Starting the lesson

It's rare to have audio recorded on-camera that is perfect for your final output. There are several things you might want to do with sound in Premiere Pro.

- Set Premiere Pro to interpret recorded audio channels differently from the way they were recorded in-camera. For example, audio recorded as stereo can be interpreted as separate mono tracks.
- Clean up background sound. Whether it's system hum or the sound of an air-conditioning unit, Premiere Pro has tools for adjusting and tuning your audio.
- Adjust the volume of different frequencies in your clips (different tones) using EQ effects.
- Adjust the volume level on clips in the bin and on clip segments in your sequence. The adjustments you make on the Timeline can vary over time, creating a complete sound mix.
- Add music and mix levels between music clips.
- Add audio spot effects, such as explosions, door slams, or atmospheric environmental sound.

Consider the difference it makes if you turn the sound off when watching a horror movie. Without an ominous soundtrack, scenes that were scary a moment ago can seem like comedy.

Music works around many of our critical faculties and directly influences our emotions. In fact, your body reacts to sound whether you want it to or not. For example, it's normal for your heart rate to be influenced by the beat of the music you're listening to. Fast music tends to raise your heart rate, and slow music tends to lower your heart rate. Powerful stuff!

In this lesson, you'll begin by learning how to use the audio tools in Premiere Pro and then make adjustments to clips and a sequence. You'll also use the Audio Mixer to make changes to your volume "on the fly" while your sequence plays.

Setting up the interface to work with audio

Let's begin by switching to the Audio workspace.

1. Open Lesson 11.prproj.
2. Save the project as Lesson 11 Working.prproj.
3. In the Workspaces panel, click Audio. Then open the menu adjacent to the Audio option, and choose Reset To Saved Layout.

Working in the Audio workspace

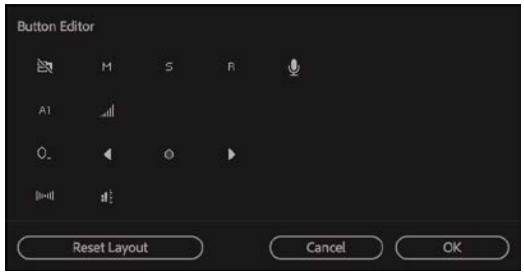
You'll recognize most of the components of the Audio workspace from the video-editing workspaces you've used. One obvious difference is that the Audio Clip Mixer is displayed in place of the Source Monitor. The Source Monitor is still in the frame; it's just hidden, grouped with the Audio Clip Mixer.

You can modify the appearance of the Timeline track headers to include an audio meter for each track, along with track-based level and pan controls.

To add audio meters to your tracks, follow these steps:

1 Open the Timeline Settings menu , and choose Customize Audio Header.

The Audio Header Button Editor appears.

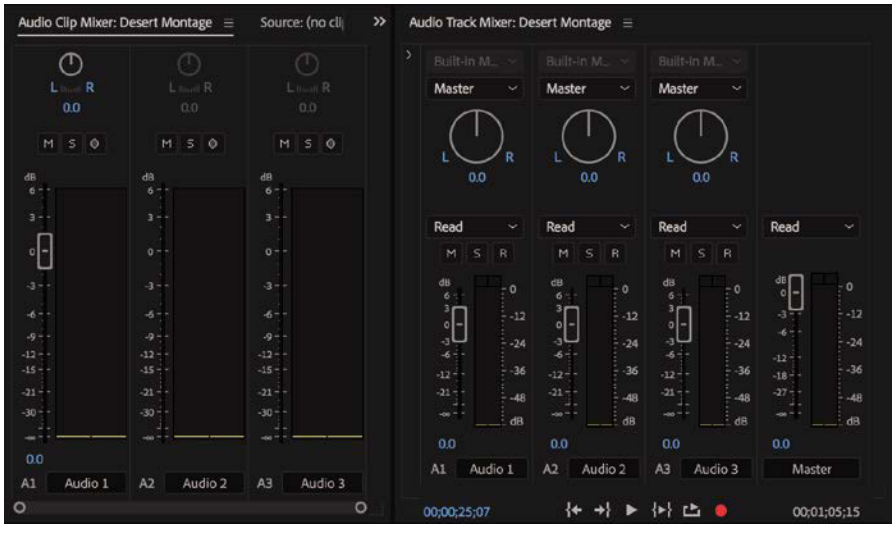


2 Drag the Track Meter button onto a Timeline audio header, and click OK.

When you click OK, the audio track headers return to their previous size. You may need to resize an audio header vertically and horizontally to see the new meter.

