

A: Attenuation, loss of dB.

AC (Alternating Current): An electrical current that periodically changes in magnitude and direction.

Acoustic Fiberglass: Thin fiberglass material used as damping material inside speaker enclosures.

Acoustics: The science or study of sound.

Air Gap: The space between the top plate and the pole piece. This is where the voice coil sits.

Alignment: A class of enclosure parameters that provides optimum performance for a woofer with a given value of Q.

Alpha: In sealed enclosure designs, the ratio of V_{as} to V_b , where V_b is the volume of the box you will build.

Alternator: A device that is turned by a motor to produce AC voltage, which is then rectified (turned into DC) and used to supply voltage to the vehicle's electrical system.

Ampere (A): The unit of measurement for electrical current in coulombs per second. There is one ampere in a circuit that has a one ohm resistance when one volt is applied to the circuit.

Amplifier: An electrical circuit designed to increase the current, voltage, or power of an applied signal.

Amplitude: The relative strength (usually voltage of a signal). Amplitude can be expressed as either a negative or positive number, depending on the signals being compared.

Attenuation: The reduction, typically by some controlled amount, of an electrical signal.

Audio Frequency: The acoustic spectrum of human hearing, generally regarded to be between 20 Hz and 20 kHz.

B: Magnet flux density in gap.

Baffle: A board or other plane surface used to mount a loudspeaker.

Balance: Equal strength provided to both left and right stereo channels.

Bandwidth: The range of frequencies covered by a driver or a network (crossover).

Band-Pass Enclosure: Type of enclosure used for subwoofers where the driver is completely inside the enclosure and all of the output emerges through a port(s) on one of the sides. They are difficult to calculate for optimum performance.

Band-Pass Filter: An electric circuit designed to pass only a certain range of frequencies.

Basket: The metal frame of a speaker.

Bass Blockers: First order high-pass crossover (non-polarized capacitors), generally used on midbass or dash speakers to keep them from trying to reproduce deep bass which could damage them at high playing levels.

Bass Frequencies (Low Frequencies): The low end of the audio frequency spectrum. There are no real frequencies where bass is categorized, but it ranges from approximately below 20 Hz to 400 Hz.

Bi-amping: Means that instead of driving a speaker full-range with a single channel of amplification, through a single set of speaker cables, you actually connect two sets of cables, with each set driven by a separate amplifier, or separate channels of a multi-channel amplifier. This way, low frequencies and high frequencies each receive dedicated amplification.

Bi-wiring: Involves connecting two sets of cables to your speakers, like bi-amping, but both sets of cables connect to the same set of output connectors on your receiver or amplifier. Bi-wiring doesn't deliver more watts to your speakers, so it doesn't offer the dramatic sonic improvement and higher loudness capability of bi-amping.

BI: Electro-magnetic force factor.

BL: Driver motor strength.

Boomy: The smearing of transients that makes bass reproduction sound muddled, usually because of improperly designed sealed (too small), ported (too small or tuned improperly), and band-pass enclosures, although the latter are sometimes designed this way on purpose by car audio manufacturers or install shops to be loud.

Bridged: In a multi-channel amplifier, the connection of two channels to drive a single load. The input signal is split, and then the phase of one of the signals is inverted. The non inverted signal is sent to the left amplifier and the inverted signal is sent to the right amplifier (L+R-). The load is connected between the two outputs so it receives twice the voltage at a given input level. The resultant power is much greater than the two 4-ohm channels combined.

C: Propagation velocity of sound at STP, approx. 342 m/s (meters per second).

Cab: Acoustic compliance of air in an enclosure.

Cabin Gain: The low frequency boost normally obtained inside a vehicle interior when subs are properly mounted.

Capacitor: An electronic device, which stores energy and releases it when needed. Also used to direct high frequency energy to tweeters. (Rated in Farads)

Cas: Acoustical equivalent of Cms.

Center Channel: In home theater, sound decoded from the stereo signal sent to a speaker mounted in front of the listener. Specially designed to enhance voices and sound effects from a movie soundtrack or other audio recording with enhanced features. Used in car audio to help offset skewed stereo imaging due to seating positions in the automotive environment.

Channel: The path an audio signal travels through in a circuit during playback. At least 2 channels are required for stereo sound.

Circuit: A complete path that allows electrical current from one terminal of voltage source to the other terminal.

Circuit Breaker: An electromechanical device designed to quickly break its electrical connection should a short circuit or overload occur. A circuit breaker is similar to a fuse, except it will reset itself or can be manually reset, and will again conduct electricity.

