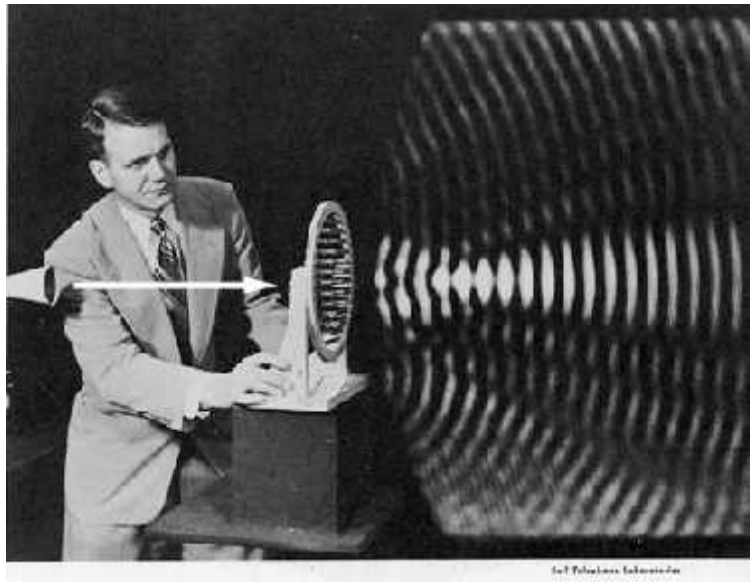
Lab: Analog Audio

Outline

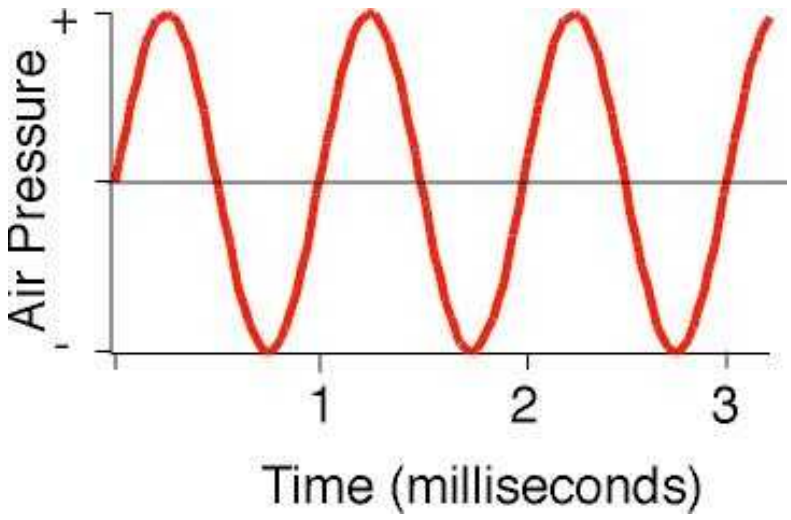
- Review sound waves and frequency
- Learn to read an electrical schematic
- Build the circuit

Sound waves

- Compressional waves
- Air density increases and decreases periodically
  - These waves hit tiny hairs in your ear
  - When they wiggle your nerves feel it
  - Brain understands it's sound

