Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by Wayne Parham on Fri, 18 Jan 2013 22:59:49 GMT
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The multisub approach is intended to mitigate room modes. The problem is the direct sound from the subwoofer and the reflections from each boundary combine differently at each point in the room. So there are hot spots and dead spot in the room, and they're in different places at different frequencies. They form a sort of a checkerboard pattern, with just a few widely-spaced nodes down low, and a larger number of closer-spaced nodes as frequency goes up. By the time you reach the Schroeder frequency, the spaces between nodes become close enough together you can't tell them apart, they aren't well defined and the sound field begins to average.

You can think of a subwoofer as a source, and each boundary as another virtual source. Since many of the reflections are futher than a quarter-wavelength away, you cannot setup the subs so they avoid destructive interference between subs or between the subs and the mains. There is destructive interference caused by the room, itself.

Think of it like a pool of water that stretches for miles in each direction. The goal would be still water, perfectly flat. Then throw in a rock and you'll see well-defined ripples appear. If you through in one more rock (or add a single reflector for the waves to bounce off), then you see a clearly defined interference pattern. The peaks and valleys are well defined. This is course interference. But now sprinkle the pool with many impacts, like from rain, for example. The nodes are now indistinct, the energy is distributed pretty evenly. This is dense interference.

To look at the difference between a wave expanding without a reflection and the interference that comes upon meeting a reflection, see the post below:
Speaker placement and wavefront launchThe multisubs arrangement is done to create dense interference. It is intended to actually create more interference, not less. The best goal is to have no interference, to have point source summing. That's possible outdoors, but not indoors in a small room. So the next best thing is to have dense interference, because at least then the sound field is averaged. What you don't want is course interference, because that is what causes sharp nulls.

Distributed subs are placed far away, and they tend to smooth the sound field at low frequencies. Flanking subs are placed closer, and are used to smooth the sound field at midbass and lower midrange frequencies. Each is designed to "fill in the holes" caused by course interference, to actually make the interference more dense.

Room modes, multisubs and flanking subs