Subject: Diffraction and Baffle Spacing - critic this design?
Posted by Adrian Mack on Tue, 08 Jul 2003 03:08:05 GMT
View Forum Message <> Reply to Message

Hi guys,Above is a diagram showing something that I might be building. As for crossovers, I'm using the 1Khz two-way Pi crossover, and the other crossovers are all active, probably 2nd order LR or something (these are transient perfect?). Now... onto the mystical subject of time/phase alignment, and other catch-phrases like that. I know theres so many opinions/views on this topic, but what I do know is that we can only align phase at one frequnency, and thats it. So its quite pointless in a sense. Also room reflections will be screwing up the phase angles too. But should I take any of this into consideration? Also should I bother with aligning the acoustic centers?The mouth of the horn itself is a big cause for diffraction they say, but I've heard that mounting the horn on the baffle removes this (strange, I dont know how true this statement was, and I dont think its true). As can be seen the horns are rather close to the edge of the enclosure, so I'm not sure how bad diffraction is going to be here. All horns/drivers are going to be flush mounted, and I think that crossover overlap is pretty limited using the linkwitz riley crossover, and also the horns/drivers are all placed pretty close togethor so that destructive interferance is minimized from the multiple "point sources". Both horns have wider horizontal dispersion than vertical so hopefully overlap is minimized. Does anyone think I should round the edges? Apparantly it has to be rounded quite a lot for it to have any real effect, I dont really like the look of highly rounded edges, or rounded edges at all for that fact. So I dont really want to do this. Does anyone think the distance of 20" from the ground to 15" driver is too little? I'm thinking I could get some floor bounce notch problems this way, I dont think it will be too bad. Also, being this close to the ground is quite a distance away from the listeners ears so these frequnecies 70-300Hz would be delivered at a different time, but because from 300Hz and down its starting to get rather omni-directional, I think this wouldn't pose a problem?I'm open to all critics and help I can get with my baffle spacing arrangement in the diagram above, and also if I've got diffraction minimized or not. Thanks!Adrian

Subject: Re: Diffraction and Baffle Spacing - critic this design?
Posted by Sam P. on Tue, 08 Jul 2003 10:07:49 GMT
View Forum Message <> Reply to Message

a)hf horn positioned too highb)woofer too far from floorc)midrange is doing 300 to 1khz?, why bother with 3 way?!advice: look into Wayne's 4 Pi Pro design or one using the Eminence drivers. a high performance passive crossed two way will be "tweakable" by the diy builder...your biamped/passive hybrid may have you tuning from now until there is peace in the middle east...and at the 1 watt(?!) home listening level don't sweat the top end numbers, have you even BEEN in front of a system running at 120dB? I've used ear plugs and muffs while running 100watts rms into the 100dB/watt quasi-4 Pi Pro's with music...120dB is loud with "double" ear protectionconstructive advice: consider facing the 18 rearward towards the wall, near the floor, and position the enclosure about 3 to 6 inches from the wall. set the height of your HF and mid horns so that a point between them is at the listeners ear level, say 36 inches? Active crossover at 300 Hz. feeding a big ass sand amp for the woofer. Use a similar amp for the front drivers, just be sure it can handle the reactive load of the passive crossover OK, if selecting a tube amp use

one that is not too load sensitive. throw Wayne's 1kHz. Pi crossover in there if desired. HOW ARE WE MATCHING the MID and HF levels? Expect to spend some time here swapping series R's and bypass caps for the HF, and likely working out a z peak damper for the Mid. any questions?even better advice: again, see Wayne's 4 Pi Pro plans, or do a search on quasi-4 Pi pro's using 2035's:) Samtrivia:the "phase loaded" wall facing woofer(sealed box, not reflex, btw) was used from 30Hz. up to 300Hz. by EV back in the 50's and "achieves almost a full added octave of bass range and completely eliminates the boomy characteristics of bass reflex enclosures", while the "wall and floor act as reflecting surfaces, close and almost equidistant from the driver cone, ELIMINATING phase difference between the reflections and the source".useful(?) trivia:the 50's "Duchess" enclosure EV used for "phase loading" is the correct size(4cu.ft.)for Eminence's Kappa Pro-15LF 600W Driver according to my PE catalog:) but facing forward will let a hi-po 2 way be built with them! ...waiting for the "sale brochure"...hah, my PE catalog says it is a 4600 watt driver, and 100dB watt, hmmm, I need a PAIR of 5kW amps now?! even scaring myself now, time for meds!

