Subject: Re: 4pi benefits
Posted by Wayne Parham on Wed, 16 Jun 2010 23:49:17 GMT
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Actually, as much as I like the Altec 811 horn, there's no way to get the polar response right, or even close. You can make the on-axis response right, but not off-axis. So you have to sit with the speakers directly facing you for them to sound good.

While that may seem to be a non-issue, it is actually really important because if the sound isn't balanced in all directions, then reflections have the wrong spectral balance. The total energy in the room - what you hear is made up of this total energy - is actually an aggregate of sound radiating in all directions, not just the sound that points directly forward from the speaker. So the goal is balance of the reverberent field, not just the on-axis response.

The problem is that long neck on the 811 horn. The lower region, from about 800Hz to 4kHz or so, radiates from the horn pretty evenly at all angles defined by the mouth. At the low end, it's actually wider than that. But as sound frequency rises, the pattern becomes more narrow. The higher frequencies are only present straight forward on-axis, and cannot be heard off-axis at all. That long narrow throat makes the sound beam at higher frequencies.

All of my loudspeakers have constant directivity as one of their design goals. If you'll stick with the stock plans, what you'll gain is nice smooth response over a nice wide 90°x40° pattern. I gave you a brief overview of why that's important in the paragraphs above, and in the link below, there are several threads with more detailed information. I've also included a link to the response (both

range of angles, and that's no easy feat. It's more complicated to make performance good over a large area, and there are more competing priorities to balance. That's why it's nice to be able to leverage the R&D I've already done, but to do that, you'll have to build what's shown the plans.

have an effect on lower midrange response, mostly in larger cabinets. The positions set how the standing waves line up. The goal is to keep acoustic radiators near zero crossing positions, so internal standing waves aren't audible. But that's not the only thing that matters where position is concerned. In fact, it's not even the main thing. The main thing is acoustic flight time, the path lengths between sound sources and listeners. These distances combine with electrical phase from the crossover to set the overall summing between sound sources. You can find more information about that at the link above.