Now every audio track will have a small built-in audio meter.

It's important to understand the key differences between the Audio Clip Mixer panel and the Audio Track Mixer panel.



They look similar but apply different adjustments.

- **Audio Clip Mixer:** This provides controls to adjust the audio level and pan of sequence clips. As you play your sequence, you can make adjustments, and Premiere Pro will add keyframes to clips as the Timeline playhead moves over them.
- **Audio Track Mixer:** This adjusts audio level and pan on tracks rather than clips.

  Clip adjustments and track adjustments are combined for final output. So, if you reduce the clip audio level by –3 dB and then also reduce the track audio level by –3 dB, you'll have a total drop of –6 dB. The Audio Track Mixer is more advanced and also offers track-based audio effects and submixes, which allow you to combine the outputs from multiple tracks.

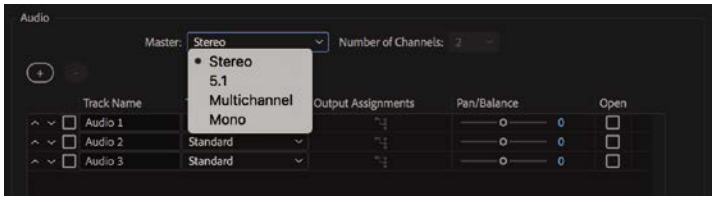
You can apply clip-based audio effects and modify their settings in the Effect Controls panel.

Clip-based audio adjustments and effects are applied before track-based adjustments and effects.

Defining master track output

When you create a new sequence, you define the number of audio channels it outputs by choosing an audio master setting. It's easiest to think of your sequence as a media file. It will have a frame rate, frame size, audio sample rate, and audio channel configuration.

The audio master setting is the number of audio channels the sequence would have if it were a file.



The default audio mastering setting is Stereo.

- Stereo has two audio channels: Left and Right.
- 5.1 has six audio channels: Middle, Front-Left, Front-Right, Rear-Left, Rear-Right, and Low Frequency Effects (LFE)—that's the sound that gets played through the subwoofer.
- Multichannel has between 1 and 32 audio channels—you can choose.
- Mono has one audio channel.

What is an audio channel?

It's common to think that Left and Right audio channels are in some way identifiably different. In fact, they are both simply mono audio channels designated as Left or Right. When recording sound, it's the standard configuration to have Audio Channel 1 as Left and Audio Channel 2 as Right.

What makes Audio Channel 1 Left is simply the following:

- It's recorded from a microphone pointing left.
- It's interpreted as Left in Premiere Pro.
- It's output to a speaker positioned on the left.

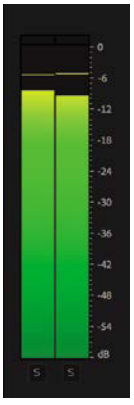
None of these factors changes the fact that it is still a single mono channel. They are nothing more than conventions.

If you perform the same recording from a microphone pointing right (but with Audio Channel 2), then you have stereo audio. They are, in fact, two mono audio channels.

You can change most sequence settings later, but not the audio master setting. This means that, with the exception of multichannel sequences, you cannot change the number of channels that your sequence will output.

You can add or remove audio tracks at any time, but the audio master setting is fixed. If you need to change your audio master setting, you can easily copy and paste clips from a sequence with one setting to a new sequence with a different setting.

Using the audio meters



The primary function of the audio meters is to give you the overall mix output volume for your sequence. As your sequence plays, you'll see the level meter dynamically change to reflect the volume.

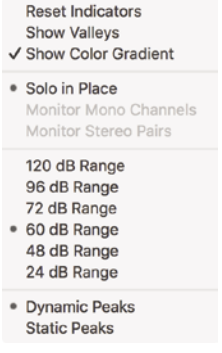
To view the audio meters:

- If the audio meters are not already displayed, choose Window > Audio Meters.

  In the default Audio workspace, the audio meters are displayed, but they are relatively narrow. You may want to make the panel wider when working with them.

- There are Solo buttons at the bottom of the audio meters, which allow you to exclusively hear the channel you select. If the Solo buttons are displayed as small circles, drag the left edge of the panel a little to make the meters wider. Larger Solo buttons will be displayed.

