Subject: physics of port tuning
Posted by dbeardsl on Mon, 02 Sep 2002 05:45:39 GMT
View Forum Message <> Reply to Message

I noticed something, messing around with a box calculator.When tuning a box I've thought that the tuning was simply using the air in the port as a mass and the air in the box as a spring in a simple spring/mass system. But then, how much the spring (air pressure inside the box) affects the mass (air in the port) is directly proporional to the area presented to it (port area). And if I follow that reasoning, the volume (port air mass) is directly proportional to the area, making the tuning frequency directly proportional to the length of the port no matter what the area... Whatever the case... I'm wrong and I noticed something that I really don't understand. If you have a certain tuning, and you divide the port in half down its length so it is now 2 ports, the overall length must increase to keep the same tuning... Why is that?Anyone care to explain more of the physics involved?

Subject: not sure what you mean...
Posted by Sam P. on Mon, 02 Sep 2002 13:51:45 GMT
View Forum Message <> Reply to Message

since when I "play" with boxplot, it appears that two vents whose total AREA is the same as a single vent calculate to about the same length for a given tuning frequency. When you halved the port area, did you increase the vent number to 2? Sam

---

Subject: re:
Posted by dbeardsl on Tue, 03 Sep 2002 06:01:41 GMT
View Forum Message <> Reply to Message

I use WinISD for calculations, I did it correctly, two ports with the same total area as another single port end up having different lengths.Why?

Subject: port calcs
Posted by vladimir4 on Tue, 03 Sep 2002 07:02:25 GMT
View Forum Message <> Reply to Message

The right approach to calculate multiple identical ports is:a) on port : normal formulae for Vbb) two ports: do calculations as for one port for Vb/2, (then for Vb use two such ports)c) in general, for m ports : calculate one port for Vb/m and use m such ports in VbI hope it's clear :)v.

Subject: Re: physics of port tuning
Posted by Jostein on Tue, 03 Sep 2002 10:28:01 GMT
View Forum Message <> Reply to Message

The physics involved:Port resonance fport=(1/(2*Pi))*squareroot(K/M)K is stiffness of airspring, M is mass of moving air in port.K=beta*Ap*Ap/Vb, there Ap is port area, and Vb is box volume and beta is a stiffness constant for air.M=p*Ap(Lp+16/3sqrroot(Ap/Pi*Pi*Pi)) there p is air density and Lp is length of port.If you use one port with area A and port length Lp or 2 ports with area A/2 and port length Lp, the tuning frequency should be the same

---

Subject: Re: re:
Posted by Adam on Tue, 03 Sep 2002 13:52:15 GMT
View Forum Message <> Reply to Message

There is an "end correction" factor involved with multiple ports. I'm not completely aware of the physics behind it, but I believe it is because there is increased air drag on the inner walls of the port when you use two smaller ports verses a single large port. Thus the length has to be increased a small amount to compensate. Usually no more then a couple of inches.Is this what you're talking about?Adam

---

Subject: multiple ports
Posted by dbeardsl on Tue, 03 Sep 2002 23:40:00 GMT
View Forum Message <> Reply to Message

Yer propbably right adam, that makes the most sense.. yeah, it was only like 5 inches vs 7.5 inches.

Subject: Exact value
Posted by vladimir4 on Wed, 04 Sep 2002 06:00:45 GMT
View Forum Message <> Reply to Message

Hi,sorry form my redundant input, but when you use the approach I described below you get exactly what winisd (or other speaker cad) calculates:Example: Eminence Delta-12LF in 3.853 ft3 box tuned to 43Hz: one square port 5"x5" require 5.53" length "two" ports 2.5"x5" (same area) require 6.45" length BECAUSE: length of one port 2.5"x5" in 3.853/"two"=1.9265 ft3 for 43Hz is 6.45" This is exact and valid approach.V.