Subject: Crossover Question about building line arrays
Posted by Wendall Evans on Wed, 16 Sep 2009 21:45:22 GMT
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Since there are so many speakers involved does this give more crossover options?

Many people have different conceptions of where the crossover points should be handled in a line array. Also I've heard some people say that passive crossovers for line arrays are just too hard, and that people should only be thinking about electronic crossovers. What options are there for that and how expensive is that?

Sorry for all the questions but this seems to be a place where they might be answered by people who have actually built a line array.

TIA,

Wendall

Subject: Re: Crossover Question about building line arrays
Posted by AudioFred on Wed, 16 Sep 2009 23:20:27 GMT
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Having more drivers doesn't give you any more flexibility in line array crossover design. In fact, it's harder to get it right with a line array because of the effects of driver size and spacing with multiple drivers. There are more variables, and a modeled crossover for a line array is more likely to need tweaking.

Active crossovers solve lots of problems, but they can be very expensive if you're building a high end line array for use with high end audio equipment. You could insert a $300 Behringer crossover betwen a $5K preamp and $10K of amplification, but that doesn't make much sense. However, if you're building a budget array and are willing to buy used pro audio equipment the cost can be very reasonable, and the sound quality of brands like Ashley, Rane, etc is surprisingly good.

Eric, this is your area of expertise, so please chime in here.

Subject: Re: Crossover Question about building line arrays
Posted by Wendall Evans on Thu, 17 Sep 2009 01:22:55 GMT
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Maybe I've asked too many questions....

Subject: Re: Crossover Question about building line arrays
Posted by Marlboro on Fri, 18 Sep 2009 22:21:14 GMT
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Wendall Evans wrote on Wed, 16 September 2009 16:45Since there are so many speakers involved does this give more crossover options?

I'm going to answer your questions one at a time and leave a space in between for your answer.

I know what Fred is saying, but I disagree slightly.

One of my design goals(and for a low cost line array you need design goals) were to avoid a crossover in the 200-3000hz region. This really means that I was looking for a midrange speaker to handle at least 1/2 octave above and 1/2 octave below. This means the FR had to be more like 150 to 4500.

This is hard to find a good speaker in this range normally, if you need a cheap one, its worse, if you need a cheap one to play loud, forget about it because of the distortion involved.
And so, IN MY OPINION, its the distortion that is the big concern. Its hard for the human ear to differentiate much less that +/- 5db in a freq response, and even less than that in certain areas of the FR.

But with a line array that has 16 of these "cheap ones" per channel, each one will only be playing .0625 of the music.

So if you want such a wide range of FR for the speaker, you are way more likely to get acceptable distortion when each one only plays 6.35% of the total music per channel. And you can do it even with some very inexpensive speakers.

What do you think?

Subject: Re: Crossover Question about building line arrays
Posted by Wendall Evans on Sat, 19 Sep 2009 00:03:16 GMT
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Why did you want the midrange to be between 200-3000 and have no crossover in that range? Lots of people use crossovers around 500-1600.

Subject: Re: Crossover Question about building line arrays
Posted by Marlboro on Sat, 19 Sep 2009 16:13:02 GMT
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Wendall Evans wrote on Fri, 18 September 2009 19:03Why did you want the midrange to be

between 200-3000 and have no crossover in that range? Lots of people use crossovers around 500-1600.

When using electronic crossovers this is less significant. But here is the reason:

"It is not at all uncommon to see systems where the crossover frequency is set right in the middle of what I call the "intelligence band". This is the range of frequencies from 300Hz to 3600Hz, and is extremely important from a psycho-acoustic point of view.

"It is no accident that this is the range of the telephone system (and has been for many years). If we are only to hear a limited range, then this band of frequencies is by far the most important. Just from this we can recognise a person's voice, which musical instrument is being played (even bass instruments!), and - more importantly - what is being said. It contains nearly all the "intelligence" of the sound, which is to say that if this band is "corrupted", intelligibility is greatly reduced.

"So why do speaker manufacturers insist on placing their crossover frequencies within this band of frequencies? The public address (PA) systems used by many rock bands are a case in point - how often does one find that the vocals are completely unintelligible? Mind you, it may also be the case that the band's lyrics just don't make sense, but that's another story altogether.

