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Subject: PiAlign RS1354?

Posted by [craigha@attbi.com](mailto:craigha@attbi.com) on Wed, 02 Jan 2002 13:04:30 GMT

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First off thanks to Wayne and the others that have been answering my questions. I would like to build a Theater 4 Pi when I can afford the parts. In the meantime I have a pair of Radio Shack 1354 drivers on the shelf and some time to build a speaker. I want to try a PiAlign'ed cabinet with a full range 1354 and a Motorola 1038 piezo for HF fill. I'm using these parameters for the 1354: Fs 51, Vas .5 ft<sup>3</sup>, Qts .46, Qms .537, Qes 3.46, Pd 40W, Re 7, Diam. 4.75, Xmax 0.1 (??) From PiAlign I got: Vol. .23 ft<sup>3</sup>, Fr 46 From Box Plot: Alpha 2.2, H 0.9 The Box Plot alignment was: vol. .8 ft<sup>3</sup>, Fr 44 Hz Alpha .62, H .97 The Box Plot alignment Amplitude plot has -3dB at 40 Hz and a flat 0dB line from 60 Hz up. The Pi Alignment Amplitude plot has -3dB at 70 Hz and a hump from 90-250 Hz. Some questions: 1) Am I entering things correctly? Assuming this is correct 2) Why the differences in the 2 alignments? How will the sound compare? 3) How are the cylindrical port sizes determined for each alignment? This has got me confused. Tia, Craig

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Subject: Re: PiAlign RS1354?

Posted by [Wayne Parham](#) on Thu, 03 Jan 2002 00:53:19 GMT

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BoxPlot uses a different algorithm when you press the "Align" button. You'll notice that the PiAlign box is usually larger for very low Q drivers and smaller for high Q drivers.

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Subject: Port length calculator

Posted by [craigha@attbi.com](mailto:craigha@attbi.com) on Thu, 03 Jan 2002 11:24:49 GMT

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Thanks Wayne. I'm getting more comfortable using PiAlign and BoxPlot. Here is an attempt at a port length calculator. From Loudspeaker Design by Vance Dickason For a tubular vent flush-mounted on a speaker, calculate the length by:  $L_v = \frac{(1.463 \cdot (10^{**7}) \cdot (R^{**2}))}{((fB^{**2}) \cdot VB)} - (1.463 \cdot R)$   $L_v$  = length in inches  $fB$  = tuning frequency in Hz  $VB$  = box volume in cubic inches  $R$  = radius of the vent in inches My favorite calculator is the Python interpreter. A Windows version is available at: <http://www.activestate.com/Products/Download/Get.plex?id=ActivePython> I wrote a function to calculate port length for me: 

```
def portlen(diamInches,tuningFreq,boxVolCubFt): radiusInches = diamInches / 2.0 cubInchConv = 12.0 * 12.0 * 12.0 boxVolCubInch = boxVolCubFt * cubInchConv num = 1.463 * (radiusInches * radiusInches) * (1000000.0) denom = (tuningFreq * tuningFreq) * boxVolCubInch term1 = num / denom term2 = 1.463 * radiusInches len = term1 - term2 print 'calc port len diam.=',diamInches,'freq=',tuningFreq,'vol=',boxVolCubFt,'len=',len return len
```

 Example output: calc

port len diam.= 0.5 freq= 54.0 vol= 0.23 len= 0.423228647155calc port len diam.= 0.75 freq= 54.0  
vol= 0.23 len= 1.2265769561calc port len diam.= 1.0 freq= 54.0 vol= 0.23 len=  
2.42441458862calc port len diam.= 1.5 freq= 54.0 vol= 0.23 len= 6.0035578244calc port len  
diam.= 2.0 freq= 46.0 vol= 1.0 len= 2.53815084366calc port len diam.= 3.0 freq= 46.0 vol= 1.0  
len= 6.80808939824calc port len diam.= 4.0 freq= 46.0 vol= 1.0 len= 13.0786033746

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Subject: Re: PiAlign RS1354?

Posted by [Otor](#) on Thu, 03 Jan 2002 13:44:13 GMT

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Hi Craig,I calculated Pi Align for RS-1354 some time ago, but not built them.Where I was confused was a really small port dimensions.In the Pi align, there is another factor to be considered, which is the ratio  $Q_e = L_p^2/A_p$ . For RS-1354 in 0.234 cu ft Pi aligned box tuned to 41.6 Hz, this ratio is 2.206. The only possible port dimension I found is  $D_p=0.414"$  and  $L_p=0.545"$  - not a huge port, it risks to produce some noise, IMHO.I do not understand exactly how important is to keep this ratio close to calculated  $Q_e$  value. What's more important: use such a small port or make the port bigger and then keep right values for  $Q_e$  or rather for  $F_r$ ? O'tor

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Subject: PiAlign

Posted by [Wayne Parham](#) on Thu, 03 Jan 2002 21:03:15 GMT

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Making the system resonant frequency correct is most important, but then again, having a port that is inappropriately sized isn't good either. Sometimes - and particularly with very small cabinets - PiAlign compromises one or both of these in order to keep the port size manageable. It usually makes the same compromise I would make, because the program essentially automates the decisions I would make. But in cases where the cabinet is exceedingly small, it tends to compromise resonant frequency more than I would.

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