Subject: tweeter horns in the line array?
Posted by Eric J on Wed, 29 Jun 2005 14:29:12 GMT
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Are there pros and cons in using tweeters horns in the line array? how about in using more than three or four constant directivity horns per channel?eric j.

Subject: Re: tweeter horns in the line array?
Posted by Bill Wassilak on Wed, 29 Jun 2005 15:24:02 GMT
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Yes, using 1 it's not so bad but then you're back at having a 6db drop in doubleing of distance for the tweeters. Using more it's usually the c-t-c spacing of the drivers in the array that will determine at what frequency comb filtering starts setting in. On using more constant dir. horns usually the mouning flanges are going to add about 1/2" to an in. more to the c-t-c spacing in which comb filtering will start setting in at a lower freq.In pro sound most line array horns I've seen have a dispersion pattern of 90x5 or 90x10 deg with 2-4 1" drivers mounted on 1 horn.HTH

Subject: Re: tweeter horns in the line array?
Posted by Eric J on Wed, 29 Jun 2005 15:41:25 GMT
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OK...but I'm NOT talking about pro-sound reinforcement.I'm talking about the room listening environment that is about 7 meters from the speakers for normal sitting down listening.I'm also talking about electronic crossovers, and separate amp for the tweeter array (and mid/woof, and sub woofer). I'm talking about cutting the flanges so that the distance is less that 1/8 of an inch between tweeter speakers, and well as between the flanges of the midrange drivers. I'm looking to cross them at 3000 to 3500 hz. Another piece that I read (http://www.lenardaudio.com/education/07_horns.html) suggested that round horns were the most musical, and talked against constant directivity or rectangular horns. eric j

Subject: Re: tweeter horns in the line array?
Posted by Wayne Parham on Wed, 29 Jun 2005 16:02:49 GMT
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Constant directivity just means the sound is uniform no matter where you are. To not like constant directivity is to like unbalanced sound.In fairness, most people that like horns with

collapsing DI usually like other features about them. It isn't the lack of CD they like, it's the acoustic EQ they get. Or some may like them just to fit in with a particular orthodoxy.But the fact still remains. Constant directivity is a requirement of balanced sound. If the sound source doesn't have constant directivity, then off-axis sound is unbalanced. That also means the tonal balance of sound reflected back from the room is unbalanced. You can treat the room, but you're still just masking the problem.

Subject: Re: tweeter horns in the line array?
Posted by Eric J on Wed, 29 Jun 2005 17:18:43 GMT
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So how many of the CD horns would I PUT into a 60 inch array that also has 18 full range mid woof drivers on the side?

Subject: the wave front
Posted by lcholke on Wed, 29 Jun 2005 17:59:12 GMT
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Hi,I think the wave front would not be flat. That is what the 1/4 to 1/2 wave length spacing helps accomplish. With the horn the 1/4- 1/2 spacing is not possible due to the mouth dimensions. I saw a picture of a pro sound solution where the horn was a manifold to maintain zero phase shift at the exit of the horn.-Linc

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Subject: Re: the wave front
Posted by Eric J on Wed, 29 Jun 2005 18:15:41 GMT
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I hate to sound like an idiot, but could you explain what you just wrote in "layperson english" and tell me why what you wrote is a problem for you?

Subject: Re: tweeter horns in the line array?
Posted by Wayne Parham on Wed, 29 Jun 2005 18:23:21 GMT
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It depends on the characteristics of the drivers, horn flares, mounting geometry, intended pattern and use, etc. I just wanted to point out what constant directivity was because I thought it might be beneficial to you.

Subject: Re: tweeter horns in the line array?
Posted by Eric J on Wed, 29 Jun 2005 18:28:02 GMT
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Thanks. I did know what CD horns are. I just don't always understand the jargon of audio. You have to understand that I did know most of the jargon 25 years ago, but then children and college expenses and all kind of things intervened, and I was out of the picture for a long time. My own field is clinical school psychology, not audio or electronics.I am pretty sure what the other poster mean about unequal wave fronts (time delay among speakers?) and I'm pretty sure with a combination of time delay adjustment in the electronic crossovers, and placement in the speaker system, that is a fixed deal. But I'm not sure if that's what he is talking about.eric j.

Subject: Hypothetical Question About Horns In Line Arrays
Posted by FredT on Wed, 29 Jun 2005 20:17:47 GMT
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If I built a tweeter array using an inexpesive horn/driver combination like the Selenium HM17-25 horn and the DH2000E 1" compression driver I could space the horns no closer than 5.16" center-to-center, because that's the dimension of the horn mouth. Wouldn't I have the equivalent of an array of 1" tweeters placed on a 5.16" ctc spacing, with the attendant comb effect issues? Is there something I don't understand about horns that would mitigate this problem?
Inexpensive Horn/Driver combination

Subject: Re: Hypothetical Question About Horns In Line Arrays
Posted by Eric J on Wed, 29 Jun 2005 21:02:22 GMT
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According to my non-professional reading of Jim Griffin's white paper, the center to center separation of circular drivers yields to ACTIVE RADIATING FACTOR(ARF) AND SLOT (RECTANGULAR) DRIVERS. The flange detracts from the active area in the array, and any space between the drivers. So the ARF is the total percentage of the active area in the array from the top of the tweeters to the bottom of the tweeter line. If you used a single long thin driver horn, then the ARF would be 100%. Stacking them takes away ARF %age, but cutting flanges increases it. According to the values in the white paper, the ARF needs to be 80% or better.

