Subject: Re: One more thing...
Posted by Wayne Parham on Sat, 12 Jun 2004 06:35:55 GMT
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I think you and Bill are on to something about cone material and geometry.  Klippel and others use lasers to measure the movement of the cone at various frequencies, to be able to perform visual inspections of the ripples that occur across the surface.  That's the ticket these days, because since regions of the cone become decoupled from the voice coil, each of these regions wil move independently.  Each independently moving section will resonate at its own rate depending on the mass of the decoupled section and the rigidity of the connections to adjacent sections.  So the twisting movements become complex.  It's like watching the weather, a simple thing that has complex motion.Without the benefit of such instrumentation to see what's happening, understanding and improvement becomes a little more empirical.  I've never been a big fan of the idea of doping cones and other modifications like that, but my reason has been that it is hard to do hand modifications consistently.  Two similar-looking modifications might cause two completely different characteristics.  And I've also typically been dealing with products from companies like Eminence and JBL, both having instruments like Klippel systems to assist them in their design and test processes.  They've just had better visibility than I've had, so I implemented components they provided, as-is.  But you're dealing with components that were developed at a time when none of this was available.  In a very real sense, you have better tools and equipment available to you than the manufacturer did.I don't know why I got off on that tangent, since it really isn't directly related to what you're talking about.  The point I was really trying to make is that whizzer cones are an effort to make use of breakup modes in a controlled fashion.  Even speakers without whizzer cones, if used as full-range drivers, are intended to be used well past the point where the cone operates as a rigid piston.  The cones are designed to flex gracefully, and so that each decoupled region will resonate in a well-damped mode.  The idea is to have small-mass resonances that serve to extend response without having any that are aggressive enough to create sharp response spikes.Now days, a computer model can be made that does a magnificant job of showing how the speaker will behave.  Fast motion laser video can be used to literally watch the cone in motion at various frequencies.  But prior to modern times when things like those weren't possible, the best thing an engineer could do would be to analyze the structure.  It's a lot of minutia work and analysis to find a simple resonant system, and what we're really talking about here is a whole bunch of them coupled together to form a complex system.So that brings me to "why."  My guess is that the answer is the cones act differently in the vocal and overtone region as they flex in various twisting modes.  They form rippling patterns like waves of water in a pond when excited by a rock being thrown into them.  Shape the ponds differently, and the reflections from their shores make different ripple patterns.  The patterns are repeatable when the surface is static and a rock is thrown in the same place with the same intensity.  But two differently shaped ponds make two different patterns, and this is kinda like what is happening with the two different speaker cones.