

Mastering a CD in Peak 4

“Mastering” is the final stage of arranging and polishing material prior to sending it out for mass duplication. This process typically consists of editing songs, using effects processing to emphasize particular instruments or voices, adjusting levels to suit each song, arranging songs in a particular order, inserting just the right amount of silence between songs, and converting the format from a high-definition digital audio file to a standard CD audio format that can be played in any CD player, and of course, burning the final “master” copy.

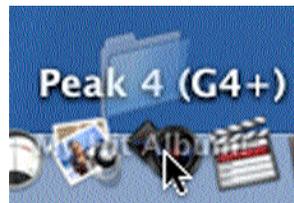
In the mastering process, Peak picks up where a multi-track DAW leaves off – after songs have been recorded and mixed as desired – stereo (and sometimes mono) masters are the end result. Peak’s job is to take all these individual files, and assemble them in such a way that the order of songs makes sense according to the artist’s intent and vision. That is, depending on the style of music, certain elements of the mix may need to be enhanced. For example, if you’re mastering a CD of dance music, you’ll most likely want to add equalization in the low end of the frequency spectrum, so the drums and bass really stand out. On the other hand, if you’re mastering classical music, you would not want to use the same type of equalization setting, as there are far more instruments in the mix, and you may want to really emphasize a softer, gentler sound, such as a violin or a flute.

To master a CD in Peak, you will need a few songs that have been mixed down from your DAW application, as well as a blank CD-R disc. To easily access Peak, you may also want to create an alias in the Dock by clicking on the Peak application icon and dragging it into the Dock. The next few examples show how to accomplish common tasks in mastering – such as trimming the beginnings

and ends of songs, applying fade-ins & fade-outs, normalizing levels, and applying touch up effects such as EQ or compression.

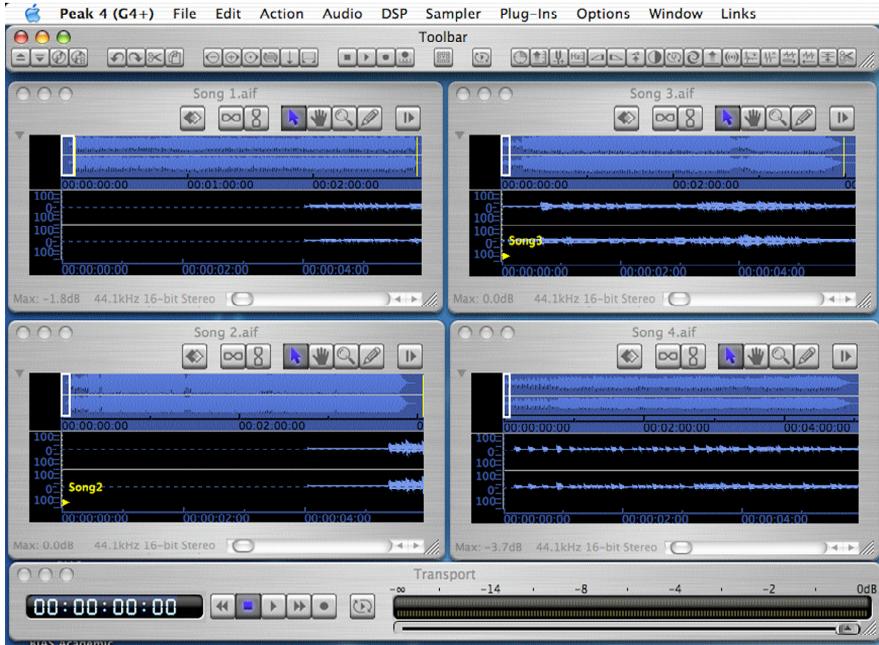
Trimming Songs:

1. Open your song files (or a folder full of files) in Peak by selecting them in the Finder, and dragging and dropping them over the Peak application icon in the Dock.



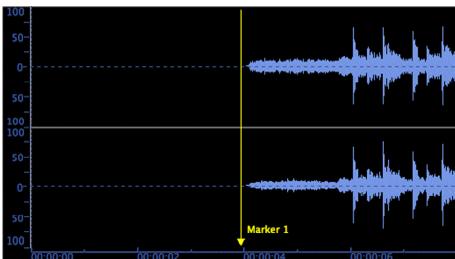
Opening an entire folder of audio files by dragging it over the Peak icon in the Dock

2. Once open in Peak, an easy way to view all the files is to tile all the audio document windows – by choosing Tile Windows from the Window menu (⌘-T). Now it’s easy to find the file you wish to begin working on. To get a better view, click the green maximize button in the upper left corner of the audio document’s window.
3. The song we’ll start off with is well mixed, and has nice strong levels right out of the DAW, but needs a bit of trimming at the beginning and end, as there are several seconds of silence at either end that we don’t really want on the finished CD. The best way to eliminate this silence, without actually cutting out any material, is to create a “region” around the area of the song that we want to keep – anything that falls outside of the region’s markers will not translate into the next stage, which is assembling the Playlist. To locate the exact spots for the beginning and end of the region, play the file from the



Multiple audio documents tiled neatly on the screen

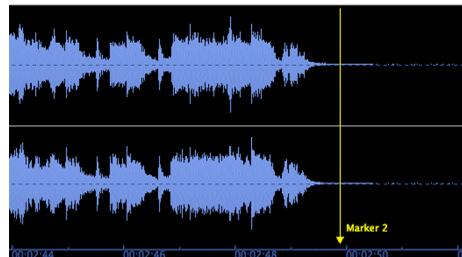
beginning, and when you reach the spot where the song should start, stop playback, and insert a new reference marker by choosing New Marker from the Action menu (\mathfrak{H} -M), or by clicking the Toolbar's New Marker button.



Marker placed where song *should* start

- Now, also place a reference marker before the end of the file, as there are several seconds of unwanted silence here as well. To locate quickly to the end of the file without having to hear the entire song, click into Peak's file overview, near the end of

the file – playback will start at whatever point you click. As the playhead reaches the end of the song, try to drop a reference marker in place while audio is playing, using the keyboard shortcut \mathfrak{H} -M. If the marker doesn't get put in exactly the right place, it can be moved to position later by clicking and dragging the triangular base of the marker to the left or right.

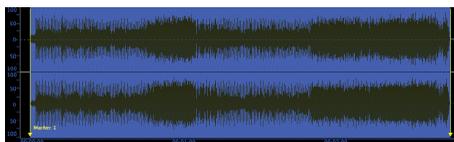


Marker placed where song *should* end

- With markers in place, designating where the actual beginning and end of the song should be, it's

time to create a region around this part of the song. Regions are always created around a selection in the audio waveform – that is, you must first select an area, and when you choose New Region from the Action menu, markers are placed at the beginning and end of the selection automatically. There are various ways to make selections, but since we've already placed reference markers where we want the song to start and end, it's easiest to \mathfrak{H} -click between the two markers, and Peak automatically selects the space between them. This holds true for any two markers of any kind (reference, region, or loop) – if you \mathfrak{H} -click between them, you'll select the entire area. Since we're already located at the end of the song, the easiest thing to do is simply \mathfrak{H} -click to the left of the marker that's at the end of the song, because there's another marker much earlier in the song. Try it!

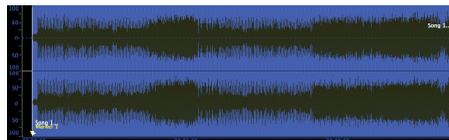
6. Now that you've successfully selected just the desired area of the song, you may want to bring it all into view, as much of the selected area may be off-screen. Select Fit Selection (\mathfrak{H} -Shift-J) from the Action menu. Now the entire selection (ie: the entire song) will snap into view.



After using the Fit Selection command, the selected area stretches to fit the entire screen

7. To make a region around this selection, just choose New Region (\mathfrak{H} -Shift-R) from the Action menu. It's a good idea to name your regions, as it makes keeping track of them later in the process much easier. Type in a name, and click the OK button. Don't forget to save your work! Song 1 is now

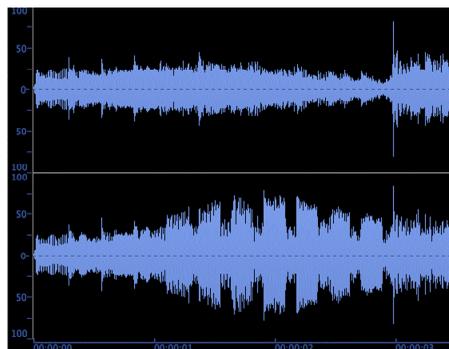
ready, let's move on to Song 2, which has other issues...



