Subject: Re: H290C Horn/Waveguide
Posted by Wayne Parham on Thu, 16 Aug 2012 15:12:31 GMT
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The H290C was designed from the start to be a bolt-on upgrade, that would require a minimum of crossover changes. The acoustic centers are in the same place and the patterns are similar, so the pre-2012 crossover used with the old H290 horn can be used and the primary lobe is forward and centered. But the upgraded H290C waveguide benefits from an upgraded crossover that has different values in a couple locations. Its impedance curve is different, necessitating the removal

identify and locate these components.

provides three functions, 1. To provide full-band attenuation, 2. To provide mass-rolloff compensation in the top-octave and 3. To provide specific damping for the core-splitter, which sets the SPL level of the crossover region independently of the midband. This network provides maximum flexibility, allowing the low, medium and high frequency ranges of the tweeter's transfer function to be set independently.

This network is created by components R1/R2 and the compression driver itself. In many cases,

shunt is required. But in the case of the H290C, a shunt resistor Rs is used.

The input leg R2 sets the load on the core splitter, which sets the damping. High levels of damping (low resistor values) brings down the SPL in the crossover region. Low levels of damping (high resistor values) increase SPL in the crossover region. The attenuator R1 sets the midband SPL level, and interacts with the output leg, providing mass-rolloff compensation. Optional components C1 and Rs are used to further tailor the response.

As for audible differences, remember that I always found the old H290 horn to a pretty good part, and didn't change it even when several new waveguide products began to enter the market. I found it to be better than most of the so-called waveguides out there, for one reason or another. The only thing I really didn't like about it was the edge at the mouth. I would have preferred it to have a rounded lip. But that's probably not audible, really. Constant directivity horns with sharp edges in the throat are audibly harsh and "spitty", and I think the edge at the waistbanding expansion in some CD horns also contributes to that somewhat. But it doesn't seem to be so much the case with horns having their only edge at the lip, like the old H290 had. I suspect distance from the throat matters most, and so an edge right at the mouth was least objectionable. Still, I prefer a gentle radius at the mouth, making the horn smooth everywhere.

Of course, the basic flare profile of the H290 is different too. The new H290C uses an OSEC flare profile, which is the shape that best transforms a plane wave into a spherical wave section without "fracturing" it. The wavefront expansion is at right angles to the wall at all points through the horn. Other shapes cause it to twist and bend as it progresses down the throat, making modes or "pockets" of distortion. The wavefront is slightly distorted as it travels down the throat of any other shape. So the oblate spheroidal profile is the perfect shape because it allows the wavefront to pass through the horn without distortion.

How audible is this? How much distortion of the wavefront is too much?

I don't know the answer to that question. At this point, I don't think anyone does. I know that the OSEC shape is mathematically correct, so it's at the "best" end of the scale. I also know that horns with diffraction slots in their throats are just the opposite, audibly harsh and spitty at the "worst" end of the scale. In between are the horns with other shapes.

In my experience, the biggest thing is to stay away from horns with sharp edges in them, particularly those close to the throat. If the horn is gently radiused from throat to mouth and holds the right patern without sharp edges, it's a 90% good horn, at least. The ultimate horn uses a pure OS/EC flare, and this is what the H290C is.