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Subject: Re: Single sub bad - multi subs good

Posted by [Wayne Parham](#) on Sat, 24 Jan 2009 00:10:11 GMT

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I agree with you about running subs and mains as stereo pairs. If outdoors or in a very large

essentially what you're saying, I think, when you talk about being aligned. One problem in home listening rooms is the reflections off walls make virtual sources that are too far away for constructive summing. They cause self-interference that makes room modes. That prevents us

close enough, the reflections aren't. I think it helps to visualize what the sound field looks like in a room. At high frequencies, interactions of direct and reflected waves form nodes that are so closely spaced they are indistinguishable from one another. This dense interference makes the sound field average in what's called the reverberent field. The approximate frequency where sound begins to act as a reverberent field is called the Schroeder frequency. Above this frequency, reflections are like ripples from rain drops, so dense that individual waves can't be seen. But at bass frequencies, the interactions between direct and reflected energies are more spread out, so the modes are well defined. It's like the discrete waves that can be seen spreading from a single rock thrown in a pond interacting with another rock thrown in a moment later. The small number of them makes the interactions well defined. What is needed is something to make the nodes less defined, more dense. That's where the distributed multi-sub idea comes from. Since there is no way to prevent interference, the idea is to make interference more dense. In so doing, the sound field is averaged and more balanced as a result. You can look at it as having the nodes from one subwoofer fall on the anti-nodes of another. Indoors, overlap the mains with the subs for best results. The low-pass of the subs should be set high enough to provide smoothing through the modal range. I like to have stereo flanking subs that are pretty close to the mains and placed symmetrical to them, no less than three feet away but not usually very far either, under about six to eight feet. These local or flanking subs are used up through the midbass and smooth the upper modal range, up to the Schroeder frequency, usually somewhere between 100Hz and 200Hz for most rooms. Rolloff gradually to transition into the reverberent region, ideally to point source mains with uniform directivity. This is accomplished with flanking subs low-pass somewhere around 90Hz - 120Hz, maybe as high as 150Hz. That's too high for distant subs but it's just right for woofers that are spaced only a few feet away. If you need smoothing at lower frequency, one or more subs can be placed further away and crossed lower. If you need max SPL, you might want to high-pass the mains but for best smoothing, don't. Instead, allow the mains to go as low as they'll go, which makes them be additional bass sound sources. It's different than the way you might be inclined to setup, but try it and see how you like it. Indoor sound has a different set of challenges than outdoor sound, so the priority of trade-offs is different. For home hifi, I think I'd prefer the smoothing offered by overlap more than the reduction of IMD offered by high-passing the mains. This is probably more true for speakers with large high-efficiency woofers than it is for mini-monitors. If a person was running mini-monitors, the reduction of excursion would probably be important enough to high-pass the mains, maybe add more bass and midbass sound sources another way. But if you're running mains with a prosound 12" or 15" woofer for hifi speakers, I'd probably run them all the way down and blend them with the subs, low-passing the subs as is appropriate for their position in relation to the mains.

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