Amplifier Installation Tips

A power amplifier's performance is only as good as its installation. Proper installation will maximize the system's overall performance. It is recommended that you have our product installed by an authorized Soundstream retailer. However, if you decide to install it yourself, please follow these safety tips and take your time to do a quality installation:

1. Fuse amplifier's power wire at the battery.
2. Be sure to fuse the power wire within 12" of the car's battery. This will protect the car's battery in case of a short circuit between the power amplifier and battery. THIS IS A MUST, the amplifier's built-in fuse will only protect the power amplifier not the car's battery.
3. Use high-grade wire connectors. Use Proper power wire size for maximum current transfer and safety. Improper size power and ground wire can reduce the amplifiers power and poses a risk of damage to the amplifier and the vehicles electrical system. Please follow the recommended "Amplifiers Power Cable Requirements" to ensure maximum power transfer and safety.
4. To ensure maximum power transfer and secure safe connections, it is recommended to use high-grade barrier spades (for connection at amplifier) and terminal rings (for connection at battery).
5. Do not run any wires underneath vehicle. Exposed wires have a chance of being cut or damaged. It is best to run all wires through the vehicle under the carpet and/or side panels. This lends to a cleaner installation and less risk of damage.
6. Use caution when mounting amplifier. Remember there are many electrical wires, gas lines, vacuum lines, brake lines, as well as a gas tank in the automobile. Make sure you know where they are when mounting the amplifier to avoid puncturing lines, shorting wires, or drilling holes in the gas tank.
7. To avoid possibility of induced noise from the car's electrical system (i.e. popping noises or engine noise), Keep signal wires (Speaker or RCA) away from any electrical wires.
8. In order to reduce the chance of ground loops (i.e. engine noise); make the grounding wire as short as possible to reduce the wire's resistance. Also, when using multiple components, make sure all units are grounded at the same point.
9. Avoid sharp edges when running the wires. When laying wiring inside the car, watch for welding burs in channels throughout the car. If necessary adequately grind, finish sand or fill in around any ruff spots so wires will not be punctured by sharp protrusions. Use a grommet to protect the wire when running through the firewall.

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Enclosure Types

Before deciding on a particular type of enclosure to use, you must first determine the amount of space you have available. This is a very important step to ensure you have the appropriate volume needed to provide proper performance of the subwoofer. For example, if you wish to build an enclosure for a 15" and you only have one cubic foot space available, it would be better to use a 10" because the volume is not large enough to allow the 15" to perform properly. The small enclosure would restrict the performance of the 15" not allowing it properly reproduce low frequencies.

Sealed Enclosure

Advantages

Easy to build, smaller enclosure size, lean tight sounding bass, better power handling vs. ported design and Linear low bass extension.

Disadvantage
Less efficient as compared to ported design.

Ported Enclosure

Advantages
More output at the tuning frequency as compared to the same woofer in a sealed enclosure, higher efficiency.

Disadvantage
Larger enclosure size, Calculating enclosure and port dimensions more difficult,easy to blow woofer if power handling limit is exceeded.

Glossary of Terms

AC (Alternating Current)
Voltage that alternates from positive to negative in regular or irregular cycles. This type of voltage flows back to its source. Go Back.

Acoustics
A science dealing with the production, effects, and transmission of sound waves through various mediums.

Active Display
A step-up display feature that generates animated patterns for both segment and dot matrix LCDs that precede the sequential display of information such as clock, Custom File titles, and radio station frequencies.

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.

Alternator Whine
A siren-like whining that appears when the RPMs of an engine increase. The noise is usually the result of a voltage differential created by more than one ground path or a poor ground path.

Amplification
An increase in signal level, amplitude, or magnitude .

Amperage
A unit of electrical current. The force through which the energy is pushed through a conductor. Measured in amps.

Ampere
The unit of measurement used to determine the quantity of electricity flowing through a circuit. One ampere flows through a 1 Ohm resistance when a potential 1 Volt is applied.

Amplifier
A device that strengthens or enlarges an electrical signal.

Amplitude
The measure of how powerful sound waves are in terms of pressure.

Antenna
A mechanical device, such as a rod or wire, which picks up a received signal or radiates a transmitted signal.

Attenuate
To lessen the amount of force, magnitude, or value of something.

Audio Frequency Spectrum
The band of frequencies extending roughly from 20 Hz to 20 kHz .

Auto Memory
A tuner feature that automatically finds the strongest stations in the local area, and places them in preset memories .

Baffle
A flat panel that divides the front and rear sound waves produced by a woofer. Sometimes baffle is used to mean an enclosure or the front panel that the speaker is mounted on.

Balanced Input
An input, which compares the negative and positive sides of the signal, used to help eliminate noise.

Bandpass Filter
In mobile electronics, a device which incorporates both high-pass and low-pass filters in order to limit and attenuate both ends of the frequency range.

Bandwidth
Refers to the "space" in the frequency response of a device through which audio signals can pass (between lower and upper frequency limits, those points where the signal level has rolled off 3 dB).

