Subject: Re: High output basshorn
Posted by Tom Danley on Sat, 06 Nov 2004 17:09:31 GMT
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Hi WayneA couple thoughts, the lab sub low cutoff and dimensions were chosen by the group as was the 32Hz low cutoff target and the desire to have the greatest maximum output per size for Pro sound use. In the side by sides that have been done, many with the big name pro gear, so far the lab sub is both the most powerful and possesses the lowest distortion. One lab, used in the home already would have vastly lower harmonic distortion than any direct radiator at the same SPL (in band). Also, being proportioned to run out of excursion at full input power results in a great acoustic output this means one in the home, even if not in a group, at full blast one is driving it with few Watts max.It is the mechanical and electromechanical nonlinearity that is the primary distortion mechanism in LF horns and this problem is minimized by having the greatest maximum output compared to the normal level.If I were designing a lf horn for a living room, one wouldn't design for half space. One could drop the 145 dB+ peak spl capacity and shape based on concert use and trucking. One could look at the driver in a modeling program to figure out where, based on Xmax the onset of gross distortion begins and then what percentage of that is "normal" operation.One could figure that increased power handling for a given size motor is generally equal to more power compression if its used because it is the increased VC temps which allow the increased power capacity (with a few exceptions where air is actually moved through the gap). One can count on thermally related dynamic non-linearity beginning on essentially all drivers at and above about 1/8 to 1/5 rated electrical power.One could size the driver parameters and front volume to give the maximum acoustic attenuation above the intended crossover, thus minimizing radiated distortion.One could keep in mind that a driver suspension is always more non-linear than the air in the sealed box behind the driver and chose a driver with a low FS, resulting in the least distortion due to suspension non-linearity's.One could limit the bandwidth such that the driver is in the range where its impedance is raised by the acoustic loading (and is efficient) and use Leach's math to find the horn / driver parameters that result in this condition.Push pull mounting would cancel the second H (like using a push pull transformer vs single ended) however of all the harmonics the second is the least objectionable. That's no reason not to do it how ever.So far as what the Bdeap means, (boundary dependent external air path), the idea is more than just accounting for fractional space.A horn is (among other things) a high pass filter of sorts, partly controlled by the rate the acoustic passage expands. The Bdeap idea is to envision the air surrounding the speaker and configure the enclosures shape size and outlet position so that when next to a boundary (like one in a corner) , the last few doublings in area happen at the right rate and are comprised of the air trapped between the speaker walls and corner boundaries.If one goes through the math on say a klipsch corner horn, it has a big step in its expansion into a corner (fractional space) where the Bdeaps are a continuous function and hence one box in a corner is flat to 32Hz.Stacking 4 (2on2) Bdeaps outdoors, one sees the effect of the external enclosure boundaries acting as a horn in the directivity (a 180 degree pattern more or less). One also see's that the hemispheric expansion at the outlet is "like" a more rapid expansion horn than being in (its proper position) a corner and so has a higher cutoff also.On axis at 10 meters (-20 dB from 1 meter) the measured sensitivity for the group of 4 (1/4 watt each) is 97.5 dB and with a maximum input power of 6400Watts, this makes "significant" (as in the mid 150's at 1meter) Bass (with drivers similar to the Lab 12). Here, one has an efficiency of about 40% or about 107dB plus about 10 dB of directivity in the forward half of the pattern.I have had a pair in my living room, they are nuts and the Bdeap R (a more refined design and 2 inches

thicker) goes even lower (into the 20’s in a corner).I have not been on line much lately, working on a nutty and hard project for someone special, how to produce 130 dB at 15 Hz at 10 meters.Anyway, hope things are well.Tom Danley