Subject: Re: Other Drivers and stuff
Posted by Tom Danley on Thu, 01 Apr 2004 14:13:36 GMT
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Hi WayneThe non-linearity you speak of (called throat distortion in horns) is caused by the fact that the speed of sound is temperature dependant (with speed increasing with temp). Imagine a sound wave, the "pressure" half of the wave is actually warmer than the rarified side. AS a result, the "hot" side travels slightly faster than the cool side and so after enough distance (and sufficiently high SPL) the nice sine wave progresses into a saw tooth wave. If I recall, at about 1100 degrees C, the speed has doubled.This was a real problem in the acoustic Levitators I used to work on as once one had a saw tooth (or sufficiently distorted sine wave) then one also produced acoustic pumping (an effect like a fan). These operated in the range of 155 - 175 dB SPL @ 21Khz generally.This effect is also seen in a sonic boom, here, on the leading edges, the air is compressed over 1atm at supersonic flight. Here, because of the same temperature/speed relationship, what finally reaches the ground as radiated sound is also a saw tooth (on the front edge), over all, the waveshape of a sonic boom is like a capitol letter N.Throat distortion is pretty much a non-issue in bass horns though, cone and coil drivers generally cannot produce enough acoustic pressure to cause this.While dozens of bass horns I have measured had sometimes even gross distortion, the driver is the primary source.This distortion is the sum of the VC motor and mechanical system's non linearity.The "bad" effects of the latter can be minimized by choosing a driver with a low Fs which then requires a small Vb to end with the right compliance.Depending on the sealed volume more means that a more linear spring is dominating over the drivers relatively non-linear suspension (by comparison) spring.Generally, stay away from High Fs driver for bass horns if low distortion is a goal.The BT-7's for example of relitively high throat pressure, are the same horn (essentially) as the LAB sub but at full rated power have typically less than 1 ½ % distortion. This on a system having a higher compression ratio than the Lab sub (as the SDL has 2, 15 inch radiators and a much stronger motor). If air non-linearity were a problem for bass horns, it would be here.Even with the LAB12 driver, the LAB sub has measured to have less distortion than any other box tested, even the other low distortion horn, the Bassmaxx.I found the comment of one of your posters to be humorous in that he thought the lab sounded un-musical and preferred the sound of his vented boxes. All of the vented boxes tested so far were VASTLY higher in distortion and less musical when listened to side by side though according to those doing the testing. Your suggestion of a shorted turn being added to the LAB 12 is timely too, this was not possible at Eminance back when I gave Jerry my original request for the lab 12 driver.On the other hand, reducing the distortion a little bit more is not going to make any horn system made with it sound MORE like a vented box or what people are used to given how badly most systems measure at "normal" levels..We use a version of the LAB 12 in several of our products and I should have a sample pair of them (with the Shorted turn) in a week or so.While I never built a LAB sub myself (I was confident enough in the computer program) I do have a similar horn (acoustically) I can compare the differences in.I'll let you know what the difference is if you want.I don't know if McBeans program can predict the Throat pressure but for a bass horn one is safe if you stay under 150-160dB MAX pressure. To put that in atmospheric terms, 132 dB is about 2 pounds per sq foot and 161 dB is about .1 psi if I recall.Cheers,Tom Danley