Bass
The part of the frequency range made up of the low frequencies. Bass is generally agreed to be those frequencies between 20 Hz and 400 Hz.

Bass Reflex
A vented enclosure that allows control of rear radiated sound waves.

Battery
An electrically connected group of cells (wired in series) that stores an electrical charge and supplies a direct current (DC).

Boomy
Usually refers to excessive bass response, or a peak in the bass response of a recording, playback or sound reinforcement system.

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.

Butterworth Filter
A filter with a pass-band with no ripple but usually sacrifices some steepness in attenuation.

Capacitance
The property of an electric nonconductor that permits the storage of energy as a result of electric displacement when opposite surfaces of the nonconductor are maintained at a difference of potential. In a capacitor, capacitance is the measure of the property (the amount of charge that can be stored) equal to the ratio of the charge on either surface to the potential difference between the surfaces.

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

CD/MD Control
The ability of a component to operate a CD or MD disc changer.

CD Text
A compact disc and player feature utilizing disc, track, and artist information encoded directly on the CD media. Both playback and media components must have CD Text compatibility.

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 rest itself or can be manually rest, and will again conduct electricity.

Class
There are different classes of amplifiers, depending on how the biasing of the amplifier circuit is done.

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 of," at the signal's ceiling.

Coaxial Speaker
TA coaxial speaker has a large cone for the low range, and a smaller tweeter for the high spectrum. There is a cross-over network which divides and routes the signal to the correct driver.

Coil
A number of turns of wire around an iron core or onto a form made of insulating material. Used as an inductor, a coil offers a great deal of opposition to the passage of AC, but very little to the passage of DC. This device is good for use as a filter.

Cone
The most common shape for the radiating surface of a loudspeaker. Often used to refer to that part of the speaker that actually moves the air.

Crossover
A device intended to separate the different frequency bands and redirect them to different components.

Crossover Frequencies
The frequencies at which a passive or electronic crossover network divides the audio signals, which are then routed to the appropriate speakers.

Crossover Network
A unit which divides the audio spectrum into two or more frequency bands (Also see Crossover Frequencies).

Current
The rate of electrical or electron flow through a conductor between objects of opposite charge. Symbol I, measured in amperes or amps.

DAC (D/A)
Digital to analog converter. A component or circuit that is used to derive or convert an analog signal from a digital one.

Damping
The reduction of the magnitude of resonance by the use of some type of material.

Damping Factor
The ratio of rated load impedance to the internal impedance of an amplifier. The higher the value, the more efficiently an amplifier can control unwanted movement of the speaker coil. A high damping factor is crucial for large speakers that reproduce bass.

dB (Decibel)
The unit of measurement for sound, using a logarithmic scale. It is an expression of the relative loudness of a sound or power level .

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

Detachable Face Security
A head unit theft-deterrent system in which the front panel is removable, to prevent its loss.

Digital Output
A signal output connection in digital format using TOSLINK connectors.

Digital Signal Processing
Audio signal manipulation executed entirely in the digital domain.

Distortion
Sound which is modified or changed in some way. In a speaker, distortion is produced by several things, most related to poor construction. Voice coil rubbing (caused by being overdriven) is the most common cause of distortion.

Diversity Tuner
An FM tuning method, which employs two antennas. The tuner can switch between the two antennas in order to attain better reception.

Dot Matrix Display
A display type that employs regularly spaced patterned grids of point-source lighting elements. As a result, characters displayed have greater resolution than a segmented display.

Driver
Another term for a loudspeaker. Often used when the loudspeaker is coupled to a horn for acoustic coupling and controlled dispersion of sound.

DSP Digital Signal Processing (or Processor)
A type of processing accomplished by a microcomputer chip specifically designed for signal manipulation, or a component using such processing. The term is often misused as a synonym for ambience synthesizer; however, DSP can do much more than sound field creation.

DSP
Control the ability of a head unit to control an external digital signal processor.

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.

DVC Subwoofer
Refers to a subwoofer with 2 voice coils. These coils can be any impedance. Allows for a wider range of installation options.

Efficiency
The measure of loudspeaker's ability to convert power to work. Formula Efficiency = (power out/power in) x 100. Efficiency is always expressed as a percentage.

Electrolytic Capacitor
A capacitor with a negative and a positive terminal that only passes alternating current.

Enclosure
A box housing a speaker to separate the front sound waves from those in the rear.

Farad (F)
The basic unit of capacitance. A capacitor has a capacitance of 1F when a charge of 1 Volt across the capacitor produces a current of 1 Ampere through it.

Fidelity
A term used to describe the accuracy of recording, reproduction, or general quality of audio processing.

Flat Response
An output signal in which fundamental frequencies and harmonics are in the same proportion as those of the input signal being amplified. A flat frequency response would exhibit relatively equal response to all fixed-point frequencies within a given spectrum.

Fluttery
A Bass response often cause by the subwoofer's enclosure being larger than it is rated x-max. To much air allows the subwoofers to flutter uncontrollable. Often an EQ can help this.

