

# How to Batch Upmix using Penteo and Reaper

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## Overview:

This 'how to' will show how to do a Batch Upmix of stereo files to Surround using Penteo 16 Pro and Reaper DAW (Digital Audio Workstation).

Without any knowledge of Reaper or any other DAW, you can easily select multiple files to process (upmix) with the Penteo VST plug-in using Reaper to batch convert all selected files. The typical scenario would be to upmix all of files from a stereo album's folder to Quad or 5.1.

The Batch Upmixing is done faster than real time. For example, a typical 40-minute album of 10 tracks will upmix all tracks in about 5 minutes or so.

Penteo 16 Pro can create Quad, 4.1, 5.1 and 7.1 upmixes using its patented DSP technology and is used by audio professionals for upmixing for TV and Movies. Steven Wilson has used Penteo when multitracks have been lost. Penteo is a VST plugin. It is not available as a stand-alone program that you can just run on a PC or MAC. You must host the plugin in another program that support VST3. Penteo requires a license (fee). Penteo can be used on Windows and MacOS.

Reaper is a program that runs on Windows and MacOS that can host VST3 (Penteo) and has a nice feature where it can batch process multiple files. Reaper requires a license (fee) but has a free 60 fully functional trial license.

## Requirements:

You will need the following to Upmix using Penteo and Reaper:

**Penteo 16 Pro**, a purchased license and an iLok (a USB key that holds software licenses)

<https://www.perfectsurround.com/>

NOTE: There is a 14 day trial license (free) but the trial license still requires an iLok (about \$50 from Amazon, possibly cheaper on the web)

There is special pricing occasionally. (\$100 off during Black Friday)

**Reaper** for Windows or MacOS

<https://www.reaper.fm/download.php>

NOTE: There is a 60 day trial license (free) and a special discounted licence (\$60) if you are an individual, and REAPER is only for your personal use.

**IMPORTANT:** For \$50 (the cost of an iLok) you can evaluate Penteo and Reaper to batch upmix quite a few of your stereo albums to Quad, 4.1 or 5.1 very easily. In 14 days you can easily upmix a bucket load of albums and will not be disappointed in the quality of your upmixes! I'm sure once you hear what you can achieve you'll buy the Penteo license.

## Step 1: Setting Up Reaper:

After you have installed Reaper and Penteo 16 and activated the Penteo license using the iLok Manager (following the Penteo install instructions).

NOTE: Step 1 is a 'once off' setup. Once completed you will not do this step again on your current PC or MAC.

### Run Reaper

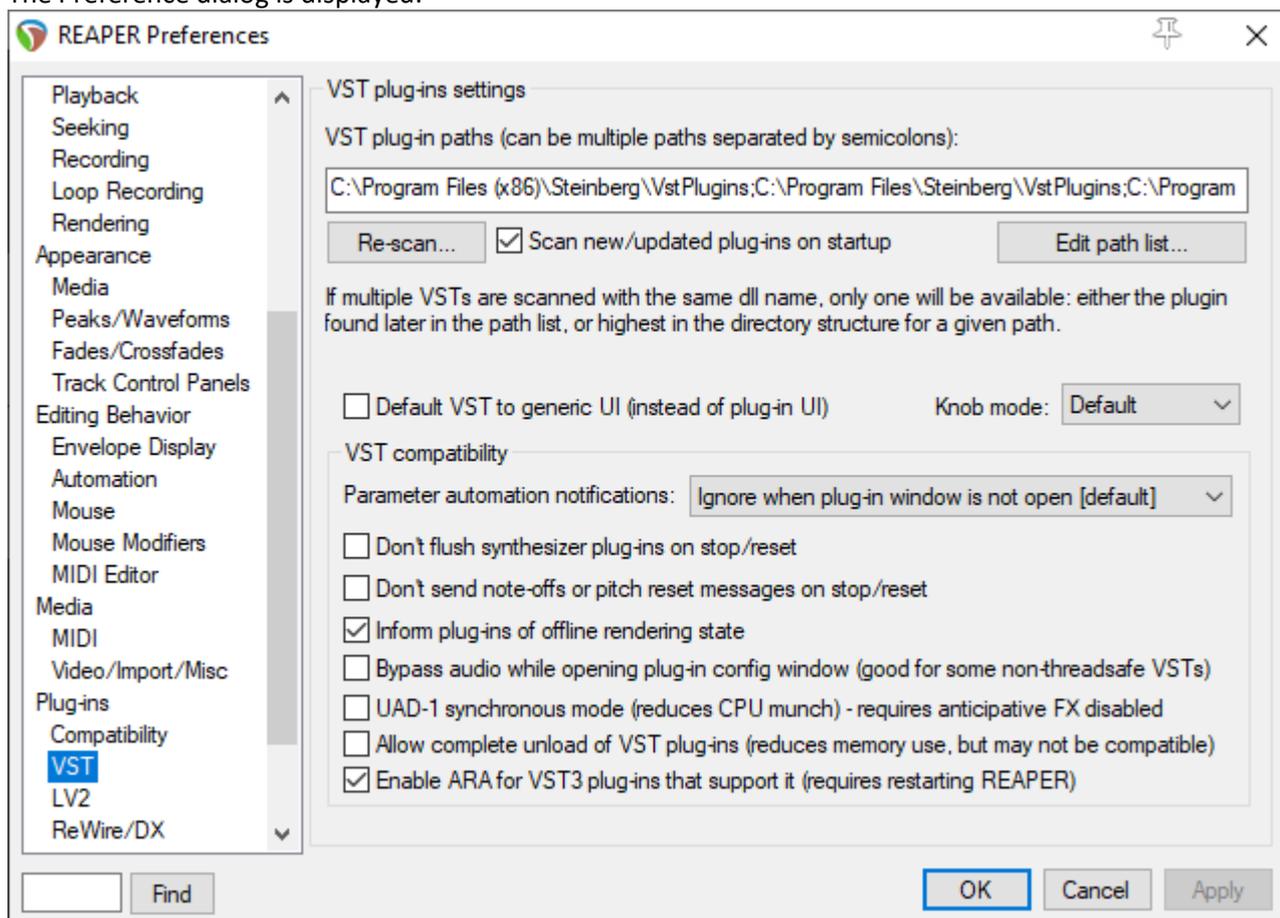
#### Adding the Penteo VST to Reaper:

From the main Reaper toolbar:

Click: 'Options'

Click: 'Preferences' from the option menu

The Preference dialog is displayed:



On the left, Scroll down and Click: 'VST'

The VST plug-ins settings is shown (see above)

Click: 'Edit path list' (near top right)

Now add this folder to the VST plug-in paths: 'C:\Program Files\Common Files\VST3') on Windows

(I don't know where the plug-ins are installed on MacOS)

Click: 'Rescan...' (near top left)

The folders are re-scanned and Reaper will find the Penteo plugin. Click: OK to exit

## Setting up Reaper's Batch tool:

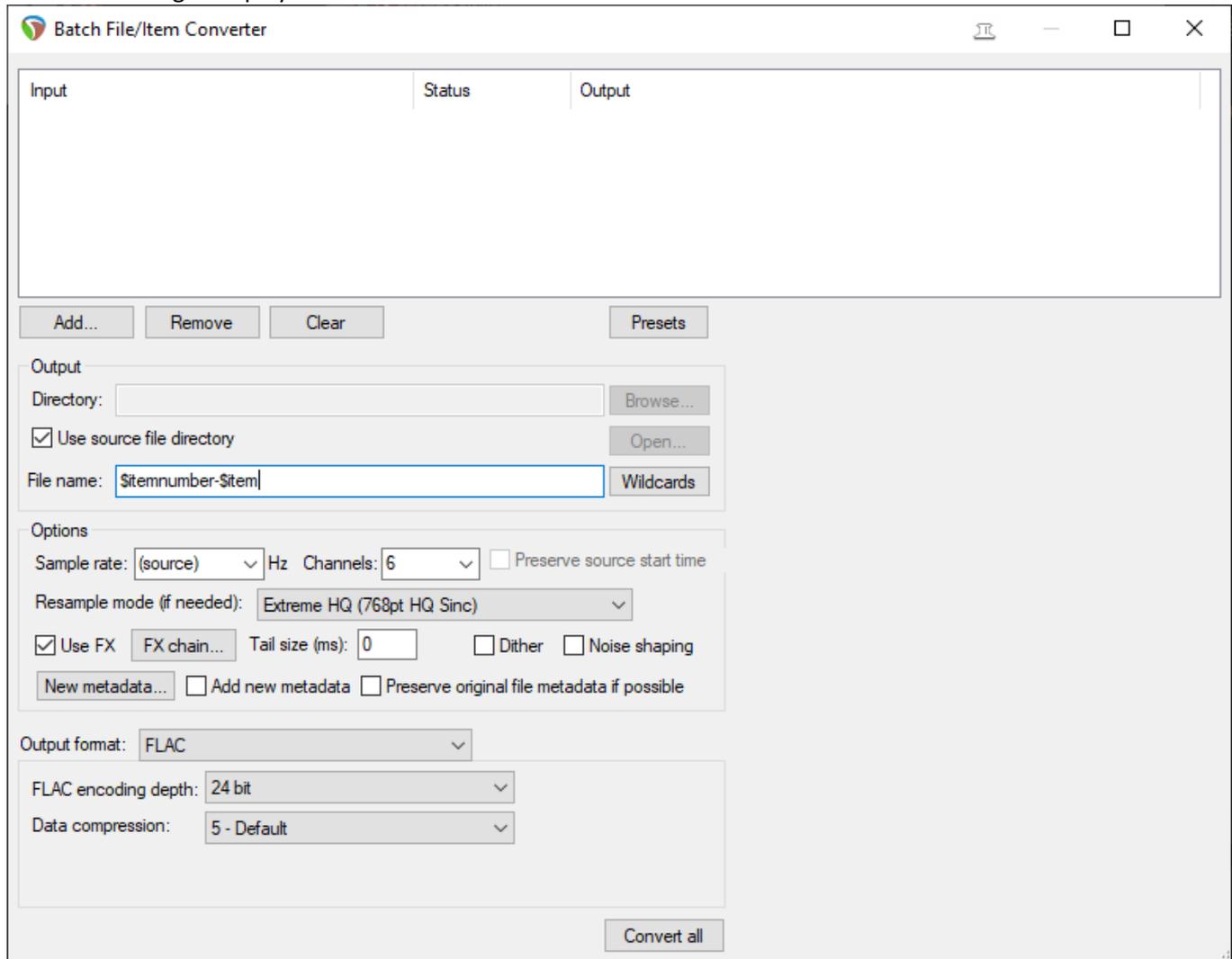
From the main Reaper toolbar:

In its toolbar menu:

Click: 'File'

Click: 'Batch file/item Converter'

The Batch dialog is displayed:



Now make some changes in the Reaper Batch dialog as follows:

Enable: 'Use source file folder' (your upmixed output files will go into your source file folder)

Sample rate: '(source)' (no resampling of the source)

Set the Channels dropdown to 6 (if you are doing a Quad, 4.1 or 5.1 upmix in Penteo) - this is the Output channels layout Reaper will create from the Penteo upmix. Set this to 8 if you are doing a 7.1 upmix.

