Introduction to Audacity
Version 20061116B

by
Barry G. Wong
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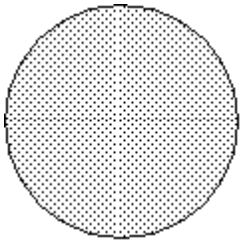
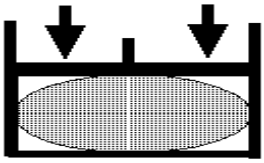
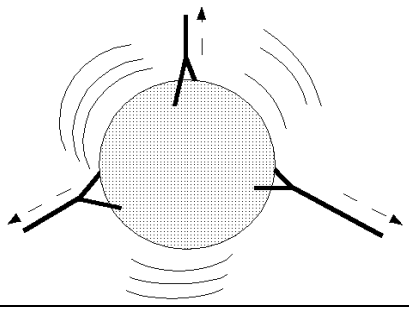
I. Sound

A. Compression

Think of a balloon inflated with air molecules.

Uncompressed	
Compressed	
Rarefied (Stretch the balloon)	

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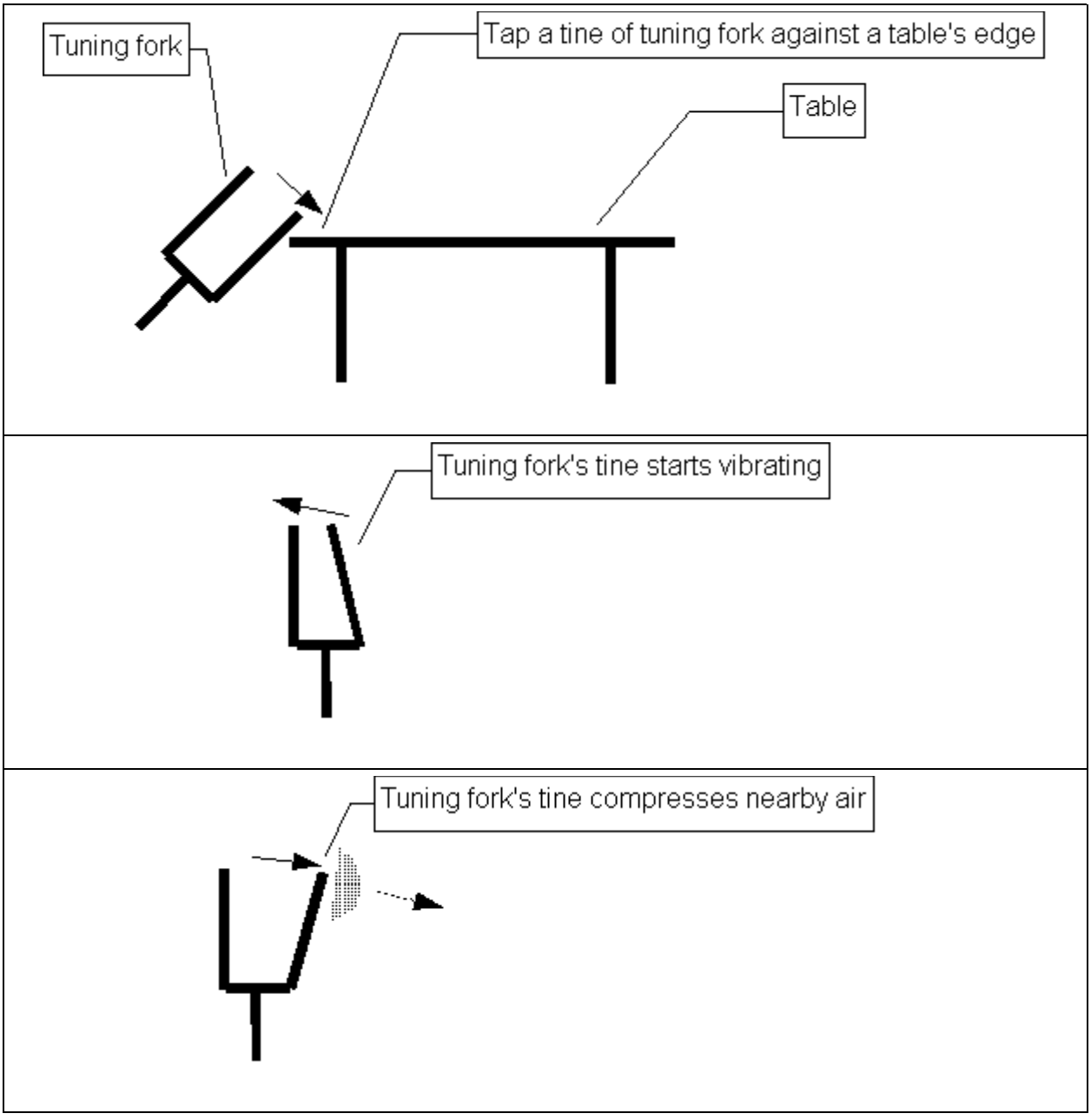
B. Tuning fork