A region called "Song 1" now added to waveform

Fading in & Fading Out:

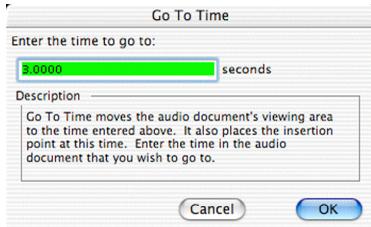
1. We'll press \mathfrak{H} -T to tile all the windows again, and locate our second song – Song 2. This song also came out of the DAW just fine, except for the levels come in a bit too fast in the beginning of the song, and end a bit too abruptly. A basic fade-in and fade-out should really help this song to blend in better with the songs on the CD that come before and after it.



Beginning of song before creating a fade-in

2. In this instance, since Song 1 has a nice, smooth fade-out at its end, we'd like to have Song 2 also have a smooth fade-in at its beginning, so the two blend together nicely on the finished CD. To accomplish this, you simply need to decide how

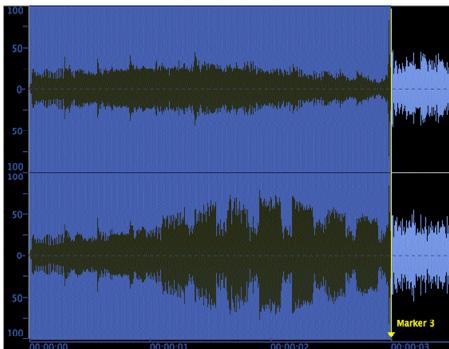
long of a fade-in you would like – in this case, a short three second fade-in should work well. Rather than selecting the first three seconds of the song though, we'll precisely place a marker at the three second mark using Peak's Go To Time command. From the Action menu, choose Go To>Time... (⌘-G)



The Go To Time dialog

When the dialog appears, type in a value of three seconds, and click OK. Peak's playhead cursor jumps to the three second point in the waveform automatically.

3. Now that the cursor is in the right place, create a marker here by typing ⌘-M, or by choosing New Marker from the Action menu.
4. ⌘-click in the area between the beginning of the file, and marker that was placed at the three second mark to select exactly the first three seconds.

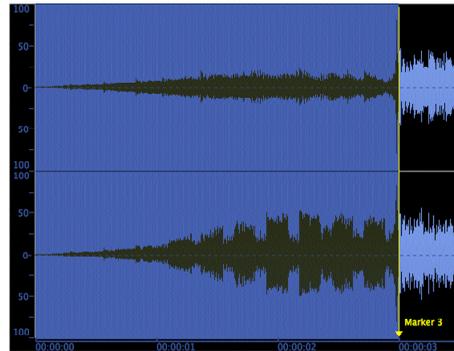


⌘-click to the left of the marker to select just the first 3 seconds...

5. With a selection made, you can now fade in just this portion of the waveform – click the Fade In button in the Toolbar (or choose Fade In from the DSP menu).



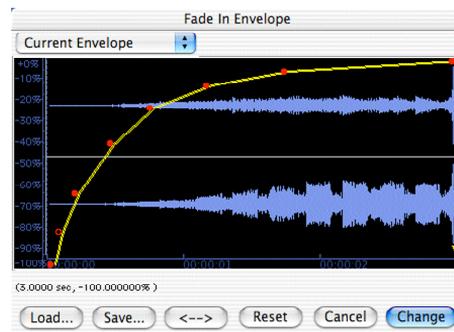
The Toolbar's Fade-In button



Choosing the Fade-In command creates a gradual fade over the selected portion of the waveform



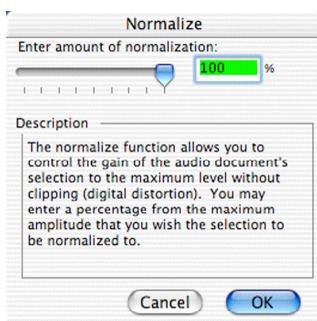
This technique uses the default fade-in curve – to customize the type of fade being applied, just choose a different fade in preset or create your own, under Peak's Preferences panel>Fade In Envelope.



An example of a custom Fade-In envelope

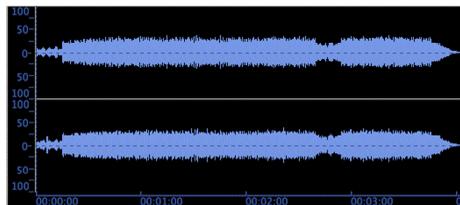
DSP Processing Tools:

1. Song number 3 doesn't have the same issues as the first two songs – it's perfectly trimmed and has nice fades and either end, and sounds good overall, but compared to the other two, it just doesn't seem as loud. If used for our CD as is, the listener would inevitably have to adjust the volume on their stereo system to really be able to hear this track, and then might have to turn it down again for the song that follows. We can use one of Peak's DSP tools such as Normalize to fix this track.
2. To Normalize this song – to get it as loud as possible, like the first two songs, first open Song 3 in Peak. Just about all DSP operation in Peak, with the exception of sample rate conversion, are based on a selection made in the audio waveform. Assuming we want to normalize the entire song, the easiest thing to do is to use the Select All command from the Edit menu, or ⌘-A.
3. Now, choose the Normalize command from the DSP menu – for this example, leave the amount of normalization at 100%.

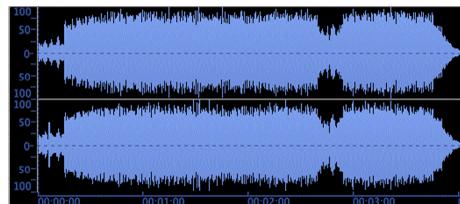


Peak's Normalize dialog

Peak normalizes the file to the level specified in the Normalize dialog. Compare the before and after levels in the pictures below:



Before normalizing...



After normalizing

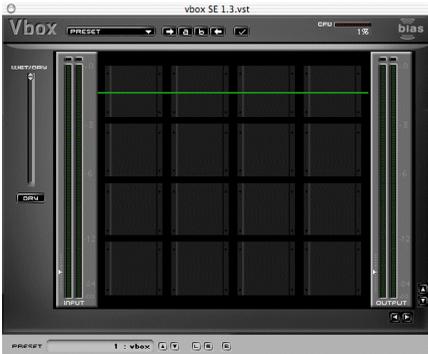
4. Song 3 now has just as much “punch” to it as the first two songs, and as far as levels go, will fit right in with the other songs on our CD.

Effects Plug-Ins:

Our next song – Song 4, suffers from yet other problems, and while it's fine as far as trimming, fades, and levels are concerned, something about it just doesn't sound “right”. There's no low end in this song, so the bass and kick drums get lost amid the guitar and vocals. We can fix this right up though, using Audio Unit or VST format equalizer plug-ins, both of which are accessible in Peak. Peak includes the BIAS Freq 4 band parametric equalizer – and any of the Audio Units EQs that are included with Mac OS X can be used as well. Aside from using equalization to balance out the missing low frequencies, we also want to add a little compression to help give this track a bit more “punch” overall. Effects plug-ins can be

used one at a time, with a single plug-in on each of Peak’s five effects inserts, but when mastering using multiple plug-ins, the built-in Vbox SE effects routing interface is handy, as it gives access to many controls all within a single interface.

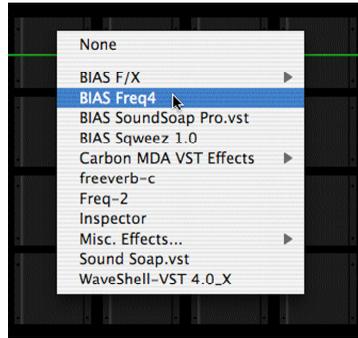
1. With Song 4 open in Peak, we’ll choose Vbox from the Plug-Ins menu – the Vbox routing interface appears.



