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.