Subject: port/duct position question in a simple ported system
Posted by Herbsbuddy on Sat, 24 Mar 2007 15:03:04 GMT
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Hello, Does anyone know if port position in a simple ported system has any significant effect on output/tuning? For example, in many speaker books and speaker modelling programs I have seen they usually show the woofer and port on the same side of the enclosure (such as on the front baffle). I am wondering what would happen if I put the woofer and port on totally opposite sides of the box. One reason is I am using a 12" woofer and there is really no room for a 6" diameter port on the same side as the woofer but there is plenty of room on the opposite side. Since the woofer is virtually silent at Fb in a simple ported system (the port makes virtually all the bass) and low bass is non directional, I am thinking there wont be any conflict with that design. Another advantage of positioning the port on the far opposite end is you can use a much longer port with a wider duct. For example, the box I plan to build is 8.2 cu. ft. and the internal dimensions are 48"x18.5"x16". The box will lie flat on the floor like a coffin on it's back and would be about 16" high. I want to put the 12" woofer on the one 16" tall side and the port on the other 16" tall side. This gives me 48" of room between sides. The woofer is about 6" inches deep but I would still have over 40 inches for the duct allowing me to use a much larger diameter duct such as 6" ID. That should cut down on air particle movement noise at the port opening. I am just wondering what bad effects (if any) this may have. Does anyone know of any speaker book or technical paper that addresses this concern? If so I would be interested in reading it. I will go ahead and build the ported box this way and post my results although I can only really test frequency response not really distortion/group delay... Thank you.

Subject: Re: port/duct position question in a simple ported system
Posted by Wayne Parham on Sat, 24 Mar 2007 16:46:27 GMT
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The main feature of a bass-reflex cabinet is a Helmholtz resonator, and port position is not relevant. However, the shape of the cabinet, and the positions of the driver and port might be, if standing waves setup within the box in the bass frequency range. If this is the case, the system will develop transmission line behavior, which is position sensitive. You can also have a system that has both mechanisms working, Helmholtz resonation and standing wave resonation. It would be a hybrid, something between a transmission line and bass-reflex speaker. I suspect that many speakers that are physically large fall into this category.

Subject: Re: port/duct position question in a simple ported system
Posted by Herbsbuddy on Sat, 24 Mar 2007 17:27:32 GMT
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Hello, I am still reading up on this there seems to be a few issues/concerns if the duct is very long (significantly longer than the diameter of the duct. In The Loudspeaker Design Cookbook (sixth edition) by Vance Dickason, I spotted something that raises a concern about a "pipe organ" effect if the duct is excessively long. I guess the general rule is "dont go crazy". For example, if the design calls for a 30" long 6" diameter duct then a better compromise might be a 4 or 5" diameter duct much shorter like 15" or even less. As far as port/duct placement, I feel it matters to some degree but not greatly. Many formulas and simulation software for speakers I have seen assume the port is on the same side as the driver. If it really didn't matter then they wouldn't specify or assume a driver side mounted port/duct. I have to do more research it is an interesting concern that some "simple" speaker books do not address in depth but in my recent design, I have a need for it. It seems to me that if the woofer is virtually silent at Fb in a simple ported system that the position of the ducted port should not be critical as long as a few simple rules are followed such as reasonable length and not too close to any wall of box interior (3" minimum clearance I think). In my room the woofer will be "pointing" to the large opening of the room whereas the port opening will be very close to a wall so when the port "takes over" around Fb, I am wondering if there will be any sonic quirks like a shift in perceived location of the source of bass. My guess is I should be ok but with all the phase shifting going on it is hard to predict. I have walked around my apt playing test tones under 20Hz and some places are dead silent while others almost make my ears "pop" like when the pressure drops outside so where you sit makes a big difference many times. The loud spot was at the end of a hallway by my front door not even in the same room as the sub and not inline with the direction the speaker was "pointing". We are really fortunate to have all the books, formulas and simulation software for ported/ducted systems readily available. I was able to model a great subwoofer in only a few hours (but of course have been playing with the design for days). I have settled (for now) on a 8.22 cu. ft. box with a Fb of 16Hz and an F3 of 15Hz. That should handle any deep pipe organ note down to super low C which is about 16.3Hz. A super low A below that is about 13.75Hz but I dont know if anything musical (pitchwise) can be perceived that low but it might be good for movies and such for impact. It is also "good" to have a subwoofer that can go lower then the lowest note you want to hear so it is not "maxed" out. Caution must be exercised with ported/ducted designs when subsonic material is introduced. The cone is basically "unloaded" below Fb and is basically acting as if it was not in a box so excessive cone motion may cause problems. A very sharp subsonic filter (24dB/octave) may help as long as it is at the proper frequency and not in the range you want to hear. My subsonic filter is at 15Hz but I dont use it because I want to hear 16.3Hz and that is very close to 15Hz.

Subject: Re: port/duct position question in a simple ported system
Posted by Wayne Parham on Sun, 25 Mar 2007 02:06:11 GMT
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The "pipe organ" effect is exactly what I was talking about. It is a standing wave resonance set up by the length of the pipe. It can also set up inside a cabinet if dimensions are large.

Subject: Re: port/duct position question in a simple ported system

Posted by dB on Sun, 25 Mar 2007 22:31:36 GMT
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Usually when the port is very long they make it even with one side of the speaker. Doesn't matter the form of the port as long as it maintains it's ratio or area, like in a circle or a rectangle. Inside you should leave some space between the port tube and the side of the enclosure like 1/2 a diameter min. Outside it's at your discretion, if you make sure is not against a wall, you can play with it.Waves of 20Hz and below you do not hear, you can feel them.Pay attention to the maximum displacement Xmax, you don't want to blow it with power. Check max. Xmax for speaker damage and Xmax on WinISD simulator to the maximum (red line) level allowed on the speaker.