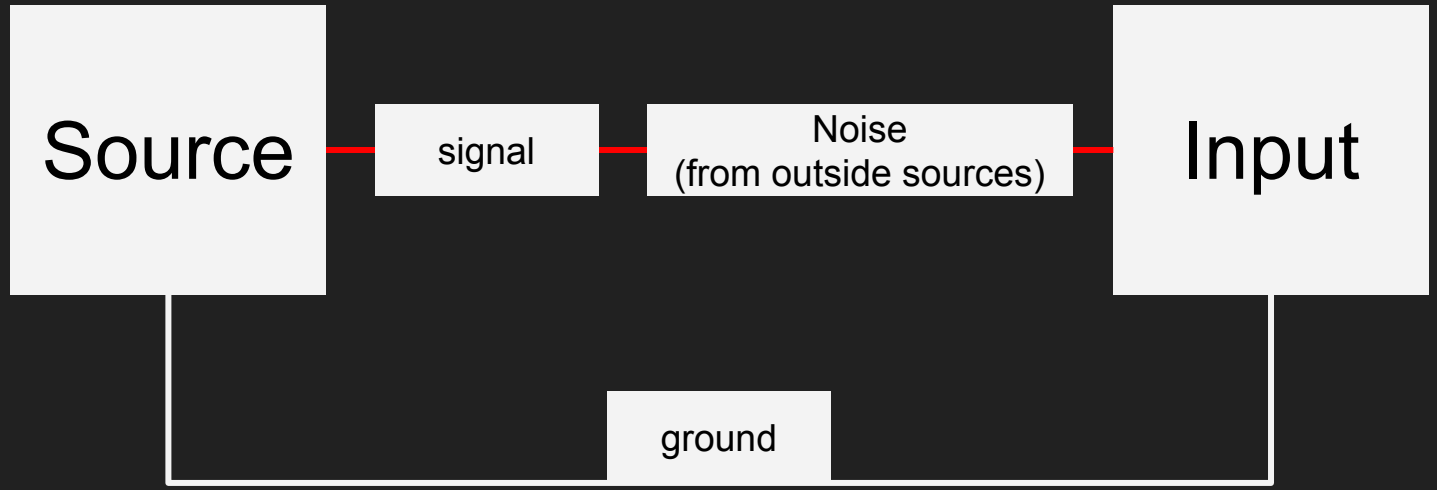
Things You Should Know

Audio Engineering

Balanced vs. Unbalanced Cables and Inputs/Outputs

- Unbalanced cable - contains two connectors on each side connected by two conductors, a signal and ground wire.
- Ground wire serves to shield the signal wire moderately from outside noise sources and carry some of the signal.
- General maximum range with minimal noise is about 15 feet which is why they are fine for guitar amps, keyboards, etc.