The Vbox SE effects routing matrix – with no active plug-ins

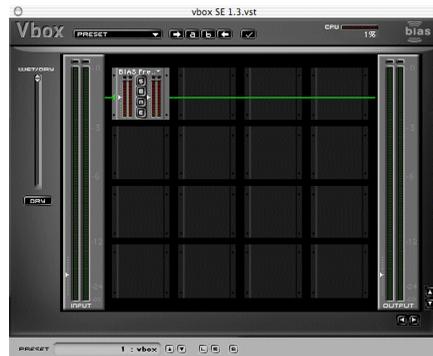
When using multiple plug-ins, Vbox allows you to route an audio signal through effects in the Vbox matrix, in series, in parallel, and also in various combinations. Single effects may be soloed, muted, or bypassed, and A/B comparisons can be used to compare settings. In addition to these routing options, Vbox presets may also be saved. For example, say you have your five favorite plug-ins that you always use for mastering, and in each of these plug-ins, you have specific presets you like to use. If a Vbox preset is saved, it includes not only the position of the plug-in within the Vbox matrix, but also contains information about each plug-in’s own presets/settings. With Vbox, you can instantly load up your favorite effects, with specific settings, with just a single click in Vbox’s Presets menu.

2. Click into one of the empty gray boxes within the Vbox matrix – in the middle of the interface. A pop-up menu appears, with a list of all available VST plug-ins. Choose the BIAS Freq 4 EQ plug-in.



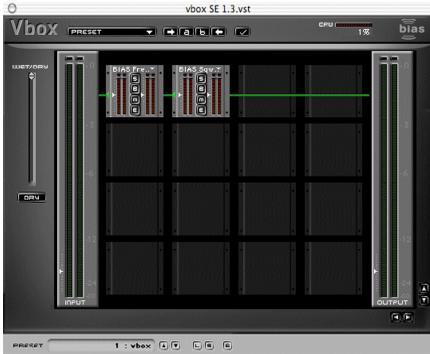
Choosing the BIAS Freq equalizer plug-in

A thumbnail icon of the plug-in now appears in the Vbox matrix – the plug-in’s name appears at the top of each box.



The Vbox SE matrix – now with one active plug-in

3. Now, click in the box just to the right of the box containing the Freq EQ, and Select BIAS Sqweez, which is a brand-new compressor/limiter plug-in, also included with Peak 4.

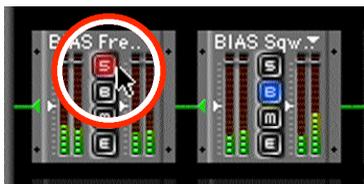


The Vbox SE matrix – with two active plug-ins, arranged in a series

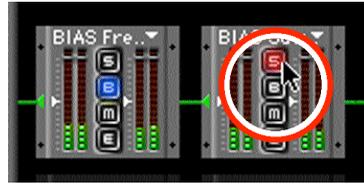
Think of the audio signal flow through the Vbox matrix as going from left to right. Audio signals are fed in from the left, and with the current arrangement of effects, they flow first through the Freq EQ, and are modified by any settings made in Freq. Then the signal flows out of the Freq EQ, and into the Sqweez comp/limiter, where it's again modified by any settings made in this plug-in. As there are only two plug-ins in the current arrangement, audio then flows out to Vbox's output, and can then be heard with all of the settings made in the plug-ins.

4. Let's take a look at some of the features that make Vbox such a good tool for mastering -

- **Solo/Bypass/Mute/Edit** - Each plug-in's thumbnail icon has four buttons down its center – **S** for Solo, **B** for Bypass, **M** for Mute, and **E** for Edit. When plug-ins are arranged in a series, that is – horizontally in the same row, clicking the Solo button will automatically bypass the other effects in that same row/series.

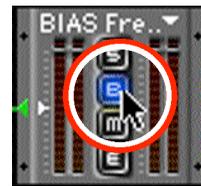


Clicking the Solo button in one plug-in thumbnail automatically bypasses other plug-ins in the same series



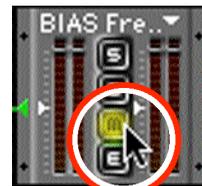
Clicking the Solo button in another plug-in in the same series bypasses all other plug-ins in the same series

Clicking the Bypass button in any effect in a series or parallel arrangement simply lets audio pass through that plug-in, without processing the signal.



Clicking the Bypass button lets audio pass through the plug-in without being processed

Clicking the Mute button stops audio from passing through an effect altogether – for example, if there are two plug-ins, arranged in a parallel (that is, in separate rows) and one is muted, then audio would stop flowing through the effect that is muted, and the only audio that would be heard would be that going through the un-muted effect. Likewise, if only one effect plug-in is active in the Vbox matrix, and it is muted, there would be no audio output at all.



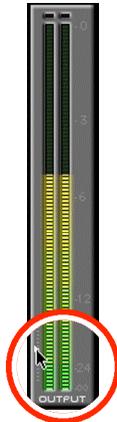
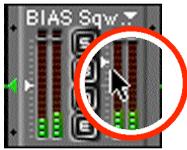
Clicking the Mute button stops audio from passing through a plug-in, as well as other plug-ins in the same series/row

Clicking the Edit button opens the plug-in's editor, or graphical interface, where you can adjust any of its parameters (knobs, sliders, buttons, etc.)



Clicking the Edit button opens a plug-in's editor window (graphical interface)

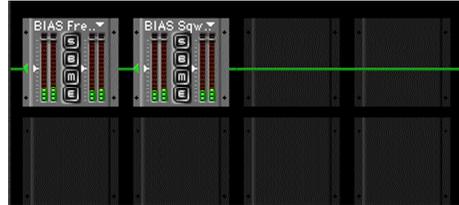
- **Independent Input/Output Levels** - for each plug-in, as well as for the entire collection of plug-ins within the Vbox matrix make is easy to get just the right level for either an individual plug-in, or the entire collection of plug-ins that are active within the matrix.



Circled areas showing output level sliders - on the left, the output level slider for an individual plug-in - on the right, the master output slider for the entire Vbox SE matrix

- **A/B Comparisons** - can be used to create snapshots of two different states of the Vbox matrix - any settings to plug-in parameters, levels, or arrangement of plug-ins within the matrix are stored in A/B comparison snapshots. These are useful when comparing two different plug-in setups, such as setting snapshot A to represent the original state of an audio file, and snapshot B to represent what the audio will sound like after plug-in settings are changed. The pictures below illustrate how this works - assume that you have an arrangement of plug-ins, such as the one illustrated below, that has

two effects in a serial arrangement. This setup is sounding pretty good, and we may want to use it, but we also want to experiment with the same two plug-ins in a parallel arrangement.



A potentially good setup - this will be saved as "Snapshot A"

To temporarily memorize this arrangement of plug-ins and any setting made in each plug-in's own interface, click the Assign State A button at the top of the Vbox interface...



Assigning Snapshot A

Now, we're going to jump out of order for a moment, to show another of Vbox's powerful features, but we'll come back to snapshots, so keep these last couple of steps in mind.

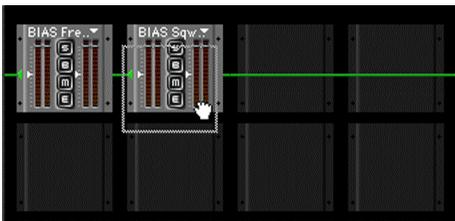
- **Real-time, hot-swappable effects** - The plug-in thumbnail icons in Vbox can be moved from any box to any other empty box, or, plug-ins in an active box can also be hot-swapped by selecting a different effect plug-in from the effect assignment pop-up menu at the top of an active plug-in's box. For example, in the last step, we had two effects plug-ins arranged in a series, and we assigned these as a snapshot. Now, we want to experiment with some different settings, to get just the right sound. The picture below illustrates hot-swapping the BIAS Sqweez comp/limiter plug-in with BIAS SoundSoap, another plug-in that's

installed in our system:



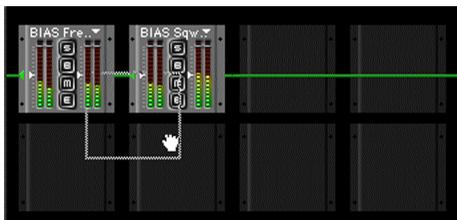
Replacing BIAS Sqweez with BIAS SoundSoap – in real time!

Another option for changing the way the audio signal is processed is to simply drag a plug-in's thumbnail icon to a different box – the example below shows how this is done – just grab a part of the plug-in's thumbnail (a part that has no controls on it!) and drag it to an empty box. A grey outline indicates where the plug-in will be dropped when the mouse button is released.

