Subject: Got my line arrays on a web photo center.....finally!
Posted by Marlboro on Mon, 23 Apr 2007 22:00:16 GMT
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Marlboro

Subject: Awesome!
Posted by Wayne Parham on Tue, 24 Apr 2007 00:53:39 GMT
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Subject: Awesome?
Posted by Marlboro on Tue, 24 Apr 2007 03:01:20 GMT
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As awesome as they might look, I would assure you that the sound is much much more. If the recording is even reasonable, I no longer even know about speakers, I get lost in the music, I find myself conducting, I keep saying "Wow", over and again. So many CD's, so little time. Even things like Creedence Clearwater Revival present stuff I never heard before. And listening to Renee Fleming singing "Summertime" by Gershwin is so heavenly that I get tears in my eyes.Yeah....awesome. I was thinking this evening that I would enlarge the woofers to the ceiling in a large sonotube, and I kid you not, I found myself saying, that I couldn't do that because it would block the sound from the basses and harpsichord which were behind the cellos. Talk about depth of image!! I had to remind myself, that there wasn't a harpsichord back there behind the basses!Marlboro

Subject: Re: Awesome?
Posted by Bill Wassilak on Tue, 24 Apr 2007 16:23:55 GMT
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What are you're x-over points on the midrange? It looks like there's quite a bit of space on the c-t-c spacing of them.

Subject: Yeah....AWESOME
Posted by Marlboro on Tue, 24 Apr 2007 22:26:13 GMT
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The lower crossover to the woofers is at 165hz. The upper crossover to the tweeters is at 2600. The center to center distance is exactly 5 inches. This sets the upper limit to: 13560/5= 2712hz as the maximum crossover to avoid THE BEGINNING OF comb filter distortion. I'm under that limit. There are other theorists who may suggest other limits, but this one works in practice. The midranges are designed by Sammi of South Korea. They were designed to sell for about 16 bucks a piece, but Sammi could NOT find anyone to buy a three inch widerange speaker at that price. They have copper voice coils, paper-fabric composite cones, and 3.3 Xmax and are pretty flat in FR in the range that I use them. Sammi unloaded them in the buyout market for quite a bit below market value, and were happy to do that on their poor design/cost decision. In the large group, they only have to handle 5.8 % of the total midrange volume per channel. Additionally they are placed in separate 4 inch by 23.5 inch PVC closed tubes stuffed with 4 lb/cu ft fiberglass. Closed tubes have some unusual features which augment clarity in speakers that I won't go into now, but I tested them in boxes and in my tube design, and verified the clarity myself and with two audio observers. This also makes a difference. I could have put the midranges closer and had more them, but then I would have lost the considerable gain in using 4 inch PVC closed tubes. I have actually crossed lower than 2600, but haven't noticed a difference in sound between 2300 and 2600. Considering that 2300 will stress the tweeters more than 2600, and I hear no comb filtering at 2600, I go with that one.I am using Dayton Neo 20FA's. These tweeters are the only dome tweeter of any quality that I am aware are available in the USA which by cutting the flanges can get the center to center distance below 1 inch and closer to .9. This has to be done, and if you look closely at the photos you can see the tightness. The keeps comb filter distortion in the tweeters above an inaudible(for me) frequency of about 15,000hz. The normal crossover for this tweeter when ONLY one is used is 3500hz. However, this is a generalized number for a 2nd order crossover of 12 db/octave slope. Mine is a 24 db L-R electronic crossover. And instead of letting just one carry the load, 30 of them are carrying the load. Discussion about this tweeter on the Parts Express Audio forum(Dayton is the brand name for PE), puts the tweeter as low as 2200hz for a 48 db/oct slope, and easily do-able at 2600 for a 24 db slope when each one is only carrying 3% of the total frequencies as mine are. And of course, my crossovers are stable since they are electronic.HOPE THIS HELPS YOU.Marlboro

Subject: Just a thought on high frequency comb filtering.
Posted by Andy_G on Tue, 24 Apr 2007 22:56:08 GMT
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Just a supposition is all....With tweeters say X" ctc, the combing that occurs at listening distance will be a sort of ripple in the reponse, with the troughs about X" apart.. now our ears are like 2" from top to bottom, so they will average out any variations within those 2", so maybe combing will not be audible once the tweeters are closer than about 2" ctc. As I said, just a random thought.

