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Subject: DSP xover and EQ with line arrays?  
Posted by [denverdoc](#) on Fri, 26 Nov 2004 15:49:52 GMT  
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Am new to this site--but have decided to toss the Infinity Prelude system I bought just a month ago in favor of an ambitious DIY project. Have always been drawn to line arrays (like the new Monster Cable Speakers, the big Dali's, the Epiphonies, old IRS, etc) and am an ardent believer in the power of DSP eq and xovers/multi-amping: question: has anyone out there tried building a line array with dipolar open baffles (a la S Linnwitz's Orion, Phoenix, etc) and something like the DEQX out of australia for the digital muscle?

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Subject: Re: DSP xover and EQ with line arrays?  
Posted by [Jim Griffin](#) on Sun, 28 Nov 2004 02:36:54 GMT  
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You idea sounds like it has merit. While I haven't used the DEQX, the reviews for it promise exceptional capabilities for most applications. I've seen dipolar open baffle line arrays on the web but most of these designs have been directed at arrays of low cost drivers. These designs clearly don't have all of the necessary compensations as Dr. Linkwitz features in his Orion and Phoenix designs. I would characterize the open back line arrays with the cheap drivers as interesting but likely flawed because of their uncorrected imperfections. Hence, you likely would not be interested in a low dollar line array of cheap speakers paired with a state of the art DSP compensator. To match up with the DEQX you would need to have near world class drivers like the Seas Excel products or equivalent and true ribbon tweeters (Fountek, Aurum Cantus, etc.) in my opinion. None of the commercial line arrays that you mention are open baffle. The Monster Cable speakers are certainly not derived from world class components. The Dali line array and some of the others you mention look interesting but their costs are well above reasonable levels for most folks. My buddy Rick Craig ([www.selahaudio.com](http://www.selahaudio.com)) has some interesting line arrays on his web site and I can vouch for their design soundness and excellent component selection. He doesn't have an open baffle model but he does custom designs if you are interested. Jim

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Subject: Re: DSP xover and EQ with line arrays?  
Posted by [denverdoc](#) on Sun, 28 Nov 2004 03:13:46 GMT  
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Jim, Thanks for the input to my query; you are on target when you suggest what I had in line was higher quality drivers, tho as an aside, the DEQX may have the capability to cover all but the worst warts in a line array of say aura drivers, so long as the warts were relatively consistent--but I digress; I was looking at the seas drivers but there has been a lot of fanfare over the about to be released adire 6.5 and 4 inch drivers. Now a dozen a-c G1's would cost me a cool 5k or so--while

this is meant to be ambitious, it is after all my first real speaker project, having built subs and some custom x-overs is all. Would be sweet, no doubt say a dozen seas 15-001'2 and half dozen a-c's per side (christ what would the efficiency of the tweet line be--around 110db/2.83v?).If using active xovers, then could tapering be achieved thru insertion of passive series resistors w/o messing things up too much otherwise? The other mandate of my design besides having the usual virtues of -3db/distance doubling, low distortion, huge dynamics, is not to store a single erg of energy in the enclosure/baffle--hence the drivers will all be screwed/epoxied to an I-beam with the super light and ultra stiff carbon fiber baffle barely making contact with the drivers. While I am uncertain this is a one way ticket to audio nirvana, I believe the "speed" of ribbons/esl speakers is tied to the absence of significant energy storage, and the "slownesss" of dynamic woofers in such a context is not so much from poor transient response per se but sstored energy invariably muddying up things. May also relate to the discontinuity from an array or long ribbon dipole to the monopolar bass radiation pattern. Anyway these are some of the questions I hope to at least shed a little light on!!I'll certainly check out Ricks web site; God, is this a great hobby or what--left brain absolutely subjugated to meets the demands of the right sided mistress!

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Subject: Re: DSP xover and EQ with line arrays?  
Posted by [Jim Griffin](#) on Sun, 28 Nov 2004 15:12:34 GMT  
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Denverdoc,A comment or two along the way. First, I'm not sure that equalization alone can make various speakers all sound the same. But if you start with low distortion, high sound quality drivers you can more easily yield great sound. Over equalizing less capable drivers will not produce world class sound in my opinion. You said: "I was looking at the Seas drivers but there has been a lot of fanfare over the about to be released adire 6.5 and 4 inch drivers."I (and most everyone else for that matter) have not heard the new Adire drivers so I'll reserve judgement on them until enough users have reported. One comment is that the 4.5" driver (and perhaps even the 6.5" version) may not have enough cone area to carry the sound impact on open baffles, that is, if you like sound pressure in your room. Linkwitz uses 8" drivers in his Orion implementation.

You said: "Now a dozen a-c G1's would cost me a cool 5k or so.....and half dozen a-c's per side (christ what would the efficiency of the tweet line be--around 110db/2.83v?)."No, you don't necessarily get array efficiency gain with ribbon tweeters. The ribbons (like the Aurum Cantus G1 and G3 plus the Fountek Jp-2 models) have limited vertical dispersion so when arrayed their sound fields don't overlap across the entire frequency band. Hence, don't count on huge efficiency improvements with ribbons. On the other hand remember that these ribbons have sensitivities in the 100 dB 1w/1m SPL range. Therefore, you can count on SPL capabilities far greater than 110 dB SPL with ease in the array. You said: "If using active xovers, then could tapering be achieved thru insertion of passive series resistors w/o messing things up too much otherwise?"The way I do power tapering is to feed more signal to drivers near the center of the array than the outer edges. This works for passive and active crossovers. No resistors are involved. One example for 10 drivers is to wire the bottom three drivers in series, wire the top three drivers in series, and then wire the center four drivers in two pairs of two series drivers. Hence, you have a 3/2/2/3 configuration. Now parallel each of those sets and you have the resultant tapered configuration. Tapering of less than 2:1 power ratio works best for me and prevents too much center weighting.You said: "The other mandate of my design besides having

