Subject: Pi-aligned line array?
Posted by uW on Mon, 16 Dec 2002 23:24:47 GMT
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Can anyone spell out for me (or point me to a good post or written source) how to compute box volume and port tuning for a line array of identical woofers in a bass-reflex box, where the Thiele-Small parameters of a single woofer are known? I presume there's a fairly straightforward way of pretending the woofer array is one big woofer?Thanks.-uW

Subject: Re: Pi-aligned line array?
Posted by Wayne Parham on Tue, 17 Dec 2002 03:37:40 GMT
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PiAlign will calculate a cabinet size for multiple woofers, but it is concerned with box tuning for the bottom octave, and not for higher frequency performance. The assumption is that crossover will be done before interactions become significant between the multiple woofers.Phase issues in line arrays become more apparent at higher frequencies, because of the distances involved. If multiple woofers are driven by the same signal, there will be no phase interaction between woofers at the lowest frequencies. The frequency where interaction becomes significant is determined by the distance between drivers, and when you get to a point where wavelength becomes close to the distances between them, the speakers will begin to beam and lobes will form.For frequencies above the point where the system begins to form lobes, sound becomes directional, specifically, it is strongest at positions where the distances between the listener and drivers are equal or multiples of a wavelength. Other positions will cancel out, where where the distances between the listener and drivers are equal or multiples of a half-wavelength, so directionality can be controlled by the positions and phase of the drivers. This is the basis for arrays, and why they are generally built as vertical arrays rather than horizontal arrays - to keep distances equal along the horizontal plane.So basically, if you're just wanting to build a system with two or four woofers, you can do this pretty easily provided you are willing to crossover low. That avoids the issue of interference, and the drivers act in unison, as a single source. But if you're wanting to run the speakers at higher frequency, then you'll want to put them in a straight vertical line, so that the distance between listeners and each driver is the same.

Subject: Re: Pi-aligned line array?
Posted by mollecon on Tue, 17 Dec 2002 08:28:22 GMT
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Well, the basic thing here is quite simple: If you've got the boxsize for a sigle driver calculated (using TS-parameters), you can double the boxsize if you wnna use two, triple the boxsize for 3 &

so on - the tuning-frequency (Helmholz-resonance) will be the same. It will be necessary, however, to re-calculate the port-dimensions in each case in order to maintain the aforementioned tuning!But be carefull! If you're gonna use a combination of series/parallel coupling of the drivers in order to maintain a reasonable impedance (the only other alternative being using seperate amps for each driver, may for two in parallel), the condition for the reflex box working proberly might well be altered to an extent where it doesn't do that anymore - coupling bass-drivers in series is tricky business, particulary in a reflex enclosure.

Subject: a pair of 15's
Posted by Sam P. on Tue, 17 Dec 2002 11:22:08 GMT
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interfere with each other at 820 Hz. when mounted about 16 inches apart center-to-center. I imagine adding a third woofer would create a situation where the outer two interfere with each other around 400Hz. I've considered the 3 woofer vertical "array" as "do-able" for a while now...using 2226J's the nominal z would only be 5.33 ohms, and parallax issues won't be too bad, as the relative distances from the woofer to listener might not vary much. Add a fourth woofer to the array, now we're still looking at an easy 4 ohm load, with 4 jbl2226J's in parallel. But UNLESS you position the woofers along an arc like Pro Arrays, parallax issues will become more prominent. Maybe not an issue for "home hi-fi". And stuffing a horn in there somewhere for the HF, along the vertical axis, is going to force an even larger gap between at least two of the woofers in the array. Intuitively, I'm thinking the array format is designed for SPECIFIC pro sound applications, and will create more problems than it will solve if implemented poorly. I'm not clear what characteristics it has that would be so desireable for home use that acceptance of the self-interference and parallax issues would be considered worthwhile. Samps, when the "benchmark" is the performance of a pair of 4 Pi Pro's, you have to get pretty fancy to do any better:) and NOTHING ELSE that fits in such a small footprint is available, period.

