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Subject: HT subwoofer is done; anyone remember "The Wrong ...

Posted by [BillEpstein](#) on Fri, 07 Dec 2001 02:01:08 GMT

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....Box"? I ordered the surplus Klipsch 10" woofer with an Fs of 32 and built the 1.62 cu ft box. Got the woofer and decided I should have ordered the Dayton Titanic 12" in the first place. Back went the Klipsch, Titanic sailed in to port today. Fs is 16 but I put it in the box anyway. Both Boxplot and WinSD say 10 cu. ft. Kinda critically under done, right Wayne? But I don't want another 36X24X20 box in the tv room unless it's a TV stand and the little (!) 22X16X13 fits in the corner real nice. Data sheet says the Kevlar spider takes forever to break in but right away the Titanic goes deep and loud on the explosions. You can really feel it in the chestal region. The \$79 plate amp is a treat, too. Feeds 150 watts to the 4ohm Titanic with polarity switch, 40 to 160 Hz crossover and the usual line and speaker connections. So I've got \$240 in this thing and it's cooking. Maybe I should get 2 more and have them fire out the sides of the Theatre 4 Pi's! 3dB down= 16.5 Hz! Yowza!

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Subject: A bit small, yes?

Posted by [Wayne Parham](#) on Fri, 07 Dec 2001 11:52:27 GMT

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It does sound like that box is a little too small. However, there are a lot of alignments that work well, and some can be shoehorned into small boxes. Generally speaking, subs need to be large but you can make use of a small box if you're willing to make certain compromises. Speakers in small boxes can be made to have response that is reasonably flat and low, as long as the box is tuned appropriately. Check out the alignment called "Underdamped Ported Alignment, tuned low". That particular response curve was made with a rather large box, but you can get a similar response curve in a small box with appropriate tuning. More likely is the case shown as "EBS Stepped Response from ported cabinet with specific peaking", which is attractive since your Dayton motor will be used fundamentally in its lower stepped region, which is flat. You can crossover before the edge of the step where response rises. Granted, this is a lesser efficient part of the curve, but it is a way to get flat response over the intended range from a very small box. For that matter, you can generate an "Overdamped Ported Alignment" using certain tuning in a undersized box. This isn't what you would want for a subwoofer that would be used in large rooms or outdoors, but it is perfect for home hifi use, for subs that will be used in small to medium sized rooms or when corner loaded. Room lift tends to boost the lowest frequencies, and this kind of response prevents room gain from forming a peak.

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Subject: sub, corner horn?

Posted by [bmar](#) on Sat, 08 Dec 2001 02:24:54 GMT

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would it be possible to make a slightly shorter cornerhorn into a sub? using something like a titanic and tuning the box appropriately?

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Subject: Re: sub, corner horn?

Posted by [Wayne Parham](#) on Sat, 08 Dec 2001 04:12:07 GMT

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Sure, you can do that. The most important thing to remember is corner-loaded subs need to have an overdamped response curve to conjugate room lift. The smaller the room, the greater the boost.

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Subject: Re: A little more help, Wayne?

Posted by [BillEpstein](#) on Sat, 08 Dec 2001 09:06:53 GMT

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I put the small box parameters into Boxplot and also WinISD. I'm not sure what I'm doing in terms of "box tuning". Both programs gave me a port of 4"X165"!!! So I made the port 1.25" and the length came down to 5". Does that sound right? The box is (internal) 21X14X11.5, the plate amp 9X7X4, and the Titanic:fs 16.26vas 9.89qms 8.226qes .428qts .407xmax 14.22 mmOh yeah. The P.E. site says the Titanic was designed "for a 3.5 cu.ft. sealed enclosure". Whatever, should I give up on the small box and go up to at least 3.5, ported? Or can I get good response down to, say 20Hz and up to an 80Hz cut-off with the 2 cu. ft. I've got?Thanks for the help.

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Subject: Re: A little more help, Wayne?

Posted by [Wayne Parham](#) on Sat, 08 Dec 2001 14:14:30 GMT

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PiAlign suggests 4.0 cubic feet tuned to 15Hz with a 3.3" long x 1.6" dia cylindrical port or a 3" x 1.8" x 3.3" long rectangular port. This makes a nice flat response curve with -3dB at 25Hz, -6dB at 20Hz and -12dB at 15Hz. A 3.5 cubic foot sealed is very similar, having -3dB at 30Hz, -6dB at 24Hz and -12dB at 17Hz. Your proposed 2 cubic foot box is too small for sealed because it becomes underdamped. Not too badly though, so I wouldn't consider it to be unacceptable. A sealed 2 cubic foot box gives a -3dB point of 30Hz, so it is similar to the larger 3.5 cubic foot box but underdamped. My suggestion is that you build the PiAlign recommended cabinet, and that you consider 3.5 cubic feet a minimum chamber volume. If you must run the system in a 2 cubic foot cabinet, you should tune it as low as possible or just leave it sealed. In a cabinet this small, there is nothing you can do to prevent the system from being underdamped.

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Subject: Re: A little more help, Wayne? (over vs under damping)

Posted by [Chris R.](#) on Sat, 08 Dec 2001 15:11:46 GMT

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Hi Wayne, Can you explain this whole concept of damping? Underdamping, overdamping, what do those terms mean, exactly?

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Subject: Re: A little more help, Wayne? (over vs under damping)

Posted by [Adam](#) on Sat, 08 Dec 2001 18:40:59 GMT

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You might want to try stuffing the 2 cuft box with two pounds of polyfill for that box volume. In many cases, doing just this can lower QTC by 0.1 or even more sometimes. Might make it sound better in such a small sealed box. Adam

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Subject: Pneumatic damping

Posted by [Wayne Parham](#) on Sun, 09 Dec 2001 00:39:39 GMT

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A system at resonance oscillates at maximum intensity. This can be a mass and a spring, a Helmholtz chamber or an electrical tuned circuit. At the resonant frequency, even just a little energy input creates large amplitude output. Notice that the examples of resonators each have two reactive elements. The mass and the spring are two reactive elements, the electrical circuit has an inductor and capacitor and the Helmholtz resonator has mass of the air and its compressibility, just like a mass and spring. If you add a resistance, you are providing damping. A shock absorber of a car is a damper, and it prevents the car from bouncing wildly at resonance. Likewise, the acoustic/pneumatic properties of a loudspeaker cabinet control the resonance of the speaker.

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Subject: Sealed vs. Ported

Posted by [Wayne Parham](#) on Sun, 09 Dec 2001 01:20:27 GMT

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I agree with you - If there was no choice but 2 cubic foot sealed, I'd stuff it full with acoustic damping material. But I would probably not accept this limitation, and would put it in a 4 cubic foot box ported to 15Hz instead. I can't see any reason not to do this. It's a much better alignment for that woofer.