
Subject: Measure impedance

Posted by [Wayne Parham](#) on Fri, 16 Aug 2002 21:34:35 GMT

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To find the box frequency, you measure impedance much the same way you find a woofer's free air resonance. But when the woofer motor is introduced to the (Helmholtz resonator) speaker cabinet, it now forms a system that has two resonant peaks, separated by a drop in impedance. So the box resonant frequency must be determined indirectly, by looking at the twin peaks and the dip between them in the impedance chart. The lower-frequency peak is described as f_l and the upper-frequency peak is called f_h . The Helmholtz frequency, or box resonance is called f_b , free air resonance of the woofer is f_s and f_o is the frequency of resonance of the woofer mounted in the box, were there no port present. The formulas that describe these relationships are:
$$f_l f_h = f_s f_b$$
$$f_l^2 + f_h^2 = f_o^2 + f_b^2$$
Therefore, $f_b = \sqrt{f_l^2 + f_h^2 - f_o^2}$
$$f_b = f_l f_h / f_s$$
Basically, if you know f_l , f_h and either f_s or f_o , you can determine f_b . And exact impedance values aren't required, only the frequencies f_l , f_h and either f_s or f_o