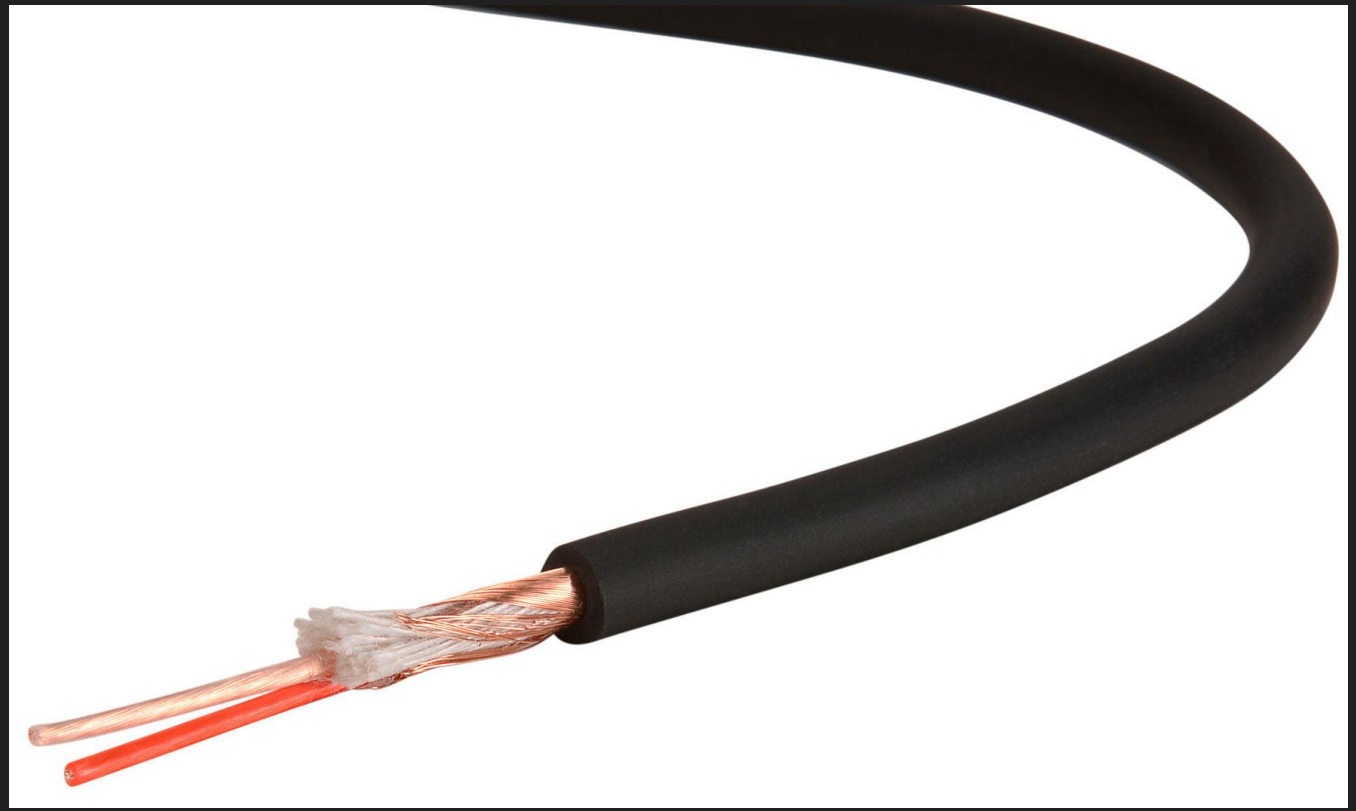
Unbalanced Cable

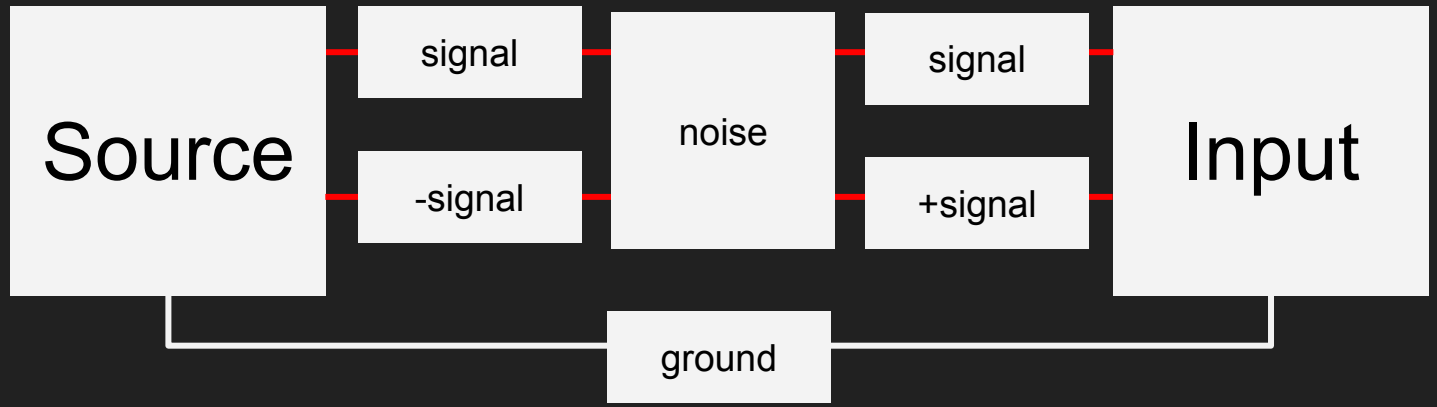

Source
signal
Noise
(from outside sources)
Input
ground

Balanced vs. Unbalanced Cables and Inputs/Outputs

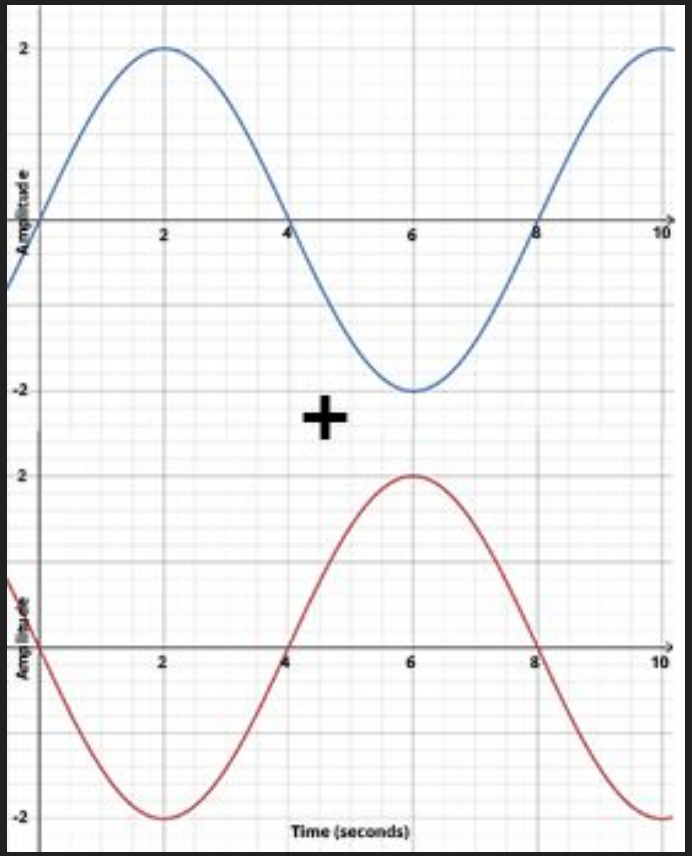
- Balanced cables - contains three connectors on each side connected by three conductors, two signal wires that carry a copy of the signal and ground wire which still acts as a shield wrapped around the wire.
- The balanced output sends one copy of the signal in its normal phase and the other copy with its phase inverted.
- The input then receives the two signals and inverts the phase again. Since the two cables receive identical noise, inverting the phase at the end of the signal chain flips the noise out of phase with its copy, canceling the noise out.
- Balanced cables can then support much longer cable runs, upwards of at least 100 feet.

Balanced Cable

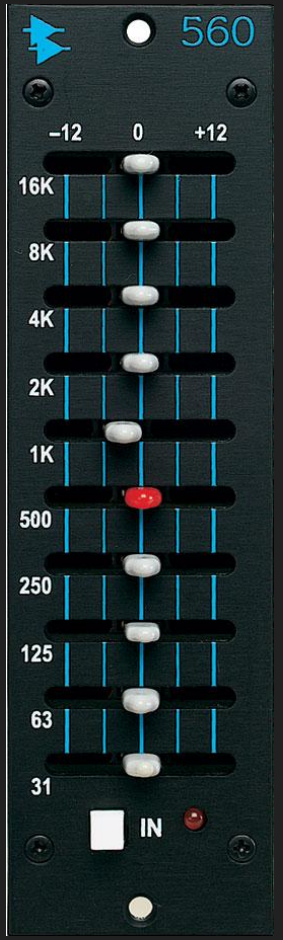



Source
signal
-signal
noise
signal
+signal
Input
ground

Phase



Balanced Devices



Unbalanced Devices

Trying to Hack the System

- Using balanced cable on unbalanced input and output gear won’t give you the noise cancellation benefits because the circuits don’t perform the polarity inversion, but the audio will pass.
- Using unbalanced cable with balanced inputs and outputs will give you audio, but no noise cancellation.
- The common notion is that balanced cable has more shielding but it is in fact no different than balanced cable.

