

A close-up photograph of a vinyl record on a turntable. The record is black with a prominent pink center. A silver tonearm is visible on the right side of the record. The text "Audio 101 Part 2" is overlaid in white in the center of the record.

Audio 101 Part 2

Fayetteville Public Library

Digital Audio Theory



Sample Rate



Bit Depth



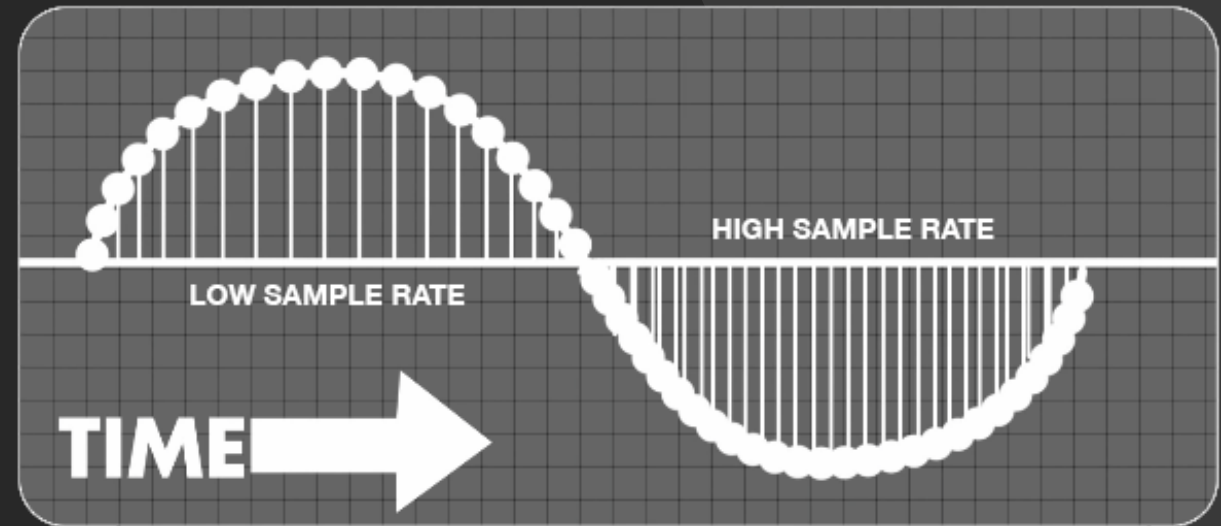
Buffer Size



Latency

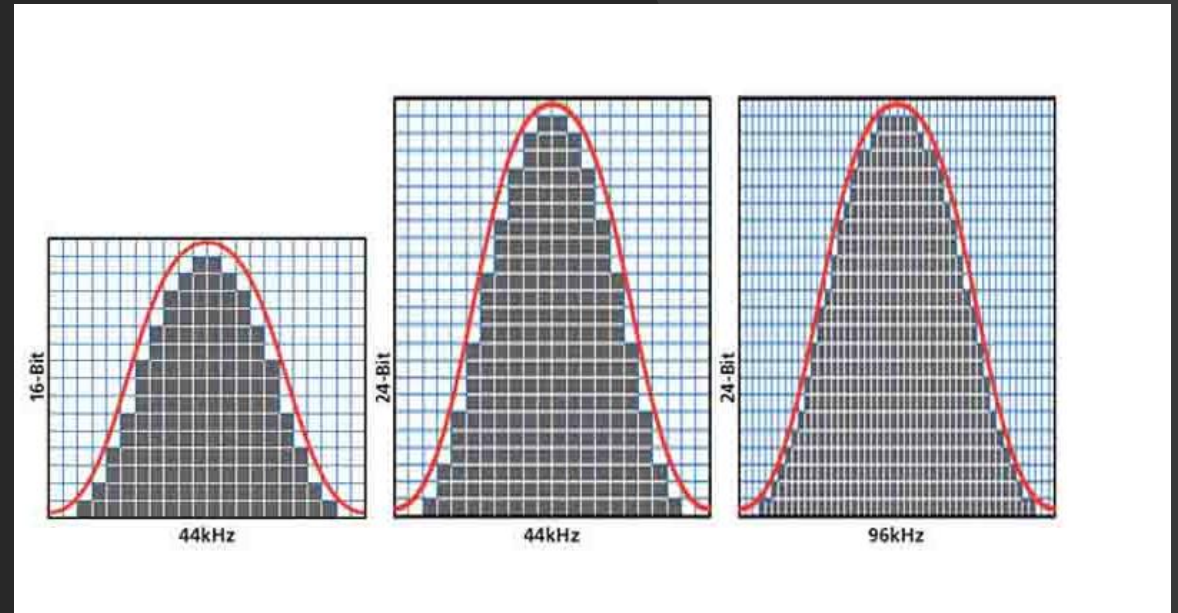
Sample Rate

- Samples per second
- AD -> turns continuous waveform in discrete waveform
- Nyquist Theorem - in order to reproduce a signal, it should be periodically sampled at a rate that is 2X the highest frequency you wish to record.




Bit Depth

- Bit Depth relates to the SNR and the dynamic range
- The more bits, the lower the noise floor and the more dynamic range you have
