
Subject: 8 Pi Tuning

Posted by [Jeff Aiken](#) on Thu, 23 Sep 2004 15:18:47 GMT

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Hi Wayne, looking at the 8 Pi design I estimate ~3.5 ft³ internal volume (accounting for bracing and the mid horn). According to WinISD, with the dims of the ports given (3 ports @ 1.625 x 3.5 x .75) it looks to be tuned to about 70hz. This yields a 3db down point @ 56hz and a 6.25db peak at 80hz. Am I mistaken? Or is this by design and corner loading is used to reach a lower cutoff? Or am I just completely confused? ;^>Thanks in advance!

Subject: Re: 8 Pi Tuning

Posted by [Wayne Parham](#) on Thu, 23 Sep 2004 20:24:38 GMT

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I considered tuning the system like this and you could do it to good effect. The bass-reflex peak would bring midbass up to the level of the midrange, so it wouldn't need to be attenuated to match the bass. But instead, the reflex portion is tuned for flat response which then gives the overall system a stepped response like an EBS curve. The midrange and treble is reduced by the crossover network and attenuation is bypassed at low frequencies so the bass is brought up to match.

Subject: Re: 8 Pi Tuning

Posted by [Jeff Aiken](#) on Thu, 23 Sep 2004 21:39:50 GMT

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But, using the dimensions in your plans for the 8 Pi, I seem to be getting this alignment. Instead of 5.5 ft³, I get somewhere between 3.5 and 3.9 ft³. Did I calculate the wrong volume from the plans?Thanks,Jeff

Subject: Re: 8 Pi Tuning

Posted by [Wayne Parham](#) on Thu, 23 Sep 2004 22:14:49 GMT

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is a bit oversized. It's done that way to allow room for panel thickness and the braces and 7.2ft³. It's 32" tall, 26" wide and 16.34" deep.

Subject: Re: 8 Pi Tuning
Posted by [GarMan](#) on Thu, 23 Sep 2004 23:00:40 GMT
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Jeff, In calculating volume, are you only considering the bottom 20" of the cabinet (everything below the mid horn)? If so, that would give you the 3.5 ft³. The midhorn does not take up all the space behind it so that volume needs to be included as well. The volume behind the horn should give you an additional 1 to 1.5 ft³.gar.

Subject: Re: 8 Pi Tuning
Posted by [Jeff Aiken](#) on Fri, 24 Sep 2004 04:37:18 GMT
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Hi Wayne, thanks for the reply. I did make a mistake in that I calculated the driver volume to be .75ft³ instead of 75in³. So, here's the internal volume I calculate, now (sorry so lengthy, my geometry is a little rusty ;). Using the 8 Pi external dimensions I've subtracted 1.5" from each dimension (2*.75" material) to arrive at the internals. 1) I calculated the front "cube" portion of the cabinet first: 24.5"W x 30.5"H x 9.6"D = 7173.6in³ or 4.15ft³ 2) I calculated the rear "trapezoid" portion as $(A=h/2(b_1+b_2))*Height: (5.25/2(12.5+24.5))in^2 \times 30.5"H = 2962.3125in^3$ or 1.714ft³ 3) Add front and rear portions and get 5.864ft³ total internal before subtracting mid-horn or bracing. 4) I estimated the mid-horn flare w/mounting plate to be about 1.12ft³ and the driver to be .043ft³ totaling 1.163ft³. 5) Subtract 1.163 from 5.864 and total volume remaining is 4.701ft³. 6) I only subtract 5% for bracing giving 4.466ft³ total internal volume. According to WinISD, using 3 ports (1.625x3.5 as the plans suggest) this tunes a 4.466ft³ cabinet to 62hz with a F3 = 50hz and a 5.4dB peak at 70hz with the Alpha 10. To get a flat response to 40hz WinISD says the ports would each have to be 4.43" long. Am I still calculating something wrong? Is WinISD's vent calculation inaccurate (seems I read that somewhere)? Wayne, if you're bored (you have to be if you've read this far ;p) and enjoy toying with the mathematically challenged I still appreciate your help and now your patience. ;^> Sorry, if I'm beginning to aggravate. Just trying to grasp things before I make the plunge. Thanks, Jeff

Subject: Re: 8 Pi Tuning
Posted by [Wayne Parham](#) on Fri, 24 Sep 2004 06:03:17 GMT
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I think it's great you are looking into this in such detail. It is a new design, so I welcome the extra examination. For the front section you've described in part #1, I calculate 26 x 32 x 10.34 = 8602in³. I calculated the rear section you've described in part #2 as two extruded triangles and an extruded rectangle. I combine the triangles to form a rectangle. The two triangular portions are 6 x 6 x 32 = 1152in³. The rectangular portion is 6 x 14 x 32 = 2688in³. Combined, it is 12442in³ or 7.2ft³. The horn, driver, panel wood thickness, braces and brackets all displace

volume inside and so must be removed from this figure. I don't recall the displacements right off hand but I remember they were around two cubic feet, and virtual volume increase from insulation adds some of this back. Fortunately, at this size of cabinet, a few hundred cubic inches difference either way doesn't make any difference. As for resonant frequency, I don't know about the accuracy of WinISP. I use the Helmholtz formula to calculate resonant frequency:

Subject: Re: 8 Pi Tuning
Posted by [Jeff Aiken](#) on Fri, 24 Sep 2004 13:52:34 GMT
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That helps. I didn't account for the insulation. Sure appreciate the time. Hope to order the kits soon, too! Thanks, Jeff

Subject: Re: 8 Pi Tuning
Posted by [Jeff Aiken](#) on Fri, 24 Sep 2004 13:54:13 GMT
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Thanks for the post. Yeah, I did include the volume behind the horn. See my post to Wayne below. Much appreciated! Jeff
