Subject: Re: 4PI Plans Request
Posted by Wayne Parham on Mon, 09 Dec 2019 16:47:23 GMT
View Forum Message <> Reply to Message

You've got mail!

I agree with Barry about the JBL 2226H. It is an excellent midwoofer. The flux stabilization ring in the motor structure reduces distortion down to the levels normally only seen in horns. When combined with a horn tweeter, you have a system that is very smooth and distortion free.

Also compare the H290C waveguide to the SEOS12. The H290C is measurably smoother. I considered using the SEOS12 at one time, but I wasn't happy with its performance. It has peaks that must be smoothed with notch filters in the crossover. So I designed the H290C waveguide specifically to allow an upgrade path beyond that.
H290C Horn/Waveguide
Don't get me wrong - SEOS enthusiasts are very much like Pi Speakers enthusiasts. And their waveguides and loudspeaker designs are very good. In fact, when they started out, many of them were regulars here and on (Zilch) Evan Flavell's "Econowave" threads. Pi Speakers is sort of like the grandfather design for Econowave and SEOS speakers. The loudspeaker models here were inspirations for their designs.

That's why I considered using the SEOS waveguide when they first started out. I had a wood horn/wavguide that provided constant directivity, but it was very expensive. My other option was a radial horn that had nearly constant-directivity. This was much more popular because of its cost. So I was looking for an upgrade path for the radial horn using a horn/waveguide of approximately the same physical dimensions.

At that time, about ten years ago, the guys that are now DIYSG were talking about making a waveguide too. Back then, I thought we might work together. And like I said, many of them were regulars on this forum and on the Econowave thread. We were all very much kindred spirits.

But we diverged mostly on the points of acoustic loading. We agreed on pretty much all other aspects. I personally do not like waveguides that deoptimize acoustic (horn) loading because they become excessively resonant and require notch filters in the crossover to avoid peaks in response.

So I chose to have an injection mold made for the H290C horn/waveguide, which was very much like the expensive wood horn/waveguide I offered at the time. The H290C does everything I want it to do, at a reasonable cost. It provides constant directivity and is very smooth, not needing notch filters in the crossover.

And speaking about the crossover, I suggest that you stick with the passive crossover as shown in the plans. You could employ an active crossover, but it must have the exact same transfer function as the passive crossover or you would be degrading performance rather than improving it.

I use a digital active crossover to design the passive crossover. It uses an impedance chart in the

form of a ZMA file to incorporate the actual electro-mechanico-acoustic load of the drivers in the system. See the link below for more information about the process.
Crossover optimization for DI-matched two-way speakers
Systems with active crossovers have their benefits, but first-things-first: To get amplitude and phase response right, we need either to include the driver's electro-mechanico-acoustic interaction directly with the passive components, or if isolated using an active filter, we need to be able to employ a ZMA file or some other way of including the load impedance.

It's an Nth degree thing. You can definitely make a great loudspeaker without this kind of precision. It's like making a hotrod car with a carburetor and distributor with ignition points. You can make some awesome stuff with that technology. But if you have a computer sensing oxygen and detonation, you can get even better performance.

While some might see the passive crossover to be more akin to the carburetor, it's not the case. The passive crossover has been dialed-in with the computer. So in this case, the passive crossover is the one that is the Nth degree solution.

An active crossover that didn't exactly emulate the transfer function described above would be more like the computer controlled carburetors of the 1980s. It wouldn't be exactly right. Sort of like how the computers in the 1980s cars couldn't detect detonation and their narrow-band oxygen sensors don't have the ability to provide an accurate signal. They couldn't rapidly change the air/fuel mixture or set the ignition timing. So even though those 1980s cars had computers, they didn't offer much in the way of performance. Same could be said of an active crossover that wasn't dialed in, but instead used generic filter functions.

The only way to get an active crossover to give a true benefit would be to employ a digital filter like I use for designing, one that has an impedance plot of the drivers in the system. It would then give the exact same transfer function as the passive unit.

And one last thing. Not something you asked about but worth mentioning anyway. I highly recommend flanking subs be used. They work very well with my mains or with DIYSG speakers. They are a subset of the multisub concept, which is another thing I advise. But if you want to start small, use two flanking subs and then later add another sub or two, placed further away. I call the distant subs "distributed" multisubs, to distinguish them from flanking subs. But both "flanking subs" and "distributed subs" are parts of a total multisub setup.
Flanking subs and multisubs