Subject: Very puzzling
Posted by Manualblock on Thu, 27 Jul 2006 00:00:43 GMT
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I have to ask this in the hopes people will give it some thought. Regarding xover and xover design I will start with a saying I read in a speaker builder book; it said anyone who thinks they can grab a bunch of off the shelf parts and create a fundamentally sound xover design is dreaming. The chances of coming up with a sufficient design by doing that are slim and none.Yet lately on forums I read about guys swapping parts in and out of their xovers and changing values like the weather.I have to wonder are they really getting good results that are consistent and well integrated in the over-all design or are they tailoring the frequency response at random and calling it good?I mean why do established companies with good designs spend so much R&D on xover design if it is that easily done?

Subject: Re: Very puzzling
Posted by GarMan on Thu, 27 Jul 2006 00:35:47 GMT
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I think the odds of improving a crossove by swapping parts at random are next to zero. But most of the swaps I read about is just replacing stock components with higher quality, while maintaining the same values. Considering most stock crossovers are build on a price-point, can't be too hard to improve quality with better parts, provided values remain the same.Tweaking crossovers by changing values really requires you to understand what each component is doing and why. First order crossovers are the easiest. As poles increase, it becomes increasingly more complicated. Not only do you have shape of slope to worry about, but you have to contend with phase, baffle and relative positioning of drivers. Computer modelling programs are a big help in this area.I want to address your comment about established company spending a lot of money on XO design and whether or not it's really that easy. The short answer is yes, it is that easy. Considering that there are many in the DIY community armed with nothing more than a laptop, microphone, a corner in their basement, and several hundred dollars of software, that are able to design and build perfectly flat speakers, it's not really that difficult if you really want to do it. The big difference is that established companies have to design these things so that can be built consistently under price points.Gar.

Subject: Re: Very puzzling
Posted by Manualblock on Thu, 27 Jul 2006 02:37:09 GMT
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Good reply and food for thought. Swapping the same values out for better quality doesn't change anything so thats a wash.So to address your comment on computor modeling I would ask why

every speaker doesn't pretty much sound the same since the models would assume similar conditions to find the best solution for a given component choice.Regarding DIY efforts; the first point that jumps out at me is that why would we need any proffessional speaker builders if we could just spend the money we give them on a couple programs and some measuring devices and create better stuff on our own. I don't dispute what you say; I just think it might be a little more involved than that. Designing to price points when you have economies of scale seems to also be a wash in regards to big companies VS DIY. So I guess the question becomes is there any pro speaker designers that actually best the home constructor who has some knowledge and access to a little gear for testing? If the computor modeling works well it should mean the pros have no advantage other than access to larger inventories of parts to experiment with. What do you think?In order to be candid I will say there are commercial speakers I am familiar with that I will say are worlds above the average homebuilt in quality and distinctive sound. But I haven't heard everything.As an example I see the SD field where as I have expressed in the past I personally feel they sound astonishing;...on certain types of music. On other types they sound dead. Thats I think where we go with the homebuilt and designed computor modeled examples. They get certain things right; sometimes very right. But not everything. And that is what a commercial and well rounded speaker should be doing. So I am not so sure it is a price point so much as the requirement that the speaker play everything. IMO. Just an opinion; I would love to be proven wrong and be able to build my own gem of a loudspeaker; one that does most things well and some great.Then again I always loved the Quad 57 so that kind of pin-points me in a way.

Subject: Re: OOO! OOO! I Know!
Posted by wunhuanglo on Sat, 29 Jul 2006 14:56:51 GMT
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The reason they don't sound pretty much the same is the whole speaker is worked to a price point, not just the crossover.I'd be willing to bet that if you listened to several generations of Wilson Audio WAMMs side-by-side the sound character would be pretty much the same.As far as pros having an advantage over DIY? I'm willing to bet a dollar to a dime that their advantage (excluding obvious charlatans like Audionote selling 2-way $28,000 speakers that they proudly declare sound like a drumhead when tapped on)is that the pros are more likely to be clear-eyed (eared?)about their results, less self-delusional because they're not working in isolation, open-loop, no feedback.

Subject: Re: OOO! OOO! I Know!
Posted by Manualblock on Sat, 29 Jul 2006 15:38:47 GMT
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Interesting; whats your take on the DIY/pro thing regarding your big gun Altecs and JBL's? I know you like them and most of their designs were done without the aid of computor modeling. See I would accept that if you have access to a lab and use the best available drivers; Scan-Speak/TAD

etc with anechoic chamber results and such then as a diy'er you could turn a better design, but then it would cost you more than a pro built unit. Guys working out of their garage build really nice stuff that sounds good; but it ain't competing with the top shelf stuff.

