Subject: 18" Subwoofer Horn - Opinions wanted!
Posted by Adrian Mack on Tue, 27 Jan 2004 05:18:47 GMT
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Have been thinking about basshorn's today, and was messing around in Hornresp with an 18-Sound 18LW1400 subbass driver that I currently have in a 300L/25Hz tuned vented box. Preferably below 30Hz operation, I started to think about using electronics to shape the response curve flat of a small sized horn. Here is the response curve from hornresp (imported to excel) of a basshorn of 2 meter length, 1800cm^2 mouth, and 450cm^2 throat with this driver and some 95L back chamber. Actually the horn is 3 segments but I won't list all the details here. Segment details are in diagram at end of this post though. Modelled in 1/8th space condition, or 0.5Pi. As you can see the difference between 35Hz and 100Hz is about 3 or 4db, and it drops quite steadily from 100Hz to 35Hz. Then below 35Hz it drops off further. It's the small mouth size that is making that rolloff from 100Hz to 35Hz, in effort to keep the horn as small physically as possible. So instead of making the mouth bigger, what if we add in some sort of filter to counteract it? I choose 75Hz, 6db/oct lowpass filter at 75Hz. The response is below. The falling response from 100Hz and going down to 35Hz is now no longer, the filter corrects for the 3 or 4db rolloff and makes it flat. I loose a little efficiency this way, but in the end its still 104db 1w/1m (18LW1400 has a very strong motor, 24.7 BL).That curve looks like its pretty smooth from 33Hz to 100Hz now. But there is rolloff below 30Hz still and I want a subwoofer horn which goes deeper than 30Hz. At low frequencies, the ceiling becomes a source launch boundry so its like 1/16th space loading below there when placed in a corner. Hornresp cannot simulate interaction of the ceiling, but I took a guess at what would happen in 1/16th space. I analyzied what hornresp did from free space to half space, then the gain from half space to quarter space, then quarter space to eigth space and made some decisions off that as to what sort of gain I could get going from eigth space to sixteenth space. Also to consider would be the walls on the other side too, which could give even more gain below 30Hz. Anyway, I took a rough estimate, using the lower of the figures that the gain could possibly be. It could easily be more than this in a 4 by 4.5m average room or something, I think it would be very constrained. Anyway here is what I think the curve from 1/16th space loading below 35Hz could look like. This is the gain. If I add that to the basshorn graph above, it comes out as:Average F3 then becomes 27Hz, and -6db becomes 24Hz. I've only estimated 3.39db boost @ 30Hz to 5db boost at 20Hz from 1/16th space loading. Anyone here think that a typical room will be more constrained than this at low frequencies, with interaction from room mode's and stuff? What is people's opinion on this horn? It's very small at only ~400L for 27Hz F3, and using an 18" driver. What do people think of that corrective filter? Here is the horn, with folding's (thanks to Mike.e for this!). It's pretty compact overall. What I want to do is keep it small. I burned off a couple of db to make response flat, but even then this basshorn is ~104db 1w/1m. I also have a question on the small mouth. Is there any issue with directionality here? Bass wavelength's are long and I would think that dispersion will not be limited to mouth dimensions, as wavelength is a lot longer than horn length. Like when a midrange horn forms a diffraction slit below a specific frequency related to mouth dimensions, and dispersion is then not limited to mouth dimensions but will instead widen very rapidly. Does the same apply for a basshorn? The mouth is only 1800cm^2 on this horn, length 2meter. Could this basshorn be a good idea to go and build? CheersAdrian

Subject: Re: 18" Subwoofer Horn - Opinions wanted!
Posted by Wayne Parham on Tue, 27 Jan 2004 08:20:31 GMT
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Those are some very interesting thoughts, Adrian. In particular, I was impressed with your observations and the reasoning that led you to estimate the transition to greater than eighth-space conditions at very low frequencies. Very interesting indeed.

Subject: Opinions wanted!
Posted by Mike.e on Tue, 27 Jan 2004 13:36:24 GMT
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Subject: Re: Opinions wanted!
Posted by Wayne Parham on Tue, 27 Jan 2004 14:19:40 GMT
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Agreed absolutely!

