Subject: Re: 3pi/ 4pi plans
Posted by Wayne Parham on Mon, 12 Apr 2010 17:44:52 GMT
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There is probably no problem with those dimensions, but you could only really know for sure if you measured a speaker made that way. It's pretty close to a stock build though, so I'd be optimistic, kind of surprised to find any surprises.

You know, Helmholtz resonance is a piece of cake, and knowing how the woofer and box will act down low is a no-brainer. If that's all there was to it, if we were building a sub, I'd be almost flippant about box tuning. Down low, it all works as expected.

The thing is, at higher frequencies, you see standing waves take hold. There are internal standing waves that set up along boundary dimensions and in some cases, along port dimensions. These can be modeled, and some software does that, like in the Smith & Larson WTPro and in Martin King's spreadsheets. Of course, the acid test is what the physical model does, so measurements are always in order.

What you'll find is that the position of the woofer, the port and internal cabinet walls all set the positions of (harmonic) pressure nodes inside the cabinet. Again, we know what to expect down low, almost any T/S modeling program does a great job of predicting what happens below 100Hz. But above that, if standing waves make a high-pressure quarter-wave node line up just right, it will show up as a spike in the response curve.

Acoustic insulation absorbs high frequency standing wave modes, but it doesn't work at low frequencies. That's good, because we want the low bass to be unimpeded by the insulation, and for the the woofer and the Helmholtz resonator to work together without resistance. But there is a transition region, the midbass and lower midrange, that is too low in frequency for insulation lining the walls to attenuate. If standing wave spikes are created here, you're going to hear them. Spanning the cross-section with insulation helps increase lower midrange absorbtion, and that why the plans tell you to put a sheet (or two) in larger speaker cabinets, laying on the braces and spanning the cross-section. But it is also best to layout the cabinet and port to reduce the amplitude of midbass and lower midrange standing waves in the first place.