Subject: Listening results with Theater 4 variation
Posted by Lebob on Fri, 07 Oct 2005 03:15:39 GMT
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I just finished my Pi Theater 4 variation using the Eminence Deltalite 15" neodymium low frequency drivers and a pair of Altec 806/811b horns.I used the 800hz Pi crossovers with Zobel and tested the 6,9, and 12db attenuation points on the Altec Horns. In the large studio where I built them the 6db seemed correct but in my small home studio the 12 db attenuation was better. The 800hz crossover point seems to make changing the sound to match the room/system very easy. There are a lot of possible combinations using the padding and bypass. I am able to go from warm to detailed with most padding/bypass combinations being fairly well balanced. I tried the speakers with a few different tube amps and they worked well adjusting the placement and circuit a little for each amp. I used all oil and film motor run caps in the external crossovers which will get some selector switches later. I also tried some Solen Film caps and found the motor run caps to be more to my liking. I may also try a higher crossover point to hear the difference. I get the impression that the higher crossover points are favored for the bass-reflex Pi speakers.Overall I think these speakers are excellent. I got the warmth and detail with Altec horns that I wanted and decent well matched bass without building Jensen Imperials.Is experimentation with port length +/- 5-10hz going to mess anything up?Thanks, Orren

Subject: Re: Listening results with Theater 4 variation
Posted by Wayne Parham on Fri, 07 Oct 2005 08:28:28 GMT
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to three times as large. The Helmholtz frequency chosen prevents the cabinet from being underdamped, and forms a sort of narrow EBS. This tends to raise the deepest bass a little around the f10 point. It acts something like an overdamped curve, in that there's a lot of area between f3 and f10. You can raise the Helmholtz frequency some, but it will tend to shift the alignment towards being underdamped. Lowering is a bit safer, but it doesn't extend response much deeper, it just reduces output at the Helmholtz frequency.The large Altec horns tend to work better at 800Hz than the smaller H290 horns. That makes 800Hz to 1200Hz crossover pretty reasonable. I like to keep the midrange covered by a single driver, so I don't like to push the crossover much under 1kHz. DI matching is also something to think about if you're crossing a direct radiator to a horn. You can expect a direct radiator to have a 90º pattern at the frequency where wavelength equals the diameter of the radiator. A 90x40 horn has a little tighter pattern than that, because the vertical spread is only 40º.A 10" driver typically has a radiating surface about 7.5" diameter, 12" driver has about 9" diameter radiator and 15" driver has about 12" radiating diameter. So the frequency where wavelength equals diameter is 1765Hz for a 10" driver, 1500Hz for a 12" driver and 1130Hz for a 15" driver. That makes a 90x40 horn matched to a 10" driver between 2.0kHz and 2.4kHz, a 12" driver between 1.8kHz and 2.1kHz and a 15" driver between 1.3kHz and 1.6kHz.There's a little bit of wiggle room in the octave between 1kHz and 2kHz. Smaller horns shouldn't be pushed low because they get peaky, and some compression drivers sound bad when crossed over too low. But your Altec horns have no trouble

at all with 1kHz. So the next thing to consider is the midwoofer. If it sounds very smooth in the overtone region, you might want to let it cover as much of the midrange and overtones as possible and choose a higher crossover frequency. If not, crossover down low.In practice, I've found that using a crossover between 1kHz and 2kHz sounds really good with 90x40 horns and 12" and 15" direct radiating midwoofers. Naturally, this requires that the drivers chosen are smooth through the midrange and overtone region. I also like to use asymmetrical slopes and fairly high orders because of the geometries involved. The two drivers won't be coupling fully at the crossover frequency because of their directionality, but you still want summing to be good. Might be good to calculate phase angles considering the length of the horn and the crossover shifts and choose a network that provides summing better than +/-3dB varience.Programs like LSPcad will model the crossover for you and make these calculations easy. If the program reports less than +/-3dB varience, you can expect summing to be great because the program assumes mutual coupling. The drivers aren't pointing at one another, so coupling won't be as strong. After you find a configuration that appears to work for you, you can check it with measurements if you have Speaker Workshop or something like that.

Subject: Re: Listening results with Theater 4 variation
Posted by Lebob on Fri, 07 Oct 2005 13:36:48 GMT
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Thanks for the detailed response. I am going to get my speaker books out and do some reading. These are the best speakers with my 45 amp to date.I guess my question should have been more specific. Would raising the the tuning frequency a bit strengthen the mid-bass? If yes, to what extent can I raise the tuning of the boxes to taste with out messing things up? I made two thick paper ports to lengthen the Theatre 4 ports an inch and another two inches from your design's 3.5 inch length. Both seemed to strengthen the lower midbass a bit with some loss of the lowest bass. The percieved midrange was also affected, not sure if it was better or worse. Thanks,Orren

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Subject: Re: Listening results with Theater 4 variation
Posted by Wayne Parham on Fri, 07 Oct 2005 22:13:12 GMT
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Raising the Helmholtz frequency will increase midbass output, but it does so by introducing some peaking in that region.

Subject: Thanks for the help. NT
Posted by Lebob on Sat, 08 Oct 2005 02:00:01 GMT
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nt