Subject: 3pi/ 4pi plans
Posted by hot grits on Sun, 11 Apr 2010 12:53:45 GMT
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Hey Wayne, First of all, thank you for all the hard work that you have put in to help out us DIYers. I am trying to decide between the 3pi and 4pi for HT use. Can you send me the plans for both?

Subject: Re: 3pi/ 4pi plans
Posted by Wayne Parham on Sun, 11 Apr 2010 14:04:20 GMT
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Subject: Re: 3pi/ 4pi plans
Posted by hot grits on Sun, 11 Apr 2010 17:01:44 GMT
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thank you. Quick question If I decided to go with the 3pi, Would adding a roundover or faceted edge to the baffle negatively affect anything?

Subject: Re: 3pi/ 4pi plans
Posted by Wayne Parham on Mon, 12 Apr 2010 02:50:38 GMT
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No harm at all. I used to roundover the baffles, but eventually stopped. A little bit of history about that here:
My personal opinions of various design philosophies

Subject: Re: 3pi/ 4pi plans
Posted by hot grits on Mon, 12 Apr 2010 11:42:55 GMT
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Thank you Wayne. I think I am going to go with the 3pi with the upgraded drivers. The only problem is space constraints. The 4pi enclosure would be a better fit but my wife will think I am crazy at the sight of 15's in my mains.

The 20" width is a problem in my set up. I've read a few old posts where you stated that the external dimensions could be modified slightly without a negative impact as long as the internal

dimensions remain the same.

The original external meaurements of 20"W X 30"H X 13.5"D give an internal gross volume of 3.821 cuFT. I would like to change these dimensions to 16"W X 34"H X 15"D. This gives an internal volume of 3.844 cuFT which I hope is close enough. These numbers might actually be a little off as I might use 3/4" panels and a double baffle.

Do you envision any problems with standing waves or anything else with these dimensions? I would like to avoid any change to the xover design.

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.

Subject: Re: 3pi/ 4pi plans
Posted by hot grits on Wed, 14 Apr 2010 01:20:43 GMT
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thanks for the reply. Must get pretty annoying answering questions about modifying plans that you spent countless hours on, and give out for free. I do appreciate your patience.

I think I am going to definitely go with the 3PI with a couple of modifications. I have to get these to look a little more livingroom friendly to get it pass the wife.

From reading old posts it seems it would be better to make the cabinets deeper rather than taller.

I plan on having an approximately 16" baffle with either large facets or a big roundover, maybe 3 inches.
I will keep the driver distances from each other the same.
I would like to center the port widthwise under the woofer.
The baffle might be 2.25" deep if I go with the facets.
If I change the height, maybe I should curve the sides, back or front to help deal with standing waves.
I am also thinking of building the enclosure angled up a couple degrees toward the listener sort of like a parallelogram.
And finally instead of building stands. I might build it to look like a floorstander in which the bottom of the enclosure is seperated from the actual speaker enclosure as to not effect the enclosure volume.
Is there a certain height the woofer should be limited to off the floor.

I am planning to buy your premade crossover for this project. With all these changes I am doing, I wonder if I should go the active Xover route. Of course I would rather not have the expense of buying amps but I am a little nervous that I am deziating too much from the plans.

Sorry for all the rambling.

Subject: Re: 3pi/ 4pi plans
Posted by Wayne Parham on Wed, 14 Apr 2010 02:27:58 GMT
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Stands are good for raising the sound source, particularly for smaller speakers. I think it becomes less necessary with larger speakers, and sometimes I use stands that are short enough they are probably best called angled risers. But sometimes even larger speakers need stands, especially when used in a home theater to get the sound source up nearer to screen height.

In any case, I'd suggest going with the multisub approach when the main speakers are placed on stands. When you raise the speaker up off the floor, the reflection creates a self-interference notch in the lower midrange. You can mitigate this (and other room modes) by blending other sound sources in that range.