Fold Down Face
A DIN head unit whose faceplate hinges at the bottom to reveal a media-loading slot. Provides a larger area on the face for the display and controls.

Free Air Response
The frequency at which a speaker will naturally resonate.

Frequency
The term in physics, that refers to a number of vibrations or cycles that occur within a given time.

Frequency Modulation (FM)
A method of modulation in which the frequency of the carrier voltage is varied with the frequency of the modulation voltage (Also see Amplitude Modulation).

Frequency Response
A term which describes the relationship between a devices is input and output with regard to signal frequency and amplitude.

Full Logic Deck
A cassette mechanism where the tape operations are carried out by logic circuits rather than mechanical methods.

Fuse
A device designed to provide protection for a given circuit or device by physically opening the circuit. Fuses are rated by their amperage and are designed to blow or open when the current being drawn through it exceeds its design rating.

Gain
Refers to the degree of signal amplification.

Ground
The term given to anything having an electrical potential of zero. Most modern vehicles are designed around a negative ground system, with the metal frame being the vehicle's ground.

Ground Loop
The term given to the condition that occurs when a voltage potential exists between two separate ground points.

Harmonic
A weaker overtone or undertone of the original note responsible for the character of the note.

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

Heat Sink
Part of the frame of the speaker used to conduct and radiate heat away from the motor assembly.

Hertz (Hz)
The unit of frequency within a specific period, such as alternating or pulsating current; 1 Hz = 1 cycle per second.

High Frequency
Refers to radio frequencies in the 3-30 MHz band. In audio, it usually refers to frequencies in the 5-10 kHz band.

High Level
Input An input configured to accept speaker level signals.

High Pass Filter (HPF)
A network of components, which attenuate all frequencies below a predetermined frequency selected by the designer. Frequencies above cut-off are passed without any effect.

High Power Output
Speaker level outputs driven by an amplifier, typically at least 35 watts max per channel.

Imaging
The effect of reproducing a sound stage faithful to that of an original recording. Represented, for instance, in the listener's ability to place a particular instrument at a single point, rather than to hear it as if spread throughout the sound field. Good imaging is often described in terms of channel separation of openness.

Impedance (Audio)
A measurement of the resistance to the audio current by the voice coil of the speaker.

In-Line Fuse
A fuse and holder incorporated into a length of supply wire.

Inductor
An electrical component in which impedance increases as the frequency of the AC decreases. Also known as coils that are used in passive crossovers. Inductors are rated in Henries.

Infinite Baffle
A loudspeaker baffle of infinite space that has no openings for the passage of sound from the front to the back of the speaker. Also, a sealed enclosure where the internal volume is greater than the Vas of the driver.

ISO-DIN Mounting
Refers to a mounting system in which the head unit is mounted behind the dash panel with side brackets, employing factory installed trim panels.

kHz
Abbreviation for kilohertz, or 1000 cycles per second.

LCD
Liquid Crystal Display.

LED(s)
Light-Emitting Diodes. A form of diode that sheds light. Used in many systems for indicator purposes.

Load
The resistance or impedance to which energy is being supplied. In amplifiers, the speaker or speakers connected to the output of the amplifier.

Loudness
A signal-processing feature, which compensates for the human ear's deficiencies at various listening levels.

Loudspeaker
An electro-acoustic transducer that converts electrical audio signals at its input to audible sound waves at its output.

Low Pass Filter
A network of components which attenuate all frequencies above a predetermined frequency selected by the designer. Frequencies below cut-off are passed without any effect.

Memory
The word most commonly used to refer to a system's ability to retain specific information.

Midrange Driver
A loudspeaker specifically designed to reproduce the frequency in the middle of the audible bandwidth. Most musical energy lies in the mid band.

Mono
The operation of an amplifier in one channel for both input and output. Can refer to an amplifier with only one channel of amplification.

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

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

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 musical interval between two tones formed when the ratio between the frequencies of the tone is 21.

Ohm
Electrical resistance equal to the resistance of a circuit in which an electromotive force of one volt maintains a current of one ampere.

Parallel
A circuit in which two or more devices are connected to the same source of voltage, sharing a common positive and negative point, so that each device receives the full-applied voltage.

Parametric EQ
An equalizer with adjustable frequency, level, and "Q"

Passive Component
In a crossover system, a non-powered component used to separate an audio signal into a specified frequency band before it goes to a particular amplifier or driver. A passive device usually presents some loss (expressed in decibels) to a system.

Phase
The timing of a sound wave that is measured in degrees from 0 to 360.

Polarity
In electricity, refers to the condition of being either positive or negative.

Power
The amount of energy (in joules) that a device delivers or consumes divided by the time (in seconds) that the device is operating.

Pre-Amp
A circuit unit which takes a small signal and amplifies it sufficiently to be fed into the power amplifier for further amplification. A pre-amp includes all of the controls for regulating tone, volume, and channel balance.

Preamp Output
Typically found on head units, a preamp output provides low level, high quality audio signal for use with external amplifiers.

Preset
A collection of system settings stored in a memory that is virtually instantly recallable, typically at the touch of a button.

