Subject: Effects of horn loading
Posted by Jerry Parker on Thu, 22 Aug 2002 02:37:05 GMT
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Lets say I have a bass driver that is horn loaded. Its frequency rolloff f3 points are 25 and 120hz. We all know that in situations such as a bass reflex or sealed enclosure, a rolloff starts at a certain frequency, dependant on the front baffle size, as the driver transitions from a 2pi radiating environment to a 4pi environment. Does the horn loading effect of the bass speaker allow the speaker to operate in a 2pi (or even smaller) environment? At 25hz, anechoic, will the driver still be working in its 4pi environment like a ported or sealed, or will it be less, due to the horn loading?Also, my knowledge on horns is VERY limited. I know it decreases the radiating area, focusing it into a given space, increasing sensitivity. Why then will a compression driver without its horn lens on have super high output at its lower frequencies, but as you go to say 10khz, the output drops significantly. I would assume it would be the opposite, and would roll off the lower frequencies while the highs were still as strong. What makes this happen?Also, you see horn lenses saying they provide loading to 800hz, etc. What exactly does that mean?Also, this is not part of the horn loading question, but I don't feel like starting another post. Why are passive crossovers below around 200hz bad? Is it because of the resonance of driver is close? Or is it because the components needed would be rather expensive? All passive crossovers create a loss of power, isn't it typically 3dB? Is that why? If so, wouldnt crossovers in the khz range be bad too? 3dB is twice as much power! Thanks!

Subject: Re: Effects of horn loading
Posted by Wayne Parham on Thu, 22 Aug 2002 07:53:34 GMT
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When a horn is placed in constrained space, it acts similarly to a ground plane would for an antenna. It's like a mirror were presented to the mouth of the horn, and it acts as though it had a larger mouth.This is true for room boundaries and for baffle mounting. Both are "boundaries," if they are close enough. For frequencies high enough that the baffle is larger than wavelength, the baffle itself enforces half space radiation. And for those low enough that room boundaries are

cornerhorn is attractive. It forces the system to operate in eighth space. It's also a conical horn with dispersion that equals the room's dimensions. So this is a really good placement for woofers, especially when the HF horn pattern is matched.It is rare that a horn will be large enough to work properly in free space at subwoofer frequencies. That would require a very large device. Most basshorns are undersized, being acoustically small. And while half space is pretty easy to do - just set the speaker on the ground - quarter space requires the junction of two boundaries and eighth space requires three. After all, the wavelength of 25Hz is 45 feet long. So except for permanent horns that use a large structure such as the room itself for the flare, most are not nearly large enough to load properly at 25Hz.About HF rolloff in compression horns, the driver itself usually has much more output down low than it does up high. It's total output can be measured on a plane wave tube, often refered to as power response. This is different than on-axis measurements, which include directivity effects. A narrowing pattern provides acoustic

EQ which will show up in an on-axis measurement but not a power response chart. Power response is what you'll see on a plane wave tube or a constant directivity horn. If you put the driver on a horn that focuses the pattern narrower and narrower as frequency goes up (collapsing directivity), then it will be acoustically equalized on axis. This sacrifices off axis response, and makes the (reverberent field) energy in the room non-uniform since more acoustic energy is produced at low frequencies.You might want to grab a copy of the "JBL Professional Sound System Design Manual." It's a really handy document, and it discusses all of this stuff and more.