



Audio Editing in Audacity

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Revised 6/2010

ABOUT

Audacity is a free downloadable program for both PC and MAC platforms, which makes it a great tool to edit audio for both the beginner and intermediate multimedia storyteller. This tutorial does not cover nearly everything that this program is capable of, but rather is a guide to the tools that we'll need for our purposes.

To download the program and a more comprehensive how-to guide, go to <http://audacity.sourceforge.net/>

BEFORE WE START

There are a couple of preferences that we'll want to set up before we get started. Some of these are quality control preferences and a few are to mirror the hot-keys that Final Cut Pro uses, an industry standard in audio, video and multimedia storytelling. This way, if you decide to upgrade to Final Cut Pro, or work or go to school where you'll use this, some of these hot-keys that you'll learn with Audacity will carry over directly into Final Cut Pro.

So, let's go to AUDACITY-> PREFERENCES or *Command + ,*

1. Choose at the left the *Keyboard* settings
2. Find the *Choose Play to Selection* and *Previous Tool* and clear the keystroke commands for both of those (they are defaulted to A and B, and we'd like to assign the keys A and B for our own uses)
3. Set *Time Shift Tool* to the letter A
4. Set *Selection Tool* to the letter B

The reason I'm doing this is that in Final Cut Pro the corresponding tools that do the same things, use the quick-keys A and B for the same action.

Mp3 Files

Audacity cannot encode MP3 files by itself, because the MP3 encoding algorithm is patented and cannot legally be used in free programs. However, Audacity has been programmed to recognize other existing MP3 encoders that you can download separately. All you have to do is obtain the appropriate MP3 encoder for your computer and then show Audacity where it is located.

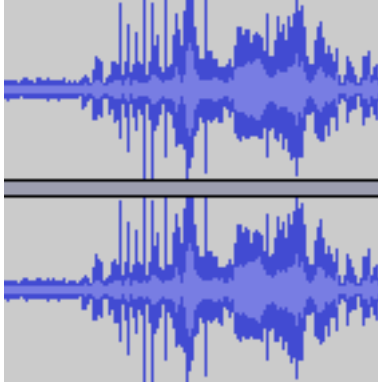
For links to these MP3 encoders, go to the Audacity web page

<http://audacity.sourceforge.net> and go to the page for your operating system.

If you use...	You need to...
Windows	Download LAME and look for the file called lame_enc.dll
Linux/Unix	Download LAME and compile it as a shared object, then look for the file called libmp3lame.so
Macintosh	Download LAMELib (see our website for more info).

Understanding Visual Digital Sound

The main difference between analog and digital sound or images is that analog images use continuous tone (think film) and digital information is made up of concrete digits, and there isn't anything in between. However, the digital information is so detailed that it will mimic that of analog quality. (think the difference between a 1kb photograph and one that is 15mb.





The sound in Audacity and all other digital audio editing programs appears as visual waveforms. The height of the wave is the volume and the distance horizontally between waves is the frequency or pitch of the sound. You can zoom in to the nitty gritty to actually see these waves individually if you're curious.


Control Toolbar





Editing Tools


 Selection tool - for selecting the range of audio you want to edit or listen to. **Quick key 'B'** (think B for blade)

 Envelope tool - for changing the volume over time.

 Draw tool - for modifying individual samples. **We won't use this tool**

 Zoom tool - for zooming in and out. **Quick key Command + or Command -**

 Timeshift tool - for sliding tracks left or right. **Quick key 'A'** (think A for arrow)

 Multi tool - lets you access all of these tools at once depending on the location of the mouse and the keys you are holding down.

Audio Control Buttons



Skip to Start - moves the cursor to time 0. If you press Play at this point, your project will play from the beginning.



Play - starts playing audio at the cursor position. If some audio is selected, only the selection is played.



Loop - if you hold down the Shift key, the Play button changes to a Loop button, which lets you keep playing the selection over and over again.



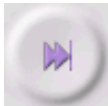
Record - starts recording audio at the project sample rate (the sample rate in the lower-left corner of the window). The new track will begin at the current cursor position, so click the "Skip to Start" button first if you want the track to begin at time 0.