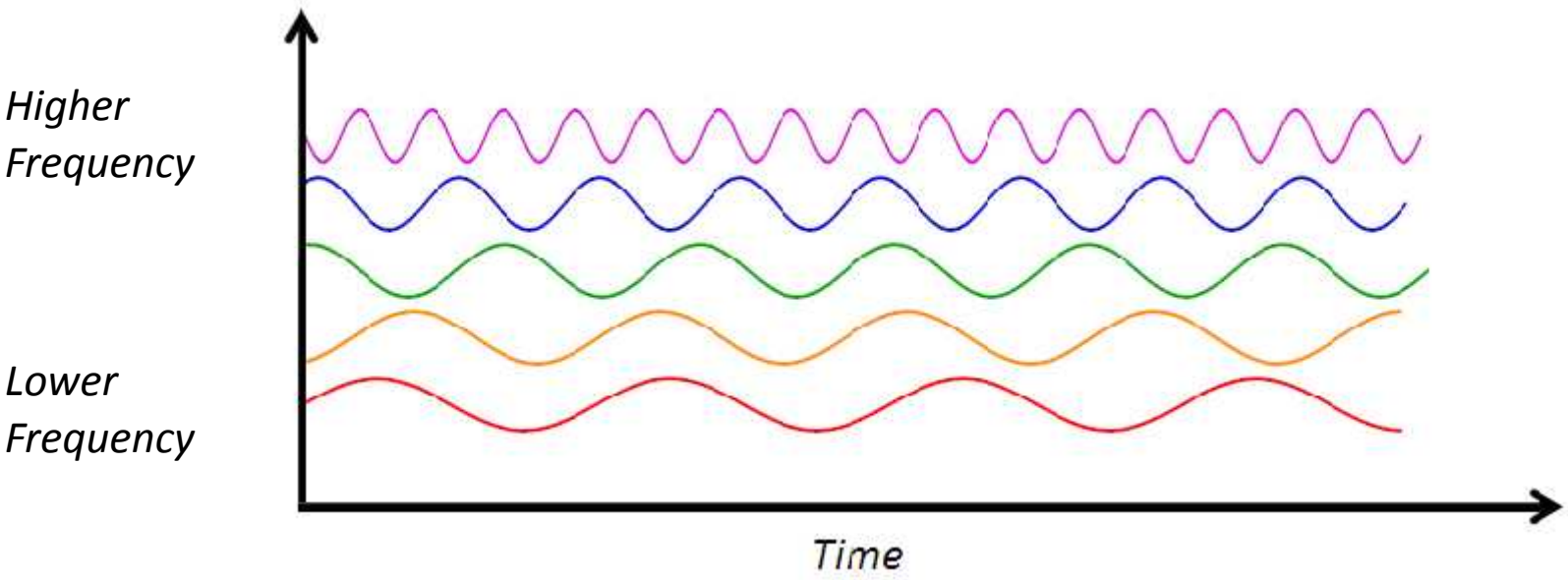


Waves: periodic



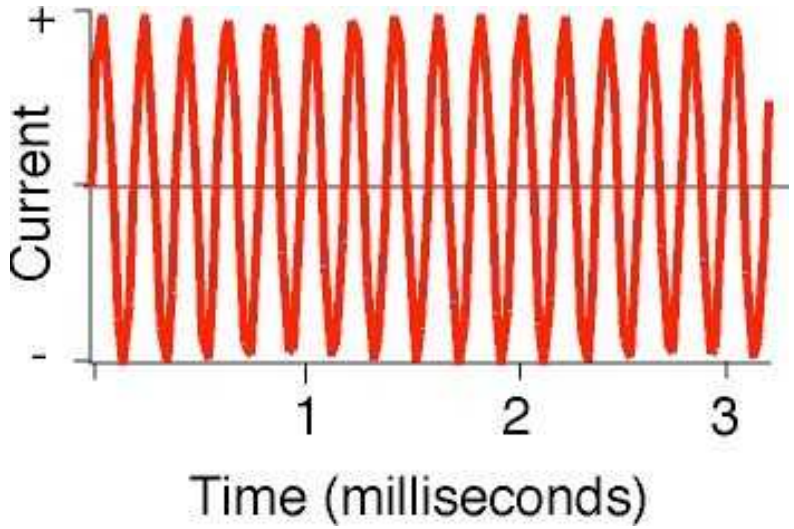
- Frequency is 1 cycle per millisecond
  - 1000 cycles/sec (1 kHz)
- This one is a sine wave
- Sine wave=Pure tone

Frequency relates to pitch



Electronic version

- Current is proportional to sound pressure
- What is the frequency of this wave?
- Will it sound higher pitched or lower pitched (when played through a speaker)?



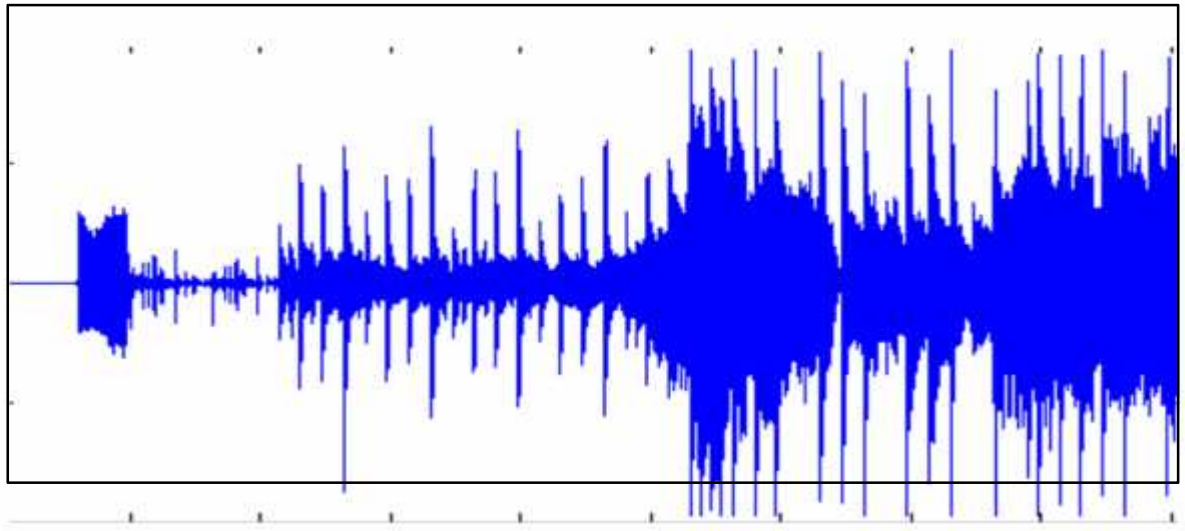
The audible range

- The audible range for humans is approximately 20 Hz to 20 kHz (20,000 Hz).
- The lowest note on a piano, A0, has a frequency of 27.5 Hz.
- The highest note on a piano, C8, has a frequency of 4.186 kHz (4186 Hz).

Sound consists of:

- Pitch
- Timbre
- Volume
- And all of this varies with time
- Music is a wildly complex combination of frequencies

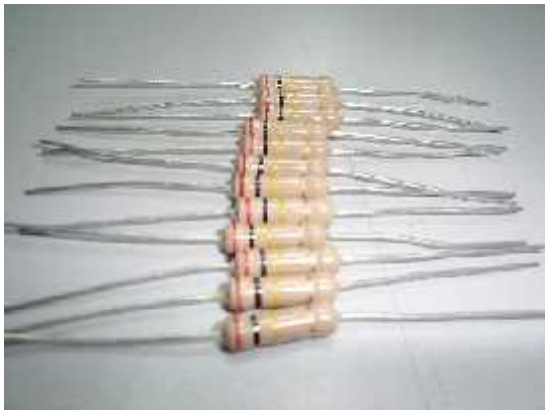
output of a .wav file



How about this?

- Resistor
- “Resists” electricity
- Why?

- Lets you control how much current flows
- Protect components



Potentiometer

Add variable resistor
to output

As you turn the wheel, the amount of signal passed to output changes.

This is a volume control and a pitch control.