Subject: Re: Dimensions clarifications
Posted by Wayne Parham on Sat, 07 Apr 2018 23:54:44 GMT
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You're right that the horn angles are approximately 85° x 40°. And that's the way the tweeter waveguide is too. That's what we want - We want a horizontal pattern that's a smidge less than the expansion of the walls from the corner. So your top drawing describes best the dimensions of the midhorn.

The 45° figure is actually our target to exceed for the nulls. We want the nulls out at +/-20° to +/-25°, something like that. It's a reasonable goal that gives us plenty of vertical coverage. We definitely don't want nulls too close to the vertical centerline. So to have vertical coverage in the 40°-45° range is perfect. It keeps the HF attenuated at large vertical angles - to limit ceiling slap - and it gives us plenty of coverage, a nice tall "strata" of good sound. The nulls are set just outside the vertical pattern and sort of punctuate it.

Don't get too wrapped around the axle about differences of 5° or even 10°. For one thing the beamwidth "edge" we're talking about here is defined as a -6dB point, and outside this angle isn't a brick-wall sound void but rather a gradual falloff. And for another thing, the pattern is not perfectly constant, even from a waveguide or CD device. Directivity is closer to a constant than the pattern from an exponential or tractrix horn, but it varies with frequency, especially at the low end of the passband. So an 85° waveguide is very similar to a 90° waveguide, and we'll see much more variance than that from the environment.

For example, consider the difference in the radiation pattern from the midhorn when it is placed in open freespace compared with the radiation pattern when it's placed in the corner of the room, as designed. In freespace, the pattern is approximately 85° x 40° at 500Hz upwards, but below that it begins to waver. It actually narrows before widening way up. But in the corner, the walls constrain the pattern and make it much more constant. The pattern can never exceed 90° even at low frequencies where pattern control is lost, because the walls constrain the radiation angle. And the corner loading even limits the narrowing that occurs just before pattern control is lost.