1. Oscillating amounts of compression



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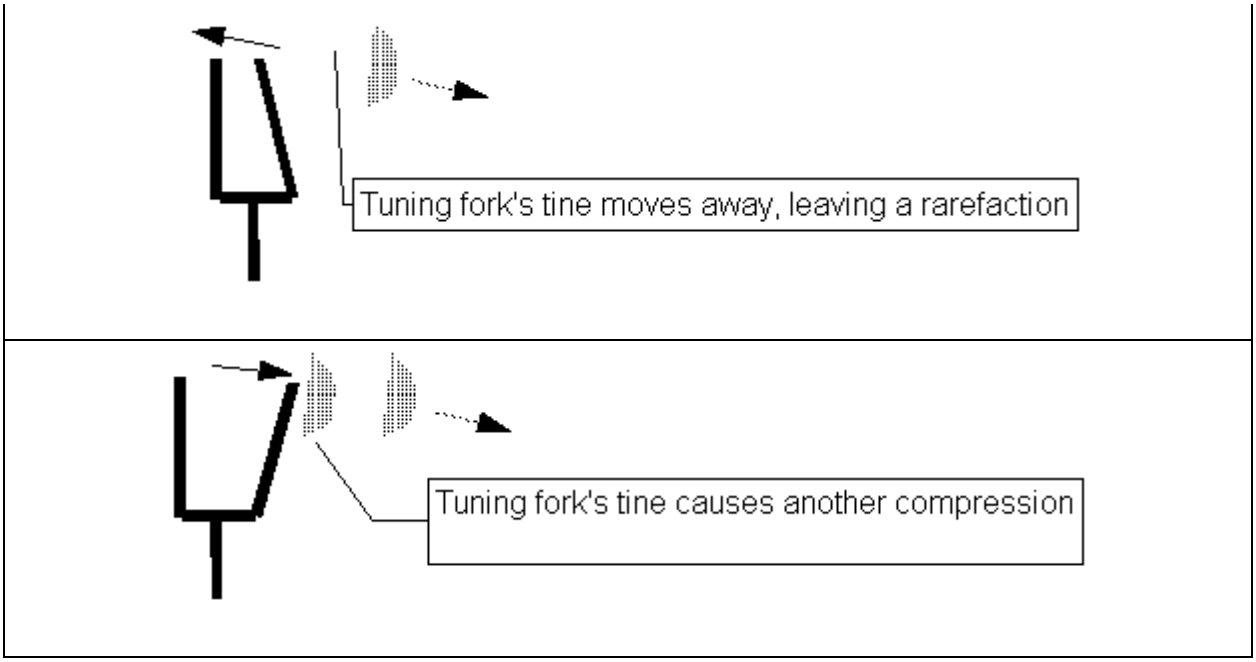

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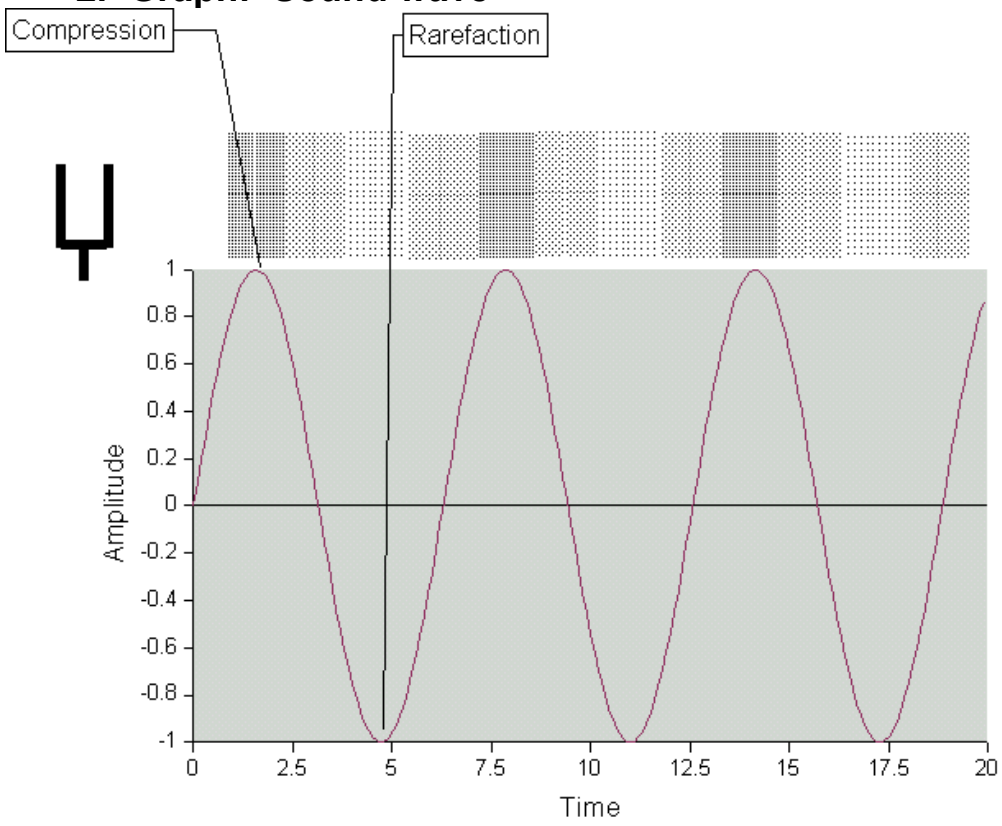
2. Graph: Sound wave



