**Formulas for Tuning a Subwoofer**

Now that you know the basics of speakers and subwoofers, how they work, and you’ve chosen one; it is time now that we build a box.

BEFORE I SAY ANYTHING: Building your own box will not necessarily bring better quality to your sound, professionally made boxes are equally as good if not any better.

Formulas and what they mean:

Select an equation to solve for a different unknown  
  
efficiency bandwidth product

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| [efficiency bandwidth product](http://www.ajdesigner.com/phpsubwoofervented/efficiency_bandwidth_product_equation.php) | efficiency bandwidth product |
| [speaker resonance frequency](http://www.ajdesigner.com/phpsubwoofervented/efficiency_bandwidth_product_equation_fs.php) | speaker resonance frequency |
| [speaker electrical Q](http://www.ajdesigner.com/phpsubwoofervented/efficiency_bandwidth_product_equation_qes.php) | speaker electrical Q |

box or enclosure volume

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| [box volume](http://www.ajdesigner.com/phpsubwoofervented/box_volume_equation.php) | box or enclosure volume |
| [speaker total Q at fs](http://www.ajdesigner.com/phpsubwoofervented/box_volume_equation_qts.php) | speaker total Q at fs |
| [air volume with same acoustic compliance](http://www.ajdesigner.com/phpsubwoofervented/box_volume_equation_vas.php) | air volume with same acoustic compliance as the speaker suspension |

box or enclosure tuning frequency

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| [box or enclosure tuning frequency](http://www.ajdesigner.com/phpsubwoofervented/box_tuning_frequency_equation.php) | box or enclosure tuning frequency |
| [air volume with same acoustic compliance](http://www.ajdesigner.com/phpsubwoofervented/box_tuning_frequency_equation_vas.php) | air volume with same acoustic compliance as the speaker suspension |
| [box or enclosure volume](http://www.ajdesigner.com/phpsubwoofervented/box_tuning_frequency_equation_vb.php) | box or enclosure volume |
| [speaker resonance frequency](http://www.ajdesigner.com/phpsubwoofervented/box_tuning_frequency_equation_fs.php) | speaker resonance frequency |

box or enclosure tuning frequency

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| [minus three decibel half power frequency](http://www.ajdesigner.com/phpsubwoofervented/minus_three_decibel_equation.php) | minus three decibel half power frequency |
| [air volume with same acoustic compliance](http://www.ajdesigner.com/phpsubwoofervented/minus_three_decibel_equation_vas.php) | air volume with same acoustic compliance as the speaker suspension |
| [box or enclosure volume](http://www.ajdesigner.com/phpsubwoofervented/minus_three_decibel_equation_vb.php) | box or enclosure volume |
| [speaker resonance frequency](http://www.ajdesigner.com/phpsubwoofervented/minus_three_decibel_equation_fs.php) | speaker resonance frequency |

peak sound pressure level

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| [peak sound pressure level](http://www.ajdesigner.com/phpsubwoofervented/peak_sound_pressure_level_equation.php) | peak sound pressure level |
| [speaker total Q at fs](http://www.ajdesigner.com/phpsubwoofervented/peak_sound_pressure_level_equation_qts.php) | speaker total Q at fs |
| [equivalent air compliance](http://www.ajdesigner.com/phpsubwoofervented/peak_sound_pressure_level_equation_vas.php) | equivalent air compliance |
| [box enclosure volume](http://www.ajdesigner.com/phpsubwoofervented/peak_sound_pressure_level_equation_vb.php) | box enclosure volume |

sound pressure level

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| [sound pressure level](http://www.ajdesigner.com/phpsubwoofervented/sound_pressure_level_equation.php) | sound pressure level |
| [free air reference efficiency](http://www.ajdesigner.com/phpsubwoofervented/sound_pressure_level_equation_n0.php) | free air reference efficiency |

maximum air volume displaced by cone excursion

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| [maximum air volume displaced by cone excursion](http://www.ajdesigner.com/phpsubwoofervented/air_displaced_equation.php) | maximum air volume displaced by cone excursion |
| [cone effective radiation area](http://www.ajdesigner.com/phpsubwoofervented/air_displaced_equation_sd.php) | cone effective radiation area |
| [cone peak linear displacement](http://www.ajdesigner.com/phpsubwoofervented/air_displaced_equation_xmax.php) | cone peak linear displacement |

cone effective radiation area

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| [cone effective radiation area](http://www.ajdesigner.com/phpsubwoofervented/cone_area_equation.php) | cone effective radiation area |
| [cone diameter plus one third of surround](http://www.ajdesigner.com/phpsubwoofervented/cone_area_equation_d.php) | cone diameter plus one third of surround |

port or vent length

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| [port or vent length](http://www.ajdesigner.com/phpsubwoofervented/port_length_equation.php) | port or vent length |
| [volume of enclosure or box](http://www.ajdesigner.com/phpsubwoofervented/port_length_equation_vb.php) | volume of enclosure or box |
| [tuning frequency](http://www.ajdesigner.com/phpsubwoofervented/port_length_equation_fb.php) | tuning frequency |
| [end correction factor](http://www.ajdesigner.com/phpsubwoofervented/port_length_equation_k.php) | end correction factor |

minimum port or vent diameter

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| [minimum port or vent diameter](http://www.ajdesigner.com/phpsubwoofervented/port_minimum_diameter_equation.php) | minimum port or vent diameter |
| [maximum air volume displaced](http://www.ajdesigner.com/phpsubwoofervented/port_minimum_diameter_equation_vd.php) | maximum air volume displaced  by cone excursion |
| [tuning frequency](http://www.ajdesigner.com/phpsubwoofervented/port_minimum_diameter_equation_fb.php) | tuning frequency |
|  |  |

Courtesy of: <http://www.ajdesigner.com/phpsubwoofervented/box_tuning_frequency_equation.php>

Since all of these formulas seem quite daunting and confusing to most of us, instead of explaining each and everyone thoroughly enough and wasting your time, I’m going to list a few sites with calculators for these formulas.

Subwoofer Box Design Sites:

Subwoofer Box Calculator for Sealed, Ported, or Bandpass

<http://www.ajdesigner.com/fl_subwoofer/subwoofer.php>

Free Software Download for bandpass, sealed and ported subwoofer boxes

<http://www.ajdesigner.com/speaker/index.php>

Top of the page it brings you too… the lower part of the page explains each software in a summary

For most of the speakers/subwoofers you buy, you will get a data sheet with all of the numbers to punch in on the calculator, it may even be on their website.

Courtesy of: <http://www.ajdesigner.com/fl_subwoofer/subwoofer.php>