Subject: second array already in the works
Posted by Villain3g on Mon, 31 Aug 2009 04:45:57 GMT
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After checking out the recommended reading... I've decided to make my next line array a 2 way setup, crossed around 3k. For the woofers I'd like to use 8 Vifa BC14WG79-08's. They should go low enough to meet up with my subs. My question lies with the tweeters. My plan is to modify the flanges on the Tang Band 13-1264SA it looks like the inner structure is 30mm. If I remove the entire flange, will this get the c-to-c close enough?

Subject: Re: second array already in the works
Posted by darkmoebius2 on Mon, 31 Aug 2009 06:03:56 GMT
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Villain3g wrote on Sun, 30 August 2009 23:45If I remove the entire flange, will this get the c-to-c close enough Dr. Griffin answers your question in the 2nd paragraph of pg 13 in his line array white paperQuote:For the tweeter line very close center-to-center spacing is difficult to attain as very small circular drivers would be necessitated for either the one wavelength or especially the half wavelength criteria. Consider operation to 20 kHz where one wavelength is 17.2 mm (0.68") and a half wavelength is only 8.6 mm (0.34"). Without regard to their surrounding flanges, dome tweeters are available in 25 mm (1"), 19 mm (0.75") and 13 mm (0.5") diameters. Hence, with any mounting flange allowance at all, the one or half wavelength c-t-c criteria are very difficult--if not impossible--to satisfy at 20 kHz. But, if we relax the c-t-c criterion, more secondary lobes would appear in the 10 to 20 kHz frequency range. Fortunately, in this octave the ear is less sensitive (per Fletcher-Munson curves) so any secondary lobes likely would be less audible to the listener. Thus, if one wavelength spacing at 10 kHz is adopted as a compromise, then tweeter spacing would need to be 34.4 mm (1.35") c-t-c apart. While more off axis secondary lobes would be generated in the far field, small flange tweeters are available to meet this dimension. The tradeoff is possible sound degradation from comb lines near 20 kHz.

Subject: Re: second array already in the works
Posted by Villain3g on Mon, 31 Aug 2009 16:27:58 GMT
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I saw that in there, but thought it was a little unclear. Because I know 10k is audible. Just wanted to make sure I wasn't missing anything.

Next question relates to pairing the drivers. The tweeters are 92db. The woofers are at 88db. My hope is to have the tweeter line close in length to the woofers. I am afraid that they will be too loud compared to the woofers.

It looks like 12 woofers power tapered in 2,4,6 orientation is most appealing, resulting in 8.7 ohms. Would that give me an efficiency of around 98db?

If I had 32 tweeters, is there in optimal arrangement that would result in an appropriate efficiency?

Can I have different impedances for the tweeters and woofers? Does that impact the design of the crossovers?  I was hoping the use parts express's 2way 3k 8ohm crossover.  or will I have to build my own...

Well, thank you for your time. As you can tell I'm new to the game, but I want to learn.  Any advice is much appreciated.

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Subject: Re: second array already in the works
Posted by darkmoebius2 on Mon, 31 Aug 2009 17:57:35 GMT
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Villain3g wrote on Mon, 31 August 2009 11:27I saw that in there, but thought it was a little unclear.  Because I know 10k is audible. Without going to vertical ribbons, it is going to be nearly impossible to do better than that. Eric J/Marlboro was able to shave enough flange off Dayton ND20FA-6 3/4" Dome Tweeters to get comb filtering out to 15k. But, if I remember correctly, he mentioned that he wouldn't go through all that hassle again if he had the chance. You might want to try the rear-mount version, Dayton ND20FB-4, of his tweeter which has no flange. Could save you a hell of a lot of time, frustration, and get nearly the same, or better, results than the Tang Band.
Quote:Next question relates to pairing the drivers.  The tweeters are 92db. The woofers are at 88db...I am afraid that they will be too loud compared to the woofers. Funny hat should ask that exact question this morning! I was up all night trying to crash-course myself on driver matching and crossover/filter design.

