Subject: 4pi build and questions
Posted by n-a on Wed, 14 Nov 2018 08:31:47 GMT
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Hi Wayne,

Can you confirm my math in the compensation chart for the 4pi with -3db for the DE250 8ohm with the 2226J 16ohm midwoofer.
I understand the basics, but can you tell me a little more about the voltage sensitivity? Effects of doing this "wrong" with 16ohm woofer? Effects on the amplifier? Is there some amp better than the other in this configuration?

Thank you very much.
n-a

File Attachments
1) IMG_0959.JPG, downloaded 995 times

Subject: Re: 4pi build and questions
Posted by Wayne Parham on Wed, 14 Nov 2018 22:36:45 GMT
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There are two things to consider when substituting a driver with different impedance:

1. Voltage sensitivity
2. Reactive load

The voltage sensitivity is the easier of the two to understand. You need to match the SPL of the woofer and the tweeter at a given drive voltage. If their load impedances are different, then each will receive a different amount of power, because power is a function of the reciprocal of resistance (V2/R). So you have to match their sensitivity at a given voltage level, rather than to

95dB/2.83v/M whereas the 2226H generates 98dB/2.83v/M. Both parts generate 98dB/W/M, but the drive level to dissipate one watt is different.

The load presented to the reactive parts in the crossover is different, so the components must be scaled. Generally speaking, if the load impedance is doubled, then the inductance of the coils should be doubled and the capacitance should be halved. But this is not always exactly the case, so it's best to verify with testing.

Subject: Re: 4pi build and questions
Posted by n-a on Thu, 15 Nov 2018 14:13:38 GMT
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Ok, thank you so far. So to confirm this; double the coils (woofer), half the capacitors (woofer, but not C4), double the R3 to 16ohm, compensate -3db with the resistors in HF schematics. Can you confirm my math in the earlier post? Does it show?

My intention is to take measurements when the speakers are ready to confirm that is working as designed. But I understand that it should be build with the right parts. All the parts that I have are new and I thought that I have the 2226H, but what I received was 2226J. And the private seller didn't have the 2226H left anymore so I will try to make these work. :)

I will send some pictures when the building starts.
Br,
n-a

Subject: Re: 4pi build and questions
Posted by Wayne Parham on Thu, 15 Nov 2018 14:47:01 GMT
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If I were you, I would send back the 2226J drivers and get 2226H drivers instead.

Since you've just recently purchased and implied that's an option, I wouldn't think twice - I'd just do it. That way you'll know they're right.

But if you had 2226J parts and were going to try to make them work, what you've described is a good starting point. You'll still need to "dial them in" though. Measure amplitude response and polars, and slightly change the capacitor and/or coil values slightly to get the on-axis and off-axis response right. Pay most attention to the verticals, because that's where you'll see phase shifts caused by the crossover.
Crossover optimization for DI-matched two-way speakers

Subject: Re: 4pi build and questions
Posted by n-a on Fri, 16 Nov 2018 07:53:18 GMT
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I did tried to change the parts but in the end and after all the frustration, what I have is two NOS JBL 2226J drivers. Positive thing is that those were cheap.

So I will try to make the best out of this. :)

What is your opinion, is the Dayton audio iMM-6 (mic for phone) + audio tools app (studiosixdigital) good enough to make home brew measurements? :)

Can you give me advice how to avoid the biggest mistakes when measuring?

Thank you for all the help, I very much like the scientific approach that you have when designing loudspeakers. Math doesn't lie. I personally am tired to build 6.5" two-way speakers. Expensive ones have more refinement but all those lack the easy going, effortless, dynamic sound. Time will tell what the 4pi with the new horn+DE250 and 2226 will bring to the table :) Coils are already bought and those are 14awg for 2226 and 15 awg for the DE250. Resistors are Mills and Jantzen. 100w 16ohm resistors are from Ebay:

https://www.ebay.com/itm/100W-16-OHM-Non-inductive-Resistor-Power-Amplifier-Test-Dummy-Load/190878673517?epid=900385139&hash=item2c71416a6d:g:txkAAMXQVhFR94HB:rk:1:pf:0

English is not my native so please ignore any misspelling.

Br,
n-a
Finland

Subject: Re: 4pi build and questions
Posted by n-a on Fri, 16 Nov 2018 08:04:28 GMT
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And thanks for the video, very helpful! I was going to ask about poor room acoustics and how does that reflect but as you already said in the video, I need to take the focus in to 1000Hz to 2000Hz range where the crossover point is.

Subject: Re: 4pi build and questions
Posted by Wayne Parham on Fri, 16 Nov 2018 16:44:44 GMT
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Do exactly what I did in the video and find the position of the vertical nulls. Dial-in the crossover by nudging parts values up or down in size to get the nulls symmetrically above and below the speaker +/-20°.

If you're lucky the nulls will be in those positions right from the start. That's how they are when using the JBL 2226H and the crossover as shown in the plans.

Subject: Re: 4pi build and questions
Posted by n-a on Wed, 05 Dec 2018 14:33:58 GMT
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I made the crossover in two separate pieces. Taking my time, no hurry :)
There is some cushioning under the coil and capacitors.

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1) Cr2.JPG, downloaded 888 times