

# Glossary of Basic Microphone Terms

**Amplifier:** a device that tracks the amplitude of an incoming signal and proportionally increases the voltage, current or power of the signal by adding power from another source.

**Attenuation:** the process of decreasing the amplitude of a signal as it passes from one point to another. Analog attenuation circuits typically use resistors to reduce the voltage of a signal. In audio, the effect of such attenuators is usually expressed in decibels. See decibel, resistor.

**Balanced line:** An audio line comprising three conductors—two carrying signal and a ground (shield) wire, where one of the signal wires carries the sound and the other carries an inverted copy. When the signal reaches the destination, the inverted copy is flipped and added to the original. Any noise that has been induced into the signal is also inverted. When this is combined with the "uninverted" noise, it cancels it out. Balanced lines thus are less susceptible to hum and can carry audio signals over longer distances. Balanced audio lines typically use 3-pin XLR or 1/4-inch tip-ring-sleeve (TRS) phone connectors.

**Capacitor microphone:** an alternate, less-used term for condenser microphone.

**Cardioid microphone:** a microphone with a directional pickup pattern that is most sensitive to sounds coming from the front and sides while rejecting sounds coming from the rear. The pickup pattern is roughly heart-shaped when viewed from above, hence the name "cardioid."

**Condenser microphone:** a microphone that picks up sounds via an electrically charged, metallized diaphragm, which is separated from a conductive back plate by a thin air layer. Sound waves striking the diaphragm cause a minuscule voltage change, which is increased by a tiny amplifier circuit within the mic body. Because power is required by both the microphone capsule and the amplifier, condenser microphones must have a power source, which can be a battery inside the mic body or "phantom" power from a mixing console or external power supply.

**dB:** abbreviation for "decibel." See decibel.

**dBm:** a term expressing an electrical power level, referenced to 1 milliwatt (i.e., 0 dBm = 1 mW). Originally, dBm was used to express the power dissipated in telephone applications with 600-ohm impedances, but it is not necessarily referenced to a particular impedance.

**dBu:** a means of expressing voltage referenced so that 0 dBu equals 0.775 volts, regardless of impedance. One mW of power is dissipated if 0.775 volts is applied to a 600-ohm load, so when the load impedance is 600 ohms, 0 dBu = 0 dBm.

**dBV:** a means of expressing voltage, referenced so that 0 dBV equals 1-volt RMS, regardless of impedance.

**dBv:** synonymous with dBu but rarely used due to confusion with dBV. See dBu.

**decibel:** a unit of measure used to logarithmically express ratios of change in power or signal levels. Equal to one-tenth of a Bel (named for Alexander Graham Bell).

**Dynamic microphone:** a transducer that relies on the law of induction, with an output proportional to the velocity of a moving element within a magnetic field. The most common type is the moving-coil microphone, which picks up sounds when sound waves strike a diaphragm attached to a coil of wire. When the coil moves within the magnetic structure of the microphone, it creates an output voltage. The process is exactly the reverse of the way a speaker operates. Moving-coil dynamic microphones tend to be extremely rugged, making them well-suited for most sound reinforcement applications. The other common type of dynamic microphone is the ribbon mic. See ribbon microphone.

**Dynamic range:** a ratio (expressed in dBs) of the difference between the softest and the loudest sound that can be produced, reproduced or captured by a musical instrument or audio device.

**Feedback:** a condition where the output of a circuit recycles through its input. Acoustic feedback is a whine or howl that occurs in live audio situations when an amplified sound re-enters a sound system through the same microphone (or guitar pickup) that reproduced the original source, creating a loop. Feedback also can be used in signal processing; for example, part of a signal routed through a digital delay can be fed back into the delay to create a more complex effect. This is also called "regeneration."

**Highpass filter:** a circuit designed to attenuate, or cut, frequencies that fall below some designated point, while allowing higher frequencies to pass unaffected.

**Hypercardioid:** a variation of the cardioid microphone pickup pattern. A hypercardioid microphone is most sensitive at the front and sides, while rejecting sounds entering 120° to the rear.

**Impedance:** Measured in ohms, this is a way of expressing a circuit's opposition (resistance and reactance) to a signal or current attempting to pass

through. The practical difference between impedance and resistance is that impedance changes as a function of frequency.

**Omnidirectional microphone:** a microphone that is equally sensitive to sounds coming from all directions.

**Phantom power:** a method of powering condenser microphones by sending DC current (typically 9 to 52 volts) over the same mic cable that carries the audio signal. "Phantom" is derived from the fact that there is no visible power cord and the voltage is not perceptible in the audio path.

**Polar pattern:** A circular, 2-D plot that indicates the directional response of a transducer. While polar patterns are commonly used to show microphone pickup patterns, they can also indicate the dispersion of a speaker. Interpreting polar patterns, even with something as simple as a common cardioid microphone, can be fairly complex. For one, the polar response shown on paper doesn't indicate the fact that a microphone's pickup pattern is actually a 3-D space around the mic. Second, the polar response of any microphone is frequency-dependent. For example, an ultradirectional "shotgun" microphone is extremely directional at high frequencies and much less so at low frequencies.

**Proximity effect:** a boost in the low-frequency response of a directional microphone that occurs when the sound source is relatively close to the microphone. The phenomenon begins when the source is about two feet away from the mic capsule and becomes more noticeable as the subject gets closer to the mic. Used properly, a singer can use the proximity effect as a means of adding fullness to a voice; however, the effect can also emphasize nondesireable low-frequency noises such as breath sounds and popping consonants ("p" and "b" sounds).

**Ribbon microphone:** a type of dynamic microphone that uses a thin metal ribbon placed between the poles of a magnet. Ribbon mics are typically bidirectional, meaning they pick up sounds equally well from either side of the mic.

**Roll-off filter:** a circuit that attenuates a signal that is above (lowpass filter) or below (highpass filter) a specified frequency. For example, microphones frequently have a bass roll-off filter to remove wind noise and/or excessive breath pops.

**Spaced pair:** a stereo microphone technique where two microphones are pointed directly at the source separated by two feet or more. Depending on the mic-to-source distance, this method can provide an extremely wide (occasionally exaggerated) stereo perspective. See X-Y miking.

**Supercardioid microphone:** a variation of the cardioid microphone that is most sensitive at the front while rejecting sounds entering 150° to the rear.

**Transducer:** a device that transforms energy from one form to another. Examples of electromechanical transducers include microphones (which convert acoustic pressure into electrical voltage) and loudspeakers (which convert voltages into acoustic pressure).

**XLR:** Developed by ITT/Cannon, XLRs are rugged, locking multipin connectors frequently used in professional audio equipment. While 3-pin XLRs are most commonly seen on microphones and console inputs, other configurations also exist, such as 4-pin XLRs (a standard for stage intercom systems) and 5-pin XLRs (often used on stereo microphones).

**X-Y miking:** a stereo microphone technique where two directional mics (typically cardioid) cross at an angle from 90° to 130°, with their capsules placed closely together. In most cases, X-Y miking provides good stereo separation with a well-balanced image. See spaced pair.