the usual virtues of -3db/distance doubling, low distortion, huge dynamics, is not to store a single erg of energy in the enclosure/baffle..."I'm a believer in near field line arrays (3 dB per doubling of distance far off) as you can read in my white paper. The issue with the open baffling of the array is the lack of bass which will necessitate a lot of equalization to overcome that issue. As a compromise, I like sealed enclosures as they can yield a natural sound (good transient response) yet provide some bass. With an open baffle arrangement you will have to go to a set of woofers (dipole or U-frame) to carry the load down low. Again, Linkwitz provides some help on the dipole side of the equation but even he suggests sealed subwoofers for the low end (below 40 Hz in the Orion) if you really need sonic impact. Finally, remember that dipole or open baffle speakers will require a room large enough to move the speakers away from at least the rear wall. Placement would be best more than 4-5 feet or so from the wall. Good luck in your quest. Let us hear on your progress. Jim

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Subject: Re: DSP xover and EQ with line arrays?  
Posted by [denverdoc](#) on Sun, 28 Nov 2004 18:45:51 GMT  
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Jim. Thanks so much for your insightful remarks on the project. And I hope you think me not so naive as to believe a silk purse can be actually made from a sow's ear. But from hazy memories of coursework in DSP in grad school (man a dry subject if there was one), I do recall a demonstration where a crummy caruso recording using big horn/wide needle transducers/shellac was considerably improved by characterizing and inverting the Z transform of the then time recording "technology". Perhaps such faith is misplaced and bordering upon religious fanaticism, as I have yet to hear the DEQX. But indeed, why not start with the best transducers one can afford! Mitigating v this view is the finding that seems to be emerging from multichannel investigation, i.e., that increasing the number of channels seems to relax significantly the performance standards of the component parts (one channel). Could the same phenomenon explain why the Monster Cable system, constructed from more drivers than I could count in a single sitting, make a pretty damn good impression on the ole eardrum, in spite, you said, were far short of perfect parts. I wanted to at least raise this question, as a lot of folk seem to embark on this line array mission as an implicit assumption. Granted distortion figures will be reduced, efficiency goes way up with less tax on amps, and bandwidth can be stretched within limits so long as there is acoustic summing. Which raises my next question--if vertically challenged ribbons don't add, is there any real point in arraying them? I have read your paper and still remain a little confused on this issue--suppose I intend only to listen from a certain distance, and head elevation remains more or less constant depending only on time of day and perhaps what has been consumed earlier, why bother at all with arrayed ribbons? Yet when I hear a well implemented line array of tweeters, its agape with jaw time? Take the Dali Megalines for instance I heard at the recent Rocky Mountain Audio Fest{{BTW everyone make a point of attending next years event which, because of CEDIA's proximity, gonna be a don't miss affair!} This year no lines whatsoever, anywhere, play your own music, not a problem.}} These things for whatever reason were able, albeit in a huge room (at least 70' by 20', able to produce both depth and lateralization which was friggin uncanny--heard distinct sound sources from 15 feet deep and 8 feet wide of the speaker. I was stupefied. Forget the disappearing speaker description, I've had that experience often enough--this was more like walk ten yards and handshake a particular musician. Satchmo

recording, ca 1950 btw. This was within nearfield: less than 15 feet. What provided comic relief to this otherwise sublime experience-- magic standoffs to keep the cables, arrayed between at least a 100k in amplifiers, off the floor! Can I capture this in my living room--fat chance, not even a ghost's chance, but if you can play something loud enough in such a venue, w/o a lotta reflections messing it up, it can be religious--hence my abiding hope for this project of approximating by using line arrays and reflection busting software--hell put me in a straightjacket and my head in one of those screw mounted halos suspended from the ceiling. Now about the bass/mid driver issues: these little 6.5 inch wonders from Adire, because of the XBS^2 tech are supposed to move an inch back and forth with nominal distortion. This set off a big debate around doppler distortion and one guy claimed a figure of 45% under worst conditions (at a point, max velocity, with a 3000 hz tone riding on the bass). I have no idea, but am more worried about air noise from the backside. Finally, bass eq--isn't this the inherent advantage to line arrays? No single driver can be made to hit 110 db at 50 hz, but add in the efficiency/sharing advantages of an array, why not? And last for another 8k gimme one of those adire drivers that doesn't so much as move air, as people, pets, walls: f3 of 7 hz and capable of something like 120 db at 20 hz--this with a 2'X 2'foot baffle, NO ENCLOSURE NECESSARY! In rereading, this post seems like some kind of endorsement for adire--not so, no affiliation whatsoever. Guess it comes down to my admiration for all and any who can think outside the box, I want no box at all!! Cheers to all, JPS: thanks dearly re the reminder of shaping via proper lumping!

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Subject: Since you're in Denver .....

Posted by [ThomasW](#) on Sat, 04 Dec 2004 15:40:50 GMT

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Why don't you contact me and then maybe stop by for a listen. edit email address as needed (PRN) I've got large quad-amped dipole planar hybrid line arrays, dynamic driver dipoles (speakers like the Orions), and a 12 driver IB sub and several other things you might find interesting. ttriff at comcast dot net

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