Subject: Conical HF Horn?
Posted by Cuppa Joe on Fri, 15 Jun 2007 02:46:12 GMT
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Opinions & Inputs, Please & Thank-you!I've noticed that very few designers bother with a conical horn for a 1" or 2" compression driver. I'm aware, though marginally, that a conical doesn't load well near its lower cutoff, so does this mean that a larger horn is needed to achieve the same cutoff as (for instance) a smaller CD-type horn?I've also observed two characteristics of the Danley-designed 1" conical horns (ignoring the tapped-horn components for now). One, is the fact that they're VERY big; two, is they all have fairly narrow coverage patterns (40-50 degrees). I know that the horn has to be large enough to house the other speakers, but how much of it is needed to load the 1" driver?And, if the coverage pattern were opened to 90 degrees, what might be expected for an off-axis response? Will it become beamy?Having failed to find a HF horn which meets my criteria for coaxially mounting in the mouth of a conical midbass horn, I had thought to design my own from plywood.Any experience in this area will be met with adulation!

Subject: Re: Conical HF Horn?
Posted by Bill Wassilak on Fri, 15 Jun 2007 16:39:21 GMT
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::I'm aware, though marginally, that a conical doesn't load well near its lower cutoff, so does this mean that a larger horn is needed to achieve the same cutoff as (for instance) a smaller CD-type horn? Yes a conical horn will start cutting off appox. 20% higher in frequency than what the flare rate is. So you would need a larger horn to achive the same cutoff.::I know that the horn has to be large enough to house the other speakers, but how much of it is needed to load the 1" driver? I have no idea.::And, if the coverage pattern were opened to 90 degrees, what might be expected for an off-axis response? Will it become beamy?It would hold its pattern down the the cutoff of the horn but off-axis the higher freqencies would be more jagged in response and at a lower level. All horns start to beam at a higher frequency especially a conical horn (But I don't remember what the formula is). CD horns try to stretch the beaming out effect to the upper octaves where the ear's not a sensitive.

Subject: Re: Conical HF Horn?
Posted by Cuppa Joe on Fri, 15 Jun 2007 18:16:46 GMT
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Adulation duly awarded!My intent is to stack (vertically) two 1" compression drivers on narrow or otherwise smallish 90-degree horns within the mouth of a 1x10" conical midrange horn of my own design, for line array purposes. Thus far, the horns available either obstruct too much mouth area, or don't span the midhorn's height for coupling to the next unit. (Using a pair of HF drivers

per enclosure better approaches the "dense interference" tactic.) I really don't want to change the mouth ratio by shortening the height. This has led me to consider the possibility of home cooking the HF horns, but the design needs to be simple, meaning no curved flares. Maybe adding a diffraction slot would work....

Subject: Re: Conical HF Horn?
Posted by Duke on Fri, 15 Jun 2007 21:30:47 GMT
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The device I use in my speakers could be called a "90 degree conical horn" or a "90 degree constant-directivity waveguide" (the latter being the more politically correct term in audiophile circles).It's the 10" diameter DDS ENG 1-90 waveguide, which is back in production under DDS's new owners in Texas. The off-axis response declines gently and uniformly out to 45 degrees from the centerline, so the power response is very good. There's a little beaming in the top octave but it's less noticeable than with a direct radiator 1" dome because the pattern doesn't widen much at lower frequencies.I'm not sure that a CD horn really has worse pattern control at its bottom end than other types; I think that a non-CD horn's variable pattern sort of "masks" the breakdown of pattern control whereas it's easier to detect the transition with a CD horn.I like to match up the pattern of horn and woofer in the crossover region as closely as is practical, so I don't use 40 or 50 degree horns, CD or otherwise. All else being equal, smaller and/or shallower horns will have less audible reflections within the horn itself - another argument in favor of wide-pattern horns.Duke

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Subject: Re: Conical HF Horn?
Posted by Cuppa Joe on Fri, 15 Jun 2007 22:47:57 GMT
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Thanks for the input, Duke!I've already considered the ENG 1-90, but a pair of them stacked would be taller than my midhorn design unless they were each trimmed flat on one side and adhesed together. With a pair per box plus modifications, that would become very cost prohibitive for a 3- or 4-box line array (per side)! The design is already a bit large so I'm hesitant to enlarge the mouth unless it's necessary, and I'm afraid to make it shorter due to increasing diffractive effects. Decisions, decisions!