Subject: Re: Just a thought on high frequency comb filtering.
Posted by Marlboro on Tue, 24 Apr 2007 22:58:08 GMT
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Good thought. I wonder what JIM Griffin might say.....

Subject: Re: Just a thought on high frequency comb filtering.
Posted by Andy_G on Tue, 24 Apr 2007 23:11:58 GMT
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my goodness, you mean it might not be as silly as it sounds ?

Subject: Re: Just a thought on high frequency comb filtering.
Posted by Andy_G on Tue, 24 Apr 2007 23:17:25 GMT
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actually. at any particular frequency over say 15k, the combing would, I think, manifsted itself as a ripple in amplitude as you change vertical position. The ear would average this to an rms value (maybe), hence you get the apparent lowering in spl at high frequencies. Sorta makes sense, perhaps. That means that it could be counteracted by using tweeters with a rising response above say 15k.Disclaimer, all this is pure conjecture. ;-))

Subject: Re: Yeah....AWESOME
Posted by jphaggar on Wed, 25 Apr 2007 05:01:48 GMT
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Makes me want to build a pair !!!!!1 what is the electronic xover you are using ? How are the mids and tweeters connected ? If you dont mind giving some details , I could build a pair .ThanksJP

Subject: Re: Yeah....AWESOME
Posted by Marlboro on Wed, 25 Apr 2007 10:10:23 GMT
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Rane AC23 electronic cross(analog).Crossed at 2650.Its a long building process. What else do you want to know?Marlboro

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Subject: Re: Yeah....AWESOME
Posted by jphaggar on Wed, 25 Apr 2007 10:30:45 GMT
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Drivers model No and where to buy ? Dimentions of PVc pipes Sub driver and plate amp if any ? where to buy xover ?I'll start by getting all the components first , it will take a while cause I am in Egypt .I'll be giving you news and ask my questions when needed.I already have a Selah Audio RS 8 with citrine woofers , that I just built , how would you compare this one with yours ?? thanksJP

Subject: Re: Yeah....AWESOME
Posted by Marlboro on Wed, 25 Apr 2007 12:44:10 GMT
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I have a basic difference of opinion with the Selah versions of line arrays. We all use Jim's research, but I don't believe in breaking up the critical human hearing band with a crossover, and mine are clearly designed as three ways, not two ways with a sub woofer.So there is no sub woofer here. There are three separate power amps and two 12 inch woofers that are capable of handling 17hz to 300hz with out a problem. My problem with Selah is the use of 8 inchers. They really won't cover the deep bass, and they get thin in the lower midrange. Now when you use a lot of them, this is a bit blurred, but..... I can't believe that their transient response can be as good as a three inch speaker; the big cone just can't move fast enough.I've not heard the Selah so I can't say, but we have basically different design characteristics. However, I'm using domes for two reasons: 1. I like dome tweeters, 2. Domes fit in my price building model. You could use ribbons, but I would NOT use any one except the B&G Neo 3. You would need a line of them at least 35 inches big.You can't buy the mid range anymore, but there is a good HiVi model which I would recommend as a replacement---more expensive, but it would fit the design parameters. As a bass amp, mine is a two channel one with 350 w/ch. I picked it up on ebay. Its not the best amp for upper mid and high frequencies, but its great for the low ones, and never even gets warm. For the mid range 165hz to where you cross to the tweeters(2600 to 3500), you need a power amp of about 150 - 200 watts/ch, looking for something HEAVY showing a really good power supply and a big capacitor. For the tweeters, any amp will do. I have an old Sherwood receiver I use for them that puts out 60 w/ch, and is light with a light power supply.PVC pipes are simple 4 inch thin wall white drain pipe. Very cheap at Home Depot in the States.I bought my Rane AC23 on ebay used for about $115, new they run $400, but they are built like brick sh*t houses, so there is no need to buy a new one. If you want a digital one, so you can have a slope up to 88db/octave or anything in between, you can get a Behringer for about $230.An equalizer is worthwhile having. You need a constant-Q model, and at least 2/3 octave, 1/3 would be better but I couldn't afford it

in my budget. Expect to pay on ebay about $175 for a two channel constant Q DOD or Rane analog equalizer. Mine is not currently in the loop.You need a measurement mic, behringer 8000 or Apex 220, and software.For woofers I use a DVC 12 inch Goldsound which retail at about $129 now. Any other one by Dayton for the same price around $130 or so would work. You need two of them.You need a preamp. I use a Kenwood B-1, but a Kenwood B-2 would be even nicer. Any pre-amp that works for you would be fine.That's a smattering of what I needed---maybe a quick 10% of the total info you need to design it.Marlboro