C. Superposition

1. Addition – in-phase

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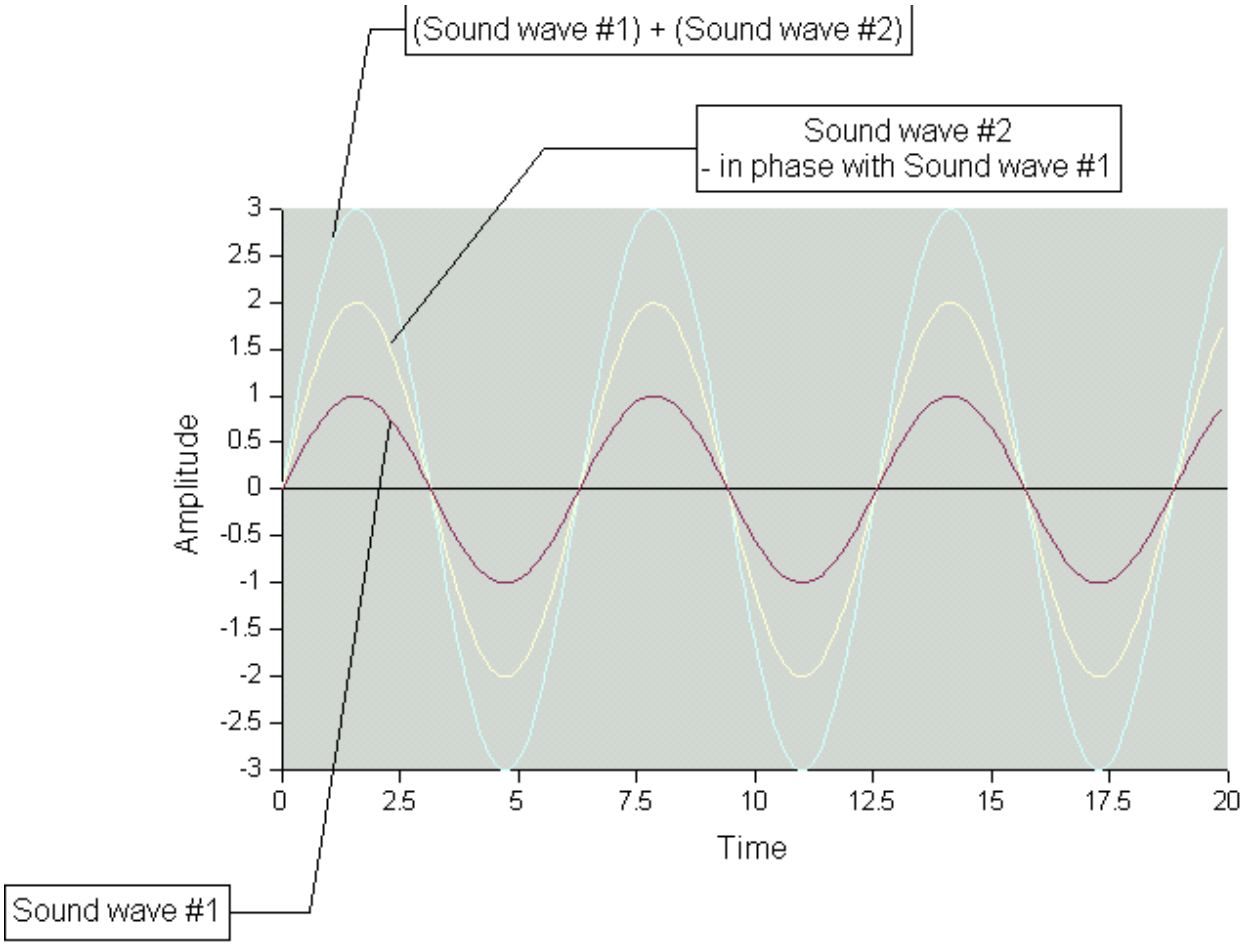