"Often this occurs because the system is so loud that the amplifiers are clipping badly, but even at lower levels it is quite common. Place a common-or-garden crossover filter right in the middle of the "intelligence band" and this is exactly what will (and does) happen. With phase aberrations and cancellations, this most important frequency range becomes muddied and indistinct causing loss of intelligibility - not only on voice, but instruments as well.

"The effect is also noticeable with some hi-fi speaker systems, except that it usually less pronounced, and it is far less likely that the amplifier will be driven to clipping. Reviewers will often say of a speaker that the vocals seem veiled, or that there is noticeable colouration of either male or female vocals. These effects are often caused by the effects of phase shift around the crossover frequency, coupled with the fact that the crossover frequency falls right in the middle of the intelligence band.

"Should a crossover be unavoidable in this region - due (for example) to available loudspeaker drivers - then the manufacturer must go to great lengths to ensure that "artifacts" created by the crossover are not audible. This often causes greater problems with amplifier loading at the crossover frequency, since impedance dips seem a common problem with many speakers. It will be found that these almost invariably occur at the crossover frequency. "

Read the whole article at:
http://sound.westhost.com

Rod Elliot given permission for posting pieces of his articles but only the home website can be posted as the source. Search through the site for articles, and look for bi-amping, and then search for "intelligence band" and you will find the context this was taken from.

Subject: Re: Crossover Question about building line arrays
Posted by selahaudio on Mon, 21 Sep 2009 13:21:05 GMT
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Active crossovers give you more flexibility but regardless of what you use being able to measure the result is paramount to having optimal performance. If you're using tweeters with lower sensitivity (domes and some planars) the active crossover will help you balance the output of the lines. Passive crossovers for arrays can be difficult to design and for most DIY's a good kit designed by a pro or access to an active DSP crossover is your best option. I advise against a non-DSP crossover because they typically only have symmetrical slopes and little ability to contour the response for baffle step and driver anomalies.

Subject: Re: Crossover Question about building line arrays
Posted by AudioFred on Mon, 21 Sep 2009 13:44:40 GMT
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selahaudio wrote on Mon, 21 September 2009 08:21
I advise against a non-DSP crossover because they typically only have symmetrical slopes and little ability to contour the response for baffle step and driver anomalies.

Unfortunately this leaves one with the choice of a DEQX, which is as good as it gets, but costs upward for $5K new, or a Behringer DCX-2496, which costs only $300, but is mass market quality and not something I would place between a high end pre and amps driving a good pair of speakers.

What do you think of the Behringer used with a "budget" line array, for example one using sixteen sealed Tang Band W3-1053SC 3" woofers and a tweeter array of Dayton 3/4" neo domes or PT2 planars? It seems to me that entry level electronics would sound no better or worse than the Behringer, and actively crossing this array with the Behringer might sound better than a passive crossver.

http://www.parts-express.com/pe/showdetl.cfm?Partnumber=248-669
http://www.parts-express.com/pe/showdetl.cfm?Partnumber=264-880

Subject: Re: Crossover Question about building line arrays
Posted by selahaudio on Mon, 21 Sep 2009 14:25:28 GMT
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AudioFred wrote on Mon, 21 September 2009 08:44selahaudio wrote on Mon, 21 September 2009 08:21
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http://www.parts-express.com/pe/showdetl.cfm?Partnumber=264-880

There are some options. DBX has a DSP crossover (DriveRack PA+)for $500. Built better than the Behringer and also has parametric EQ for baffle step and response contouring. I also have access to a 3-way DSP crossover that includes ICE amps. It's more expensive, but for $2,000 you have six amp channels and a DSP crossover.

The AuraSound NSW1 is a better choice than the Dayton because it will cross lower; however, it is beyond the budget for many builders. The PT2 also crosses lower than the Dayton and would make a good match with the TB woofer. The Dayton 3/4" has a Fs=2K which means a crossover point of at least 3.5K-4K and that's not going to work well in an array with 3" woofers.

Subject: Re: Crossover Question about building line arrays
Posted by Wendall Evans on Tue, 22 Sep 2009 22:41:49 GMT
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I'm really confused now. But I'm editing this post.

OK.... I went back to the posts and realize that I have some questions from the above posts:

1. Selahaudio says: " I advise against a non-DSP crossover because they typically only have symmetrical slopes and little ability to contour the response for baffle step and driver anomalies."