RIBBON PLANAR DRIVERS use another method.eric j.

Subject: Re: the wave front
Posted by lcholke on Wed, 29 Jun 2005 23:29:52 GMT
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Eric,Here are a few things that may help.The first concept is that if 2 waves are 180 deg out of phase they combine to 0 spl. That is how the bose silence headphones work.The second concept is that each wave travels to the ear in a straight line from the source. The next thing to consider is the variance of the paths each wave makes as it travels to the ear. The far sources have to travel farther than the near ones. So now when they combine they may be 180 deg out of phase and you will hear nothing.So the horn will cause the wave front to have different path lengths from the start.Now if the sources are 1/4- 1/2 a wave length apart they have a tendency to combine as a plane wave. I have seen arguments for and against this description.Some times math and sometimes geometry are the best tools for these things. A few lines in a chat forum can be difficult and frustrating. Let me know if you want some book sources. There are good sources on acoustics on the web also if one digs.-Linc

Subject: Re: Hypothetical Question About Horns In Line Arrays
Posted by FredT on Thu, 30 Jun 2005 11:33:54 GMT
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Thanks for responding, but I'm still not sure I understand. In the hypothetical horn array I described would I have an array whose ARF is closer to 80% or 25%? I suspect the answer is closer to 25%. Regardless of whether the 1" drivers are horn loaded or not, they are still 1" drivers spaced 5.16" center-to-center.

Subject: Re: Hypothetical Question About Horns In Line Arrays
Posted by FredT on Sat, 02 Jul 2005 10:16:47 GMT
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Actually this wasn't just a casual question. I really would like another informed opinion about whether an array of horns is a viable option with line array speakers. Thanks.

Subject: Re: Hypothetical Question About Horns In Line Arrays

Posted by Wayne Parham on Sat, 02 Jul 2005 15:30:59 GMT
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I think you hit the nail on the head when you said Regardless of whether the 1" drivers are horn loaded or not, they are still 1" drivers spaced 5.16" center-to-center. Here's an article from JBL that shows their 2370 horn used in arrays. Works just like you'd expect. Nice polars down low, with some lobing along the vertical up high.
JBL 2370 in vertical horn arrays

Subject: Re: Hypothetical Question About Horns In Line Arrays
Posted by FredT on Sat, 02 Jul 2005 16:52:01 GMT
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Thanks, Wayne. I saw a picture of a line array someone had built using an array of inexpensive vertically positioned 2X5" piezo horns ($0.95 ea from Parts Express) and was thinking either they know something I don't know or that array is going to have some lobing issues. As I suspected, it's the latter, in addition to the questionable sound quality of a bunch of 95 cent piezo tweeters.Too bad. That means you still have to spend a bunch of money on drivers, especially the tweeter arrays, to build a good sounding pair of line arrays. Maybe we should all find a less expensive hobby, like restoring vintage automobiles or motorcycling:)

Subject: Re: Hypothetical Question About Horns In Line Arrays
Posted by Eric J on Fri, 08 Jul 2005 17:32:06 GMT
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I defer to the experts, but according to the white paper, the center to center discussion is only for cone and dome speakers. The edge of the horn is the critical factor for horns.But the real problem as I see it is the huge difference in sensitivity between the horn array and the mid/woof cone array. Balancing this even using active crossovers, would be hard. On would need a power amp that is adjustable. And doing it with passive crossover would just destroy all the benefits of the horns, in my opinion.eric j

Subject: Re: Hypothetical Question About Horns In Line Arrays
Posted by Bill Fitzmaurice on Mon, 11 Jul 2005 19:47:16 GMT
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It is the matter of the frame span that counts with horns, not the center to center spacing. A

maximum of 10% frame to mouth ratio is considered adequate in most cases. You'll get the best result by trimming away all the flange so that there is one continuous horn mouth on the vertical plane. Much has to do with the listening distance; in the case of PA one doesn't have to be so fussy about the frame widths as whatever lobing might occur dissipates once you get far enough from the array, but for hi-fi in the average size listening room you've got to be more judicious. Sensitivity problems aren't that tough to get around, you just wire the tweets to a higher impedance to balance it out. In the case of piezos they have a lower sensitivity to begin with, and being high impedance with capacitive loading anyway you don't have to be too concerned about what series wiring will do to the impedance.

Subject: There is no simple answer
Posted by Earl Geddes on Mon, 18 Jul 2005 18:48:08 GMT
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There were a lot of answers to this post and I found that I really didn't agree with many of them.I did an entire chapter on this subject in my book and from what I found, the prevailing philosophy was mostly incorrect.There are three things that have to be considered - dimensions, numbers of units, and mouth wavefront shape, including frame gaps. They are all more and less important depending on the specific configuration.Some say the wavefront shape is the most important and some the spacing, others the gaps between the drivers. In what I found, all of these factor interplay in a complex way for short lines of a few units. At two units the wavefront and the gap are more important then the spacing, at three and four the gap becomes unimportant and the wavefront shape and spacing are the most important. But above about four units, these factors all have almost no effect, the total height of the array being dominate.There are also near field and far field differences, etc. In detail, the subject is very complex. A complete analysis can be found in my book where techniques are also given to analyze any specific configuration.One well know reviewer of the book found this chapter the most interesting because it dispelled a lot of prevailing beliefs about line arrays.
