

Audio Terminology Basics



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Introduction

Audio Terminology

Are you getting ready to buy a new amp? Is your band booking some bigger venues and in need of new loudspeakers? Are you just starting out and have no idea what equipment you need? As you look up equipment details, a lot of the terminology can be pretty confusing.

What do all those specs mean? What's a compression driver? Is it different from a loudspeaker? Why is a 4 watt amp cheaper than an 8 watt amp? What's a balanced interface, and why does it matter?



We're Here to Help

When you're searching for the right audio equipment, you don't need to know everything about audio engineering. You just need to understand the terms that matter to you. This quick-reference guide explains some basic audio terms and why they matter.



What makes EV the expert?

Experience. Dedication. Passion.

Electro-Voice has been in the audio equipment business since 1930. Recognized the world over as a leader in audio technology, EV is ubiquitous in performing arts centers, sports facilities, houses of worship, cinemas, dance clubs, transportation centers, theaters, and, of course, live music. EV's reputation for providing superior audio products and dedication to innovation continues today. Whether EV microphones, loudspeaker systems, amplifiers, signal processors, the EV solution is always a step up in performance and reliability.



Audio Terms: A-I

Alternating Current (AC)

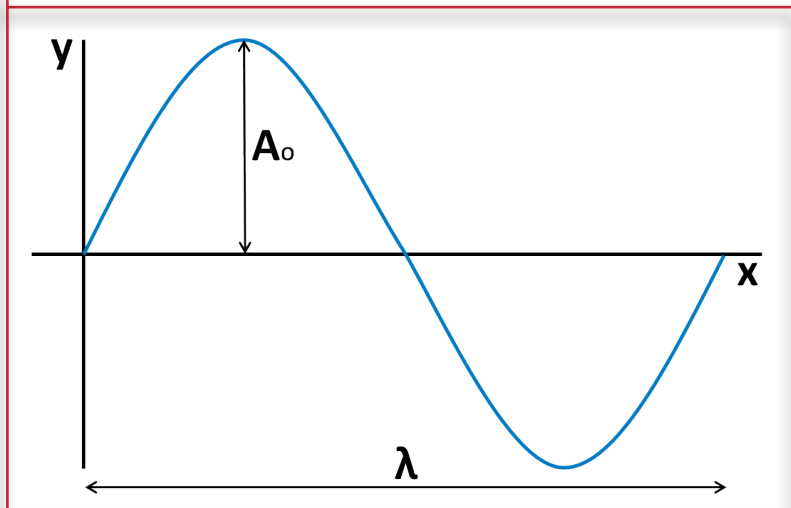
An electric current that repeatedly reverses direction.

Amplifier

An electronic device used to increase the amplitude of the audio signal fed into it.

Amplitude

The relative magnitude of the signal.



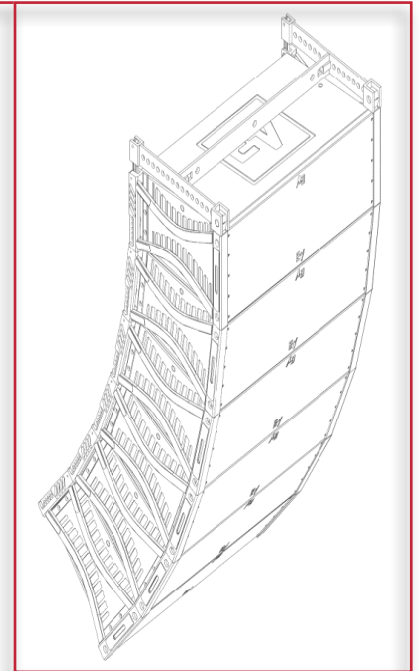
Array

A loudspeaker system made up of a number of loudspeaker elements joined together.

A **Column Array** - Generally a single cabinet with the elements of the array oriented in a straight line to provide some level of directivity at a range of frequencies.

A **Constant Curvature Array** - An array of multiple boxes, each at the same angle of separation between each array element.

A **Line Array** is a loudspeaker system made up of a number of loudspeaker elements joined in a line to create a single sound source. The loudspeakers must be close enough together to send sound waves farther than individual loudspeakers, and with a more evenly distributed sound output pattern.