Receiver
A device designed to receive a signal or command from a source such as a transmitter.

Resistance
The electrical term used to describe the property that various materials possess to restrict or inhibit the flow of electricity. Electrical resistance is relatively low in most metals and relatively high in most nonmetallic substances. Electrical resistance is measured in ohms.

Resonant Frequency
The frequency at which a speaker cone vibrates the easiest-the point at which it has the most amplitude.

RF Modulator
A device that converts a signal (typically audio and/or video) into a radio frequency.

RMS
Root Mean Square. Generally a closer representation of output power of an amplifier -vs- Peak Power.

Sensitivity
The rating of a loudspeaker that indicates the level of a sound intensity that the speaker produces (in dB) at a distance of one meter when it receives one watt of input power.

Signal-to Noise
Ratio A ratio which indicates how much audio signal there is in relation to noise, or a specified noise floor.

Sound
A type of physical kinetic energy called acoustical energy (Also see Acoustical Energy).

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

Spectrum Analyzer
A device that displays a frequency response curve, in real time, as the curve, changes.

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

Subwoofer
A loudspeaker made specifically to reproduce the lowest of audio frequencies, approximately between 45 Hz and 125 Hz.

THD Total Harmonic Distortion
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%.

Tweeter
A small loudspeaker or driver meant to reproduce treble frequencies.

Vented Enclosure
A type of speaker enclosure with a vent (or port). The combination of (1) the specific internal volume of air and 2) the action of the port allowing some sound waves from the enclosure's interior to pass through, enhances the speaker's response .

Voice Coil
A coil of wire and the former (bobbin) around which the wire is wound. It is part of a speaker's electromagnetic motor that drives the cone to produce sound waves .

Voltage
Electromotive pressure that forces current through an electrical conductor. The difference of potential between any two conductors of a circuit .

Watt
The basic practical unit of measure for electrical or acoustical power.

Wattage
Electrical power.

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

Xmax
The distance a speaker cone can travel before the magnet loses control over the voice coil.

How an Equalizer Helps Your System

You have put together a system that is truly "bad" in the very best sense of the word. Yet even though your drivers and subs are properly placed, your crossover points are correctly set, and your head unit is pouring out clean CD sound, something is still missing.

Maybe the cymbal crashes lack that special sheen that makes it seem like you are close enough to feel the drummer's sweat fly from his head. Alternatively, your bass hits hard enough, but instead of the solar plexus punch you were looking for you ended up with a vehicle-quaking rumble. If your dream system's still aching for something to give it that final tweak, check out that often overlooked component, the equalizer.

Why equalize?

Like you, we have heard plenty of car stereo snobs dismiss graphic EQs as elaborate tone controls designed to mask a weak choice of components. While it is true that a graphic equalizer gives you ultra-precise tone control (call us crazy, but we think that is a good thing), a quality EQ, properly used, can fine-tune even a high-end system.

An equalizer makes the difference by catering to your listening preferences and allowing you to restore great sound that is disrupted by your noisiest, most hard to handle component — your car.

Most vehicles have a natural resonance frequency between 100 and 200 HZ, and most road noise occurs between 25 and 200 Hz. So even an otherwise perfectly balanced system gets a bump at these resonant frequencies, exaggerating them in a way that can muddy your sound and mask other frequencies. With a graphic EQ, it is easy for you to reach out and clean up your sound by cutting the offending bandwidths.

In addition, every listening environment, from a living room to a concert hall to your Chevy S10, has its own acoustic properties.

The glass in your car, a hard, highly reflective surface, can overemphasize highs and make for a particularly "live" (reverberation heavy) sound. On the other hand, the definition or "crispness" of your entire system can easily be dulled by absorbent surfaces like your car or truck's carpeted interior. Even differences in upholstery material, from smooth, reflective vinyl or leather, to more plush-textured seat covers can affect your system's sound.

You can use an equalizer to remedy each one of these ills, boosting the frequencies you are missing and attenuating the one's your vehicle exaggerates. In short, you will be able to restore the ideal, flat response of your music or customize it to suit your ears.

When you make these adjustments, use a light touch on those slider switches — a boost of 10 dB works your amplifier ten times harder, and this can introduce distortion. (Tip: Try attenuating frequencies first. For example, before you boost your bass, lower the midrange and high frequencies a little bit first.)

Of course, an EQ is also a great way to protect your equipment. For example, if your system's bottom-end is provided by a pair of 6-1/2" woofers, use an EQ to cut out all frequencies below 50 Hz. Your amp will work more efficiently and you will get higher, clean volume while protecting your drivers from tones they cannot handle.

Going beyond the basics

Besides restoring the desired response curve to your system, the equalizers available from also offer you plenty of other useful features. Each of our EQs offers a front-to-rear fader for dual-amp balancing, even with a head unit that has only one pair of pre-outs. The fader's also ideal for dialing in just the right amount of rear-fill.

In addition, you can take that concept one step further with one of our particularly "imaging-conscious" units.