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Subject: This is getting long but.....
Posted by Marlboro on Wed, 25 Apr 2007 12:47:02 GMT
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If other people want to hear the design factors on my array and look at other pictures, please indicate that here, because other than that I'm going to move the discussion to private email.Marlboro

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Subject: Re: Yeah....AWESOME
Posted by jphaggar on Wed, 25 Apr 2007 13:12:28 GMT
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Marlboro, I guess it is going to take about a year for me to build your project but I'm decided . Just one rectification to your comment on selah design , the bass/mid is a 6.5" not an 8", but I want to experiment with smaller mids as you say they are faster .Could I keep in touch with you by private email ?JP

Subject: Re: Yeah....AWESOME
Posted by Bill Wassilak on Wed, 25 Apr 2007 15:47:03 GMT
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Thanks Marlboro, I was going to build some line array's for my PA system and when I talked to Jim Griffen, he said I could go out to about 1 wavelength on the c-t-c spacing, but I wasn't sure if it would have any noticeable comb filtering going on. From your arrays it sounds like you don't.

Subject: Re: Got my line arrays on a web photo center.....finally!
Posted by Rick Craig on Sat, 28 Apr 2007 17:34:03 GMT

Sorry to say but this is very poorly executed. With the spacing and drivers that you're using there certainly will be response problems.

Subject: No.....I should be EXECUTED for saying it.
Posted by Marlboro on Mon, 30 Apr 2007 01:07:43 GMT

The spacing matching Jim Griffin's report to the letter. The problem here is probably that I said I did it really cheaply, and most line array systems are done very expensively. Saying that I can have a system that really kicks butt, with all the benefits of a full 3-way line array for $1300, INCLUDING tri-amping, 1200 watts RMS, electronic crossovers, 2/3 octave Constant Q equalization, and includes an Apex 220 calibration Microphone, and Fuzzmeasure computer software, and a floor to ceiling system done in Oak, is a very bad thing to say. Very bad. it makes people very angry. It makes them angry when they think what they might have paid.Sorry to say, but there are no response problems that I can hear. The system kicks ass playing everything from Bach organ to solo violin to Saxophone Jazz to Little Feat and Led Zepelin. I'm not some 22 year old kid in the music department. I have near perfect pitch. I play the violin and the Saxophone. My father had degrees in music from Columbia and Julliard and my sister and brother in law have degrees in music performance(cello and Organ.) I still have local SEASON symphony tickets. I know what quality music sounds like both in live performance and how it usually doesn't sound like that in speaker systems. And while being 58 may have its detriments(I can't run quite as fast for my 45 minute run), it also has the benefits of more than 40 years of listening to speaker systems.Think what you want. I know what I might be thinking If I were you, but you won't. I've paid close attention to Jim's design parameters and followed them. I just did it cheaper and with a 3 way than the usual TWO way system.The spacing between the drivers is 5 inches. This means that the crossover to the tweeters cannot exceed 2712hz according to Jim's design parameters. My electronic cross is at 2600. The tweeters have their flanges cut the spacing is .9 inch which means that comb filtering might start around 15066hz, quite a bit above audibility.The real problem for you, Rick, is that I said I did the mid ranges with a 17-3 inch mid bass woofer, which was sold on PE for a measly $4.00, and 30 -tweeters which are sold on PE for a measly $4.10. Of course you are going to say its poorly executed. My God, if you don't say that then you cannot justify charging people what you do for a set of speakers that don't even go to the ceiling, and only have 8 woofers and 8 tweeters, and don't even have electronic crossovers, much less the included pre-amp, three power amps and equalization.Very Poorly Executed? What you may think, ACTUALLY, is that I should be executed for saying it outloud. Most people won't. It takes so damn long to build the systems that almost no one will build one from scratch like I did, and so almost no one around in the DIY speaker community can make comments like I did. Commercially designed Line Arrays have almost no competition from the DIY community.Marlboro