  Note: The Solo buttons are not displayed when using the more advanced multichannel audio mastering option.



- If you right-click the audio meters, you can choose a different display scale. The default is a range from 0 dB to –60 dB, which clearly shows the main level information you'll want to see.

You can also choose between static and dynamic peaks. When you get a loud "spike" in audio levels that makes you glance at the meters, the sound is gone by the time you look. With static peaks, the highest peak is marked and maintained in the meters so you can see what the loudest level was during playback up to that point.

You can click the audio meters to reset the peak. With dynamic peaks, the peak level will continually update; keep watching to check the levels.

About audio level

The scale displayed on the audio meters is decibels, denoted by dB. The decibel scale is a little unusual in that the highest volume is designated as 0 dB. Lower volumes become larger and larger negative numbers until they reach negative infinity.

If a recorded sound is too quiet, it might get lost in the background noise. Background noise might be environmental, such as an air-conditioning system making a hum. It also might be system noise, such as the quiet hiss you hear from your speakers when no sound is playing.

When you increase the overall volume of your audio, background noise gets louder too. When you decrease the overall volume, background noise gets quieter. This means it's often better to record audio at a higher level than you need (while avoiding over-driving) and then reduce the volume later to remove (or at least reduce) the background noise.

Depending on your audio hardware, you may have a bigger or smaller signal-to-noise ratio; that's the difference between the sound you want to hear (the signal) and the sound you don't want to hear (the background noise). Signal-to-noise ratio is often shown as SNR, also measured in dB.

Viewing samples

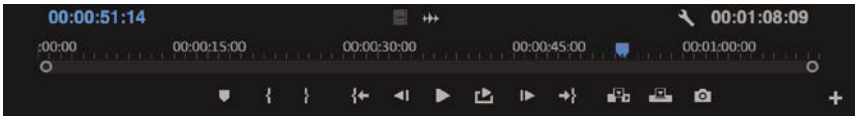
In this exercise, you'll look at an audio sample.

1 In the Project panel, open the Music bin, and double-click the clip Cooking Montage.mp3 to open it in the Source Monitor.

Because this clip has no video, Premiere Pro displays the waveforms for the two audio channels.

At the bottom of the Source Monitor and Program Monitor, the time ruler represents the total duration of the clip.

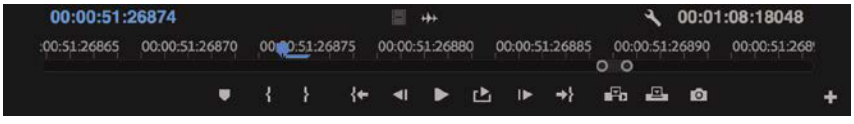
2 Click the Source Monitor Settings menu, and choose Time Ruler Numbers.



The time ruler now shows timecode indicators on the time ruler. Try zooming in to the time ruler using the navigator. The maximum zoom shows you an individual frame.

3 Click the Source Monitor Settings menu again, and choose Show Audio Time Units.

This time, you'll see individual audio samples counted on the time ruler. Try zooming in a little more. Now you can zoom in to an individual audio sample—in this case, one 48,000th of a second.



The Timeline panel has the same option to view audio samples in the panel menu (rather than the Timeline Settings menu).

4 For now, switch off the Time Ruler Numbers option and the Show Audio Time Units option in the Source Monitor using the Settings menu.

Note: The audio sample rate is the number of times per second the recorded sound source is sampled. It's common for professional camera audio to take a sample 48,000 times per second.

Showing audio waveforms

When you open a clip in the Source Monitor that has only audio (no video), Premiere Pro automatically shows the audio waveforms.

When you use the waveform display option in the Source Monitor or Program Monitor, you'll see an extra navigator zoom control for each channel. These controls work in a way that's similar to the navigator zoom control at the bottom of the panel. You can resize the vertical navigator to see the waveforms larger or smaller, which is useful if your audio is quiet.

Note: This option is great if you are trying to locate some specific dialogue and you are not so concerned about the visuals.

You can choose to display audio waveforms for any clip that has audio by choosing Audio Waveform in the Source Monitor and Program Monitor Settings menus.

If a clip has video as well as audio, the video will be displayed in the Source Monitor by default. You can switch to viewing the audio waveform by clicking the Drag Audio Only button .

Let's look at some waveforms.