Clipping: The distortion that occurs when a power amplifier is overdriven. This can be seen visually on an oscilloscope, when the peaks of a waveform are flattened, or "clipped" at the signal's ceiling.

Cmes: The electrical capacitive equivalent of Mms.

Cms: Mechanical suspension compliance of a driver consisting of the spider and surround.

Coaxial Driver: A speaker composed of two individual voice coils and cones; used for reproduction of sounds in two segments of the sound spectrum. Usually used in automotive speakers.

Compliance: The relative stiffness of a speaker suspension, specified as Vas.

Cone: The cone-shaped diaphragm of a speaker attached to the voice coil, which produces pulses of air that the ear detects as sound. Some subs are now made with flat pistons instead of a cone shape.

Coulomb: An amount of electrical charge, which contains 6.24×10^{18} of electrons.

Crossover Frequency: The frequency at which a driver is crossed over at, usually when response is down -3dB.

Current (I): The flow of electrical charge measured in amperes.

D: Effective diameter of driver.

Daisy Chain: The wiring of multiple amplifiers together using the line out wiring options on the amps.

Damping: The reduction of movement of a speaker cone, due to either the electromechanical characteristics of the speaker driver and suspension, the effects of frictional losses inside a speaker enclosure, and/or by electrical means.

Damping Material: Any material added to the interior of a speaker enclosure to absorb sound and reduce out-of-phase reflection to the driver diaphragm (cone). Usually acoustic fiberglass, Polyester batting, or poly-fill is used in speaker enclosures.

DC (Direct Current): A flow of electrons, which travels in one direction only.

Decibel (dB): (1) A logarithmic scale used to denote a change in the relative strength of an electric signal or acoustic wave. It is a standard unit for expressing the ratio between power and power level. An increase of +3 dB is a doubling of electrical (or signal) power; an increase of +10 dB is a doubling of perceived loudness. The decibel is not an absolute measurement, but indicates the relationship or ratio between two signal levels. (2) SPL (sound pressure level) can be measured in dB. 0 dB represents the threshold of normal human hearing, 130 dB represents the threshold for pain.

Diaphragm: The part of a dynamic loudspeaker attached to the voice coil that moves and produces the sound. It usually has the shape of cone or dome.

Diffusion: The scattering of sound. Diffusion reduces the sense of direction of sound source, a useful quality in surround speakers.

Dispersion: The spreading of sound waves as it leaves a speaker.

Displacement: The measurement of cubic volume that an item (such as a speaker or port) takes away from the internal volume of an enclosure, when designing an enclosure this figure must be added to the enclosure volume.

Distortion: Any undesirable change or error in the reproduction of sound that alters the original audio signal or recording.

Dome Tweeter: A high frequency speaker with a dome-shaped diaphragm, usually small in size.

Dual Voice Coil (DVC): A voice coil with two windings, generally subwoofers. Each voice coil can be connected to a stereo channel, or both voice coils can be wired in parallel or series to a single mono channel. If connecting to stereo channels it is important that each channel have the same audio signal input so that 2 channels have the same output and both voice coils work in unison.

Driver: A loudspeaker unit, consisting of the electromagnetic components of a speaker, typically a magnet and voice coil.

Driver Parameters: The physical properties of a driver that determine its electrical and acoustical behavior. Also called Thiele small parameters. The minimum parameters used in determining speaker enclosures are F_s , Q_{ts} , and V_{as} .

Dust Cap: Part of the speaker that keeps foreign material from falling into the voice coil, which could hinder the speaker's movement and cut short its life.

Dynamic Range: Expressed in decibels, the range of signal amplitude (from the loudest to the quietest) that can be reproduced effectively by a piece of equipment. With respect to amplifiers, this range is defined by inherent noise at low levels and by overload distortion at high levels. The higher the number, the better the performance.

EBP: Efficiency Bandwidth Product. A rating that helps a builder determine whether a driver is suitable for a sealed or ported enclosure. EBP of less than 45 indicates the driver should be used in a sealed, 45 - 65 indicates flexible design options, over 65 indicates best for a ported enclosure. This only gives us a general idea what type of box to use. With actual testing the subs, sometimes EBP does not prove 100% accurate.

$$EBP = F_s/Q_{es}$$

Efficiency Rating: The loudspeaker parameter that shows the level of sound output when measured at a prescribed distance with a standard level of electrical energy fed into the speaker.

