



O7A Upmixer Plugins
v2.4.0

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1 Introduction

The O7A Upmixer plugins take existing multichannel mixes and convert them into [seventh order ambisonic \(O7A\) streams](#).

Speaker layout upmixers are available for various standard speaker layouts (5.1, 7.1, 7.1.2, Auro-3D, IMAX and so on). Other plugins handle stereo upmixing, ambience generation, and injection or upmixing of some other formats.

In general we recommend the use of O7A streams primary for research purposes, or in studios with high-end modern hardware. **The CPU load generated by the O7A plugins can be very high and may not be suitable for use on standard studio computer systems.** Third order (O3A) streams are an alternative. These carry enough spatial detail for most practical applications and present a much lighter processing load. Many O3A plugins run roughly four or sixteen times faster than their O7A equivalents.

1.1 Compatibility

O7A streams require audio busses with at least 64 channels, which (at the time of writing) most Digital Audio Workstations (DAWs) cannot handle. Some are limited at 2 channel stereo and many are limited at the 8 channels used for 7.1 surround mixes. **The O7A plugins will not work correctly with these DAWs**, which may even crash. In general, Reaper or Pro Tools Ultimate (version 2023.6 or later) are good options.

1.1.1 AAX

Most of the O7A plugins exist as AAX versions which are compatible with [Pro Tools Ultimate](#) version 2023.6 or later and plugin support (or not) is indicated in this text.

Pro Tools keeps careful track of exactly what stem formats are present on tracks and busses; this is a powerful feature which helps avoid mistakes and helps ensure plugins are used in the right places. However, where formats are not available in Pro Tools, corresponding plugins are generally not available. To avoid this in some cases, some plugins "misuse" stem formats with matching channel counts. Cases like this are described for individual plugins below in the text.

1.1.2 VST2

The plugin library works as a "shell" plugin. This means that a number of individual audio plugin effects are provided by a single library file. Some VST2 hosts may have a slightly different way of managing these plugins to ordinary ones. For instance, in [Max/MSP](#) the vst~ plugin uses "subname" messages to specify the individual plugin within the library. At the time of writing, VST2 shell plugins are not supported in Nuendo or Cubase.

Most VST2-compatible DAWs (such as [Reaper](#)) have a plugin "path", which is a list of directories which will be searched for VST2 plugins. You may need to change this path to point at the location of the plugins, or move the plugins there. By default, these plugins are installed into `/Library/Audio/Plug-Ins/VST` on macOS. Various directories may be used on Windows, but `C:\Program Files\Steinberg\VST2` is not uncommon.

1.1.3 Buffering

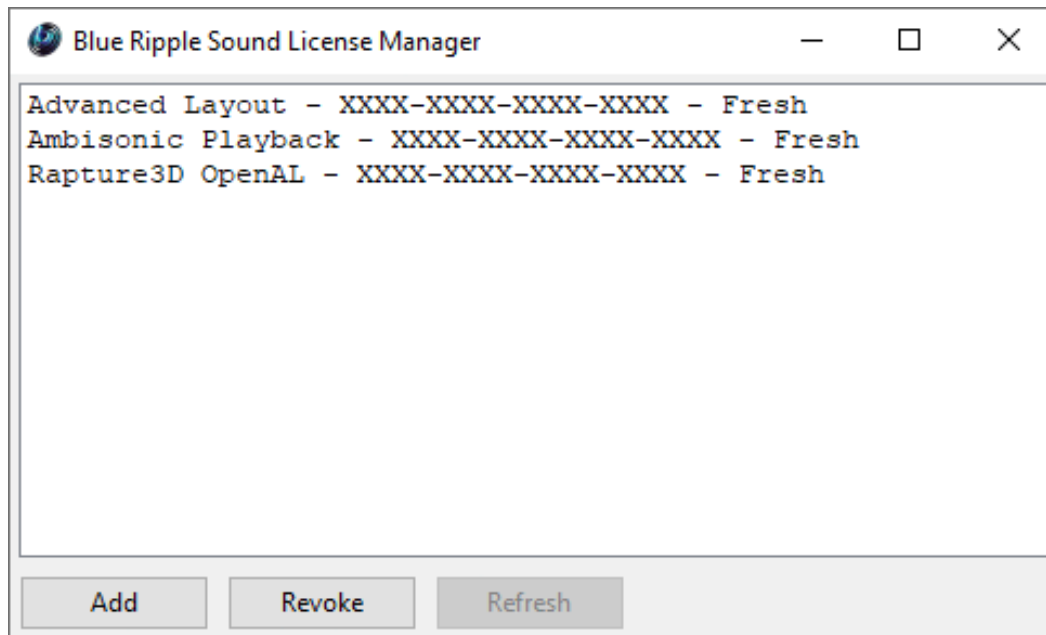
Some of the O7A plugins use internal buffering with a length of 128 samples. For smooth CPU load, you may wish to ensure your DAW buffer size is a multiple of this.

1.2 Getting Started

This documentation assumes you are familiar with Reaper or a similar DAW, and with the O7A Core library, which provides a number of essential tools for working with O7A streams. If you are not, you may wish to start with the documentation for the O7A Core.

1.3 The License Manager

The Blue Ripple Sound License Manager application can be used to move license keys around between computers.



The application is generally available in the Start Menu on Windows, and in your installation directory, which is typically:

- C:\Program Files\Blue Ripple Sound\ on Windows, and
- /Applications/Blue Ripple Sound/ on macOS.

License keys can be removed from a computer using the 'Revoke' button and added with 'Add'. If data is not 'Fresh' this probably indicates a network connectivity issue, in which case the 'Refresh' button may be used. Generally, licenses are refreshed automatically.

1.4 Low Frequency Effects (LFE)

Some formats supported by the loudspeaker upmixer plugins have one or two LFE channels (e.g. the ".1" of 5.1). In these cases, LFE Gain controls allow the LFE to be added into the omnidirectional content of the mix.

It may not be appropriate to do this. The LFE content may literally be an effect and the main channels may contain the full bandwidth content of the mix. Here, there is no need to set the LFE Gain and it can be left at -inf dB. This is the default.

However, the LFE channel may have been used to carry low frequency content (rather than effects) that would otherwise cause clipping in the main channels. Then, the LFE channel needs to be injected into the mix to avoid losing low frequency content. In some cases, a gain of +10dB may be expected here; please check with the content provider.

1.5 Technical Requirements

1.5.1 Operating System

Supported versions of Microsoft Windows are 10 or 11, 64bit Intel.

Supported versions of Apple macOS are 10.14 to 13.5, 64bit Intel or Apple Silicon.

1.5.2 VST Host

The VST plugins require a VST 2 host with shell plugin support.

These plugins do not work with all VST 2 hosts. One reason for this is that the O7A plugins need large numbers of channels on their input or output busses. Check the individual plugins for the channel counts they need, but all of the O7A plugins need at least 64 channels on each track. Also, at the time of writing VST 2 shell plugins are not supported in Nuendo or Cubase.

1.5.3 AAX Host

The AAX plugins require **Pro Tools Ultimate version 2023.6** or later.

Due to channel and stem restrictions, not all plugins are supported in AAX. Please see the plugin descriptions for details.

1.5.4 PC Hardware

Please check your PC meets the following requirements:

- Intel Core i7 CPU or better, or Apple Silicon.
- 400MB of free disk space.

1.5.5 Permissions

You'll need administrator permissions while installing on Windows. The software probably won't install properly using a "restricted" account.

1.5.6 Internet Connection Required

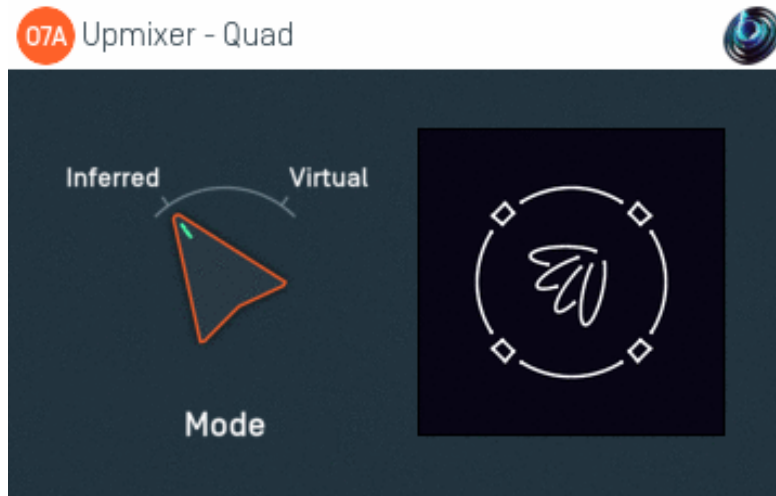
This software requires an Internet Connection for license activation and verification.

