Subject: Woofer / alignment comparison...
Posted by jeff mai on Tue, 13 May 2003 09:28:16 GMT
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Thanks for the response below, Wayne.I've attached a graph comparing an intriguing looking Beyma 12K200 woofer to a JBL 2206H woofer in a Pi-Aligned cabinet. The T/S parms for the Beyma unit are:Fs = 35HzRe = 6.2 ohmsQms = 11.17Qes = 0.229Qts = 0.225Vas = 160 litersCms = 383 um / NRms = 1 kg / sn0 = 2.9%Sd = 0.053 m^2Xmax = 4.5 mmLe = 0.8 mHI also compared the Beyma unit in a "shelved" type alignment you mentioned in the previous thread. I think the Beyma compares well to the JBL, though it's distortion figures and build quality are certainly not going to match the JBL. Comments?I guess my main questions are:How realistically will these graphs represent the true frequency response? And, which sort of alignment is likely to give best in room response? And if the answer to the previous question is "it depends on the room" is it worthwhile trying to tailor the alignment to the room?Anyone feel free to chime in.Thanks,Jeff Mai

Subject: Re: Woofer / alignment comparison...
Posted by Wayne Parham on Tue, 13 May 2003 17:39:43 GMT
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Super good work, and thanks for posting the response graphs.Honestly, I've found that Thiele/Small models do a great job of predicting response. Most of the audio community approves of their work, so to use it to develop these graphs and show predicted response is probably quite accurate. It is better than measurements for most hobbyists and small shops, since it is difficult to obtain reliable measurements.

Subject: OK, so I've since learned...
Posted by jeff mai on Wed, 14 May 2003 08:34:03 GMT
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...that the response I mentioned and showed in the graph is a type of EBS alignment. Reading through previous posts to this forum, I noticed you warn against the dangers of increased distortion of such an alignment because it works below resonance. Is that the resonance of the system or of the drive unit? If I tune the system above the resonance of the drive unit, am I in the clear?Thanks again!

Subject: Mechanical resonance of speakers
Posted by Wayne Parham on Wed, 14 May 2003 08:45:33 GMT
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I've made the observation that speakers' distortion rises as frequency drops. Intermodulation distortion rises and harmonic distortion generally does too. Flux stabilization rings tend to lose effectiveness as frequency drops, and devices intended for use as midwoofers and full range speakers are not usually designed for use at subwoofer frequencies. In general, most designs layout the motor so that the shorting ring is effective to within about an octave of mechanical resonance. That's why I've mentioned the trade-off of bass-extension verses distortion. You can reduce distortion by configuring the system so that the midwoofer is used above resonance, and not at subwoofer frequencies.

Subject: Re: Mechanical resonance of speakers
Posted by jeff mai on Wed, 14 May 2003 09:14:45 GMT
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Sounds perfectly reasonable. What if we tune the box to the same resonance as the driver? I've read that the excursion of the woofer is lowest at the box tuning frequency. Wouldn't this minimize the distortion at resonance?

Subject: Basically, yes, but...
Posted by mollecon on Wed, 14 May 2003 17:15:58 GMT
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Only in some cases a tuning at the drivers free air resonance will give a good result, bass response wise. But the reduced excursion at the Helmholz resonance (usually the excursion is down to 1/4 of the unaided diaphragm) does lower the distortion quite a bit.

Subject: Frequencies of interest
Posted by Wayne Parham on Wed, 14 May 2003 17:53:38 GMT
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Yes, tuning the Helmholtz frequency to match that of the motor will reduce its excursion. This in turn will reduce distortion. But it is also important to note that system tuning affects a region and not a specific frequency. The mechanical resonance of the woofer is shifted upwards by putting it in a box, and this new resonant frequency is denoted as Fo.In a bass-reflex system, you have five frequencies of interest - Fs, Fo, Fb, Fh and Fl. Fs is the woofer's free air resonance, Fo is the mechanical resonance that's been shifted by putting the woofer in the box and Fb is the resonant frequency of the box, it's Helmholtz frequency. Fh is the upper frequency of highest impedance, sometimes called the upper resonant frequency, and Fl is the lower frequency of highest impedance, the lower resonant frequency.The upper resonant frequency (Fh) is usually nearly coincident with the enclosed woofer's resonant frequency (Fo). They actually aren't the same, but they are near enough that the port damps the woofer's resonant frequency by a great deal. So for the octave above woofer resonance (approximately Fh) down to resonance (Fo), the port is tightly coupled with the woofer, damping its motion and making the system more rigid. Distortion is reduced because excursion is limited. Then, as frequency drops near Fl, the port begins to augment system output. In this mode, the port isn't limiting motion but it is increasing output so that the woofer doesn't have to move as much. You can find the formulas that define the relationships in the post called "Measure impedance."

Subject: Excursion damping bandwidth?
Posted by mollecon on Wed, 14 May 2003 18:43:06 GMT
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Wayne, are there any general rules as to how big an area the damped excursion works - in other words, over how big a bandwidth does the port reduce excursion &/or assist the woofer? & where is the Helmholz resonance/tuning frequency in relation to that bandwith?I probably shoulda figured it out from your post, but I'm not sure I 'get it'... :-(

Subject: Re: Excursion damping bandwidth?
Posted by Wayne Parham on Wed, 14 May 2003 20:36:42 GMT
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Excursion is limited the most in the region between Fo and Fh, so I suppose you could say that's where the cabinet is assisting to control the woofer the most. Fl is the frequency where port output is highest, so you can view Fl to Fo as the region where the box is helping to augment falling output from the woofer. So you can see that the entire range of Fl to Fh is significant in bass-reflex tuning.

Subject: Re: Woofer / alignment comparison...
Posted by Scholl on Tue, 20 May 2003 12:43:20 GMT

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Surf on over to madisound.com and do the same plots to the Fostex FW305.Let us know what you think.