Balanced Connection

A balanced connection allows for the use of long cables while reducing susceptibility to external noise. Professional audio products support a balanced connection. A typical balanced cable contains two identical wires, which are twisted together and then wrapped with a third conductor that acts as a shield. Three-pin XLR connectors are the most common balanced connector, but quarter-inch (1/4" or 6.35 mm) TRS connectors (tip-ring-sleeve) are also commonly used.

Bandwidth

The range of frequencies an amplifier or transducer produces.

Carrier Signal

A continuous signal of a single frequency capable of being modulated by a second, data-carrying signal.

Channel

The designation of a unique path through a device from input to output.

Clipping

Audio distortion caused by pushing an amplifier to create a signal with more power than its source can produce (i.e., overdriving an amp). The signal will cut off when it reaches maximum capacity, which produces clipping.

Comb Filtering

Also called phase cancellation. A comb filter adds a delayed version of a signal to itself, causing interference. Comb filtering can occur when two loudspeakers are playing the same signal at different distances from the listener. In an enclosed space, a listener hears a mixture of direct sound and reflected sound. Because the reflected sound takes a longer path, it sounds like a delayed version of the direct sound, which is called comb filtering.

Comping

Reducing the dynamic range of a signal for recording and then expanding it to its original value for reproduction or playback.

Compression Driver

A high-frequency dynamic loudspeaker.

Conductor

Material that allows the flow of electrical charge.

Coverage Pattern

A loudspeaker system's directional pattern, which can vary by frequency and tone.

Crossover

An electrical circuit (passive or active) consisting of a combination of filters used to divide an audio frequency into segments suitable for individual loudspeaker use.

Active crossovers split frequency bands prior to amplification of the audio signal.

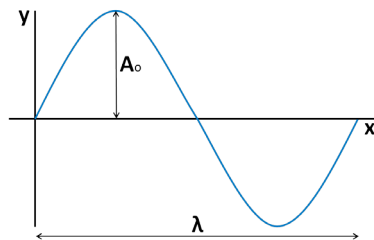
Passive crossovers split frequency bands after amplification of the audio signal, just before reaching the individual loudspeaker components. Passive networks may cause power loss and usually aren't capable of the fine tuning and adjustment that an active crossover provides.

Current

Electric current is the flow of electric charge through a conductor, such as wire.

Cycles per Second (CPS)

One cycle is the transition of a sine wave from 0 to positive crest down through 0 to the negative crest and back to 0. One full cycle is shown in this graph. Cycles per Second refers to the number of times a full cycle is repeated in the period of one second. Cycles per Second is usually expressed as hertz (Hz). One hertz is equal to one cycle per second.



Direct Current (DC)

An electric current that does not change direction of flow.

Decibel (dB)

A logarithmic scale that is used to measure signal levels. Sound pressure level (SPL) can be measured in dB.

Good to Know: Doubling electrical power only yields an increase of +3 dB. Increasing the power tenfold will yield an increase of +10 dB and is a doubling of perceived loudness.

dBu

Decibels unloaded; reference voltage for professional applications. The reference voltage for the decibel unloaded (0 dBu) is the voltage required to produce 1 milliwatt (mW) of power across a 600 Ω load (approximately 0.7746 VRMS). The most common nominal level for professional equipment is +4 dBu.

dBV

Decibel volts; reference voltage for consumer applications. The reference voltage for the decibel volt (0 dBV) is 1 VRMS, which is the voltage required to produce 1 mW of power across a 1 kilohm ($k\Omega$) load. The most common nominal level for consumer audio equipment is -10 dBV.

Delay

An electronic circuit that delays the audio signal for a short period. Mixing delayed signals back with the original sound generates a number of audio effects.

Digital Signal Processor (DSP)

A device which receives an audio signal and typically

Direct Box (DI box)

A device that enables a musical instrument to be connected directly to a mic- or line-level mixer input.

Distortion

The alteration of the original shape (or other characteristic) of a sound wave which changes the sound. Distortion is usually unwanted, but it may be stylistically desirable for certain instruments, such as an electric guitar. The three principal types of intentional distortion effects are overdrive, distortion, and fuzz.

Diversity

The method of minimizing the effects of multipath delays that can create drop-outs of the RF signal.

Efficiency (in loudspeakers)

Sound power output divided by the electrical power input.

Frequency

The number of times a wave repeats per second, measured in Hertz (Hz).

