Subject: Re: 7PI midrange directivity
Posted by Wayne Parham on Tue, 09 Mar 2010 21:20:36 GMT
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The wall angles aren't exactly 90°x40°, more like 85°x30°.  Those angles are what set the pattern up high, and the (corner) room boundaries are what set it down low.

To give a little more description of of the pattern, the flare wall angle sets the radiating angle at


angle.

To put this into perspective where the midhorn is concerned, it does a pretty good job of setting the pattern in the horizontal, having control down to just a few hundred Hertz.  Below that, the corner placement provides assist, with the room walls setting the pattern all the way down to the Schroeder frequency, where room modes take over.  Where the pattern width would double in freespace at 400Hz or so, the room's walls confine the beamwidth and limit the radiating angle.  In a sense, the corner itself acts as an extension to the horn.

The vertical is a different situation, and the wall angle doesn't really set the pattern.  The vertical pattern is taller than the flare wall angle, more or less collapsing through the entire band up to the crossover region, where it narrows to approximate the flare.  This then limits the amount of energy at large vertical angles in the crossover band, which helps reduce null-forming interactions.  But the point is that the horn doesn't really set the vertical pattern until nearly the crossover frequency.  It isn't large enough.

It is important to understand that vertical directivity of the individual sound sources is modified when stacking other sound sources to form a loudspeaker system.  In a sense, vertical position is more important than the source's vertical pattern because when sources are stacked, the interactions form lobes and nulls.  See my reply in your other thread:
Vertical directivity