Output Format: 'FLAC'

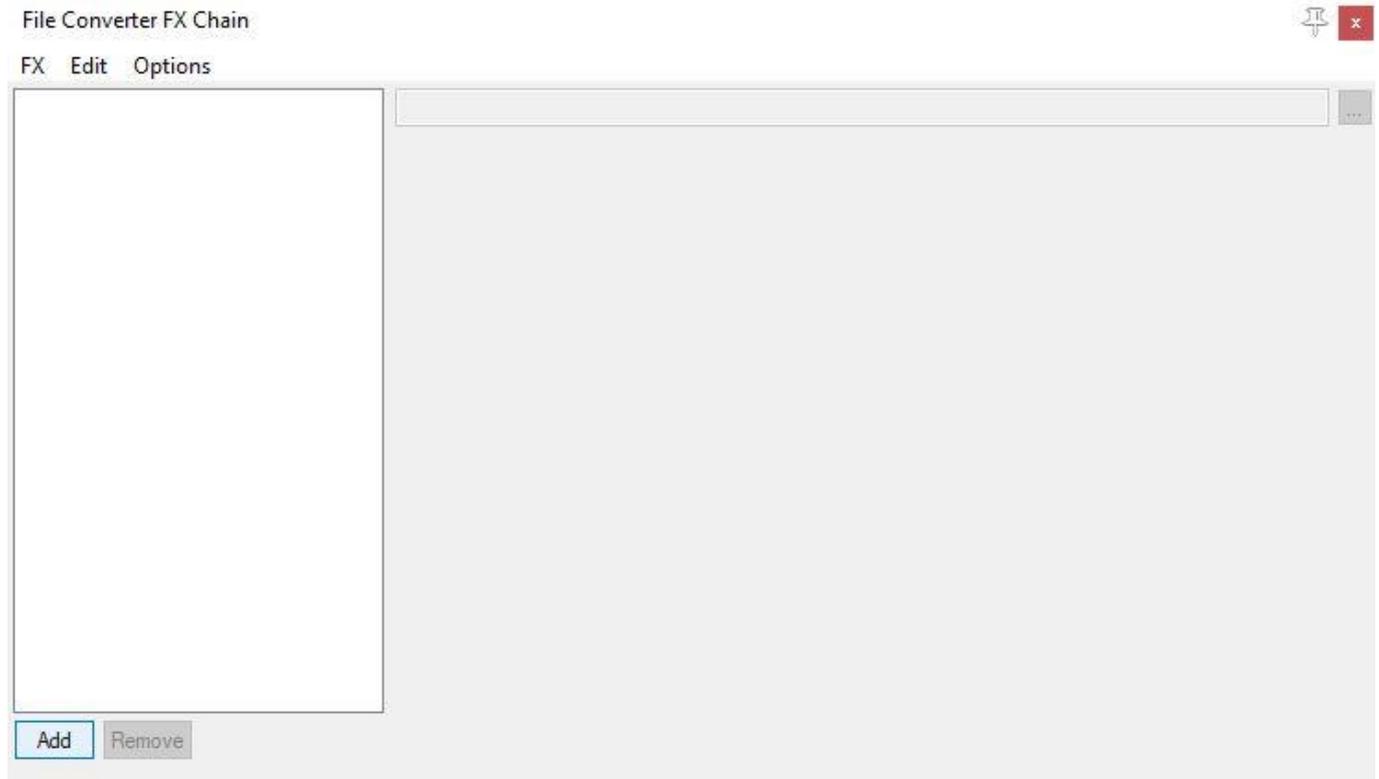
FLAC encoding depth: (you should select same as your source) '16 bit or 24 bit

Data Compression: '5 - Default'

Enable: 'Use FX'

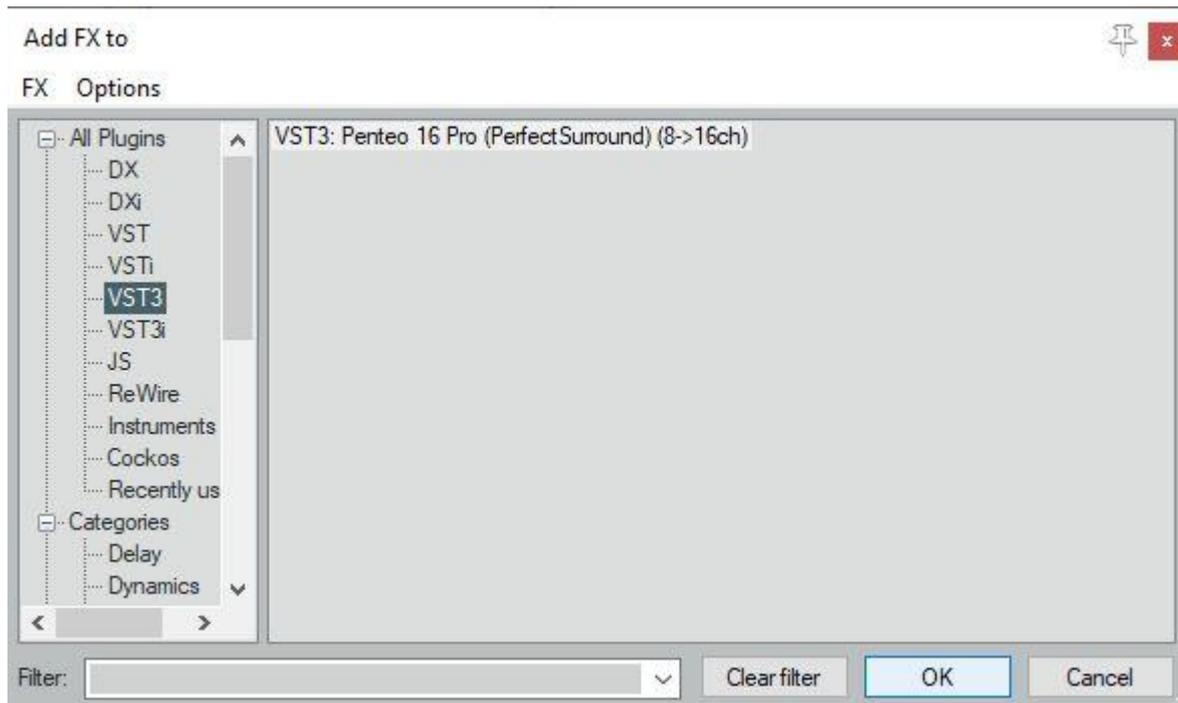
Click: 'FX chain...'

