Subject: Re: c-t-c formula and tweeter placement
Posted by Jim Griffin on Thu, 02 Sep 2004 02:38:32 GMT
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Taylor,The c-t-c calculation relates the frequency (F) in Hz wherein the c-t-c spacing (D) in inches becomes a wavelength. The formula is F = 13500 / D where 13500 is the velocity of sound in inches per second. Thus if you have a 4 inches c-t-c spacing (4 inch diameter drivers with flanges touching) you get a frequency of 3375 Hz. As I explain in my white paper this is the recommended crossover frequency between the woofer and tweeter lines. What happens if you crossover above 3375 Hz in the example above is that you will run the risk of comb lines in the vertical axis (the comb lines will be most severe at twice 3375 Hz or 6750 Hz. Thus I would suggest that you avoid crossing over much beyond 4000 Hz to prevent those comb lines. Parts Express has a frequency response on their web site (click on the sample response tab) for their 4 inch drivers which shows serious peaks in the response of the 4 inch 27-570 drivers at around 7000 Hz so for sure you need to crossover well below that frequency. But more important than the comb line issue I just raised, you start to lose array directivity above 3375 Hz. That means the array gain of the woofer line would start to decline as the wavefronts from each individual woofer are no longer additive. Thus the sensitivity improvement that you had below 3375 Hz will start to suffer if you operate beyond that point. While you can compensate for this effect if you use an equalizer to adjust for the decrease in sensitivity, you can not avoid the comb line issue. Bottom line is that 3375 Hz (or below) is the prefered cross point for the 269-570 (same as 269-568) units. You could try a higher cross but with tradeoffs such as a higher low pass filter slope (say 3rd or 4th order) or response flatness performance will start to suffer. I recall reviewing the specs and response on the Onkyo autosound driver. That tweeter could be crossed a little lower if you remove the plastic grid over the dome if I recall. It may blend OK with the 4 inch driver in the 4000-5000 Hz area. You may be a candidate for Bill Fitzmaurice's line array which he offers a tease in his coverage in several threads below. While his detailed article will not appear for a while, his design uses some of the same drivers that you have purchased. As you might guess from my comments to Bill on his design, his design does have issues related to driver spacing (his design features a greater than 4 inches c-t-c for these drivers) and his choice of crossover frequency is 6000 Hz. I guess we will have to await his design article to understand how he deals with the above issues. Jim