Subject: Re: OOO! OOO! I Know!
Posted by wunhuanglo on Sun, 30 Jul 2006 13:59:06 GMT
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I really, really, REALLY believe that not competing with top shelf stuff is the illusion they (the producers of top shelf stuff) have fostered over the years to get the buying public in the door.99 and 44/100% of any loudsepaker is the driver and very, very few manufacturers of dynamic loudspeakers build or even specify drivers; some big Chinese company produces a huge range of variations and they pick one. If you turn to the Japanese companies (TAD, GOTO, ALE) I highly doubt (but don't know for a fact) that they wouldn't consider any outside input beyond "thank you for the honor of allowing me to purchase your products".So you're left with a company buying drivers and building a box to hold them. How hard is that really? The guy who designed and built the driver had an ideal enclosure in mind when he started. Ask him. If you don't want to ask him as T-S - they know to a very high degree of certainty.And the crossover? I'm convinced that all the "mystique" about crossovers is largely manufactured - that even a textbook crossover will work just fine with well-behaved quality drivers. It's undoubtedly a challenge to knock off the peaks and dips in the response of some "Made in China" POS but that wasn't your point. And even if you engineer a brilliant response shaping network, how meaningful is it when applied to a line of drivers with poor quality control and large sample-to-sample variations?As far as cost goes, look at the prices of Westlakes or Wilsons or those of similar stature - a speaker with perhaps $5K of drivers and materials at retail sells for $30,000 - there's a hell of a lot of $ for the DIYer to play with. And what I think most important is that the DIYer doesn't need an anechoic chamber - he's building a custom speaker for a custom space, his livingroom - all that really matters is the in-room response he gets, not how his speakers measure in some absolute sense.And another point - people who build and sell "statement" speakers with passive crossovers are just full of shit - there's no justification for a $30K pair of speakers with a passive crossover these days, especially as cheap as DSP has become. But again, it's part of the manufactured mistique - you use passive crossovers and your customer is much more likely to waste thousands on the speaker wires and amp-trading that your retailer relies on between big speaker sales.And yet ANOTHER point - most loudspeakers above a certain quality level are a distinction without a difference, a matter of personal taste and peference (what the hell is a $50,000 Stereophile Class A loudspeaker with LIMITED FREQUENCY EXTENSION anyway???)Much if not most of the consumer loudspeaker market is an exercise in illusion and intimidation - mass hysteria or a sort, assuming you're vulnerable to it.

Subject: Re: OOO! OOO! I Know!
Posted by Manualblock on Sun, 30 Jul 2006 23:20:38 GMT
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You know I buy that; good train of thought. You addressed my exact point and I appreciate it. So regarding the money if a DIY guy had 30k could he duplicate the success of a Wilson Watt. BTW I am not a fan of them but some people seem to like them.

Subject: Re: OOO! OOO! I Know!
Posted by Martin on Mon, 31 Jul 2006 17:51:34 GMT
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wunhuanglo,You wrote :"And another point - people who build and sell "statement" speakers with passive crossovers are just full of shit - there's no justification for a $30K pair of speakers with a passive crossover these days, especially as cheap as DSP has become."BAM! I feel like somebody just hit me square in the forehead with a 2x4 to get my attention. I had never considered that thought before but it makes absolute perfect sense. Spend $30K and you get to listen to your high priced amps and preamps filtered by a bunch of Solen caps, sand cast resistors, and coils of magnet wire. But they are safely hidden in a beautiful styled exotic cabinet that makes a statement to anybody coming into your home. That was probably one of the most enlightening statements I have read on a forum in a long time.Excellent,Martin

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Subject: Re: I have to Ask
Posted by Manualblock on Wed, 02 Aug 2006 13:07:00 GMT
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Regarding WUNG and Martin; I have a copy of "Theory and Design of Loudspeaker Enclosures", J.E. Benson; in my little library. It looks daunting; in fact it makes it look hard to come up with a good design. How do we justify that level of scholorship if this isn't all that hard?I am not being argumentative here just curious.Whats the "Fibonacci Alignment?"

