Subject: ?Horn Questions?
Posted by Cuppa Joe on Fri, 09 Feb 2007 04:47:12 GMT
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I've read that a horn's depth should be at least 1/4 wavelength of the desired cutoff frequency, while the mouth's circumference should equal the wavelength. The problem with a 90-degree (horizontal) conical horn is that the width increases 2" for every inch of depth added. If I wanted (for instance) a 160Hz cutoff, a depth of at least 21" would be required, which would make the interior width about 42" plus the width of the throat. That's a little too much like furniture or pet housing! Is there some way to obtain a lower cutoff (that is, below 200Hz) in a 90-degree conical horn without resorting to a mouth that wide?I've seen some designs that look like they have 2 conical sections within the horn's horizontal expansion. Examples are the Peavey MB-2 and Rog Mogale's MT122. The first section, attached to the throat, appears to be about 1/2 the coverage angle of the second section terminating at the mouth. Is this still a conical horn, or is it a crude approximation of another horn type? When the wavelength becomes shorter than the first section's depth, does it beam at that coverage angle?

Subject: CD horns
Posted by Wayne Parham on Fri, 09 Feb 2007 07:11:18 GMT
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One thing that can really help you with the size problem is boundary loading, especially corner loading. Of course, that only works indoors, mostly a home hifi thing. But if you have room corners, use them. They're built-in 90° flares, and they're large.Room corner characteristicsAs for the wider angle near the mouth of a CD horn, that's done to try and maintain constant directivity as a horn begins to transition to a diffraction slot at the low frequency end of its range, just before it loses pattern control. Looking back at the patterns made by single-slit diffraction, notice the ripple in energy distribution out to the sides of the main pattern. As frequency drops, just before a horn loses pattern control and the pattern widens up, it becomes slightly narrower through a band of frequencies. Spacing down the horn from the throat, if you widen the flare at that point, it will tend to widen the pattern through that transition region. The idea is to widen it up just enough to match the wall angle from the throat forward to the transition point.

Subject: Re: CD horns
Posted by Cuppa Joe on Sat, 10 Feb 2007 03:34:14 GMT
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Unfortunately, boundary loading won't be an option, which brings me back to the problem of depth vs. horizontal expansion. That's why I brought up the dual-angle midbass horns. The transition from one coverage angle to the next is almost exactly halfway down the horn, not near the mouth

(although you did answer a future question). I found a third midhorn designed that way, on the Speakerstore.nl site. Are these horns a variation of a conical design? If so, this could solve my depth problem (even if it creates others).I've bookmarked your link to room corner characteristics. It's valuable information to non-techies like myself! I've done as such with several of your posts, Wayne!The reason why I haven't yet shared this design is because I want to make sure that the forum isn't designing it for me. I'll post an outline of it for reviews and guffaws when I'm done tweaking on paper!

Subject: Re: CD horns
Posted by Wayne Parham on Sat, 10 Feb 2007 04:05:10 GMT
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If the bend is made halfway down, it is possible it was done not so much for pattern control but more to approximate a curved flare. At low frequencies, expansion doesn't require a smooth curve. It can be stair-stepped, so to speak. This, again, is related to wavelength and to resolution. The expansion doesn't have to be particularly smooth, even abrupt transitions of several inches are "smooth" if the wavelengths of interest are tens of feet long. So a curve can be approximated with straight sections that change angles, gradually growing wider. It might even be approximated with only two conical sections, if the granularity needed isn't high.

One way to test the performance of a proposed design is to use Hornresp. It will let you model a horn using sections of flare shapes, either conical or curved. You can model a horn with Hornresp and it will provide simulated response, excursion and impedance charts for you.

Subject: Re: CD horns
Posted by Cuppa Joe on Sun, 11 Feb 2007 03:51:44 GMT
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Then, the dual-angle "conical" flare in those midbass horns is just a crude approximation of a curved flare. Oh, pooh! I was hoping that this configuration could solve my depth problem for a single horn and still act conically.Actually, I simulated my horn (as is) in HornResp about a month ago. I modeled the Delta 10A, since you already showed that it worked well in a front-loaded horn, plus it was an inexpensive choice at Parts Express. The throat, being a slot, wouldn't model just using the total area, so I pretended that it was a square of the smallest dimension (the width). The horn was modeled in 4Pi space as the worst-case scenario for a live SR subsystem. One box was a little disappointing, but 4 boxes stacked as a line array --usually the minimum box requirement for most pro audio line arrays-- flattened right out and rolled off close to the lower cutoff target. The upper cutoff was a little higher than in your Midhorn (which I used as a reference point, thank-you) though it was inconclusive whether the 2kHz goal was met.