Frequency Response is given as the range of frequencies between the points at the upper and lower ends of the sound spectrum, where the speaker response is 3 dB below the nominal output level. This indicates that the system is starting to have a reduced output below this frequency.

Frequency Range is given as the range of frequencies between the points at the upper and lower ends of the sound spectrum, where the speaker response is 10 dB below the nominal output level. This is commonly referred to as the lower and upper limit of the system's usable output. Anything below or above this frequency range should not be expected to be reproduced from the system.

Filter

A frequency-dependent amplifier circuit designed to amplify, pass, or attenuate certain frequency ranges.

A **Low-Pass Filter** allows frequencies below its cutoff to pass and progressively attenuates frequencies above the cutoff.

A **High-Pass Filter** allows frequencies above its cutoff to pass and progressively attenuates frequencies below the cutoff.

A **Bandpass Filter** passes frequencies between its two cutoff frequencies; attenuates frequencies outside the range

Band-Reject Filter –attenuates frequencies between its two cutoff frequencies; passes frequencies not within the “reject” range.

Ground

Ground, or “earth,” is the point of zero voltage in a circuit or system. It’s the reference point from which all other voltages are measured. Professional audio equipment should maintain a good technical ground and operate with a good safety ground.

Hertz

Units of frequency. One hertz is equal to one cycle per second.

Impedance (Z)

The amount of resistance offered by an electronic circuit or device to the (AC) current that flows through it. It is commonly represented by the mathematical symbol “Z” and is measured in Ohms.

Input

Connection from a signal source.

Inverse-Square Law

Each doubling of distance from a sound’s point source results in a -6 dB change in SPL.



Audio Terms: J-R

Limiter

A circuit that allows signals below a specified input power to pass unaffected while attenuating the peaks of stronger signals that exceed this input power. A limiter is a compressor with a high ratio and, generally, a fast attack time.

Loudspeaker

An electroacoustic transducer that produces sound in response to an electrical audio signal input. May refer to individual transducers (or “drivers”) or to complete speaker systems consisting of more than one. To reproduce a wide range of frequencies, most loudspeaker systems use more than one driver. Individual drivers reproduce different frequency ranges.

Subwoofer

A loudspeaker designed to reproduce bass frequencies.

Tweeter

A small loudspeaker designed for the reproduction of high-frequency sounds.

Woofer

A loudspeaker designed for the reproduction of low-frequency sounds.

Magnitude

The value of a voltage or current waveform.

Microphone

An acoustic-to-electric transducer that converts sound into an electrical signal.



Condenser Microphone

A microphone where a condenser (capacitor) is created by stretching a thin diaphragm in front of a metal disc (the back-plate). Condenser microphones require external voltage to operate, which is normally supplied in the form of phantom power from the microphone preamp or the mixing console.



Dynamic Microphone

A microphone design where a wire coil is attached to a small diaphragm. Sound pressure causes the coil to move in a magnetic field, thus creating electrical voltage proportional to the sound pressure. They're rugged, robust and reliable microphones that add coloration to the audio signal. Since dynamic microphones have a weaker signal than condenser mics, they must be placed relatively close to the audio source.

Directional

Sound reflected from surfaces behind a directional microphone's diaphragm is permitted to be incident on the rear side of the diaphragm. Since the sound reaching the rear of the diaphragm travels slightly farther than the sound at the front, it is slightly out of phase. The greater this phase difference, the greater the pressure difference and the greater the diaphragm movement. As the sound source moves off the diaphragm axis, this phase difference decreases due to decreasing path length difference. This is what gives a directional microphone its directivity.

Cardioid

A type of microphone that has a heart-shaped polar, or directional, pattern. It is the most common unidirectional microphone in use because it effectively rejects sound from other directions.

Hyper-Cardioid

A type of microphone with a tighter area of front sensitivity and a smaller lobe of rear sensitivity.

Omnidirectional

Also called nondirectional, this type of microphone's response is generally considered to be a sphere in three dimensions.

Super-Cardioid

Similar to a hyper-cardioid microphone, except there is more front pickup and less rear pickup.

Mixing Console

Also called a soundboard, a mixing console is an electronic device for combining, routing, and changing the level, timbre and/or dynamics of audio signals.

Multipath

In wireless systems, it is interference due to multiple arrivals of the same RF signal due to reflections off nearby objects. The difference in path lengths creates different arrival times, thus causing signal cancellation and degradation.

