Subject: Re: Positioning and subs
Posted by Wayne Parham on Thu, 08 Jan 2009 05:36:01 GMT
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I wouldn't say that subs should always go in corners, but there are some benefits of corner placement and I think that at least one sub in a multi-sub setup should go in a corner.

main speakers. The spectral balance is uniform throughout the room and imaging is great over a large area.

If the room doesn't have corners that will work well for this setup, then DI-matched two-ways like

As for the multi-sub setup, there are several schools of thought. All share some things in common, and all are in agreement that the more subs used, the more uniform energy distribution is.

When I first started looking at multi-sub configurations, I would have probably suggested four corners for sub placement. It is not a bad arrangement, and it has some advantages. The number of subs ensures a great deal of smoothing. Most agree that once you get to four subs or more, it almost doesn't matter where you put them. If they aren't grouped closely together, you can put them almost anywhere and get good smoothing. Putting all of them in corners tends to also increase SPL.

The first proponent of the multi-sub configuration I saw was Todd Welti. He did a study of several configurations and came to a conclusion that the best placements were (4) corners, (4) wall midpoints or (2) wall midpoints. At that time, I would have probably picked four corners because it smoothed room modes, gave high SPL and coordinated nicely with my cornerhorns.

Later, Earl Geddes proposed what he called a random configuration. We talked about it in person at the 2005 GPAF and later in several online dialogs, both public and private. It made sense to me immediately that he was trying to break up the resonances with random placement, but I was also concerned about a couple of things. For one thing, "random" is not specific and so is vulnerable to what I would consider random results. Some configurations might be good and do what Earl wanted, but others might not. And for another thing, I was concerned about localization.

Earl began to give specificity and perhaps evolved his approach. Instead of being totally random, he proposed that one sub go in a corner, one sub be at mid-height and a third be totally random except that it not be in the same position as either of the other two subs. I began to refer to his proposed setup as a pseudo-random placement. He has recently changed this recipe further to say that the mid-height sub is not always necessary, but that it should be at least midway along a wall or close to it.

This approach sounds reasonable to me, but it still seems vulnerable to not necessarily making the target area have the best balance over the widest area. Then again, since you should "dial in"

the placement with measurememts for best performance, I think it is probably as good a starting point as any.

The second point I was always concerned with - localization - is addressed by making sure the furthest subs are low-passed at the lowest frequency. Only the sub placed physically closest to the mains can be low-passed higher, where it can smooth the portion of the modal range closest to the Schroeder frequency.

two-way loudspeakers. Either Welti or Geddes configurations will prove effective at smoothing room modes, and I would recommend either one. I think it is worthwhile to try both to see what works best in your particular room.

I personally prefer a sort of hybrid approach. Even though I agree in principle with both Welti and Geddes arrangements, I like some parts and dislike some parts of both of them. For example, I see the room itself as providing some of the random-ness of the Geddes approach, and so it may be that the subs can be placed in a more ordered arrangement. Welti multi-sub arrangements are always symmetrical between subs, but they aren't necessarily symmetrical with respect to the mains. I think this is a key issue, because integration with the mains is the most important thing we're trying to do.

My approach is a little more empirical. I like to put symmetrical midwoofer/woofer pairs in fairly close proximity with each other to smooth the highest portion of the modal range, nearest the Schroeder frequency. The helper woofer flanks the main woofer, hence the name "flanking subs" that I mentioned earlier. Another subwoofer or pair of subwoofers can be placed further from the mains, if more smoothing is desired at lower frequencies. The distant subwoofer(s) should be low-passed at a lower frequency, so it doesn't betray the mains by exposing its location.

the bass bin and midhorn. They are separated by a couple feet vertically and are also offset in both other axis. This is close enough to allow a relatively high frequency overlap but far enough apart in all three planes to provide smoothing.

In the DI-matched two-way speakers, it can be done by flanking the mains with a pair of subs

midwoofer/subwoofer pair is placed close enough to allow a relatively high low-pass frequency on the subs. This provides smoothing of the upper end of the modal range but does not muddy the mains or betray their imaging because the subs are close enough to integrate well. They should be offset in at least two planes, possibly all three, but should be symmetrical with respect to the mains.

Many times the mains are offset to one side of the room or the other, not exactly centered. That is sometimes why cornerhorns weren't chosen in the first place. If that's the case, one subwoofer may be placed in a corner, say four feet from the main speaker on that side. Then the other one may be also placed four feet away from its corresponding main speaker but instead of being place in a corner, it may be several feet away from the corner, possibly 2/3rds of the way down a wall or maybe even at a midpoint. This kind of arrangement gives what I would call "local symmetry" because the mains and subs are all symmetrical with respect to the listening area. It is not

symmetrical in the room though, so is not a Welti configuration. It isn't a Geddes configuration either, but does have two of three bass sources where Geddes suggests. If you consider the woofers in the mains as your "random" placements, this configuration is similar to the Geddes pseudo-random configuration even though it has what I would call local symmetry.

I think the main thing is every room is different. The other main thing is the more bass sound sources you have, the smoother the bass energy distribution will be. And a third main thing is higher frequency smoothing requires relatively closely spaced sound sources blended high and lower frequency smoothing requires further spaced subs with a deeper low-pass frequency. Sometimes you can strike a balance with a pair of subs augmenting the mains, other times it's better to have three or four.