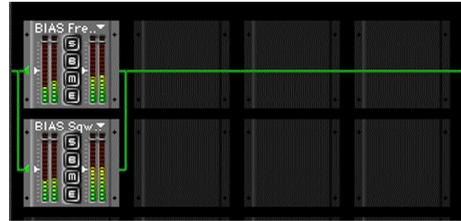


Grabbing the plug-in's thumbnail and moving it to an empty box

The next couple of pictures show moving the plug-in into a new box, finally ending up with a parallel arrangement of these two effect plug-ins.



Dragging BIAS Sqweez to a new location...

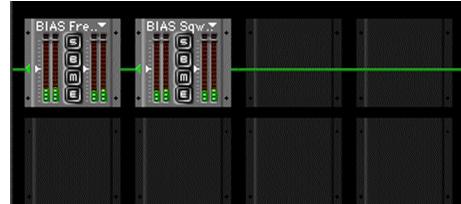


BIAS Sqweez dropped into place in a parallel row

By moving Sqweez to this new location, what has happened is that rather than having a serial plug-in arrangement, where the audio flows from one effect into the next, the signal now flows into both effects simultaneously, is processed simultaneously in each effect, and then the split signal rejoins and moves to VBox's outputs.

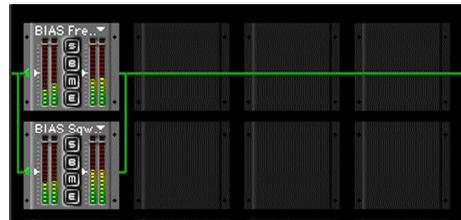
Now, back to A/B Comparisons...

So, we had saved one arrangement of plug-ins in a series as Snapshot A, which looked like this:



Snapshot A – from earlier

Let's now set the new parallel arrangement as Snapshot B, and show how to jump back and forth between the two setups. With the desired effects in the desired boxes, simply click the Assign State B button at the top of the VBox interface.

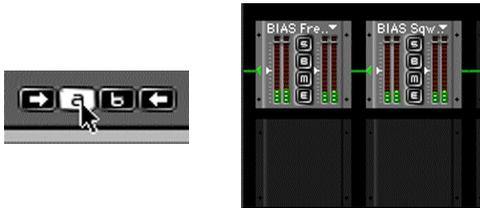


This new arrangement will be saved as "Snapshot B"

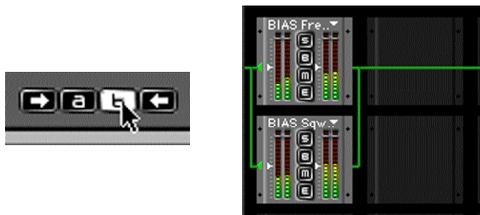


Assigning Snapshot B

With both A & B snapshots set, you can instantly recall a state by clicking either the State A or State B buttons, also at the top of the Vbox interface.



Clicking the State A button recalls this arrangement of effects...



And clicking the State B button recalls this arrangement

This feature is invaluable for quickly going back and forth between two settings.

- **Master Wet/Dry slider** - Vbox also offers a master Wet/Dry slider, to control the overall amount of effect being applied to an audio signal.



Vbox SE's Wet/Dry slider

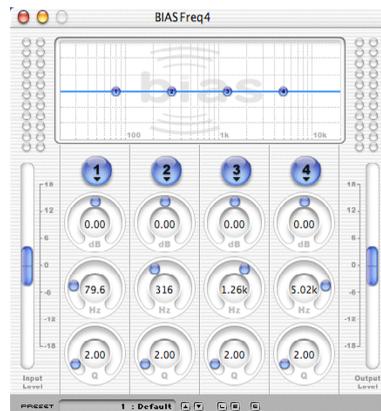
When this slider is in the “Wet” position, the audio signal being processed through Vbox is receiving 100% of the effects, and when in the “Dry” position, the audio is receiving 0% of the effects. In any other position between Wet and Dry, the signal is receiving some percentage of the effects.

Back to Song 4... - This side trip into the inner working of Vbox should help us with the original goal – to give Song 4 in our mastering project a bit more low-end presence and compression, so that it fits in with the other songs on this CD... Our last step discussed some of the benefits of using Vbox for mastering, but let's get back on track, and finish up this last song, and burn a CD!

5. With BIAS Freq & Sqweez assigned in Vbox in a series arrangement, click the Edit button in each plug-in's thumbnail icon.



Clicking the Edit button to bring up a plug-in's interface and access its controls



The BIAS Freq user interface – Freq is included with Peak 4

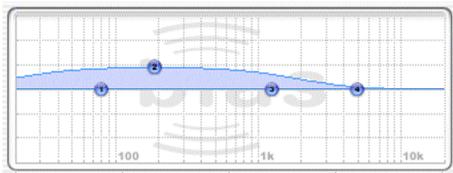
When the Freq EQ interface comes up, look for parametric filter band 2...



We lowered the "Q" value – so that filter band 2 affects a wide frequency range

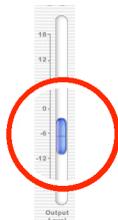
Close-up of filter band 2

Here, we lowered the Q (bandwidth) value, so this band affects a wide frequency range...



Close-up of frequency graph

We then boosted mainly the low frequencies using the numbered filter band indicators in Freq's graphical frequency display. Since we boosted some levels, we'll also lower the overall output level to avoid clipping – using the output level slider....



Close-up of Freq's master output level slider

In the Sqweez comp/limiter interface, we'll adjust the threshold, attack, release, ratio, and knee controls to the desired settings. (For more information on Sqweez's controls, please consult the Sqweez Read Me file that was installed along with Peak 4).



The BIAS Sqweez compressor/limiter plug-in – also included with Peak 4

- To apply the plug-in settings to Song 4, choose "Bounce" from the Plug-Ins menu.

DSP Effects Tools:

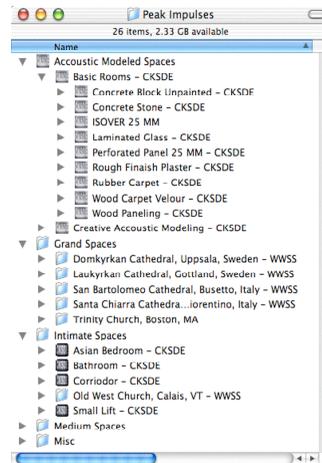
Some of Peak's most powerful audio processing tools are found under the DSP menu – there are exotic functions, such as Convolve, Change Duration, Reverse Boomerang, Rappify, Modulate, Harmonic Rotate, and ImpulseVerb – as well as more common but still useful functions, like Fade In/Out, Add, and Mix – many of Peak's DSP tools can be invaluable in a mastering session. During the mastering process, you may wish to use native DSP tools to vary levels, panning, or perhaps add a touch of reverb – to create the desired effects.

As an example of how Peak's DSP tools might be used to

enhance an audio file for just the right effect, let's look at ImpulseVerb. ImpulseVerb is a sample-based reverb tool, which operates using Peak's already powerful Convolution algorithm. Convolution is a unique and powerful sound design tool that allows you to apply the sonic (i.e., spectral) characteristics of one sound onto another. Convolution works by multiplying the frequency spectrum of the impulse contained in the clipboard and that of the target audio document, reinforcing the frequencies that are in common between the two. The results are always interesting and often quite unlike anything you've heard before. This is especially true when the character of the two sounds is very different, and when the clipboard impulse is harmonically rich (imagine for example, convolving a rainfall sample with piano tinkling!).

ImpulseVerb was specifically created to allow the convolution of Impulse-Response files with music, dialogue, etc. to create a very rich and natural sounding reverb. Impulse-Response (IR) files are essentially recordings of an environment that can be applied to other files, giving the impression that those files were also recorded in the same environment. IR files are typically created by setting up a mic (or a number of mics) in the desired environment, and recording a sound with a strong impulse to it – usually a balloon pop – and the reverberation and decay of this sound. The longer the environment (think cathedral) the longer the reverberation lasts, and when applied to another audio document, the effect is that of a very rich reverb.

Peak includes hundreds of IR files, everything from computer-modeled spaces with various types of textures, such as wood paneling or carpet, to real recordings of famous cathedrals and performance halls. In addition, users may also download IR files from the web and add them to the library of files, or they can record and add their own IR files.