Elliott Sound Products has excellent tutorials on all aspects of DIY Audio. I suggest you read all of these primers related to speaker/crossover design. I did last night and my understanding(while still beginner) is lightyears ahead of what it was before. These are all short (1-4 pages) but pack a lot of information, yet are still easy for the beginner to understand. He also provides free complete designs for working passive and active crossovers, notch filters, etc - all you will need.

Design of Passive Crossovers
Benefits of Bi-Amping (Not Quite Magic, But Close) - Part 1
Benefits of Bi-Amping (Not Quite Magic, But Close) - Part 2
Active Filters
Effects Of Source Impedance on Loudspeakers
Phase, Time and Distortion in Loudspeakers
Baffle Step Compensation
Doppler distortion in loudspeakers - Real or Imaginary?

Quote:It looks like 12 woofers power tapered in 2,4,6 orientation is most appealing, resulting in 8.7 ohms.  Would that give me an efficiency of around 98db?...If I had 32 tweeters, is there in optimal arrangement that would result in an appropriate efficiency?

I leave those questions to those with more experience and knowledge than me.

Quote:Can I have different impedances for the tweeters and woofers? Does that impact the

design of the crossovers? Absolutely to both questions.  Quote:I was hoping the use parts express's 2way 3k 8ohm crossover. Don't. Read the links I provided above and you'll see why that would completely undermine all the planning and design you put into your arrays. Build your own, active if possible.

Subject: Re: second array already in the works
Posted by Villain3g on Mon, 31 Aug 2009 19:55:28 GMT
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Wow! Thanks for the reading material.  My first array was more of a science experiment.  These second ones will take some more planning. And $$$...  We'll see how I digest the info.  Thanks again.

Subject: Re: second array already in the works
Posted by darkmoebius2 on Mon, 31 Aug 2009 20:10:23 GMT
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Villain3g wrote on Mon, 31 August 2009 14:55Wow! Thanks for the reading material.  My first array was more of a science experiment.  These second ones will take some more planning. And $$$...  We'll see how I digest the info.  Thanks again. No problem, I am just at the beginning of the learning curve, too.

I almost jumped right in, but then came to the mindset that it's best to back off any initial plans, digest all the information on speaker/array design, then pick parts to maximize performance within personal limitations(financial, building skill, time, etc.)

As Eric J has said, and Rod Elliott stresses on the ESP website, it is probably more effective, cheaper or equal in cost, and just plain better to go with active crossover and two or 3-way amping. That will help negate many of power loss/impedance/efficiency/non-linearity/etc. problems in passive crossovers.

Subject: Re: second array already in the works
Posted by Eric J on Mon, 31 Aug 2009 21:32:27 GMT
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I'd be concerned about comb filter distortion with a crossover of 3000 for those Vifa's.  It would seem that 3000 is a bit high for them.  I have a Vifa BC14SG49-08 sitting right her in front of me, and unless you cut THEIR flanges(4.75 cut), they are 5.75 inches center to center.  The ones they

are selling have a truncated edge coming to 5.12, but that means that comb filter distortion starts at 2660.  Going to 3000 is too high.

I have an excell database with every c-to-c from .6 inches to 113 feet listed for the start of comb filter distortion, in fractions of an inch.  I email it to you if you want it.

Going down to 3000 is too low for the TB's.  They drop like a rock after 3000.  Below 3000 they are going to screech.  You don't say how many you are going to use.  To have any hope of using them you would have to be using a 48 db per octave crossover.  Look at it this way.  The crossover doesn't simply cut the tweeter off at 3000.  You need to be able to deal with one octave below where the cutoff is.  If you drop 12 db, you pretty much can't hear it.  Every 3 db down cuts the sound volume in 1/2.

So  if you put in thirty tweeters like I did, then the volume at full power is already cut to 1/30 of the sound that one would have to put out.  A simple 6 db octave crossover will cut below the cut off so that each one puts out 120th of the amount of the original sound.  But while the recommended range for the Neo 20FA's is 3500, their FS is 2000.  The TB's have a lower range of 3000, but their FS is also 3000.

It could work but you better be using a lot of them.  The problem is that you really don't want to be crossing them below their FS or you're going to get screeching from them at theat frequency no matter how many you use.  And it still doesn't help you with the problem with the mid ranges and their comb distortion.

