens the stereo image, which means that the stereo components in the signal are boosted in relation to the mono content. Although most people perceive very wide stereo as "improving", it tends to reduce mono-compatibility more and more. The energy of the mono signal is proportionally reduced with increasing stereo power. The stereo impression itself generally arises by shifting the phases of an audio signal.

With the switch "recover mono" you can make or "restore" a "lossy" stereo signal. A good example of this is an audio channel that has been completely out of phase, so that in the ideal mathematical case, there would be nothing (or very few) left to hear, if it is played monophonically. In stereo playback, the same signal is clearly perceptible, with mono playback only silence or only very quiet noise can be heard or the whole thing sounds somehow hollow and extremely washed out. This paradox can hardly be perceived in rooms with large stereo boxes or under stereo headphones, because the brain usually adds these waves together. Nevertheless, a mobile phone with only one speaker (or two very narrow speakers) could not play such hi-fi audio satisfactory and the brain no longer can reconstruct the lost stereo parts.

The parameter for the restoration of the mono-compatibility is therefore at first somewhat difficult to understand. However, the principle is very simple. First, the signal that would be canceled out by the shifted phases is eliminated. Then it is rotated in phase and added back to the mono portion on (the left side of the slider). This way the signal is recovered and made audible again. So you can now fade (switch "recover mono" turned on) between the restored mono signal and the original stereo signal. Then select a good setting for the newly

assigned "stereo width" and the audio signal is as far as possible restored and optimized in its mono-compatibility.

Sometimes it makes sense to completely invert one of the channels or move it in phase. With the switch "invert" you can also invert one of the channels at the touch of a button. With the switch "swap" you swap the two channels, right and left completely. This may be necessary if, for example, a device was incorrectly wired during recording or if a connected signal processor twisted the channel or such things.

The shift of the phase with the "phase shift" is always constant and is realized by a fixed delay of the left stereo channel. The maximum possible shift is around 100 ms. You should be very careful with that, because a constant phase shift can lead to significant frequency loss. However, it does wonders if the channels have been shifted exactly in relation to each other during recording. This can happen very quickly due to problematic microphone placement or due to unpredictable room reflections or similar inconsistencies. Here you have to manually try something around to find an ideal setting for the right recovering balance.

Sometimes it also happens that one of the two audio channels is constantly too quiet in the stereo image. You can easily correct this with the "panorama" parameter (upper slider control), which is switched before the stereo processor.

The correlograph

A good mix is always characterized by an optimal balance between stereo vision and mono-compatibility. If the correlograph shows a predominantly upright oval graphic, this is usually good. If the oval tilts to the right or left, this circumstance indicates that the signal is not centered, that is, that one of the channels is too loud or too quiet and thus

needs to be corrected in panorama. For example, if the oval has only a vertical bar, it is monophonic and has no stereo information at all. A monophonic signal can not be broadened with the stereo widener. However, there are different approaches. Sometimes a slight and constant change of the phase helps to create a pseudo stereo impression, even from monophonic input like a microphone. If you do so, you must carefully watch the resulting frequency range and the energy of the audio material.

If the oval of the correlograph collects mainly on the horizontal, then the audio is generally not or badly mono-compatible and there are strong phase cancellations in action. Such a mono signal would be very problematic, quiet and spongy to listen with monophonic or narrow devices. A vertical line therefore means complete phase cancellation. Here you can invert one of the channels to restore mono-compatibility or simply try "recover mono" mode. Just experiment with the features.

With the JAX Stereo Tool you have all possibilities to analyze, control and correct the stereo image of your audio. If you are satisfied with the result of the settings, you can bounce the result into a new file. This is usually done by an external audio application, hosting the audio unit.

A side note: We had some trouble with our first app releases because the app store staff was continuous rejecting all our apps with extended MIDI and bluetooth support for unknown reasons. So we are sorry to tell you, that we decided to overcome this trouble by removing all MIDI and bluetooth features from the distribution apps just for the pure fact that we are able to release our stuff to the masses without the trouble an without further delays.

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