
Subject: How do we counter teh 90 degree phase shift in a 6 db?

Posted by [akhilesh](#) on Fri, 06 Feb 2004 20:22:26 GMT

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Hi Everyone,I should probably work this out myself, but it's friday! My question is:I have a full range driver, with a supertweeter corossed over at 16000 HZ at 6 db/octave. Both drivers have similar eff at 95 DB. The 90 degree phase shift that ensues: how do i counter that? Do i push the tweeter forward in relation to the full range? and by how much?Placement of the tweeter is TOTALLY flexible. -akhilesh

Subject: You can't

Posted by [Wayne Parham](#) on Fri, 06 Feb 2004 22:13:16 GMT

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Actually, a first-order crossover only shifts phase 90o at the asymptote, which is a fancy way of saying the stop band. The stop band is where the driver is attenuated, so this is sort of a "mute" point. Pun intended.Please notice the graph of phase shifts of first-order filters in the post called "Phase, delays and offset baffle spacing." These shifts are an inevitable part of the nature of filters. Both low-pass and high-pass filters are shown, and equivalent baffle offsets are shown at various frequencies.You can line up the tweeter and woofer (or fullrange) so that they are in phase at one frequency and at one specific listening position. Move off axis and the whole thing shifts. But I'm not sure this is really a huge problem when you consider that there are few sound sources in a home sound system, and there are walls and furnature and things of various sizes in the room to reflect different frequency components at different amounts and positions. The numbers of phase modifiers from the environment usually makes much more irregularity than do the electronics.

Subject: Re: You can't

Posted by [akhilesh](#) on Sat, 07 Feb 2004 19:50:05 GMT

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Thanx Wayne. I feel a whole lot better now! I was planning on isolating a single frequency, like 12000 cycles (since i am croseed over at 16000 cycles) and attempting to calculate 1/4 the distance travelled by a sound wave at that frequency, and then put the tweeters ahead by that much. But you are right, that may not really be audible at all, especially given inevitable room colorations & other sources. and if i do put the tweeters forward, that may have worse effects because of interference with the main speaker baffle. I'll build small boxes for them and isolate them on top of the main cabinet, and then experiment with different positions. will keep us all posted!-akhilesh

Subject: Re: You can't
Posted by [Wayne Parham](#) on Sat, 07 Feb 2004 21:48:34 GMT
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The wavelength of 12kHz is an inch and an eighth. So naturally, a quarter wavelength is about a quarter inch. Alignment really has little meaning at that scale, since diaphragm dimensions are larger. Best thing is to shoot for a dense interference pattern, where there are literally so many interference nodes that the sound field balances out.

Subject: Re: You can't
Posted by [akhilesh](#) on Sun, 08 Feb 2004 17:46:36 GMT
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AHHHH, so you mean place the super tweeter & main driver as close to each other as possible?
thanx-akhilesh

Subject: Re: You can't
Posted by [Wayne Parham](#) on Sun, 08 Feb 2004 22:03:53 GMT
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Actually, that's not what I meant but I'd do that anyway, just so the sound sources were seeming to come from the same direction. But the point I was making is that there is no way to to time or phase align the super-tweeter. When crossed at 12kHz, the amount of misalignment will be best described in full cycles, and not by phase. In other words, there will be greater than 360o phase shift throughout most of the listening room. But this is largely academic, because items in the listening room create reflections having a very rich set of phase relationships with one another anyway.