- $2^n =$ Possible integers values per sample
- $20\log(2^n) =$ dynamic range



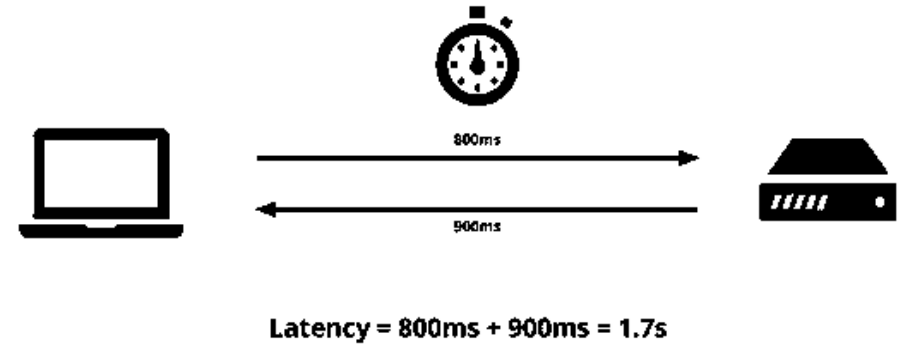


Buffer Size

- The amount of time it takes your computer to process audio
 - Stores chunks of data in RAM before processing
 - Buffer Size determines latency and CPU load
 - Low Buffer = Low Latency, High CPU usage
 - High Buffer = High Latency, Low CPU usage
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Latency

- The amount of time the AD/DA process takes
- Will cause delay in foldback/headphones while tracking



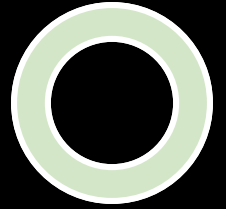
What Is Latency



Microphones

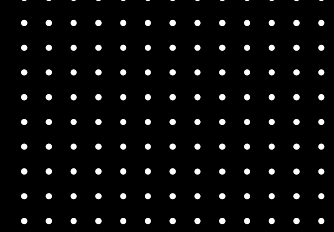
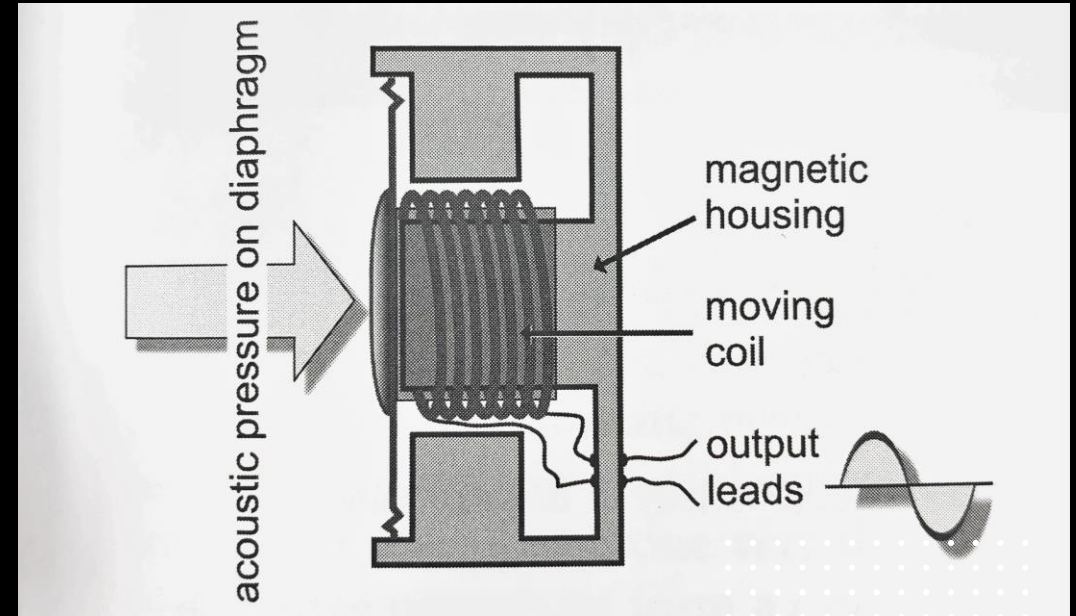
- Microphones are transducers which convert sound energy into analogous electrical signals
- Dynamic
- Ribbon
- Condenser