Subject: Re: Diffraction and Baffle Spacing - critic this design?
Posted by Adrian Mack on Tue, 08 Jul 2003 10:39:37 GMT
View Forum Message <> Reply to Message

Hey Sam,Thanks for the advice. Yes, I have been in front of a few systems that can do 120db (currently only my sub is capable of this level, hence the upgrade in main speakers along with other factors), and also some nice car systems capable of quite a bit more than that :-). I like to listen to music and high levels as it gives you that "live" level sensation. Oh yea... the direct radiator on the bottom is actaully 15" not 18". I do have the sensitivity levels matched, the midrange horn would have to be padded down 8db to match that of the augmented compression driver on the HF horn. The woofer is on a seperate amp and well capable of keeping up with the rest :-). Wont be using any tube amps. I have actually considered Wayne's designs a lot, and to be honest, I have not made the decision if I will go that way or not. Theres a few reasons I am after the 3 way here, its because of the midrange horn characteristics. The tractrix horn is supposed to offer much faster dynamics, lower distortion, and what some people call "clarity/crispness". And the last reason... is because I've really wanted to build a horn for a long time !!! But I dont know yet... the 4pi Pro uses the expensive 2226's so thats out of the question.... The Theater series uses the budget Delta 15, but this is a higher distortion driver, mostly because of no faraday ring. I want low distortion in this design, and I think that the midrange and tweeter horns will offer this :D. Also the 15" woofer too, which has very low distortion figures. How far from the ground do you think the woofers should be? I think that a total height for the enclosure should be 50", which would mean the 15" woofer would be placed only 10" from the ground in this case rather than 20" in the other. What do you think of the height I've choosen?Thanks!Adrian

---

Subject: Re: Diffraction and Baffle Spacing - critic this design?
Posted by Bill Martinelli on Tue, 08 Jul 2003 11:49:53 GMT
View Forum Message <> Reply to Message

I'm with Sam. Shorten the cabinet so the total height 44"-46" for a tall cabinet. Run the midrange up 2K. This will elimate any peaking at lower frequencies in the 2370. 1" compression drivers sound better above 1600hz. The Alph 6 is not the correct driver if you want "clean and crisp" midrange. It's an ok driver for you application if thats what your modeling things after. Reconing your JBL baskets to a 2235 would be Very nice. Bill

Subject: Re: Diffraction and Baffle Spacing - critic this design?
Posted by Wayne Parham on Tue, 08 Jul 2003 12:45:09 GMT
View Forum Message <> Reply to Message

There's a pretty thourough write-up about the issues your talking about in the post called "Baffle spacing, phase angles and time alignment, revisited." So rather than re-write some of the same stuff here, I'll just refer you back to that.

Subject: How 'bout this....
Posted by Adrian Mack on Tue, 08 Jul 2003 12:55:37 GMT
View Forum Message <> Reply to Message

Hey Bill,I would actually like to run the midrange horns higher as you've suggested so that the compression driver is crossed at like 1.6KHz, but Hornresp shows the horn cutting off at 1KHz, I know "suspension controlled response" (or something like that) will make it go higher, but I dont think successfully to 1.6KHz would work with that tractrix horn and that driver. Only the JBL LE5 is one that I know will work up there, but very expensive and rare :(I guess what I'm having the trouble in.... is how good this midrange horn will sound. Some people swear its so much better than direct radiators. Some people dont bother with horns. Have you used any JBL 222x series drivers before? If so, do you think a 15" driver from this series (specifically 2225, but is very similar to 2226) covering the range 300 to 1KHz, would it be better than a horn loaded Alpha 6 in this same range? Thats in terms of both distortion, and high detail/clarity. JBL says the highest reccomended crossover frequency for the 2225H is 1200Hz. I could employ these drivers in a two-way design, I think the 2225H could drop straight into a 4pi Professional cab which originally would use a 2226, but the two drivers are very similar and should perform the same I think. So in that case I could cross at 1.2KHz which will make things a bit easier for the compression driver also. Any other advice you can give is appreciated :-)Thanks!Adrian

Subject: Re: Diffraction and Baffle Spacing - critic this design?
Posted by Robert Hamel on Tue, 08 Jul 2003 14:36:52 GMT
View Forum Message <> Reply to Message

Looking at the stack how high is your seated listening position? I did a similar stack. Problem was high frequency horn height. Mine works but could be better if I had paid more attention to this. That 2370 gets beamy in verticle the higher you go. Take a look at the polar response curves. You might want to keep the 2370 closer to your seated height. Depends on how close you will be too. You don't want the last octave over your head. Just something to think about. Looks like a fun project!! What are you crossover points??