Peak 4 ships with a vast library of impulse-response files from real & modeled environments

To get an idea of how this technology works, let's take a look at some files.

1. Navigate to the directory where Peak's Impulse-Response files are stored:

MacHD/Library/ApplicationSupport/BIAS/Peak/PeakImpulses/GrandSpaces/

2. Open the file called "domkyrkan1 - WWSS.aiff"

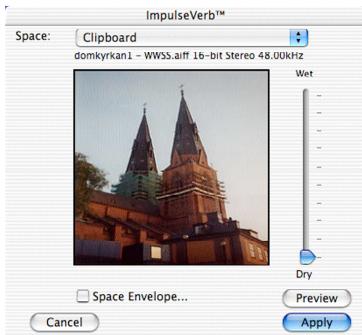


Before going any further - turn down the volume of your speakers or headphones. Impulse Response files start at their loudest volume and fade away quickly - having the volume turned up too high can damage your hearing and equipment.

3. With the volume on your playback system turned down most of the way, press the spacebar to play the IR file. This file was created by recording a balloon

pop in a large cathedral. If your system's volume was too low to hear this well, turn it up a bit and audition the file again. It's easy to hear the reverberation qualities in an IR file, and this reverb effect can be applied to any other audio file.

- Now, open another file - one of the songs from your current mastering session. Peak offers real-time preview of the ImpulseVerb DSP feature, and this is based on a selected portion of the audio waveform. Make a selection (loops work great) and then from Peak's DSP menu, choose ImpulseVerb.



The ImpulseVerb interface

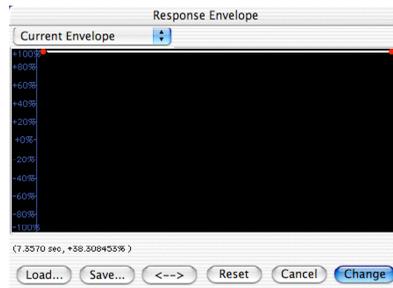
When the ImpulseVerb interface appears, choose the same IR file as you just listened to, from the Space pop-up menu - "domkyrkan1 - WWSS.aiff" - this file is in the Grand Spaces category.



ImpulseVerb's Wet/Dry slider allows real-time preview of a "space"

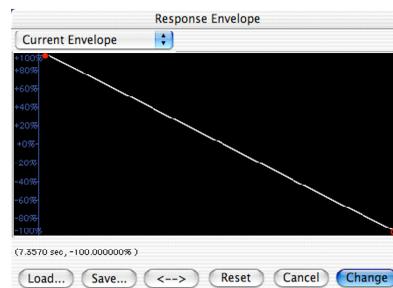
Move the Wet/Dry slider all the way to the Dry position (0% of effect applied), and click the Preview button. The area you selected in the audio waveform will now begin to play. Slowly move the Wet/Dry slider toward Wet, and you'll slowly hear more and more reverb applied to the target audio document. To apply a setting you like, just click the Apply button - to preview a different area, click the Cancel button, and select a different area of the waveform, and open ImpulseVerb again.

- If you like most of the qualities of one of the IR files, but would like to modify it slightly, you can do so by modifying the Space Envelope. The Space Envelope is an envelope that controls the length and decay of the reverb. By default it looks like this:

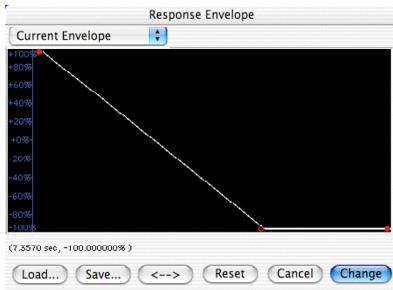


The default Space Envelope

To shorten the reverberation time of a given IR file, you may want to change the settings to something similar to those below:



A modified Space Envelope



Another modified Space Envelope – showing settings for a shortened reverb

That’s an example of one of Peak’s native DSP tools in action.

Removing Hiss, Hum, & Rumble with SoundSoap:

The next stage of our mastering exercise will be removing unwanted broadband noise with a dedicated noise reduction plug-in. This step will get rid of any low level line noise and give a little extra polish to our songs. In this case, we’ll look at the BIAS SoundSoap plug-in – which will be “plugged-in” into Peak, thereby adding broadband noise reduction processing to Peak.



Noise reduction couldn’t be easier – BIAS SoundSoap offers pro-quality broadband noise reduction, with a minimal amount of effort

SoundSoap is designed specifically to reduce/remove “broadband” noise. Broadband noise includes analog tape hiss, 50 & 60 Hz hum, low-frequency rumble, DV camera motor noise, air-conditioning system noise, and many other types of noise that have a pattern to them.

SoundSoap is not designed to work with clicks and pops, as might be encountered when recording old vinyl LPs. For information about removing clicks and pops, please refer to the section of this workbook called “Removing Clicks and Pops”.

To remove noise with SoundSoap:

The first step in reducing noise in digital media is to open the file in Peak, then open SoundSoap. The following steps will guide you through your first attempts at noise reduction.

1. Launch Peak
2. Open noisy file
3. Choose “Insert 1>VST>SoundSoap from the Plug-Ins menu
4. When the SoundSoap interface appears, enable the Learn Noise button
5. Start playback by pressing the space bar, or by clicking the Play button in Peak’s transport window
6. Listen to the results
7. To apply/render the current noise reduction settings, choose “Bounce...” from Peak’s VST Plug-Ins menu

Congratulations! You’ve just learned the basics of using SoundSoap. Now, we’ll show some advanced techniques to fine tune the noise reduction.

8. Turn the Noise Reduction knob all the way to the right for the maximum amount of noise reduction
9. While listening to your media, adjust the Noise Tuner knob to fine-tune if necessary (see tip below)
10. While still listening to your media, (in the “On” listening mode) slowly turn the Noise Reduction knob to the left to reduce the amount of noise being taken out. Continue to reduce the Noise Reduction setting until you reach an acceptable compromise between the amount of noise being reduced and any audible artifacts from the noise reduction process
11. Now, using the Mode Buttons, toggle between the “Off” and “On” listening modes. This allows you to compare the “before” and “after” states of your audio file
12. To apply/render the noise reduction settings to the file, go to Peak’s VST Plug-Ins menu, and choose “Bounce...”

Removing Clicks & Pops:

Clicks and pops are something that everyone working with digital audio will run into at one time or other. These unwanted sounds can occur in a variety of ways, and some common ways they occur are when recording old vinyl LPs, or cutting audio at non-zero crossings of the waveform.

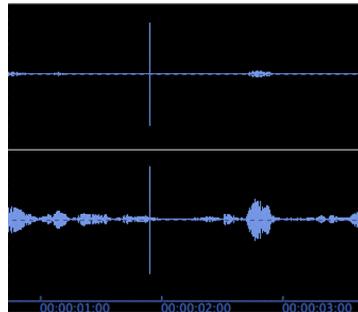
Regardless of how they occur, they’re usually unwanted artifacts, and Peak offers an easy and effective way to remove them. Peak’s Pencil Tool works by “re-drawing” the samples that make up the click or pop, essentially re-

assigning the values those samples. By smoothing out the very abrupt amplitude transition, the unwanted sound is eliminated.

The following steps show how to use the Pencil Tool to repair a click.

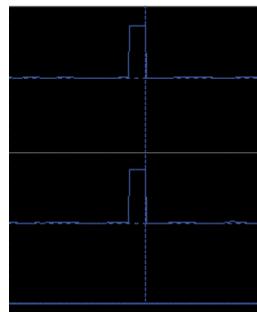
To repair a click:

1. Open an audio file in Peak that contains a click or pop.
2. Audition the file in Peak to locate the click.



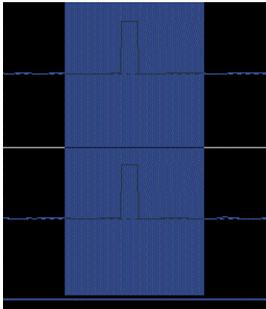
A click in an audio waveform – when zoomed out all the way

3. When you have located the click, place the mouse-cursor directly over the click, and click into the waveform, so Peak’s playhead indicator is directly over the click (or as close as possible).