Electronic Crossover: Uses active circuitry to send signals appropriate drivers. This is more efficient than passive crossovers.

Enclosure: The box that contains the driver(s).

Equalizer: Electronic device used to boost or attenuate certain frequencies.

F3: The roll-off frequency at which the driver's response is down 3dB's from the level of its mid-band response, sometimes called the cutoff frequency.

Fb: The tuned frequency of a ported box.

Fc or Fcb: The system resonance frequency of a driver in a sealed box.

Fs: The frequency of resonance for a driver in free air.

Farad: The basic unit of capacitance. A capacitor has a value of one farad when it can store one coulomb of charge with one volt across it.

Filter: Any electrical circuit or mechanical device that removes or attenuates energy at certain frequencies.

Flat Response: The faithful reproduction of an audio signal; specifically, the variations in output level of less than 1 dB above or below a median level over the audio spectrum.

Free Air Resonance: The natural resonant frequency of a driver when operating outside an enclosure.

Frequency: The number of waves (or cycles) arriving at or passing a point in one second, expressed in hertz (Hz).

Frequency Response: The frequency range to which a system, or any part of it, can respond. Unless a limit of variation in intensity is stated, this specification is meaningless.

Full-range: A speaker designed to reproduce all or most of the sound spectrum.

Golden Ratio: The ratio of the depth, width, and height of a speaker enclosure, based on the Greek Golden Rectangle. Usually recommended for home speakers, difficult to use in car audio applications.

The ratio: $W = 1.0$, $Depth = 0.618W$, $Height = 1.618W$.

Ground: Refers to a point of (usually) zero voltage, and can pertain to a power circuit or a signal circuit. In car audio, the single most important factor to avoid unwanted noise is finding and setting a good ground.

Harmonic: The multiple frequencies of a given sound, created by the interaction of signal waveforms.

Harmonic Distortion: Harmonics artificially added by an electrical circuit or speaker, and are generally undesirable. It is expressed as a percentage of the original signal.

Heat Dissipation: The ability to transfer heat away from a component into the air to prevent damage to the speaker.

Hertz (Hz): A measurement of the frequency of sound vibration. One hertz is equal to one cycle per second.

High-pass Filter: An electric circuit that passes high frequencies but blocks low ones.

Hiss: Audio noise that sounds like air escaping from a tire (high frequency).

Horn: A speaker design using its own funnel shaped conduit to amplify, disperse, or modify the sounds generated by the internal diaphragm of the speaker.

Hum: Audio noise that has a steady low frequency pitch.

Imaging: Listening term - it is the speaker's ability to locate where each instrument or voice is located.

Impedance: The opposition of a circuit or speaker to AC current. The combined effect of a speaker's resistance, inductance, and capacitance that opposes the current fed to it. It is measured in ohms and varies with the frequency of the signal.

Inductance (L): the capability of a coil to store energy in a magnetic field surrounding it. It produces impedance to an AC current. Inductors are commonly used in audio as low pass crossovers.

Midbass: Mid-level bass usually frequencies just above the sub-bass range from around 100Hz - 400Hz or so.

Midrange (mids): The frequency range above bass but below treble carries most of the identifying tones of music or speech. It is usually from 300Hz - 400Hz to 3KHz or so.

Millihenries (mH): A measurement of inductance.

Mms: The moving mass of a driver assembly normally measured in grams (g).

Mono: Monophonic sound. A method for reproducing sound where the signals from all directions or sources are blended into a single channel.

MOSFET: (Metal Oxide Semiconductor-Field Effect Transistor) a form of field-effect transistor controlled by voltage rather than current, like a bipolar transistor. They generate almost no loss (little heat generation), which lends the power supply fast response, excellent linearity, and high frequency.

n0: The reference efficiency of the system.

Neodymium Magnet: A magnet material offering 7.5 times the magnetic strength of standard magnetic materials.

Noise: Any undesirable sound reproduced in an audio system.

Nominal Impedance: The minimum impedance a loudspeaker presents to an amplifier, directly related to the power the speaker can extract from the amplifier.

Octave: A range of tones where the highest tone occurs at twice the frequency of the lowest tone.

Ohm: A unit of electrical resistance or impedance.

Ohm's Law: A basic law of electric circuits. It states that the current [I] (measured in amperes) in a circuit is equal to the voltage [E] in volts divided by the resistance [R] in ohms:

$$I=E/R$$

One Ohm Stability: Refers to an amplifier's ability to operate when wired to a speaker load that offers a 1 ohm impedance.

