Apparatus Competition
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Horizontal Resonance Tube with Sound Source

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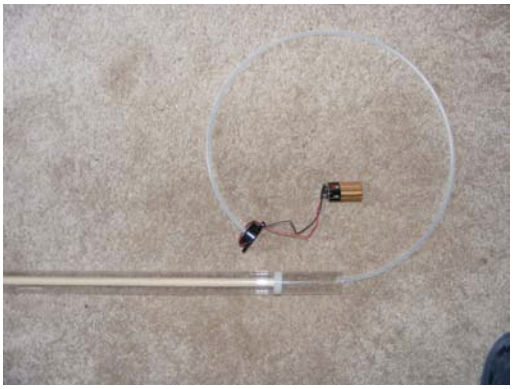
Abstract

A clear, dry resonance tube that can be used to measure the speed of sound by finding the distance between resonant lengths. The sound source is a piezo-electric buzzer attenuated and directed by plastic tubing. PIRA DCS# 3D30.16



Construction of Apparatus:

Parts: T8 Fluorescent tube guard 48 inches long
Plastic water bottle cap
screw
7/16" x 48" dowel rod
Radio Shack Piezo Buzzer
9 V Battery
9 V battery clip
1/4 inch outside diameter plastic tubing.

Screw the bottle cap onto the dowel. Some caps may have a bottom flange that needs to be trimmed off for the cap to fit in the tube.

Insert a length of plastic tubing into the hole in the piezo buzzer. This will reduce the sound intensity and direct it to the top of the resonance tube.

Attach a 9 V batery to the clip and place the end of the tube (sound source) slightly inside the plastic tube.

Use of Apparatus:

The tube will resonate when the sound's standing wave fits along the interior length of the tube. A fixed end is attached to a dowel rod so the length can be adjusted. As the column length is increased or decreased, resonant positions of the fixed end are noted. The distance between adjacent resonant lengths is one half of the wavelength of the sound. By marking and measuring several lengths, and average value of the half wave length can be found. A decibel meter can be used in noisy environments to more precisely find the resonant locations.

The frequency of the piezo buzzer in this set up (found by using Wave Window on a MacBook) is 3518 hertz. Other brand buzzers can be used with different frequencies for more data.

The average delta L was 4.88 cm (6 deltas in 29.3 cm), giving a wavelength of 9.77 cm, 0.0977 m. Frequency times wavelength gives 343 m/s, pretty close to the accepted value for the speed of sound.