A click in an audio waveform – when zoomed in to sample level

- Using the Zoom In command, zoom in on the audio waveform until you can clearly see the click.



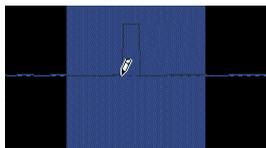
The click – selected

- From Peak's Cursor Palette, select the Pencil Tool.

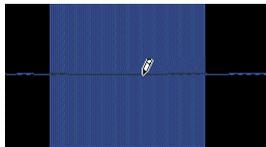


Choosing the Pencil Tool

- Draw across the the area in the waveform where the click occurs, trying to approximate the shape of the waveform on either side.



To repair a click, simply draw across its base, trying to approximate the shape on either side



The click now "drawn out"

- Zoom out and audition the section of audio that had a click - it should now be gone.



Peak 4 adds a "Magic Pencil Tool" mode that allows a selected/highlighted click to be automatically repaired – With a click selected in the audio waveform, simply select the Pencil Tool, hold down the Option key, and click the mouse button directly over the click (the audio click that is) in the waveform – Peak automatically repairs the click!

Sample Rate/Bit Depth/File Format Conversions

To master an audio CD in Peak from multiple audio documents, you'll be drawing audio regions from several different source files into a single Peak Playlist document. In order to successfully create this compilation, the bit depths and sample rates of the documents must be the same - that is, you cannot mix files with different bit depths and sample rates in a single Playlist.

To achieve a consistent bit depth and sample rate, Peak includes two very necessary processes - sample rate conversion and dithering.

Sample rate conversion allows files recorded at a high sample rates - such as 96 kHz or 192 kHz - to be reduced to 44.1 kHz as a final processing step, so that the resulting audio CD burned from Peak will be playable in any standard audio CD player. Typically, it's best to leave files in a high-resolution format for all effects processing and editing, and to reduce their sampling rate as one of the last steps before assembling a Playlist and burning an audio CD master.

Likewise, files recorded at a high bit depth - such as 24 or 32-bit - will need to have their bit-depths reduced to 16 bits before burning a master CD. Only 16-bit audio files

can be burned as a standard audio CD, and be recognizable to a standard audio CD player. The process of reducing the bit-depth of a file is known as dithering, and there are various approaches to it. Rather than simply truncating (and thus eliminating) the extra bits (and better audio fidelity), Peak uses a special dithering algorithm called POWr™ (Psychoacoustically Optimized Wordlength Reduction), which is licensed from the POWr Consortium – an industry leading audio research organization. By using this special dithering technology, the resulting 16-bit files are able to retain a higher perceived audio fidelity, such as that of a 20-bit file, for example.

File Formats

To create a Peak Playlist, you'll want to use the highest quality audio file format available. Since we're working with Peak on the Macintosh, this means working with either AIFF or Sound Designer II file formats. These formats are equal in terms of audio quality, and differ only in the type of additional information that can be stored in the file's header. This additional information may include various forms of reference markers used in different host applications.

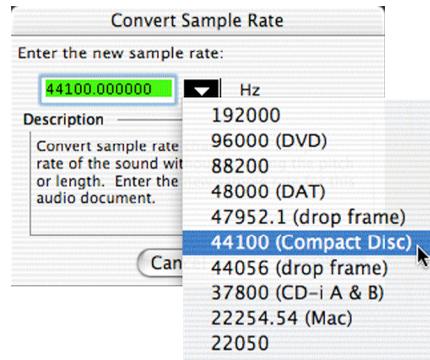
AIFF and Sound Designer II (SDII) formats may be mixed within a Peak Playlist document. It is however recommended that other file formats first be converted to AIFF or SDII before assembling a Playlist and burning an audio CD.

Performing any of the processes mentioned above is a simple - the step-by-step directions for each follow.

To Convert Sample Rate:

1. Open the desired audio document

2. From Peak's DSP menu, choose Convert Sample Rate



Choosing the audio CD standard – 44.1kHz – from Peak's Convert Sample Rate dialog

3. When the Convert Sample Rate dialog appears, choose 44,100 Hz (or 44.1 kHz) from the Sample Rate pop-up menu

To dither a file from a high bit-depth to 16-bit format, use the steps below...

To Dither a High Bit-Depth File & Save As AIFF or SDII Format:

1. Open the desired audio document – or use the same document used in the last step (Sample Rate Conversion)
2. From Peak's File menu, choose Save As...
3. When the Save dialog appears, select either AIFF or Sound Designer II from the File Type pop-up menu



4. Choose 16-bits from the Bit-Depth pop-up menu



5. Enable POWr dithering by checking the POWr dithering checkbox



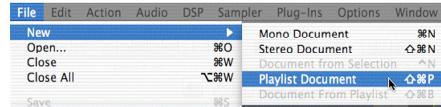
6. Click the Save button

That's all there is to it - your audio files are now ready to be compiled into a Peak Playlist document.

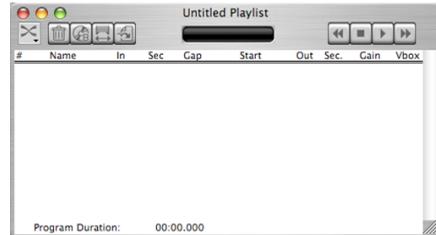
Building Playlists & Burning Audio CDs:

Now that all of our songs have been spruced up, and are all in perfect shape, it's time to assemble these in a Peak Playlist document in the desired order; add just the right gap times between songs, and perhaps crossfade some songs together, and add subtle gain changes. VST effects, plug-ins, and Vbox may also be used in the Playlist on a per region basis, with dedicated effects "snapshots" being applied individually to each region. Playlists essentially serve as a "blueprint" of a finished audio CD - the Playlist window contains Play, Stop, Next Track, and Previous Track controls, just like those found on a CD player. The CD you burn from Peak's Playlist will sound identical to the regions arranged in a Playlist.

1. The first step in building a Playlist is to open all the audio files you wish to use in it, so we'll open Songs 1-4. It's also handy to be able to quickly view/access any of the files, so you may want to tile the windows (**⌘-T**).
2. Next, create a new, empty Playlist by selecting **New>Playlist Document** from the File menu. The Peak Playlist window appears...



Creating a new Playlist document



An empty Playlist

3. Now, the idea is to add items to the Playlist - but what items can be added, and where do they come from? The only items that can be placed into a Playlist are audio regions. Regions are sections of audio documents that have been defined by Region Markers - one marker defines the beginning of a region, while another defines the end. A region can be as long as an entire audio document, or as short as a single sample. An easy way to create a region is to make a selection within the audio waveform, and then select **New Region** from the Action menu. This technique inserts a region begin marker at the beginning of the selection, and a region end marker at the end of the selection. At any point after the region markers are added to the file, the length of the region may be modified by either dragging the triangular base of a region marker to the left or right, or by double-clicking the triangular base, which brings up the **Edit Region** dialog. In this dialog, you can type in desired values for beginning, end, or overall length of the region. (Marker times may also be modified by typing into the text fields of the **File Drawer** or **Contents Palette**.)

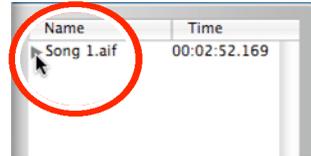
When creating regions in several audio documents, as we're doing in this example, it doesn't matter which are created first. At this stage we're not concerned

with the order of songs - that's something that will be determined in the Playlist. In the previous steps where we edited each of our four songs, Song 1 had a region created in it, so let's examine it first. Click the Toggle File Drawer button in the upper right corner of Song 1's document window.



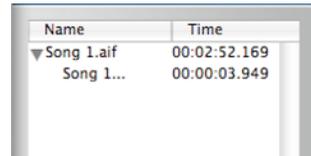
Opening an audio document's File Drawer...

Click the disclosure triangle next to the audio document's name in the File Drawer...



Clicking the disclosure triangle to reveal a list of regions

A list of any regions in that document is revealed.