Subject: Re: I have to Ask
Posted by Martin on Wed, 02 Aug 2006 22:40:59 GMT
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I think there are a couple of things going on with this text.First, Benson was probably writing as an academic for an academic audience which really means that the elegance and complexity of the derivations is elevated. People who write in these circles are all extremely talented and the style tends to be as important as the content. You see similar styles in articles in most professional technical society Journals. It satisfies a certain community and can unintentionally exclude the average person trying to learn the sunject. The author is demonstrating his or her skill and

completeness in mathematical derivation and documentation and this is required to remain and florish in academia. Anybody pursuing a technical Phd is probably well schooled in this style of writing. As an aside, early in my career I wrote an internal company paper on bending of bolted joints and closures for nuclear pressure vessels. I tried to explain it so any other engineer could understand and use the simple equations/methods I had derived. A month or two after the paper was distributed, I got a copy of an article put together by a Phd based on my work. Everything was a variable including the shape of the bolts. He had derived the equations to include square bolts! Totally impractical and crazy.I am not trying to imply that Benson's work is either impracticle or crazy, it is really a very nice book but aimed at a limited audience. I have the same book on my shelf and have read it but not used it very much.The second thing to remember is that people trained in this type of work can read Benson's text and not struggle too much. Somebody with an electrial engineering, mechanical engineering (like me), or maybe a physics education has seen this type of math modeling of systems in school. I make my living analyzing structures and hardware mathematically and have worked on several different products using the same set of skills. When you look at a closed or ported box system, you are really working with the simplest of these type od math models. One (the driver) or two (the driver and the air in the port) mass systems with a couple of springs (driver suspension and air volume in the box) are as simple as it gets in math modeling. These math models can be derived and solved by hand, then they can be easily prgramed to make nice response plots (think Boxplot, WinISD and my MathCad worksheets). This is why they are "not rocket science". Now you can add more and more complexity to the models and the predictions that will make the solution more accurate and at the same time more complex. But basically, closed and ported speaker systems are fairly simple systems compared to the work most analytical engineers/physicists do at their day jobs.Hope that helps,Martin

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Subject: Perhaps I could add an analogy by way of clarification
Posted by wunhuanglo on Thu, 03 Aug 2006 03:40:06 GMT
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Deriving F=Ma was a hell of a lot harder than the high school physics describing the arc of a baseball would make it seem. But the point is once derived, nobody needs to go through the grief over and over again.

Subject: Re:Whelp; you guys pretty much cleared that up for me.
Posted by Manualblock on Thu, 03 Aug 2006 14:20:21 GMT
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Thanks; I don't pretend I read that book; and truthfully I don't even remmember where I came to own it. It looks good on my shelf I think. I used to go to used book stores and buy up audio textbooks and stuff; so I have a couple dozen reference tomes.Some day I may try to read one.

Subject: Disagree
Posted by colinhester on Thu, 03 Aug 2006 21:07:25 GMT
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Are you using an equation or understanding it. BIG difference. Once you understand an equation, you are in a much better position to use it correctly and know its limitations.FWIW, describing a baseball's arc is not a trivial calculation in the real world.

Subject: Re: Disagree
Posted by Martin on Thu, 03 Aug 2006 23:54:27 GMT
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"FWIW, describing a baseball's arc is not a trivial calculation in the real world."It really depends on what you are after and what accuracy you require. If you are interested in how far the ball will fly, or how high up it will go, when tossed by a outfielder at a certain angle and initial speed then equations from high school physics will get you fairly close. If you want to know how the baseball moves when thrown by a knuckle ball pitcher then even a super computer will probably not get you an accurate answer.When I talk about simple models for closed box and bass reflex enclosures then the results will be reasonably accurate for small signal inputs and using the rest of the assumptions that come with a Thiele/Small type of model/analysis. This is how I operate my stereo system most of the time. If you are talking about high input signals driving the driver into the nonlinear range then the simple model's accuracy will suffer.However, in my opinion and within my experience the simple models do an excellent job of describing the behavior of a baseball's trajectory and a speaker's low frequency performance. Sometimes people overcomplicate problems and the result is they never get a decent usable answer. I had a manager that used to preach "Better is the enemy of good enough!". But there are always people (engineers in particular) who dive right into rocket science when it is really not required. Martin

Subject: Martin, I agree totally!!!!
Posted by wunhuanglo on Fri, 04 Aug 2006 11:12:11 GMT
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You must be what we refer to as a "real" engineer. Your post references the EXACT issue (and the only issue, he's really a great guy) I have with my boss of the past 9 years.I know it's my personal prejudice, but when, for example, we calculate process temperatures and vapor fractions my answers are along the lines of "10 ppm methane at about 85F". My boss, asked the same question answers "9.879 ppm methane at 84.067F". It just drives me insane when the boundary conditions are about as well defined as a blob of whipped cream.I blame computers; Colin probably didn't work in the era (I started at the tail-end)when you had to turn in your hand written calcs on quadrille paper for peer check. Not too many "9.8705 kips" solutions in those days.From my perspective while extreme precision may well be a very good when working in deep

sub-micron lithography, the application of that sort of precision to loudspeakers is fairly ridiculous - the whipped cream boundary condition problem again.

