Subject: LAB-12 as HT Subwoofer
Posted by GarMan on Fri, 08 Sep 2006 20:04:52 GMT
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Hi Wayne,I'm trying to decide on a subwoofer to complement my Theatre-3 for HT use. Space is tight, so it'll have to be sealed or BR. The Pi-3s alone go plenty low for most music, but they're missing the lowest rumble for HT. I think the Pi-3s are good down to mid-30's in my room, so I'm looking for something to fill in that last octave between 20 and 40.Your Theatre-3 BR Sub, based on the LAB-12 seems like a logical choice. But I need help getting over its description as "designed for use in pro sound bass horn enclosures". Would this mean I'll be getting compromised performance if I use the LAB-12 in BR or sealed? I would love to hear from people who have used the LAB-12 in BR at home.Also, what are the main difference between a pro-driver like the LAB-12 vs HT sub drivers like the Titanics or Peerless? I've been very happy in the past few years adapting pro-drivers for home-use in the form of Pi speakers and my JBL system. The advantages of these speakers over "normal home" speakers are apparent in higher sensitivity and power handling. However, the difference between the LAB-12 and "normal" HT sub drivers are not obvious to me.thx,Gar.

Subject: Re: LAB-12 as HT Subwoofer
Posted by Wayne Parham on Fri, 08 Sep 2006 23:22:56 GMT
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The LAB12 works very well in vented cabinets from 2.0ft3 to 6.0ft3 tuned to 22Hz. It also works well in a large sealed cabinet, particularly with boundary reinforcement. If out in the open, like placed as a coffee table, I'd run vented. If in the corner or near walls, either run an overdamped vented alignment or run sealed.For home hifi, I prefer the direct radiator subwoofer over the horn. It's smaller and you can tune it lower as a result. A horn run below cutoff is basically an undersized sealed cabinet with a horn that amplifies harmonics. So unless you have a lot of real estate, I prefer the LAB12 in a vented or sealed box for home hifi.As for comparison with other woofers, most of the really good parts have shorting rings and the LAB12 doesn't. But before writing it off, consider the fact that shoring rings don't really work below 100Hz. Theoretically, one could be made that reduced distortion at very low frequencies, but it's difficult. The ring has to be large, and that takes away from magnet space. From a practical design standpoint, it becomes prohibitively impractical to design a subwoofer with an effective shorting ring. That's why you see other technologies employed, things like differential voice coils and other forms of push-pull drive.If you really want to make the best small subwoofer you can make, look at implementening a pair of LAB12 or HL10 woofers in push-pull, perhaps driving a bandpass box that attenuates higher frequencies. The push-pull drive will cancel second harmonics, the front chamber will reduce third harmonics and both the push-pull drive and front chamber will reduce fourth harmonics. Above that, the front chamber will remove the higher harmonics.That's a very similar

harmonics and the front chamber and horn folds reduce higher harmonics. It's probably too large for home use, and if pushed below cutoff then the horn would amplify harmonics in its passband. But as long as it is used above its 30Hz cutoff, it generates almost no distortion.No matter what

kind of system you run, if you push it below cutoff, distortion will rise. Excursion is lower in the passband than it is below cutoff. This applies to bass-reflex and bandpass systems as well as horns. So system tuning is very important. Don't tune the system for 30Hz cutoff and try and EQ down to 20Hz. If you want to run the subwoofer down to 20Hz, then tune it for 20Hz or below.

Subject: LAB-12 Deathbox
Posted by Matt Presley on Sat, 09 Sep 2006 14:15:29 GMT
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Wayne, its interesting that you mention using a bandpass box design. I wonder how 2 LAB 12s in clamshell would do in a Decware 12 inch Deathbox. I've actually had the HL 10C on my mind lately in either a 10 inch deathbox I have in my attic or in a 1ft3 vented box tuned to 30hz for a car application. But what you say really makes me wonder about the LAB 12 Deathbox in a home setting. -Matt

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Subject: Calculated BP for LAB 12
Posted by mollecon on Sat, 09 Sep 2006 14:34:59 GMT
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I just threw LAB 12's data into liniarteams calculator. An optium 4th order BP design gives 49 liters for back, 35 liters for front (giving a total internal volume at about 3 cu.ft.), tuned at 41 Hz. -3 dB would be ~25 and 70 Hz. I use a BP of almost similar size, and I'm very satisfied with it - mine 'only' have a 10" Peerless unit, but is more than enough for my needs. I haven't ever even come close to playing it at the loudest...

Subject: Re: LAB-12 as HT Subwoofer
Posted by Russell Hartman on Sat, 09 Sep 2006 22:51:55 GMT
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WAYNE,WOULD YOU HAPPEN TO HAVE PLANS FOR THAT PUSH/PULL SUB USING THE HL 10S, IF NOT COULD YOU DIRECT ME TO THEM?THANKS RUSS

Subject: Re: LAB-12 as HT Subwoofer
Posted by Wayne Parham on Sun, 10 Sep 2006 01:31:05 GMT
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No, sorry, you're on your own there. The loudspeaker designs I've done use the LAB12. I've considered doing a basshorn design using a pair of HL10 woofers, but haven't done any work on it yet.