Audio Interfaces

What to look for?

- Converters
- Preamps
- I/O

Scarlett 2i2

Scarlett 2i2

- “High quality” converters (that could mean anything)
- Cheap but transparent preamps
- instrument-level inputs
- 2 in/ 2 out
- Scarlett 2i2

Audient id44

Audient id44

Audient id44

- Burr Brown converters (name brand converter)
- Same preamps from their studio consoles
- JFET instrument-level inputs, the same as a radial di box
- 20 in/ 24 out
- Audient id44
- Audient Console

Microphones

- Condenser
- Dynamic
- Ribbon

Condenser

- Works off the physics of capacitance, the diaphragm is constructed from two metal plates with a space between them.
- Sound waves strike the diagram and the plates move, which causes the distance between the plates to change which in turn is turned into an electrical signal.
- The output voltage is high, but the current is very low. This is why they require phantom power, the outside power source invented by Neumann.
- Loud output
- Typically not suited for loud, close mic placement.
- Usually has a bright tone.

Condensers

Dynamic

- Has a coil with a magnet. Sound waves move the coil and the magnet which produces the electrical signal.
- Built to move, so they are very sturdy and ideal for stage applications and very loud, plosive sources.
- Do not require external power.
- Relatively small output, might need extra preamp gain.
- High end is usually rolled off.