Oscilloscope: An electronic instrument that produces an instantaneous trace on the screen of a cathode-ray tube corresponding to oscillations of voltage and current.

Out of Phase: When your speakers are wired in reverse polarity (One speaker is wired one way, and another speaker is wired opposite of the first speaker). Bass response will be very thin due to cancellation.

Output: The high level (speaker) or line level (RCA) signals sent from one system component to another, or the high level signal from an amplifier to the system speakers.

p: Density of air at STP 1.18 kg/m³ (rho).

Pa: Acoustical power.

Parallel: A method of wiring that lowers the total impedance of multiple voice coils when wired together.

Pass Through: To pass a signal through without processing or changing the signal.

Passive Crossover: Uses inductors (coils) and capacitors to direct proper frequencies to the appropriate drivers. These crossover systems can be simple (First Order 1 component @ -6dB/octave slope) to complex (Fourth Order = 4 components @ -24dB/octave slope).

Passive Radiator: A device that looks just like an ordinary driver, except it has no magnet or voice coil. A radiator is usually a highly compliant device, with a similar cone material and surround found on regular active drivers. The radiator must usually be at least as large (or larger) providing bass reinforcement for the driver in a similar fashion as any regular ported box. A clear advantage of the radiator is the absence of port noise and some audiophiles claim the radiator provides a better sounding bass than a ported

enclosure. Disadvantages include difficulty in tuning and the extra, required baffle area for the radiator. Most radiators can be tuned with either weights or silicone, adding material in a balanced manner until F_b is attained.

Pe: Driver's rated RMS power handling capability.

Peak: The maximum amplitude of a voltage or current.

Phase: Refers the timing relationship of two or more signals or sound waves. It's especially important to be sure that your stereo speakers are playing "in phase." This means that the drivers (cones and domes) of your right and left speakers are moving in and out at the same time. If your speakers are "out of phase" you'll hear significantly less bass, and instead of producing a strong center image, the sound tends to stay localized at the speakers.

Phase Coherence: The relationship and timing of sounds that come from different drivers (subs, mids, tweets) mounted in different location in the vehicle.

Phase Distortion: A type of audible distortion caused by time delay between various parts of the signal; can be cause by equalizers.

Polarity: The orientation of magnetic or electric fields. The polarity of the incoming audio signal determines the direction of movement of the speaker cone. Must be observed when wiring speakers, so that they are "in phase."

Ported Enclosure: A type of speaker enclosure that uses a duct or port to improve efficiency at low frequencies. Excellent design for lower power systems, as the port often adds up to 3dB's to low frequency efficiency. F_3 can be set considerably lower with proper design, although low frequency roll-off is generally -24dB/octave. Good transient response with proper tuning, F_b , but source material or frequencies below F_b cause the driver to progressively perform as if it were not enclosed at all. Due to this, ported enclosures without a low frequency filter may have lower power handling compared to other designs. More difficult to properly build and tune than a driver. The best way to model these alignments is with a software program, where changes in tuning and enclosure size can be immediately noted.

Power (P): The time rate of doing work or the rate at which energy is used. One equation for power is:

$$P = \text{Volts}^2 / \text{Impedance}$$

Power Line Capacitor (Capacitor): Wired inline on the power lead with your car amp, this device stores current for instant release when short bursts of energy are needed to produce loud, deep bass notes. Best to mount as close to amp as possible.

Pressure Effect: In sealed box designs, the pressure build-up on one side of the cone which may cause non-linearity and inhibit dynamic range in the low bass.

Push-Pull Configuration: One driver is mounted normally, the second is mounted so that it faces into the enclosure, both sharing the same internal volume and wired out of phase with one another. The drivers are acoustically in phase since they move in the same direction. This alignment theoretically reduces second order harmonic distortion.

Q: The magnification of resonance factor of any resonant device or circuit. A driver with a high Q is more resonant than one with a low Q.

Qa: The system's Q at Fb, due to absorption losses.

Qec: The system's Q at (Fc), due to electrical losses.

Qes: The electrical Q of the driver.

QI: the system's Q at Fb, due to leakage losses.

Qmc: The systems Q at resonance (Fc), due to mechanical losses.

Qms: The mechanical Q of the driver.

Qp: The system's Q at Fb, due to port issues (turbulence, viscosity, ect.).

Qts: The total Q of the driver at Fs, $Qts = Qes + Qms$.