Successful license verification isn't required every time you use the software, but it is needed during installation and needs to succeed once every couple of weeks to keep the license fresh.

The license can be "revoked" to remove it from one machine so it can be moved on to another. You should also do this if you're updating your system in case the machine appears to have changed identity.

2 Loudspeaker Upmixers

2.1 O7A Upmixer - Quad



2.1.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

2.1.2 Audio

	Channels	Content
Input	4	Quad
Output	64	O7A

2.1.3 Controls

- [Mode](#)

2.1.4 Description

This plugin takes a four channel Quadraphonic (Quad) mix and converts it to seventh order ambisonics (O7A).

2.1.4.1 Channels

The channel ordering used is:

Channel	AAX/VST
1	Front Left
2	Front Right
3	Back Left
4	Back Right

2.1.5 Controls

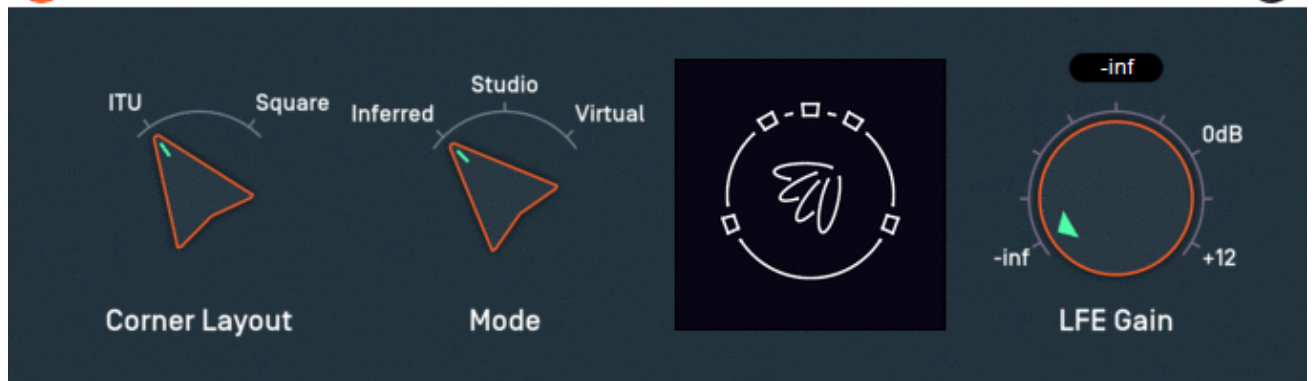
2.1.5.1 Control: Mode

Three modes are supported, "Inferred", "Studio" and "Virtual". Generally, "Inferred" or "Studio" are recommended.

Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Studio	This mode is optimised for use with material that has been mixed using 'pairwise' panning, for instance in Pro Tool's surround panner. The approach produces smooth transitions when sounds pass between speaker locations. In this mode, the corner layout is always assumed to be Square.
Virtual	This mode simply places each of the audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.2 O7A Upmixer - 5.1

O7A Upmixer - 5.1



2.2.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

2.2.2 Audio

	Channels	Content
Input	6	5.1 Surround
Output	64	O7A

2.2.3 Controls

- Corners
- Mode
- LFE Gain

2.2.4 Description

This plugin takes a surround mix prepared for a 5.1 system and converts it to seventh order ambisonics (O7A).

2.2.4.1 Channels

The channel ordering used is:

Channel	AAX	VST
1	Front Left	Front Left
2	Front Centre	Front Right
3	Front Right	Front Centre
4	Left Surround	LFE
5	Right Surround	Side Left
6	LFE	Side Right

2.2.5 Controls

2.2.5.1 Control: Corners

The corner layout lets you tell the processor how the 5.1 mix was prepared, as this can help the accuracy of the spatial imaging. ITU is the most common option.

Corner Layout	Description
ITU	In principle, the speakers of a 5.1 system should be set out using ITU angles. From front centre, this recommends front left and right speakers be at +30 or -30 degrees and side speakers be at +110 or -110 degrees. ITU layouts are common in studios and are a common way to mix 5.1.
Square	In practice, many 5.1 speaker systems are set up with the corner speakers set out in what is roughly a square and some mixes are put together on this basis. If you know that's the case, switch the corner layout to Square.

2.2.5.2 Control: Mode

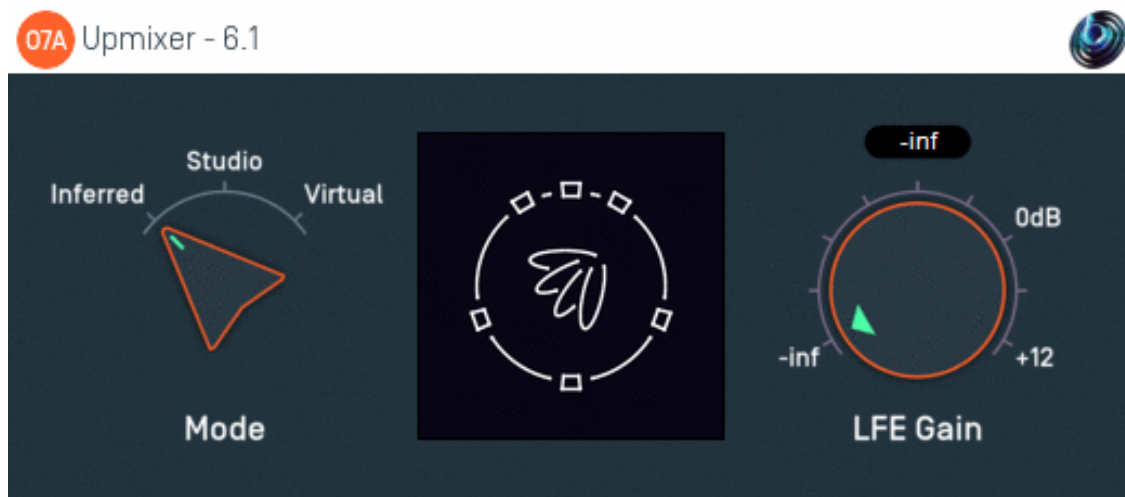
Three modes are supported, "Inferred", "Studio" and "Virtual". Generally, "Inferred" or "Studio" are recommended.

Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Studio	This mode is optimised for use with material that has been mixed using 'pairwise' panning, for instance in Pro Tool's surround panner. The approach produces smooth transitions when sounds pass between speaker locations. In this mode, the corner layout is always assumed to be Square.
Virtual	This mode simply places each of the main (non-LFE) audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.2.5.3 Control: LFE Gain

Audio from the LFE channel can be mixed into the output by setting this dial. It is added to the stream as an omnidirectional signal.

2.3 O7A Upmixer - 6.1



2.3.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

2.3.2 Audio

	Channels	Content
Input	7	6.1 Surround
Output	64	O7A

2.3.3 Controls

- Mode
- LFE Gain

2.3.4 Description

This plugin takes a surround mix prepared for a 6.1 system and converts it to seventh order ambisonics (O7A).

2.3.4.1 Channels

The channel ordering used is:

Channel	AAX	VST
1	Front Left	Front Left
2	Front Centre	Front Right
3	Front Right	Front Centre
4	Surround Left	LFE
5	Surround Centre	Side Left
6	Surround Right	Side Right
7	LFE	Back Centre

2.3.5 Controls

2.3.5.1 Control: Mode

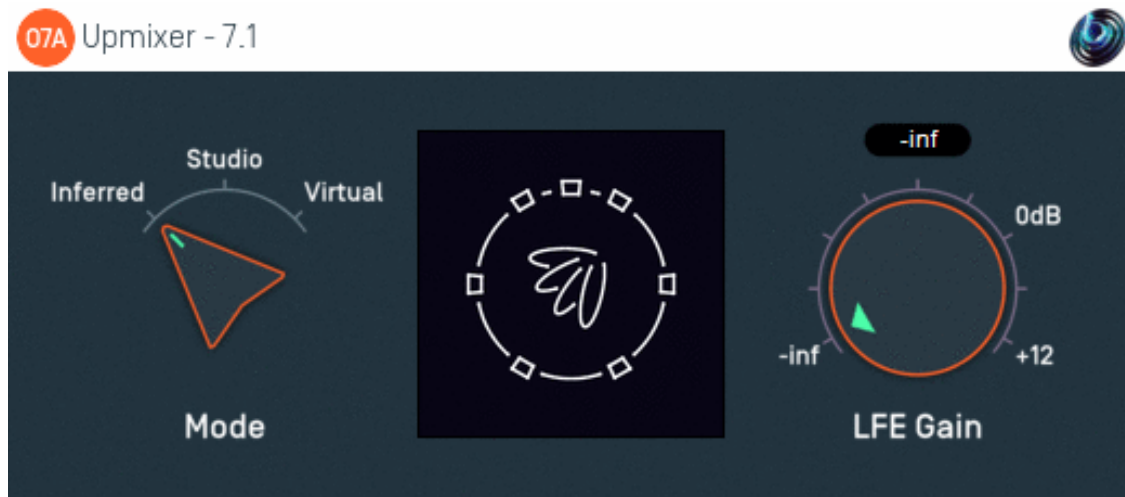
Three modes are supported, "Inferred", "Studio" and "Virtual". Generally, "Inferred" or "Studio" are recommended.

Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Studio	This mode is optimised for use with material that has been mixed using 'pairwise' panning, for instance in Pro Tool's surround panner. The approach produces smooth transitions when sounds pass between speaker locations. In this mode, the corner layout is always assumed to be Square.
Virtual	This mode simply places each of the main (non-LFE) audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.3.5.2 Control: LFE Gain

Audio from the LFE channel can be mixed into the output by setting this dial. It is added to the stream as an omnidirectional signal.

2.4 O7A Upmixer - 7.1



2.4.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

2.4.2 Audio

	Channels	Content
Input	8	7.1 Surround
Output	64	O7A

2.4.3 Controls

- Mode
- LFE Gain

2.4.4 Description

This plugin takes a surround mix prepared for a 7.1 system and converts it to seventh order ambisonics (O7A).

2.4.4.1 Channels

The channel ordering used is:

Channel	AAX	VST
1	Front Left	Front Left
2	Front Centre	Front Right
3	Front Right	Front Centre
4	Left Surround Side	LFE
5	Right Surround Side	Back Left
6	Left Surround Rear	Back Right
7	Right Surround Rear	Side Left
8	LFE	Side Right

2.4.5 Controls

2.4.5.1 Control: Mode

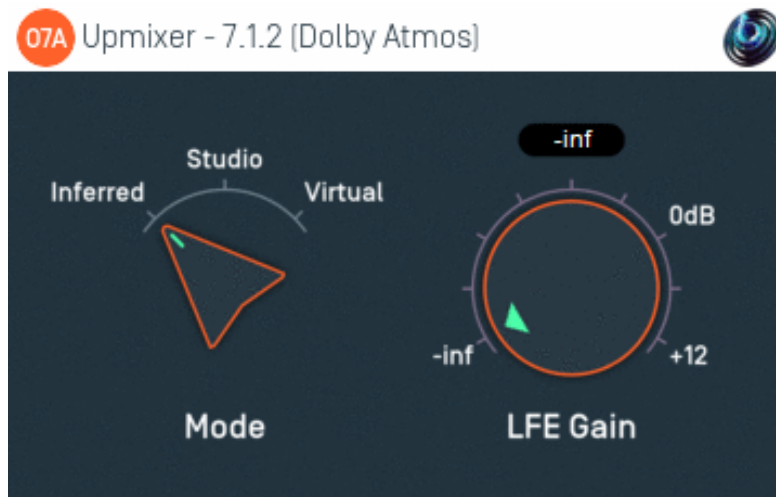
Three modes are supported, "Inferred", "Studio" and "Virtual". Generally, "Inferred" or "Studio" are recommended.

Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Studio	This mode is optimised for use with material that has been mixed using 'pairwise' panning, for instance in Pro Tool's surround panner. The approach produces smooth transitions when sounds pass between speaker locations. In this mode, the corner layout is always assumed to be Square.
Virtual	This mode simply places each of the main (non-LFE) audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.4.5.2 Control: LFE Gain

Audio from the LFE channel can be mixed into the output by setting this dial. It is added to the stream as an omnidirectional signal.

2.5 O7A Upmixer - 7.1.2 (Dolby Atmos)



2.5.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

2.5.2 Audio

	Channels	Content
Input	10	7.1.2 (Dolby Atmos)
Output	64	O7A

2.5.3 Controls

- Mode
- LFE Gain

2.5.4 Description

This plugin takes a surround mix prepared for a 7.1.2 system and converts it to seventh order ambisonics (O7A).

7.1.2 is a standard mix format for beds in Dolby Atmos. It adds two ceiling channels to standard 7.1. **Please note that this plugin does not process Dolby Atmos bitstreams directly.**

2.5.4.1 Channels

The channel ordering used is:

Channel	AAX	VST
1	Front Left	Front Left
2	Front Centre	Front Right
3	Front Right	Front Centre
4	Left Surround Side	LFE
5	Right Surround Side	Left Surround Rear
6	Left Surround Rear	Right Surround Rear
7	Right Surround Rear	Left Surround Side
8	LFE	Right Surround Side
9	Left Top Surround	Left Top Surround
10	Right Top Surround	Right Top Surround

Please note that the channel ordering used by Dolby's Atmos RMU may differ. Also, the AAX order above is used when plugins interact with ProTools through the AAX software interface; other parts of ProTools may use a different default order, for instance when exporting to file.

2.5.5 Controls

2.5.5.1 Control: Mode

Three modes are supported, "Inferred", "Studio" and "Virtual". Generally, "Inferred" or "Studio" are recommended.

Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Studio	This mode is optimised for use with material that has been mixed using 'pairwise' panning, for instance in Pro Tool's surround panner. The approach produces smooth transitions when sounds pass between speaker locations. In this mode, the corner layout is always assumed to be Square.
Virtual	This mode simply places each of the main (non-LFE) audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.5.5.2 Control: LFE Gain

Audio from the LFE channel can be mixed into the output by setting this dial. It is added to the stream as an omnidirectional signal.

2.6 O7A Upmixer - 7.1.4



2.6.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

2.6.2 Audio

	Channels	Content
Input	12	7.1.4
Output	64	O7A

2.6.3 Controls

- Mode
- LFE Gain

2.6.4 Description

This plugin takes a surround mix prepared for a 7.1.4 system and converts it to seventh order ambisonics (O7A).

7.1.4 adds four ceiling channels to standard 7.1.

2.6.4.1 Channels

The channel ordering used is:

Channel	AAX	VST
1	Front Left	Front Left
2	Front Centre	Front Right
3	Front Right	Front Centre
4	Left Surround Side	LFE
5	Right Surround Side	Left Surround Rear
6	Left Surround Rear	Right Surround Rear
7	Right Surround Rear	Left Surround Side
8	LFE	Right Surround Side
9	Left Top Front	Left Top Front
10	Right Top Front	Right Top Front
11	Left Top Rear	Left Top Rear
12	Right Top Rear	Right Top Rear

2.6.5 Controls

2.6.5.1 Control: Mode

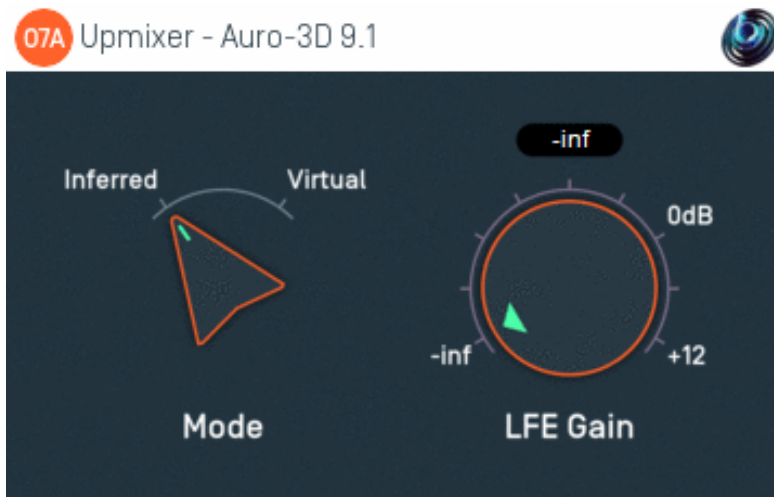
Three modes are supported, "Inferred", "Studio" and "Virtual". Generally, "Inferred" or "Studio" are recommended.

Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Studio	This mode is optimised for use with material that has been mixed using 'pairwise' panning, for instance in Pro Tool's surround panner. The approach produces smooth transitions when sounds pass between speaker locations. In this mode, the corner layout is always assumed to be Square.
Virtual	This mode simply places each of the main (non-LFE) audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.6.5.2 Control: LFE Gain

Audio from the LFE channel can be mixed into the output by setting this dial. It is added to the stream as an omnidirectional signal.