Speakon

A type of cable connector mostly used in professional audio systems for connecting loudspeakers to amplifiers. Speakon connectors are a higher current-carrying alternative to other connectors for loudspeakers. NL4 is a type of Speakon connector that has four electrical connections.

Ohm (Ω)

Measurement of the resistance in an electrical conductor, which can be calculated using the $R = V / I$ (resistance = voltage/current) equation.

Power Rating

The electrical output of the amplifier module based on a set of test parameters. There are many different kinds of power ratings for amplifiers and speakers, which can make comparisons difficult unless you identify the ratings that use the same test parameters.

Preamp

Preamplifier; device that amplifies the weak electrical signals from microphones and pickups used to record voices and musical instruments to professional line level.

Proximity Effect

An increase in bass or low frequency response when a sound source is close to a microphone. Proximity effect is caused by the ports that create directional polar pickup patterns, so omnidirectional mics are not affected.

Receiver

An electronic device, with an antenna, that receives audio waves and converts the information carried by them to an audio signal. The antenna intercepts electromagnetic waves and converts them to alternating currents, which are applied to the receiver; the receiver extracts the audio. The receiver uses electronic filters to separate the wanted audio frequency signal from all other signals.



Audio Terms: S-Z

Sensitivity (in loudspeakers)

A certain number of decibels at 1 W electrical input, measured at 1 meter, often at a single frequency. Driver ratings based on the SPL for a given input are called sensitivity ratings.

Shielding

A shielded cable is an electrical cable of one or more insulated conductors enclosed by a common conductive layer. The shield may be composed of braided strands of metal, a non-braided spiral winding of copper tape, or a layer of conducting polymer. Usually, this shield is covered with a jacket. The shield reduces electrical noise and interference. In shielded signal cables the shield may act as the return path for the signal, or may act as screening only.

Signal-to-Noise Ratio (SNR)

A measure that compares the level of a desired signal to the level of background noise.

Signal Path/Chain

Path taken by a signal. This can either be from the input to the output of one device, or the path taken through many different devices (e.g., from microphone to mixing desk / signal processing devices then amplifier(s), speakers, etc.)

Signal Voltage

The effective voltage value of the signal that leaves or feeds an audio device.

Line Level

Within a sound system, signals of various levels enter a mixer, but the signal that leaves the mixer is at professional "line level." The standard is +4 dBu or -10 dBV audio levels, or approximately 1V.

Mic Level

The relatively low-level signal (generally -40 dBV to -60 dBV) of microphone or pickup output that must be amplified to line level, where it is more easily manipulated by a mixing console.

Speaker Level

Signals stronger than line level that are used to drive headphones and loudspeaker. Produced by amplifiers.

Signaling Reference Voltage (dBu and dBV)

See entries for dBu and dBV.

Sinusoidal (Sine) Wave

An oscillation whose waveform is that of a sine curve, e.g., a sound wave or an electrical wave. Audio signals are sine waves.

Sound Pressure Level (dB SPL)

The loudness of an acoustic wave stated in dB.

Squelch

A function that mutes the audio output of a receiver when there isn't a strong enough radio frequency (RF) signal present at the antennas. Most professional level wireless microphones have adjustable squelch.

Transmitter

An electronic device which produces radio frequency (RF) signal. The transmitter itself generates a radio frequency alternating current, which is applied to the antenna. When excited by this alternating current, the antenna radiates radio waves.

Unbalanced Connection

Consumer audio products use unbalanced connections, or interfaces. An unbalanced connection requires the use of short audio cables and is susceptible to external interference. An unbalanced interface uses coaxial wire and connectors with two electrical contacts.

Voltage

Electric force or potential difference expressed in volts.

Watt (W)

A unit of power in the International System of Units equal to one joule per second. Watts of electrical power equals volts times amperes.

XLR cable/connector

A style of electrical connector most commonly associated with balanced audio interconnection.

Z

The electrical symbol for impedance.

Wrap-Up

The More You Know

Now that you understand the specs that matter to you, you should be ready to make some decisions about your audio components and hit the road.



Ready to Get Started?

We hope this list helped you get a grip on some audio terms you're going to encounter when choosing your audio equipment. If you need additional information or help, visit Electro-Voice online at <http://www.electrovoice.com>.