Subject: 4Pi measurements
Posted by zheka on Wed, 24 Oct 2012 04:18:03 GMT
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Hi Wayne,

I finally assembled the speakers and took some rough measurments.
Can you tell me if the graphs look sane?

I am especially concerned with the 1st speaker. what do you think about that bump in the crossover region ?

thank you very much

File Attachments
1) 1st speaker.jpg, downloaded 6236 times
2) 2nd speaker.jpg, downloaded 6095 times
3) 3rd speaker.jpg, downloaded 6214 times
4) all three.jpg, downloaded 6222 times
5) pimeasurmentsetup.jpg, downloaded 6177 times

Subject: Re: 4Pi measurements
Posted by Wayne Parham on Wed, 24 Oct 2012 05:33:00 GMT
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Your measurements look right except for two things:

1. The first speaker does have more peaking around 1.6kHz than it should. Could be the crossover, or it could be the midwoofer cone. Is it a new woofer? If not, you might measure it by itself and see if there is excessive cone breakup. Also, check your crossover and make sure you have the Zobel connected. A missing Zobel will do that. And check all the other values too, especially the capacitors in the woofer circuit and the coil in the tweeter circuit.

2. There is more rolloff up high than I would expect. They don't falloff this much in the top decade. I'm guessing it's something in the measurement system. It has what appears to be a first-order rolloff above about 2kHz. I don't really think your speakers are doing that, partly because it is consistent across multiple speakers, and partly because this is a fairly common measurement problem. I see it happen pretty often, people produce a curve that looks a lot like mass rolloff even on speakers that couldn't possibly produce that kind of response.

Other than those two things, your measurements look right. I think if you were to conjugate that abnormal first-order filter above 2kHz, your response curves would be exactly right.

You've done a very good job, and I'll bet they sound great.

Subject: Re: 4Pi measurements
Posted by zheka on Wed, 24 Oct 2012 13:56:51 GMT
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I really appreciate you taking time to help me with all this.

1. it is a second-hand woofer. I will check the Zobel connection. But if I need to, how do I go about measuring the woofer by itself? Do I remove it from the cabinet and feed the signal directly, bypassing the crossover? or should I keep it in and simply disconnect the compression driver? or keep it in but bypass the crossover? Also, what frequency range should the test signal cover? Is 40Hz-2kHz range reasonable?

2. re: HF roll off. What are the common measurement pitfalls that can account for this? I am thinking that positioning of the mike may be the issue. I tried to point it at the edge of the woofer or slightly above, between the woofer and the horn. If I remember correctly, that's where the center of the front lobe is supposed to be. But given that the measurements are fairly near field, should not the mike be pointed straight at or at least much closer to the center of the horn?

thank you

Subject: Re: 4Pi measurements
Posted by Wayne Parham on Wed, 24 Oct 2012 19:17:25 GMT
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To measure the woofer, leave it in the box and just disconnect the tweeter. A sweep up to 2kHz

or 2.5kHz is sufficient, but it wouldn't hurt to go to 4kHz. I would measure it two ways: (1) Measure the woofer connected directly to the amplifier (without crossover). This will tell you what the woofer is doing, all by itself. If it has excessive breakup, this will show it. Then (2) measure with the woofer crossover connected, which should show smooth rolloff above 1kHz. If it peaks at 1.6kHz, we have a problem with the Zobel or the core low-pass splitter filter.

As for the HF, you have the microphone positioned exactly right. In fact, it will be pretty much the same even if the microphone is moved towards the top or the bottom of the box, until you reach the point of the vertical nulls, which are pretty far apart. See the following thread, and click on the "Vertical Nulls" link for a video of the measurement process (just like what you're doing): Crossover optimization for DI-matched two-way speakersThere are a lot of things that can cause the rolloff up high, but I think the most common one is just needing calibration. Seems like most uncalibrated systems are a little hot up high or a little rolled off. The microphone can be measured by a calibration house, who will return to you a disk that you install in the measurement system. The data on the disk is essentially a response curve of the microphone, which is then conjugated to make the resulting data true. Of course, this assumes the measurement system is accurate, including its internal preamp and ADC. It would be good to have this verified too.

Subject: Re: 4Pi measurements
Posted by zheka on Wed, 24 Oct 2012 19:36:27 GMT
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Thank you very much, Wayne.

The SPL meter I use is calibrated by Herb Singleton of cross-spectrum labs. I am not at all confident about my sound card though. I know for sure that it gives erroneous results in extreme LF region.

I will try a different sound card when i get a chance. But for now I am not going to worry about it. I do want to figure out what's going on with that speaker because, as you suggested, it maybe an indication of a bigger problem.

Thanks again.