2.7 O7A Upmixer - Auro-3D 9.1, 10.1, 11.1 and 13.1



2.7.1 Host Support

2.7.1.1 O7A Upmixer - Auro-3D 9.1

Host Type	Support
AAX	Yes, input mapped to 5.1.4
VST2	Yes

2.7.1.2 O7A Upmixer - Auro-3D 10.1

Host Type	Support
AAX	Yes, input mapped to 7.0.4
VST2	Yes

2.7.1.3 O7A Upmixer - Auro-3D 11.1

Host Type	Support
AAX	Yes, input mapped to 7.1.4
VST2	Yes

2.7.1.4 O7A Upmixer - Auro-3D 13.1

Host Type	Support
AAX	Yes, input mapped to 7.1.6
VST2	Yes

2.7.2 Audio

2.7.2.1 O7A Upmixer - Auro-3D 9.1

	Channels	Content
Input	10	Auro-3D 9.1 (mapped to 5.1.4 for AAX)
Output	64	O7A

2.7.2.2 O7A Upmixer - Auro-3D 10.1

	Channels	Content
Input	11	Auro-3D 10.1 (mapped to 7.0.4 for AAX)
Output	64	O7A

2.7.2.3 O7A Upmixer - Auro-3D 11.1

	Channels	Content
Input	12	Auro-3D 11.1 (mapped to 7.1.4 for AAX)
Output	64	O7A

2.7.2.4 O7A Upmixer - Auro-3D 13.1

	Channels	Content
Input	14	Auro-3D 13.1 (mapped to 7.1.6 for AAX)
Output	64	O7A

2.7.3 Controls

- Mode
- LFE Gain

2.7.4 Description

There are four O7A Upmixer plugins for processing Auro-3D surround mixes. These correspond to each of the Auro-3D 9.1, Auro-3D 10.1, Auro-3D 11.1 and Auro-3D 13.1 speaker layouts. They convert the mixes to seventh order ambisonics (O7A).

2.7.4.1 Channels

The channel orderings used for 9.1 use the following table. AAX is mapped to the 5.1.4 speaker layout.

Channel	AAX	VST
1	Front Left	Front Left
2	Front Centre	Front Right
3	Front Right	Front Centre
4	Surround Left	LFE
5	Surround Right	Surround Left
6	LFE	Surround Right
7	Height Front Left	Height Front Left
8	Height Front Right	Height Front Right
9	Height Rear Left	Height Rear Left
10	Height Rear Right	Height Rear Right

The other Auro-3D formats are:

Auro-3D 10.1	Auro-3D 11.1	Auro-3D 13.1	Channel Name
1	1	1	Front Left
2	2	2	Front Right
3	3	3	Front Centre
4	4	4	LFE
5	5	5	Surround Left
6	6	6	Surround Right
-	-	7	Back Left
-	-	8	Back Right
7	7	9	Height Front Left
8	8	10	Height Front Right
9	9	11	Height Surround Left
10	10	12	Height Surround Right
-	11	13	Height Front Centre
11	12	14	Top Ceiling

When these formats are mapped for AAX, no attempt is made to map to channels where they correspond. The channels simply appear in the order above. The AAX stem formats actually used are 7.0.4, 7.1.4 and 7.1.6.

If you are using the recommended "Inferred" mode, make sure you are using the right plugin for your content, rather than just patching to some of the channels of 13.1. This will give better results.

2.7.5 Controls

2.7.5.1 Control: Mode

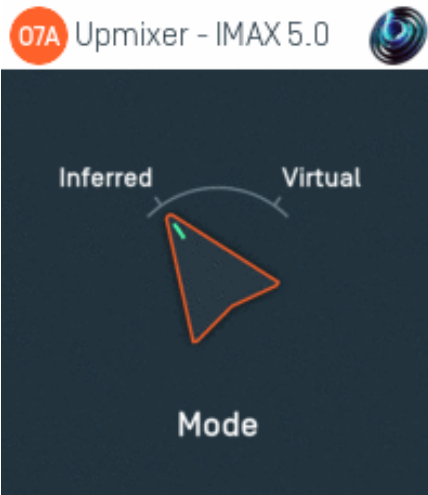
Two modes are supported, "Inferred" and "Virtual". Generally, "Inferred" is recommended.

Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Virtual	This mode simply places each of the main (non-LFE) audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.7.5.2 Control: LFE Gain

Audio from the LFE channel can be mixed into the output by setting this dial. It is added to the stream as an omnidirectional signal.

2.8 O7A Upmixer - IMAX 5.0, 6.0 and 12.0



2.8.1 Host Support

2.8.1.1 O7A Upmixer - IMAX 5.0

Host Type	Support
AAX	Yes, input mapped to standard 5.0
VST2	Yes

2.8.1.2 O7A Upmixer - IMAX 6.0

Host Type	Support
AAX	Yes, input mapped to standard 6.0
VST2	Yes

2.8.1.3 O7A Upmixer - IMAX 12.0

Host Type	Support
AAX	Yes, input mapped to 7.1.4
VST2	Yes

2.8.2 Audio

2.8.2.1 O7A Upmixer - IMAX 5.0

	Channels	Content
Input	5	IMAX 5.0 (mapped to standard 5.0 for AAX)
Output	64	O7A

2.8.2.2 O7A Upmixer - IMAX 6.0

	Channels	Content
Input	6	IMAX 6.0 (mapped to standard 6.0 for AAX)
Output	64	O7A

2.8.2.3 O7A Upmixer - IMAX 12.0

	Channels	Content
Input	12	IMAX 12.0 (mapped to 7.1.4 for AAX)
Output	64	O7A

2.8.3 Controls

- [Mode](#)

2.8.4 Description

There are three O7A Upmixer plugins for processing IMAX surround mixes. These correspond to each of the IMAX 5.0, IMAX 6.0 and IMAX 12.0 speaker layouts. They convert the mixes to seventh order ambisonics (O7A).

2.8.4.1 IMAX 5.0 Channels

The channel ordering used for IMAX 5.0 is as follows:

Channel	AAX	VST
1	Front Left	Front Left
2	Front Centre	Front Right
3	Front Right	Front Centre
4	Rear Left (mapped to Left Surround)	Rear Left
5	Rear Right (mapped to Right Surround)	Rear Right

For AAX, note that this is mapped to standard 5.0.

2.8.4.2 IMAX 6.0 Channels

Channel	AAX	VST
1	Front Left	Front Left
2	Front Centre	Front Right
3	Front Right	Front Centre
4	Rear Left (mapped to Left Surround)	Front Centre Overhead
5	Front Centre Overhead (mapped to Centre Surround)	Rear Left
6	Rear Right (mapped to Right Surround)	Rear Right

For AAX, note that this is mapped to standard 6.0, with the IMAX Front Centre Overhead channel mapped to the Centre Surround in standard 6.0 (i.e. at the back).

2.8.4.3 IMAX 12.0 Channels

Channel	VST
1	Front Left
2	Front Right
3	Front Centre
4	Front Centre Overhead
5	Rear Left
6	Rear Right
7	Side Left
8	Side Right
9	Overhead Front Left
10	Overhead Front Right
11	Overhead Rear Left
12	Overhead Rear Right

IMAX systems use speakers with wider bandwidth than typical cinema systems. No Low Frequency Effect (LFE) channel is used in the mix formats. Also note that the last two channels in IMAX 5.0 and 6.0 correspond to rear speakers, not side or surround speakers.

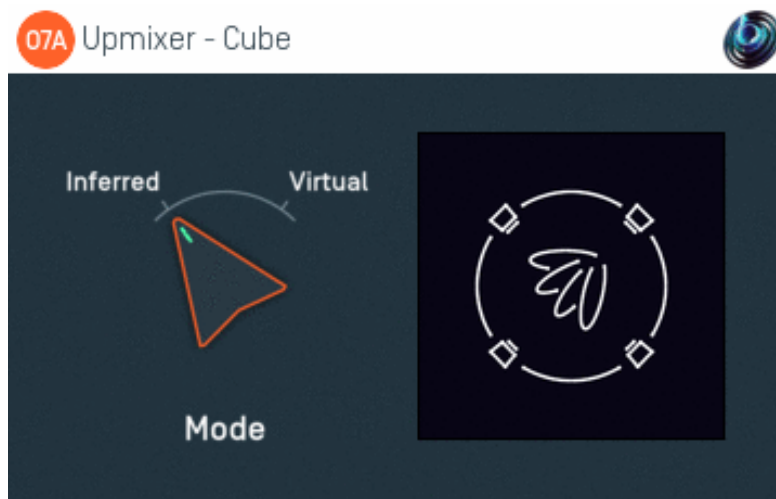
2.8.5 Controls

2.8.5.1 Control: Mode

Two modes are supported, "Inferred" and "Virtual". Generally, "Inferred" is recommended.

Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Virtual	This mode simply places each of the audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.9 O7A Upmixer - Cube



2.9.1 Host Support

Host Type	Support
AAX	Yes, input mapped to 7.1
VST2	Yes

2.9.2 Audio

	Channels	Content
Input	8	Cube (mapped to 7.1 for AAX)
Output	64	O7A

2.9.3 Controls

- [Mode](#)

2.9.4 Description

This plugin takes an eight channel mix designed to feed eight speakers set out at the corners of a cube and converts it to seventh order ambisonics (O7A).