Subject: Re: Conical HF Horn?
Posted by Duke on Fri, 15 Jun 2007 23:54:10 GMT
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Hello Joe,I didn't realize this was for a line array. Nope, I don't think the ENG 1-90 would work well in that sort of application.Hmmmm. DDS makes a two-horn stackable array that might be of interest, but I have zero experience with it. Sounds like this is a very ambitious project!Duke
http://www.ddshorns.com/catalog.php?page=DSLA1100

Subject: Re: Conical HF Horn?
Posted by Cuppa Joe on Sat, 16 Jun 2007 01:32:25 GMT
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I've also given the DSLA 1-100 and the DSLA 1.5-100 some thought, but they're both too panel-like to mount in the mouth of another horn. Again, I would need 2 cut/modified 1-100's to bridge the gap from one midhorn to the next. The 1.5-100 is still a candidate if I decide to change the horn's mouth layout. But right now, I'm shopping for CHEAP! I was intimately familiar with DDS for a number of years before I retired from live audio about 8 years ago. Their factory was a half hour drive from my home, and I would drop in now & then to BS with Pat and Bob (the original owners). They would emerge --or, float-- from their shared office, usually followed by a billowing cloud of smoke. They even did some TEF analysis for me on a monitor I designed using one of their horns and McCauley drivers. (The McCauley brothers, also in this area, were another story....)In reality, the designs are ambitious but the projects are not. When I'm satisfied with these loudspeaker systems on paper (there's a couple more on the drawing board), I will simply share them with the Forum in appreciation for all the help I've received here toward their development. I can't afford to build them myself, but if anyone sees any promise in my amateur doodlings, they are free to build and modify as they wish!

Subject: Re: Conical HF Horn?
Posted by Wayne Parham on Sun, 17 Jun 2007 14:56:50 GMT
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If you're not planning to array the tweeter horn, a diffraction slot in the throat of an otherwise CD flare is the ticket. When sized properly, a throat like this will give you constant directivity all the way up through the top octave.

Subject: Re: Conical HF Horn?
Posted by Cuppa Joe on Sun, 17 Jun 2007 18:41:38 GMT
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The HF horns will only be arrayed vertically, but not horizontally, the same as the 10" midrange horns. Still OK?

Subject: Re: Conical HF Horn?
Posted by Wayne Parham on Mon, 18 Jun 2007 15:21:54 GMT
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A non-symmetrical horn with a diffraction slot is astigmatic, because it has a different path length in each plane. The problem that exists when arraying horns of this type is that the apparent apex is different when listening off-axis in the horizontal plan than it is in the vertical plane. The apparent sound source shifts forward an inch or two (depending on the location of the diffraction slot in the horn) when listening off axis in the horizontal plane compared to listening on-axis or off-axis in the vertical plane. You can really only properly array horns like this in one plane, but not in both.

Subject: Re: Conical HF Horn?
Posted by Cuppa Joe on Tue, 19 Jun 2007 00:46:20 GMT
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I've read something of the sort concerning the old EV Mantaray stadium horns. Intuition tells me that the dense vertical interference will help mask the apparent apex difference. (Yes? Maybe?) The singular task of finding just the right HF horn for this project has taken at least 4 times longer than it took to design the midrange horn! A pair has to fit exactly across the mouth in the vertical, they can't be too wide or too panel-like, they must be constant directivity, 90 degrees, and have a cutoff between 1.5kHz and 2kHz. I've even considered using a bi-radial horn sideways with a deflector to correct for upper-range dispersion!

Subject: Re: Conical HF Horn?
Posted by Wayne Parham on Tue, 19 Jun 2007 01:46:02 GMT
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You'll be OK is you just array vertically. To tell the truth, at the frequency range where the dispersion slot works, you'd have more problems with center-to-center spacing than astigmatism. But I would suggest against splaying horns like this horizontally and grouping them as a vertical array also. Don't do two rows.

Subject: Re: Conical HF Horn?
Posted by Cuppa Joe on Tue, 19 Jun 2007 02:35:01 GMT
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Right! I'm avoiding the classic cluster array for all of my designs. Either they're vertical only, or they're horizontal (arced) only, but they're never both at the same time! For 2 of the 3 horizontal designs, I'm relying upon a high-quality, large format HF horn for segregation purposes, just the opposite of the HF section in the line array.

Subject: Re: Conical HF Horn?
Posted by DMoore on Fri, 27 Jul 2007 21:00:54 GMT
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I don't remember EXACTLY where I read this, but I did somewhere that a conical horn does not have an Fc (low frequency cutoff) as we commonly know it. I don't know whether that means that it doesn't fall off at all, or that it is unpredicable where it falls off...Dana

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