Subject: Consider both power and excursion.
Posted by Bill Fitzmaurice on Fri, 16 Apr 2004 11:30:21 GMT
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What limits a tweeters ability to run with a 1st order crossover is both power and excursion. The power reduction afforded by a capacitor at 6dB per octave is generally adequate to counter the rising program power input, on average 3dB per octave, as one goes lower in frequency, giving a net reduction of 3dB per octave, assuming a reasonably robust voice-coil. However, since excursion increases by a factor of 4(6dB) per octave as frequency drops for equal power input then even with a net power input reduction of 3dB/octave the excursion demand will rise at 3dB/octave. That being the case I wouldn't consider a 1st order filter unless the corner frequency was set to at least 4 times Fs. On the other hand, you can go to the other extreme as well with a very high order crossover. Neville Thiele has recently shown that with a 5th order high-pass you can run the corner frequency very close to the Fs without any difficulty from either the power or excursion standpoint, and the additonal octave or two of operating range thus afforded can well offer the opportunity to run two-way rather than 3-way. This works very well with a 3rd order low-pass on the woofer as far as integration goes, and offers a parts cost reduction as well compared to a 4th order/4th order arrangement due to the lessened high value inductor count.