Subject: Re: LAB-12 as HT Subwoofer
Posted by GarMan on Mon, 11 Sep 2006 20:40:06 GMT
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Hi Wayne,Thanks for the feedback. I've never considered a push-pull design because of driver cost. However, after stumbling on this driver on Partsexpress (see link below), it seems quite affordable. According to the specs, it looks like a light version of the Lab-12. It models almost exactly like a Lab-12. Probably made by Eminence. Wayne, any thoughts on this driver?Also, can you provide me with more background on designing a push-pull sub, or point me to some links. Googling has turned up very little.Would cabinet size be double that of a single driver box? If so, that would make the cabinet 6 to 7 cu ft, and far too big for most home use.What about driver mounting? I don't think I want to see the back of a driver sticking out of the front baffle. Can drivers be mounted front baffle/ back baffle?thx,Gar.
 Lab-12 Lite?

Subject: Re: LAB-12 as HT Subwoofer
Posted by Wayne Parham on Mon, 11 Sep 2006 21:46:52 GMT
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Sorry, I have no experience with that driver. It does look like it was made by Eminence, probably an OEM made to customer specs. I imagine it was made as a car audio woofer, which is where the LAB12 has its roots.As for information about push-pull drive, see the post called "Push-pull verses shorting rings". It has links to several posts, some containing links to outside information sources and test data as well.

Subject: Why BP?
Posted by GarMan on Tue, 12 Sep 2006 15:40:10 GMT
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What would be the value of using a bandpass design vs the active XO from the plate amp or HT receiver?gar.

Subject: Re: Why BP?
Posted by Wayne Parham on Tue, 12 Sep 2006 16:12:55 GMT
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The front chamber of a bandpass (or folded horn) acoustically attenuates HF, which serves to reduce harmonic distortion. The distortion products are generated by the speaker, not the components upstream, so reducing HF in the signal presented to the speaker will not reduce harmonic distortion.

Subject: Just so I got this right ...
Posted by GarMan on Tue, 12 Sep 2006 19:09:45 GMT
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The front chamber attenuates harmonic distortions that's generated by LF signals, but sits in the HF spectrum?That's brilliant!

Subject: Re: Just so I got this right ...
Posted by Wayne Parham on Tue, 12 Sep 2006 19:32:02 GMT
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In this case what I mean by "HF" is frequencies higher than the fundamentals. Looking back at it, I don't think "HF" was really the proper term since I'm talking lower midrange. But what I meant was the front chamber and folds attenuate signals that are above the passband. So, for example, a bandpass box or a folded basshorn tuned for 30Hz to 100Hz will actually attenuate signals above that range. So second and third harmonics (and all others above that) are reduced.Without this kind of acoustic filter, whatever harmonics are generated by the speaker will be heard. Even if you low-pass electronically, the harmonics generated by the speaker are still there. But the acoustic low-pass filter formed by the folds of a basshorn or the front chamber of a bandpass box attenuate them.When also using push-pull drive, you have another level of distortion reduction. The main feature of the push-pull drive is that it cancels even harmonics. So the second harmonic is greatly reduced. That's the one of lowest frequency, closest to the passband. The next one up is the third harmonic, which is not reduced by the push-pull drive, but is 3x the frequency of the fundamentals and on the edge (or completely outside) of the passband. By the fourth harmonic, push-pull cancellation plus the depth out of band ensures practically no distortion is heard. The combination of the push-pull drive and attenuation of out-of-band harmonics make distortion very low.

Subject: Re: Just so I got this right ...

Posted by GarMan on Tue, 12 Sep 2006 20:45:32 GMT
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I think I see it now. Unfortunately, I'm getting scared off by the size of this thing. Back chamber will be doubled that of a single driver. Add the front chamber to the equation and you're looking a almost 10 cu ft!

Subject: Re: Just so I got this right ...
Posted by Wayne Parham on Tue, 12 Sep 2006 21:54:46 GMT
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Yeah, you're right. Ten cubic feet isn't bad for prosound subs but for home hifi use, it's pretty big. The HL10 can be used in a smaller cabinet, so maybe it's worth looking into.And don't dismiss using a single LAB12 in a bass-reflex or sealed box either. It sounds good. The LAB12 works very well in vented cabinets from 2.0ft3 to 6.0ft3 tuned to 22Hz. It also works well in a large sealed cabinet, particularly with boundary reinforcement. If out in the open, like placed as a coffee table, I'd run vented. If in the corner or near walls, either run an overdamped vented alignment or run sealed.

Subject: Re: Just so I got this right ...
Posted by GarMan on Wed, 13 Sep 2006 02:47:13 GMT
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Yup. Back to my original plan I guess. I was fun exploring new ideas though.

Subject: Re: Just so I got this right ...
Posted by mollecon on Thu, 21 Sep 2006 22:30:29 GMT
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It deserves to be mentioned, that apart from horns, 4th order BP boxes are probably the best at handling power, + reducing diaphragm excursion, and hence distortion. The price one pays is the limited bandwith (though that in itself also gives some advantages, as pointed out by Wayne), and the fact that it can be difficult to design a correct port in smaller BP boxes.