This displays the Reaper's File Converter FX Chain dialog:



Click: 'Add'

This pops up a list of possible FX plug-ins:

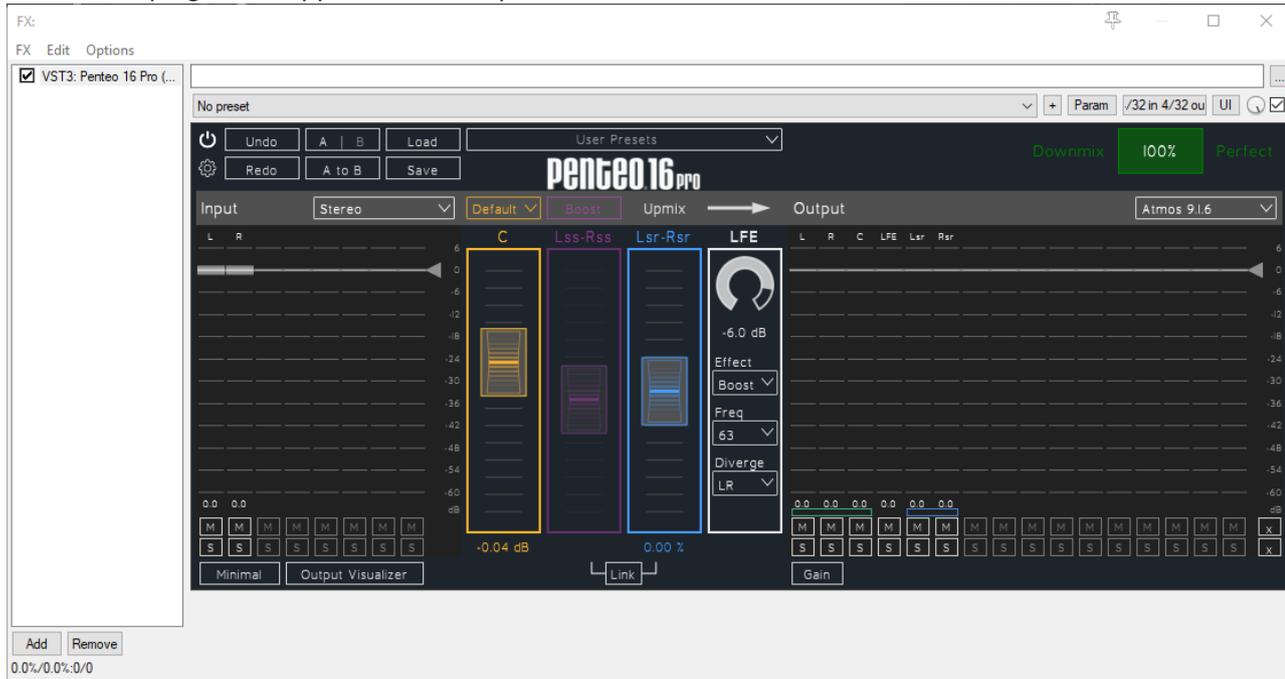


Scroll down the list and click: 'VST3'

Select: 'VST3: Penteo 16 Pro ...'

Click: 'OK'

The Penteo plug-in will appear in the Reaper FX window:



Reaper is now setup for Penteo. Don't close this just yet.

### Setting up Penteo VST:

From the main Reaper FX window in the previous screen shot:

You need to select the small 'Gear' icon at the top left of the Penteo screen to set Penteo's Preferences.

Click: small 'Gear' icon at the top left

The Penteo Preference dialog appears:

Now set the Input and Output channel layouts to be exactly as shown in the next screen shot:

**IMPORTANT:** The layouts shown are standard for file FLAC and WAV playback on all devices and media playback software.



Click 'Done' to save the Penteo preferences.

Back at the Penteo VST you should now set your input and output channel arrangements from the two dropdown lists on left and right near top:

Input: Stereo (assuming you are upmixing from a stereo source)

Output: 5.1 (I prefer 4.1 which gives a better sounding front image, but users can easily try for themselves)

Penteo is now setup for a default upmix from stereo. You can change any of the Penteo settings before doing a Batch upmix.

Now Exit Reaper.

## Step 2: Doing your Batch Upmix:

To do a Batch Upmix:

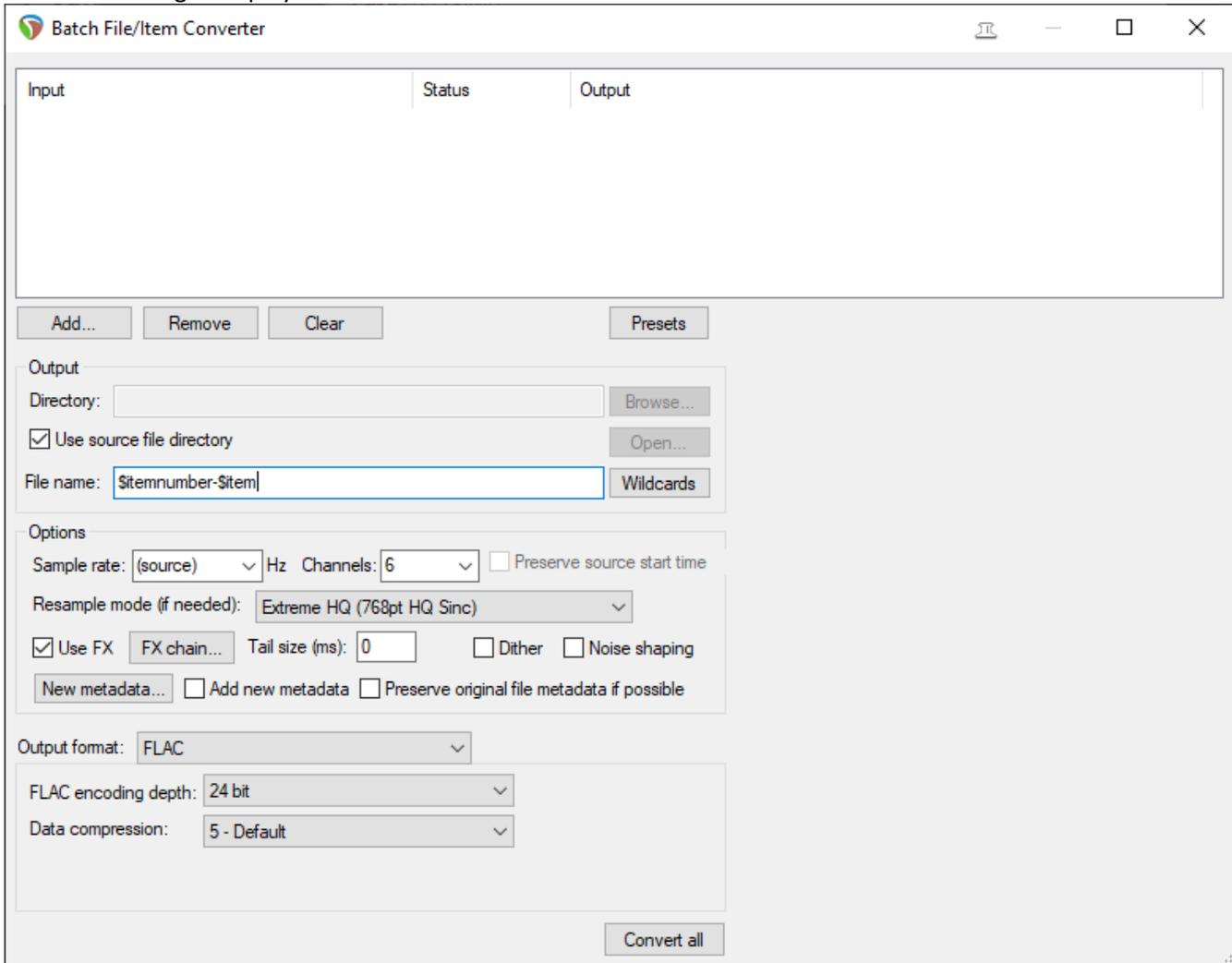
Run Reaper

In Reaper's toolbar menu:

Click: 'File'

Click: 'Batch file/item Converter'

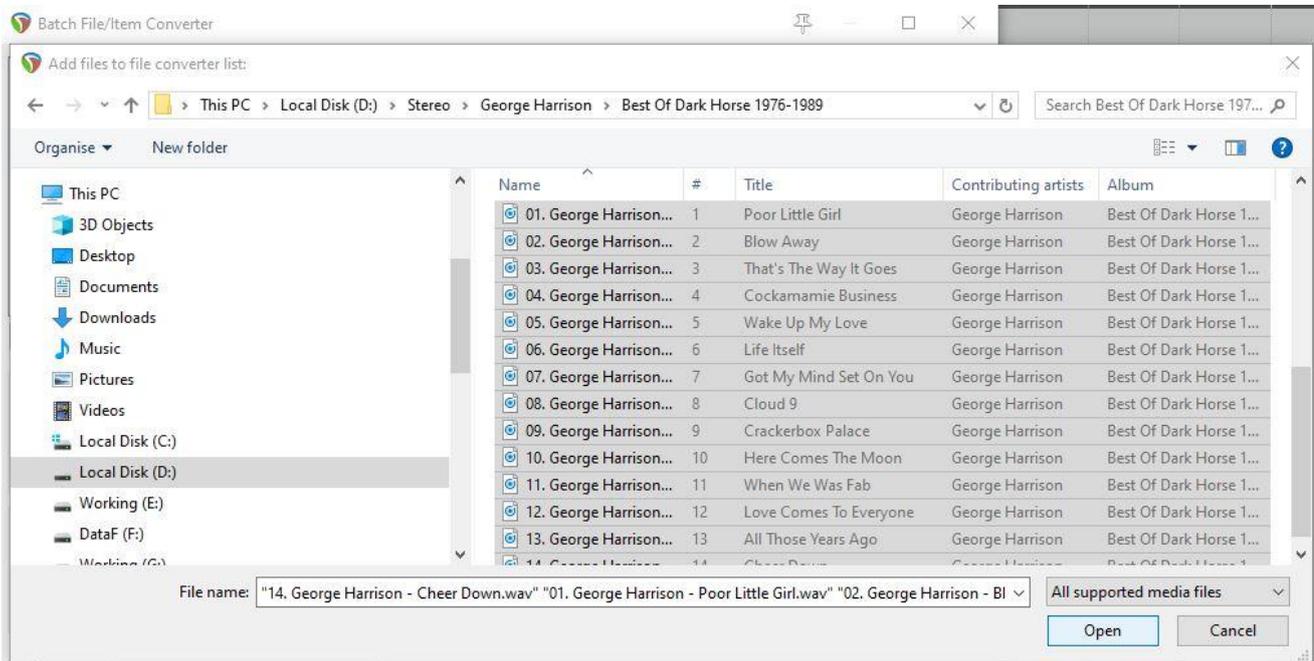
The Batch dialog is displayed:



Now click: 'Add' button, then:

Click: 'Add Files' option.

This pops up the file location dialog, go ahead and navigate to the folder with your source files:



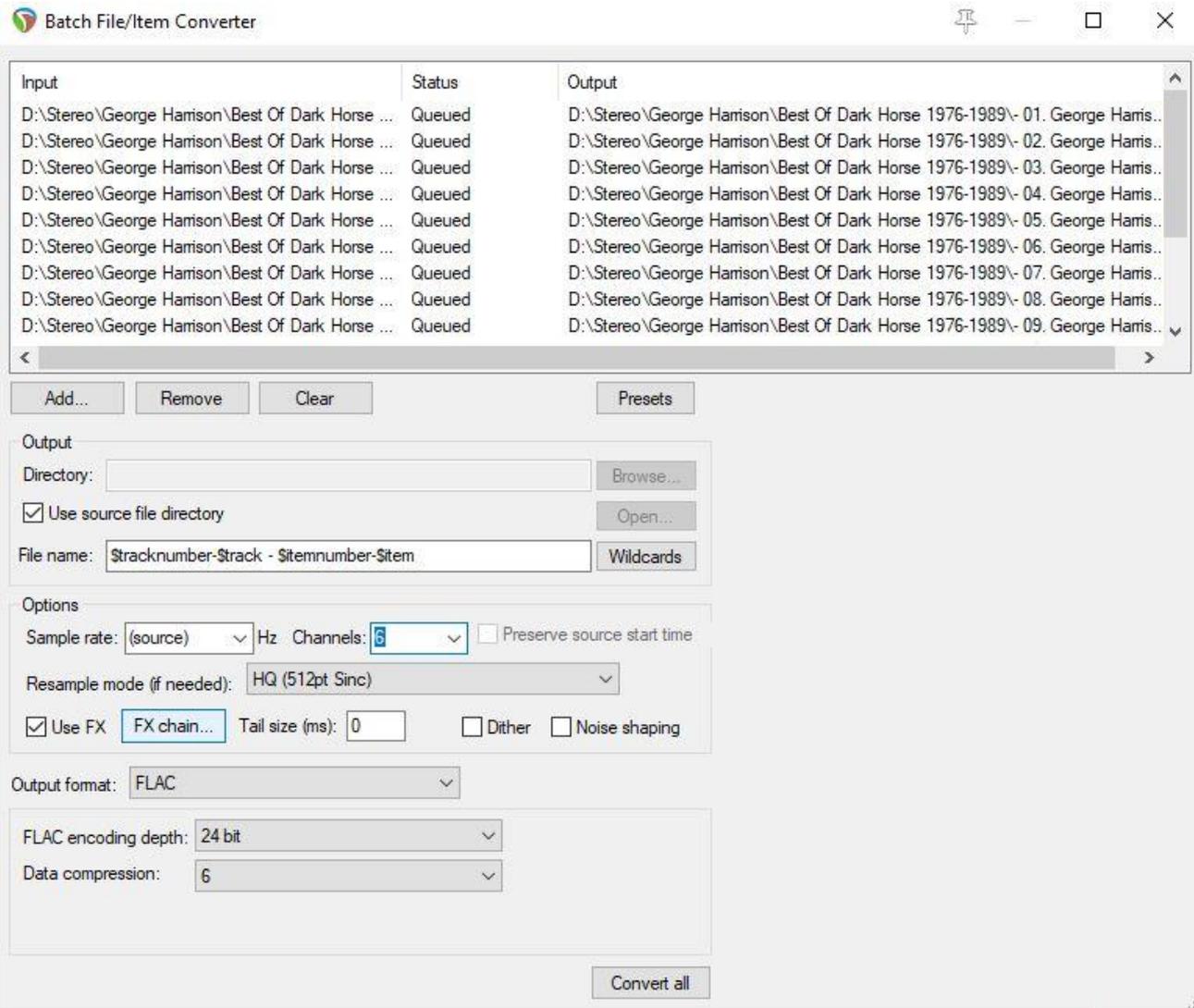
TIP: CTRL-A will select all the audio files in your selected folder in Windows (shown above)

TIP: You can add more files (albums) from more folders and process multiple albums in a single batch

After selecting your files in the dialog:

Click: 'Open'

All the selected files are added to the Reaper Batch Converter dialog:



Now check Reaper's options to ensure they are valid for your selected files and change anything (FLAC encoding bit depth is probably the only one).

NOTE: Penteo recommends upmixing from WAV files. I always convert my stereo FLACs to WAV prior, but I can't say I've had issues upmixing stereo FLACs on my PC – its extremely fast with SSD drives.

NOTE: If you are upmixing FLAC to FLAC you need to ensure the File Name template is creating a file name not the same as the input FLAC files. If you don't Reaper will not upmix as it can't read from a file its also outputting to.

Click: 'FX Chain' to display the Penteo plugin while upmixing.

### To start the batch upmix:

Click: 'Convert All'

Reaper will now update the Batch File Converter with progress for each file and the Penteo plugin will display the channel levels as it processes each file, the channel levels jump up and down based on the music that's being processed (i.e. continuously variable):



### Adjusting the Penteo Surround Mix:

The screen shot (snap shot) above shows the rear channels and centre are louder (and they contain more music) than the front L & R. If you watch this over 30 seconds or so you get to see what the mix will sound like. Often the beginning of the source stereo has an intro that sounds and looks quite different to the majority of the track.

You can adjust the balance of this track towards the L & R by lowering the Lsr-Rsr slider control down and the C slider down.

**IMPORTANT CONCEPT:** Although changing the mix Sliders has the effect of lowering the C and Rear gain (volume) it is moving the mix to the front L & R. This is not just a volume adjustment effect. It is changing the mix so less music is mixed to the Rears and C and more is mixed to the L & R.

I have found the best adjustments are to get the levels all around the same, but the rears to be a little lower than the front L & R. For 5.1 the C should be a little lower than L & R too.

As the Batch Converter completes each file (in order of its file list), each upmix FLAC file gets saved. You can immediately play a completed file and listen to the results (I use Foobar2000), but any player that supports multichannel FLAC will be fine.

If you think further adjustments to the Penteo mix is required, click the 'Stop' button (at bottom of the Reaper Batch Conversion dialog – it's the same button as 'Convert All' but once a batch is started the button's function and label is changed to 'Stop').

Once stopped, you can make your Penteo changes then start the conversion again. The Batch Converter will overwrite any existing upmixes if the source file is listed in the Files list. So, you can remove files already upmixed from the list you are happy with, then Start the batch again, only upmixing the files remaining in the list.

Please read the Penteo manual for more info about its controls and options.

You now know enough to start upmixing your favourite albums. Experiment with the Penteo settings to find what sounds best for you.

## Advanced Upmixing:

The single biggest factor in getting a superb upmix is the quality of the source:

**The original stereo mix width:** Stereo mixes with a wide stereo image and panning of instruments will always upmix well. Stereo imaging that sounds narrow (mono-like) will not upmix well.

**The original sonic quality:** Nice dynamics, balanced EQ and little loudness compression will also provide the best audible experience. If the stereo sounds great so will the upmix, and vice versa.

