Subject: Re: H290 vs CH3
Posted by Wayne_Parham on Wed, 01 Aug 2001 23:03:27 GMT
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Both the CH-3 and the H290 are good horns. They each have pros and cons. The CH-3 does look flimsy, I agree. When I first saw it, I was skeptical about its performance. But it provides amazingly flat response and good coverage. The CH-3 has a diffraction thoat, so the coverage angle is constant to a higher frequency.The H290 is smaller, so it can't be used as low. But it is a simple horn that works very well. It has a smooth radius, gradually blending the compression driver exit angle to the horn flare angle, so there is no throat diffraction.These are two different approaches to providing constant directivity, each with its own set of tradeoffs. But in the end, I think they both sound good. Both can be used in this application, so you can pick your favorite.As for a comparison between the four Pi and the seven Pi, this is really more about placement than it is about loudspeaker configuration. Both designs produce good response off-axis as well as on-axis. This has always been important to me because I want the sound to be basically the same to each side of the speaker as it is directly in front. I prefer a wide coverage angle to a narrow sweet spot. This has the additional benefit of creating a uniform reverberent field, which is important because the total sound you hear in the room includes the reflected energies that make up the reverberent field, not just the direct energy.The way this is accomplished is different in the four Pi than it is in the seven Pi. The four Pi is what I call a DI-matched two-way loudspeaker. It uses a direct radiating midwoofer and a horn tweeter. Crossover between the two is made where their directivity matches, hence the name. The seven Pi uses horns that all have the same radiating pattern. The bass bin radiation angle is confined by the room walls, which matches the 90 degree radiaton angle of the horns used at higher frequencies.A direct radiator is acoustically small at low frequencies, so sound tends to be omnidirectional. As frequency rises, the sound tends to become more and more directional, because the diameter of the cone causes edge-to-edge path length differences resulting in off-axis interference. The effect grows as frequency increases, so the radiating angle tends to narrow. Where the midwoofer pattern narrows to match that of the horn above it, that's where crossover is done.In the four Pi loudspeaker, this makes a pattern that collapses uniformly from bass through the midrange frequencies, and then in the treble range where the tweeter has directivity control, the pattern becomes constant. In the horizontal plane, the pattern narrows to 90 degrees but in the vertical, it narrows even further, closer to 40 degrees. This is because the vertical spacing of the midwoofer and tweeter cause nulls to form above and below the speaker, and those nulls set the edge of uniform pattern control. Above the crossover frequency, the tweeter horn maintains this radiation angle. It is useful to have a narrow vertical pattern, because it prevents reflections from the ceiling and floor.The seven Pi speaker is similar in how it works, except that the room corner confines the pattern at low frequencies too. It is what I call a DI-matched cornerhorn. The room is acoustically large, so the walls are effective at confining the radiating angle at low frequencies. The bass and low midrange radiate into a 90 degree angle just like the higher midrange and treble do.Of course, room modes create their own energy patterns within the room in the modal region, but this must be viewed separately because it is an outside system. The room is definitely related, and intimately connected, so the bass bin and room form a system of their own. But each individual room has its own conditions and its own modal behavior, so each must be considered separately. A large room that is well damped has practically no modal behavior, whereas a small room with rigid walls has strong, well defined room modes. But in either case, the walls of the room set the maximum radiation angle, since sound is contained within them, directed outward from the apex of the corner, radiating into an angle of 90 degrees.