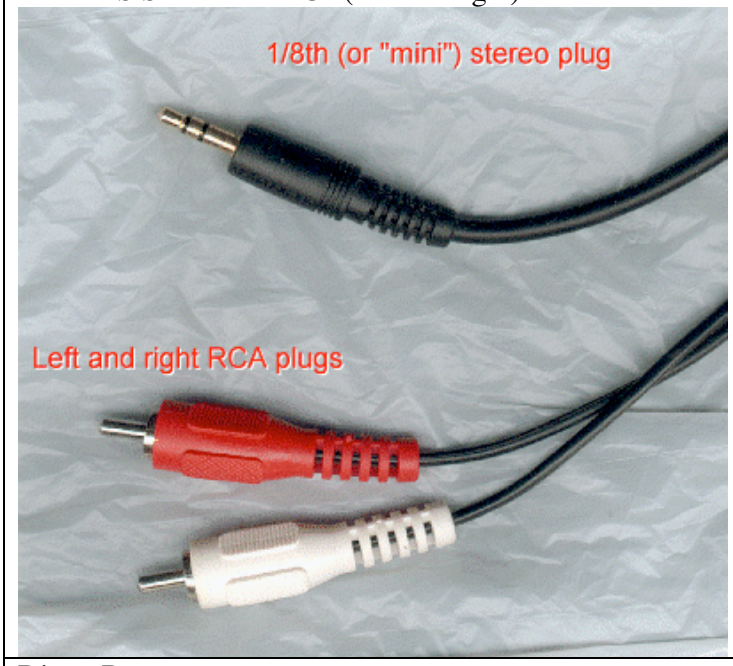
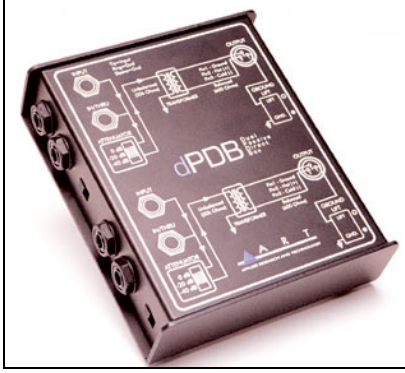
Connections:

Type / Connector	Use
XLR 	Balanced, Microphones, Pro Audio Gear, Intercom, Long (over 15ft) runs, Professional Standard for audio connections
NL-4   NL8	Speaker, NL-4 for 1 or 2 way speakers NL-8 for 3 or 4 way speakers
EP4, EP6, EP8	Speaker EP4 for 1 or 2 way speakers EP6 for 3 way speakers EP8 for 4 way speakers
1/4" TS (Tip/Sleeve)  	Unbalanced, Guitar cords, keyboards, short runs Sometimes used, with heavier gauged cable (14-18AGW) for speakers. Usually not in professional installations because they pull out easily.

Type / Connector	**Use**
1/4” TRS (Tip/Ring/Sleeve) 	Balanced mono or unbalanced stereo, headphone outputs (unbalanced stereo), some mixer outputs (balanced mono), Insert cables (Unbalanced send & return)
RCA   	Unbalanced, CD Players, VHS & DVD decks, Consumer Standard for audio connections
1/8” TS (Tip/Sleeve)	Unbalanced mono, sometimes used for mono audio inputs for consumer video cameras and computers
1/8” TRS (Tip/Ring/Sleeve) 	Unbalanced stereo, computer outputs

Type / Connector	Use
1/8” TRS Stereo to 2 RCA(Left & Right) 	Adapter used most commonly when interfacing Computer Audio to a sound system. The Computer sends a stereo audio signal out of an 1/8” TRS jack, and then is adapted to 2 RCA connectors for interfacing to an audio system. NOTE: This is an Unbalanced signal, and must be converted to a balanced signal for cable runs longer than 15ft. 2 direct boxes (1 for each channel) to accomplish this.
Direct Box  Stereo Direct Box 	Direct Boxes (DI, which stands for Direct Input) are used to convert an Unbalanced line into a Balanced line. Examples are Guitar, Keyboards, Computer Outputs, Unbalanced playback deck (Such as CD & DVD players with RCA outputs). A stereo direct box is simply one box with 2 channels, designed for connecting to something with a stereo output (Such as Keyboards & CD Players)

Standard XLR Audio Wiring:
- Pin 1: Ground
- Pin 2: Hot
- Pin 3: Negative

Exceptions: Intercom, some older audio equipment

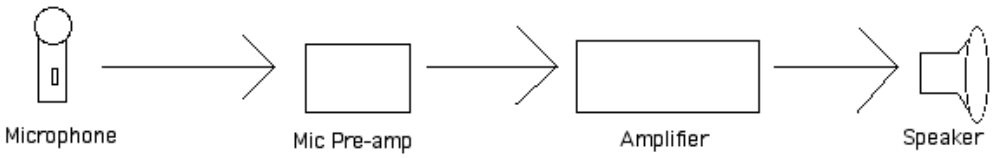
Microphone: Used to pickup acoustic vibrations in the air and convert those vibrations into a low level electrical signal.

