Subject: Re: Constant Directivity Speakers Using DSP
Posted by Wayne Parham on Thu, 27 Oct 2011 02:02:22 GMT
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As you know, this is a design approach that I'm very experienced with. The Econowave borrows heavily from my designs, and I see the builders of those speakers as kindred spirits. In fact, the

with it, and can go so far as to say I know its exact properties. I have a great deal of experience knowing how it reacts with various crossover points and slopes, with and without fixed delays in addition to those caused by reactive phase shifts.

All that to say I am not opposed to active crossovers, but do think that the whole enchillada is in the time spent optimizing them. Without a properly designed crossover, its really not a constant directivity loudspeaker, its just a box of parts. Spend an appropriate amount of time dialing it in, and it's a wonderful loudspeaker, but just pick an arbitraty crossover point and slope and it's really not, even when the delay is matched.

It doesn't matter if you have a $500 DSP or a $100 passive crossover - what matters is that the transfer functions be right for the drivers, their spacing, orientation and directivities. It is really important to get the best out of a design like this.

Beyond the obvious matters of matching sensitivities and compensating for mass rolloff with top-octave EQ, I think the main thing is to make sure the forward lobe is centered, and you can check that with measurements. The vertical nulls should be above and below the baffle normal (centerline) by at least 20°, for a 40° spread. It isn't hard to get a 50° spread with that combination so strive for that.

Watch the video at the link below, which shows how to find the location of the vertical nulls. I think you'll recognize the cabinets.

Don't settle for anything less than on-axis amplitude response that's flat within +/-3dB through the whole audio band, and through a horizontal arc of 90° and a vertical arc of 40°. You can actually get it down to +/-2dB with those parts, when the crossover is right.
Crossover optimization for DI-matched two-way speakersAs for the tweeter hiss, I agree with Bill. I wouldn't add anything between the amps and the drivers, because that takes away some of the advantage of biamping. Increase the crossover/processor output signal, but not so far it will ever clip, allowing for adequate dynamic range. Then set the amplifier gain to match sensitivity. This will improve digital resolution as well as signal-to-noise. If the amp is too noisy, get a different amp. Might try one of your tube amps for the tweeter.