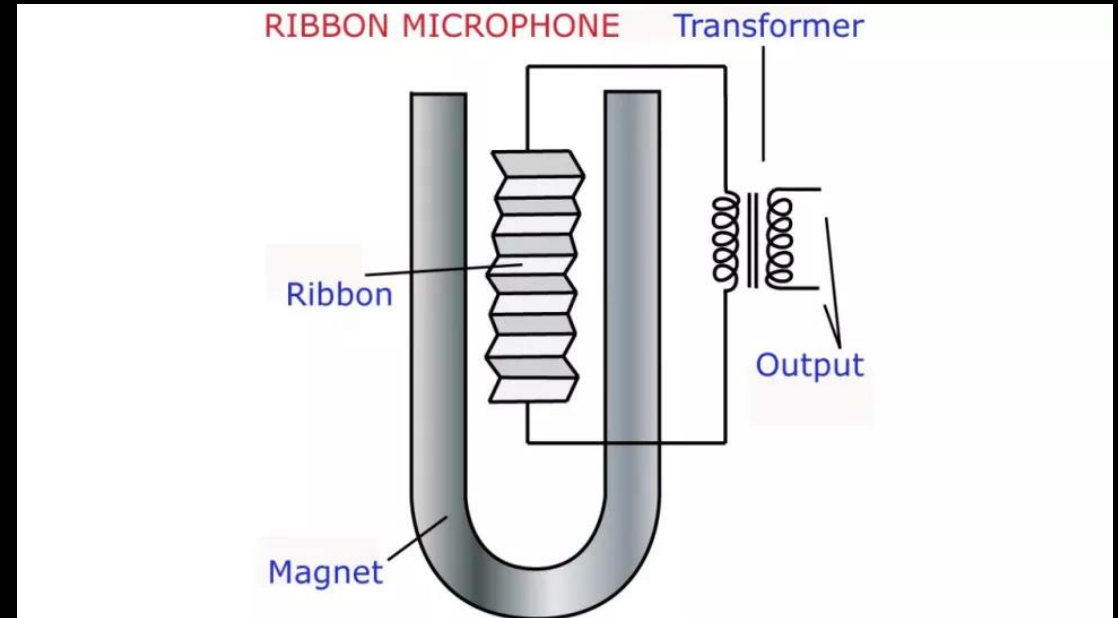
Dynamic

- A diaphragm is attached to a wrapped core of wire, which is suspended around a magnet
- Moving a coil around a magnet creates a voltage
- This is known as electromagnetic induction