2. Addition – 2 different frequencies

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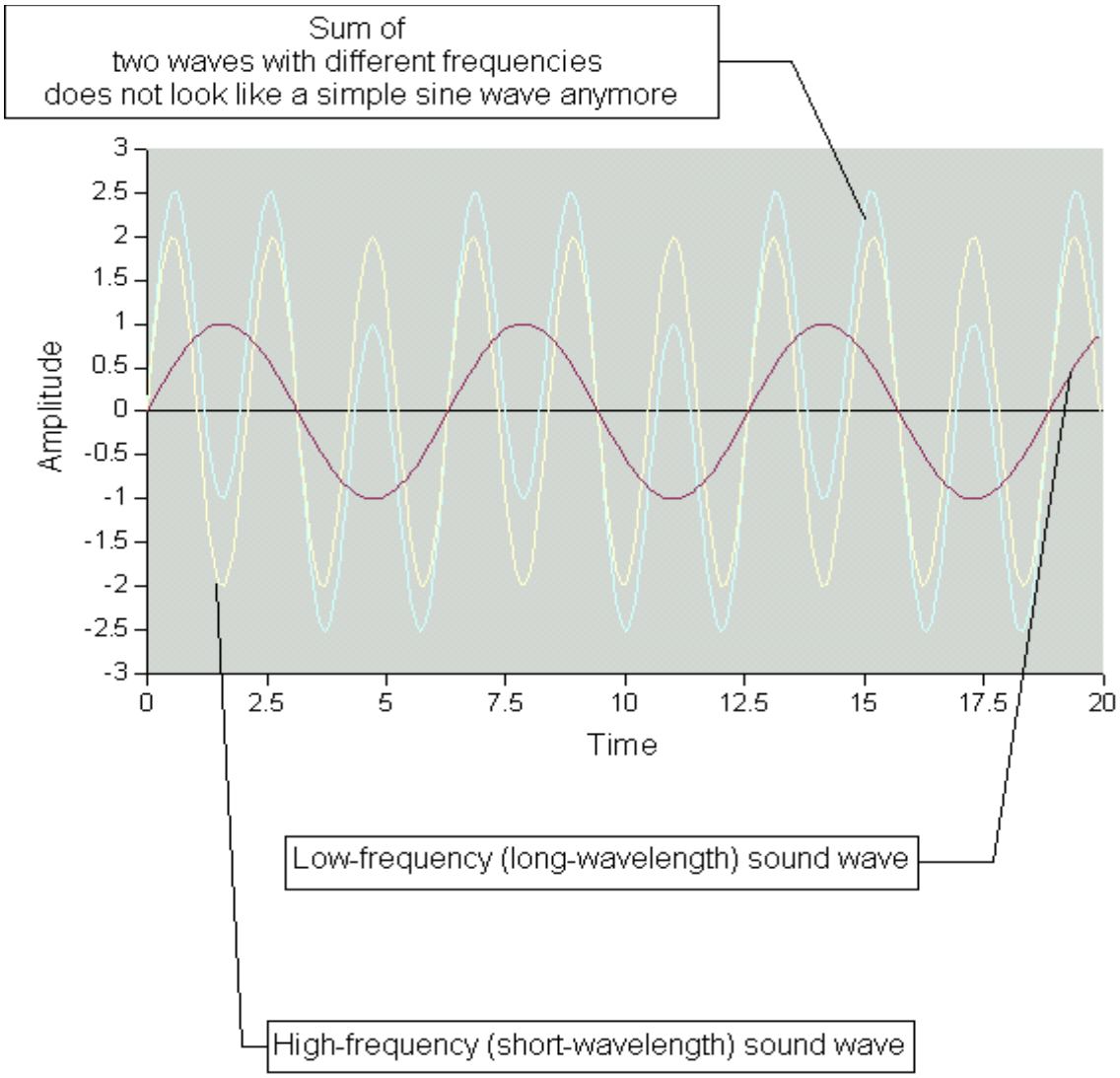

