Products
- Car Hi-Fi
- DAB Digital Radio
- Navigation
- Security
- Multimedia
- Phones
- Radar
- FM Modulators
- Bass Page

Jump to..

APPROVED SPECIALIST MESF

Products

Ray Smith Car Hi-Fi Bass-Heads Page

Bass Speakers - Bass Amplifiers - Bass Stuff.

For all you Bass junkies out there we have put together all the bits you need to blow your socks off. Bass speakers, Bass amplifiers, bass stiffening capacitors and all the other stuff you will need to build the loudest car on the street, and it's not just the bass frequencies that are low, look at these prices.

Good Sub sound starts with good speakers. Focal - Alpine - Sony - Pioneer etc, only quality subwoofers will take the strain. Free air - Ported box - Sealed box (Infinite Baffle) it is not a black art, just different ways of getting the best type of bass into the space provided. For more information, see our article on Sub box design below.

Subwoofers.

The best speaker on the world will destroy itself if it is not matched to the proper Amplifier; a common mistake is to couple a powerful subwoofer to a small amp which then struggles and clips, sending a square wave to the speaker. So it is very important to get the power of the Sub and Amp matched.

Amplifiers.

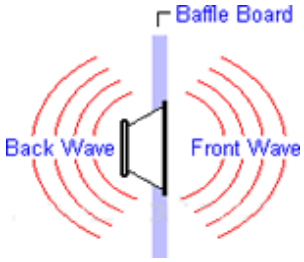
Stuff is the important part of the installation. A car battery is capable of cranking the starter motor which takes around 500amps so it can take care of your amplifier setup – PROVIDED you use the right "Stuff". The tricky part is knowing what stuff goes with what Amp and Sub. We have put together a summery to help you.

Stuff.

Car Audio: Sub Woofer Box Design

These are great for applications where boot space is at a minimum and usually the easiest and least expensive way to add a subwoofer to most cars. Not having to construct a box is an advantage, but many vehicles will require a new rear deck panel and/or vent to be constructed to accommodate even smaller woofers. These custom vents and panels could cost as much or more than a prefabricated or custom box.

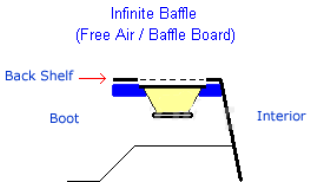
Infinite baffle set-ups require a woofer with a beefier suspension for high power handling and one with better cone damping. This set-up will be less efficient in reproducing the lowest frequencies as compared to other second order or higher enclosures.



In any free air application, the back seat and surrounding panels should be removed to seal any possible areas where energy could be lost. It is crucial to separate (seal) the back wave of the loudspeaker (woofer) from the front wave of the loudspeaker. If not, bass cancellation will occur. This is also a good time to rid and deaden the boot and surrounding areas of any unwanted noises and rattles

Typical Rear Shelf Installation/Infinite Baffle/Free

Larger Cars, especially older ones, will have enough surface area to accommodate a pair of 12 or 15 inch woofers. These will be the easiest to incorporate an infinite baffle set-up into. Don't forget to seal any areas where energy could be lost that would cause any cancellation. For smaller rear shelves, a vent will have to be constructed.



Back Seat Installation

The baffle board may also be mounted behind the back seats (usually folding) instead of under the rear deck. This is often easier and less expensive than cutting the rear shelf and will not require any modifications to the existing shelf panel.

Small Shelf Installation

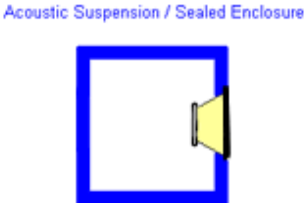
Many of today's vehicles lack the surface area needed to mount a ten inch or larger woofer in the rear shelf. If this is the case, it is still possible to use free air woofers by venting them through the rear shelf as shown in the two diagrams below. Sealing the boot area from the interior of the vehicle is still critical to a successful installation. Try to keep the inside dimensions of the front and rear walls of the vent at least four inches apart when working around boot springs and other obstacles.

Another small shelf configuration like the one above, but with the magnet structure mounted inside the vent.

Car Audio: Sub Woofer Enclosures/Second Order

These enclosures are usually the easiest enclosures to build and are the most forgiving of many construction and design errors.

Other characteristics include a shallow roll off on the low end (12 dB), great low frequency power handling, the best transient responses, and smaller enclosure sizes than most other designs. However, magnet structures will not cool as well as they do in some ported enclosures, and distortion in the upper bass frequencies is more noticeable than ported enclosures, but can usually be compensated for by lowering the crossover frequency or using a steeper cut-off filter.

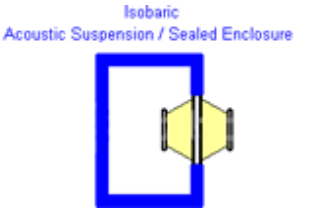


Remember, none of these enclosures are shown to scale. Please refer to your driver's specifications for recommended/optimal enclosure volumes.

