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Subject: Re: Art Array Improved Crossover

Posted by [Wayne Parham](#) on Mon, 09 Feb 2009 20:38:31 GMT

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I do all my initial designs by modeling, and I encourage others to do that too. I don't believe any optimization was done on the ART Arrays, so maybe it's time. But I think the only way to find an improvement is with real measurements. Your design is past the point of most DIY modeling efforts. Sophisticated models would be required to get past where you are, or better yet, obtaining real data from measurements of actual samples. One suggestion is to use the Smith & Larson WTPro measurement system, which fuses Spice modeling and acoustic measurements into an extremely powerful development tool. That's what I use for development work, and I use LMS for measuring finished products. Again, the main thing I would focus on is the hump at 700Hz. That may be reduced a little bit. But really, the response chart for the stock speaker is pretty good. At no point does the amplitude response vary more than  $\pm 5$ dB in the passband. Average (3rd octave smoothed) response is within  $\pm 3$ dB from 40Hz to 25kHz. That's not bad at all, so I don't expect huge improvements from a crossover update. Only subtle improvements could be made, at best. If the curve had been made for publication by a marketing department, they would have set the scale so it didn't show the peaks and valleys so well. It would have also been smoothed to 1/3 octave resolution. That's what people are used to seeing, and your speaker by comparison would have looked very good. I didn't post the chart that way, because I like seeing the detail. Trouble is, that makes it seem worse than it is I suppose. If the chart had been "bad" I would have suggested some changes when you first presented the speakers to me for measurement. Not only was it "not bad" but I think it was pretty good, especially for an entry-level DIY speaker using relatively inexpensive parts. The tweeter is fine with the first-order HP filter. I have literally

tweeter circuit is exactly the same as what you've used in the ART Array. Perhaps a different slope might be employed for phase/summing, but then again, measurements showed first/first summed better than second/first. From that, I'm guessing this speaker probably responds best to symmetrical or nearly symmetrical slopes. The woofer circuit might be modified a smidge, maybe changing the LP filter, inserting a notch filter or modifying the Zobel. That might help reduce the 700Hz hump. On the other hand, the speaker with first-order LP filter measured better than the second-order, with less attenuation on the top end, not more. That tells me probably you want these particular midwoofers to run up just about as high as they can, just shaving any breakup modes from the top. In the end, you may find that this issue is specific to the woofer chosen, and that anything you do to correct its rise at 700Hz changes the response elsewhere, perhaps doing more harm than it does good. Can your ART Array be improved, probably. Does it need to be? That's harder to say. Average response from 40Hz to 25kHz within  $\pm 3$ dB is pretty good, in my opinion. But if optimizations are found that bring it even flatter, say to within  $\pm 1.5$ dB, that's even better. I'm interested to see, so please let us know how things progress. If there is a genuine improvement found, we'd like to post it in the Projects directory with the original plans and schematics.

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