Subject: Re: Got my line arrays on a web photo center.....finally!
Posted by Jim Griffin on Mon, 30 Apr 2007 01:29:21 GMT
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Rick,Perhaps not as bad as you are thinking. He is using 3" diameter mid-woofs with 4" pipe loading for each one. It would have been better to locate these drivers closer together so that the center to center spacing was smaller (I'm guessing about 5" c-t-c in his design). While with his crossover at 2650 Hz would create some potential combing issues for a low slope crossover, his active crossover likely has a high enough slope to minimize the crossover overlap region between the mid-woofs and tweeers. He does trim the flanges on the dome tweeters so that their c-t-c spacing is reduced. Hence, he pushes the coherent frequency coverage for the tweeters higher than you would have without those trimmed flanges. He is a student of my white paper and suggestions which is a good start toward a cohesive line array. I'm sure that his next project will be improved but for a budget array it is a very good start IMO.Jim

Subject: Re: Got my line arrays on a web photo center.....finally!
Posted by Rick Craig on Mon, 30 Apr 2007 03:17:24 GMT
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Jim,Based on what we've measured with smaller drivers and a similar spacing there will be frequency response problems. The tweeters will simply not cross low enough to avoid this.

Subject: Re: No.....I should be EXECUTED for saying it.
Posted by Rick Craig on Mon, 30 Apr 2007 03:29:51 GMT
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As I responded to Jim this arrangement will have response problems by virtue of the driver spacing and tweeters used. I know what Jim's paper says but have you actually measured the raw driver response?

Subject: Re: Yeah....AWESOME
Posted by jphaggar on Mon, 30 Apr 2007 09:13:54 GMT
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Is this the tweeter you are talking about :HI-VI TN25 FABRIC DOME TWEETERJP

Subject: HiVi
Posted by Marlboro on Mon, 30 Apr 2007 14:37:54 GMT
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The HiVi I'm talking about is the 3 inch midrange/woofer. The only dome tweeter you can use is the PE Dayton ND20FA, which can have the flanges cut to a .8-.9 center to center. The B&G is a ribbon.Marlboro

Subject: Re: Yeah....AWESOME
Posted by Rick Craig on Mon, 30 Apr 2007 16:56:46 GMT
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Actually the RS8 uses 7" woofers. I've found that having the woofers operate down to 80hz and below is optimal in dealing with room issues. With running monopole drivers below 300hz you don't have that advantage.Using the small neo domes can lower your budget but they limit your sensitivity and crossover point. With equalization you can fill in the area below 2.5K; however, you'll be pushing the tweeters much harder at close to their resonant frequency - not a good thing. Domes also suffer from the interference patterns in the top octave but the EQ can help with that. Maybe you can explain why you would only use the Neo3 if implementing a planar or ribbon driver? Do you speak from experience using these in an array design?The Rane crossover is quite dated and uses inferior op-amps. Something like the Behringer digital crossover would be much better.

Subject: Response to Mr. Craig's Questions about my array
Posted by Marlboro on Mon, 30 Apr 2007 18:46:23 GMT
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Mr. Craig,You operate in a world of "use as much money as you want." I operate in a world of limited budgets, limited by a real world salary and living out in the country, with car loans, and college expenses for two kids etc. I'm not sure that you understand this concept based solely on your comments.I also believe that if I can hear a difference then there is a difference. If I cannot hear a difference or see a difference, then all the technical papers in the world don't matter. I also believe that just because I am too poor to afford your $4000 array kits that doesn't mean that I'm not entitled to build something that works for me. While technically my design may be inferior to the quality of your parts, my design beats out any other point source speaker I've ever heard, and allows me to feel through my listening experience that I'm right there in the concert hall using all the qualities of a line array. Can I ask for more than that? No, I think not.I chose several design goals that you don't care about. Just because YOU don't care about them, only means that they are not important to YOU. These design goals include:1. use a 3 way, not a 2 way2. NOT break up as much of the critical human hearing frequencies between 300hz and 3000hz as possible with the effects of a crossover3. Use electrical crossovers4. Separate the midranges in