Qtc: Value for the damping provided for a driver in a sealed enclosure. Denotes the enclosures ability to control the driver response at resonance. $Qtc = 0.707$ is the optimum value for sealed enclosures, providing flattest response and highest SPL for deep bass extension. Enclosures for this value are often rather large. Lower Qtc can give even better transition response, down to a Qtc of 0.577 for the best damping and transients, but the enclosure is usually huge and SPL's are down. A Qtc of 1.0 is a compromise between deep bass and transient response vs. smaller sized enclosure. Larger subs can go with an even higher Qtc , as their resonant frequency is often very low, but Qtc 's above 1.5 can begin to sound very muddled and boomy, and sacrifice deep bass extension and transient response for enhanced mid-bass peaks (louder).

Ras: Acoustical equivalent of Rms

RCA: Also known as line level input, wires carry signals from your source unit to other processors such as an amp, EQ, crossover, line driver, etc. They can also be used from one processor to another. They carry higher signal strength than speaker wires, also known as high-level input. This means that you get a cleaner, stronger signal from unit to unit which helps increase the performance of your stereo. RCA's are the preferred method of wiring.

Rear Fill: In autosound, the ambience created by a pair of rear speakers that helps complete the soundstage. A set of high quality components for the front powered by an external amp and a set of coax mounted on the rear deck powered by the head unit or small amp is a good example of a rear fill application. Rear fill speakers should be faded so that they create a richer ambience, but you should not be able to isolate any sounds coming from them.

Res: The electrical resistive equivalent of RMS.

Resonance: The tendency of an object to vibrate most at a particular frequency.

Resonance Frequency: The frequency at which your speaker tends to vibrate most at.

Resistance (Re): In electrical or electronic circuits, a characteristic of a material that opposes the flow of electrons. Speakers have resistance that opposes current. R_{vc} : DC resistance of the voice coil only.

Rg: Amplifier source resistance (includes leads, crossover, etc.).

RMS: An acronym for "root mean square." Used in audio to help rate continuous power output of an amplifier or input capability of speakers. This is the preferred method for comparing anything in audio applications.

R-off (cut-off): The attenuation that occurs at the lower or upper frequency range of a driver, network, or system. The roll-off frequency is usually defined as the frequency where response is reduced by -3dB's.

S or (Q'): The overall damping of a 4th order bandpass enclosure. I.e., if you were to figure a 4th order bandpass enclosure with a Q_{tc} of 0.707 for V_r (the sealed chamber), then you would also figure V_f (ported chamber) with an S of 0.707.

SAF: Spouse Acceptance Factor.

Satellite Speaker: A small speaker with limited bass response. It is normally intended to be used with a matching subwoofer.

Sd: Effective piston area of a driver, Normally measured in meters squared (M^2).

Sealed Enclosure: Air tight enclosure that completely isolates the back wave of the driver from the front. Very tight, defined sound (with $Q_{tc} = 0.707$) with very good transition response and power handling. Low frequency roll-off is at -12dB/octave. Less efficient than other designs, and higher distortion levels at resonance. Easy to design and build. Originally this design was pioneered and marketed by companies like Acoustic Research. Sealed boxes are normally the best enclosure to use for sound quality applications.

Series: A method of wiring that raises the total impedance of multiple voice coils when wired together.

Series-Parallel: A method of wiring that contains elements from both wiring methods.

Signal: The desired portion of electrical information.

Signal-to-noise (S/N): The ratio, expressed in dB, between the signal and noise.

Sine Wave: The waveform of a pure alternating current or voltage. It deviates between a zero point to a positive value and a negative value. Audio signals are sine waves or combinations of sine waves.

Sound Pressure Level (SPL): An acoustic measurement for the ratios of sound energy. Rated in decibels (SPL dBA, SPL dBC).

Sound Stage: The sound systems ability to recreate an imaginary stage. A good speaker will faithfully make the stage seem close to the actual height, width and depth of the actual performance stage where recorded. Imaging is similar, but the speaker must be able to place each instrument or voice in the correct location on the soundstage. The reproduction of the way the music would sound if you were actually watching the musicians play in front of you. The stage should always appear to be in front of you, with a proper "image" of where each musician is playing on the imaginary soundstage.

Spider: The flexible material that supports the former and voice coil within the speaker frame.

Standing Wave: A buildup of sound level at a particular frequency that is dependent upon the dimensions of a resonant room, car interior, or enclosure. It occurs when the rate of energy loss equals the rate of energy input into the system. This is what you hear when you listen into a seashell. Building a slant in a box on the back wall can help reduce standing sound waves.