2.9.4.1 Channels

The channel ordering used is:

Channel	AAX/VST
1	Lower Front Left
2	Lower Front Right
3	Lower Back Right
4	Lower Back Left
5	Upper Front Left
6	Upper Front Right
7	Upper Back Right
8	Upper Back Left

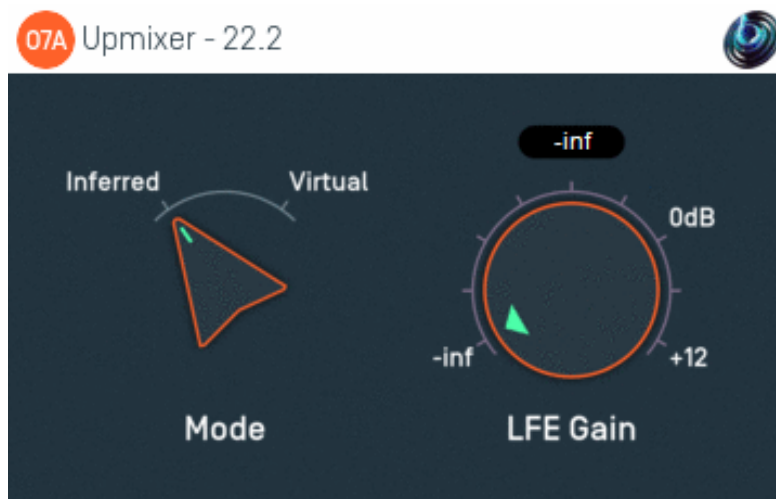
2.9.5 Controls

2.9.5.1 Control: Mode

Two modes are supported, "Inferred" and "Virtual". Generally, "Inferred" is recommended.

Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Virtual	This mode simply places each of the audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.10 O7A Upmixer - 22.2



2.10.1 Host Support

Host Type	Support
AAX	No
VST2	Yes

2.10.2 Audio

	Channels	Content
Input	24	Hamasaki 22.2
Output	64	O7A

2.10.3 Controls

- Mode
- LFE Gain

2.10.4 Description

This plugin takes a surround mix prepared for a Hamasaki 22.2 system and converts it to seventh order ambisonics (O7A).

2.10.4.1 Channels

The channel ordering used is:

Channel	VST
1	Front Left
2	Front Right
3	Front Centre
4	LFE Left
5	Back Left
6	Back Right
7	Front Left/Centre
8	Front Right/Centre
9	Back Centre
10	LFE Right
11	Side Left
12	Side Right
13	Top Front Left
14	Top Front Right
15	Top Front Centre
16	Top Centre
17	Top Back Left
18	Top Back Right
19	Top Side Left
20	Top Side Right
21	Top Back Centre
22	Bottom Front Centre
23	Bottom Front Left
24	Bottom Front Right

2.10.5 Controls

2.10.5.1 Control: Mode

Two modes are supported, "Inferred" and "Virtual". Generally, "Inferred" is recommended.

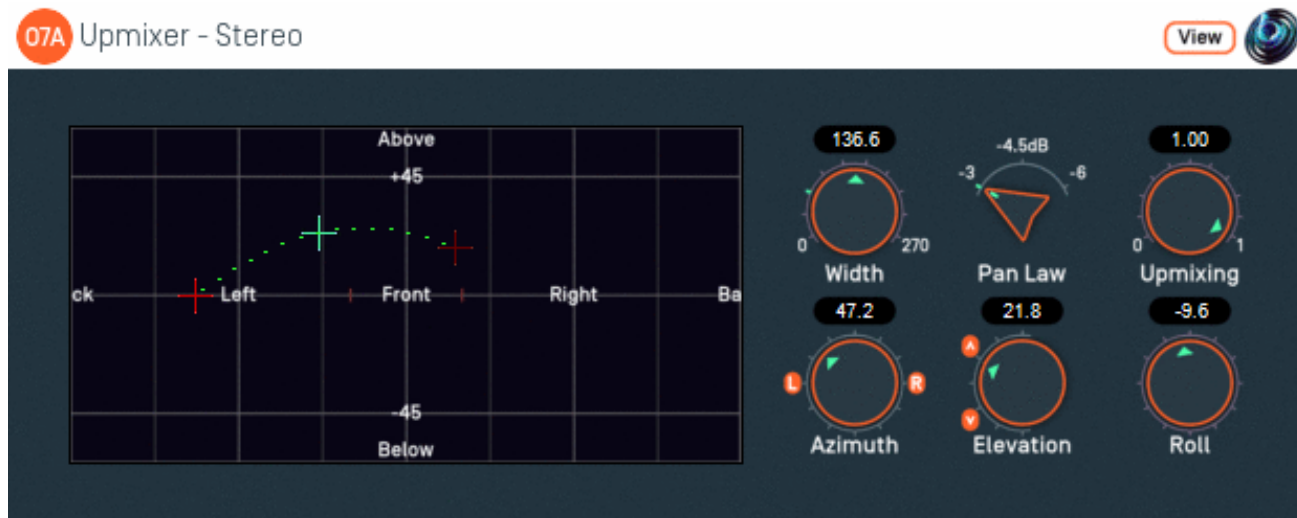
Mode	Description
Inferred	This mode is optimised for use with material that has been mixed using conventional panning techniques, such as equal-power panning or VBAP. The approach produces smooth transitions when sounds pass between speaker locations.
Virtual	This mode simply places each of the main (non-LFE) audio channels in their appropriate speaker direction. This can be worth trying when the mix has not been put together by conventional panning and the channels have a complex phase relationship.

2.10.5.2 Control: LFE Gain

Audio from the LFE channels can be mixed into the output by setting this dial. It is added to the stream as an omnidirectional signal.

3 Stereo Upmixing

3.1 O7A Upmixer - Stereo



3.1.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

3.1.2 Audio

	Channels	Content
Input	2	Stereo
Output	64	O7A

3.1.3 Controls

- Width
- Pan Law
- Upmixing
- Azimuth
- Elevation
- Roll

3.1.4 Description

This plugin takes a stereo stream and converts it to seventh order ambisonics (O7A), spreading it out dynamically over a region of the O7A soundfield set out in two opposite directions from a central point.

In other words, it paints the stereo image along a left-to-right "line" that can be moved around freely.

The centre and "left" directions can be set using the control surface, where the directions are indicated by crosshairs. The "right" direction moves accordingly.

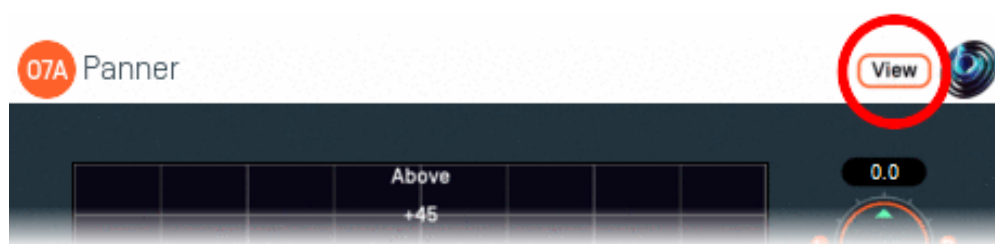
There are labels on the control surface to help you find left, right, above etc. However, if this still does not make any sense, you might want to see our page on the O7A Visualiser which lays out its viewing region in the same way.

This plugin places stereo material in a very definite spatial location or region. If you would like a more spatially spread result, another option is the [O7A Stereo Ambience](#) plugin. This is particularly relevant when placing "non-diegetic" material such as music into an ambisonic mix.

3.1.5 View Support

When used with O7A View Sync from the O7A View library, this plugin can be connected to the separate View or ViewVR applications.

When this option is available, a 'View' button appears at the top right of the plugin's user interface.



When this is pressed, the plugin is connected to the View or ViewVR application and is displayed there.

View Support	ViewVR Support
<p>The current centre and left side directions are shown using green/blue and red crosses, similarly to the plugin display. A dotted line connects the left and right extent of the stereo image.</p> <p>Point at the centre or left side cross and hold the left mouse button to select it. Then, drag to set its azimuth and elevation.</p>	<p>The current centre and left side directions are shown using green/blue and red beams and crosses, similarly to the plugin display. A dotted line connects the left and right extent of the stereo image.</p> <p>Each VR controller moves one of the centre and left side directions and the controllers show short green/blue and red beams to indicate which is which. Hold a VR controller trigger to set an azimuth and elevation.</p>

3.1.6 Controls

3.1.6.1 Control: Width

When converting the stereo to O7A, this angle tells the processor how far apart the stereo speakers are understood to be. 60 degrees is the default and corresponds to standard stereo speaker placement. Angles from 0 to 270 degrees are available.