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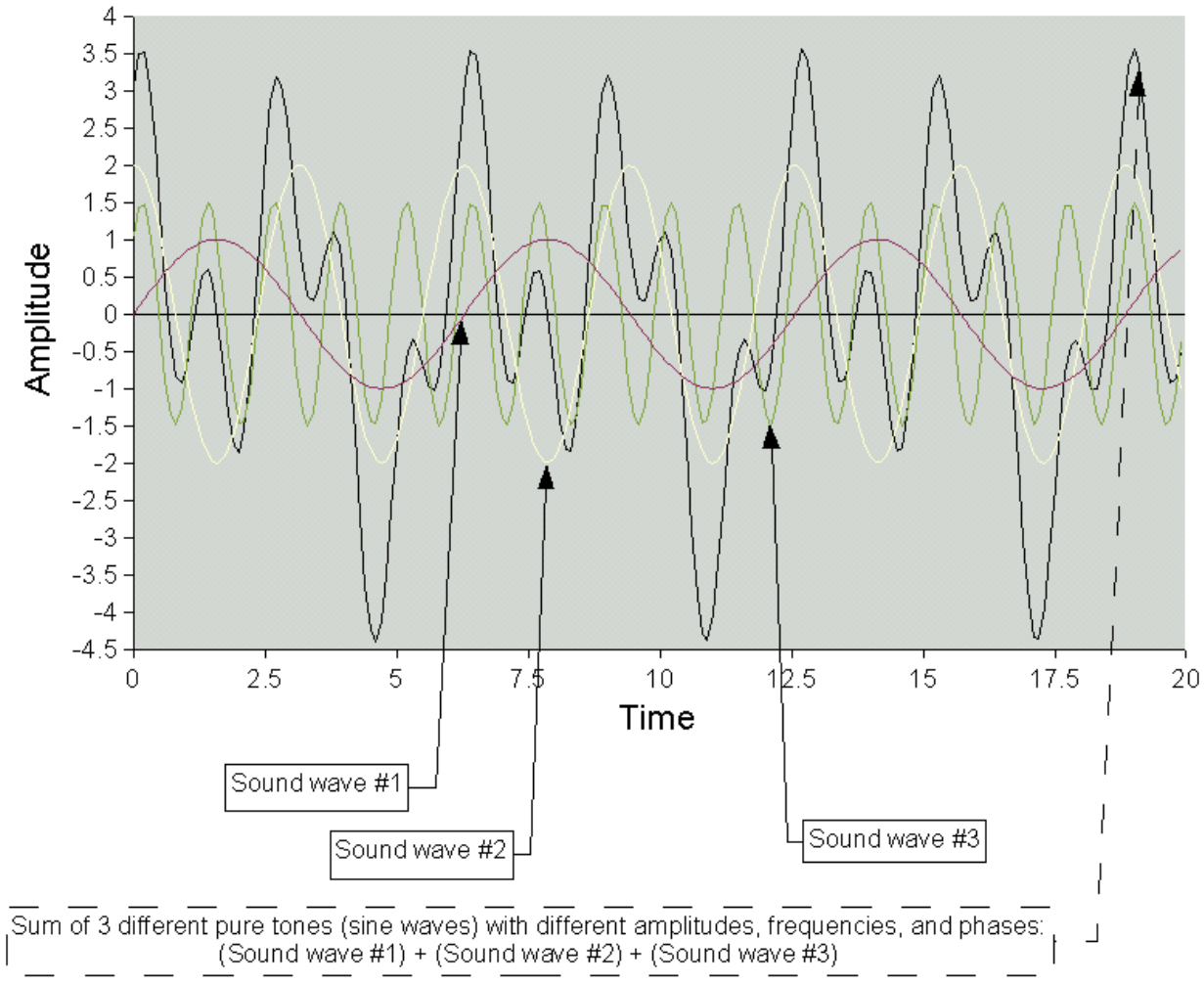
3. Addition – 3 different amplitudes, frequencies, and phases



II. Capture and digitization of sound

A. Analog

Signals are **continuous**.

B. Digital

Digital electronic computers use numeric **digits** to represent information.

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1. Binary

- Many digital computers represent information with a sequences of the two digits, 0 and 1.
- The computers might use one electrical voltage to represent 0 and another voltage to represent 1.

C. Analog to Digital Conversion (ADC)

- Audio or video is converted from an **analog** (smooth) format to a **discrete** (broken-into-pieces) format.
- Then the results are **encoded** as sequences of zeros and ones
- **Then** digital **computers**, by working with those sequences of zeros and ones, can handle that audio or video.