What's wrong with symmetrical slopes. Often people who want to contour the system will buy Constant-Q 1/3 octave two channel equalizer so that they can contour exactly they way they want for any driver anomalies. As to baffle step, I had some software awhile ago that showed that the larger the number of speakers on the baffle, the less impact baffle step issues were(db loss dropped to below 1 for more than 10 speakers in the baffle)

2. Selahaudio says: "If you're using tweeters with lower sensitivity (domes and some planars) the active crossover will help you balance the output of the lines." I was under the impression from my software that the sensitivity increases with the number of speakers in the array. However, the Dayton neos are already at 91.5 db sensitivity which is pretty high I think. But am i wrong to assume based on the software I have that using say a line of them the sensitivity might rise to as much as 108?

3. The PT2 crossover is also recommended and I would wonder why? This little item failed

miserably on Zaph audio's test since its the same as the Silver Flute Yag-20. Also while the Dayton Neo's have an fs of 2000, Their manufacturer recommends a cross of 3500. I should think that using them in a large number with a steep slope electronic crossover that you could get them down to the mid 2000's without much difficulty. Is there something here that I don't know?

Thanks in advance for helping me with my questions.

Wendall

Subject: Re: Crossover Question about building line arrays
Posted by selahaudio on Wed, 23 Sep 2009 00:28:34 GMT
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Wendall Evans wrote on Wed, 16 September 2009 16:45Since there are so many speakers involved does this give more crossover options?

Many people have different conceptions of where the crossover points should be handled in a line array. Also I've heard some people say that passive crossovers for line arrays are just too hard, and that people should only be thinking about electronic crossovers. What options are there for that and how expensive is that?

Sorry for all the questions but this seems to be a place where they might be answered by people who have actually built a line array.

TIA,

Wendall

Eric / Marlboro / Wendall?

Subject: Re: Crossover Question about building line arrays
Posted by Wendall Evans on Wed, 23 Sep 2009 00:36:39 GMT
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Huh?

Could you answer my questions, please? I'm confused about some of the things that Marlboro said. The last speakers I actually built were back in the 70'd from some company called Speakerlab in Washington I think. Maybe you remember them They had three ways with mid and tweeter horns. They were pretty neat looking too.

I would be please to have your point view in addition to his?

Wendall Evans

Subject: Re: Crossover Question about building line arrays
Posted by jp on Wed, 23 Sep 2009 18:51:40 GMT
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Hello Rick
You say :""There are some options. DBX has a DSP crossover (DriveRack PA+)for $500. Built better than the Behringer and also has parametric EQ for baffle step and response contouring. I also have access to a 3-way DSP crossover that includes ICE amps. It's more expensive, but for $2,000 you have six amp channels and a DSP crossover""

Is the difference between Behringer and DBX worth the change ?
Tell us more about this 2000 $ 3 way DSP Crossover, it seems to be in between the DBX and DEQX , where to get it from and what's the make and model ?
Thanks
JP

Subject: Re: Crossover Question about building line arrays
Posted by selahaudio on Wed, 23 Sep 2009 20:04:17 GMT
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jp wrote on Wed, 23 September 2009 13:51Hello Rick
You say :""There are some options. DBX has a DSP crossover (DriveRack PA+)for $500. Built better than the Behringer and also has parametric EQ for baffle step and response contouring. I also have access to a 3-way DSP crossover that includes ICE amps. It's more expensive, but for $2,000 you have six amp channels and a DSP crossover""

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Thanks
JP

I've not compared the DBX and Behringer side-by-side but an earlier version of the DBX that I heard worked well for my customer. You probably could find some opinions on a pro audio site because that's where the two are primarily used.

The unit I mentioned is only available to OEM's as far as I know. There may be something available from Hypex that's similar but I don't know if it's in production yet.

Subject: Re: Crossover Question about building line arrays

Posted by justinc on Thu, 24 Sep 2009 17:57:05 GMT
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Rick what amplifiers are those you are referring to, that could be very interesting! I am currently using 3 crown xti2000's for xover and eq issues. They work great but are a little noisy.

Subject: Re: Crossover Question about building line arrays
Posted by selahaudio on Thu, 24 Sep 2009 18:42:34 GMT
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justinc wrote on Thu, 24 September 2009 12:57Rick what amplifiers are those you are referring to, that could be very interesting! I am currently using 3 crown xti2000's for xover and eq issues. They work great but are a little noisy.

These are designed for OEM so you can't buy them from a retailer. They are sold to speaker manufacturers who program them and ship to the end user. I believe the Hypex units are similar but I don't know if they have a U.S. distributor.