Subject: Re: Three 4Pi's in Basic Black for Home Theater Build Thread
Posted by Wayne Parham on Mon, 12 Jul 2010 19:18:51 GMT
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Sorry. I didn't mean to be brutally honest. I don't really like coming across that way. But I guess it probably did sound like that.

In truth, there are a lot of things in the environment that cause 10dB swings in what would be an otherwise perfectly flat response curve in an anechoic environment. Heck, just the reflections off the walls do that in the region below 200Hz or so.

Then again, I'm not sure I would be willing to accept response swings so large in that frequency range, right where our hearing is most sensitive. Here are a couple things I'd try:

First, angling the speakers might help because the much of the reflected energy would be directed away from the speaker instead of back towards the source. The self-interference ripple is caused by a reflection that combines with the source, and is therefore strongest when it is straight on.

When a boundary is a quarter-wave away from the source, the reflection is a half-wavelength late, which forms destructive interference. When the boundary is a half-wavelength away, the reflection is a full-wavelength late, which forms constructive interference. The relationship between source and reflection changes with wavelength i.e. frequency, so the resulting response curve develops ripples, as some frequencies combine constructively and others combine destructively.

If the reflection isn't directed back towards the source, the ripple would be reduced. So angling them inward should help. On-axis sound is at an incident angle that reflects away from the source. Far side off-axis is even further angled away from the source. Only near side off-axis sound is reflected back towards the source. Of course, that's the problem with this approach. These speakers generate sufficient output off-axis that there will be a fairly significant reflection back to the source even with a lot of toe-in. But it's worth trying. Try the recommended 45° toe-in to see if it helps reduce screen ripple.

Second, putting some open cell foam or other semi-absorbant material between the speaker and the screen may smooth the ripple. It would probably only be required in front of the tweeter if the screen is placed close enough. Increase tweeter output slightly to compensate. It would make the reflective "boundary" formed by the screen be somewhat "fuzzy". Instead of having a partially reflective boundary that is at a single distance from the source, you'll have a region of semi-transparent, semi-reflective material for the sound to pass through. The self-interference reflection could not line up with well-defined quarter-wave nodes.