Subject: IMPORTANT - Compensation component values
Posted by Wayne Parham on Fri, 07 Sep 2001 07:49:45 GMT
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Here's a chart that shows the appropriate values of R1, R2 and C1 compensation components for the Pi crossover. The way it works is the level of attenuation shown in the "dB" column is what the circuit presents to the tweeter below mass rolloff. Above that, attenuation is removed at 6dB/octave. So if you use R1/R2/C1 values that give 10dB attenuation, the tweeter will be -10dB from crossover up to 6kHz, at 12kHz it will be -4dB and by 20kHz there is no attenuation at all.

dB	R1	R2	C1
6dB	12 ohm	30 ohm	0.47uF
8dB	12 ohm	20 ohm	0.47uF
10dB	16 ohm	16 ohm	0.47uF
12dB	25 ohm	16 ohm	0.47uF
14dB	30 ohm	14 ohm	0.33uF
16dB	40 ohm	12 ohm	0.33uF
18dB	50 ohm	12 ohm	0.22uF
20dB	75 ohm	12 ohm	0.22uF

Subject: Re: IMPORTANT - Compensation component values
Posted by Rich B on Fri, 07 Sep 2001 09:19:20 GMT
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The table is a great idea!ThanksRich

Subject: Re: IMPORTANT - Compensation component values
Posted by Mike Borzcik on Fri, 07 Sep 2001 11:19:24 GMT
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I built some speakers and find them to have just a hair too much treble, so I suppose this would help that, right?Thanks,Mike Borzcik

Subject: Re: IMPORTANT - Compensation component values
Posted by Wayne Parham on Fri, 07 Sep 2001 20:51:31 GMT
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If your tweeter circuit is like the Pi crossover, and you're using a compression driver with CD horn, then this is the approach you'll want to take. It will make your speakers very smooth, not lacking in treble but not too bright either. You just have to match the efficiency of the woofer with the tweeter output, using the compensation values in the chart.However, if your tweeter is not a compression driver, or if it is but is mounted on a horn that has collapsing directivity, then this crossover arrangement may not be right for you. It's perfect for Pi's and speakers like them, but no single crossover is right for all loudspeaker configurations.

Subject: Compensation components
Posted by Art J. on Fri, 07 Sep 2001 22:27:59 GMT
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Hi Wayne, Ive been looking over a Klipsh Cornwallcrossover schematic and they use a transformerfor compensation. Is their any advantage to that over resistors and L pad ? Thanks Art.

Subject: Re: IMPORTANT - Compensation component values
Posted by James W. Johnson on Sat, 08 Sep 2001 00:10:05 GMT
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Excellent... that's just what I was looking for.Out of curiosity, is there anything that uses more than 10-12dB attenuation?

Subject: Re: IMPORTANT - Compensation component values
Posted by Wayne Parham on Sat, 08 Sep 2001 00:55:56 GMT
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No, and I wouldn't recommend it if there were. The best match is a high efficiency woofer that's only about 10dB lower than the tweeter, just enough for passive EQ of the power response using the R1/R2/C1 network. A woofer that is less efficient than that - needing more than 12-14dB attenuation - is probably not a good match for this kind of system. I've calculated values well

above and below what I'd actually recommend using.

Subject: Re: Compensation components
Posted by Wayne Parham on Sat, 08 Sep 2001 01:44:03 GMT
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There may be an advantage for their application, but for what we're doing, the RRC approach works best. The initial load resistor R2 provides a specific amount of damping for the splitter filter to provide an initial shelf of flat response, followed by 6dB/octave rising response above 4kHz via R1/C1 to compensate for the falling power response of the driver. A transformer would not do this.One benefit from using step-down transformers is they transform the energy rather than dissipating it, so they don't get as hot when current is high. On the other hand, I don't expect the Klipsch transformers are made to take a whole lot of power, so this might be a mute point. However, another aspect of this is the impedance transformation which effectively increases tweeter damping when a step-down transformer is used to lower the drive voltage to a tweeter. The output coil from the step-down transformer has lower impedance and is therefore a better current sink, providing better damping. Here again though, I'm not sure this is very relevant in practice because tweeters do not require a lot of electrical damping, particularly compression horns which are extremely well damped acoustically.

Subject: Re: IMPORTANT - Compensation component values
Posted by Wayne Parham on Sat, 08 Sep 2001 02:11:24 GMT
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Thanks! I hope it helps. I'm only sorry that I didn't think to post it sooner. Everyone doing a custom job asks what values I'd suggest they use, so here it is.Note that if you're building from the plans, you won't need this chart. Use the values specified in the plans. The chart is for people that are doing their own thing, and gives them a place to start.

Subject: Re: Compensation components
Posted by Art J. on Sat, 08 Sep 2001 09:11:15 GMT
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Thanks, To fully cover the subject;What do you think of variable L Pads ?They are my choice because you can further compensatefor room conditions and peircing headaches.

Subject: L-Pads
Posted by Wayne Parham on Sat, 08 Sep 2001 21:11:04 GMT
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L-Pads don't work as well in this application because they don't provide the proper load to the splitter filter for what we need in a compensation circuit. If we weren't building in EQ for the driver's power response, an L-Pad would be fine. But to make a conjugate of the compression driver's power response, we need an initial region of flat response followed by a couple octaves of rising response, 6dB/octave reduction of the attenuation. The best way to do this is by slightly underdamping the splitter filter to get the initial flat part of the curve, and using an RC network to provide the 6dB/octave rising part of the curve in the top octave.