Atlantic TECHNOLOGY

TECH TIPS

7-06

Tip #9 Why we do sealed (acoustic suspension) subwoofers

Most people don't think too much about what kind of subwoofer they're using. They see the box, they hook it up, and then they pretty much forget it. But at Atlantic Technology, we give these things LOTS of thought, because we take them very seriously.

So for subwoofers, we really like the sealed box (sometimes called "acoustic suspension") approach. We find this design has certain advantages that, when properly executed, make them sound great.

How a Sealed Box Differs from a Ported Design: In a sealed design, the woofer radiates sound off the front of its cone, but the sound off the back of its cone is contained inside a sealed box that's stuffed with fiberglass or polyfill. The driver's suspension–its surround and spider–are somewhat loose (engineers say the suspension is very "compliant"). Outside of the box, the woofer's cone moves quite easily back and forth. But when put in an airtight cabinet, the air trapped inside the cabinet acts as a nearly perfect "spring," compressing and expanding in response to the woofer's back and forth motion. This air spring exerts virtually perfect control over the woofer's cone, guiding its back and forth motion with great accuracy. The result: Outstanding frequency response, with nearly perfect transient characteristics (the ability of the woofer to start and stop quickly in response to a sharp input signal).

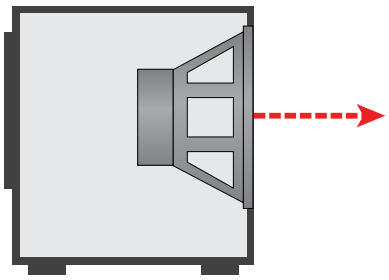
In contrast, the woofer in a ported design is far less compliant. Instead of relying on the cabinet's air spring to "guide" the cone's motion, a ported woofer relies mostly on its own suspension to control the cone. The driver's suspension is far less accurate than the virtually perfect motion of compressed and expanded air.

So why do a ported woofer at all? Simple: it seems like you get "more" bass from a ported woofer. In a ported design, the woofer radiates sound not only off the front of the cone, but also off the rear of the cone. The rear radiation exits the cabinet through the port and reinforces the bass output off the front of the cone. Nice, right?

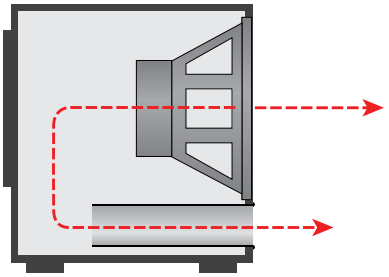
Not so fast, buckaroo. Look again at the pictures. You'll notice that the sound from the port is just ever-so-slightly delayed in time relative to the sound off the front of the woofer cone, smearing the sound. This is somewhat of an oversimplification of the complex behavior of subwoofer systems–but not that much! Another thing: because of the law of acoustics, a ported woofer's response falls off in the low bass much faster than a sealed woofer. Depending on the port's "tuning frequency," the last few bass notes might just drop off the audibility cliff altogether.

Assuming proper design and optimization of the various factors (which you can assume with us, because we know what the heck we're doing!), an acoustic suspension woofer will often sound more detailed, faster, less "thumpy" than a ported sub. That's why we do them.

Sealed Box



Ported Box



Subwoofer Driver

Other Tech Tips:

Tip 5: In-wall speaker room size chart
Tip 6: Why a corner sub?
Tip 7: Why the ICTS-6 LCR?
Tip 8: Why the IWCB?