Increasing this angle has the effect of widening the stereo image.

Note that small angles effectively result in the input being summed to some extent and so will work less well with material not optimised for mono downmixing (e.g. panned using a -3dB pan law). You may also encounter a bass boost with wide angles because of the effective increase in source size. Best results will typically be achieved with angles between 30 and 90 degrees or so.

3.1.6.2 Control: Pan Law

Ideally, this should be set to be the same as the pan law used when the stereo mix was made. Normally this is -3dB for modern stereo mixes and -6dB for early stereo mixes intended to be mono-compatible. -4.5dB is midway in between.

In practice, this can normally be set to -3dB. If you then find that central sounds (typically vocals) are too quiet then set this to -4.5dB or -6dB.

3.1.6.3 Control: Upmixing

The underlying stereo upmixing algorithm is optimised for use with material that has been mixed using conventional panning techniques. It is not necessarily well-suited for other mixes.

This control determines how much of the output signal is provided by this upmixing algorithm. The rest of the output is provided by simply panning the left and right channels to the "hard" left and right of the region of space used for output.

With this control set to zero, this plugin is not unlike the O7A Panner - Two Channel plugin.

3.1.6.4 Controls: Azimuth and Elevation

Azimuth and Elevation control where the centre of the stereo image will be placed in the 3D audio scene.

Azimuth is the horizontal angle, between -180 to +180 degrees, measured anticlockwise (left) from the front. Elevation is a vertical angle between -90 and +90 degrees, measured with positive upwards and 0 on the horizontal.

For instance, the direction for azimuth +90 and elevation +45 can be found by turning 90 degrees to the left and then looking up by 45 degrees.

Effectively, this allows the upmixed stereo image to be moved around.

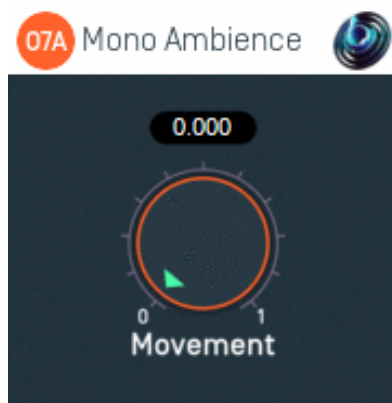
3.1.6.5 Control: Roll

The output of the upmixer is centred around the point given by the azimuth and elevation controls and with a width given by the width control. The roll control sets the *angle* of the output and can be used to rotate the stereo as a "line" around the centre point.

This control has an angle between -180 and +180 degrees. Increasing the value rotates the stereo image clockwise. A value of zero presents the stereo with the left to the left and the right to the right (from a vertical perspective).

4 Ambience Plugins

4.1 O7A Mono Ambience



4.1.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

4.1.2 Audio

	Channels	Content
Input	1	Mono
Output	64	O7A

4.1.3 Controls

- [Movement](#)

4.1.4 Description

This plugin takes a mono stream and converts it to seventh order ambisonics (O7A). The sound is spread in different directions using a method which depends on frequency. This can produce an ambient O7A scene with sounds appearing to come from all directions.

Optionally, the sound components can be made to move in pseudo-random patterns. In general, we recommend movement only be used sparingly; it can be unsettling.

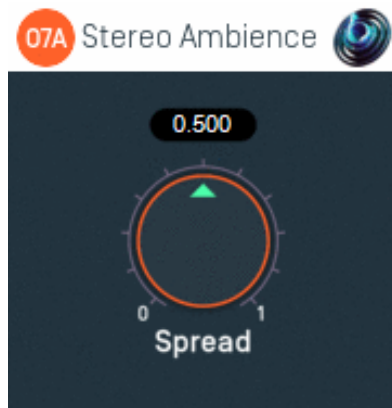
Be careful with this plugin. Because it spreads frequency content spatially, subsequent spatial manipulations can result in strong filtering effects.

4.1.5 Controls

4.1.5.1 Control: Movement

The movement control has a range from zero to one. A value of zero indicates no movement and the maximum value indicates maximum movement. The default is zero.

4.2 O7A Stereo Ambience



4.2.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

4.2.2 Audio

	Channels	Content
Input	2	Stereo
Output	64	O7A

4.2.3 Controls

- Spread

4.2.4 Description

This plugin takes a stereo stream and converts it to seventh order ambisonics (O7A). The stereo is spread over a range of directions using a method which depends on frequency. This can produce an ambient O7A scene with sounds appearing to come from all directions.

This is a rather different approach to the one taken by the [O7A Upmixer - Stereo](#), which attempts to recreate the original stereo directivity.

Be careful with this plugin. Because it spreads frequency content spatially, subsequent spatial manipulations can result in strong filtering effects.

4.2.5 Controls

4.2.5.1 Control: Spread

When the spread is set to 0.0, the left channel is presented as if panned directly to the left (i.e. with an azimuth of +90 degrees) and the right channel directly opposite it, to the right.

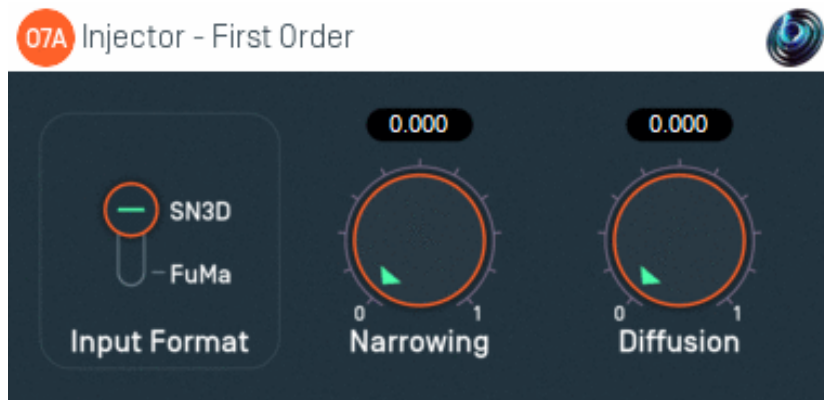
Increasing the spread value causes sound to spread away from these directions. For each frequency, contributions from the left and right channels remain opposite.

When the spread is 0.5 (the default), sounds appear to come from all directions, but all frequencies from the left channel are still presented on the left and all frequencies from the right on the right.

Increasing the spread value above 0.5 causes overlap between the regions used by the left and right channels. When the spread reaches 1.0, both the left and right channels are distributed over the whole sphere.

5 Other Formats

5.1 O7A Injector - First Order



5.1.1 Host Support

Host Type	Support
AAX	Yes
VST2	Yes

5.1.2 Audio

	Channels	Content
Input	4	First order B-Format ambisonics (SN3D/ACN O1A or FuMa, switchable)
Output	64	O7A

5.1.3 Controls

- [Narrowing](#)
- [Diffusion](#)
- [Format](#)

5.1.4 Description

This plugin is designed to make subtle modifications to four channel first order B-Format while injecting it into an O7A mix. It is intended for use particularly with recordings from first order B-Format microphones.

In general when we refer to B-Format we are referring to 64 channel seventh order ambisonic (O7A) B-Format, but this plugin is an exception. The first order ambisonic B-Format we are talking about here is less detailed and only uses four channels. The plugin supports two first order input formats, SN3D and FuMa. Please check which you have and set the switch accordingly.

The plugin does *not* perform conversion from A-Format to B-Format. If your microphone produces ambisonic A-Format, you will need to use software specific to your microphone to convert to B-Format before using this plugin.

After any input format conversion, the plugin has two independent processing stages:

1. Narrowing
2. Diffusion

For some material, neither stage is needed as four channel B-Format (in the SN3D/ACN format) maps naturally onto the first order components of the O7A stream. So, it is often fine not to use this plugin at all when injecting first order material into an O7A stream, or to use this plugin with both dials set to zero.

However, there is typically spatial detail missing in the first order material when it is used in a seventh order context and this missing detail has a subtle effect on how the material sounds, particularly when compared with seventh order material. Sounds are likely to differ in both "sharpness" and "envelopment". Also, first order material injected directly into a seventh order stream can sometimes introduce an audible antiphase "ghost" image in the direction opposite the original sound source, which can cause a blurred effect.

Both stages of this plugin can actually be achieved with other plugins (the O7A Order Amplifier and O7A Diffuser from the O7A Manipulators plugin library). This plugin is organised for convenience when working with four channel first order B-Format material.

It is worth noting that the O7A Harpex plugin can be used in place of this one. This uses an active algorithm which estimates original sound directions and uses these to synthesise seventh order material. For much material, this can produce far sharper imaging.

5.1.5 Controls

5.1.5.1 Control: Narrowing

Narrowing *reduces* the amount of spatial information that is used (it applies a gain reduction to the X and Y channels).

