Subject: Re: 7pi Plans
Posted by Wayne Parham on Sat, 06 Feb 2010 04:06:21 GMT
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Yes, that's true. I noticed that I mislabeled that a while back, meant to change it and forgot. It's been labeled like that for a while.

About woofer sensitivity, I'd pad the midhorn and tweeter to match. You might build it as-is and measure to find out what the exact difference is.

You know, the function of a crossover is pretty simple. It's job really is to split the frequency band out to the respective drivers so that no out-of-band frequencies are presented to a driver that would cause damage or poor performance. The main thing that's important, in that regard, is to do so in such a way that summing is good through the overlap band. Sometimes, the crossover also has to match sensitivity, which is usually done by a voltage divider, basically a pair of resistors.

Occasionally, it is desirable to do a little bit of equalization in the crossover, in addition to its basic frequency-splitting function. If a driver has response that isn't flat but that is predicable, such as a simple first-order rolloff, say from mass, then that's a good canidate for equalization in the crossover. An example is CD equalization, often done in tweeter circuits for constant-directivity horns because of the mass rolloff exhibited by the drivers. In this case, equalization fully solves the problem and it works well.

Some people also provide equalization in the crossover for things that I wouldn't do myself. Examples that come to mind are response anomalies that are caused by directivity or diaphragm breakup. These are things that cannot be solved with equalization. If you try to solve either of those kinds of problems by equalizing response flat on-axis, then it is NOT flat off-axis and vice versa.

I prefer to make power response flat, and then to have uniform directivity. That solves the problem rather than using some kind of on-axis band-aid approach. As an example, by putting the speakers in the corner, you make the so-called baffle step a mute point.

It's popular in DIY circles to provide baffle step compensation, but think about what that really is. When a speaker transitions from free-space radiation to half-space in the frequency range where the baffle becomes acoustically large, then the sound gradually becomes more focused from being omnidirectional to radiating only forward. It is then louder at the higher frequencies than it is at lower frequencies.

Baffle step is a form of collapsing directivity. Most speakers will tend to continually narrow their radiation patterns even further as frequency rises because the diaphragms become acoustically large and the pattern narrows even more, often into less than eighth space at the highest frequencies. Some people call this beaming, and that's a good description of what it is.

When the sound pattern is increasingly narrow at higher frequencies, then the response usually rises. It gets louder as frequency rises. If the speaker has equalization, either in the crossover or

because of electro-mechanic-acoustic properties, perhaps mass-rolloff that precisely counters the rising response from collapsing directivity, then response is flat on-axis but rolled-off off-axis. This makes the reverberent field unbalanced spectrally, and I think that sounds unnatural.

A simple and I would argue elegant solution is to control directivity. The cornerhorns, for example, cannot have baffle step because they are already radiating into a much tighter area than half-space. When the woofer fires into the corner, it radiates into eighth-space. The midhorn and tweeter are also designed to radiate a 90° pattern. So there is no need for any sort of equalization for changing directivity - It is already uniform. The only EQ required is for mass-rolloff of the compression driver, a simple first-order slope.