6 Using Noise Reduction Filters



You can add new life to old or low quality audio recordings using Adobe Audition's enhancement and restoration effects. Distracting hiss or background noise can easily be removed with the Noise Reduction effect. Pops, clicks and crackles can be identified and removed using Audition's Spectral View. In this lesson, you'll learn how to do the following:

- Navigate through Audition's Effects tab.
- Apply effects to loops.
- Save effects settings.
- Create and save a noise reduction profile.
- Remove pops, crackles and hiss from a recording.
- Use Parametric and Graphic Equalizers.

Getting started

In this lesson, you will be utilizing Adobe Audition's built-in effects to improve the overall quality of a waveform. Because many recordings do not take place in a sound booth or professional recording studio, noise is typically recorded along with the focus of your recording. Noise can be described as underlying frequencies, usually at lower amplitudes, which are picked up by the microphone during the recording session. Street noise, crowd noise, and the buzz of nearby electronic devices—such as a fan, are all examples of noise which can be recorded unintentionally.

Noise and imperfections in a recording may also be related to the recording source. Creating a digital loop from an analog source, such as a record player, may result in crackles or pops throughout the recording, due to scratches or imperfections in the vinyl record itself.

In this lesson you will use some of the tools available in Adobe Audition for repairing or removing audio imperfections.

- 1 Start Adobe Audition and click on the Multitrack View tab, if not already selected.
- **2** Choose File > Open Session, and open the 06_Start.ses file in the AA_06 folder, which is located in the AA_CIB folder on your hard disk.

Note: If you have not already copied the resource files for this lesson onto your hard disk from the AA_06 folder on the Adobe Audition 1.5 Classroom in a Book CD, do so now. See "Copying the Classroom in a Book files" on page 2.

3 Choose File > Save Session As, and name the file **06_Recording.ses**, and save it in the AA_06 folder.

4 To review the finished session file, choose File > Open Session, and open the 06_end.ses file in the AA_06 folder, which is located within the AA_CIB folder on your hard disk. Play the session file by either clicking on the Play button () in the Transport Controls toolbar, or pressing the spacebar on your keyboard.



5 When you are ready to start working on the lesson, close the 06_end.ses file by choosing File > Close Session and Its Media.

6 Select File > Open Session to reopen the 06_Recording.ses file you created in the previous steps.

Tools to clean up sound

The lesson files in this chapter are modeled after an amateur radio commercial demo. The Voice Over track recording was created using a low-quality microphone in a non-studio environment. The Guitar track is a sampled loop recorded from an old heavily used vinyl record. As you play this session file, note all the residual noise which is evident throughout the session. Listen to each track individually by clicking on the Solo button (3), then pressing the spacebar on the keyboard to play. Notice that the Voice Over track has a substantial amount of noise in the background of the recording. The Guitar track contains hiss, pops and clicks throughout the loop as a result of the wear in the vinyl record.

Audition offers several effects which can be utilized to repair these imperfections. These tools are available in the Edit View. Any change made to these files within the Edit View are destructive and will require that the changes be saved. You can also save the file using a new file name by choosing the File > Save As command.

Creating a noise reduction profile

Using Audition's Noise Reduction Profile feature you will isolate the background noise from the Voice Over sample. You will use this noise reduction profile as a filtering effect throughout the entire recording.

1 Double-click into the VoiceOver_Take1.cel loop located in the multitrack in the Voice Over track. This opens the file in the Edit View.

2 Press the Home key and then click the Zoom to Selection button ((a)) once to zoom in slightly. When you previewed the file you may have noticed a slight pause before the subject begins speaking. The file contains approximately 1 second of background noise during this pause. Isolate the first second of this waveform by clicking and dragging in the Edit View display window. Your selection should end prior to any significant change in the waveform.



3 Click on the Effects Tab in the Organizer window. Select the plus sign (Ⅲ) positioned to the left of the Noise Reduction effect. The effect expands, revealing options.



4 Double-click on the Capture Noise Reduction Profile option from the Organizer window. If an Alert window opens, informing you that a profile is being created from the current selection, click OK. A window appears illustrating Audition's progress in creating the profile, and then the window closes after the profile is created.

5 Click anywhere in the waveform to clear the current selection and then press the Home key to place the current-time indicator at the beginning. Double-click the Noise Reduction effect in the Organizer window. The Noise Reduction effect window is displayed.



6 In the Noise Reduction effect window, click the Select Entire File button to select the entire recording, then select the Preview button to listen to the file as you make changes. Allow the file to continue to play.

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7 As you move the Noise Reduction Slider left to right, make note of its effect on the file. Move the slider to the 75% position or click into the input area and enter 75 as the value. Allow the file to continue to play.



