# Kyma (fixed-audio) → Reaper

#### Working within Kyma

Create audio files within Kyma

Prepare for import into Reaper

- Apply no pre-set panning, elevation, or reverb within Sounds
- Apply <u>no</u> automation of panning, elevation, or reverb within Timeline
- All Sounds positioned Center-Front
- In TimeLine, assign tracks to specific output channels (1-8)



• Record multichannel output (e.g., Audio1.wav, Audio2.wav, etc.)

2

# Start with Reaper Template(s)



- 3\_Template o3.RPP = Third-Order Ambisonic work file
- 5\_Template o3.RPP = Fifth-Order Ambisonic work file
- 7\_Template o3.RPP = Seventh-Order Ambisonic work file

Ambisonics Orders:

•	1 <sup>st</sup> Order (o1)	4 audio channels
•	2 <sup>nd</sup> Order (o2)	9 channels
•	3 <sup>rd</sup> Order (o3)	16 channels
•	4 <sup>th</sup> Order (o4)	25 channels
•	5 <sup>th</sup> Order (o5)	36 channels
•	6 <sup>th</sup> Order (06)	49 channels
•	7 <sup>th</sup> Order (o7)	64 channels

## Import Audio

Place audio files (from Kyma) into same computer folder as Reaper session Open Reaper template; rename for current project Select designated audio track Import audio track into Reaper (→ Insert / Media file)



## Ambisonic Mixing

Use Ambisonic Bus & Headphones Bus

MUTE Loudspeakers Bus (retain in overall routing scheme)

FX plugins added to audio tracks in top frame of TimeLine (where audio tracks are inserted), <u>not</u> in lower frame (Mixer).



Routing assignments in Mixer section (see "Reaper Routing Setup" document):

- Make sure Ambisonic Bus, Headphones Bus, Loudspeakers Bus, and all imported Audio Tracks have the correct number of tracks/channels selected for the desired Ambisonic Order.
- Make sure that "Master send channels from/to" is De-selected in the <u>Ambisonic Bus</u> and <u>Loudspeakers Bus</u> routing (Route colored square with diagonal slashes).

FX plugins: click on green "FX" button to view current active plugins. FX plugin assignments (screenshots follow on next page):

- Headphones
   Binaural Decoder (IEM)
- Ambisonic Bus
   Energy Visualizer (IEM)
- Each Audio track Stereo Encoder (IEM) & FdnReverb (IEM)

#### Headphones $\rightarrow$ Binaural Decoder

∑ ⊂⊃ ⅲ 🍰 ⅲ ⊃ 🔒 🚿	•••	FX: Track 1 "Headphones"
	VST: BinauralDecoder (IEM) (64ch)	
1 • O Headphones O M S FX 0		Program 1 🗘 + Param 16/64 in+out UI 🕠 🗸
2 🖸 🙆 Loudspeakers 🌔 M S FX 🕴 🕅		
Ambisonic Bus		🖽 SN3D 🕇 Binaural Decoder
4 • 🙆 Audio 1		
🗿 ပံ Azimuth Angle / StereoEncoder		Headphone Equalization OFF 🗸 🗸
45.00 * 🔨 🗭 💌	Add Remove	
O & Elevation Angle / StereoEncoder	0.24%/0.25% 0/0 spls	İ≘∏ ⊙⊙osc v0.6.5

## Ambisonic Bus $\rightarrow$ Energy Visualizer



#### Audio Tracks → Stereo Encoder



#### Audio Tracks → Reverb



\* \*\* \*\*\* \*\*\*\*\* \*\*\*\*\*\*

Make sure that each Audio track is sending to the Ambisonic Bus, and that the Ambisonic Bus is sending to the Headphones Bus.

(NOTE: each Template should be OK for all of the routing described above.)

#### **Automation**

Import Audio tracks (e.g., from <u>Kyma</u>, Audacity, ProTools, etc.) Audio file notes:

- Prepare audio files with NO pre-set panning, elevation, or reverb.
- ADD all automation (panning, elevation, and reverb) within Reaper.

Open Automation window for a given audio track using the (See next page for larger Mixer view.)



button in the Mixer.