So this combination gives you a double whammy.  The frequency range between 2500 and 3000 is going to have your tweeters screeching like chalk on a board, and the woofers are going to give you dropped frequencies between 2500 and 3000.  If you want to use the Vifa's you'll have to use planars or ribbons unless you are willing to use a 3/4 inch dome that can go that low.  If you want to use the 1/2 inch domes, then youa re going to have to use a fullrange that will go as high as say 3300 but at the same time can be close enough together to not produce comb filter distortion.

I've said before that the only usable dome tweeter on the market is the 3/4 Dayton Neo 20A. And then you have to use the TB 3 inchers.

What you are setting yourself up for in the speaker category is not going to give you something that you like, I suspect.  You'll be complaining about the lower harmonics.

Eric/Marlboro

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Subject: Re: second array already in the works
Posted by Villain3g on Tue, 01 Sep 2009 03:11:47 GMT

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Would six Dayton PT2C-8 pair better to the the vifa's?

Have you heard them compared to your line of modified domes?

That list would be great.
My email is Grant.Gustavsen@gmail.com

Maybe the Tymphany TPY04WO4O0016 4" could substitute the vifa's. They're flange is only 4 3/16".

The goal is to keep these relatively inexpensive. Maybe later on in life I can go all out.

Subject: Re: second array already in the works
Posted by Eric J on Tue, 01 Sep 2009 03:39:47 GMT
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I think the question here is how inexpensive are you talking about?

And how much of a line array are you interested in doing.

I mean a real line array must be able to be coupled to the ceiling and the floor, which means that the array must be roughly 70% of the height of the ceiling to floor. For example, 8 o of the Vifa's are not going to be long enough to couple with the ceiling and the floor, and if you don't provide coupling your array might not be long enough to guarantee listening in the nearfield. Listening in the nearfield is very very very important to the line array experience. Otherwise you just have a larger point source experience, but not a line array.

Eric/Marlboro

Subject: Re: second array already in the works
Posted by Eric J on Tue, 01 Sep 2009 03:56:23 GMT
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The PT2's are a good consideration. I've heard planars before but I specifically wanted domes. The Pipedream white paper sums my reason up clearly:

"We see from various manufacturers heroic design techniques applied to individual drivers. This is usually because such drivers
are being asked to do too much. Our line array directly circumvents this problem avoiding the need for tortured driver design.

"An important result of this is the use of soft dome tweeters which, while not ideal at extremely high drive levels, are surpassingly transparent when not overdriven. In a Pipedreams array, they virtually cannot be overdriven."

Besides, while I wanted to keep it cheap, I wanted a very flat FR and the transparency of using 30 domes. The dynamic range and vanishingly low distortion of having each dome picking up only 3% of the total music per side, was the reason. There is no way that 6 Planars could match the transparency and incredibly low distortion of 30 domes.

But everyone must make their own decision for what ever resources they have available.

Eric

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Subject: Re: second array already in the works
Posted by Villain3g on Tue, 01 Sep 2009 16:24:49 GMT
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What did you end up with for spacing on your tweeters. Seems like 30 wouldn't be long enough, especially when modified. Do tweeters line not have to be as long a woofer lines?

Do you have any pictures of arrays that you've built?

When looking at the technical drawing of the Tang Band 13-1264SA, it actually looks like they can be cut down to 21mm. What are your thoughts?

File Attachments
1) untitled.bmp, downloaded 3294 times
2) untitled2.bmp, downloaded 3270 times

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Subject: Re: second array already in the works
Posted by Marlboro on Tue, 01 Sep 2009 21:47:27 GMT
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If you read Griffin's paper, you need to make sure that the line is within line of sight of your ears either sitting or standing. I chose sitting since I'm 6'4" but its within standing for most everyone else.

You are going to actually buy one of the tweeters to find out. That's what I did.

Marlboro

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1) DSC00819ADF.jpg, downloaded 3390 times

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Subject: Re: second array already in the works
Posted by Marlboro on Wed, 02 Sep 2009 00:43:29 GMT
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Two more photos.