1 Open the clip HS John from the Theft Unexpected bin.

2 Click the Source Monitor Settings menu, and choose Audio Waveform.

You can easily see where the dialogue begins and ends.

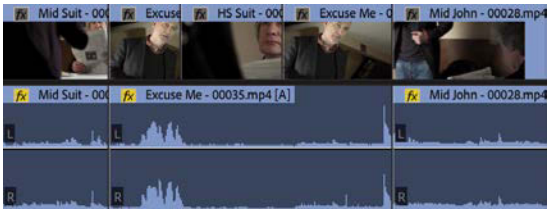
3 Switch back to viewing the composite video using the Source Monitor Settings menu.

You can also turn off and on the display of waveforms for clip segments on the Timeline.

4 Open the Theft Unexpected sequence in the Master Sequences bin.

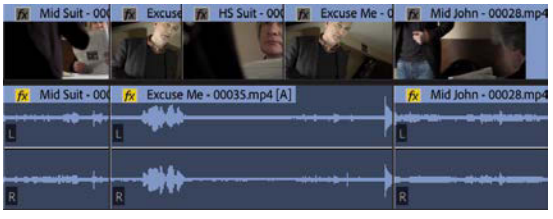
5 Click the Timeline Settings menu, and make sure the Show Audio Waveform option is enabled.

6 Resize the Audio 1 track to make sure the waveform is fully visible. Notice that two audio channels are displayed on one audio track in this sequence: The clips have stereo audio.



The audio waveform on these clips looks a little different from the waveforms in the Source Monitor. That's because it's a Rectified audio waveform, which makes it easier to see lower-volume audio, like the dialogue in this scene. You can switch between Rectified and regular audio waveforms.

7 Open the Timeline panel menu (not the settings menu), and choose Rectified Audio Waveforms to deselect it.



The regular waveform display works well for louder audio, but notice the quieter parts of the speech; it's much harder to follow the level changes.

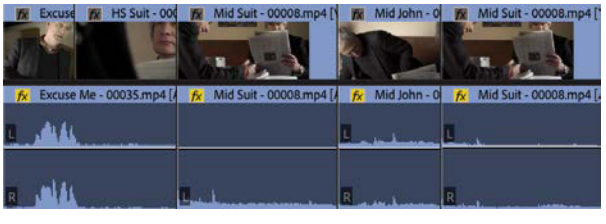
8 Open the Timeline panel menu, and restore the Rectified Audio Waveforms option.

Working with standard audio tracks

The standard audio track type can accommodate both mono audio clips and stereo audio clips. The controls in the Effect Controls panel, the Audio Clip Mixer, and the Audio Track Mixer work with both kinds of media.

If you're working with a combination of mono and stereo clips, you'll find it more convenient to use the standard track type than the traditional separate mono or stereo tracks.

This standard audio track has a mix of stereo and mono clips.



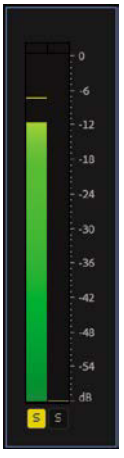
Monitoring audio

You can choose which sequence audio channels you hear when monitoring.

Let's try this with a sequence.

1 Open the Desert Montage sequence.

2 Play the sequence, and while you do, try clicking each of the Solo buttons at the bottom of the audio meters.



Each Solo button allows you to hear only the channel you select. You can solo multiple channels to hear a specific combination—though in this example it wouldn't help much as you have only two channels to choose between. When working with multichannel sequences, you'll solo output channels more often.

Soloing is particularly useful if you're working with audio where the sound from different microphones is recorded onto different tracks. This is common with professionally recorded location sound.

The number of channels and associated Solo buttons you'll see depends on your current sequence audio master setting.

You can also use the track header Mute button M or Solo button S for individual audio tracks in the Timeline panel. This gives you precise control over what's included or excluded in your mix.

Examining audio characteristics

When you open a clip in the Source Monitor and view the waveform, you're seeing each channel displayed. The taller the waveform is, the louder the audio for that channel will be.

Three factors affect the way audio sounds to your ears. Consider them in terms of a television speaker.