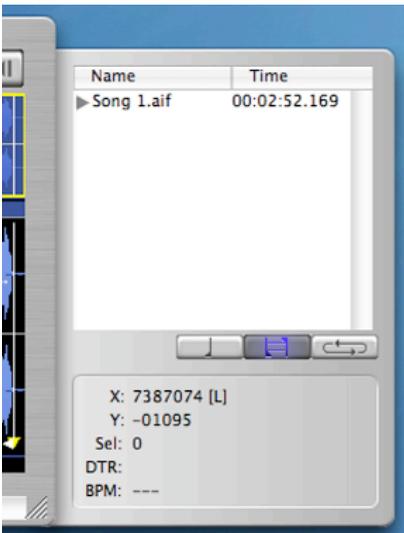


"Song1" showing the one region it contains - also called "Song1"

(Clicking the Region, Reference, or Loop Marker buttons changes what's displayed in this list).

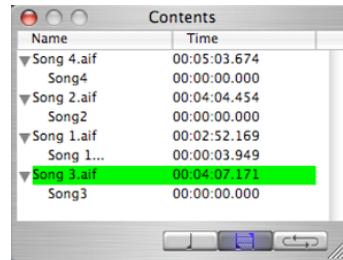


The buttons at the bottom of the File Drawer allow you to see either reference, region, or loop markers



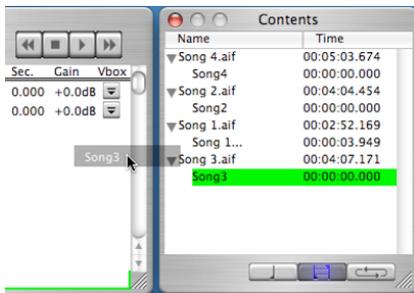
Each document's File Drawer contains a library of reference, region, and loop markers specific to that document

This is one way to access the regions that we can add to our currently empty Playlist. This method shows only the regions contained in a single audio document. In other cases, you may wish to see all the regions contained in all the open audio documents - Peak also allows this, just choose Contents from the Windows menu, and the Contents Palette appears...



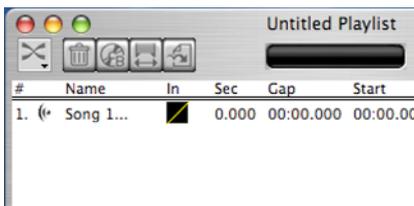
The Contents Palette is a global library of reference, region, and loop markers

The Contents Palette is a global library of region, reference, and loop markers contained in any open audio documents in Peak. Initially, you'll see each open audio document's name with a disclosure triangle just to the left of the name. Clicking these triangles reveals a list of any region, reference, or loop markers in any of the open audio documents. So, to get back to the practical stuff, click on the name of the region in Song 1's File Drawer (be sure you're clicking the name of the region, rather than the name of the document itself!) and drag it into the Playlist window.



Dragging a region from the Contents Palette into the Playlist

When you release the mouse button, you'll see that there is now one item in the Playlist.

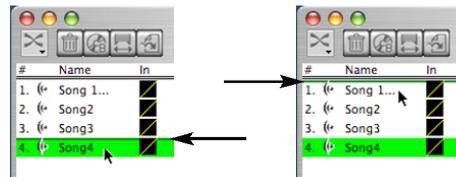


One region, or "Playlist Event" now added to Playlist

- For the other three songs, let's drag their regions from the Contents Palette into the Playlist. If the Contents Palette isn't still open, just choose it from the Window menu, and click the disclosure triangles next to each song name to access each song's

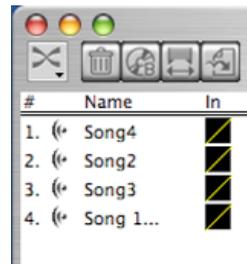
regions. In the same manner as with the File Drawer, just click on a region's name, and drag it into the Playlist. Now we've got a full Playlist with our four songs in it - if we were to burn a CD at this point, it would contain four individual tracks. Each region in a Playlist translates to a single CD track.

- Do we really want to arrange these songs in order from 1 to 4? Perhaps we really want to have Song 4 appear first, with Song 2 second, Song 3 third, and Song 1 last. Once regions are in a Playlist, they can be re-ordered by clicking on the region's name (or anywhere in the region's row) and dragging up or down. A thin, horizontal green line appears, indicating the new position of the region when the mouse button is released.



Note position of insertion point – represented by a thin, green, horizontal line. When the mouse button is released, this line indicates the new position for that Playlist Event/Region

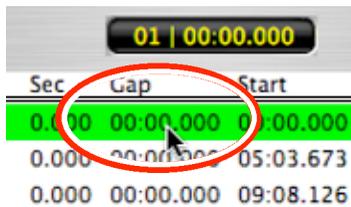
We'll move the regions around so that by region name, they appear in this order: 4, 2, 3, 1...



Our finished Playlist – with songs in the desired order

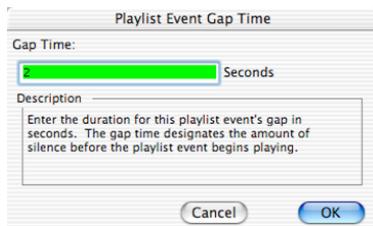
- We have the songs in the correct order now, but what else can be done in the Playlist? We can also designate the gap time between tracks, or control

how two songs are crossfaded and blended into one another. Let's add a standard two second gap between the first, second, and third songs, but then we'll crossfade the third song into the last song, so that they blend together seamlessly. To create the two second gaps for the first few songs, just double-click in the region's row, under the Gap Time column...



Double-clicking a Playlist Event under the Gap Time column lets you type in a custom gap time duration

When the Playlist Event Gap Time dialog appears, type in 2, for a two second gap time...



The Playlist Event Gap Time dialog

- To blend the end of Song 3 into the beginning of Song 1, we must create a crossfade between the two, another process that's always performed in the Playlist window. There are two ways to create crossfades - the first is by simply double-clicking in the "Sec" (Seconds) column and typing in the desired length of the fade in seconds. Keep in mind that each region's row has two "Sec" columns, one for fading in and the other for fading out. To use this technique to crossfade Songs 3 and 1 together, we would need to assign a fade out

value for Song 3, and the fade in time for Song 1. If we wanted to have a simple 5 second crossfade between the two regions, we'd just type in a 5 second fade out time for Song 3, and a 5 second fade in for Song 1. Since the fade in and fade out happen simultaneously, the effect is that the two songs blend together. Look at the diagram below for more detail...

Name	In	Sec	Gap	Start	Out	Sec.
Song4	█	0.000	00:02.000	00:00.000	█	0.000
Song2	█	0.000	00:02.000	05:05.673	█	0.000
Song3	█	0.000	00:00.000	09:12.126	█	5.000
Song 1...	█	5.000	00:00.000	13:19.297	█	0.000

Typing a Fade-Out value of 5 seconds directly in the Playlist...

Name	In	Sec	Gap	Start	Out	Sec.
Song4	█	0.000	00:02.000	00:00.000	█	0.000
Song2	█	0.000	00:02.000	05:05.673	█	0.000
Song3	█	0.000	00:00.000	09:12.126	█	5.000
Song 1...	█	5.000	00:00.000	13:19.297	█	0.000

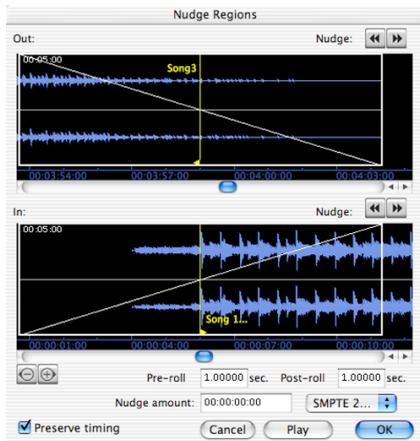
And a Fade-In value of 5 seconds

- Sometimes it's not possible or practical to simply enter these fade times without a visual reference to the audio material. In these cases, you'll want to use the Playlist's Nudge Regions window, which is a visual region crossfade editor. This window allows you to visually see where in the audio waveform the fades will occur, and compare the fade in portion of one region to the fade out of the next region. When using the Nudge Regions window, it's important to always select the region in the Playlist that you'll be fading into, and then going into the Nudge Regions window. Since we'll be fading into Song 1, our last song, we'll first select Song 1 in the Playlist, and then click the Nudge Regions button in the upper left of the Playlist to open the graphical editor.



Clicking the Nudge Regions button

The Nudge Regions window appears...