D. Sampling

1. Earplugging analogy

- Suppose you are listening to a radio news report which lasts 3 minutes.
- Now **imagine** that you put earplugs into your ears for **10 seconds**, and then remove the earplugs.
  - You would have missed some of the news report.
  - Suppose you continue alternately plugging your ears for 10 seconds and then unplugging your ears in this way repeatedly until the end of the news report.
  - Then, you would have heard **only** a **few** samples of the news report. You would have been hearing samples not very frequently. In other words, you would have sampled with a **low** sampling frequency.
  - If someone asked you to say what was in the news report, then you might be able to provide only a **small amount** of **information**.
- Now **imagine** that you put earplugs into your ears for **only one-half of a second**, and then removed the earplugs.
  - Suppose you continued alternately plugging your ears for one-half second and then unplugging your ears in this way repeatedly until the end of the news report.
  - Then, you would have heard **many** samples of the news report. You would have been hearing samples fairly frequently. In other words, you would have sampled with a **high** sampling frequency.
  - If someone asked you to say what was in the news report, you might be able to provide a lot more specific information. The accuracy of your summary might also be higher.

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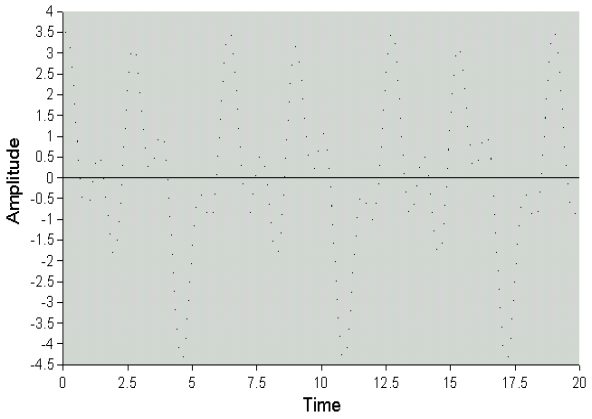
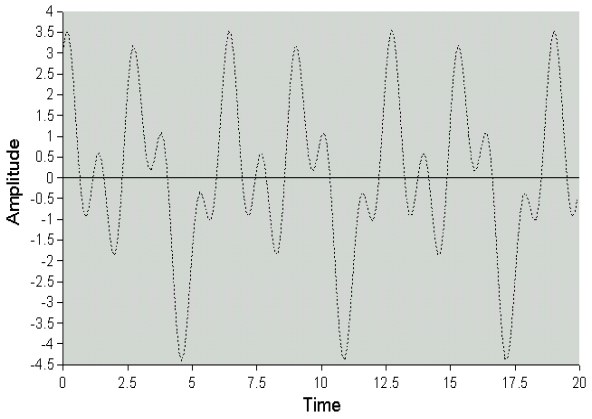
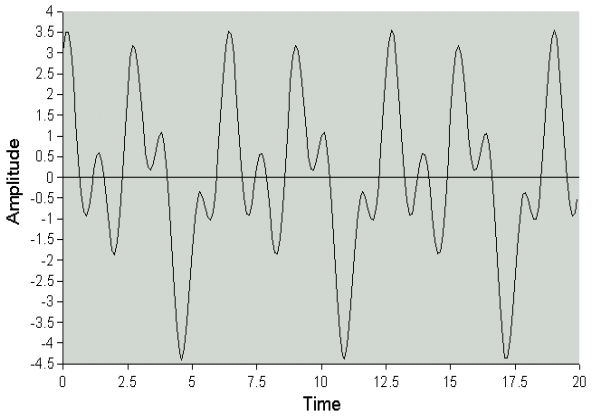
2. Glimpses per second

Look at the same sound waveform viewed at low and high sampling frequencies.

Low sampling frequency	
High sampling frequency	
Waveform being sampled	

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III. Downloading

A. Apply appropriate security procedures

1. Antivirus software

- In general, whenever you **receive software** – via downloading or via other means – use appropriately **updated antivirus software** to **scan** the received software for **viruses**, malware, and similar threats.

2. Personal firewall software

- Consider use of appropriate personal **firewall software**, if appropriate.

B. Download methods

1. Small files

a. Browsers

(1) Microsoft Internet Explorer

1. **Right-click** the hypertext **link** for the file to be downloaded.
2. Click on **Save Target As...**.
3. Follow the instructions to save (download) the file to (for example) the Windows Desktop.

2. Large files

a. Download manager software

Select, for example, one of these two options:

(1) Free Download Manager

1. Go to http://www.freedownloadmanager.org/download.htm .
2. Download and install the Free Download Manager software.
3. Follow appropriate instructions for use of that software.

(2) GetRight

1. Go to http://www.getright.com/ .
2. Download and install the GetRight software.
3. Follow appropriate instructions for use of that software.

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IV. Compression (and decompression) software

A. Compression software for Microsoft Windows ("Windows")

1. Enzip

- Enzip
  http://www.bcuc.ac.uk/main.asp?page=2118
  - EnZip is for use with **.zip** compressed files.