Second Order/Acoustic Suspension/Sealed Enclosures

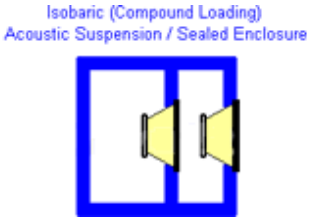
Isobaric – Sealed

When enclosure space must be at a minimum, sealed isobaric designs work very well. These usually require half the space of a basic sealed enclosure, but require twice as many drivers and will achieve the same acoustical output as the single driver show above in the larger enclosure.



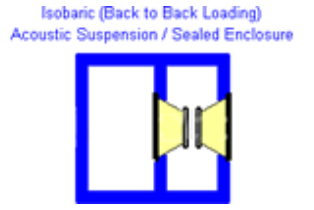
Isobaric - Sealed (Compound Loading)

Another isobaric enclosure with the drivers facing the same direction. Obviously this will require a larger enclosure than the one shown above, but again, output will be the same.



Isobaric - Sealed (Back to Back)

Another variation of an isobaric enclosure. It doesn't matter which way the two drivers face, but if you have the space to use this enclosure, you should be able to use a simple sealed enclosure instead (only one driver required!).



Isobaric - Sealed (Planar Loading)

Odd spaces will require unique box shapes. This isobaric enclosure can be a great solution for such a space. Remember, the volume of air space between the two drivers is not crucial to the design of the enclosure, (however, you do not want to make it too small) only the volume of the main section of the enclosure (that of the rear enclosed driver).

Isobaric (Planar Loading)
Acoustic Suspension / Sealed Enclosure

Car Audio: Sub Woofer Enclosures/Fourth Order

A fourth order enclosure (vented box) is a sealed enclosure with the addition of a port tuned to a specific frequency. The port extends the low frequency response of the basic sealed enclosure usually providing a lower cut-off frequency. The enclosure offers a good transient response (second to that of a sealed enclosure), good power handling within it's bandpass region, and excellent efficiency making it a popular choice for many competitors and everyday users, but below the tuned frequency power handling is poor and damage to the woofer is likely to occur if over driven. Lowering the port frequency below that of the manufacturer's recommended frequency will only worsen matters and cause the sound to become "muddy"!

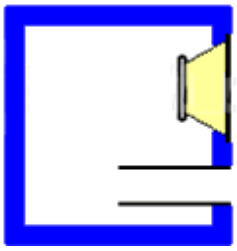
With any ported design enclosure, the largest port diameter or area should be used to minimize port noises (or whistling). Flaring the edges of the port is also recommended for the same reasons. Ports may be any shape, but a cylinder is usually the easiest to incorporate into your design.

These enclosures are obviously more complex to build, less forgiving of design errors, and usually larger than sealed enclosures, but if done properly, they can provide that additional output a competitor desires.

Fourth Order/Bass Reflex & Bandpass

Bass Reflex / Ported Enclosure

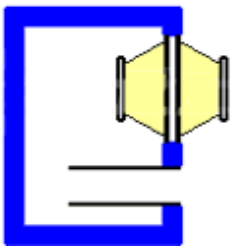
Most often used in hatchbacks, vans, SUVs, and other vehicles where the enclosure can be mounted inside of the vehicle, the bass reflex enclosure is a popular choice for competitors and the easiest of the fourth order enclosures to build. The shape of the box may vary, often seen with the facing or rear wall angled, but may be a simple box shape as shown.



Isobaric - Bass Reflex

Isobaric
Bass Reflex / Ported Enclosure

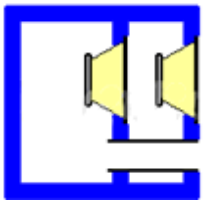
If space is at a premium or just a smaller enclosure is desired, an isobaric design may be used. The volume of the enclosure will be approximately half the space of the above enclosure with the same results. The downside is you will need two woofers vs. one and the output will be the same.



Isobaric - Bass Reflex (Compound Loading)

Isobaric (Compound Loading)
Bass Reflex / Ported Enclosure

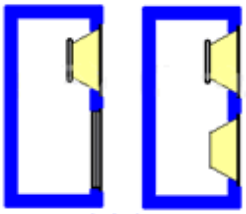
This is a variation of the above enclosure. As long as the woofers are mechanically in phase, it doesn't matter which way they face each other, however this will require a larger enclosure to accommodate the magnet and frame assembly of the outer woofer and is more complex to build.