Pause - temporarily stops playback or recording until you press pause again.



Stop - stops recording or playing. You must do this before applying [effects](#), saving or exporting.



Skip to End - moves the cursor to the end of the last track.

Mixer Toolbar



The Mixer Toolbar has three controls, used to set the volume levels of your audio device and choose the input source. The leftmost slider controls the playback volume, the other slider controls the recording volume, and the control on the right lets you choose the input source (such as "Microphone", "Line In", "Audio CD", etc.). Use the [Record Level Meter](#) to set the correct level.

Changing these controls has no effect on the audio data in your project - in other words it doesn't matter what the output volume level is when you Export or Save a project - the end result is the same.

NOTE: Since we'll be recording audio with our audio recorders, rather than with the computer, we won't use these tools at all.

Edit Toolbar



Cut **Quick key Command X**



Copy **Quick key Command C**



Paste **Quick key Command V**



Trim away the audio outside the selection



Silence the selected audio



Undo **Quick key Command Z**



Redo (repeat last command).



Zoom In **Quick key Command +**



Zoom Out **Quick key Command -**



Fit selection in window - zooms until the selection just fits inside the window.

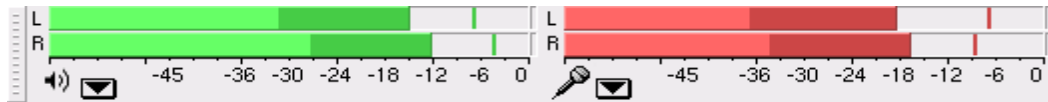


Fit project in window - zooms until all of the audio just fits inside the window. **Quick key Command F**

NOTE: To fit everything vertically in your window **Quick Key Shift Command F**

One more tool that you'll use a lot that isn't on the toolbar is SPLIT or **Command I** – This will allow you to split an audio clip to move around. Click where you want to separate the clip with the selection tool or **B** then switch to the Time Shift Tool or **A** to move the separated clips around.

Meter Toolbar



The Meter Toolbar is used for monitoring the input and output audio levels. Typically it is used to make sure that the loudest volume is as loud as possible (for maximum fidelity) without clipping or distorting it. The output (playback) meter is the green one, on the left in the picture above, and the input (recording) meter is in red, on the right. **We'll be using primarily only the output, since we won't be using the computer to record anything.**

The meters provide a visual indication of the current audio levels going in and out of audacity.

You can float the Meter Toolbar, either by dragging it out of the toolbar or by selecting "Float Meter Toolbar" from the View menu, you can resize it and even orient it vertically.

Each meter shows several characteristics of the audio level at once:

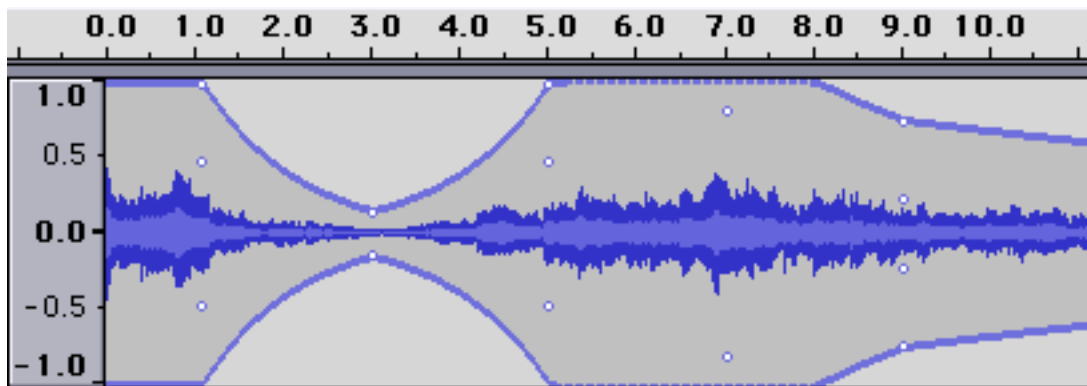
- The right hand end of the meter corresponds to the point at which the audio will be clipped, and the left hand end is silence
- For stereo, the top bar shows the left channel, and the bottom bar shows the right channel.
- The brightest part of the bar shows the average audio level (related to the loudness) and the darker part of the bar shows the peak audio level.
- The peak-hold line to the right of this shows the maximum audio level achieved in the last 3 seconds.
- Finally, the clipping indicators on the far right of each meter will light up if clipping is detected (meaning that the audio was too loud and will sound distorted).

