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Subject: Re: Constant directivity, compression drivers and crossovers

Posted by [Wayne Parham](#) on Mon, 27 Jul 2009 14:54:09 GMT

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I've made a few comments on other audio discussion boards but I keep the real meat and potatoes here. Most of what I say on other audio sites is just a regurgitation of things I've said here for years.

On the thread you're talking about on DIYaudio, I've tried to be a voice of reason with respect to performance in the vertical plane. There are some there that have made a point that verticals don't matter much and I think that is a sophomoric position, one that shows a lack of loudspeaker design maturity. You can use the best horn in the world and if it isn't implemented properly in a loudspeaker system, performance and sound quality won't be as good as it could be.

To me, if you're going to ignore the pattern in the vertical, you're not that much further along than those that simply optimize on-axis response and call it quits. If you're using a CD horn and choose an appropriate crossover frequency, then the horizontal pattern approximately equals the on-axis pattern. That's the easy part. What's hard is to keep the on-axis response good over a useably tall vertical range, and then to drop off at large vertical angles. This is the most desirable coverage pattern - Uniform in both the horizontal and vertical planes.

Matching directivity in the vertical and the horizontal planesIt's not enough for the horn to do that, in fact, when combined on a baffle with another driver it doesn't even make sense to talk about the horn in isolation. Once two sound sources are stacked vertically on a baffle, their interaction sets the pattern and the response on-axis as well as off-axis is modified as a result. The shape, size and quality of the forwards lobe is set by the interaction of the sound sources, which is largely determined by their position, (crossover) phase and orientation.

When a constant directivity loudspeaker design is fully optimized you should be able to enjoy the same quality sound sitting in front of the speaker at various heights and not have to be right in front of the tweeter or any other pinpoint spot. That's the whole purpose of constant directivity, to provide uniform coverage over a range of listening positions.

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