#### Mixer: Automation select button

center	MONO	Input 1	Input 1	Input 1	Input 1	Input 1
о.ооdв -inf -inf 12 12	M S	-inf M		-inf M	-inf M	-inf M
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	FX					
$ \begin{array}{rcrcrcr} 12 & -24^{-} & -12 \\ 18 & -30^{-} & -18 \\ 24 & -36^{-} & -24 \\ 26 & -42^{-} & 26 \\ \end{array} $	TRIM	FX C	EX U	FX C		
30- <sup></sup> -30 36- <sup>-48-</sup> -36 42- <sup>-54-</sup> -42	i	디 🧿 Ø Headphones	디 🧿 Ø Loudspeakers	Ambisonic Bus	Audio 1	Audio 2
RMS -inf MASTER		1	2	<b>N</b> 3		

Scroll down to desired FX and its parameters. For example, StereoEncoder  $\rightarrow$  both Azimuth Angle and Elevation Angle are active (dots on Active, Visible, & Arm)

<b>•</b> • •		Track 4: A	udio 1 - E	Invelope	S			
Show all active	Hide all	Arm all visible	Disarm a	I				
Automation mod	e: Trim/Read		\$					
Filter:		All envelopes	_	٥				
Name		^	Active	Visible	Arm	Touch	Learn	M
Folder "An	nbisonic Bus"	Send Volume						
Folder "An	nbisonic Bus"	Send Pan						
Folder "An	nbisonic Bus"	Send Mute						
VST: Stere	oEncoder (IEN	/l) (64ch)						
Ambisonic	s Order							
Normalizat	tion							
Quaternio	ר W							
Quaternio	ו X							
Quaternio	۱Y							
Quaternio	۱Z							
Azimuth A	ngle		•		•			
Elevation A	Angle		•		•			
Roll Angle								
Stereo Wid	dth							

	Track 4: A	udio 1 -	Envelope	S			
Show all active Hide all	Arm all visible	Disarm a	all				
Automation mode: Trim/Read		\$					
Filter:	All envelopes	_	¢				
Name	^	Active	Visible	Arm	Touch	Learn	M
руразэ							
Wet							
Delta							
VST: FdnReverb (IEM) (64	lch)						
Room Size							
Reverberation Time							
Lows Cutoff Frequency							
Lows Q Factor							
Lows Gain							
Highs Cutoff Frequency							
Highs Q Factor							
Highs Gain							
Dry/Wet		•	•				
Fade-in Time							

# FX parameter: FdnReverb $\rightarrow$ Dry/Wet is active (dots on Active, Visible, & Arm)

ADD graphic automation to each audio track.

Automation parameters appear directly below each audio file.

Automation graphic windows' height can be expanded (and later compressed) for easier access. Grab the line below each automation parameter and drag down (expand) or up (compress) as needed.



To INSERT new data point: SHIFT - CLICK. Mouse move data point left-right and up-down.

2-D surround sound panning via Azimuth degrees (0° is Center Front; 180° is Center Rear).





NOTE: To pan through ±180°, insert immediate shift from +180° to -180° (or vice versa).

3-D elevation panning via elevation degrees ( $0^\circ$  = floor level;  $90^\circ$  = straight up zenith).

StereoEncoder (on each audio track) graphically shows 3-D sound placement.



EnergyVisualizer (on Ambisonic Bus) graphically shows full mix's energy levels in 3-D global space:



Final notes:

- You can monitor your spatialization mix via headphones, as the BinauralDecoder FX on the Headphones Bus creates a live binaural mix.
- You can add other FX parameters for automation, if you wish. (E.G., A basic amplitude control could be added in order to adjust track volumes within Reaper.)

