Subject: Very interesting article/experiments
Posted by BillEpstein on Thu, 25 Nov 2004 16:06:21 GMT
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Another reason to love Google. Art Ludwig. Read the whole site but especially the pages on measuring cabinet vibration: cabinet vibrationI wonder how much of this is verifiable truth as opposed to bad measurement or method.
Art Ludwig

Subject: Re: Very interesting article/experiments
Posted by GrantMarshall on Thu, 25 Nov 2004 20:20:36 GMT
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Nice find Bill.I liked his section on time alignment as well. Dr. Edgar's articles from his tratrix midrange mention putting the midrange in front of the highs similar to what Art mentions.I took my horns out and set them about 8 inches behind the midrange the other day. Really messed things up. I've moved the midrange horn an inch or 2 in front of where the high frequencies come out and it seems to improve the sound (I'm running Waynes conical horn midrange).I hope life is being kind to you these days.Grant.

Subject: Re: Very interesting article/experiments
Posted by Wayne Parham on Fri, 26 Nov 2004 02:05:13 GMT
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Good link, thanks!I thought the conclusions drawn about attenuation of sounds in the cabinet with insulation were good. But using a constrained layer for absorbtion isn't something that has been overlooked by the industry. Look at Chapter 5 of the JBL Sound System Design Manual, for example.The thing is that there is limited room in a loudspeaker cabinet, and so this is something that has to be considered. But it is also why a thick insulator is required, to space it away from the boundary. It's also why using something like a thin felt attached directly to a panel surface has no effect at all.As for time alignment, I have never thought this was an appropriate expression when used to describe loudspeakers. I prefer to talk about things that reduce frequency anomalies throughout the listening area. Maybe some would say that's splitting hairs, but I think it is a very important distinction.Physical alignment is not time alignment, because there are too many other variables involved. So to compare time alignment with physical alignment is just not appropriate, in my opinion. I think it's better to show response in various positions in the listening room, which is a better indicator of what's really going on.For years, I calculated the phase angles and determined driver positions that would result in a reduction of frequency anomalies. There was always a range or positions that would be acceptable, and a range that would not. It was a pretty long and tedius process, but it was really the best method available to me.These days, a person

can do it the easy way with software like Speaker Workshop. I didn't trust budget measurements for a long time, because my experience told me that budget measurements weren't worth much. But things have changed in the last few years, and programs like that make finding frequency anomalies a lot easier. The thing you're looking for is destructive interference that causes response aberrations. An absense of these is the best indication that the loudspeaker is setup right.

Subject: Re: Very interesting article/experiments
Posted by Wayne Parham on Fri, 26 Nov 2004 02:30:44 GMT
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There are several ways you can setup the system that will work well, but thre are several others that won't. One that I've had success with is using a third-order on the tweeter and the mechanical rolloff of the midhorn. There's also a small inductor on the midhorn that nudges it a bit, but it's only there to attenuate output from breakup modes. It doesn't add anything as far as rolloff slope is concerned.Midhorn implementationWith this arrangement, I am able to use the

reverse polarity. Between the crossover phase angles and the depth of the horns, it allows me to position the horns so that their mouths are flush. This configuration provides increased power handling and dynamic range and also reduced comb filtering anomalies by way of decreased overlap. To me, it is the most attractive solution, both aesthetically and acoustically.

Subject: Re: Very interesting article/experiments
Posted by spkrman57 on Fri, 26 Nov 2004 14:42:50 GMT
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Hi all, Interesting thoughts on time/phase alignment. There are a lot of theories that I have heard on this, but the easiest way to see is to have a horn on top of a low freq driver and actually slide the horn back and forth to listen to the changes it makes.Also like Wayne mentions often, the crossover type plays a big difference in the alignment. I have found 1st order crossovers most forgiving in alignment errors, and I have found that with higher order crossovers that the physical alignment to get it all right is different also.I use the text-book method when trying out a new system, than experiment afterwards to see how far off from textbook the results are.I would like to acknowledge Sam Payne Jr for steering me in the right direction a few years ago. I believe the beginning of it started in the Pi forum. I have not heard from Sam in awhile, wonder what he is up to lately???Bill, have you moved your horns back around yet?????? LOLRon

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Subject: Re: Very interesting article/experiments
Posted by Wayne Parham on Fri, 26 Nov 2004 23:17:37 GMT

I wrote to Sam just the other day and we exchanged a few E-Mails. I'll have to write to him again and point out that you were asking about him. Sam always advocated the Altec method of setting driver position by reverse-connecting and adjusting for the largest null. It's simple and effective.I was always quick to point out that this was a way of finding a configuration that minimized anomalous behavior, and that it was not exactly time alignment. But then again, that's the point. To speak of time alignment is kind of a misnomer in my opinion, but to find a configuration that reduces nulls through a particular range of frequencies at specific locations is the goal. One can either find it by calculation or measurement.First-order crossovers are very simple, and I agree with you that they're easy to make sound good, for the most part. The lower the frequency of crossover, the better they work. That's because at low frequencies, wavelengths are long and the two drivers being crossed can be fairly far apart and still act in unison through the wide overlap range.But as frequency goes up, the distances shrink and shrink to a point where it is impossible to prevent interference-related anomalies. After all, the crossover band of a first-order crossover is about four octaves wide, so the two drivers act like a two-element array through this region. Both speakers are playing and nulls form where drivers interact to create destructive interference. That causes dead spots, but ironically, if the interference is very great, then the nulls are so closely spaced that it seems like everything balances out.Just like everything else, there are pros and cons for each configuration. As for me, I like first-order networks for some things and higher-order for others. To me, a passive crossover at 200Hz is perfect for a first-order filter because wavelengths are large. A simple two-way loudspeaker is a good place to use one. I've even heard some compression horns that worked well with first-order filters, when used at low power. But in general, that's where I like to use a higher-order filter and to do what's necessary to implement it properly. To me, the benefits there are worth the effort.

Subject: Terminology might be wrong - but principles apply
Posted by spkrman57 on Sat, 27 Nov 2004 12:22:53 GMT

Wayne, You are probably correct in that the "time/phase" alignment may not be what we are physically aligning for. Yes we are decreasing the destructive componenets. But for me, the terminology will always be a "hit and miss" item as I am a "backyard-mechanic". I will never be able to hold up against you engineers. You are held to higher standards.But anyways, In my experiments I have found that you can be slightly off on alignment and sometimes get a response that will counter other flaws such as room reflections/etc in the environment. But I have always found it a compromise of one sort or another. Ask BillE how many times we discussed horn placement and crossover freq, every time I think I can nail it down using textbook ideas, I still have to do slight tweaking using my ears for the final reference.Anyways, just sitting here at work and rambling on. Just thought this might bring up more observations on sound reproduction and such!Thanks for listening Wayne!!!!Crazy Ron

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Subject: Re: Terminology might be wrong - but principles apply
Posted by Wayne Parham on Sat, 27 Nov 2004 17:51:50 GMT
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What you're saying makes sense, and that's the point. I think it's important to minimize nulls throughout the listening area, and that's the issue to be addressed. The thing I'm focused on is outlined in the post called "Baffle spacing, phase angles and time alignment, revisited."

Subject: Re: Terminology might be wrong - but principles apply
Posted by spkrman57 on Sat, 27 Nov 2004 18:36:21 GMT
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You got a way with words dude!One thing is for sure, it seems that you can't ever get 2 sound producers to ever be in sync all the time, no matter what. Kind of eerie, ain't it!!!Ron