Subject: Playing with new midrange horn.
Posted by GrantMarshall on Thu, 22 Apr 2004 00:48:26 GMT
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Hi Wayne.Checked out your plans for the midrange which motivated me to play with a couple pieces of MDF over the last couple of nights. It sure amplifies the midrange. I noticed on the Delta 10 the SPL rating is normally around 100 and you're finding 108 with the horn on. That's about an 8 SPL increase.I got one horn put on tonight mounted to the horn directly in front of the midrange. (temporary test position). There is a noticable increase in volume. I'll have to get things set up properly and on both sides before I know what happens to sound stage. One thing I love about horns is the detail that comes through. When someone takes a breath you hear it. I have the PHL 1660 midrange which is only a 6 1/2 inch speaker. PHL suggests it can be used for horns though. It has low Q numbers as well as the rising SPL numbers which makes it suited to the conical horn. It's rated at 97 spl with a 250 watt maximum rating. The speakers suited to these horns are not flat at all. To give a 97 rating is a bit of a joke. It should be a 95-100 SPL rating or something like that.With any luck the link to the graph and specs works. http://www.akkus.com.pl/glosniki/szczegoly.php?firma=phl&model=1660I figure that the smaller speaker radius gives about 2/3 the area of the 10 inch driver and knocked the throat opening down proportionally. (to 3 inches from 4 1/2 inches) I left the horn width 1 1/2 inches narrower and kept the rest of the dimensions the same as your plan. I'm hoping that leaves the compression about the same, the dispersion very slightly altered, and the SPL improvement about the same. I remember on Bruce Edgars plans they used to mount with about a half inch space between the driver and horn and used some of the MDF as a spacer.I hope things are going well for you and your family. It should be a good summer.Grant.

Subject: Re: Playing with new midrange horn.
Posted by Wayne Parham on Thu, 22 Apr 2004 04:17:15 GMT
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Great to hear from you Grant. Hey, check out Adrian's horn. He's already done the homework for a horn that mounts an Alpha 6, so I expect your PHL 1660 will work just fine with it.To match sensitivity levels, you can pad the horn with a 4 ohm resistor in series and an 8 ohm resistor in shunt. This brings the sensitivity down but dynamic range is still increased by horn loading. And drive requirements are less, so distortion is reduced too.For a spacer, you can sure use the spare MDF you're talking about, but that requires you to cut a ring. Another way to do it is to use an extra gasket as a spacer. They don't cost much and most recone shops have them.

Subject: Re: Playing with new midrange horn.
Posted by GrantMarshall on Fri, 23 Apr 2004 10:24:33 GMT
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Hi again Wayne.Thanks for the response.A second way of playing with efficiency would be to play with the compression ratio if I'm following this idea right. I suspect that would be done by using a slightly larger hole in the mounting plate.I notice that your model showed a square hole where Adrian used a round hole in front of the driver. I would expect a 4 1/2 inch square to have a lot more surface than a 4 1/2 inch circle which would affect compression ratios.Still playing.Grant.

Subject: Re: Playing with new midrange horn.
Posted by Wayne Parham on Fri, 23 Apr 2004 16:01:43 GMT
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I modeled (both mathematically and physically) horns having 20in2 and 30in2 throats and this same length and mouth size. The difference from this change in throat area was actually pretty small. Sometimes, a little change is all you need though.

When making the throat much larger or much smaller there is more difference, but not much when going from 4.5" square to 5.5" square. I also considered different front and rear chambers, and other mouth sizes and horn shapes.

The biggest influence is overall horn size and shape.

The rear chamber sets the peaking frequency, you can make a peak from an underdamped sealed box and fill in a valley in response from an undersized mouth. Or you can make the rear chamber sized so that the suspension tuning is equal to the flare rate, which is sort of the same thing. That's called reactance anulling, and its effect must also be determined by sealed alignment, and whether the rear chamber and motor system is underdamped or overdamped.

The front chamber can be tuned similarly to that of the rear chamber, and it tends to modify some of the peaking in the upper response curve. But big changes require large volume differences, so small things like gasket thickness don't tend to do very much. One generally needs to change volume by amounts like 50% or more to see much of a diffrence.

Bigger than all of these is horn size and, especially if the horn is not large, its position in relation to boundaries like baffle mounting or proximity to walls. Being in eighth-space or quarter-space (corners) does much more to the response curve than just about anything else. Even half-space (baffle mounting) does quite a bit if the horn is not large in relation to wavelength.

I'd say play around with Hornresp and see what results you get. Try a few "what-if" scenarios and find a response curve you can work with.

If response at the upper extremes is important to you, don't overlook the fact that the cone will probably be flexing at high frequencies, and not acting as a single rigid piston. The cone will have waves across it like ripples in a pond, and those represent movements of part of the diaphragm decoupled from most of the mass of the moving assembly. That means part of the system acts like it's tuned much higher at high frequencies, and this can't be shown in the pistonic model.

You can get an idea by superimposing the response curve of the driver on your horn's response curve, and where you see rising response and/or peaking up high, you'll probably see output from the horn. Your (Hornresp) pistonic model may show response down -20dB at 1kHz but if the driver is up 10dB or 15dB there, the horn may very well have full output at this frequency. Pistonic models can't show this. But still, if you'll model the horn and do some what-if's, you'll be able to narrow down your options a great deal.

Subject: Re: Playing with new midrange horn.
Posted by GrantMarshall on Fri, 23 Apr 2004 21:27:57 GMT
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Great reply Wayne.I didn't mount the horn in a cabinet so I had no "rear cabinet" at all. I didn't have a contained compression area either. I just built the horn, attached it in front of the speaker, and got major amounts more sound. I didn't even do both speakers. If the speaker was in a music hall it would have probably had problems. In my living room it didn't.Even with the little work I did it still makes a HUGE difference. It confirms what you say above. Horn shape and size make a big difference.I figure the size has a lot to do with how low a frequency the horn affects since the lower the tone, the longer the sound wave. The shape controls dispersion and I would expect with most people having 90 degree horns on the top end they would like to match the midrange to them. If you don't I expect a seating position right in front of the speakers would match up well. Off center would have waves of high and midrange not matching well.I'll go back to car basics. If compression isn't affected by the size of the hole in the mounting plate a "slightly" wider gap between the speaker and hole should lower compression, therefore SPL increase.Have a good week-end.Grant.

Subject: Re: Playing with new midrange horn.
Posted by Wayne Parham on Fri, 23 Apr 2004 21:54:59 GMT
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I ran my horn without a rear chamber too. It sounds great that way, but when you install the horn in corners, the backwave is loaded by the corner apex and that brings it up to compete with the front wave. So the rear chamber is particularly important when used near corners.You're right about size. Having a horn in the corners does a lot, since the corner itself is essentially a very large conical horn. But putting that aside, you really need size to get the response down low.

effective.