- **Frequency:** This refers to how fast the surface of the speaker moves. The number of times the surface of the speaker beats the air per second is measured as Hertz (Hz). Human hearing ranges from approximately 20 Hz to 20,000 Hz. Many factors, including age, affect the frequency range you can hear. The higher the frequency, the higher the perceived tone.
- **Amplitude:** This is how far the speaker moves. The bigger the movement, the louder the sound will be because it produces a higher air pressure wave, which carries more energy to your ears.
- **Phase:** This is the precise timing with which the surface of the speaker moves out and in. If two speakers push out air and pull in air in sync, they are considered "in phase." If they move out of sync, they become "out of phase," and this

can produce problems with sound reproduction. One speaker can reduce the air pressure at exactly the moment the other speaker is attempting to increase it. The result is that you may not hear parts of the sound.

The movement of the surface of a speaker as it emits sound provides a simple example of the way sound is generated, but, of course, the same rules apply to all sound sources.

What are audio characteristics?

Imagine the surface of a speaker moving as it beats the air. As it moves, it creates a high- and low-pressure wave that moves through the air until it arrives at your ear in much the way that surface ripples move across a pond.

As the pressure wave hits your ear, it makes a tiny part of it move, and that movement is converted into energy that is passed to your brain and interpreted as sound. This happens with extraordinary precision, and since you have two ears, your brain does an impressive job of balancing the two sets of sound information to produce an overall sense of what you can hear.

Much of the way you hear is active, not passive. That is, your brain is constantly filtering out sounds it decides are irrelevant and identifying patterns so you can focus your attention on things that matter. For example, you have probably had the experience of being at a party where the general hubbub of conversation sounds like a wall of noise until someone across the room mentions your name. You perhaps didn't realize your brain was listening to the conversation the whole time because you were concentrating on listening to the person standing next to you.

There's a body of research on this subject that broadly falls under the title *psychoacoustics*. For these exercises, we'll be focusing on the mechanics of sound more than on the psychology, though it's a fascinating subject worthy of further study.

Recording equipment makes no such subtle discrimination, which is part of the reason why it's so important to listen to location sound with headphones and to take care to get the best possible recorded sound. It's usual practice to try to record location sound with no background noise at all. The background noise is added in post-production at precisely the right level to add atmosphere to the scene but not drown out the dialogue.

Recording a voice-over track

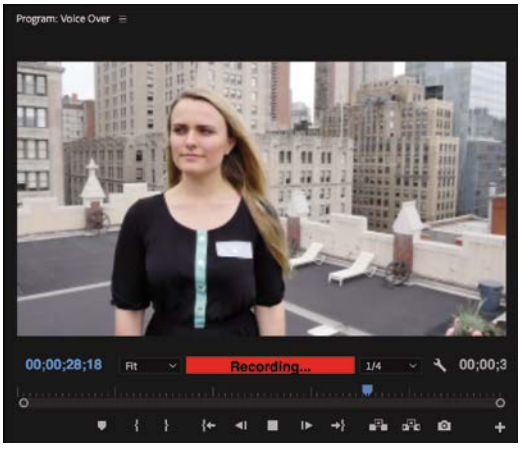
If you have a microphone set up, you can record audio directly to the Timeline using the Audio Track Mixer or a special Voice-over Record button on each audio track header. To record audio in this way, check that your Audio Hardware preferences are set up to allow input. You can check your audio hardware input and

output settings by choosing Edit > Preferences > Audio Hardware (Windows) or Premiere Pro CC > Preferences > Audio Hardware (macOS).

Try the Voice-over Record button by following these steps:

1. Open the Voice Over sequence in the Master Sequences bin. This is a simple sequence with visuals only; you'll add the voice-over.
2. Take a look at header for the A1 track. You should already be able to see the Voice-over Record button .
3. Mute your speakers or wear headphones while recording voice-over to avoid getting microphone feedback.
4. Position the playhead at the beginning of the sequence, and click the Voice-over Record button. The Program Monitor gives a short countdown, and you can begin. Describe the shots that come up to create an accompanying voice-over.

   As you record, the Program Monitor shows you're recording, and the audio meter shows the input level.



5. When you're finished recording, press the spacebar, or click the Voice-over Record button to stop.

   The new audio appears on the Timeline, and an associated clip appears in the Project panel. Premiere Pro will create a new audio file in the location specified in the Scratch Disks settings in the project settings. By default, this is the same location as your project file.

   You can use this technique to record professional-quality audio using a studio microphone and sound booth. Or you can use it with the built-in microphone on a laptop to record guide-track voice-over while on your way back from a shoot. That voice-over can form the basis for an outline edit, saving significant time later.