Subject: Clarification of attenuation values
Posted by Wayne Parham on Thu, 01 Aug 2002 16:48:20 GMT
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The tweeter compensation circuit does three things:

1. It matches the amplitude of the midwoofer and tweeter.
2. It provides damping for the tweeter's frequency splitter filter, to set specific Q.
3. It provides top octave EQ to compensate for the power response of the compression driver.

You can play with these values in Spice and see the results.

The resistors I use for R1 and R2 are a combination of 16 ohm, 20 ohm and 30 ohm. With these values, I can make just about anything I want. The 16 ohm value is made with a series/parallel block of 16 ohm resistors, two in series form 32 ohms and then a pair of those networks in parallel bring it back down to 16 ohms. The 25 ohm value is made using 20/30 in series to form 50 ohms, and then a pair of those networks in parallel to get 25 ohms. You can make a 15 ohm resistor using a pair of 30 ohm resistors in parallel.

What is required is to find values of R1 and R2 that match the tweeter level in the region below where mass rolloff starts, i.e. below 4kHz. The initial shelf should also be flat, which requires a specific damping for the crossover filter. Damping is provided mostly by resistor R2, but R1 and the driver are in parallel with R2, so they affect the amount of damping. Basically, to increase attenuation, R1 is made larger and so R2 must be made smaller to compensate, to keep damping the same. C1 is fairly non-critical, but as it is a bypass across R1, it should be made smaller as R1 is made larger, in order to maintain approximately the same ratio of capacitive reactance to resistance. In the end, the transfer function should be flat at some baseline level up to 4kHz, and then to provide 6dB/octave augmentation after that.

Top octave compensation response curve