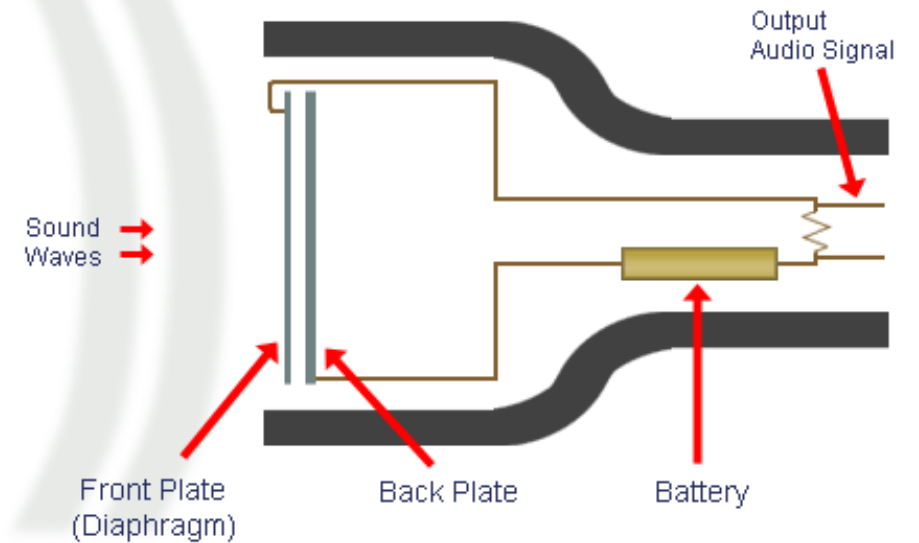
Ribbon

- A metal ribbon is suspended between a magnet
- When the ribbon moves between the magnets it creates a voltage
- Also uses electromagnetic induction



Condenser

- One small, movable diaphragm and one fixed backplate
- These two plates create a capacitor
- When the distance between the two plates move, it creates a change in capacitance
- Uses the electrostatic principle
- Needs phantom power



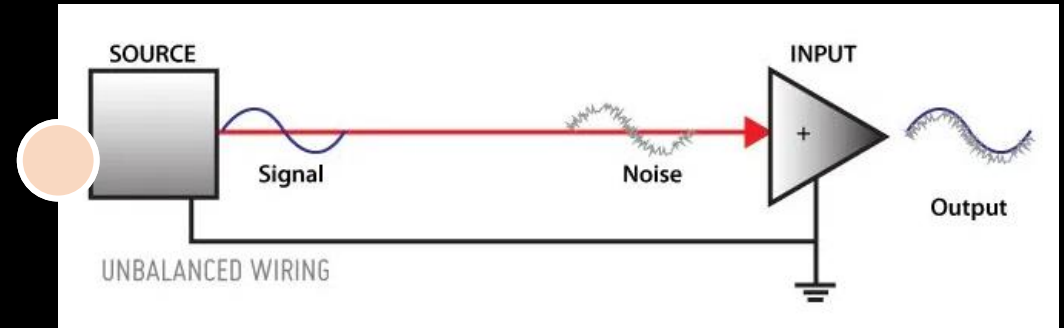
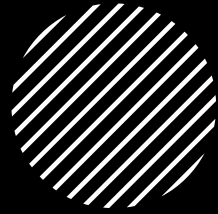


Cable Types

Balanced vs Unbalanced

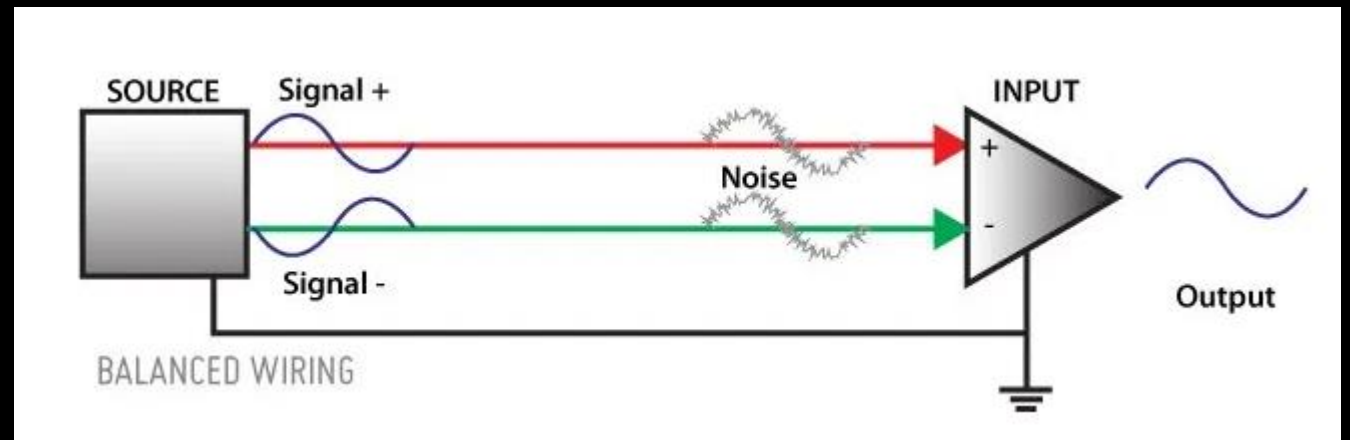
Unbalanced Cable

- Has two connections, one for signal and the other for ground
- Types of unbalanced cables
 - TS (tip – sleeve)
 - RCA
- Susceptible to noise



