Subject: PiAlign port
Posted by Adrian Mack on Sat, 13 Sep 2003 22:20:14 GMT
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Hi Wayne,I realize that port size doesn't change the response curve if the tuning is the same, but will a port by PiAlign be better than a different sized port of the same tuning? (has this damping got anything to do with transient response or overring). In PiAlign.doc, the formulas for the port set Lc, Fre, and Qe. Does Lc correct for when the port is flanged on one end? It seems that the formulas want you to guess a port diameter/length and plug them into the formulas until we get the port Fre to match what cabinet Fre should be. Are we meant to juggle these numbers until the ports Qe is the same as the cabinets Qe. If these Qe are very different for the same tuning, what will happen? BTW: Are port resonances associated with standing waves, or waveguide behaviour? Have you got any links on this topic?Thanks!Adrian

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Subject: Re: PiAlign port
Posted by Wayne Parham on Sat, 13 Sep 2003 22:30:43 GMT
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A Helmholtz resonator and a waveguide are two different things. You will have waveguide behaviour in a port if it is presented with energies where standing waves develop. But that is a separate issue from the Helmholtz frequency. Most speakers are tuned below 100Hz using ports with dimensions that wouldn't act as waveguides until midrange frequecies. That's why there is acoustic insulation inside - to limit midrange energies and prevent the duct from acting as a waveguide.

Subject: Re: PiAlign port
Posted by Adrian Mack on Sun, 14 Sep 2003 06:44:51 GMT
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Hey Wayne,I actually meant port self resonance, also reffered to as "pipe organ" resonances. Maybe you meant this too, I dont know enough on the topic yet. Programs like WinISD (which I do not like) and Unibox calculate whats called port self resonance and it tells you when the 1st port resonance occurs. Longer lengths calculate that port resonances start at a lower frequency. These port resonances have a pretty big effect on the response curve if its within the passband. The port resonances create the anomolies seen in the graph below:This person on another forum has told me that the port resonance happens when a full wavelength can fit inside the port. So for a 10" port, frequency 1320Hz is also 10" wavelength and thats when 1st port resonance occurs, and the ones after that are found by adding 1320Hz each time or multiplying the number. EG: In graph above, 1st port resonance is at 157Hz, 2nd is at 2*157=314Hz, 3rd is at 3*157=471Hz, and so on. How about half and quarter wave, I've thought they wont introduce port resonance. But I've heard they can. If that were the case though couldn't we get 1/24 wave resonance too and stuff like that, hmmm. According to graph above, 1st port resonance is largest, so for half wave would start at even lower freq, and cause even bigger anomaly. I'm not even sure if this is the right way to calculate when the first port resonance occurs, it doesn't match with what computer box programs tell me. And actually, the different box simulations dont even match each other when calculating when the 1st port resonance occur for the same port length. WinISD shows diameter has no effect when 1st port resonance occurs, but length does. Unibox shows that both have big effect. Hah... maybe this is just one of those topics where it doesn't matter and we should just keep vent lengths small for 2-way systems when the woofer is used high and use correct vent location and damping material to mimimize port resonance effects. It seems very unpredictable. The person that first got me thinking about this however believes that its as simple as the lowest freq that has its wavelength that can fit in the port is when 1st port resonance occurs, and also all that half wave stuff too meaning it starts even lower than the 1st, ick. I dont think so, or Unibox and other programs would show effect of half and quarter wave resonances and not just begining from the 1st... what do you think? I was thinking, port resonance might have something to do with standing waves, or maybe not. Apparantly port resonance is affected by port placement, proximity to enclosure walls, and damping material too according to Vance Dickasons Loudspeaker Design Cookbook. So anything is a guess really. But we do need to be able to guess somewhat espescailly for two way systems where the woofer is run to 1KHz+, if port resonance is in its bandwidth then it may cause large peaks/dips in the freq response as in graph above. If we calculate port resonance with Unibox or WinISD or something else that can, then we can keep the calculated 1st port resonance outside of bandwidth which would mean no port resonances are in the bandwidth. But all this half wave and quarter wave crap... they cant be real, they will be half and quarter of the 1st port resonance, and then we will get port resonances well below 1Khz which doesn't seem right. My example graph done in Unibox above shows that 1st port resonance is most severe. Dickason's measurements show that the 2nd, 3rd and higher are more severe than the first, they kind of "add onto each other". I think Vances would be more accurate as the simulation was done with the (very very) expensive LinearX programs and not a free downloadedable Unibox program. I personally believe 1st port resonance is the first, and theres no such thing as half wave, quarter wave resonances etc. And I think, just keep the 1st out of passband, then your fine. Vents in 2-way systems are usually real small anyway because they are tuned higher and should be able to be kept outside of passband, and then help more by correct placement and damping material. Have you got any light to shed on this subject or comments about my findings/thoughts?PS: Sorry for another long post. You've probably heard that from a lot of people, but I guess some of mine are really really long, lol, although some of your answers are even longer :-). So I better say it again, sorry for the long post!Thanks!Adrian