File Attachments
1) DSC00824a.jpg, downloaded 3202 times
2) DSC00825a.jpg, downloaded 3444 times

Subject: Re: second array already in the works
Posted by Villain3g on Wed, 02 Sep 2009 03:11:07 GMT
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wow. Im having trouble getting a scale of those things. Looks like 3 1/2" woofers with about 5 1/4" ctc spacing. Interesting. That allows you to separate each enclosure. Are they ported in the back? Are there any benefits to having one shared enclosure?

Im thinking with the flange on the tang bands I can screw them down to a jig and cut them on my table saw. I bet its possible to melt the cut ends and fuse them together to make one long tweeter.

Im going to order some tomorrow. I'll tell you how the turn out.

Subject: Re: second array already in the works
Posted by Marlboro on Wed, 02 Sep 2009 12:48:28 GMT
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I chose to put each mid in its own separate enclose to eliminate any interaction in the back wash of sound. Additionally I didn't want any sound coming back through the front of the speaker to muddy the midrange, thus the 22.5 inch SEALED tubes stuffed with fiberglass TO A 4 lb/cu foot density, and wrapped in polyfill batting to keep the fiberglass strands out of the speaker itself.

Also using tubes you have no odd order harmonics in the back wash due to the characteristic of propagation of sound in a closed tube. This means that any sound that might come through will be clarifying sharp even order harmonics. There will be no harmonic distortion since each speaker only handles 6% of the total sound per channel. Each one never plays loud enough to distort in any way.

Its a little know fact that even inexpensive speakers will perform at high QUALITY levels when their volume is turned down low. its when they are required to play above 3 watts that they start to sound badly when they are inexpensive.

Marlboro

Subject: Re: second array already in the works
Posted by Villain3g on Mon, 12 Oct 2009 03:29:48 GMT
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I haven't forgotten about my line array dreams. I've been weighing options like cost and complexity.

I was wondering about the length of the tweeter line. A line of 32 modified Tang Band 13-1264SA would only be about 26.5". I was considering doubling that number to 64 tweeters per line. That would make the line closer to 53". Would this provide a noticeable pushback of the far-field transition? If so, then it might be worth the investment.

I'm also interested in bi-amping with an active crossover. Is that an active crossover in your setup Eric? Does it perform to your liking?

The Tymphany TPY04WO4O0016 are a 4" woofer that head down to 66hz. They should be able to meet up with my subs. Their flanges will allow for 4-3/16" spacing, sufficient for crossing them at 3khz.

So, my setup as of now looks like 32 or 64 tweeters and 16 woofers per channel, bi-amped with an active crossover crossed at 3k.

The drivers are going to come to about $1k... I guess that's on the low end of the spectrum for line arrays.

32 tweeters per line will get me down to about $720.

What say you?

Subject: Re: second array already in the works
Posted by Marlboro on Mon, 12 Oct 2009 13:31:13 GMT
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Active is way better. And although some people complain that an analog crossover is inferior to a digital, I have no problems with my Rane AC23.

The following is my two cents, and I could easily be wrong.

I sit about 9 feet from my speakers so the 30 inch tweeter line is about at the transition.

I would have some questions as to why you've chosen the speakers that you have. The tweeter only goes down to 3000hz , and thats its FS, which means that it drops like a rock below that. Even with a 24 DB OCTAVE CROSS I should think that you might have some loss of sound in the vicinity of 3000hz due to crossing at its FS rather than above it. The Dayton 20FA seems a better choice due to its not having its FS until 2005hz, which gives a good bit of leeway. You have to figure that the tweeter is going to be screeching at 2500hz and it will probably still be audible.

So with your electronic cross I'd want to cross higher than 3000, more like 3550 hz.

I wonder why the Tmpany's.  I would have taken the three inch HV aluminums which go higher and have a higher x-max of 3.0mm.  You will have to cross higher than 66, but you probably want to again because you have to expect that crossovers are not exact cutt offs, and your speaker still has to produce sound at half an octave below the cutoff.  If you cross them at 66,  there is no way that they are going to be producing distortionless sound at 33 hz.

But to each his own, and the system might work out just great for you, after all, people have told me that my system doesn't work, and it does admirably.  Just my thoughts.

Marlboro

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