You will also find a low-pass, "sub-out" set of pre-amp outputs on many of our EQs. engage high-pass crossovers on the front and rear channels whenever the subwoofer output is in use. That is like having a free electronic crossover packaged with your equalizer — a pretty sweet deal.

The 11 band 6042A also gives you two bands with adjustable center frequencies (30-800 Hz and 800-16kHz). These parametric (variable) bands really let you zero in within a given frequency range. Therefore, it is a snap to dial up your favorite lead guitar sound, from smooth, violin-like sustain to a percussive snap and twang.

When using any equalizer, the more you know about which frequencies are produced by which instruments, the more effective your adjustments will be. Within the range of a given instrument, tonal shading can get downright subtle.

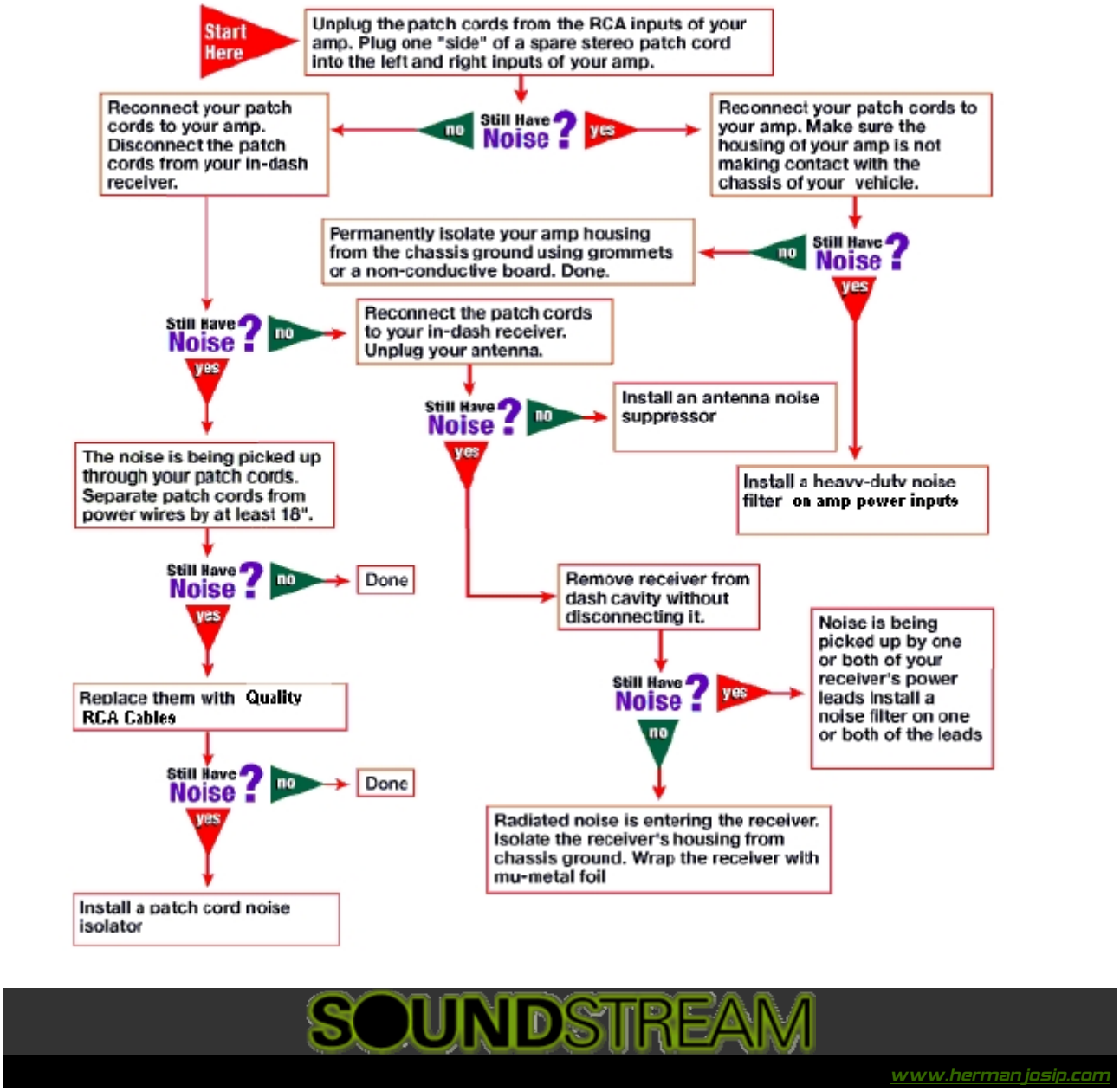
For example, the meaty bottom-end of a bass guitar is found around 60 to 80 HZ, the attack (the percussive sound of the string being plucked) ranges from 700 to 1,000 Hz while the string noise itself is up around 2,500 Hz! In addition, that is why an EQ can be so handy!

Some EQs, let you program your own EQ curves and store them for repeated use. Therefore, you can create one curve for rock, another for rap, a third for jazz. After all, each of these musical forms naturally emphasize different tones, from the bottom heavy thump of Coolio to the scooped-mids of Metallica to the pastel horn tone of Miles Davis.