Envelope Editing

Audacity lets you edit the amplitude envelope of a track directly using the Envelope Tool:



Editing the amplitude envelope lets you change the volume of a track gradually over time by adding a number of **control points** to the track. Each control point sets the amplitude (volume) at that point in time, which can be as low as zero, and as high as 150% of the normal maximum volume, and the volume is interpolated smoothly between the points.



In the figure above, there are five control points, at 1.0, 3.0, 5.0, 7.0, and 9.0 seconds. Each control point has up to four "handles" arranged vertically. The top and bottom handles are positioned at the target volume, and the middle handles are positioned a quarter-screen down, giving you a way to move the envelope above the 1.0 level. Note the dotted line at the top and bottom between 5.0 and 8.0 seconds. This indicates that the actual envelope is above the screen. You can see the entire contour by zooming vertically - position the cursor over the vertical ruler to the left of the track and shift-click to zoom out.

To create a new control point, just click. To move a point, just drag. To remove a point, click on it and drag it outside of the track, then let go.

Label Track



Label Tracks can be used to annotate an audio file. They can be used for lyrics, markers, or notes, and they can even be used to save selections.

To create a Label Track, select New Label Track from the [Project Menu](#). Alternatively, simply click or select where you would like to place a label, and choose Add Label at Selection from the [Project Menu](#), and a Label Track will be created automatically if one doesn't already exist.

To add a new label, click or select where you want the new label to appear, then select Add Label at Selection from the [Project Menu](#), then type the name of the label, and finally press Enter or click outside of the label.

In addition, you can use the Add Label at Playback Position command from the [Project Menu](#) if you want to add a label at a certain place while you are listening. By default, this command has a shortcut of Control+M.

To edit the name of a label, click anywhere in it. Zoom in first if there are too many labels crowded together and you are unable to click on the one you want. When a label is selected for editing, it looks like the first label below:

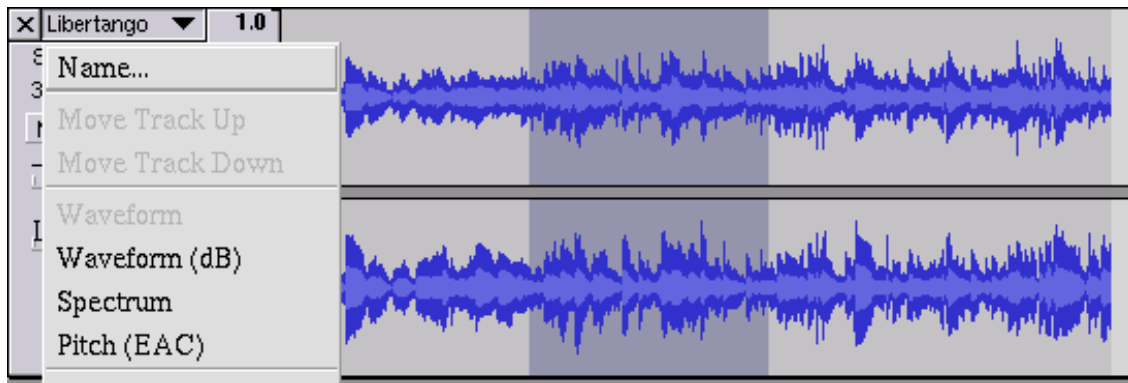


Once a label is selected, you can move to the next label by pressing Tab, and move to the previous label by pressing Shift-Tab.

To delete a label or multiple labels, select the area containing the label flags you wish to delete, and choose Silence from the [Edit Menu](#). Alternatively you can delete an individual label by clicking on it and pressing Backspace until you have deleted all of the characters in the label, then pressing Enter.