Balanced Cable

- Has three connections, two for signal(hot and cold) and one for ground
- Hot and cold cable send the same signal but 180 degrees out of phase
- Not as susceptible to interference



Digital File Types



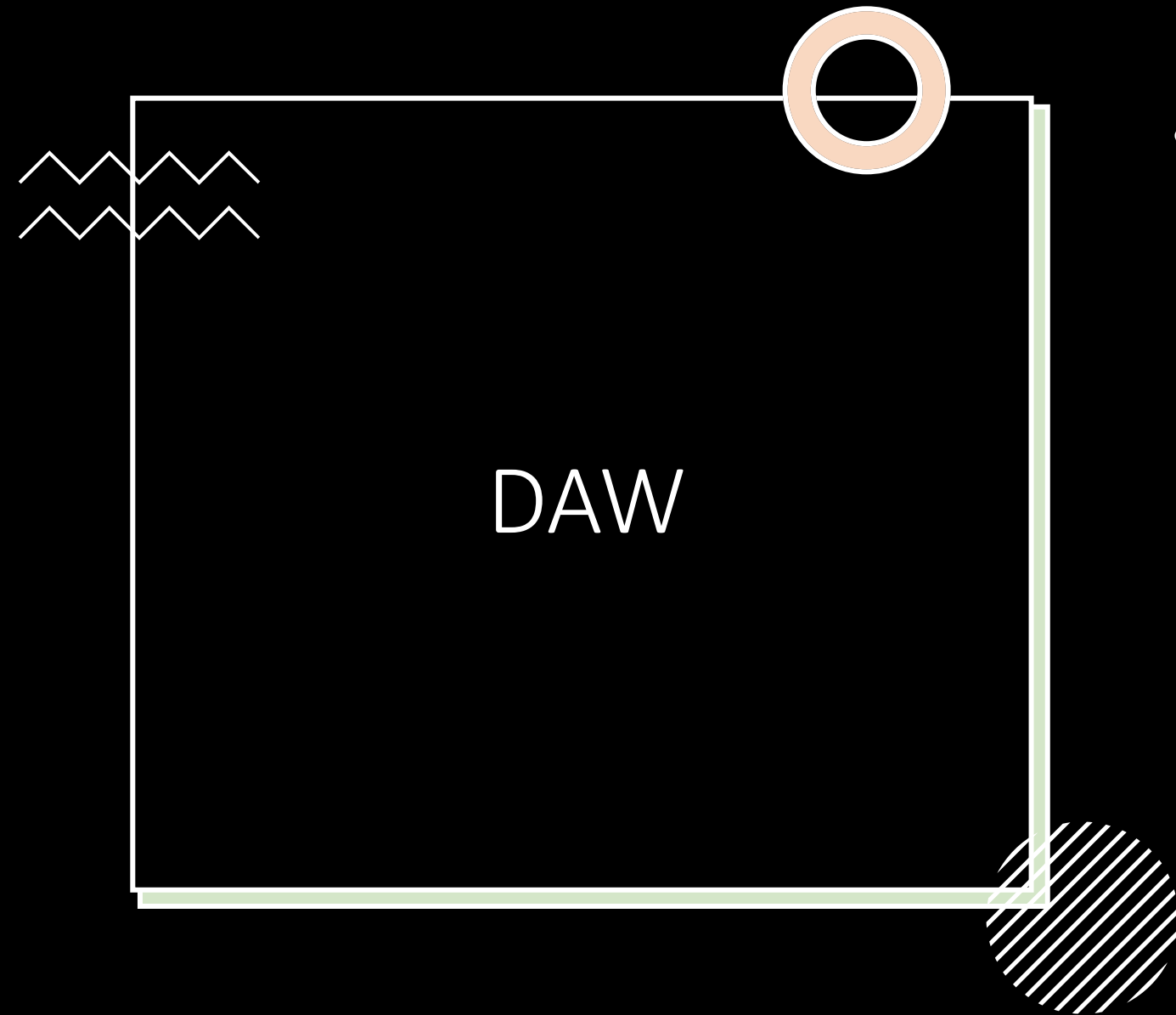
Lossless vs Lossy



Lossless – Data compression with no information loss



Lossy – Data compression with removing information



- Digital Audio Workstation

- Pro Tools
- Logic
- Reason
- Ableton
- Cubase
- Studio One
- Etc...