Subject: Am I in the Right Place?
Posted by hazmoment on Mon, 03 Apr 2023 07:13:05 GMT
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Hi. So I have recently built a pair of Dual Planar Front Horns which I purchased plans for from Joseph Crowe and CNC machined from Baltic Birch Plywood. They look fantastic and I'm very pleased. However, I am now looking to complete the project by building a bass cabinet for this 2-way design.

https://josephcrowe.com/blogs/news/e-250-dual-planar-front-horn

I was looking at the Eminence drivers previously but another opportunity has come up and it looks like I have acquired a pair of JBL 2226HPL drivers.

How would I know if these drivers would be suitable for a build like this, and how would I go about designing a suitable cabinet and cross over for the 2226HPL's?

I am fairly technically minded but speaker enclosures is a first for me as is crossover design!

I should mention that I build my own tube amplifiers. Specifically Ultra-Linear KT88 Single Ended approx 8-9Watts per channel which I want it to work well with so I think Im aiming for a very sensitive design but I do like music with lots of bass.
A consideration I had was to do as per the horn designers suggestion and try bi-amping with an active filter and with a solid state amp for the bass drivers, but I would much prefer a passive crossover and run it all from the tube amp!

Look forward to your suggestions!

Harry

Subject: Re: Am I in the Right Place?
Posted by Wayne Parham on Mon, 03 Apr 2023 14:04:00 GMT
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I think 2226 drivers would be perfect for a build like that. They offer high-efficiency, high-power and high-quality sound as a direct radiator.

They're also pretty easy to work with in that they have a smooth and extended response curve, having a well-damped cone that behaves well all the way up above 1kHz. Put 'em in a 2ft3 to 5ft3 cabinet with Helmholtz frequency of 40Hz using a port with ample area.

The only warning I would offer is that if you run them above 300Hz - which they are perfectly capable of doing - be sure to model the cabinet to avoid standing wave anomalies. And of course,

measure to be sure. Cabinets as large as are needed for a system like this tend to setup standing waves in the lower midrange.

As for the crossover, see the link below:
Crossover optimization for DI-matched two-way speakersYou might also look at some of the other material on the Pi Speakers FAQ, which has more stuff on crossover design and other considerations. Most of it will apply to your build.

Subject: Re: Am I in the Right Place?
Posted by grindstone on Mon, 03 Apr 2023 22:50:30 GMT
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Yeah it's a pretty good place to ask :)
Tuning below Fs with JBL 2226H

Subject: Re: Am I in the Right Place?
Posted by hazmoment on Tue, 04 Apr 2023 07:24:22 GMT
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Wow thanks Wayne! I'll be sure to post up here what I come up with. Im sure there will be more questions too!
Kind regards
Harry

Subject: Re: Am I in the Right Place?
Posted by hazmoment on Thu, 06 Apr 2023 22:33:49 GMT
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I checked the JBL 2226 Datasheet and they recommend a 4cu ft enclosure tuned to 40Hz for a single one of these drivers. Any advantage to go either side of that, size wise? you mentioned between 2ft and 5ft. Size is not a problem-
I can go as big as I have to because space isn't a problem. But what would be the pro's and con's of going for a 5ft?
Where should I begin on the design of this enclosure. How can I "tune" the enclosure? Is it by correctly designing and implementing the Port(s)? I have downloaded WinISD, but not exactly sure what Im doing with it. I do operate a CNC machine here so I was thinking to make a nice flared port to compliment the matching Horns I previously posted.
Im thinking HPL or Birch Ply for the build. But dont want to waste my time and money on a build that isnt correctly designed. I have been trauling the web for some time now, but so many different designs, drivers, concepts, ideas, I have lost track of what the main objective is for building a box.
You say I should avoid standing waves. I presume WinISD would show this if there are certain

peaks in simulated frequency response when modelling? If so, how am I avoiding them? just changing the size? or adding damping materials?

Subject: Re: Am I in the Right Place?
Posted by Wayne Parham on Thu, 06 Apr 2023 23:33:08 GMT
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Going a little larger - to 5ft3 - adds a smidge more bass and remains properly damped. You can model it and see what I mean, or build a physical model and measure it. Going smaller reduces bass output, but again, remains properly damped. So that's a useful alignment where space is a premium and/or where subs will be used.

Another couple of things that are play in a large two-way design are internal standing waves and baffle-step. Large cabinets - those larger than a couple cubic feet - tend to develop standing waves in the lower midrange. That's one of the things that can make a large two-way design difficult 'cause the midwoofer is used in the midrange. You don't want standing waves to give it an unnatural boxy, throaty sound. So it is best to watch out for them, and to mitigate them in the design.

And baffle step is always a concern, no matter what size the cabinet is, but in larger cabinets it tends to happen right around the Schroeder frequency of the room. So the radiation pattern shifts from forward to omnidirectional (with the attendant on-axis rolloff) right around the same frequency that the sound field shifts from statistical to modal. Said another way, the speaker loses on-axis SPL right at the edge of the modal frequency, so we really don't want to "pump it up" with (passive or active) equalization. There are better ways to deal with that.

The 2226H is great to 40Hz but not below, so subs are useful for extension below that point. They can also be used for mitigating room modes, SBIR and even for baffle step compensation if setup to do so. Do a search here (or on the rest of the internet) for "flanking subs" and for "multisubs" to get more information about that.

If you have no measurement equipment, you might just want to copy the four Pi cabinet and delete the tweeter. Flip it upside-down with the woofer closest to the top edge of the cabinet and make a cradle to mount your tweeter horn above that. That way you'll not have to worry about tuning, alignments or internal standing waves.

Subject: Re: Am I in the Right Place?
Posted by hazmoment on Fri, 07 Apr 2023 01:06:03 GMT
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This sounds like a nice place to begin with the 4pi cabinet. Are there plans available?
I was told by having the bass driver toward the bottom would provide extra bass / reinforcement through the floor? I can flip the 4pi cabinet so the driver is closest to the top as you suggest- is this

to help with alignment with the horns?
Is there any advantage to flaring the port? or better not the change the original design?

Subject: Re: Am I in the Right Place?
Posted by Wayne Parham on Fri, 07 Apr 2023 13:20:58 GMT
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You've got mail!

You'll want the spacing between horn and midwoofer to be as close as possible to provide a tall forward lobe. Watch the "Vertical Nulls" video in the "Crossover optimization for DI-matched two-way speakers" link I posted above, earlier in this thread.

I would suggest placing these speakers on stands and adding flanking subs. Maybe start with just the main speakers now, and add flanking subs later. And I'd use a passive crossover on the mains, and drive them with your tube amp. Flanking subs can be driven with plate amps.
