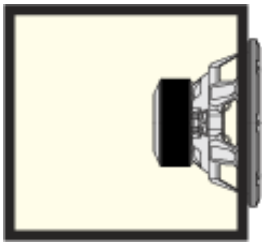
Sealed Enclosure Characteristics

Sealed Enclosure



The sealed (aka: air-suspension, acoustic-suspension) enclosure is a classic box design. Patented in 1949 by Harry Olson and popularized in the 1950's by Acoustic Research, this design has stood the test of time and has been adopted by many home and car audio companies.

Primary Advantages

- Small
- good low frequency extension and control
- good transient response
- simple to build

In a sealed enclosure, the woofer is tightly controlled by a trapped volume of air in the enclosure, which acts as a spring (hence the name "air-suspension"). The woofer must literally pull the air with it as it moves outward, thus decreasing the air pressure inside the box and compressing the air inside the box when it moves inward, which increases the air pressure inside the box. Since the air pressure inside the box seeks to equal the barometric pressure of the atmosphere, it acts as a controlling force over the motion of the speaker. The more the speaker moves inward or outward, the greater the pressure exerted by the air-spring of the sealed enclosure in the opposite direction.

The relationship between the parameters of the speaker being used and the volume of air inside the enclosure dictates the performance of the sealed subwoofer system. By making the box larger, the air spring limits cone motion less and allows the system to play lower and with flatter overall response (lower Qtc) at the expense of power handling. If you go too large, however, you begin to lose efficiency in order to gain the additional low frequency extension. By making the box smaller, the air spring exerts more control and limits cone motion at low frequencies, which increases power handling but does not let the system play as low and produces a more peaked response (higher Qtc.) For any speaker competently designed for sealed box applications, there is a range of enclosure volumes that will produce good high-fidelity sound. Changing the enclosure volume within that range can fine-tune the response to suit the tastes of the listener and/or the acoustic properties of the vehicle.