Subject: Panel Resonance
Posted by Adrian Mack on Tue, 14 Oct 2003 20:22:56 GMT
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Hi Guys,This is probably one of the easiest topics around. I'd just like to know though, what do panel resonance show up as? Do they look like the spikes in the freq response like "port resonance" looks like? (which I asked about rather recently). If so, is this the only thing they do? (besides corresponding phase change). With MDF, we consider that pretty good. Bracing shifts the panel resonance up to a higher frequency. Is it the stiffness of the material, or the absorbtivness that dictates weather or not its going to make a non-resonant enclosure? I'm thinking of it like an acoustically dead room where the walls absorb so it doesn't reflect. I'm thinking that inside the box its much the same thing, but then again I'm thinking the stiffness of MDF might be why its got a pretty high panel resonant frequency. Steel on the other hand is stiff, but I'd guess that wouldn't be good for subwoofer enclosures (besides the difficulty in building something from 1" steel or something!). Steel subwoofer box might ring like a metal horn?On the other hand - we have hardwoods too. I don't like this because of possible voids, and apparantly it lacks "dimensional stability" to quote Audio Concepts. Would hardwoods also have a lower panel resonance frequency>? I'd guess that too, because I'm guessing the wood particles arn't as jumbled up as they are in MDF where they point in all different directions so hardwood isn't as strong as MDF. Although I did wonder why hardwoods are used in house structures so they must be strong somewhat... perhaps they are not as strong in large sheets though? BTW: Is there any way to calculate the frequency when panel resonance is going to start?Thanks!Adrian

Subject: Re: Panel Resonance
Posted by Wayne Parham on Wed, 15 Oct 2003 01:33:16 GMT
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Panel resonance looks like a resonator, set to the resonant frequency of the panel and with Q determined by the amount of damping. There are lots of these "little resonators" in any physical system, and their behaviour appears chaotic, like breakup modes. But one can view them reductionistically and analyze each one.It's probably easier just to brace the heck out of each panel, to shift the resonance out of the bass range where the woofer excites the cabinet. This shifts panel resonance away from excitation frequencies, and it also makes more energy required to induce sympathetic motion. So that's a good way to handle it.

Subject: Panel Resonance - a couple ideas
Posted by AstroSonic on Thu, 16 Oct 2003 00:55:27 GMT
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Panel resonance is typically addressed using methods intended to minimize its audibility. Using panels of very high stiffness raises the frequency range over which the panel resonates, typically well into the hundreds of Hz. Examples include the Focal ceramic egg and the Celestion honeycomb metal panels used in the SL-6. Internal padding can then used to damp these frequencies - such padding is generally much less effective in the bass range.Another school used thin (1/2 - 3/8 inch) wood panels. This was to keep the resonance below the midrange frequencies where the ear is more sensitive - they kept the resonance in the less audible upper bass range. The thin panels were then damped with thick bituminous pads to lower the Q of the resonance, largely damping it out (hopefully). Examples include a number of BBC influenced speakers such as those from Spendor (BC-1) and Rogers (LS-3/5A). Yet another school considered that the Q should be maintained as high as possible (very stiff panels, not damped). The result would be a very narrow range of frequencies that would excite the panel resonance. The resonance would be only rarely excited because of the very high Q.Exceptional speakers have been made using all of these approaches, as well as just normal wood materials (plywood and MDF) with well braced construction, as was suggested by Wayne. As I think you surmized in your post, panel resonance is but one of many ingredients that go into the design of a good loudspeaker. Now, about large bass horns...Regards,AstroSonic