Subject: Re: OK, heck, I'm curious as well so I will ask them...
Posted by 16 on Thu, 23 Jun 2005 07:30:49 GMT
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Hi Guys, I am the designer of the Model 16 loudspeaker system.The question has been raised about our choice to use a compression driver without a horn. Well, firstly it must be realized that, as Wayne rightly states, a horn is a device that directs acoustic energy. When drive-units move and pressurize air, those pressure changes move outwards in space. If we were to mount a diaphragm on an infinitely large baffle, then that energy would only go forward in a 180 degree half-hemisphere as defined by the baffle...i.e. into "half-space"...it wouldn't be able to spill behind the drive-unit. Therefore an infinite baffle is somewhat like a "180 degree infinite-length circular horn". As such, it "loads" a driver to a small degree but to an infinitely low frequency. As soon as we use a baffle that is not infinite in size, then at some low frequency limit, defined by the size of this non-infinite baffle, the energy will start to spill behind the drive-unit and into a "whole-space" environment. In this case the drive-unit becomes "unloaded". Now, if we start to bend the walls of this baffle forwards into a horn, the magnitude of the loading increases. So now we can see a simple relationship forming, the longer the horn walls the lower the frequency the loading will be maintained to, and the tighter the angle the greater the "severity" of that loading. Now, just to make things a little more interesting, the tighter the angle the more the horn resembles a pipe, and of course pipes have resonances at discrete frequencies, and so it occurs that these resonances also "load" the driver and there will be specific centre-frequencies of peak loading. Once you understand all this you realize that short horns will provide very little loading below what will inevitably be a fairly high cut off frequency. Now, as a consequence of loading, the on-axis sensitivity of the loaded frequencies is increased, and this allows the possibility of electrical filtering or attenuation of those frequencies because now we may have a little extra acoustic energy to burn. Hence, in theory we can reduce the excursion requirements of the driver over the loaded frequencies, and hence the idea that loading ultimately helps to protect the driver. It is also true that the loading itself reduces driver excursion; the extent to which this happens is dependant on the magnitude of the loading.In the case of the Model 16 however, it is first and foremost a domestic hifi speaker rather than a PA system or studio monitor and as such it was never intended to be foolproof under the wild dynamic demands of uncompressed live instruments common to those environments. When used sensibly in near-field domestic situations it is more than capable of providing satisfying SPL without exploring the maximum safe output levels of the compression driver. The TAD4001 driver is rated at 30W with the TAD recommended filtering and assumed horn loading. It has an efficiency within the meat of its pass-band of 110dB per watt at one metre. So even with a tiny current flowing through its coil this driver is capable of sufficient safe output for me. We chose the 4001 driver for its sonic presentation…its tone…its musicality. We wanted to design a system that delivers a particular musical message, rather than a system that will impress people who want explosions or faithful recreations of space shuttle launches. Having a pair of Model 16s facing you at 1.5m in a quiet lounge room is like driving a 400hp car around town…you don’t ever really use the full wack…well…at least I don’t with the type of program material I listen to.Finally, we feel that there are some very real subjective virtues that we have been able to manifest by avoiding a horn, and for what it is worth we did prototype some horn systems, including going as far as modifying a TAD4001 by cutting out its conical plastic throat, filling behind it with resin and then re-machining it out so as to begin a perfect Tractrix expansion curve immediately from the phase plug!!!Hmmm....