Subject: Active Crossover Design
Posted by SPGEEE07 on Tue, 16 Jan 2007 23:43:52 GMT
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I am currently involved in a speaker design project in which I am responsible for designing the crossover network. My group has decided to employ an active-filter crossover; the 4th order Linkwitz Riley to negate the issue of off-axis acoustical response due to electrical phase delay and to take advantage of the 24dB/octave roll-off characteristics.I have been fortunate to have an anechoic chamber at my disposal in which I have performed frequency sweeps on the 3 drivers my group has chosen to use in our design: PIONEER FP66AP45-54F 2-1/2" CONE TWEETERPIONEER FB12EU14-51F 5-1/4" POLY CONE MIDRANGEPIONEER A25FU20-53F 10" WOOFERFrom these sweeps between 20 kHz to 20Hz, we have been able to extract 75 data points from each driver. Now that the data has been obtained from the experiment, the next step is to determine the two optimal crossover frequencies and Q-values corresponding to the natural response of the drivers. My question is:What is the best course of action to determine the ideal crossover frequencies for this particular application using a 4th order Linkwitz Riley crossover, and how about to determine the parameter values to achieve a flat response?I have heard about people using Exzel of Matlaab to arrive at these optimal values through the process of non-linear optimization in which the error between the driver's response and that of the desired crossover response is minimized. However, I am not sure how to begin interpolating to arrive at such parameters. DOES ANYONE HAVE EXPERIENCE WITH NON-LINEAR OPTOMIZATION? Or if not, can point me in the right direction?If anyone has experience customizing active crossover designs to maximize the electrical and acoustical output characteristics of a 3-way driver configuration, starting with the frequency sweeps of each driver, your insight would be much appreciated.

Subject: Re: Active Crossover Design
Posted by Wayne Parham on Wed, 17 Jan 2007 15:38:58 GMT
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You can start off with electronics modeling tools like Spice and crossover simulators like the function built-in on LSPCad. Then to check summing, you might want to measure with a system like Speaker Workshop. To make a design that takes into account non-linear behavior and compensates for it, you must first measure the non-linear parameters. You would need a system like provided by Klipple.