The best way to find out what an equalizer can do for your system is to try one out for yourself. A little "hands-on" experience and some trial and error tweaking will help you learn more about shaping up the sound in your car and really bring out the best from your system.

How To Diagnose and Suppress Noise

Use this diagram to diagnose and cure the most common noise problems associated with outboard amplifiers. The general idea is to isolate the specific cause of the noise in your system. If these tips don't solve the problem, pease consult a car audio installation proffessional. Before you get started, check the fluid in your car battery. Sometimes, noise can be eliminated just by topping off the fluid with distilled water!



How To Stereo Image and Soundstage

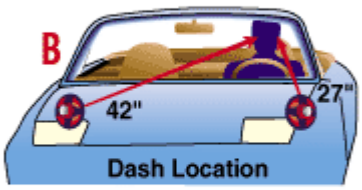
While humongous-sounding bass may let people know you're coming, true car audiophiles know that what really keeps people listening to a system is more than a matter of volume and unbelievable bottom end.

Overall sound quality, how naturally a car stereo recreates the sound of a master recording, is a key concern of everyone who really appreciates music in an automotive environment — from the casual enthusiast to the serious competitor. And a big part of the overall sonic impression your system makes has to do with the quality of your stereo image.

When we use the words **image** or **imaging**, we're talking about a speaker system's ability to create sound in such a way that you can close your eyes and envision where all the musicians were standing when the recording was made. The position of the voices and instruments should be easily identifiable and shouldn't seem to change with frequency variation.

Path Difference 24"

The speakers themselves should seem to disappear, replaced instead by this spatial arrangement of music sources, or **soundstage**. Although the soundstage is created by both front and rear speakers, it should seem to come from in front of you, filling the space from left to center to right.

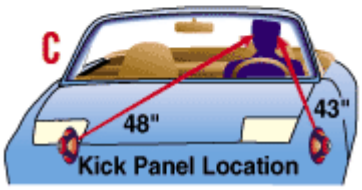


Path Difference 15"

Getting great imaging is a matter of understanding not only your components themselves, but also how they interact with your vehicle and the people sitting in it. Properly tweaked, your car or truck can be a dynamic "listening capsule" — a fantastic place to listen to music. But in order to get your vehicle to provide that type of environment, you need to compensate for some of its natural limitations.

"Side-biased" listening

When you listen to tunes at home, you probably don't make a habit of planting yourself smack dab in front of your left speaker. If you did, you'd be missing out on the detail the right channel has to offer, as well as the spaciousness of a complete stereo image. Yet when you listen to music in the driver's seat of your car, and you have conventional speakers in your doors or dash, you probably get the same type of imbalanced listening experience.



Path Difference 5"

To get proper imaging, you need as close as possible to equal path lengths between your speakers and your ears. These paths should be unobstructed as well. With your left door speaker about 2-1/2" feet from your left ear and your right door speaker about five feet from your right ear, this is clearly not the case. Playing with the receiver's balance control can help the driver's listening experience, but it throws the image out of whack for the person in the passenger seat.

There are a number of disadvantages to this "side-biased" listening. The music on your left reaches you before the music on your right. Within certain bandwidths, this may seem to alter your system's response, emphasizing some frequencies over others. The sounds on your left may also seem louder, which will distort the soundstage.

Other mounting options

Despite the growing popularity of products like Q-Forms, many of us, for reasons of taste or budget, still choose to improve our imaging with a more traditional use of matched components, mounting the mid-woofers in factory locations and tweeters up high on the dash or door. It's wise to keep the mid-woofer and tweeter as close together as possible so that the two drivers will act together as a single point source.

While a conventional component speaker set-up does leave path lengths unequal, there usually is a direct line from the tweeters to your ears, and this lack of obstruction alone really steps up the level of detail and the quality of your stereo image. Many matched component sets let you adjust the firing angle of the tweeters to further optimize imaging. (Keep this feature in mind when shopping for add-on tweeters.) In fact, a number of forward thinking speaker manufacturers now offer this feature on several of their coaxial speakers.

Adjusting for rear fill

Once you have your front speakers set up the way you want them, you'll want to make sure that your rear speakers are doing their part to create an ideal soundstage. While personal taste plays a role here, most experts agree that the correct volume for rear speakers is where you're just barely conscious of their presence.

While your front speakers should give you the best high frequencies possible, your rear speakers can be conventional coaxials or low frequency drivers. Their purpose is to add ambience and depth to your forward soundstage and if they reveal too much high frequency information, they'll "pull" the stereo image to the rear of your vehicle, away from where you want it.

If you're running a subwoofer in your trunk, you want to avoid the sensation that all the bass is coming from the rear of the car. To keep the soundstage up front, set your crossover to feed your front speakers the lowest frequencies they can safely handle and set your subwoofer crossover between 80 and 100 Hz if your system allows. This setup allows some bass to come from your front speakers and restricts your sub to low bass which is very difficult to localize.