Menu Bar

Track Pop-Down Menu



The Track Pop-Down Menu appears when you click in a track's title. This lets you access a few special commands that apply to individual tracks. I've listed some of the tools you might want to use. There are of course, many others, which we won't need for this workshop.

Name... - lets you change the name of the track.

Move Track Up - exchange places with the track above this one.

Move Track Down - exchange places with the track below this one.

File Menu

Some of the tools you'll want to know about.....

New - creates a new empty window

Open... - opens an audio file or an Audacity project in a new window (unless the current window is empty). To add audio files to an existing project window, use one of the Import commands in the [Project](#) menu.

Close - closes the current window, asking you if you want to save changes. On Windows and Unix, closing the last window will quit Audacity, unless you modify this behavior in the [Interface Preferences](#).

Save Project - saves everything in the window into an Audacity-specific format so that you can save and quickly continue your work later. An Audacity project consists of a

project file, ending in ".aup", and a project data folder, ending in "_data". For example, if you name your project "Composition", then Audacity will create a file called "Composition.aup" and a folder called Composition_data. Audacity project files are not meant to be shared with other programs - use one of the Export commands (below) when you are finished editing a file.

Save Project As... - same as Save Project (above), but lets you save a project as a new name.

Recent Files ... - brings up a list of files you have recently opened in audacity to be re-opened quickly.

Export As WAV... - exports all of the audio in your project as a WAV file, an industry-standard format for uncompressed audio. You can change the standard file format used for exporting from Audacity by opening the [File Format Preferences](#). Note that exporting will automatically mix and resample if you have more than one track, or varying sample rates. See also [File Formats](#).

Export Selection As WAV... - same as above, but only exports the current selection.

Export as MP3... - exports all of the audio as an MP3 file. MP3 files are compressed and therefore take up much less disk space, but they lose some audio quality. You can set the quality of MP3 compression in the [File Format Preferences](#). See also [MP3 Exporting](#).

Export Selection As MP3... - same as above, but only exports the current selection.

Exit (Quit) - closes all windows and exits Audacity, prompting you to save any unsaved changes first.

Edit Menu

Some of the tools you'll want to know about.....

Undo - This will undo the last editing operation you performed to your project. Audacity supports full unlimited undo - meaning you can undo every editing operation back to when you opened the window.

Redo - This will redo any editing operations that were just undone. After you perform a new editing operation, you can no longer redo the operations that were undone.

Cut - Removes the selected audio data and places it on the clipboard. Only one "thing" can be on the clipboard at a time, but it may contain multiple tracks.

Copy - Copies the selected audio data to the clipboard without removing it from the project.

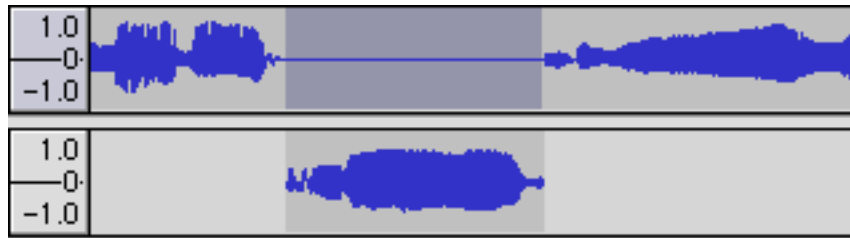
Paste - Inserts whatever is on the clipboard at the position of the selection or cursor in the project, replacing whatever audio data is currently selected, if any.

Trim - Removes everything to the left and right of the selection.

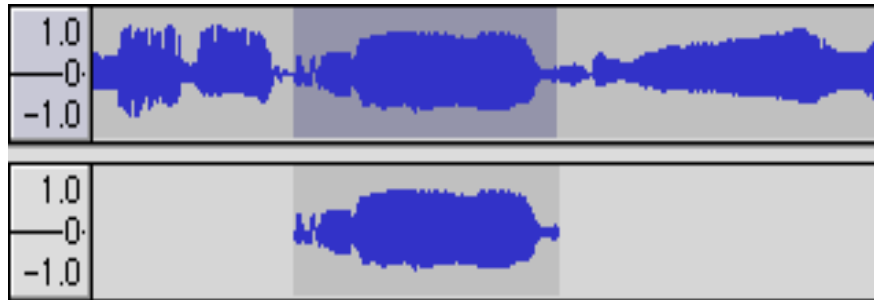
Delete - Removes the audio data that is currently selected without copying it to the clipboard.

