Subject: Guys, help me design a smokin' midrange horn...
Posted by Adam on Sat, 06 Dec 2003 21:41:41 GMT
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The guys at work are getting all down about horns and how they are just loud and can't sound good. I want to show them how wrong they are! I could show them with my Eminence 2-ways, but I'd like to go the full monty and show them with a midrange horn as well.The base platform is the Seas Excel W18EX. If you guys arent' familiar with this driver, it's is wildely considered one of the best midrange drivers in the world. They are less renouned for midbass performance, but I've foudn they sound increidble in that area as well, in the right box. I have four spare ones right now, waiting for a use.My goals are wide band operation and flat frequency response over effeciency. I'd like something that will do around 200 Hz to 1.5 kHz, to couple with a PSD-2002 for the top end. a 1/8th space, 1/4 wavelength horn should be fine. If 1/2 wavelength will greatly improve things, I'll do it though.I'd like to do a traxic or an exponential. I also have Sound Easy, so I can measure and tweak the final results. It has horn design implimented, I'm just not comfortable with it yet.I've done a fair bit of helping on this board I think, so I'm cashing in a favour ;) I need a really wicked design. I'll have the measurement capabilities to fine tune.T/S specs for the Excel:RE = 6.1 ohmsLE = 0.4 mHFS = 31 HzSD = 125 sqcmVAS = 37 litres (1.3 cuft)QMS = 2.00QES = 0.27QTS = 0.24Here is the data sheethttp://www.seas.no/excel_line/excel/E0017.PDFYou can consider response between 1 kHz and 100 Hz flat, even though it steps down. The reduction is caused by baffle step.Thanks guys, I'd really apprecaite something!!!!Adam

Subject: Re: Guys, help me design a smokin' midrange horn...
Posted by jlharden on Sat, 06 Dec 2003 22:56:58 GMT
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Hi Adam, I'm only speculating, but I'm not sure that driver will do what you want. Being 88 db, even if implemented into a good front horn you'll very likely be no better than 94 db 1w/1m or so. By the time you've padded the woofer and compression driver to match you've lost the basic horn "virtues". I'd consider a Fostex 206E or similar. 102-103 db 1w/1m in a front horn. Maybe you could trade a pair of the Seas drivers? Either way, keep us posted! Jerrod

Subject: Smokin' midrange horns
Posted by Wayne Parham on Sun, 07 Dec 2003 00:46:36 GMT
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I'm also planning to offer large format midrange horns, but I'm basing mine on JBL 2012's in a conical flare. The design is to perform well using second source drivers too, such as the Eminence Delta 10. This kind of horn-loaded large-format cone midrange subsystem is actually

very popular already, and certainly not new. Most prosound systems run this kind of midrange subsystem, some using ABS plastic flares and others using simple straight-walled plywood flares. But my goal is to have an attractive wood horn available in this format, suitable for use where aesthetics are as important as performance.Keep us posted on your progress! I'll be sure to let you know when my design is ready too.

Subject: Re: Guys, help me design a smokin' midrange horn...
Posted by Adrian Mack on Sun, 07 Dec 2003 01:23:11 GMT
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Before anyone can start designing you anything, what maximum size do you want the horn to be? as they can get very large!

Subject: Re: Guys, help me design a smokin' midrange horn...
Posted by Adam on Sun, 07 Dec 2003 01:44:10 GMT
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I'm aware ;) I specified 1/4 wavelength, that's 16" deep roughly... I'll do 32" even if it signifigantly improves response... I want it to be the proper size for 1/8th space operation. Whatever it needs to be, I'll do, within reason. Something 18"x36" for mouth size or less would be fine.Adam

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Subject: You could try this design
Posted by Adrian Mack on Sun, 07 Dec 2003 07:09:16 GMT
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I was a little cautious at first about how this driver would perform in a horn because of its lower mass corner. Its got an Fs of 31Hz so its tuned like a "mini-subwoofer" and not for a midrange horn. Anyhow, the tractrix horn isn't going to give you wideband performance that is flat. I couldn't come up with anything that I would be willing to use myself. Using a conical horn will loose you some sensitivity, but you can get it much flatter over a wider range. After some mucking around I got a nice flat response from 200Hz to 1.6KHz (-3db @ 1.6KHz) in a conical horn within your size limits. Graph is below.It assumes the air in front of the cone is 108cm^2. If I recall correctly, my Alpha 6" Eminence driver had ~118cm^2 of air in front of the cone. Your seas driver is a 6.5" woofer so I'll assume it could be ~128cm^2 or so or air in front of the cone (the air in front of the cone is a permanent front chamber). So you will need to make a filler block, carefully made so that

it takes up about ~16cm^2 or so, it serves to lower the volume of the front chamber which increases your usable HF response. Take out your ruler and do some careful measurements of the complete gemetry of the cone and dustcap, and then use a CAD program or paper to design the filler block. If you don't do this, it won't matter too much, the response wouldn't change much as you can see below:Its actually not too bad at all. Since you have SoundEasy (and suitable microphone I assume) then you can take a few measurements before and after the filler block (looks like a disc with hole in it for throat entry) is in place.I used 28cm^2 throat, 3250cm^2 mouth, 43cm axial length, no back chamber, and front chamber options are as said before. Sd to throat area ratio is less than 5:1 so distortion from the mouth geometry is low and horn length is 1/4wl of 200Hz (43cm/16.94"). The horn is only about ~95db 1w/1m sensitivity which is rather low compared to other horns. Its mostly because of the way the drivers tuned, very low, free air sensitivity is just 88db 1w/1m. Its intended use is not a horn. However it looks good in that horn, so I think you should give it a shot. Let me know what you decide to do. Adrian

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Subject: Re: You could try this design
Posted by Adam on Sun, 07 Dec 2003 15:12:07 GMT
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Thanks Adrian, great work!!! :)What's the rear chamber volume on this setup?I'm pretty impressed with that horn performance, so I think I'm going to give it a try. It's a simple conical horn, so it won't be a lot of work to build a test unit anyway. Does your design use a rear chamber volume of any kind? If so, what should the volume of the enclosure be?Thanks again.Adam

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Subject: Re: You could try this design
Posted by Adrian Mack on Sun, 07 Dec 2003 20:53:54 GMT
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Hi AdamNo back chamber is needed on this horn. 28cm^2 throat, 3250cm^2 mouth, 43cm axial length. Have the driver mounted right up against the mounting plate, and the filler block there to take up ~16-18cm^2 to smooth the top end ~1.1db or so. Heres a filler block that I made before on a tractrix horn. Once the driver is mounted the filler block will be in front of the cone as you can see. Make sure that you leave enough clearance so that the cone doesn't hit the filler block, thats why its important to take precise measurements of the geometry of the cone, spider and dustcap so you can do this while also having it take up the right amount of room. Adrian

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Subject: Re: Guys, help me design a smokin' midrange horn...
Posted by Wayne Parham on Fri, 19 Dec 2003 13:41:48 GMT
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How are things going with this horn? What did you decide to do?