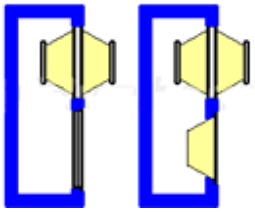
Bass Reflex - Passive Radiator Enclosures

Passive radiator systems are very similar to ported systems. Instead of a tuned port, a "drone cone" is used to extend the low frequency response. Most look like a flat diaphragm, some may look like a woofer, but will have no magnet structure. The response is similar to a ported system, but the cut-off frequency is slightly higher, and the cut-off slope is slightly steeper. In vehicles that literally had next to no room at all to mount a conventional enclosure inside of the vehicle (i.e.: Jaguars XJS, mounted under the seats).

Bass Reflex / Passive Radiator



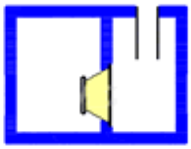
Isobaric
Bass Reflex / Passive Radiator



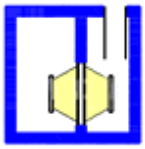
Single Reflex - Band Pass Enclosures

The single-reflex band pass enclosure is basically a combination of a sealed and vented enclosure. These can be fairly small enclosures, though larger than a sealed enclosure. They offer great power handling, good low frequency response, but are not as efficient as vented enclosures (top of this page), and are more complex to build. However, when built correctly, these make excellent enclosures and are often used by competitors. This is often referred to as a fifth order enclosure, but it's not. The addition of a crossover makes it a fifth order system.

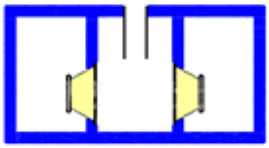
Single Reflex Bandpass Enclosure



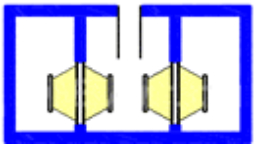
Isobaric
Single Reflex Bandpass Enclosure



Three Chamber
Single Reflex Bandpass Enclosure



Isobaric Three Chamber
Single Reflex Bandpass Enclosure



Theile-Small Parameters

This group of parameters outlined by A.N. Thiele, and later by R.H. Small, describe the electrical and mechanical characteristics of mid and low frequency loudspeakers operating in their pistonic region. These parameters are crucial for designing quality enclosures for sound quality or loudness.

B Magnetic flux density in gap, in Tesla-meters (TM)
BL The magnetic strength of the motor structure.
C Propagation velocity of sound at STP, approx. 342 m/s
Cas Acoustical equivalent of Cms
Cmes The electrical capacitive equivalent of Mms, in farads
Cms The driver's mechanical compliance (reciprocal of stiffness), in m/N
D Effective diameter of driver, in meters
F3 -3 dB cutoff frequency, in Hz
Fb Enclosure resonance (usually for bass reflex systems), in Hz
Fc System resonance (usually for sealed box systems), in Hz
Fs Driver free air resonance, in Hz. This is the point at which driver impedance is maximum.
L length of wire immersed in magnetic field, in meters
Lces The electrical inductive equivalent of Cms, in henries
Ms The total moving mass of the loudspeaker cone.
Mmd Diaphram mass, in grams

Mms The driver's effective mechanical mass (including air load), in kg
n0 The reference efficiency of the system (eta sub 0) dimensionless, usually expressed as %
p (rho) Density of air at STP 1.18 kg/m^3
Pa Acoustical power
Pe Electrical power
Q The relative damping of a loudspeaker
Qa The system's Q at Fb, due to absorption losses; dimensionless
Qec The system's Q at resonance (Fc), due to electrical losses; dimensionless
Qes The driver's Q at resonance (Fs), due to electrical losses; dimensionless
Ql The system's Q at Fb, due to leakage losses; dimensionless
Qmc The system's Q at resonance (Fc), due to mechanical losses; dimensionless
Qms The driver's Q at resonance (Fs), due to mechanical losses; dimensionless
Qp The system's Q at Fb, due to port losses (turbulence, viscousity, etc.); dimensionless
Qtc The system's Q at resonance (Fc), due to all losses; dimensionless
Qts The driver's Q at resonance (Fs), due to all losses; dimensionless
R Ripple, in dB
Ras Acoustical equivalent of Rms
Res The electrical resistive equivalent of Rms, in ohms
Revc DC voice coil resistance, in ohms
Rg Amplifier source resistance (includes leads, crossover, etc.), in ohms
Rms The driver's mechanical losses, in kg/s
Sd Effective piston radiating area of driver, in square meters
SPLo Sound Pressure Level, usually measured at 1 watt, at 1 meter in front of the loudspeaker
Vas "Equivalent volume of compliance", this is a volume of air whose compliance is the same as a driver's acoustical compliance Cms (q.v.), in cubic meters
Vd Maximum linear volume of displacement of the driver (product of Sd times Xmax), in cubic meters.
Xmax Maximum peak linear excursion of driver, in meters

Many Thanks to "The 12Volt" for the information. *www.the12volt.com*

Top