Testing your system

When you have all your components in place, test your system to see that it's imaging properly. We recommend using the material on. The discs in this series provide several tracks to evaluate your system's imaging and to help you determine exactly where corrections are needed. They also provide a broad group of tests along with several music tracks that are great for overall system appraisal.

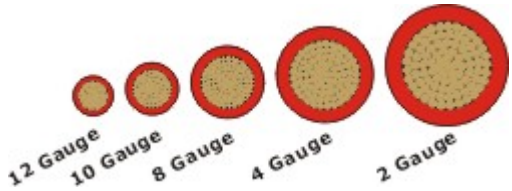
As you tweak your system to perfection, spend some time listening to other people's set-ups, informally or at sound-off competitions. Rather than attempting to precisely duplicate the systems you like, try to pick up general concepts and techniques, keeping in mind that every vehicle differs acoustically. What sounds great in a trophy-winning Camaro may muddy up the sound of your BMW. Besides, some of us like very precise imaging, while others among us prefer sound

that is a little more spacious and open.

In the final analysis the stereo image that suits your tastes is the one that's right for you. So, trust your ears.

Power Cable Selection Chart

Selecting the power and ground wire size is an important part of the amplifiers performance and safety. Thicker wire delivers more current when needed. In order to select the proper gauge wire you will need to determine the maximum current draw of all amplifiers and processors that you will connect with this wire. You will also need determine length of wire needed to connect from the battery to the location you mount your amplifiers.



Recommended Wire Gauge

The following graph is the recommended wire size based on the systems current draw and length of wire needed:

AMPLIFIER AMPERAGE DRAW								
	125 - 150A	4 Gauge 21qmm	4 Gauge 21qmm	4 Gauge 21qmm	4 Gauge 21qmm	2 Gauge 35qmm	2 Gauge 35qmm	2 Gauge 35qmm
	105 - 125A	8 Gauge 10qmm	8 Gauge 10qmm	8 Gauge 10qmm	4 Gauge 21qmm	4 Gauge 21qmm	4 Gauge 21qmm	2 Gauge 35qmm
	85 - 105A	8 Gauge 10qmm	8 Gauge 10qmm	8 Gauge 10qmm	4 Gauge 21qmm	4 Gauge 21qmm	4 Gauge 21qmm	4 Gauge 21qmm
	65 - 85A	8 Gauge 10qmm	8 Gauge 10qmm	8 Gauge 10qmm	8 Gauge 10qmm	4 Gauge 21qmm	4 Gauge 21qmm	4 Gauge 21qmm
	50 - 65A	10 Gauge 8qmm	10 Gauge 8qmm	8 Gauge 10qmm	8 Gauge 10qmm	8 Gauge 10qmm	8 Gauge 10qmm	8 Gauge 10qmm
	35 - 50A	10 Gauge 8qmm	10 Gauge 8qmm	10 Gauge 8qmm	8 Gauge 10qmm	8 Gauge 10qmm	8 Gauge 10qmm	8 Gauge 10qmm
	20 - 35A	12 Gauge 6qmm	10 Gauge 8qmm	10 Gauge 8qmm	10 Gauge 8qmm	10 Gauge 8qmm	8 Gauge 10qmm	8 Gauge 10qmm
	0 - 20A	12 Gauge 6qmm	12 Gauge 6qmm	12 Gauge 6qmm	12 Gauge 6qmm	10 Gauge 8qmm	10 Gauge 8qmm	10 Gauge 8qmm
		4 Feet 1m	**4 -7 Feet 1-1.8m**	**7 -10 Feet 1.8-2.5m**	**10 -13 Feet 2.5-3.3m**	**13 -16 Feet 3.3m-4m**	**16 -19 Feet 4m-4.8m**	**19 -22 Feet 4.8-5.5m**
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Power Requirement Tips

Determining the current capabilities of your vehicle.

Before installing a High Current amplifier in your system you should take into consideration the vehicle's ability to provide adequate current to the amplifier. The most vehicles, the alternator is only capable of supplying a little over the requirements for the standard electrical system (i.e. headlights, air conditioning etc).Depending on how you play your

system will determine the amount of current you will need. For example, you listen to your system and low listening levels, and then you will probably use less than one-third the rated current draw. If you play your system loud, then you will use most of the rated current of the amplifier.

Most alternators have about a 40 percent reserve capability. Order to determine how many in ampere of current you will have for your system; you will need to find out what your alternator is rated at. If you are not sure of the total amperage of your alternator, a good place to look is on the alternator itself. Most alternators have a metal tag stating the total average available. If you cannot find the tag, check with the manufacture to find out the rated amperage. Once rated current of the alternator is determined, you need to multiply this number by .40 in order to determine the reserve current available for use with your power amplifier.

For Example: Alternator = 80 Amps 80 x .40 = 32 Amps

Please keep in mind this is an estimate only not exact science. It is best to get your electrical system tested by a professional to determine electrical systems true capabilities.