This can be useful to remove antiphase images in the opposite direction of sound sources, which are typically heard as a kind of blurring. These are often visible in the O7A Visualiser.

The narrowing control determines how much narrowing is applied. A value of zero leaves the stream unaffected and increasing it results in a less spatially detailed, but hopefully less blurred mix.

5.1.5.2 Control: Diffusion

The diffusion value controls a set of all-pass filters which are used to smudge the mix gently. This softens transients slightly.

Different all-pass filters are used in different directions, which disrupts an unnatural envelopment or "in-the-head" effect which can sometimes occur.

A zero value for this control leaves the stream unaffected. Higher values change the sense of envelopment, allowing the stream to become more spatially diffuse without changing sound directions.

5.1.5.3 Control: Format

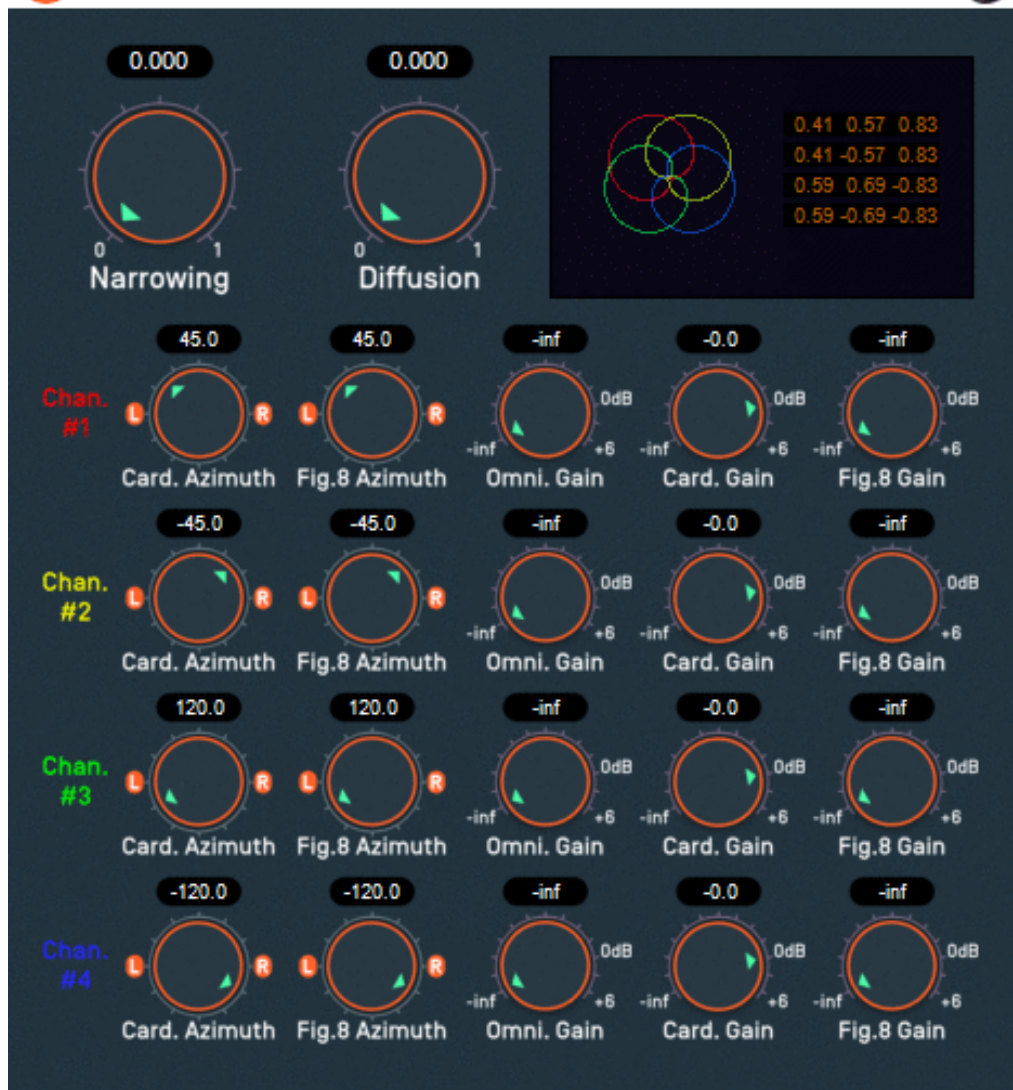
The input format describes the first order ambisonics that is being fed into this plugin. Setting this incorrectly will give bad results. The options are:

- "SN3D" (in the ACN channel ordering) is the format used by the O1A, O3A and O7A plugins. It is used by some recent first order microphones and is sometimes known as "AmbiX".

- First order "FuMa" is the same as classic WXYZ B-Format, which dates back to the 1970's. It was used in versions of these plugins prior to version 2.0 and some hardware and software uses it, including a number of 3D microphones. FuMa is only defined up to third order.

5.2 O7A Upmixer - Coincident Microphone

O7A Upmixer - Coincident Microphone



5.2.1 Host Support

Host Type	Support
AAX	Yes, input mapped to quad
VST2	Yes

5.2.2 Audio

	Channels	Content
Input	4	Microphone Channels (mapped to quad for AAX)
Output	64	O7A

5.2.3 Controls

- Narrowing
- Diffusion
- Card. Azimuth 1 - 4
- Fig.8 Azimuth 1 - 4

- [Omni. Gain 1 - 4](#)
- [Card. Gain 1 - 4](#)
- [Fig.8 Gain 1 - 4](#)

5.2.4 Description

This plugin is designed for use with recordings made with planar coincident surround microphones with more than two capsules. Examples include the Zoom H2 and Double M/S systems. The plugin uses a description of the spatial responses of the microphone capsules to convert the recordings to O7A. It takes advantage of a mathematical relationship between standard capsule responses and first order ambisonics.

Note that microphone capsules typically do not achieve their ideal responses and that errors vary between microphone capsules, even within the same microphone. These issues tend to be more significant with less expensive microphones and will reduce the quality of the resulting [O7A stream](#). Unfortunately, this plugin cannot compensate for these issues!

The spatial response for three or four channels is built up from simple omnidirectional, cardioid and figure-of-eight responses, which are shown in a display panel. The plugin relies on the microphone capsules being effectively coincident (i.e. within millimetres of each other).

The plugin does not work with stereo microphones; you may wish to use the [O7A Upmixer - Stereo](#) plugin for this instead.

This plugin also is not designed to work with A-Format or B-Format ambisonic microphones (although these are also effectively coincident). A-Format microphones should come with software to convert their output to B-Format; this should be used. First order SN3D B-Format can be mixed directly into the O7A stream or processed with the O7A Harpex Upsampler, or the [O7A First Order Injector](#) which has the same narrowing and diffusion controls as are present here. We recommend the use of ambisonic microphones, as these pick up height information, producing a 3D soundfield rather than a 2D one.

This plugin needs to be used with care or it will produce strange results. **The channel spatial responses should describe the microphone(s), *not* how you would like to place sounds into the O7A scene.** Forgetting this can cause much confusion! We normally recommend you set the channel spatial responses carefully for your microphone and then save them somewhere safe so you only ever need to do this once. Then, when you use the plugin, provide all channels of the microphone recording directly to the plugin in the expected order, without changing the channel levels.

The plugin also includes some additional processing stages to help get the best out of your recordings. There are three stages in total:

1. First Order Matrixing
2. Narrowing
3. Diffusion

First, the plugin tries to find an optimal matrix derived from the channel spatial responses. This converts the input (the microphone recording) into first order horizontal-only B-Format. The matrix is shown in the display panel at the top right of the screen. The output of this stage is the first, second and fourth channel an [O7A stream](#).

If the plugin cannot find an optimal matrix, for instance because there are fewer than three active microphone channels, or the microphone array is badly conditioned mathematically (e.g. because all capsules are facing forwards), then the matrix will not be shown and the output of the plugin will be silent.

After this, the first order B-Format can be processed with narrowing and diffusion stages in the same way as in the [O7A First Order Injector](#) plugin.

You can extract other polar patterns from the resulting O7A mix with the O7A Virtual Microphone plugin or use other O7A tools.

5.2.4.1 Setting the Microphone Up

To use this plugin, first set up the microphone responses in a way that matches the microphone you are using. This can be time-consuming, so save your settings once they are right so you can use them in the future. There are some presets available.

If the microphone channels correspond directly to simple capsule responses (omnidirectional, cardioid or figure-of-eight), you can simply set the gain for that response to 0dB and the others to -inf (off) and then point each response in the correct direction for its capsule.

For instance, the Zoom H2 in surround mode has four outputs corresponding to four cardioid response capsules, so this can be set up by setting all cardioid gains to 0dB and all other gains to -inf. The capsules can then be steered to the correct azimuths (+45, -45, +120, -120) using the cardioid azimuth controls. Other microphones with simple capsule responses such as hypercardioid or subcardioid can be modelled by mixing simple responses together (omni and figure-of-eight are usually easiest).