Subject: Re: 18" Subwoofer Horn - Opinions wanted!
Posted by Bill Wassilak on Tue, 27 Jan 2004 14:47:27 GMT
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Hi Adrian,Looks good give it a try the only thing I'd try different is extending the lorn length a little more, at 1/4 wavelength it's only going to be operating as a horn down to about 43Hz. Anything below that it's going to be operating as a sealed box, you can see this in your first graph. Try to get the horn length out to about 2.75 meters, of course this will expand the mouth area also, this should get you to 30hz and room gain should make up the rest. But if you want to keep it that small you should be able to do it with the filters you suggested. Hope you have strong walls.Bill W.

Subject: Re: 18" Subwoofer Horn - Opinions wanted!
Posted by Mike.e on Tue, 27 Jan 2004 15:51:27 GMT

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I wouldnt bother-its large enough....id just buy a lab12 or similar 12" and get 28hz out of a 400litre box...Cheers!

Subject: Re: 18" Subwoofer Horn - Opinions wanted!
Posted by Bill Wassilak on Tue, 27 Jan 2004 15:58:35 GMT
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Hey Mike,How's your box coming along? I read on AA board that you were going to drop a lab12 in a box about the same size. Or were you going to try that DD woofer you had first, in that box you already have built?Bill W.

Subject: Re: 18" Subwoofer Horn - Opinions wanted!
Posted by Mike.e on Tue, 27 Jan 2004 16:01:52 GMT
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well since the DD is unusable,plans will have to wait.I was planning on a DD 12" horn with 50hz loading, F3 of 40hz.but larger mouth so 104db/1watt .30hz plans later on...as i have some costs to cover at moment-ive been given a car-and need to pay warrant,registration,it has a little rust,gota fix that... :-(good things take time..and now its 6am,time for sleep :-)cya Bill!

Subject: DD2012 pic! big rip :(
Posted by Mike.e on Tue, 27 Jan 2004 16:06:53 GMT
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this time i put the camera on MACRO ,for less than 60cm distance pics.. its in focus Now!!!

Subject: Re: DD2012 pic! big rip :(
Posted by Bill Wassilak on Tue, 27 Jan 2004 16:13:49 GMT
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Ouch, recone time, that won't be able to withstand the preasures in a horn, even if the cones

glued. Unless maybe use epoxy on it and try it.Bill

Subject: Re: DD2012 pic! big rip :(
Posted by Bill Martinelli on Wed, 28 Jan 2004 01:04:48 GMT
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Hi Mike,You can make a patch to to the cone using a thin glue and a layer of fiberglass mesh tape similar to a drywall joint tape. An epoxy as Bill suggest and a small patch on either side would be best. Try to keep the patch small because you dont want a weight build up that will change your drivers specs. Anything you do to repair it will of course change the sound. The question is can you hear the change or is it worth a recone. If you have a 1/2 hour it's worth a try.Bill

Subject: Re: 18" Subwoofer Horn - Opinions wanted!
Posted by Adrian Mack on Wed, 28 Jan 2004 05:57:11 GMT
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Hey BillYeah, that's a good point. A few others have also reccomended this. Max linear SPL is that of the graph shown, 30Hz and above in Hornresp shows excursion requirements are minimal, but in the 20-30Hz region, excursion requirements shoot up greatly hence limiting maximum output. A longer horn length will remedy this, at the cost of size :'(I'm going to try and see what I can do though, maybe I can fit in some extra length. My walls are strong, sort of :P One of the walls has a massive crack in it, many multiple and deep cracks actually which got there when a new door was put in some 40 odd years ago by another owner, seems like the guy didn't quite get the handle of cutting a hole in the wall, haha. My 18" vented box sub has also added to the cracks :P Not to mention the ceiling actually is pulled away from one wall completely, and my sub has extended that down half of another wall too :P We'll see what happens anyway, its held up the last one and a half years I've owned the 18" sub. Another good year of 120db's should bring it down, haha. CheersAdrian