Subject: 4Pis are back and I wrote a BOOK!
Posted by Bill Epstein on Thu, 01 Sep 2011 11:48:22 GMT
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It was suggested to me that the Utah/S-B Acoustics 2-ways weren't imaging well (voices and instruments stuck to the speakers) due to beaming of the 12" woofer at the top of it's range. This was after I raised the crossover point from 2000 to 2800 Hz in hopes of improving the imaging, which didn't help, the opposite of the advice.

I'm going to try going far lower on the tweeter; it's Fs is 600 Hz so my next step is to build a 1200 Hz, 4th Order Link-Witz Riley crossover. Opinions on that???

Much as I like the tonal color of these 2-ways, replacing them yesterday with the 4Pis after about 3 months was a revelation. The last music I listened to before the switch was John Mayall and The Blues Breakers Featuring Eric Clapton. Everything about this original London sounded crisper and more dynamic.

A few days ago I received and played the Bjoerling/Corelli/Scotto Turandot on Angel. It sounded indistinct and far away, something I chalked up to the inferior reputation of the record label. I replayed it yesterday and, guess what? It sounded clear, punchy and dynamic but don't think for a minute that Puccini became John Philip Sousa; the bel cantoaspect of the music was even more bel canto!

I really want the Utahs to work out because I can hear beauty in them and I like the idea of a dynamic tweeter but right now, their flaws exceed their virtues. I'm not prepared to invest in the testing equipment and knowledge building it would take to realise a finished design so I guess I'll just Potz around with them. In between building the Theatre 4 Pis and these current to-the-letter 4Pis, I tried all sorts of variations of cabinets and drivers. No one knows better than I that when Wayne says you can't fool with the Pi parameters without extensive testing, you'd better listen. The 4Pis are just killer speakers: tone, texture, imaging, it's all there. Because it's a tested, finished design based on science and aesthetics.

Subject: Cone/dome two-way
Posted by Wayne Parham on Thu, 01 Sep 2011 18:00:31 GMT
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I'd crossover at a lower frequency, but I'm not sure I'd go fourth-order, probably less, depending on what the tweeter could handle. You'll also probably want to make the woofer and tweeter crossover filters symmetrical, i.e. same frequency and slope. It's hard to know what slope to use and what frequency works best, definitely a balancing act. With matched-directivity two-ways, it's a little easier to know the general frequency range where crossover should happen, so the hard part is limited to getting the phasing right to make the best forward lobe. But with a garden-variety cone/dome speaker, we're not looking for a directivity match. As I said, it ends up being a balancing act of competing priorities.

What we're usually hoping for is best on-axis response and a generally wide pattern with fairly uniform off-axis response. Directivity won't be matched at the crossover point, but if power response is flat, then it usually sounds best. There are a few things to balance. Low-order slopes are usually good in terms of transients, and the wide overlap makes the directivities or the midwoofer and tweeter blend, sometimes making directivity actually pretty uniform. High-order slopes are usually better in terms of distortion and tweeter protection, but usually make transient response and directivity suffer. Likewise, a higher crossover usually easier on the tweeter, but directivity and consequently imaging aren't as good. A lower frequency crossover, especially with low-order slope is great for imaging, but greatly reduces power handling, increases distortion at moderate levels and ultimately usually kills dome tweeters. So it's kind of a balancing act.

Subject: Re: 4Pis are back and I wrote a BOOK!
Posted by Wayne-o on Fri, 02 Sep 2011 15:09:51 GMT
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Hey Bill that sounds like a lot of work. It seems like this would go back to the HPM-100 design where Burt ended up blending in a mid range and a tweeter.

Subject: Re: 4Pis are back and I wrote a BOOK!
Posted by Bill Epstein on Sat, 03 Sep 2011 00:43:48 GMT
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I spent the day researching the peaks of Butterworths, the phase angles of Linkwitz-Rileys and the distortion overlaps of Chebadyevs. Came up with a new, secret process for crossover design that unfortunately I can't divulge at this time.

Subject: Re: 4Pis are back and I wrote a BOOK!
Posted by Wayne-o on Sat, 03 Sep 2011 02:39:35 GMT
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That was good.

Subject: Re: 4Pis are back and I wrote a BOOK!
Posted by Bill Epstein on Sun, 04 Sep 2011 01:07:24 GMT
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Decided on a 2nd Order Butterworth at 1200Hz mainly because I have 23.5uF oil caps and .75 coils on hand. I read somewhere that there's always an objectionable peak at the BW crossover

point but that the imaging from 12dB/octave should be better.

In the meantime I played the newly arrived Quality Record Pressings re-issue of the Reference Recordings Firebird Suite on the 4 Pis. Killer dynamics and wonderfully "live" instrument voices. Better than the outstanding original.

Subject: Damping resistor across the tweeter!
Posted by spkrman57 on Tue, 06 Sep 2011 13:48:37 GMT
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JBL did that with a lot of their MF/HF drivers in their crossovers to smooth out the impedance variations reflected back to the crossover.

Try a value that is 2 X the Dcr of the driver. The lower impedance of that scenario is not as much as you think it would be affected.

It might raise the crossover frequency to the HF just a bit, but not so much that you might notice.

Ron sends...