V. Audacity

A. Audacity World Wide Web site

1. Audacity

- Audacity Web site
  http://audacity.sourceforge.net/

2. HowToMakeRadio

- From **The HowToMakeRadio Guide** Web site, follow the **Audacity link:**

a. HowToMakeRadio

http://**mythanks.tripod.com/howtomakeradio/** > The HowToMakeRadio Guide > Audacity

b. MyThanks

http://**mythanks.tripod.com/** > HowToMakeRadio> The HowToMakeRadio Guide > Audacity

c. Search engines

1. Search for
   HowToMakeRadio
2. At the HowToMakeRadio Web site, follow the link titled
   The HowToMakeRadio Guide
3. Follow the link titled
   Audacity

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B. Open source software

1. Source code

- A (for example) person types special **instructions** in English (or another "natural language") for a computer.
- This set of instructions by (for example) a person for the computer is the **source code**.

2. Executable code

- A computer uses special procedures to translate, adjust, and merge the source code into instructions that are simpler and more efficient for the computer.
- These **translated, adjusted, and merged instructions** that the computer can execute or follow are called **executable code**.
- In general, people **cannot** read executable code very easily.

3. Open Source or Closed Source

- Some people or groups keep their source code **secret** as their intellectual property. This approach is called **Closed Source**.
- Some people or groups allow their source code to be **distributed** and **viewed** (and perhaps **modified**) **freely** by others under specific conditions. This approach is called **Open Source**. Audacity is an example of Open Source software.

C. Downloading

1. Microsoft Windows ("Windows") version

- Downloads page for Microsoft Windows version of Audacity
  http://audacity.sourceforge.net/download/windows

a. Software

(1) Audacity

- Audacity for Windows – with installation software
  http://audacity.sourceforge.net/latest/audacity-win.php/audacity-win.exe

(2) VST Enabler

- Audacity VST Enabler
  http://audacityteam.org/vst/

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(3) MP3 Encoder

(a) Licensing

- MP3Licensing.com
  http://www.mp3licensing.com/help/index.html

b. Documentation

(1) Manual

- Audacity Manual – On-line (World Wide Web)
  http://audacity.sourceforge.net/manual-1.2/
- Audacity Manual – Download
  http://audacity.sourceforge.net/audacity-manual-1.2.zip

D. Installation

1. Windows version

a. Software

(1) Audacity

1. Exit **other programs**.
2. **Double-click** on the **audacity-win-1.2.1.exe** icon.
3. Follow the **directions** displayed.

b. Documentation

(1) Manual

1. Download audacity-manual-1.2.zip (for example, to the Windows Desktop).
2. Make a **new folder** (for example, in the **My Documents** folder), and **rename** the new folder:
   AudacityManual
3. Double-click on the **icon** for **audacity-manual-1.2.zip**.
4. Using EnZip (or other **.zip** management software), **extract** all the files from **audacity-manual-1.2.zip** into the new folder which you had named AudacityManual.
5. Double-click on the **AudacityManual** folder **icon**.
6. Double-click on the **audacity-manual-1.2** folder **icon**.
7. Double click on the **index.html** file **icon**.

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E. Initial setup

1. Preferences

a. Safety (in case of deletion of original source audio)

(1) File > Preferences... > File Formats > When importing uncompressed audio files into Audacity > Make a copy of the file before editing (safer)

- This option uses **more** disk **space**, but might help, especially if you delete the original file containing the audio captured.

b. Audio hardware

(1) File > Preferences... > Audio I/O > Playback > Device: > {Pull-down menu}

(2) File > Preferences... > Audio I/O > Recording > Device: > {Pull-down menu}

c. Channels of audio

(1) File > Preferences... > Audio I/O > Recording > Channels: > {Pull-down menu}

(a) 1 (Mono)

(b) 2 (Stereo)

d. Slower computer systems

(1) File > Preferences... > Quality > Default Sample Rate > 44100 Hz

(2) File > Preferences... > Quality > Default Sample Format > 16-bit

e. Fast, not-full hard drive (for temporary storage by Audacity)

(1) File > Preferences... > Directories >Choose...