the array completely from each other and use a 4 lb/cu ft fiberglass stuffing, in a long tube to reduce the backwave sound radiation to almost nothing through absorption, and to prevent any interaction with any other speakers in that backwave.5. Keep the cost for all of this down below $1300.I was successful in all design parameters except that I couldn't get all the way to 3000hz. These are not your design parameters, they were mine.Now as to your questions:1. Room issues. I explored the issues of room issues with Dr. Griffin. My room has an 11.5 foot front and a 16 feet to the back. I am sitting about 9 feet from the speakers. This puts me entirely within the near field for the tweeter and midrange line, though of course not with the woofer. However, I was not able to find any references that said a woofer running below 165 or so would be a problem. However, at some point I am ready to implement a line array by adding two more woofers. Being entirely within the nearfield means that room reflections come too late for my brain/hearing to interpret them as part of the music, so they don't impact my hearing, and thus room issues are a non issue for me.2. Tweeters: The sensitivity of my tweeters is nearly 108db. Its 11 db above my mids which are 3 db above my woofers. Sensitivity is not an issue when you are using 60 tweeters, 30 on a side. Likewise when using 30 tweeters with the required sound volume developed in a 11.5 x 16 x 8 foot space or 1500 cu ft, and when each tweeter only needs to carry 3.3 % of the total volume of the treble volume, the tweeters are not being pushed at all. To say that each one is loafing along would be an understatement.Additionally, they are being used with a 24 db/octave L-R electronic crossover, and are crossing over at 2600hz. While their resonant Frequency is not a full octave down from their cross, the fact that the cross is so steep, that it's a stable crossover, and the fact that each one is outputting so little of the total load, as well as so little of the total watts(probably not exceeding 0.03 watts), the BAD THING that you describe is really not particularly BAD at all.I have spoken to others who used them in this was before I built them, and they found that the little Dayton ND20A's were up to the task without a problem.3. Jim Griffin and I have already spoken about the interference pattern of comb filter distortion. I have cut the flanges on these little domes(I have a word document that shows how to do this if you want it) so that the center to center distance is about 0.9 inch. This limits the start of comb filter distortion way way into the last octave and at about 15Khz. This is extremely difficult to hear. Using my equalizer in the loop, and raising the 15Khz and up made them sound excessively "bright". I satisfied that I, and my wife too, cannot hear this interference pattern in any music that we listen to. Additionally, in the room that we are in, we don't move around. Comb filter distortion, as you know, is most noticeable when moving not when standing still, as one moves in and out of the fingers of cancellation.4. The B&G Neo3. I am notorious for disbelieving manufacturer specifications. They tend to use the most smoothing possible in their FR's and basically try to put a good light on their item, which of course they should. So I tend top believe independent lab tests. I tend to believe John Krutke's evaluations. His eval of the B&G neo3 put it up with the flattest frequency response, and lowest distortion of any ribbons or planars that he tested. It was the only one that beat out a quality standard high quality dome. You know that I don't speak with experience about this since I've built a budget array so there is no need to be snide in your question. 5. The Rane crossover IS DATED. However, I needed an electronic crossover which would fit within my design goals. I was able to find one on ebay for $95. At some point, I will have more fund, possibly as early as this summer, and at that point I will sell my Rane AC-23 and purchase a digital Behringer Crossover. I do not run the op amps on the Rane at full power. When the system is not running a signal from the CD player, and is set at the full volume that I listen, I cannot hear any noise coming from the op amps of the Rane or the pre-amp, or the associated power amp through the speakers; they are dead silent.----------I hope this answers your questions. My design goal's were quite different than yours. Jim stated that I would change my next version.Perhaps you would like to

know what I might do if I had the funds:1. Upgrade the Sammi 3 inch mid woofs. At this point, I’m not sure what since my design goals require multiple 3 inch midranges(the 300-3000 range of no crossover).HiVi makes one that might work for me, though I'm not sure that it is an upgrade. 2. the digital crossover of course, but that will probably come this summer anyhow.3. Possibly a change in tweeter. Unfortunately I prefer the SOUND that is produced by domes to that which is produced by ribbons, so I’m not sure. And except for the B&G Neo 3, the FR of my domes is much flatter than any ribbon I've seen.Marlboro