Subject: Re: 3 pi speaker
Posted by Wayne Parham on Tue, 01 Feb 2011 03:05:50 GMT
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They are designed and optimized for the drivers and horns chosen.

Understand that most of the design effort is in the matching of the drivers/horns and crossover. You can do a lot with computer models, but naturally, it's best to verify with measurements. In any case, there is a fairly substantial amount of work involved in optimizing the crossover and getting everything right.

If you've read the things I've written on the subject, then you know the goal is not just to make response good on-axis but off-axis as well. The design should place the forward lobe properly out in front of the speaker. The vertical nulls should be widely spaced, above and below the speaker, outside the horn's coverage angle.

Similarly, cabinets for loudspeakers like these should be designed with care. They aren't necessarily (or even usually) boxes that simple Helmholtz models can fully simulate. The reason is they are relatively large, often large enough that internal standing waves develop in the passband. For this reason, driver and port position are usually important factors, as is the amount and position of stuffing inside the cabinet.

The baffle is generally large enough that there is no meaningful baffle step. This is discussed in the "High-Fidelity Uniform-Directivity Loudspeakers" document starting around page 21, but I think it merits another mention here.

Small mini-monitors sometimes benefit from baffle step compensation, because the radiation transition frequency is relatively high. But baffle step compensation isn't appropriate for larger speakers designed for constant directivity when used indoors. Used outdoors, it might make sense but not so much indoors because baffle step doesn't happen below the Schroeder frequency, where room modes set the pattern more than the speaker does.

Baffle step is non-sequitur in a large cabinet used indoors because directivity is ambiguous below the Schroeder frequency. There is no clearly defined step in the response curve caused by directivity change, because below the "transition" frequency, room modes modify the directivity and prevent it from being omnidirectional.

There are several variables to set simultaneously, some that represent competing priorites, and balancing them all is not an entirely trivial task. This is what separates the good basic designs from the fully optimized audiophile quality loudspeakers.

considerable amount of design and test time by sticking with the plans. You can deviate, of course, with varying degrees of success depending on how much time you are willing to invest in your design and test efforts. Do not expect different drivers to work as drop-in replacements, as

they are unlikely to be the same, and so you'll have to go through a design/test cycle to get the best results.