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f. Exit from Audacity

g. Restart of operating system / computer system

F. New project in Audacity

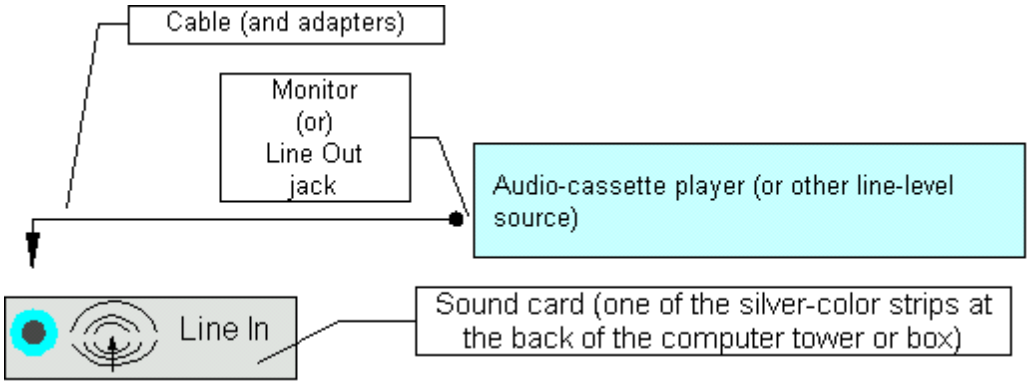
1. Windows

1. Launch Audacity (**Double-click** the **Audacity icon**, for example).
2. Click **File** > **Save Project As...**
3. Browse to an appropriate **location**.
4. Type a **file name** (without the file extension).
5. Click **Save**.

G. Recording

1. Line in

1. Use the **proper cable(s)** (and, if necessary, **adapters**) to connect your **line**-level sound-source (for example, the **Monitor** jack or **Line Out** jack of an **audio-cassette player**) to the **Line In** jack of the **sound card** in the computer system with Audacity.



2. Start playback of the sounds (for example, **press** the **Play** button on the audio-cassette player).

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3. Shortly **before** you hear the **first** sound to be recorded, **click** on the **Record** button [the button with the **red dot** (●) in the **Control Toolbar**] in Audacity.
4. Click and drag the **Input Volume** slider (the slider is **below** the Record button and to the **right** of the picture of the **microphone** in the **Mixer Toolbar**) to get a strong (but not **too** strong) signal.
   To get a strong (but not **too** strong) signal, drag the Input Volume slider until the **farthest-right edge** of the **Input Meter** bars (**red** bars above the picture of the **microphone** in the **Meter Toolbar**) is **between**, for example, **-6** and the **next (unlabeled) tick-mark to the right**, while the **loudest** sounds are being recorded. Continually **repeat** this step (as appropriate) during the recording in order to **keep** the farthest-right edge of the Input Meter bars in approximately that same location.
5. **After** you hear the **last** sound to be recorded, **click** on the **Stop** button [the button with the **yellow-orange square** (■) in the **Control Toolbar**] in Audacity.
6. In the Menu bar, click **File** > **Save Project**.

H. Cutting and Pasting

1. To **prepare** to **play** the recording **from** the **beginning**, click on the **Skip to Start** button [the button with the **left**ward-pointing magenta **double triangle** (|◄◄)].
2. Click on the **Play** button [the button with the **right**ward-pointing **green triangle** (►)].
3. Click and drag the **Output Volume** slider (the slider is to the **right** of the picture of the **loudspeaker** in the **Mixer Toolbar**) to get an appropriate (for example, listening) level.
4. Listen and watch the timeline-pointer (**vertical** line) move across the **waveform** (wavy line that stretches horizontally) representing the sound that you recorded. Find an excerpt that you want to move.
5. If you wish, click on the
   - **Zoom In** button [the button with the blue **plus** sign (+) in a **magnifying glass**]or
   - **Zoom Out** button [the button with the blue **minus** sign (-) in a **magnifying glass**].
6. When you hear the **beginning** of an excerpt to be moved, click on the **Pause** button [the button with the **blue double vertical bars** (‖)].
7. Click and **drag horizontally** along the waveform **from** the **beginning** of the excerpt **to** the **end** of the excerpt.
8. Click on the **Stop** button [the button with the **yellow-orange square** (■) in the **Control Toolbar**] in Audacity.
9. In the **Edit Toolbar**, click on the **Scissors** picture or
   in the Menu bar, click **Edit** > **Cut**.
10. Click **at** the location where you want to **put** the excerpt.

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11. In the **Edit Toolbar**, click on the **Clipboard** picture or
    in the Menu bar, click **Edit** > **Paste**.
12. In the Menu bar, click **File** > **Save Project**.

I. Export for external playback

1. When you are ready to **publish** your edited audio, (in the Menu bar) click **File**.
2. Then
   - to make a **high-quality** (but **big**) audio file,
     (in the Menu bar) click **Export As WAV**
   - to make a **medium-quality** audio file (that is **smaller**, but with some almost-inaudible **sound**-parts **discarded**),
     (in the Menu bar) click **Export As Ogg Vorbis...**
6. Browse to an appropriate **location**.
7. Type a **file name** (without the file extension).
8. Click **Save**.
9. In the Menu bar, click **File** > **Save Project**.

J. Exit from Audacity

- In the Menu bar, click **File** > **Exit**.

VI. Terms

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