Dynamic Mics

Ribbon Mics

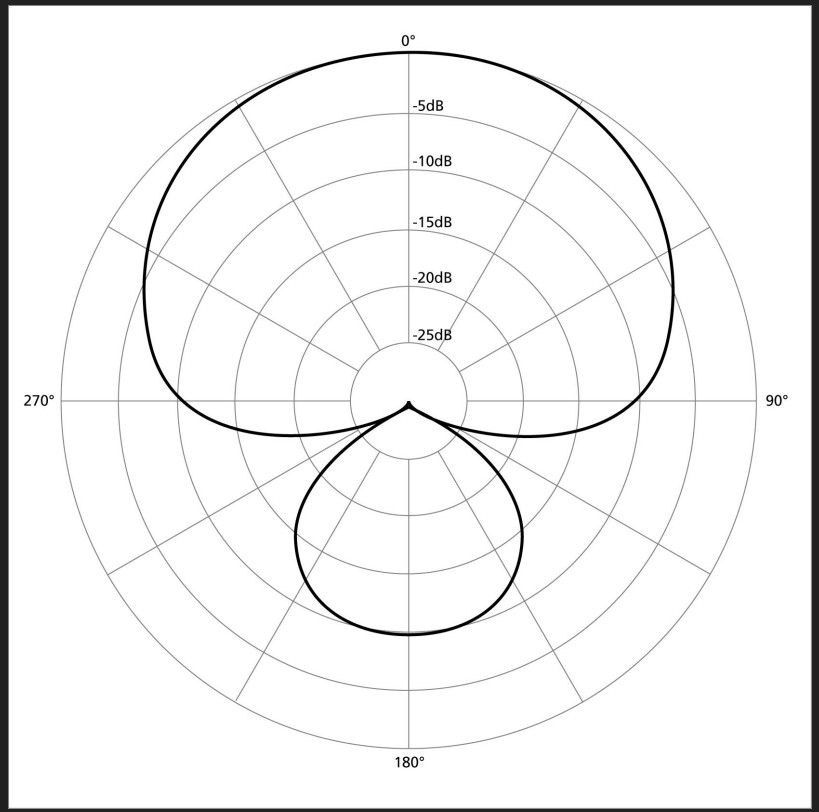
- Same concept as the dynamic mic, but a thin piece of aluminum ‘ribbon’ is moved by the sound waves and converted into electrical signals.
- More fragile than dynamic mics like the sm57.
- DO NOT GIVE THESE PHANTOM POWER, the ribbon can burn and destroy the capsule.
- Great on all sound sources that aren’t too plosive.

Ribbon Mics

Polar Patterns

- Cardioid
- Omni-directional
- Figure 8

Cardioid



Omni-directional

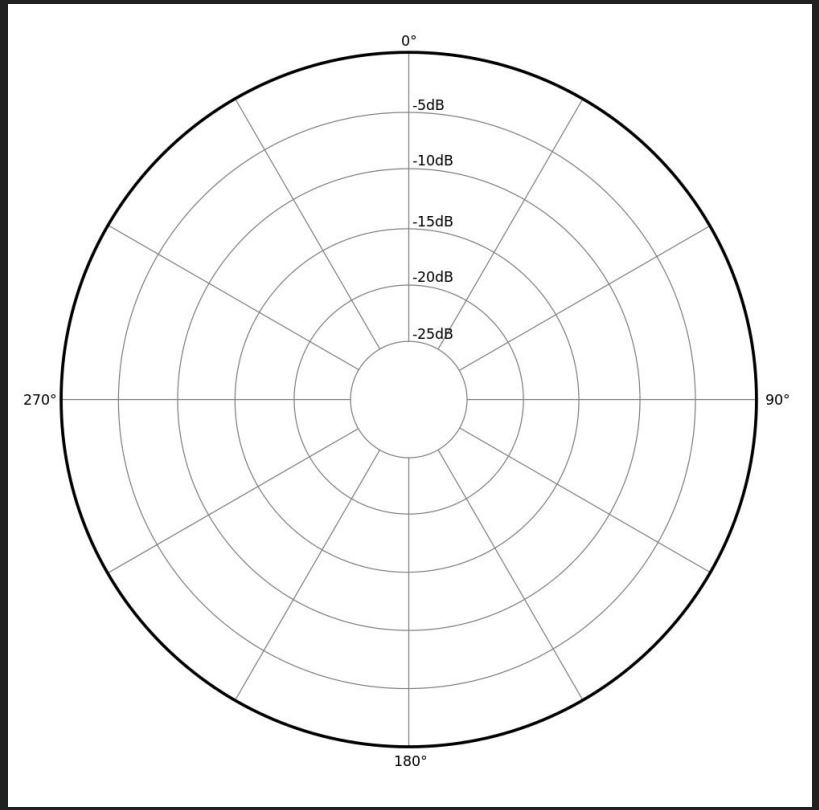


Figure 8