8 Click the Spectral Decay Rate field at the bottom of the window and enter 25 as the value. Click the Bypass option to hear the original file. Click Bypass again to restore the effect. The background noise is much less prominent.



9 Click OK to close the Noise Reduction window and apply the changes to the entire waveform. Choose File > Save As to save the revised Voice Over_Take1 file.

In the Save As window, enter the name **VoiceOver.cel** and then click the Save button. Click Yes to overwrite the original file with the same name.

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10 Press the F12 key to switch to the Multitrack View, and then play the session file using the spacebar on your keyboard or use the Play button in the Transport Controls.

11 Save your session by selecting File > Save Session.

Removing pops, crackles, and hiss

Pops and clicks are artifacts which can be unintentionally recorded from an outside source. They may also be the result of an audio file having been cut and looped. The GuitarRiff_from_Vinyl loop, which is part of the Guitar track, contains several clicks which you will remove using Audition's Pop/Click Eliminator effects.

1 Click the Files tab to display the Organizer window. Double-click on the GuitarRiff_from_Vinyl.cel file in the Organizer window to open this file in the Edit View.

2 Preview the file by pressing the spacebar, making note of the audible pops and clicks and their connection to the large spikes in the waveform.



3 Click onto the Effects tab in the Organizer window. Within the Effects Tab, click the plus sign () for Noise Reduction to reveal the Noise Reduction effects, if necessary. Double-click the Click/Pop Eliminator effect, opening the Click/Pop Eliminator window.



4 Select the Old Record—Quiet Audio option from the Preset portion of the window, then click the Find Threshold Levels Only button. This creates a threshold for minimum, average and maximum decibels (dB).



5 For each threshold value, input a new Reject value of 15, causing Audition to isolate more clicks.

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6 Save your options as a preset by clicking on the Add button in the upper right corner of the Click/Pop Eliminator window. Enter **Old_Vinyl** as the name for the preset and then click the OK button.

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7 In the Click/Pop Eliminator window, click the OK button to initiate the changes to the GuitarRiff_from_Vinyl file.

8 Play the modified file by pressing the Play button in Transport Controls or use the spacebar on your keyboard.

9 Select File > Save As. If necessary, navigate to the AA_06 folder on your hard disk. Name the file **GuitarRiff.cel** and then click the Save button. Click Yes to overwrite the original file with the same name.

Using the Auto Click/Pop Eliminator effect

If you need to quickly remove crackle and static from vinyl recordings, first try the Auto Click/Pop Eliminator effect. You can easily select and correct a large area of audio, or a single click or pop. This effect provides the same processing quality as the Click/Pop Eliminator effect, but it offers simplified controls and a helpful preview.

At this point the guitar sample has been modified significantly. You should notice dramatic improvements in the overall quality of the recording. Using some more specific effects tools, you will now isolate and eliminate the hiss which remains. You will also remove the remaining pop located midway through the loop.

10 From the Effects options in the Organizer Window, double-click the Hiss Reduction effect. The Hiss Reduction window opens.



11 In the Presets portion of the window, select the High Hiss Reduction setting, then click on the Preview button to hear your changes. Allow the file to continue to play.

12 Drag the Noise Floor Adjust slider toward the right until a setting of approximately 10dB is achieved.

You can also manually enter values by clicking into the input box and entering the value from your keyboard.



13 Click the OK button to confirm your changes, and then choose File > Save to save the revisions to the GuitarRiff_from_Vinyl file.

14 Select View > Spectral View, to display the spectral analyzer. Spectral View displays a waveform by its frequency components.



In the Spectral View, the x-axis (horizontal) represents time and the y-axis (vertical) measures frequency. This view lets you analyze audio data to see which frequencies are most prevalent. The greater a signal's amplitude component within a specific frequency range, the brighter the displayed color. Colors range from dark blue, indicating that the frequencies are very low in amplitude, to bright yellow, indicating that the frequencies are high in amplitude.

15 Press the spacebar on your keyboard to play the file. Notice that the pop correlates to the large spike indicated in the spectral view at around beat 2:4 of the waveform.

16 In the timeline, right-click and then drag to zoom into the area of the pop. Select the pop in the Spectral View window by left-clicking and dragging, to make the selection.

Note: If you zoomed into an incorrect view, you can click the Zoom Out Full Both Axis button to expand the view. You can also right-click in the timeline and choose Zooming > Zoom Full.



 \forall To select noise in a specific frequency range, use the Marquee Selection tool (\Box).

17 Double-click the Click/Pop Eliminator effect in the Organizer window. The Click/ Pop Eliminator window opens.

18 In the Click/Pop Eliminator window, select the Old-Vinyl Preset you previously saved. This is located in the Presets portion of the window. Keep the Click/Pop Eliminator window open.



