Subject: Re: Directivity Index, Collapsing DI, etc.
Posted by Wayne Parham on Tue, 29 Mar 2005 20:45:32 GMT
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DI is directivity index. Round tractrix horns become more directional as frequency goes up. This is called collapsing DI. They sound good on axis, best if the room is very absorbent.Horns like this have wide dispersion at the lower crossover point and which becomes more narrow as you reach the upper crosover point. If you have a midrange and a tweeter with round horns like this, then the pattern widens and narrows twice, at the woofer/mid crossover and again at the mid/tweeter crossover.What this does is to make the sound in the room uneven. Sound off-axis is unbalanced, being a lot louder near the crossover points. Even when sitting on-axis in the "sweet spot," sound reflected back to you is unbalanced. You can get away with that if the room is treated to make it very absorbent, but if not, the sound is unnatural. I think it's unnatural sounding anyway, since anytime you step outside of the narrow "sweet spot," the good sound turns bad.Another thing about round horns is that energy distribution up and down is the same angle as side to side, so it is wasted on the floor and the ceiling where it is not needed or wanted. That's why they were abandoned in the 1930's for radial and sectional horns, intended to place the sound where it was wanted. Don't get me wrong. Most speakers have directional characteristics like this. Direct radiators are the same way. They begin to become directional at the frequency where wavelength roughly equals diameter. Direct radiator loudspeakers and round horn systems can be made to sound very good. At least on-axis and in a very narrow range, you can expect them to sound very nice in the right setting. If you have wall to wall furnature, some furnature and curtains, you'll probably be alright.But one of the biggest advantages of horns is their ability to direct the sound where you want it to go. So for best results, I prefer to use horns that have directional characteristics that cover the room uniformly instead of those that have collapsing DI. This is particulary true in the horizontal plane. If a person is going to use a horn, I'd want to see it used to its best advantage.