Subject: Re: Corners and frequencies
Posted by Wayne Parham on Sat, 14 Dec 2013 03:25:09 GMT
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I've designed constant directivity cornerhorns for over three decades, and the current configuration is the best I've come up with. There are a handful of competing priorities, some that you've mentioned like listener height and others too, like acoustic distance from the boundaries. That's probably the biggest issue - The source must be acoustically close to the apex of the corner or it becomes a reflector.

If the source is directional, it can help mitigate nearest boundary reflections because the amplitude of sound radiated towards them is reduced. But at low frequencies, a horn cannot reasonably be made large enough to provide directional control. This is where the constant directivity cornerhorn approach gets its strength - the walls of the corner provide directional control all the way down to the Schroeder frequency. They're like a ground plane, and being acoustically close, the low and lower midrange frequencies are contained without suffering self-interference.

The best thing is to be acoustically close to the tridedral junction at the apex of the corner, of course. The next best thing, if not apex of all three boundaries, is to be at least acoustically close to the dihedral junction of the two adjacent walls. And finally, if acoustically distant, then having a source that's directional helps a great deal at limiting the reflections from nearest boundaries.

lowest frequencies up through the lower midrange are acoustically close to the apex of the corner. In order to keep the important midrange and treble frequencies at listener ear height, the midhorn and tweeter are raised above the lower corner apex, and so as wavelengths grow shorter (as frequency rises) the lower midrange transitions from being acoustically close to the apex to only being acoustically close to the two adjacent walls. But the woofer and midrange overlap in this region, so they smooth any vertical modes similarly to the way flanking subs work, as a truncated array. And being acoustically close to the two adjacent walls prevents anomalies from self-interference from them, which is the most important thing anyway.

As frequency rises further, into the upper midrange and treble, the horns provide ample directivity control to keep the beam within the wall angle. This doesn't prevent all energy from radiating towards the walls, of course, but what remains is highly attenuated. It is also at a grazing angle which does not reflect towards the listening area, and pretty much stays along the wall. So only people sitting very near the wall would be able to hear that reflection. This makes the whole room be "the sweet spot" except right up against the walls.