Calculating Amplifier Current Demands

By using the fuse value of the amplifier you can get an idea of the amount of current draw the will be used under full output power. Although the full output rating is good to determine the total amperage draw in the system, it does not represent the true continuous or averaged amperage draw in the system. Listed below is a simple way in order to determine the approximate continuous current draw of your amplifier.

1.) Determine fuse value of the amplifier.

2.) Divide the RMS power rating by the Peak power rating.

Example: 50Watts RMS Divided by 100 Watts Peak Power = .50 (50%)

Once you figure the percentage of RMS vs. Peak power, you multiply the fuse value of the amplifier by the RMS percentage.

For Example: If the amplifiers fuse value were 30A, then 30A multiplied by 50% would be 15A of continuous current draw.

Upgrading your Electrical System

Depending on systems current requirements vs. your electrical systems capabilities, you may need to upgrade your electrical system. For example, if you find that you headlights dim when you have your system cranked up when you are driving at night, this is a sign you should upgrade your electrical system.

There is several different ways order to accomplish this; one way is to upgrade the alternator so that it has higher amperage output. Another way is to purchase a Capacitor. We recommend consulting your Car Audio Retailer to determine what is best for your system.

Speaker Terms & Features

Dual-Cone
A dual cone speaker, sometimes also referred to as a "full-range" speaker, uses an inexpensive, efficient design. The small "whizzer" cone in the center of the woofer reproduces high frequencies, but not as well as a separate tweeter

Efficiency or Sensitivity
An efficiency or sensitivity rating tells you how effectively a speaker converts power into sound. The higher the number, the more efficient the speaker and the louder it will play with the same input power. An efficient speaker helps you maximize your available power.

Frequency Response
The range of frequencies the speaker will reproduce (lowest frequency to the highest). The wider the range, the better. Optimal is 20 - 20,000 Hz, the range of human hearing.

Imaging
Imaging describes the extent to which a stereo system reproduces the location of instruments and vocalists as they were positioned during recording and mixing (See also **soundstage** below).

Good imaging creates a listening experience that seems natural and lifelike. The key to attaining the best possible imaging is equal and unobstructed path lengths between your tweeters and your ears. That is one of the reasons why matched component speakers, with their versatile tweeter placement, sound as good as they do.

Maximum RMS Power Handling
Maximum RMS Power Handling refers to the amount of power a speaker can handle on a continuous basis.

Midrange Speaker
A tweeter-less speaker (ranging in size from 3-1/2" to 6-3/4") dedicated to the reproduction of midrange frequencies. They are used in systems in which the low, midrange, and high frequencies are amplified separately.

Peak Power Handling
Peak power handling refers to the amount of power a speaker can handle during a brief musical burst.

Separates or Matched Components
Separates use a superior speaker design to give you the best possible sound. A typical separates system includes a separate woofer, tweeter, and external crossover, all of which are designed to work smoothly with one another. Generally, these components are made of better materials than their two-and three-way cousins.

Separate woofers may be easier to mount in tight places because tweeter protrusion is not a factor. The separate tweeters allow positioning for optimum imaging. Given adequate power, separates deliver phenomenal dynamics and detail.

Soundstage
Individual vocal and instrumental "images" make up your stereo system's soundstage. The better the soundstage, the greater the sense of its definite width, depth and height. See also **imaging** above.

Surround
The surround is the flexible ring around the edge of the woofer cone. Good ones are pliable enough to let the woofer cone travel freely in and out. The further the cone can travel, the stronger the bass. Surrounds are usually made of cloth, foam or rubber. Rubber tends to last longest.

Three-way
three-way or tri-axial speakers take the separate woofer and tweeter from a two-way design and add a midrange driver for enhanced warmth and texture. The extra high-frequency energy also boosts overall sensitivity.

Tweeter
Your highs are reproduced by the tweeter, the small speaker perched inside the woofer cone. Cone tweeters are efficient and the most economical. Dome tweeters, the type found in most home speakers, sound smoother and more accurate. Some domes are made of metals like titanium for extended high frequency response. Others are made of a fine cloth like silk for a smoother sound. Some are made from a combination of materials.

Two-way
Your music's high frequencies are reproduced accurately by two-way, or coaxial, designs. These speakers use a separate tweeter to deliver high frequency reproduction that surpasses that of dual-cone models. This tweeter, usually a cone or a dome, is perched inside the woofer.

This three-way 6X9 features a separate woofer, midrange, and tweeter for improved clarity and detail in the bass, midrange, and high registers.

Voice coil
The voice coil is the coil of wire in a loudspeaker that creates a magnetic field. With the help of other speaker components, the voice coil converts electrical signals into mechanical energy, which is used to produce sound. The voice coil former is the part of the speaker around which the voice coil is wound. Many of the speakers on this site offer a heat-resistant voice coil to prolong speaker life.

Woofer
Your bass and lower midrange are reproduced by the woofer, the speaker's big cone. To operate efficiently, a cone should be made of material that is stiff, yet lightweight. Cones made of polypropylene, or poly mixed with other materials, provide excellent sound, and stand up to the heat, cold, and moisture that car speakers face daily. Paper cones treated for moisture resistance also do a great job, and are usually very efficient.