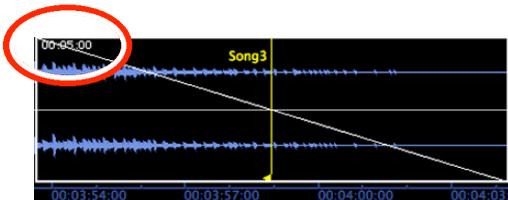


The "Nudge Regions" window is a graphical region crossfade editor

- Notice that the Nudge Regions window opens with fade-in & fade-out envelopes already in place - the reason for this is because we had already typed in a value of 5 seconds directly in the Playlist for how long these fades should be. Essentially, you can either type a crossfade value right into the Playlist, or you can open the Nudge Regions window and click in the audio waveform and drag the fade envelope to the desired length.

Name	In	Sec	Gap	Start	Out	Sec.
Song4	█	0.000	00:02.000	00:00.000	█	0.000
Song2	█	0.000	00:02.000	05:05.673	█	0.000
Song3	█	0.000	00:00.000	09:12.126	█	5.000
Song 1...	█	5.000	00:00.000	13:19.297	█	0.000

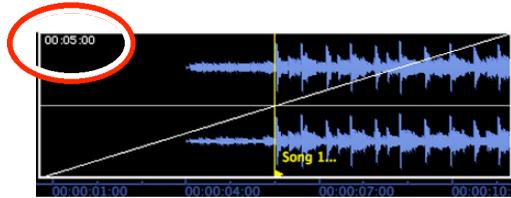
Entering a 5 second Fade-Out value in the Playlist...



Is the equivalent of dragging the Fade-Out envelope in the Nudge Regions window to a length of 5 seconds...

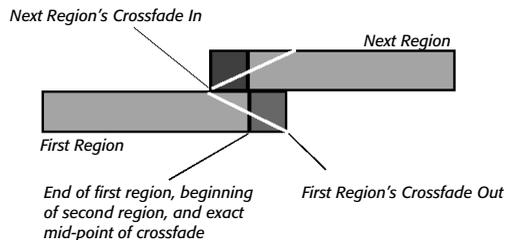
Name	In	Sec	Gap	Start	Out	Sec.
Song4	█	0.000	00:02.000	00:00.000	█	0.000
Song2	█	0.000	00:02.000	05:05.673	█	0.000
Song3	█	0.000	00:00.000	09:12.126	█	5.000
Song 1...	█	5.000	00:00.000	13:19.297	█	0.000

And entering a 5 second Fade-In value for the next region...



Is the equivalent of creating a 5 second Fade-In envelope in the Nudge Regions window

Both techniques will give the same length of fades, but the Nudge Regions window is handy for cases that need a visual representation of the audio regions being crossfaded together. We can now click on the existing 5 second fade envelopes and drag them with the mouse to a different length. The controls at the bottom of the Nudge Regions window allow us to audition the transition between the two regions, to see if the crossfade will work. Pre-roll & post-roll values may be entered to give a bit of extra audio preceding and following the crossfade, which also helps to put the transition in the context of the audio that comes before and after it. To hear the crossfade, click the Play button, and to stop playback, click the Stop button (Play button changes to a Stop button once playback is engaged).



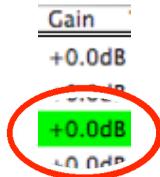
Crossfade Diagram



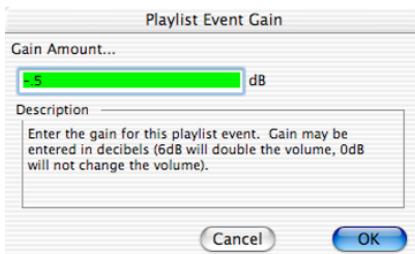
It is very important to understand that the Region marker in the reference audio document is the exact midpoint of the fade. Consequently, there must be sufficient audio data on either side of the Region marker. That is, if you have a 60 second crossfade between two Playlist Events (regions), there must be at least 30 seconds of audio data following the end region marker of the first playlist event (region), and there must be at least 30 seconds of audio data preceding the begin region marker of the second playlist event (region).

For our purposes, the original 5 second crossfade should work fine - let's move on.

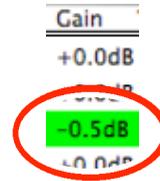
- Let's add a slight gain reduction to Song 3 - also the third item in our Playlist. To adjust the gain, simply double-click in Song 3's row, under the Gain column, the Playlist Event Gain dialog appears, and allows you to specify the gain in Decibels.



Double-clicking a Playlist Event under the Gain column allows you to non-destructively specify a new Gain value

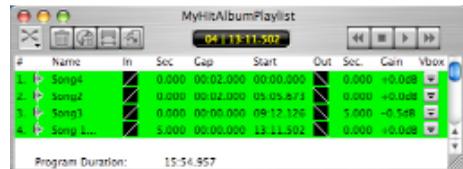


The Playlist Event Gain dialog



After a -5dB gain change

- Our completed Playlist arrangement is now finished, and ready to burn to a Red Book master CD. We'll check that the Playlist is the front-most document in Peak, and choose Select All from the Edit menu to indicate the items you wish to be burned to CD.



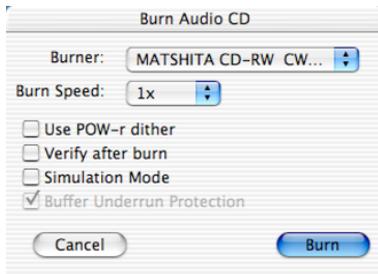
Select all the items in a Playlist to burn them all to CD

- Click the Burn Audio CD button in the upper left corner of the Playlist window...



Click the Burn button when your Playlist is as you like it

The Burn Audio CD dialog in Peak gives you various options - choosing from multiple burners that may be connected to your Macintosh, using POWr dithering (if burning from 24 or 32 bit files), verifying the CD after burning, and burning in Simulation Mode. Select the desired options, and click Burn.



The Burn Audio CD dialog gives various burning options

13. Peak prompts you to insert a blank CD...



Peak will prompt you for blank media

14. You can monitor burn progress in Peak's Transport window...



Monitoring burn progress in the Transport window

15. In just a few minutes, your CD is finished! Congratulations! You've just learned all that's required to master and burn an audio CD direct from Peak!

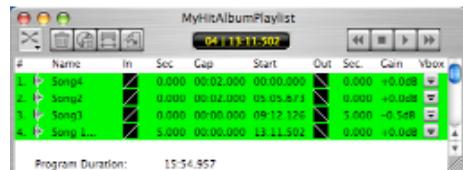


Your hit album master is ready!

Exporting a Playlist for use in Roxio Jam

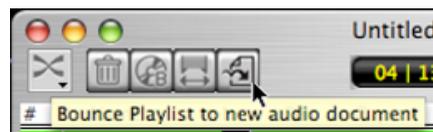
In addition to burning audio CDs directly, Peak can also export a completed Playlist as a Jam Image file, for use in Roxio's Jam CD mastering software. Jam Image files exported from Peak can be opened in Jam, and at any point while working in Jam, these files can be opened back up in Peak for editing. Like many other audio and video applications, Jam allows Peak to be assigned as a dedicated external audio editor. To export a Peak Playlist in Jam Image file format, follows these steps:

1. Build a Peak Playlist



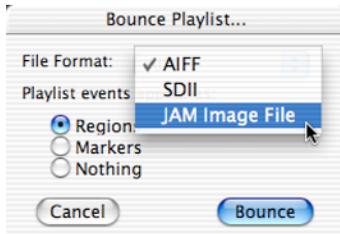
Select All in a Playlist to bounce all Events/Regions to a new file

2. Select all in the Playlist
3. Click the Bounce Playlist button, in the upper left corner of the Playlist window.



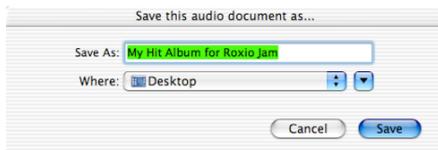
Clicking the the Bounce Playlist button

4. In the Bounce Playlist dialog, select Jam Image from the File Format pop-up menu, and click the Bounce button.



Choose JAM Image File from the File Format menu

5. A Save dialog appears - enter a name for your file, and click Save.



Choose a name and location for the JAM Image file

6. Your Jam Image file is saved and ready to open in Roxio Jam.



A JAM Image file, with all info from the Peak Playlist – ready to open in JAM

That's all there is to mastering a CD in Peak!