### Enhancing a Stereo Image to get better Upmixes:

I use another VST plug-in with all my Penteo upmixes from stereo sources: Izotope 'Imager':

There are two versions available that work with Reaper/Penteco:

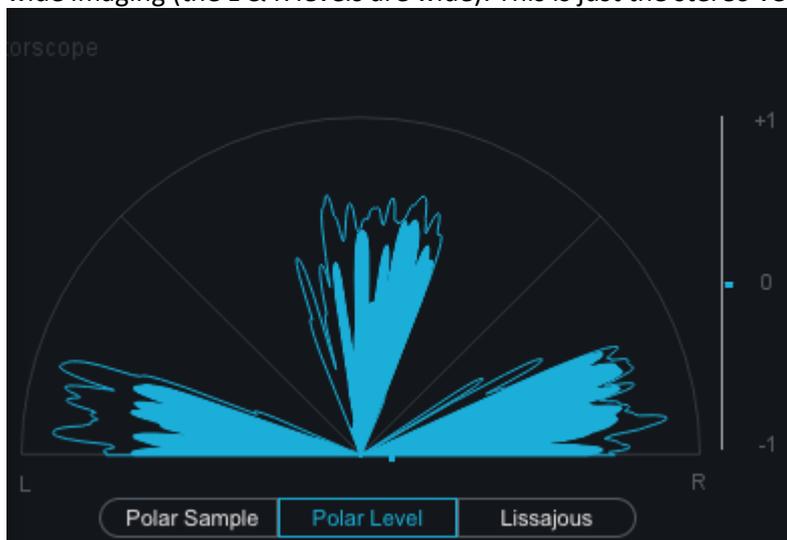
Izotope Ozone Imager Version 2 (free):

<https://www.izotope.com/en/products/ozone-imager.html>

Izotope Ozone 9 Standard Imager: (Licence fee required)

<https://www.izotope.com/en/shop/ozone-9-standard.html>

Both these plug-ins show your stereo source imaging (width) in a live vectorscope view. I have used this extensively over the past year or so to aid in upmixing stereo tracks. This screen shot of Imager shows a stereo mix that has very wide imaging (the L & R levels are wide). This is just the stereo vectorscope display:

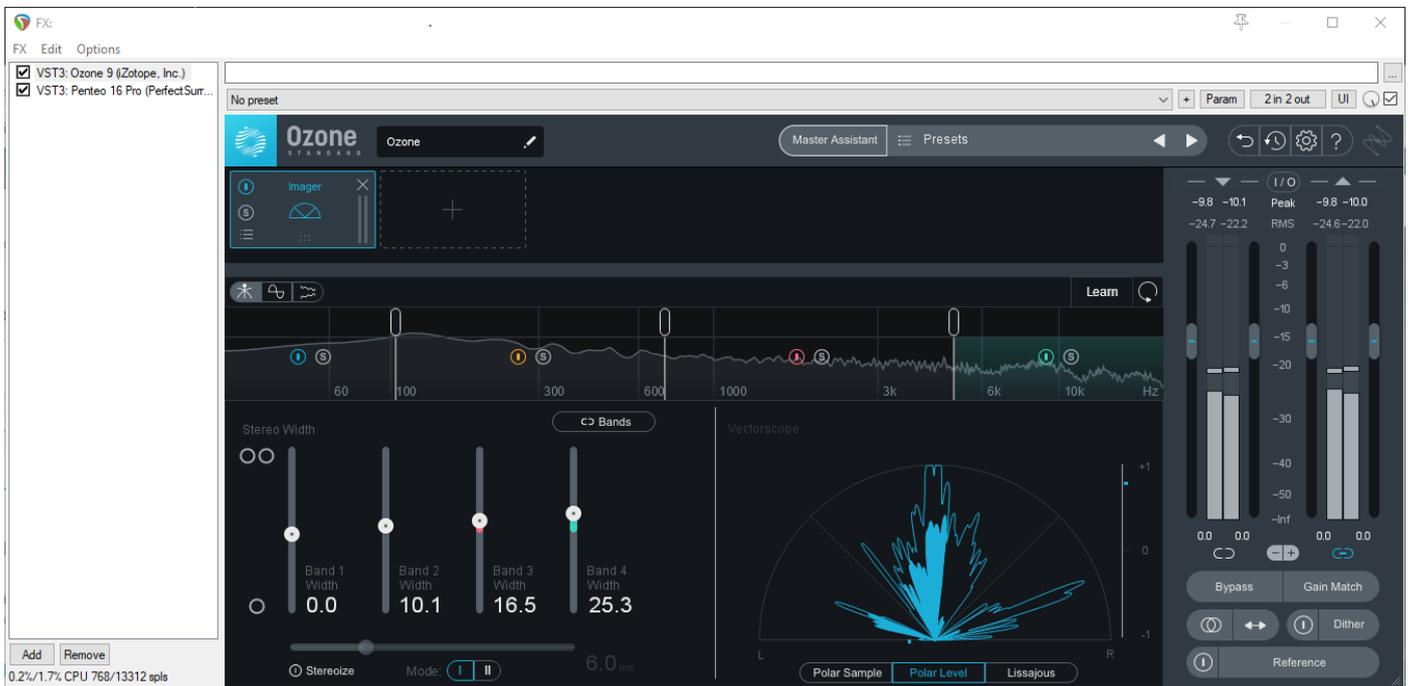


This stereo source when upmixed would place too much music in the rear channels. So, a user could adjust Penteco to move the mix more to the front. I do this without having to even listen to the upmix. I've learnt that visually I can see in Imager what I can hear when I play this Penteco upmix back after the upmix is completed. I don't have to wait for the upmix to complete, I can watch Imager and immediately adjust Penteco until Penteco's channel levels look 'right'. Stop the batch upmix. Then re-start with new settings. Its quite easy.

Both versions of Imager have gain controls so I can also lift the input level or lower if the stereo is hot.

Both versions can widen the source stereo image prior to Penteco in Batch Mode to effectively widen the surround mix created by Penteco, spreading the music out in the final mix. This is particularly useful for some narrow stereo mixes and can have quite a dramatic effect for mono-like mixes.