Silence - Erases the audio data currently selected, replacing it with silence instead of removing it.

Split - Moves the selected region into its own track or tracks, replacing the affected portion of the original track with silence. See the figure below:



Duplicate - Makes a copy of all or part of a track or set of tracks into new tracks. See the figure below:



Select ... > All - Selects all of the audio in all of the tracks in the project.

Snap-To ... > Snap On - Enable Snap-To mode. When Snap-To mode is enabled, the selection will be constrained to the nearest interval on the time scale, by default the nearest second. So if you click and drag from 4.2 seconds to 9.8 seconds, it will result in a selection from 4 seconds to 10 seconds, exactly. You can change the units that are snapped to using the "Set Selection Format" option in the [View Menu](#) .

Snap-To ... > Snap Off - Turns Snap-To mode off letting you select arbitrary ranges of time

View Menu

Zoom In - Zooms in on the horizontal axis of the audio, displaying more detail about less time. You can also use the zoom tool to zoom in on a particular part of the window.

Zoom Normal - Zooms to the default view, which displays about one inch per second.

Zoom Out - Zooms out, displaying less detail about more time.

Fit in Window - Zooms out until the entire project just fits in the window.

Fit Vertically - Resizes all of the tracks vertically so they all fit inside of the window (if possible).

Zoom to Selection - Zooms in or out so that the selection fills the window.

History... - Brings up the history window. It shows all the actions you have performed during the current session, including importing. The right-hand column shows the amount of hard disk space your operations used. You can jump back and forth between editing steps quite easily by simply clicking on the entries in the window, the same as selecting Undo or Redo many times in a row. You can also discard Undo history to save disk space. The history window can be kept open while you work.

Project Menu

Import Audio... - This command is used to import audio from a standard audio format into your project. Use this command if you already have a couple of tracks and you want to add another track to the same project, maybe to mix them together. You cannot use this option to import Audacity Projects. The only way to combine two Audacity Projects is to open them in separate windows, then copy and paste the tracks.

New Audio Track - This creates a new empty [Audio Track](#). This command is rarely needed, since importing, recording, and mixing automatically create new tracks as needed. But you can use this to cut or copy data from an existing track and paste it into a blank track. If that track was at a non-default rate then you may need to use Set Rate from the [Track Pop-Down](#) menu to set the correct sample rate.

New Stereo Track - same as above, but creates a stereo track. You can also create a stereo track by joining two tracks using the [track pop-down](#) menu.

New Label Track - This creates a new [Label Track](#), which can be very useful for textual annotation.

Remove Tracks - This command removes the selected track or tracks from the project. Even if only part of a track is selected, the entire track is removed. You can also delete a track by clicking the X in its upper-left corner. To cut out only part of the audio in a track, use [Delete](#) or [Silence](#).

Add Label at Selection - This menu item lets you create a new label at the current selection. You can title the label by typing with the keyboard and then hitting "Enter" when you're done.

Add Label at Playback Position - This menu item lets you create a new label at the current location where you are playing or recording. Do this if you want to mark a certain passage while you're listening to it. You can title the label by typing with the keyboard and then hitting "Enter" or "Return" when you're done.

Only available whilst audacity is playing.

Effect Menu

The items in this menu only work when you have audio selected. Audacity does not have any real-time effects; you must select the audio, apply the effect, and then listen to the results.

Most effects have a Preview button. Clicking on this button plays up to three seconds of audio, allowing you to hear what it will sound like after the effect is applied. This is useful for fine-tuning the effect parameters.

Again, there are tons of effects that we don't usually use for journalism applications, so I'm only including the ones that you'll need on a regular basis.