Strontium Magnet: A magnetic material with superior magnetic strength characteristics to that of ferrite.

Subwoofer: A loudspeaker designed to reproduce bass frequencies.

Subsonic Filter (Infrasonic): A filter designed to remove extremely low frequencies usually between 20Hz-50Hz or lower noise from the audio signal. This prevents the speakers from playing frequencies that could damage them.

Surround: The outer suspension of a speaker cone; holds the diaphragm in place but allows it to move when activated. Usually made of foam or rubber.

Surround Sound: Usually representative of the monophonic sound extracted from the stereo signal sent to small rear or side speakers used in a home theater.

Timbre: The quality of a sound related to its harmonic structure. Timbre is what gives a voice or instrument its sonic signature -- why a trumpet and a saxophone sound different when they play the same note.

Thiele/Small Parameters: Numbers that specify the behavior of drivers. These are normally tested by the manufacturer and are used in conjunction with computer programs to help design enclosures for drivers (normally subwoofers). These programs can normally estimate the response of a particular driver in a box to find the optimum enclosure type and size.

Three Point: Positioned inside the sub, this is the name given to the area where the voice coil, cone and spider meet.

Three-way: A type of speaker system composed of three ranges of speakers, specifically a woofer, midrange, and tweeter.

Total Harmonic Distortion (THD): A component specification which describes its ability to accurately reproduce a signal. Although lower numbers are considered to be better, the human ear typically cannot detect THD ratings below 2% or 3%.

Transformer: An electrical device that can be used to provide circuitry isolation, signal coupling, impedance matching, or voltage step-up.

Transient Response: The ability of a speaker to respond to any sudden change in the signal without blurring (smearing) the sound. A speaker that can react quickly to rapid changes in sound has "good transient response."

Transistor: An active (commonly three terminal) solid state device in which a larger output current is obtained by small changes in the input current.

Transmitter: The name given to the hand-held remote control unit used by a vehicle operator to arm/disarm and perform accessory functions on a vehicle security system. More commonly called a remote.

Treble (highs): The upper end of the audio spectrum reproduced by tweeters, usually 3 - 4kHz and up.

Tri-way Outputs: When a special passive crossover is used with an automotive amplifier to safely power a subwoofer in bridged mono (low pass circuit) as well as a pair of stereo speakers (high pass circuit). Normal inductors and capacitors can be used for Tri-way output. This is how 3 channel mode should be accomplished with an amplifier.

Tweeter: A speaker designed to reproduce the high or treble range of the sound spectrum.

Two-way: A type of speaker system composed of two ranges of speakers usually a woofer and tweeter.

Vab: The volume of air having the same acoustic compliance as the enclosures.

Vas: The equivalent volume of compliance, which specifies a volume of air having the same compliance as the suspension system of a driver.

Vb: Total box volume, usually in cubic feet or liters. Used specifically in sealed and ported designs.

Vd: Maximum linear volume displacement of the driver (product of S_d times X_{max}).

Vf: Front volume of a bandpass design.

Vr: Rear volume of a bandpass design.

Voice Coil: The wire wound around the speaker former. The former is mechanically connected to the speaker cone and causes the cone to vibrate in response to the audio current in the voice coil.

Volt (E): The term used to refer to the property of electrical pressure through a circuit. The basic practical unit of difference of potential.

Watt: A unit of electrical power. A watt of electrical power is the use of one joule of energy per second. Watts of electrical power equals (volts) x (amperes).

Wave: A single oscillation in matter (i.e., a sound wave). Waves move outward from a point of disturbance, propagate through a medium, and grow weaker as they travel farther. Wave motion is associated with mechanical vibration, sound, heat, light, etc.

Waveform: The shape of a wave.

Wavelength: The length of a sound wave in air. It can be found for any frequency by dividing the speed of sound in air (1120 feet per second) by the frequency of the sound, or:

$$WL = 1120/\text{freq.}$$

Windings: The wire in a voice coil that is wound around the former (also called a bobbin) to create a coil.

Woofer: A large dynamic loudspeaker that is well suited for reproducing bass frequencies.

Xmax: Maximum linear cone excursion of a driver, measured in inches or millimeters. This can be determined by subtracting the air gap height from the voice coil height then dividing by two.

Z: Total driver impedance.

Zero Bit Detection: A circuit in a D/A converter that monitors the digital audio bit stream. Upon encountering all bits low, or zero, the output of the D/A is disconnected from the preamp. This improves the signal-to-noise ratio specification.

Zero Output: The absence of output signal or output power.