Subject: That's funny
Posted by colinhester on Fri, 04 Aug 2006 11:46:48 GMT
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I did work in sub-micron lithography, 365nm, i-line and DeepUV

Subject: Re: Martin, I agree totally!!!!
Posted by Martin on Fri, 04 Aug 2006 15:34:11 GMT
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Yes, I started as an engineer before the wide spread use of desktop computers. My first calculator came as a freshman in college. In high school I used a slide rule. Punched card input decks, handwritten memos and calculations, using Roark's Stress and Strain book of tables a lot, and writing your own programs in FORTRAN because Excel did not exist. You had to understand the problem and be very efficient in what you wanted to include in the solution to even stand a chance of getting a usable result.Today I see young engineers pointing and clicking as they analyze simple cantilever beams with 3D finite element models. They don't even get a course in programming anymore in some colleges. I even had one young engineer argue with me that his finite element analysis of a test set-up was correct even though the calculated result was not close to the measured value from the test, my simple calculation in MathCad was much closer. Did not matter to him, we (me and the test) were both wrong.While computers have made good engineers even better, they have also masked understanding of a problem and thinking by the inexperienced engineers. You have to really understand to boil a problem down to something simple and elegant. I worked with another gray haired guy who used to say that if an engineer could not explain in simple terms what he/she was working on in five minutes, chances are they did not know what they were working on. Martin

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Subject: Re: That's funny
Posted by Wayne Parham on Fri, 04 Aug 2006 16:23:47 GMT
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I don't know quite how to say this because I don't want to offend anyone. There are some acoustical engineers that I have a great deal of respect for. But in general, I think acoustical engineers and sound technicians work in a sort of "soft science" way. There is a tendency to misunderstand common physics, and to talk about audio as if it were in a mystical ether that isn't

fully understood. Others seem to want to argue minutia, like theology or philosophy students. It's counter-productive. In my opinion, analysis and evaluations done by physicists and mechanical and electrical engineers are much more reliable.As an example, I've been having a discussion with some guys about heat transfer in loudspeaker motors. These are guys that work in prosound, where power levels are pretty high. But a lot of them have a complete lack of understanding on how heat transfer works. They have an almost sophomoric outlook, even those with some standing in the prosound field. Any mechanical engineer immediately grasps the issues, but the prosound guys talk from a seat-of-the-pants perspective, one that is almost completely wrong. They couldn't find the truth because they weren't willing to look. They reminded me of guys running flathead Fords at the racetrack even after overhead valve engines started cleaning their clocks. They had horse and buggys, and by God, they were going to stick by them, no newfangled motor carriages for them, no sir!Another example, I was talking to an acoustical engineer a little while back that boasted proudly about his programming skills. He was going to write a script to do some analysis, and he was confident that his way was the only way. I couldn't help but think how arrogant he was, and frankly, undeservedly arrogant. He is a published author, and a very bright guy. That part I can respect. But the largest, most complex things he ever did were things that could be described with a month of mathematical analysis, tops. Most were just a few days work, at best. So to discount what others had done was offputting, to say the least. It made me realize that everything he said was from the perspective of a very narrow (and strongly biased) view and almost completely worthless. He wanted to promote his pet ideas from an ego-driven perspective more than he wanted to discover the truth.A large software project is sometimes the result of tens, sometimes hundreds of man-years of work. We're getting to the point where some computing systems have thousands of man-years of work in tens of thousands of files. The complexity is mind-numbing and no one person can get their hands around the whole project. So specialization is required. You can see the system from a holistic view, sort of a top-down, birds-eye view. Or you can see it reductionistically, looking at machine level device drivers and code modules. But to see the whole thing is impossible; It would be like memorizing every book ever written and being expert in them all. In this environment, no one would ever get locked in a stubborn narrow-minded view, because then they would be completely lost, out of touch, and always embarrassed by their lack of understanding, being so isolated and out of the loop. This kind of complexity is a whole other level than the hardest problems in acoustics.All that to say I agree with Martin about loudspeakers, and about acoustics in general. Loudspeakers are very simple machines having three or four moving parts, and that's it. They are very much like mass-spring systems. Sure, things like summing multiple point sources, reflections and diffraction are involved, but those aren't terribly difficult. Cone flex becomes chaotic and the motor becomes non-linear at some points. But mass-spring system have non-linearities too, the metal is elastic at some levels and then goes plastic at other levels. A speaker cabinet is a Helmholtz resonator or it is a tuned pipe or a horn, or a hybrid having some of each property. The crossover is reactive. Each has very simple, predictable behaviors for the most part. Then there is an element of non-linear behavior, but even that can be expressed to some degree, certainly it isn't hard to understand. More complex systems have these same behaviours, and they have more parts too.So while I enjoy audio and making things as best as I can, I don't think even the most complex audio projects I've done come anywhere close to the complexity of say an large-scale integrated circuit, an operating system, a jet airplane or a nuclear reactor. I find the best acoustical engineers are usually physicists or mechanical or electrical engineers with a keen interest in audio. There are some very smart guys with acoustical engineering degrees too, some good talent working in sound fields. But I'd have to say that I think the best acoustical engineer is actually someone converted from another field, someone used to

