Subject: 3 Pi Modifications
Posted by rkeman on Sun, 04 Apr 2010 12:30:44 GMT
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Does the 3 Pi using the AE TD12S woofer perform well in a sealed cabinet? It looks good on paper with 2.6 cu ft. fully stuffed enclosure Bessel second order alignment (0.577 Q and f3 53Hz). The SBB4 vented alignment appears to have an f3 of about 43Hz and requires a 3.1 cu ft. box including the driver, horn, duct, and brace volumes. The cabinet would be lined on three sides with 1.5" open cell egg crate foam in the vented design and use a 4" flared port. Also, can Mills 15 and 12.5 ohm resistors and Jensen 15 ga P core inductors be substituted in the crossover? The latter have 400 watt ratings, +/-5% tolerance, and really low DCR. A 14 ga Erse air core on the 1.5 mH woofer coil is also a possibility, but has a higher DCR and costs twice as much. Thanks for your input.

Subject: Re: 3 Pi Modifications
Posted by Wayne Parham on Sun, 04 Apr 2010 13:41:25 GMT
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Don't use laminated core coils, because the decreased resistance isn't needed and you're increasing magnetic non-linearity in the trade. You have to really look at the circuit to know whether an iron core coil is needed. If DC resistance is high enough to modify the transfer function, to introduce a peak of say a decibel or more, then it makes sense to consider using a different coil with lower DCR. But if the added DC resistance only makes a difference of say a few tenths of a decibel, I think it's safe to ignore it. In that case, I'd suggest using an air-core coil where size and cost allow. The bottom line is, use air-core coils where you can for best sound quality.

As for the sealed cabinet, I suppose you could do that but I wouldn't. Bass-reflex cabinets distort less because they decrease excursion. Then again, unless you're cranking them, distortion will be really low anyway. As far as the crossover is concerned, this is a mod you can probably make without penalty. And if you go multisub, the tuning on the bottom end doesn't matter as much, as they all blend. So I expect it would probably be OK.

The thing is this: Unless you're setup to measure and compare, why go with untested mods? I mean, I've spent hundreds of hours designing and modifying these speakers, and once you've modified them, you throw all that out the window. I understand wanting to improve things, that's why I DIY. But blind modification (without measurements) sometimes ends up decreasing performance. Models are great, but they're a fist step, not an end-all. You can't compare a modeled speaker with a measured one. So my advice is, go with the stock build. Just my 2¢.

Here is a post (with a link inside to several more) that describe my design philisophies, and why I

Subject: Re: 3 Pi Modifications

Posted by rkeman on Mon, 05 Apr 2010 20:16:48 GMT
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The purpose of considering a sealed 3 Pi was to maximize the bass transient performance, better control the effects of room gain, and utilize the high excursion capabilities of the AE TD12S. The standard 3 Pi design uses a relatively small vent for a 12" woofer and compression at higher power levels is a concern. Would you consider a larger radius and/or flared vent in this design or is the 2.5" diameter and length vent optimal?

Thanks for the crossover advice as well. The iron core inductors model a little better due to the lower DCR, but are not acceptable if saturation is an issue. The 28 ohm resistence needed in the tweeter network could be created with Mills 8 and 20 ohm resistors if you believe that the 20 ohm resistor will be adequate to handle the relatively increased power. The Mills are rated as 12w resistors.

Subject: Re: 3 Pi Modifications
Posted by Wayne Parham on Mon, 05 Apr 2010 21:04:19 GMT
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The reflex tuning is slightly overdamped, which is characteristic of most of my designs. It provides a response curve that is similar to sealed, in that rolloff is gradual and smooth. But you gain the benefits of a vented cabinet, mainly increased LF and reduced excursion. I believe this is the best overall solution because it provides the highest degree of cone control without resorting to a huge basshorn. A basshorn would also open up another whole other can of worms, because they have their own set of problems for home hifi use, in my opinion. So to me, the reflex cabinet is king for hifi bass.

Don't forget that in a home sound environment - indoors, in a room - everything below the Schroeder frequency (around 150Hz or so) is smeared by boundary reflections. If you think about it, the best thing you can do is actually to provide some "jitter" in the reflections, decorrelating them or moving them around a little bit in time to average out the sound field. This goes in the opposite direction of what we would want outdoors or in a very large auditorium. Indoors, I want a point source above 150Hz, but I want multiple source positions and tunings below 100Hz. Between those ranges, I want transition where the multiple distributed sound sources gradually fade to a single source around the Schroeder frequency.

airspeed problems with it. There isn't a lot of displacement, really. I suppose if one were to pump a lot of content through them under 30Hz they would probably chuff, but that would be a problem anyway, since that's below the passband and the woofer would be unloaded. One would want to high-pass them at 30Hz in that scenario, really, sort of a prosound situation.

for his home theater and main stereo system. He leans on 'em pretty hard, to tell the truth. He's definitely not your triode kind of guy, more like 300 wpc, loves to play stuff like Nine Inch Nails which is real hard on woofers. No high-pass, he runs 'em wide open. If anything would make

them chuff, that would. But I've never heard any sign of turbulence, so I think port size is adequate.

Subject: Re: 3 Pi Modifications
Posted by Matts on Tue, 06 Apr 2010 22:03:11 GMT
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just a comment from the peanut gallery- not educated as Wayne's is, etc.- but "just say no" to sealed speakers! they were one of the great wrong-turns in audio. give 'em air! let 'em breathe!