Subject: 4Pi speaker tweek
Posted by mantha3 on Mon, 07 May 2012 15:58:55 GMT
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Wayne,

I have been scanning the internet on the topic of 4Pi speakers and looking at this forum. Great information and the reviews of these speakers is impressive!

I found a link to a guy who built a set of 4PI and he built to your design but built the cabinet with an increase the cabinet size by approximately 1 cubic foot. He built using your dimentions but added 7 In. in height to get the additional cu ft. He did this to boost the Bass extension. He also did his bass port by using two PVC ports on the bottom front of the speaker.

Here is the post on this build mod
http://www.avsforum.com/avs-vb/showthread.php?t=1238362

I'm curious what your thought is on this modification to your design? I know you probably can't speak in specifics as you'd need to test this to know for sure. I thought I'd check in with you on this thinking perhaps you tried a bigger cabinet when you designed the 4 PI.

I like the look of these speakers and I use a router with a circle jig cutter tool... I think I could make a speaker that looked better with the circle ports over the rectangle. So this taller 4 Pi has some things I like about it. I would not do this if you had some similar size cabinets and found something negative while testing.

I appreciate any feedback on this.

Thanks,
Andy

PS - here are some images on this

Subject: Re: 4Pi speaker tweek
Posted by Wayne Parham on Mon, 07 May 2012 17:15:59 GMT
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I talked to Nick while he was contemplating this build. I told him the same thing I tell everyone that approaches me with a mod like this.

First, if you change the physical relationship between midwoofer and tweeter, the crossover has to be redesigned and all bets are off. That's a deal breaker. One exception - Nick could have centered the tweeter since his box was larger. That would have been OK. But the tweeter can't be placed further from the midwoofer. So lets take that off the table, and consider box size only, assuming the woofer and tweeter will be mounted the same distance relative to one another.

The biggest vulnerability in changing box size/shape is it changes the internal standing waves. These cabinets are tuned with Helmholtz resonance, but that doesn't prevent transmission line effects from inadvertently coming into play. We don't want that.

It isn't that transmission lines are bad, it's just that isn't the tuning mechanism we chose. So any standing waves that line up to create a pressure node at the driver or port will cause anomalies in the response.

A smaller box can be shaped almost arbitrarily because the internal standing waves line up in the midrange where they can be effectively attenuated with insulation. But as boxes become larger, standing wave frequencies drop. Once you get to about three cubic feet, the standing wave frequencies have dropped low enough that insulation isn't as effective anymore. So driver and port position become more important.

As an aside, this isn't an issue for subswoofers. They are used at frequencies where wavelengths are small compared to box dimensions. So internal standing waves don't become an issue. It's full-range speakers with midwoofers that we have to be mindful about, and evaluate carefully using good mathematical models and verifying by acoustic measurements.

Another thing to consider is the fact that all my speakers are designed to be used with flanking subs. This approach both adds extension and smoothes room modes. So to add box volume to increase extension on the mains isn't all that important. I mean, as long as the builder has taken steps to ensure internal standing wave modes don't create response anomalies in the lower midrange, the extra extension doesn't hurt anything. But if it's done to gain extansion in lieu of using flanking subs, performance won't be as good. Flanking subs are really important for high-fidelity in the upper midbass and lower midrange.