19 Select the Fill Single Click Now button. This repairs an individual click. Press OK to confirm your changes and close the Click/Pop Eliminator window.

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Repairing single clicks

The Favorites tab in the Organizer window contains several effect presets. The Repair Transient preset is an effective tool for repairing single clicks or pops in an waveform. In the Edit View, make your selection, then select the Favorites tab in the Organizer window. Double-click on the Repair Transient option and Audition will repair the single instance in the waveform.

20 Choose File > Save to save your changes.

Using Parametric and Graphic Equalizer to change sound quality

The Parametric Equalizer provides maximum control over tonal equalization. Unlike the Graphic Equalizer, which provides a fixed number of frequencies and Q bandwidths, the Parametric Equalizer gives you complete control over frequency, Q, and gain settings. For example, you can simultaneously reduce a small range of frequencies centered around 1,000 Hz, boost a broad low-frequency shelf centered around 80 Hz, and insert a 60 Hz notch filter.

The Graphic Equalizer allows for modification of specific frequencies. By isolating typical frequencies produced by the human voice, the recorded VoiceOver.cel file can be improved using Adobe Audition.

1 In the Organizer window, click to select the Files tab. Double-click the VoiceOver.cel file, opening the file in the Edit View.

2 Click on the Effects tab of the Organizer window and, if the waveform is not selected, choose Edit > Select Entire Wave.



3 In the Effects window click the plus sign (𝔁) to the left of Filters. Double-click the Graphic Equalizer option, and the Graphic Equalizer window is displayed.

4 In the Graphic Equalizer window activate the Bypass option by clicking the check box. Select the Preview button to play your file.



5 Click the Stop button to stop the playback of the file. Click the Bypass checkbox to deselect this option. By default, the Graphic Equalizer automatically selects a preset. Choose the Bypass option and the preset is ignored, so you hear the original file.

6 In the Presets portion of the window, select the Sloping Low End Boost option. It may be necessary to scroll down through the list of presets to locate this option. Click the Preview button to play the file with the graphic equalization effects applied. At this point you should notice an increase in the lower frequencies of the voice, resulting in a broader, fuller sound. Click the Stop button, then click OK.



7 Select File > Save to save your changes to the VoiceOver.cel file.

8 Click on the Multitrack View button () to view your session. Preview your file by clicking on the Play to End of File button () or pressing the spacebar. When you have finished listening to your file select File > Save Session.

Preview buttons in Effects windows change to Stop buttons during playback of .wav files. You may also utilize the spacebar to toggle playback of files if the Preview button is active.

Review questions

1 What are some typical causes of noise and artifacts in sound files?

2 How can you set up a recording to later eliminate any existing background noise from the session?

- **3** What are the major differences between Graphic and Parametric Equalizer effects?
- 4 Can equalization effects be used in both Edit and Multitrack Views in Audition?

Review answers

1 Electronic equipment, poor recording source, or improper loop creation are some typical examples.

2 Allow for at least one second of silence at the very start of your recording. You can use this to build a Noise Reduction Profile which can be used later for the entire waveform.

3 Graphic Equalizers provide a fixed number of frequencies and bandwidths, whereas a Parametric Equalizer allows for control of gain, Q, and frequency.

4 Not all equalization effects are available in both the Edit and Multitrack views. When using an equalization effect in Edit View, it is considered destructive editing, as the waveform is physically altered from its original state. Introducing an effect in Multitrack View maintains the settings of the effects as being a process of the multitrack session, separating them from the waveform itself.

On your own

The graphic nature of the FFT (Fast Fourier Transform) Filter effect makes it easy to draw curves or notches that reject or boost specific frequencies. This effect can produce broad band-pass filters such as high- and low-pass filters (to maintain high and low frequencies, respectively), narrow band-pass filters (to simulate the sound of a telephone call), or notch filters (to eliminate very narrow frequency bands).

In order to round out the session file in a final step, an FFT Filter allows for the limiting of higher frequencies over an entire wave file. Reducing these frequencies helps to push the file farther into the background of our session file, leaving the Voice Over track as the main focus.

Note: The noise level of the FFT Filter effect is lower than that of 16-bit samples, so it introduces no noise when processing audio at 16-bit resolution or lower.

1 In the Files tab of the Organizer window, double-click the GuitarRiff.cel file, opening it in Edit View.

2 Click to select the Effects tab in the Organizer window.

3 Select the FFT Filter option from the Filters menu in the Organizer Window by double-clicking.

4 In the Presets portion of the window, scroll down and select The Club Downstairs preset. Click OK.

5 Preview the file by pressing the spacebar or clicking the Play button.

6 Save the file by choosing File > Save.