The Double M/S (or "Double Mid/Side" technique) typically uses a front-facing cardioid channel, a side-facing figure-of-eight channel and a rear-facing cardioid channel. A preset is available for this, but be careful about the actual capsules in use. Specifically, depending on the actual capsules you have chosen it may be necessary to change the channel cardioid responses slightly (for instance by mixing in some omni to produce a subcardioid response) and the relative channel levels may need tweaking.

Try to model your microphone(s) accurately. You might be tempted to tweak the channel responses to manipulate the results of this plugin, but you probably will not get what you expect because the plugin will compensate for your tweaks in ways which may not be intuitive. The channel spatial response parameters are intended to describe the actual microphone response, not what you wished it had been! If you want to modify the spatial balance of the mix, you are probably better off using plugins from the O7A Manipulators plugin library.

5.2.4.2 Tweaking Actual Recordings

After setting up the microphone accurately, listen to the results and tweak the narrowing and/or diffusion parameters if needed. Alternatively, the O7A Harpex Upsampler plugin can be used to sharpen the spatial image if it is available, in which case the narrowing and diffusion parameters should usually be left at zero.

We do not recommend making changes to the level of the individual channels of the recording before processing as the plugin relies on them being at the expected relative levels. Similarly, all channels need to be present or strange results will ensue!

After processing with this plugin you can apply O7A tools to the results, including surround decoders, for instance for 5.1. You can also extract other microphone responses using the O7A Virtual Microphone.

5.2.5 Controls

5.2.5.1 Control: Narrowing

This is the same as the narrowing control of the [O7A First Order Injector](#) plugin.

Narrowing *reduces* the amount of spatial information that is used (it applies a gain reduction to the X and Y channels).

This can be useful to remove antiphase images in the opposite direction of sound sources, which are typically heard as a kind of blurring. These are often visible in the O7A Visualiser.

The narrowing control determines how much narrowing is applied. A value of zero leaves the stream unaffected and increasing it results in a less spatially detailed, but hopefully less blurred mix.

5.2.5.2 Control: Diffusion

This is the same as the diffusion control of the [O7A First Order Injector](#) plugin.

The diffusion value controls a set of all-pass filters which are used to smudge the mix gently. This softens transients slightly.

Different all-pass filters are used in different directions, which disrupts an unnatural envelopment or "in-the-head" effect which can sometimes occur.

A zero value for this control leaves the stream unaffected. Higher values change the sense of envelopment, allowing the stream to become more spatially diffuse without changing sound directions.

5.2.5.3 Controls: Card. Azimuth 1 - 4

Four of these controls are present, one for each channel. Each indicates the azimuth (in degrees) of a contributing cardioid capsule response for the channel.

5.2.5.4 Controls: Fig.8 Azimuth 1 - 4

Four of these controls are present, one for each channel. Each indicates the azimuth (in degrees) of a contributing figure-of-eight capsule response for the channel.

5.2.5.5 Controls: Omni. Gain 1 - 4

Four of these controls are present, one for each channel. Each indicates the level of a contributing omnidirectional capsule response for the channel.

The gain range is from -30dB to +6dB.

5.2.5.6 Controls: Card. Gain 1 - 4

Four of these controls are present, one for each channel. Each indicates the level of a contributing cardioid capsule response for the channel.

Note that subcardioid and hypercardioid responses can be modelled using combinations of contributions of different capsule types (typically omni and figure-of-eight).

The gain range is from -30dB to +6dB.

5.2.5.7 Controls: Fig.8 Gain 1 - 4

Four of these controls are present, one for each channel. Each indicates the level of a contributing figure-of-eight capsule response for the channel.

Note that the polarity of a figure-of-eight response can be flipped by changing its azimuth by 180 degrees.

The gain range is from -30dB to +6dB.

5.2.6 Presets

Presets are available for this plugin:

- Double M/S
- Milab SRND360 (CF/LR/RR)
- Zoom H2

5.3 O7A Injector - N3D

 O7A Injector - N3D



N3D 7 -> O7A [SN3D, AmbiX]

5.3.1 Host Support

Host Type	Support
AAX	Yes, input mapped to standard SN3D ambisonics
VST2	Yes

5.3.2 Audio

	Channels	Content
Input	64	N3D/ACN Ambisonic Audio (mapped to standard SN3D ambisonics for AAX)
Output	64	O7A

5.3.3 Description

This plugin imports a seventh order ambisonic mix prepared in other tools using the "N3D" convention. N3D is a close relative to SN3D, which is used natively by these plugins. The "ACN" channel ordering convention is typically used in both cases, and is expected by this plugin.

The conversion uses level changes only. You may want to use the O7A Visualiser to check that the results make sense.

N3D is used in MPEG-H 3D Audio.

5.3.3.1 Warning

Please be aware that N3D and SN3D are similar to each other, but not the same. Be **very** careful to convert where necessary as it may not be immediately obvious if mistakes are made. **Do not guess!** If you get this wrong it is likely to result in level, blurring or sharpening errors which may not be immediately obvious on simple decoders.

5.3.3.2 Other Conventions

Note that other plugins are available to convert to and from ambisonics using the FuMa convention. See O7A Decoder - FuMa and O7A Injector - FuMa.

5.3.3.3 Orders

This plugin expects seventh order N3D input. If you have lower order material (with a lower channel count), feed this to the first input channels and feed silence to the rest.

Alternatively, the O7A Injector - O1A, O2A or O3A plugins can be "misused" to increase the order of the N3D material as this is a rare case where a plugin will work correctly for both SN3D and N3D.

6 Appendix: O7A Streams

6.1 What is an O7A Stream?

A seventh order ambisonic (O7A) stream is made up of 64 individual channels of audio which together represent a 3D soundfield. Into this "audio scene" can be placed individual sound sources, reverberation and complex spatial textures.

These 64 channels can be quite confusing to understand conceptually. For instance, they do not relate to particular speaker directions, or to individual sound sources in the soundfield. You do *not* need to understand them to use them! But, it doesn't hurt to know the basics.

Each channel adds spatial detail to a sound scene. With just the first channel, you have a basically omnidirectional (mono) sound image. The second channel adds some basic detail left/right, the third up/down and the fourth front/back; these four channels make up first order ambisonics. The first and second channels together provide essentially the spatial detail available with the Mid/Side (M/S) stereo recording technique, which captures a sound image with left/right width. But with the further two channels the detail is available in all directions, not just left/right.

That covers the first 4 channels. The other 60 add further detail to make the image sharper. If you are interested in what exactly is in these channels (which is not so easy to describe) you may want to read up on Higher Order Ambisonics (HOA) and the mathematics of the Spherical Wave Equation and Spherical Harmonics. But you should *not* need to read up to *use* the techniques described here. If you want to make sense of what is going on spatially in an O7A stream, we find that it is normally best to use an O7A Visualiser or O7A Flare plugin.

6.2 What processing can I apply to an O7A stream?

As well as processing designed specifically for O7A streams, it is possible to mix streams together in the expected way. It is also possible to run conventional mono DSP algorithms on them directly by applying the algorithm to all 64 channels individually, subject to some rules. Failing to follow these rules is likely to shred the spatial imaging, so be careful! Specifically:

- If you process an O7A stream with a conventional mono DSP algorithm you *must apply the same processing to all 64 channels identically*.
- Only *linear* processing can be used (e.g. not distortion or compression). Also, be aware that time-variant processing can cause issues.

If you are working in Reaper, current versions do not make it particularly easy to set up this sort of processing, but it is possible if you are prepared to use some advanced features and do some rather tedious set-up. For instance, you can save an "FX Chain" in which a number of equalization plugins are "routed" correctly and in which controls are linked by "parameter modulation" so that one set of controls operates the others. Once the FX Chain is saved, you can load it into other projects.

6.3 Encoding

There are a number of ways in which the channels can be defined in HOA. To a large extent it does not matter which is chosen, as long as *everything uses the same convention*. This is critical and horrible things will happen to the spatial image if this is not the case. However, if you follow the convention, or convert explicitly where you need to, you will be able to pass audio around between different software packages.

These plugins use the "SN3D" ambisonic convention. As is usually the case, we order the channels using "ACN" ordering.

This encoding is used in the "AmbiX" file format and YouTube. It is supported directly by Rapture3D Universal.

6.4 How does O7A SN3D relate to FuMa and Classic Ambisonics?

The ambisonic format used (SN3D) is not directly compatible with classic 1970s four channel "WXYZ" B-Format, or the extension (FuMa) which was used by versions of these plugins prior to version 2.0.

However, conversion is straightforward. The O7A Core pack includes plugins to do this: O7A Decoder - FuMa and O7A Injector - FuMa.