

Recording Basics: Signal Path

Acoustic Sound» Mic» Preamp» Recording Device» Amplifier/Speakers

»Microphone:

- Captures the sound it "hears" by converting acoustic sound waves (air compression/rarefaction) into a representative electrical signal (which includes frequency, amplitude, and time characteristics).
- This electrical signal is an extremely low voltage (around 1-3 millivolts, referred to as "mic level").

»Preamplifier:

- An amplifier that raises the low voltage to a usable level (around 1-2volts, also known as "line level;" there are 2 line level standards: consumer at -10dbV and professional at +4dbu because most professional equipment runs at higher voltages).
- Built into all equipment with a mic input (soundboards, computer interfaces, etc).
- Higher quality preamps are often made as an individual piece of equipment

»Recording Device:

- Analog (usually records to tape)
- Digital (need a converter, aka ADC; can record to CD, DAT, Hard Drive, etc)
- Number of Tracks? 2 tracks is standard (stereo), 3+ takes more expensive equipment

»Amplifier/Speakers:

- the amplifier raises "line level" to "speaker level"
- the speaker converts the electrical signal into an acoustic sound wave
- often in recording studios these are built together (aka powered speakers)
- headphones count in this category- they do the same thing, but at a much quieter level

Wiring:

- Between each of these stages is wiring that transfers the electrical signal
- Mic level should use balanced wiring (usually XLR connectors)
- Line level can use balanced wiring (XLR, 1/4", and RCA connectors are all common)
- Digital uses USB, Firewire, ADAT/optical, TDIF, cat5, etc

Gain Structure:

- It is important to make sure that all of the electrical levels are in the correct range.
- Set the volume on the preamp carefully! Do not let it peak ("go into the red"), but it shouldn't be too quiet either (close to "0" but never over- unless analog).
- Incorrect levels anywhere along the signal path can create distortion or extra noise.