Subject: Re: 4Pi measurements
Posted by Wayne Parham on Wed, 24 Oct 2012 20:11:34 GMT
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I agree with you - I wouldn't worry about your calibration. I think that's most important when you need a solid reference, like if you were planning to publish your charts or make some sort of formal comparisons. But for what you're doing, I am already comfortable with what you have. In a

expect except for an additional first-order LP filter function above 2kHz. You can mentally conjugate that curve and feel comfortable with it.

On the low-end, that's not uncommon either. At very low frequencies, a Delta-Sigma converter has a hard time, it's just the nature of the process. That's why some measurements systems take forever when measuring low frequencies. They're trying to compensate for that. An old Nyquist converter just uses successive approximation, so low frequencies are easy. But Delta-Sigma is a different process, and does not work well at very low frequencies.

Subject: Re: 4Pi measurements
Posted by thatsnasty on Sat, 27 Oct 2012 00:41:26 GMT
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Wow Zheka, you finished!
They look just like BigMouthinDc's
I've been so busy fixing my surrounds and working I haven't had a chance to put mine together. Literally everything is sitting downstairs.

Looks like I need to invest in a measurement mic to double check as well.

The real question is... how do they sound?!

Subject: Re: 4Pi measurements
Posted by zheka on Sat, 27 Oct 2012 02:51:19 GMT
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I wish mine were as well built as BigMouthinDc's I probably made all the usual rookie mistakes and than came up with some more. On the bright side, I will keep the speakers behind the screen so the looks are not all that important.

I did not have a chance to listen to them in any meaningful way. And, for reasons beyond my control, I won't be able to for at least another week. the suspense is killing me but there is nothing i can do...

BTW, I'd gladly help you with measurements if you'd like, as long as you keep in mind the limitations of my gear and expertise.

Subject: Re: 4Pi measurements
Posted by zheka on Sat, 03 Nov 2012 20:26:59 GMT
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I finally had a chance to open the speaker with unhealthy boost in the crossover region - the zobel

was disconnected! What a relief.

This is my response curve now:

File Attachments
1) Zheka_4pi_response.jpg, downloaded 5884 times

Subject: Re: 4Pi measurements
Posted by zheka on Sat, 03 Nov 2012 20:27:26 GMT
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I spent a little time today listening to Sun Ra Arkestra Music For The 21st Century. I find it a good test CD because it calls for high details/resolution as well as wide dynamic range capabilities. There are few loudspeakers that can excel in both IMHO. The 4Pi's had NO problems with this material. In fact I do not recall this album sounding better in my room, ever.

Subject: Re: 4Pi measurements
Posted by skywave-rider on Sat, 03 Nov 2012 22:55:14 GMT
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Glad the problem was an easy fixer!

Subject: Re: 4Pi measurements
Posted by thatsnasty on Sun, 04 Nov 2012 00:27:09 GMT
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zheka wrote on Fri, 26 October 2012 21:51I wish mine were as well built as BigMouthinDc's I probably made all the usual rookie mistakes and than came up with some more. On the bright side, I will keep the speakers behind the screen so the looks are not all that important.

I did not have a chance to listen to them in any meaningful way. And, for reasons beyond my control, I won't be able to for at least another week. the suspense is killing me but there is nothing i can do...

BTW, I'd gladly help you with measurements if you'd like, as long as you keep in mind the limitations of my gear and expertise.

I appreciate it! I'll definitely be posting when I get them finished. I'm off tomorrow so maybe they'll be done then.

Glad it was just the Zoebel.... I was debating soldering it to the X-over board when I attached them but didn't bother because the clip leads fit really snug.

Subject: Re: 4Pi measurements
Posted by Wayne Parham on Sun, 04 Nov 2012 01:50:08 GMT
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zheka wrote on Sat, 03 November 2012 15:26I finally had a chance to open the speaker with unhealthy boost in the crossover region - the zobel was disconnected! what a relief.
I thought that was probably the cause. Glad you took the time to measure the speakers - It sure helped you nail it down!

Subject: Re: 4Pi measurements
Posted by zheka on Sun, 04 Nov 2012 05:19:16 GMT
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Wayne,

Tonight is the first time I am using your speakers in any meaningful way. I cannot be happier about what I am hearing.

Thank you very much.

File Attachments
1) Zheka_4pi_response.jpg, downloaded 3381 times

Subject: Re: 4Pi measurements
Posted by Wayne Parham on Sun, 04 Nov 2012 06:10:18 GMT
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Subject: Re: 4Pi measurements
Posted by thatsnasty on Mon, 05 Nov 2012 05:07:48 GMT
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Cellphones are not good cameras, lol.
More to come
I'm Thinking about picking up an Omnimic soon.

File Attachments
1) 196041_10152243870375613_1354008227_n.jpg, downloaded 2395 times

Subject: Re: 4Pi measurements
Posted by zheka on Mon, 05 Nov 2012 12:31:38 GMT
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