dealing with things of greater complexity. He isn't as likely to bullshit himself or try to bullshit others.

Subject: Re: Martin, I agree totally!!!!
Posted by Wayne Parham on Fri, 04 Aug 2006 18:07:13 GMT
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I think you're exactly right. Those who understand a problem (and solution) very well can explain it easily in simple terms. If the description of a solution seems obfuscated, it is probably because it is either poorly understood or poorly executed or both. I've seen a lot of highly technical gobledygook written that looked plausible but that had the one weakness that it just didn't work.

Subject: Re: Say Wayne
Posted by Manualblock on Sat, 05 Aug 2006 00:59:19 GMT
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Can I ask something; do you believe that Psychiatry in the medical sense and Pschychology in the empirical sense are sciences?Thanks.

Subject: Another Anecdote
Posted by wunhuanglo on Sat, 05 Aug 2006 01:46:13 GMT
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I swear this is true. I go to the FEA gunius - 1978, IBM mainframe, MSC Nastran - tell him I need the 1G gravity sag at the center of a three-point edge supported, circular, 3 foot diameter fused silica mirror, three inches thick, lightweighted fom the back with 1-1/2" square pockets on a more-or-less regular grid, leaving about a 1/2" faceplate when polished.3 or 4 weeks later I receive about 5 inches of green&white - output section says the center deflection is 3 INCHES!!!I go to wonderboy and say "You think there might be something wrong here?Wonderboy says (indignantly) "Can't be, that's what the model says."Wonderboy's boss (who refused to talk to him) was a Mercury/Gemini era structural guy. He and his buddy had (more than 1) editions of Rourke that they had hand corrected over the years, doing the derivations independently and comparing them to Rourke and marking up the text. For fun.There were some guys working in the old days.

Subject: A funny heat transfer story

Posted by wunhuanglo on Sat, 05 Aug 2006 02:01:28 GMT
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Wayne,As you might recall I've worked for the government all my life. Since I started I went from cutting-edge science working for DARPA & NSA to where I've been for a very long time now - associate wrangler at a tard farm.Talking with a newly-minted PhD from Sandia, discussing our mutual client before a meeting about 18 months ago:PhD: Is Mr X an engineer?Idiot me: Well, he's supposed to be. Why?PhD: I don't think he has a good grasp of the fundamentals. He asked me how many times we'd have to recirculate the "cooled medium" through the heat exchangers before its temperature got below the temperature of the "cooling medium".I've told 10 people that story at work and they look at me like I have three heads. But fortunately I had 3 other witnesses to the conversation, so I can bring them into the fray when needed.

Subject: If you could circulate it long enough, it would probably reach absolute zero
Posted by Wayne Parham on Sat, 05 Aug 2006 03:33:08 GMT
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Subject: Thanks for cleaning up my mess, Wayne
Posted by wunhuanglo on Sat, 05 Aug 2006 14:04:13 GMT
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I forgot it wasn't plain text and used the "arrow thingys" for brackets.Charlie

Subject: Re: Well; I guess not.
Posted by Manualblock on Sat, 05 Aug 2006 18:30:32 GMT
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nt

Subject: No trouble
Posted by Wayne Parham on Sat, 05 Aug 2006 18:59:11 GMT
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Just removed the duplicate message. I kinda like removing duplicates anyway. If someone fat-fingers the "Post Message" button and clicks it twice, that makes a duplicate. Or if the server is slow and someone thinks it didn't get their post, sometimes they post it twice. So I like to remove duplicates when I see them; It just keeps things neater looking.