Here is a screen shot of Izotope Ozone 9 Standard Imager in Reaper showing the full Imager interface:



Izotope Ozone Standard Imager can widen or narrow a stereo image by adjusting the frequency band slider width controls on the left. A user can change the frequency band ranges (sliding the vertical bars in the graph at top).

In this example, Band 1 is under 110Hz (the deep bass). I leave that at 0 anchoring bass to front. Band two has a light image boost. Band 3 more and Band 4 (high freq) higher again. This works well for most upmixes in my experience.

Izotope Ozone 9 Imager Version 2 (the free version) has just a single frequency Band, all frequencies are widened or narrowed by the same amount, just a single imager slider. Izotope Ozone Standard Imager gives better results in my opinion. But users can try both (Ozone Standard has a free 10 day trial and includes many other audio editing tools).

In the previous screen shot, Reaper's Batch Converter has both the Izotope Ozone 9 plugin and Penteo added to its FX list. Reaper supports 'chaining' where the inputs and outputs of plugins are auto connected. In this example the output of Ozone 9 (Imager) is sent to Penteo for upmixing. Changing Input or Output gain can be controlled from Izotope Imager with the I/O gain controls on right.

With both Izotope Ozone and Penteo added to Reaper users can switch between by clicking on the plugin name in the FX list on left to monitor or make adjustments or you can float both plugin modules in separate windows to view them both simultaneously.

I now use both Penteo and Ozone 9 Standard Imager for all my upmixing. By adjusting Imager I can get a nice wide stereo output to Penteo where I adjust the mix channel levels. Between these two plugins I can visualise the best settings which typically work for all tracks in an album (the stereo mix was more than likely done by the same engineer with the same style). Occasionally, I will go back and redo a track or two with changed settings.

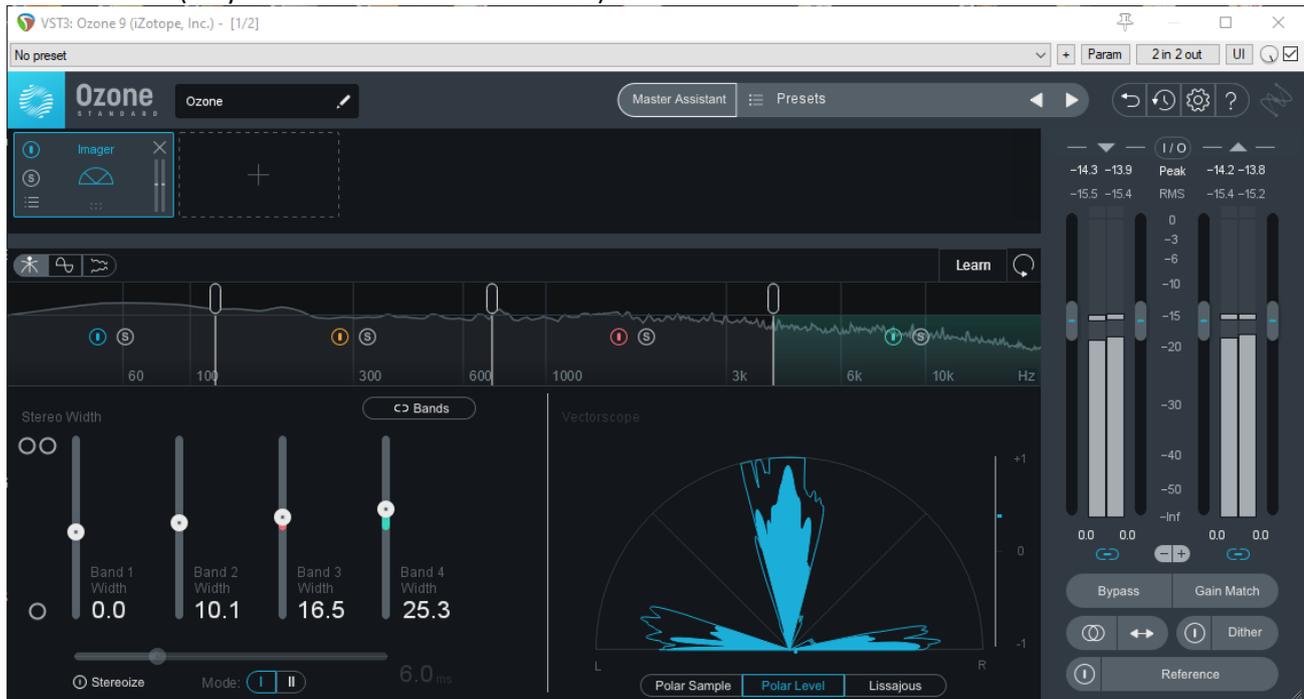
I also sometimes change the gain (volume) on individual channels on some mixes, typically adjusting rear channels. I use Music Media Helper's Channel Volume tool.

Lastly, Penteo does a great upmix without Imager on most albums. But adding Imager can give a better upmix in many cases, especially if the source stereo is not mixed with a wide stereo image. Try Penteo alone, then try the Imager free trial and you decide.

## Examples:

Using Reaper with both Penteo and Izotope Ozone 9 Standard Imager. I load the stereo files then start the Conversion/Upmix:

I first look at the Imager stereo Vectorscope and adjust the Image expansion up or down to get a vectroscope image much like this (maybe a little wider than this shot):



The above settings in Imager are my default Starting point and usually ok. This stereo mix looks (and sounds) nice. The vectorscope will fluctuate but this is about the minimum average width to get a great upmix. You can push this a wider, just about touching the circle.

Once I'm happy with the stereo width being output from Imager, I then look at Penteo:



This is a 4.1 mix. I've set Penteo to 5.1 but switched C Off. This puts the 4.1 into a 5.1 container.

I now adjust the Rears (Lsr-Rsr) mix slider so that the rears are 10 to 15% lower than the L & R (as shown). I've found this to be a good balance between front and rears. Increasing the Imager width, increases the Rear levels. So you can

tweak this to suite your taste. Remember, these adjustments are moving music towards or away from the rear channels, it is not just a volume adjustment.

Experiment and you'll be very happy with your upmixes!