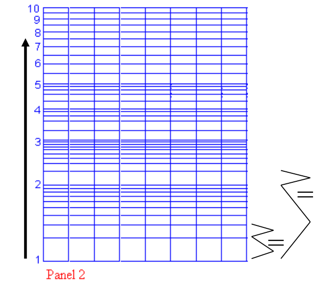
Decibels and Intensity

- ***dB*** is 1/10 of a Bel. OK so what is <u>that</u>?
  - A ratio that helps compare one sound to another,
  - Describes relative "intensity" or magnitude,
  - Describes sound in a way that "sounds right" and that matches what our ears perceive.
- Who cares? You! Used for all <u>editing controls</u>!
  - ***1*** *dB is about the smallest change we can hear.*
  - ***2*** *dB change we would notice without being told.*
  - ***3*** *dB+ increase in sound system volume requires a doubling of power from the amplifier.*
  - ***6*** *dB decrease is perceived to be twice as far away.*
  - ***10*** *dB+ is perceived to be about twice as loud*
  - ***.5*** *db can change the character of a* ***mix*** *dramatically.*

dB use a "log" scale

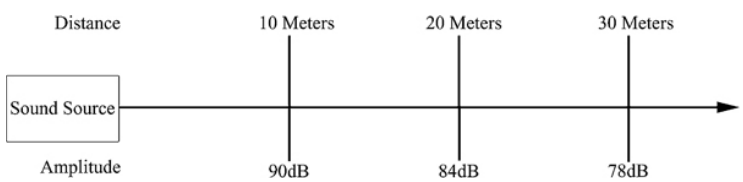
*Logarithm.



Each horizontal line represents the same amount of *energy* as the one below it.

The difference in ***energy*** between 1 and 2 db is equaled by the difference between 2 and 2.1 db (approximately) and so on up the scale. But to our ***ears***, the ***difference in loudness between 1 and 2 db or between 2 and 3 db is about the same***.

The law of conservation of energy in dBs



Typical dB Levels in Life

0 dB	No sound
10 dB	Breathing
40 dB	Whisper @ 4'
50 dB	Office ambience
60 dB	Conversation @ 4'
80 dB	Family car passing
110 dB	Loud band

Hardware: A *Different* dB Scale

dBv and dBu are used to identify inputs - outputs

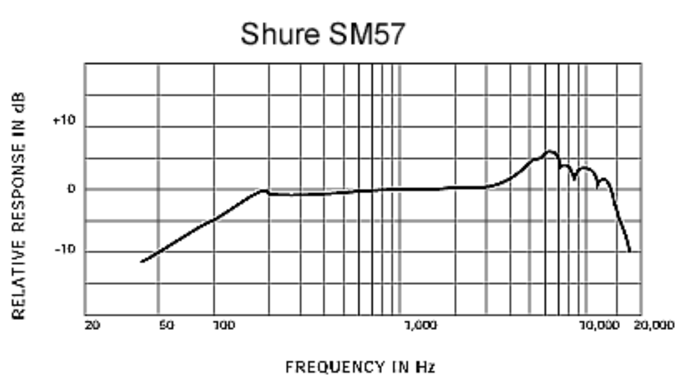
- An **input** is a connection that allows a signal to be brought in.
- An **output** is a connection that sends the signal to another piece of equipment.

- Why care? To avoid clipping and noise.
- Pro mixing hardware inputs and outputs are marked in dB Must be matched to other equipment to work best.
  - ***+4 dBv*** *or about 1.5 volts RMS (main mixer outputs)*
    - *(V indicates compared to 1 volt, old telephone line standard)*
  - *+4 dBu or about 1.228 volts RMS*
    - *(U indicates compared to .775 volts)*
  - ***-10 dB*** *is about .316 volts RMS (your stereo left and right inputs)*
  - ***-40 dB*** *microphone level*

Level Meters RMS vs Peak

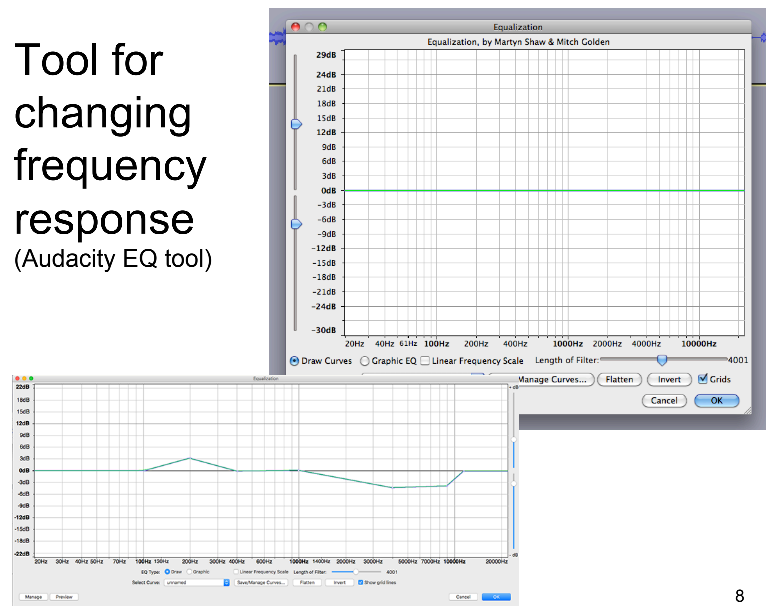
- RMS is “root mean squared”
  - Kind of a realistic average level
- Peak is quick and particular
  - No clipping can slip by undetected
- In amplifier ratings
  - RMS = 0.707 x Peak Values of a sine wave amplitude
  - Considered an realistic way to measure intensity or power delivered

Frequency response chart

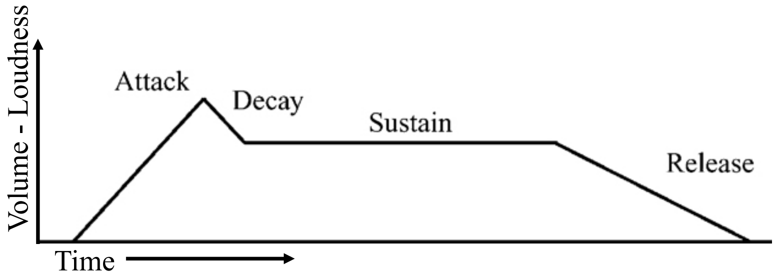


Tool for changing frequency response

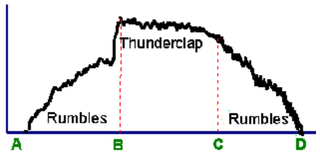
(Audacity EQ tool)



Envelope



Envelope of an “object” sound



Harmonics/Partials

Fundamental frequency example: 200 Hz

- x 2 = 400 Hz
- x 1.5 = 300 Hz
- x 1.26 = 252 Hz
- x 3 = 600 Hz
- x 4 = 800 Hz
- Etc.…

These are typical harmonics produced by instruments. Dozens would usually be present, all at different amplitudes.