

---

Subject: Thoughts on focused arrays and the phase problem

Posted by [Dave Peterschmidt](#) on Tue, 15 Feb 2005 05:25:50 GMT

[View Forum Message](#) <> [Reply to Message](#)

---

I've been kicking around the idea of designing a large line array speaker which would be essentially a floor to ceiling array. I've been doing some research along these lines, and recent ran across Jim Griffin's white paper. Excellent document! I'd like to thank Jim for his hard work that benefits so many here. Ok, to the business at hand. Since my desire is to build a tall array, it will need a way of dealing with the phase differences between the ends of the array and the middle, as outlined in the white paper. My current thinking is that some kind of focused array would be the best solution to this. However, what I had in mind differs a little from a normal concave curved front baffle. I have in mind what I call a "stepped" baffle. Basically all drivers would be oriented perpendicular to the floor as in a normal flat baffle, however, in a stepped baffle, each driver would be stepped forward a small amount as you move toward the ends of the array. This might be better than a typical focused array since the drivers at the ends of the array won't be facing the focus point directly, maintaining the cylindrical sound front better. At least that's my speculation. To understand my thinking on the reason the stepped baffle would be better than a flat baffle with power tapering, let's consider a flat baffle. This baffle can be thought of as being focused on infinity. Let's assume we have a listener whose head is positioned level with the middle of the array. The closer the listener gets to the speaker, the more pronounced the phase difference between the middle driver and the end drivers becomes. For example, if the listener is one foot from the middle driver, he would be about four feet away from the top and bottom drivers of an 8 foot tall array. A large difference. As he moves away, the distance discrepancy goes to zero as we move toward infinity. So, in short, what we have effectively is an array that would sound more phase-coherent the farther away we get, and wouldn't be optimal phase-wise until we reach infinity. This doesn't seem to be the best approach to use in practice. Let's say we step the drivers outward from the middle to the ends. Each driver sits, say, 1/4 inch forward of the one just below it (or above if we're looking at the bottom half of the array). (Note that I just picked that quarter-inch number out of the air for discussion purposes). If our array consists of 21 drivers, the top and bottom drivers would sit 2.5 inches forward of the middle driver. Now as our listener moves away from the speaker, there will be a spot somewhere before we reach infinity where the phase is close to perfect, as well as a band of area around that perfect spot where the phase is very close to perfect. Since the "optimal" listening distance band is now in the room instead of at infinity, it seems to me that the sound would, on the whole, be more coherent with this approach over most of the listening area. Not a perfect solution, for sure, but an improvement over most of the normal listening area. Obviously the step distance would vary depending on design goals and such, but it seems like some step would be preferable to a flat baffle. This would also allow the use of full power vs a power-tapered array with something less than full power. I'd love to hear anyone's thoughts on this. Is there a flaw in my thinking?

---