Subject: uW, re-read this part from Sam P!
Posted by mikebake on Tue, 17 Dec 2002 11:56:57 GMT
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"Intuitively, I'm thinking the array format is designed for SPECIFIC pro sound applications, and will create more problems than it will solve if implemented poorly. I'm not clear what characteristics it has that would be so desireable for home use that acceptance of the self-interference and parallax issues would be considered worthwhile."I strongly second that idea.BTW, Sam, I have JBL cabinets with 4 15's operating over the same range; JBL wants them crossed over to the mid at 297hz. "The Diamond Quad array orientation allows the four drivers to create maximum output, while minimizing destructive interference effects caused by the use of multiple drivers operating in

the same bandpass region".BTW, efficiency for these beasts is 103db.....! Max SPL 143dbMBB

Subject: Thanks for all the info / cautions! <nt>
Posted by uW on Tue, 17 Dec 2002 12:15:30 GMT
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Subject: how far apart
Posted by Sam P. on Tue, 17 Dec 2002 13:51:45 GMT
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are the vertical pair of woofers center to center? 297Hz. top end seems more conservative than I expected. I would have guessed OK to about 400, and a "notch" about 450Hz. Now I'm curious, see what you've done:) Sam

Subject: Re: how far apart
Posted by mikebake on Tue, 17 Dec 2002 14:33:56 GMT
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I haven't measured them. The 297hz point is nice and low, and can be because it hands off to a three inch comp. driver. The pdf link below has a scale drawing that might roughly yield an answer on distance.....MBBB

http://www.jblpro.com/pub/cinema/5674.pdf

Subject: Re: Pi-aligned line array?
Posted by bmar on Tue, 17 Dec 2002 14:54:09 GMT
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There is a line array called the Linus array. Jim griffin can help you with a lot of info regarding this

since he specializes in line arrays. You can take a look here http://www.selahaudio.com/wsn5002.htmlI have given you a link to the white paper on the linus at the bottom here. It's interesting reading and may help you out. The bottle head straight 8's are also an array. Jim has some good points of how the Linus can outperform a standard Bessal. Read up on both types and give Jim a jingle, he likes to talk about this stuff and help people out.Bill

Linus array white paper

Subject: bet they cross that low
Posted by Sam P. on Tue, 17 Dec 2002 15:28:05 GMT
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because their midrange driver is very good down to 300Hz., especially looking at that mid horns size. The crossover freq. choice they advise may have little to do with the constraints of the driver spacing in the quad itself...a bigger issue with the 5674 system would appear to be the large vertical offset between the LF and MF...well, not that large at 300Hz. maybe, but certainly greater than the space between the woofers and each other. Probably at 300Hz. the power response or dispersion between the LF and MF subsystems matches best. JBL says the dual woofer 4648a-8 systems match the power response of a 90 degree wide HF horn at 800Hz. I'll bet the same idea is at work crossing the quad at 300Hz. to it's Mid Horn. Sam

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Subject: Re: bet they cross that low
Posted by mikebake on Tue, 17 Dec 2002 16:27:15 GMT
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What problem would the vertical offset induce? It's a big rig, ain't it!!?? Of course, it's made for the largest rooms, and should be judged from a fur piece away; my experience with such systems is that 50-60 feet back, they sound terrific.....MBB

Subject: Re: bet they cross that low
Posted by bmar on Tue, 17 Dec 2002 20:21:40 GMT
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Hi guys,Sam, I cross into my mid horns like those at 400. I like the way 400 sounds a little better than 300. (actually, I like the way it measures. sound is very close) tried 200 for bit and that just

had a big hole in it. Bill

Subject: Nice Headphones
Posted by D. Kurfman on Tue, 17 Dec 2002 23:58:33 GMT
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Nice headphones.Where are the real speakers?I assume you haven't rotated the horn array because it is so high and you need the wider dispersion in the vertical domain?

Subject: Re: Nice Headphones
Posted by mikebake on Wed, 18 Dec 2002 01:19:29 GMT
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I hadn't rotated it in the photo because they just came out of the box and were set up for photos a year ago in our warehouse.