Amplify - changes the volume of the selected audio. If you click the "Allow clipping" checkbox, it will let you amplify so much that the audio ends up beyond the range of the waveform, and is clipped (distorted). The default value when you open the effect is to amplify so that the loudest part of the selection is as loud as possible without distortion.

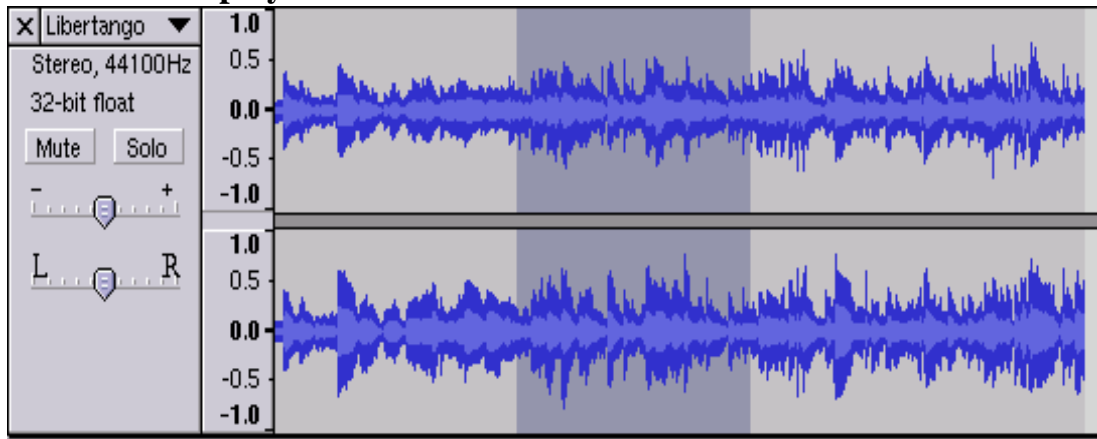
Fade In - fades the selection in linearly

Fade Out - fades the selection out linearly

Normalize - allows you to correct for DC offset (a vertical displacement of the track) and/or amplify such that the maximum amplitude is a fixed amount, -3 dB. It's useful to normalize all of your tracks before mixing. If you have a lot of tracks, you may then need to use the track gain sliders to turn some down.

Tracks

Waveform display



This is the waveform display part of the track, although it is also possible to display a spectrogram instead of a waveform here.

This image shows a stereo track, which is a group of two tracks - the top one is for the left channel, and the bottom one is for the right channel. If you need to edit the two channels as separate tracks, you can split them using the [Track Pop-Down Menu](#).

Controls



The **Mute** button stops this track from playing.

The **Solo** button plays only this track (or other solo tracks) and overrides the Mute button. *Muting and soloing* doesn't affect mixing or exporting, just playback within Audacity.

Sound File Formats

Audacity Project format (AUP)

Audacity projects are stored in an AUP file, which is a format that has been highly optimized for Audacity so that it can open and save projects quickly. In order to achieve this speed, Audacity breaks larger audio files into several smaller pieces and stores these pieces in a directory with a similar name as the project. For example, if you name a project "chanson", then Audacity will create a project file called `chanson.aup` to store the general information about your project, and it will store your audio in several files inside a directory called `chanson_data`. While the Audacity Project format is based on XML and is meant to be open, it is not currently compatible with any other audio programs, so when you are finished working on a project and you want to be able to edit the audio in another program, select Export from the [File Menu](#).

WAV (Windows Wave format)

This is the default uncompressed audio format on Windows, and is supported on almost all computer systems. Audacity can read and write this format. People working with multichannel audio at very high quality settings, or with very long recordings, should note that the maximum size of a wav file is 2GB.

AIFF (Audio Interchange File Format)

This is the default uncompressed audio format on the Macintosh, and it is supported by most computer systems, but it is not quite as common as the WAV format. Audacity can read and write this format or aiff files.

MP3 (MPEG I, Layer 3)

This is a compressed audio format that is a very popular way to store music. It can compress audio by a factor of 10:1 with very little degradation in quality. Audacity can both import and export this format with the LAME encoder (see page 1 for details).