\* \*\* \*\*\* \*\*\*\*\* \*\*\*\*\*\*

## Rendering (File / Render)

Ambisonic mix (single audio file, multi-wave)

- <u>Select Ambisonics Bus track</u> in TimeLine (only track selected)
- Select Render (File menu)

	Rende	er to File							
Source: Sel	ected tracks (stems)	ounds: Entire project	Presets						
Time bour									
Start: 0:00	Start:         0:00.000         End:         1:01.000         Length:         1:01.000         Tail:								
Output	Output								
Directory:	Directory:								
File name:	File name: Train Test o3								
Render to:	/Users/Brian/Documents/Ambisonics au	udio/Ambisonic Projects/Train Test/Train	1 file						
Options									
Sample rat	e: 48000 🔽 Hz Channels	s: 16 💟 Full-speed O	ffline						
Mix an	d process FX at project sample rate	Preserve source media sample rate	e if possible						
Resample	mode: Sinc Interpolation: 192pt	Normaliz	e/Limit/Fade						
Tracks	with only mono media to mono files	Dither master	her stems						
Multicl	nannel tracks to multichannel files	Noise shape master	ise shape stems						
Rende	r only channels sent to parent	Render stems pre-fader 2n	d pass render						
Embed:	Take markers Stretc	ch markers							
Preserve:	Start offset Metac	data Add new metadata	Metadata						
	Primary output format	Secondary output format							
Format:	WAV	\$							
WAV bit o	depth: 24 bit PCM 🗘 Lar	ge files: Auto WAV/RF64	1						
🔽 Write	BWF ('bext') chunk	ect filename in BWE data	]						
Do not in	clude markers or regions	Embed tempo							
Silently in	ncrement filenames to avoid overwriting	Save project copy to Train Tes	twav.RPP						
Do not re	nder files that are likely silent	Save Train Testrender_stats.	.html						
Add rend	ered items to new tracks in project	Combined • Per rend	dered file						
Queued F	tenders	Dry Run (no output)	ender 1 file						
		Cancel	Save Settings						

<mark>Binaural</mark> headphone mix

- <u>Select Headphones track</u> in TimeLine (only track selected)
- Select Render (File menu)

					Rende	er to Fi	le				
Source:	Selec	ted trad	cks (ste	ms)	\$	ounds:	Entire proj	ect		\$	Presets
Time bounds											
Start:	itart: 0:00.000 End: 1:01.000 Length: 1:01.000 🗸 Tail:								1000	ms	
Output											
Directo	Directory:								Bro	wse	
File nam	ile name: Train Test Binaural						Wild	dcards			
Render	to:	/Users/	Brian/D	ocuments/A	mbisonics au	dio/Amb	isonic Proje	cts/Train	Test/Trair	1	file
Option	S										
Sample	rate:	480	00	🔽 Hz	Channels	: Ster	reo 💟	Fu	ull-speed (	Offline	\$
Mix	and	process	FX at p	oroject samp	ole rate	Pre	serve sourc	e media	sample rat	te if pos	sible
Resamp	ole mo	de: S	inc Inte	rpolation: 1	92pt			\$	Normali	ze/Limit/	Fade
Tra	icks w	ith only	mono r	nedia to mo	no files	Dith	er master			ither ste	ms
Mu	lticha	nnel tra	cks to n	nultichannel	files	Nois	se shape ma	ister	N	oise sha	pe stems
Rer	nder o	nly cha	nnels se	ent to paren	t	Ren	der stems p	re-fader	21	nd pass i	render
Embed:	:		Take ma	arkers	Stretc	h marke	rs				
Preserv	/e:		Start of	tset	Metad	ata	Add	new met	adata	Meta	idata
			Prim	ary outpu	t format	Seco	ndary out	put for	mat		
Forma	at:	WAV							٢		
WAV	bit de	pth:	24 bit I	РСМ	C Larg	ge files:	Auto WAV	/RF64	0	;	
<b>V</b> N	Vrite B	WF ('be	ext') chu	unk	Include proie	- ct filena	me in BWF d	data			
Do no	ot incl	ude mai	kers or	regions	\$	En	nbed tempo				
Silent	ly inc	rement	filenam	es to avoid o	overwriting		Save proje	ct copy t	o Train Te	stwav.	RPP
Do no	ot rend	ler files	that are	e likely silen	t		Save Train	Testre	nder_state	s.html	
Add r	ender	ed item	s to nev	v tracks in p	roject		Combi	ned	Per rer	ndered fi	le
Queue	ed Rei	nders				Dry	Run (no out	put)	F	Render 1	file
								Can	cel	Save S	Settings