Subject: 18" Subwoofer Horn - Opinions wanted!
Posted by Adrian Mack on Tue, 27 Jan 2004 05:18:47 GMT
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Have been thinking about basshorn's today, and was messing around in Hornresp with an 18-Sound 18LW1400 subbass driver that I currently have in a 300L/25Hz tuned vented box. Preferably below 30Hz operation, I started to think about using electronics to shape the response curve flat of a small sized horn. Here is the response curve from hornresp (imported to excel) of a basshorn of 2 meter length, 1800cm^2 mouth, and 450cm^2 throat with this driver and some 95L back chamber. Actually the horn is 3 segments but I won't list all the details here. Segment details are in diagram at end of this post though. Modelled in 1/8th space condition, or 0.5Pi. As you can see the difference between 35Hz and 100Hz is about 3 or 4db, and it drops quite steadily from 100Hz to 35Hz. Then below 35Hz it drops off further. It's the small mouth size that is making that rolloff from 100Hz to 35Hz, in effort to keep the horn as small physically as possible. So instead of making the mouth bigger, what if we add in some sort of filter to counteract it? I choose 75Hz, 6db/oct lowpass filter at 75Hz. The response is below. The falling response from 100Hz and going down to 35Hz is now no longer, the filter corrects for the 3 or 4db rolloff and makes it flat. I loose a little efficiency this way, but in the end its still 104db 1w/1m (18LW1400 has a very strong motor, 24.7 BL).That curve looks like its pretty smooth from 33Hz to 100Hz now. But there is rolloff below 30Hz still and I want a subwoofer horn which goes deeper than 30Hz. At low frequencies, the ceiling becomes a source launch boundry so its like 1/16th space loading below there when placed in a corner. Hornresp cannot simulate interaction of the ceiling, but I took a guess at what would happen in 1/16th space. I analyzied what hornresp did from free space to half space, then the gain from half space to quarter space, then quarter space to eigth space and made some decisions off that as to what sort of gain I could get going from eigth space to sixteenth space. Also to consider would be the walls on the other side too, which could give even more gain below 30Hz. Anyway, I took a rough estimate, using the lower of the figures that the gain could possibly be. It could easily be more than this in a 4 by 4.5m average room or something, I think it would be very constrained. Anyway here is what I think the curve from 1/16th space loading below 35Hz could look like. This is the gain. If I add that to the basshorn graph above, it comes out as:Average F3 then becomes 27Hz, and -6db becomes 24Hz. I've only estimated 3.39db boost @ 30Hz to 5db boost at 20Hz from 1/16th space loading. Anyone here think that a typical room will be more constrained than this at low frequencies, with interaction from room mode's and stuff? What is people's opinion on this horn? It's very small at only ~400L for 27Hz F3, and using an 18" driver. What do people think of that corrective filter? Here is the horn, with folding's (thanks to Mike.e for this!). It's pretty compact overall. What I want to do is keep it small. I burned off a couple of db to make response flat, but even then this basshorn is ~104db 1w/1m. I also have a question on the small mouth. Is there any issue with directionality here? Bass wavelength's are long and I would think that dispersion will not be limited to mouth dimensions, as wavelength is a lot longer than horn length. Like when a midrange horn forms a diffraction slit below a specific frequency related to mouth dimensions, and dispersion is then not limited to mouth dimensions but will instead widen very rapidly. Does the same apply for a basshorn? The mouth is only 1800cm^2 on this horn, length 2meter. Could this basshorn be a good idea to go and build? CheersAdrian