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Subject: Re: Thanks, Jim.....I think.....

Posted by [Jim Griffin](#) on Wed, 22 Dec 2004 12:10:30 GMT

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Bill, All of what I say below is explained in my white paper but this is the shorthand version on driver spacing. I suggest that you space the drivers center-to-center less than one wavelength apart at their highest frequency of operation (usually the crossover frequency or 20 kHz for tweeters). Thus if you have say a 4" driver with the outside frame dimension also 4", then the highest recommended frequency of operation is 3390 Hz when the frames are touching. In your case you are using 4" drivers spaced 5" c-t-c apart so you should crossover before 2712 Hz. For circular (dome or cone) tweeters the less than one wavelength spacing issues limits their upper frequency ability--one wavelength at 20,000 kHz is 0.68" so this would indicate a very small frame tweeter. As the ear is less sensitive to combing in the 10-20 kHz octave, you can get by with c-t-c spacing as close to twice the 0.68" but that would not be the best sound. The issue that occurs is that if you go to wider spacing than one wavelength then at a frequency equivalent to 2 wavelengths spacing would create comb lines. Above one wavelength spacing you will see loss of directivity and the frequency response will start to fall from flat. For most line array applications the drivers are located as close as practical to each other for this reason and a crossover no greater than a frequency of one wavelength spacing. This is the criteria suggested in several AES papers by JBL engineers. Other researchers (L'Acoustics for one) suggest spacing drivers c-t-c no greater than a half wavelength at their highest frequency of operation. That creates an even more restrictive criteria for practical implementation. Jim

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