Subject: Re: How 'bout this....
Posted by ToFo on Tue, 08 Jul 2003 16:22:40 GMT
View Forum Message <> Reply to Message

What comp driver are you using? If it will go down to 1200 ok, then you might want to do the two way. I know you want to build a horn, but the 2370-a is real solid down to 1000 Hz, and I can't think of a much better horn to go with a 2225 bass unit than a JBL 2370-a. If your tractrix will only cover two octaves then... The two way will give you a great system quickly and with a minimum of construction cost and tuning difficulty.Now since the woof and HF stuff are both great, let's talk about that mid horn. It is a cool Idea, and no doubt would be a fun project. So, You could build the Pi pro 2 way for very little money and time. If you re-did them as a 3 way later, not much is lost. You could probably sell the boxes. I have another cool idea. What if you did the cabinet in sections that bolted together with felt in between to kill the buzzes and rattles. You could make a base the height of a mid horn to use as a stand, and if you got a great midhorn constructed, you could mount it in the base/stand part of the cabinet and just unbolt the pieces and rearrange them with the part that was the stand becomming your mid cabinet. The height of the woofer is not critical in a three way, and the 2370-a would stay at the same height. Can you visualize from my half baked description?I see it looking something like a three sectioned version of Bill Epsteins Towers with the cool revel between sections. Maybe driver cutouts would be closer together to make room for potential three way duty. All you would need to do is use T-nuts to put it together instead of glue, and when you are finally happy you could then glue them permanent. Might be cool to be able to swap things out though.Thomas

Here is a picture of the Epstein Towers

Subject: Re: it's a tough situation
Posted by Bill Martinelli on Tue, 08 Jul 2003 16:51:28 GMT
View Forum Message <> Reply to Message

Hi Adrian,I have a bit of experience with the 22xx drivers. You have an advantage that you have

2225 in that they can be reconed in the older style. The 2226 can not be reconed into a 2235 for instance. I have no qualms or problem running a 2226 up to 1.6k. Its a great thing and make for a great two way speaker. I use 2245, 2226, and m109 for cone drivers. The 2225 can not be used that hi as you know. So at this point I would shoot for cone'ing the basket as a 2235 which has super lower extension. Even though you have a sub the more you get from the main speaker the better. The sound from the JBL mains will be tighter, faster, cleaner. All those little catch phrases. So if the driver cant go hi enough. Make full use of it's low range capabilities.A cone loaded horn for the mid range in the cats meow. nothing compares. That's what the horn loaded single driver guys have going for them. They just sell the system short trying eek out to much bandwidth from a single driver, then adding a sub and a tweeter and still call it a single driver. It is, but it isn't. I use JBL M209-8a In an Exponential horn, which is a 8" 22xx similar that JBL uses with 22xx drivers. The bandwidth of that horn is crossed over between 400-1800 or 2K depending on which driver's I use above it. This horn is 14" x 16" and has no problem with this driver covering 300-3000. Horn response especially has problems replicating the upper cutoff of a design. You should be able to get 2500hz from a mid horn with a 6" driver. Take a look at single drivers that will work in a front loaded horn. You will need to build the horn and do some experimenting with different drivers now that you have done considerable planning. Or look at what some other guys have done for full range with tractrix horns. As long as you keep up with efficiency you might come across a winner. More things to add confusion eh? There does not seem to be a single perfect speaker or configuration! What fun would it be if you were done in one go. Bill

---

Subject: Re: Diffraction and Baffle Spacing - critic this design?
Posted by SteveBrown on Wed, 09 Jul 2003 15:58:22 GMT
View Forum Message <> Reply to Message

Sam, you said, "constructive advice: consider facing the 18 rearward towards the wall, near the floor, and position the enclosure about 3 to 6 inches from the wall." This was such a great thought to me! Will this work with all BR speakers (for example, I have Wayne's 3pi thermionics)? Does it have a negative impact on imaging and soundstage? I'm tempted to try this with my speakers just to see what it would sound like, but I'd have to face the HF horn forward and plug the resulting hole while testing. Thanks,Steve

---

Subject: Re: vented ok facing the wall
Posted by Sam P. on Wed, 09 Jul 2003 22:48:22 GMT
View Forum Message <> Reply to Message

My HT "subwoofer" is an empty jbl 4508 8 cu.ft. enclosure, fitted with a single EV 15BWK woofer. The other woofer opening has a plate blocking it off, with a hole/port where a mid horn was mounted. Rubbles the whole room with less than 15 watts drive...low bass is felt/heard thru

out the house, like when a ghetto blaster on wheels is parked out front:) No box tuning done, just threw it in and hooked up the wires. EV used the wall facing driver up to 300Hz. with a sealed enclosure, not vented. Reflexes back then were often boomy, and using a sealed woofer let them have greater control over the woofer loading at resonance. AR was beating the acoustic suspension drum around the same time. I wouldn't run one higher than that, except corner loaded. The EV phase loading method is for against a flat wall, and it IS important the woofer be close to the floor/wall junction. I've tried the 4508 enclosure with the woofer in the upper and lower position, and the lower one is where all the "cool room effects" kick in, even with the bass boost turned off. DON'T mess up a good pair of speakers to experiment with phase loading, since it is mainly for low freqs, and I will candidly admit that I have no idea how much of my subwoofer performance is from phase loading, and how much is just from having the woofer mistuned in a huge box. Now if I had MADE UP MY MIND to run a woofer only to 300Hz., I would investigate the technique, if only for the reasoning of it's harder to DAMAGE a large cone that is facing the wall while playing ball in the house:(Damn, I'm SOOOO glad those jbl cones are TOUGH! Sam