Subject: 2 PI - maximum volume to avoid Helmholtz standing waves
Posted by CRISTIAN M on Sun, 13 Jul 2014 02:20:54 GMT
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Hi Wayne,

I'm preparing myself to build a pair of 2PI to be used primarily as stereo speakers (not for home theater or anything like that), so they need to be as full range as possible.

BUT...Due to physical constraints in my living room I cannot use the tower version of the 2PI. I cannot even use the "standard" bookshelf version because they won't fit either (I need to put them at boths sides of a big sofa and in between 2 small tables, so the remaining space is 25.6 / 2 = 12.8 inches per speaker at most)

Anyway....Somewhere on an old topic you mentioned "You can make a box between about 1.5 ft3 and 5.5 ft3 tuned to 40Hz and make the Alpha 10 happy". The bookshelf version for 2PI is 1.5ft3, while the tower one is (roughly) 4.5ft3, so I wonder - gradually going up from the minimum recommended volume - what's the maximum enclosure volume for the 2PI before you start suffering from severe standing waves?

In your opinion:

1. would something like 12"(W) x 17"(D) x 27"(H)(rougly 2.7 ft3) work in a decent way? Or maybe 12" x 16" x 25"?

2. would port positioning for that enclosure be as crucial as with the tower 2PI's?

3. would that volume require bracing?

Thanks!

PS. I read literally 42 pages of posts (almost back to 2008) trying to find some answers, so please be patient with me

Subject: Re: 2 PI - maximum volume to avoid Helmholtz standing waves
Posted by Wayne Parham on Mon, 14 Jul 2014 15:00:27 GMT
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The bookshelf version is small enough that standing waves are in the upper midrange where the insulation is pretty effective. They're damped very well. But larger boxes boxes (like the tower model) have standing waves in the lower midrange and upper midbass where the insulation really doesn't do much. So it becomes more important that the midwoofer and port be placed in positions where standing wave modes don't line up on a pressure node.

With careful positioning of the midwoofer, port and stuffing, you can usually prevent midrange ripple. But worst-case placement can cause pretty nasty response. So if you design a tower

cabinet or other large box with midwoofer run through the midrange, it's best to model it and find best locations, and then build a physical model and measure it to validate the design.

Subject: Re: 2 PI - maximum volume to avoid Helmholtz standing waves
Posted by CRISTIAN M on Mon, 14 Jul 2014 17:03:40 GMT
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Thanks Wayne,

Which software do you recommend to run those models before being physically built? (hopefully something not very complicated).

I've checked this software:

1. BassBox Pro (same or very similar to the Eminence one)
2. WinISD
3. Passive Speaker Designer

By the way, this is the reason why speakers should be kept under 12 inches in width:

As you can see, there are a pair of tiny PARADIGM titans taking the place of the future 2 Pi's.

Thanks again!

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File Attachments
1) UL - IMG_20140714_095647191_HDR -.jpg, downloaded 4229
times
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Subject: Re: 2 PI - maximum volume to avoid Helmholtz standing waves
Posted by Wayne Parham on Mon, 14 Jul 2014 17:06:40 GMT
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I would suggest using Martin King's spreadsheets, if they're still available:
Quarter-Wave.com

Subject: Re: 2 PI - maximum volume to avoid Helmholtz standing waves
Posted by CRISTIAN M on Mon, 14 Jul 2014 17:24:00 GMT
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Yes, I was looking for those spreadsheets a couple days ago, based on your suggestions to other users, but sadly they are not available anymore (it says "restricted access").

If I rotate the bookshelf version 90° then I end up having 10 x 22 inches to arrange everything, but since the woofer is already 10", it will be too tight.

What happens if I increase just width to 11 or 12 inches, keeping all other dimensions of the bookshelf 2Pi the same?

Subject: Re: 2 PI - maximum volume to avoid Helmholtz standing waves
Posted by Wayne Parham on Tue, 15 Jul 2014 15:01:06 GMT
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I can't say 'cause I haven't done that. On the little model, I'd be pretty comfortable that it wouldn't cause ill effects but I wouldn't be as confident on the larger tower model. The bigger boxes are where things get dicey, and you'd be surprised how much a response difference you can see with relatively small dimensional change. The Helmholtz frequency isn't the issue here - it's the positions of the standing wave nodes.

Subject: Re: 2 PI - maximum volume to avoid Helmholtz standing waves
Posted by CRISTIAN M on Tue, 15 Jul 2014 21:55:29 GMT
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Thanks!

I will try to keep the enclosure very close to the small bookshelf, and will keep looking for those spreadsheets.

I will let you know my findings

Saludos,

CM

Subject: Re: 2 PI - maximum volume to avoid Helmholtz standing waves
Posted by JCDC on Wed, 16 Jul 2014 00:46:53 GMT
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How about a sideways 2Pi:

Hey Wayne, can you crunch the # to see where the best position for the driver and port are?

Cheers,
Jeff

File Attachments
1) Side 2Pi 2.jpg, downloaded 4176 times

Subject: Re: 2 PI - maximum volume to avoid Helmholtz standing waves
Posted by Wayne Parham on Wed, 16 Jul 2014 15:57:58 GMT
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Man, I'd love to have the time to run simulations and fiddle around like I used to. But these days, I'm so backlogged I just can't. If I even said I'd get to it, might be the best of intentions, but I'd be lying. I'm just so slammed with projects, and even outside of work, my "to-do" list is crazy full.