Subject: Re: 4pi's on the way!
Posted by Wayne Parham on Thu, 09 May 2013 16:29:12 GMT
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It matters more where you put the flanking subs than it does where you cross them or what you use to cross them with. They really need to be placed a few feet below, beside and behind the mains - not too far away and not too close. You need the distance to provide the smoothing, but not so far away they become apparent. The goal is to not be able to tell the subs are even on.

Crossover frequency and slope should be set high enough to smooth the upper midbass and even up into the very lowest midrange - the throaty part of a deep male voice - but it can't be set so high you can localize the subs. It's really a ballpark though, there's at least a half-octave of "wiggle room" here. I don't usually recommend setting things by ear, but this is one you really can. Just listen to the subs up close and ensure they are running up into the bottom edge of the midrange, making male voices sound extremely muffled but you can definitely hear them, the very lowest part, at least. Then sit back in the listening area and check to make sure the subs "disappear". If you can tell the subs are on, then the crossover is set wrong or the subs are too loud.

If you do have measurement gear, what you should see is fairly deep (-10dB to -15dB) notches in the 80Hz to 160Hz with the flanking subs off, and those should be reduced to around -6dB with the flanking subs on. Other than that, there should be no noticeable change in the midbass and midrange with the subs on, except slightly higher SPL below about 100Hz, of course, and extension to whatever the subs provide.

As an aside, the SPL increase doesn't run all the way up to the subwoofer crossover frequency because coupling is reduced as frequency rises. In the region where the helper woofer blends with the mains for smoothing, the biggest influence is where self-interference from reflections completely notch out one source, and in those places, the other source is in a different position, having different path lengths to the listener. So where one source suffers a notch from self-interference and cannot be heard, the other source is not, and is able to be heard. It fills in the holes from self-interference.

The helper woofer should be blended with the mains through the 100-200Hz octave, with gentle rolloff, and that is best accomplished with something like 100Hz to 150Hz low-pass using second-order slope. That gives enough energy to be useful where the self-reflection notch from the wall behind the speakers occurs, and that's usually the biggest offender. It's usually around ~120Hz, but I've seen 'em a litle higher and a little lower, depending on the proximity to the boundaries.