Subject: Full range drivers in line array?
Posted by Tom R. on Fri, 20 Jan 2006 02:13:23 GMT
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Looking at the line arrays available, most use mid-bass drivers crossed over to a tweeter (ribbon) array in the 2000 to 3000Hz range. Has anyone used a full range driver to cover 100Hz up to 10k or 12K, then cross over to a ribbon array, and use simple first order crossovers with fitlering to smooth the response where needed? This would keep the crossovers out of the most important frequency range. The only problem is the cost of full range drivers?Sounds ideal, but.....Any commentsTom R.

Subject: Re: Full range drivers in line array?
Posted by Jim Griffin on Fri, 20 Jan 2006 19:54:21 GMT
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Tom,If you haven't read my Near Field Line Array White Paper, you need to do so. It is located at the link below. This paper will explain what happens to a line of drivers as you approach center to center spacing of a wavelength and greater. Essentially, the comb lining starts to impact your performance but the worst of it is that the array gain (or sensitivity of the array) begins to decrease. For most drivers in the 4 to 6 inch diameter--spaced so that they touch--this is usally in the 2000-3000 Hz area. Hence, the sensitivity starts to be reduced and only via heavy equalization can you overcome this reduction. Bottom line when you space a line of drivers (even the very best full range drivers) close together they interact such that their performance is governed by the array spacing properties and not by their individual frequency plots. Darren Kuzma of Parts Express built an array a couple of years ago with 2.25" square flange size Tang Band full range drivers.
See:http://www.partsexpress.com/projectshowcase/Kuze3201/Kuze3201.htmlLook at his performance plots and observe the unequalized sensitivity reduction as you go into the 5000-10,000 and 10,000 to 20,000 Hz octaves. Larger drivers will have performance impact even lower in frequency.Jim
Near Field Line Array White Paper

Subject: Re: Full range drivers in line array?
Posted by Tom R. on Sat, 21 Jan 2006 01:44:20 GMT
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Thanks for pointing that out, I did read the paper, but I guess I will go back and read it again!
Thanks,Tom

Subject: Re: Full range drivers in line array?
Posted by Bill Fitzmaurice on Sat, 21 Jan 2006 14:51:16 GMT
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There is another factor that also impacts frequency response when using multiple sources, be they in a line array or any other alignment. The mutual coupling that occurs when you have sources closely spaced lowers the system's upper f3 frequency by a factor of 0.7 with every doubling of radiating plane area. While it's easy to increase average sensitivity by using more elements, the more elements you use the more response gets tilted towards the low end. The way to overcome this in large pro-touring multi-cabinet systems is to go two-or three-way, with the midrange section being more sensitive than the woofers, and the tweeters more sensitive than the mids. This way as more cabs are added to the array system response actually flattens.

Subject: Re: Full range drivers in line array?
Posted by Tom R. on Sat, 21 Jan 2006 20:57:49 GMT
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Well, nothing is free, everything comes at a price. So Most likely the best was to get a quality sounding line array is going with an existing designs, from one of the kit suppliers. Thanks,Tom R

Subject: Re: Full range drivers in line array?
Posted by lcholke on Sun, 22 Jan 2006 14:58:23 GMT
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Hi Bill, "the system's upper f3 frequency by a factor of 0.7 with every doubling of radiating plane area"...Does this still happen when using a true line source for the hf drivers. I am guessing that the pro sound setups do not have the mutual coupling for the tweeters due to tight spacing not being practical. -Linc

Subject: Re: Full range drivers in line array?
Posted by Bill Fitzmaurice on Sun, 22 Jan 2006 15:02:05 GMT
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Not necessarily, just remember that with a full range driver/1way system there are diminishing returns in the high frequencies as you make the line longer, and if you go long enough you're pretty much forced into either adding HF drivers or using electronic compensation.

Subject: Re: Full range drivers in line array?
Posted by Bill Fitzmaurice on Sun, 22 Jan 2006 15:18:29 GMT
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I haven't stacked and measured boxes to find out for sure, but in theory it should work that way. When the weather allows I'll have to do so and see. Pro-sound is a different animal, the key there is minimizing the size of the frames between horn mouths, and that's accomplished by using multiple elements on multiple throats that converge into a single mouth. Then the only obstacle to integration is the size of the frames separating the individual cabinets, but at the distances involved between the source and the audience any lobing pretty much has disappeared at the listening positions.

Subject: Re: Full range drivers in line array?
Posted by Jim Griffin on Sun, 22 Jan 2006 20:20:51 GMT
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Linc,I don't support Bill's rule of thumb as an always true result. The best answer is to measure the performance of the array. This is because the array performance depends upon the overlap of the radiation patterns of the individual drivers (also whether you are in the near and far field). I'm finding that even for well behaved individual drivers that the array effects are hard to predict without measurements so rule of thumb thinking isn't always valid. Note that some drivers--most notable are ribbon and planar tweeters--have reduced vertical axis pattern overlap vs. frequency. Hence, little vertical radiation interferences or mutual coupling occurs between the arrayed drivers. Arraying doesn't really impact the bandwidth for this case. Therefore, Bill's rule doesn't apply for this example. Jim

Subject: Re: Full range drivers in line array?
Posted by flacoman on Thu, 16 Feb 2006 13:49:35 GMT
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Given the roll-off , couldn't you add a coil to steepen the slope and use the effect to your advantage instead of fighting it with EQ?My2cJorge

Subject: Re: Full range drivers in line array?
Posted by Jim Griffin on Fri, 17 Feb 2006 01:50:04 GMT
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Jorge,A coil may steepen the slope but it also steepens the roll off vs. frequency. That is not what you want to do in my opinion as you would roll off the frequency far too much. EQ would boost the response and tend to flatten it across the upper couple of octaves which, to me, is what you should do. Jim

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Subject: Re: Full range drivers in line array?
Posted by flacoman on Fri, 17 Feb 2006 12:35:12 GMT
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What I meant by adding a coil was predicated on adding a tweeter(or array) above it and making the system a 2-way. I didn't mean to imply that I wanted to keep the system full-range...Thoughts?Regards Jorge

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Subject: Re: Full range drivers in line array?
Posted by Jim Griffin on Fri, 17 Feb 2006 13:31:49 GMT
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Jorge,Yes, that is the way to go in this case--use a crossover to a tweeter or a line of tweeters. I've found that simple first order crossovers (single component) aren't sharp enough for most line array implementations so a third or fourth order usually works better. Furthermore, the crossover likely will need to be when the midrange line starts to lose sensitivity. This would likely be in the 2-3.5 kHz area. Measurements help to determine specific crossover points.Jim

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Subject: Re: Full range drivers in line array?
Posted by flacoman on Fri, 17 Feb 2006 15:25:55 GMT
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OK Jim, I was hoping to get away with a 1st order, but we can do 4th if need be. Thinking about a 5 1/4" array with a Focal T120K...Regards Jorge

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