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Subject: Re: PiAlign port
Posted by Wayne Parham on Sun, 14 Sep 2003 07:24:43 GMT
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What I am referring to as waveguide behaviour is the same thing that you are calling self-resonance or "pipe-organ" resonance. It is caused by standing waves within the duct, and is different from Helmholtz resonation.It is entirely reasonable to explore this property, and it is good that you brought it up.All ducts will exhibit waveguide behavior at frequencies determined by their dimensions. All will act as organ-pipes and will resonate with standing waves at specific frequencies. This is true whether or not the duct is also being used as part of a Helmholtz resonator in a bass-reflex cabinet.But one of the design goals in a bass-reflex system is to limit energies presented to the port near the frequencies where standing waves would develop. They are designed to excite the Helmholtz frequency but to supress standing wave modes. The only way to do this is to limit energies at frequencies that will excite the port as a waveguide.That's what insulation is for, and port placement is fairly important too. You don't want the port to be facing right at a driver that will generate a lot of midrange. That will probably introduce energies that excite the duct at standing wave frequencies.Transmission lines are speakers that use standing wave resonance as their tuning mechanism. The ducts in them are usually much longer, because they are trying to tune the pipe for bass frequencies which are long. But standing waves also develop at harmonics of the fundamental, so the designer usually tries to limit midrange frequencies from exciting his resonator too. They usually want one or two standing wave modes to be excited, and no more.In a bass-reflex speaker, the duct is usually relatively short so that the first standing wave mode is pretty high in the frequency band, and easily filtered. The idea is to tune the Helmholtz frequency to under 100Hz, and limit energies above that. An example is a duct having a first standing wave mode of 1kHz, which is then suppressed by using insulation and with careful placement in relation to the woofer. If the crossover frequency is below the first standing wave mode, then that's even better because more energy is attenuated that might have excited the pipe.So you are right to be concerned by the standing-wave issue within the duct. Energy near these standing wave frequencies will excite the duct and make it resonate. For more information, see the paper called "Acoustic High-Pass, Low-Pass, and Band-Stop Filters," by Daniel Russell.

Subject: what about this duct_NO ONE has facts!
Posted by toxicport.e on Sun, 14 Sep 2003 08:21:03 GMT
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hi incase u you didnt see,im interested in these things..http://www.audioasylum.com/forums/HUG/messages/55643.htmlregarding the 'wickedone' and the 'deathbox'i just want some facts on WHAT exactly theyre duct is doing,and seems to increase loading bandwidth on the conetheyre whitepaper seems to show this however at an expense of low end compared to the ported box.the graphs of theirs are abit scummy and not good.no one has facts!thanks wayne

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Subject: Band-pass
Posted by Wayne Parham on Sun, 14 Sep 2003 08:42:04 GMT

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I like the idea of band-pass cabinets, and feel that in some ways they are similar to horns. To me, it's like comparing a transmission line cabinet to bass-reflex, in that they use two different mechanisms to achieve very similar goals.I think both of these Decware speakers are band-pass boxes, and that's cool. The Wicked One is too small to be a bass horn, but that doesn't mean it won't function very well as a band-pass speaker or a hybrid.

Subject: Re: PiAlign port
Posted by Adrian Mack on Sun, 14 Sep 2003 09:33:25 GMT
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Hey Wayne,Thanks for the response, it was definitly helpful. Besides peaks/dips in the response curve from port resonances if they are in the passband, is there any other unwanted things that they cause. Such as what the name suggests, "Organ-Pipe Resonances" ?I think that instead of placing so much emphasis on where the port resonances occur, using techniques which minimize them should be emphasised. That link you suggested has a formula which calculates when the resonance frequencies for an unflanged duct will occur. It seems that the port resonances occur at the acoustical impedance peaks, according to that paper. That formula would be good to get a starting point so that a suitable port length could be choosen which wont have resonance frequencies in the passband, and then use port placement and insulation, and crossover to minimize any affects which may be in the passband. Some people report that bandpass subwoofers usually have more problems with "organ pipe noise". I believe that they should be just the same as a bass reflex cab, because they both use a duct and the dimensions of the duct will set where the waveguide behaviour occurs, and its not like the duct is extremely long such as in a TL. Furthermore, its a subwoofer and the problem should be attenuated by a filter like in a bass reflex cab, so I cant see why its more of a problem. Does the acoustical lowpass filter of the bandpass subwoofer attenuate midrange energy from the port the same as an electrical crossover filter would? If so, that would mean they'd have less problems than a bass reflex cab, unless the bass reflex had a crossover to make it fair, then it would be just the same. Thanks!Adrian

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Subject: Re: PiAlign port
Posted by Wayne Parham on Sun, 14 Sep 2003 10:10:09 GMT
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Standing wave resonant modes are just that - Resonant modes. They act very much like an electrical tank circuit, having components of inductance, capacitance and resistance. The amounts of each of these values will be set by the physical dimensions of the duct, and by its amount of coupling with the energy source, i.e. distance, orientation, etc.What this means is that there will be aberrations in the amplitude and phase response at each of these standing wave modes. The aberrations may be large or small, so I don't mean to imply that it is necessarily a big deal. But the point is that any resonance is a modifier of both amplitude and phase response, and so it is potentially an issue. Best to minimize those that aren't purpose-designed as part of the system.

Subject: Re: PiAlign port
Posted by Adrian Mack on Sun, 14 Sep 2003 10:50:25 GMT
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Hey Wayne,Thanks, I got it now. It also just came to me that "organ pipe resonances" are sometimes called "organ", becauses organs use long pipes that resonant at specific frequencies. Duh! How could I forget that! CheersAdrian

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