Line Level: Standard voltage level that is used inside most electrical devices and is standard in all audio electronics. The advantages of a line level signal are: a standard electrical voltage; ability to travel long distances with minimum loss; large enough voltage to counteract most outside interference, but small enough voltage to not cause interference with most outside objects.

Speaker: Used to convert Electrical signal in audio vibrations which can be picked-up by the human ear.

Direct Box (D.I.): Used to convert an unbalanced signal into a balanced signal for travel over long distances.

The Simple Sound System:



Science of Sound

Speed of Sound: Aprox. 1130ft per second in air (Rounded off).

Wavelength: 1130 ÷ frequency = wavelength

Decibel (dB): Exponential measurement unit of volume.
- A 6dB increase in acoustic volume is a doubling of volume
- A 3dB increase in electrical volume is a doubling of volume

Ohms Law:

$R = \frac{V}{I}$ or $V = IR$ or $I = \frac{V}{R}$

Where
- V = Voltage
- I = Current ("I" stands for INTENSITY)
- R = Resistance

General Note: More Ohms = Less Resistance

Balanced: Normally Low Impedance. Uses 3 wires for each signal: Positive, Negative, and Ground. Positive and Negative are 180 degrees out of phase from each other. Good for rejecting electrical interference and radio waves. Can travel long distances with minimal signal degradion. All signals that travel more than 15 feet should be balanced.

Unbalanced: Normally High Impedance: Uses 2 Wires for each signal: Positive and Ground. Okay for distances below 15 feet in most environments. Can not reject outside electrical interferences.

Gear:

Name	Common Types	Use
Microphone	Transducers: Dynamic, Condenser, Ribbon	Pick up acoustic sounds and convert those sounds into an electrical signal.
	Polar Patterns: Omni, Cardioid, Bi-Polar, Hyper-Cardioid	
	Varieties: Hand Held, Laveleir, Plate (Floor), Stand Mountable, Wireless	
Direct Box (DI)	Active (requires power); Passive (non-powered)	Convert an unbalanced signal (ex: CD Player, Keyboard) to a balanced Signal (Usually to XLR)
Mixing Console	Analog, Digital, Powered, Automated, non-Automated, Small format, Large Format. Consoles are built for specialized needs, such as: recording, broadcast, live reinforcement, theater, etc…	Route and mix audio signals from multiple input sources and locations. Consoles are used to create multiple mixed audio signals (from the inputs) and send those various mixed signals to multiple outputs, to then be patched to various locations which require audio for various uses.
Playback/Record Decks	Cassette, CD, DVD, DAT, VHS, Beta, Hard Disk, Multitrack, etc…	Record and/or playback audio.
Equalizer	Parametric, Graphic	Process an audio signal by adjusting the volume of certain frequency bands
	Often found as a stand-alone piece of gear and also built into mixing consoles.	

Name	Common Types	Use
Crossover	Active (Requires power, placed between the console output and the Amplifiers in the signal chain. Higher quality) Passive (Does not require power, usually built into the speaker itself, and therefore is after the Amplifier)	Splits an audio signal into multiple bands (ex: lows, mids, and highs) Active: Usually placed between the Console Outputs and Amplifier Inputs. Passive: Usually built into a speaker encloser and placed right before each speaker component.
Delay	Multiple Types, most do basically the same thing.	Used to delay an audio signal to compensate for the speed of sound in air.
Amplifier	Multiple Types, most do basically the same thing.	To amplify a line level signal to an electrical signal powerful enough to move a speaker cone.
Speaker	Transducer Types: Dynamic, Condenser, Ribbon, Compression Driver/Horn, Piston	Converts electrical signal from an amplifier into acoustic vibrations. Final stage in the audio path before air and the ear.
	Passive: Requires an Amplifier and Crossover	
	Powered: Has Amplifiers and Crossovers Built-In.	

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