Subject: Pi Speakers Crossover SPICE values
Posted by Adrian Mack on Tue, 13 May 2003 07:48:18 GMT
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Hey Wayne.I downloaded Spice today and opened the pi crossover files. However I have a few problems trying to run the transfer function graph: It askes for the "Small-signal Output Varible" and also the "Small-signal input source". I went to the Help files, and entered the example ones, it said enter v(8) and vin, and it came up with a small box with three things in it, and three numbers, but no transfer function graph?! What should I do? Maybe I should stick with using the 1.6KHz compensation values on the 1KHz crossover? I do want it done properly though.... I would like to avoid as much guessing as possible. R1, R2 and C1 change the compensation values.... how can I change these values in spice? I think it has something to do with the (+)node and (-)node values in Spice.... but they dont seem to change the value of the component next to it. ! Compensation componentscomponent____(+)node___(-)node___valueR1_____3_____1_____16 C1_____3_____1_____0.47uF! Pre-compensation load R2_____3_____0_____16Which one(s) of these should be changed?BTW: How much compensation should be used? I think the graph you showed me before was for a two inch driver, which needs more compensation. I will probably do some ear tests as well in case it is too much/little compensation, so I can change it, which is why I need to know how to use Spice for this :-)Any ideas?Thanks!Adrian

Subject: Re: Pi Speakers Crossover SPICE values
Posted by Wayne Parham on Tue, 13 May 2003 08:13:52 GMT
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Let's go through this one thing at a time.First, what model did you load? Second, did you try "AC Analysis?" If so, it will ask number of points, start frequency and end frequency. The defaults of 1000, 10 and 20000 are fine. Click "Run." Then you will be told to pick variables to plot. Choose

"Magnitude" and "DB Scale" checkboxes.A grid will appear. Select "Format - X Axis" and check the values shown. The defaults are fine, being Minimum 0, Maximum 20000, Increment 5000, and Minor Tics 4. I like to select the checkbox to "display grid." Click "OK." Now select "Format - Y Axis" and check the values. The defaults are no good on this one, enter Minimum -50, Maximum 0, Increment 10, Minor Tics 4 and check "display grid."You can click the little button that looks like a traffic light and it will start the simulation and show the response graph. When one is running, you can click exit to stop it and allow you to play with the variables. If you want to change a value of a part - like those used for R1, R2 and C1 - just change the number in the corresponding value field of the model description file.I hope that gets you going. After you start getting some graphs, you'll probably catch on very fast. Don't hesitate to write back as you find more stuff you want to do, or things you want to know. And please be sure to post if you find something interesting too!

Subject: Re: Pi Speakers Crossover SPICE values
Posted by Adrian Mack on Tue, 13 May 2003 10:55:09 GMT
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Hey Wayne,It works! YAHOO! I entered your 1KHz components as in the other post. It does have a peak at crossover frequency. I changed R2 from 20ohm to 14ohm, and the peak is gone :) Here is what the 1Khz xover looks like now:Does it look alright? R1 is 12, C1 is 0.47uf, and R2 is 14ohm (or should this be kilo ohm? Its not stated in the editing part). It seems only 11db down at 1K xover freq, which is a bit less than the graph you posted in the other post on what the graph should look like.Have you got any thoughts on this?BTW: I am using 1" compression driver. Thanks!Adrian

Subject: Re: Pi Speakers - 1kHz - Crossover SPICE values
Posted by Wayne Parham on Tue, 13 May 2003 17:35:53 GMT
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Good job! You hit it right on the head with those values for an 8dB network with top-octave compensation. They are measured in ohms, by the way, and not kilohms. Your response curve looks great for use with compression horns. If you want more midband attenuation, just modify the values of R1 and R2 to suit.

Subject: Re: Pi Speakers - 1kHz - Crossover SPICE values
Posted by Adrian Mack on Wed, 14 May 2003 08:50:18 GMT
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Hey Wayne.Thanks :-)Here is a graph of my compressiond driver taken from the P.Audio website:As you can see at 15Khz, it is about 9db down, but at 20KHz, its way out to like 16 or 17db! Having the top end roll off a bit is supposed to sound better.... but I still think that its not going to be compensated enough using the 1KHz crossover with those settings (graph in last post). Maybe I should try to make it compensate more, but its pretty hard to do that just on the top bit. What do you think?Thanks!Adrian

Subject: One other thing.....
Posted by Adrian Mack on Wed, 14 May 2003 09:21:56 GMT
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Because the bottom octave is essentially rolled off to augment the top end, does this lower the overall sensitivity of the driver? Or, it it just the attenuation/lpad part of it that will lower sensitivity... ?Thanks!Adrian

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Subject: Re: One other thing.....
Posted by Wayne Parham on Wed, 14 May 2003 17:26:20 GMT
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The compression horn is attenuated just as the response chart indicates - most attenuation occurs below 4kHz. That's where the horn is most efficient because mass rolloff starts around 4kHz. Above 4kHz, attenuation is gradually removed at 6dB/octave rate, providing compensation for mass rolloff. Compression drivers on 90x40 horns are usually about 106dB/W/M below mass rolloff, so with a 10dB attenuator, you have overall output of 96dB/W/M. This doesn't change your dynamic range, it just shifts the operating point to match that of the LF subsystem.By the way, there is another rolloff point caused by voice coil inductance, generally around 16kHz to 18kHz on modern 1" exit drivers. This begins a 12dB/octave slope. The front chamber forms a third pole, usually also around 16kHz to 18kHz, so response drops like a rock above that. You can expect nice flat response up to 16kHz or 18kHz or so using 6dB/octave augmentation, but when inductance and front chamber rolloffs come in, that marks the end of usable response.

Subject: Kewl
Posted by Adrian Mack on Thu, 15 May 2003 11:54:42 GMT
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OK, thanks! I ordered a pair of P.Audio PA-D45's today... they are supposed to be really good. Only AU$160 for the pair because of a really big clearout sale, they retail approx AU$220 each :-) I could not pass up the deal! Cant wait till they arrive!Adrian

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