NEATH PORT TALBOT COLLEGE
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School of Maths & Science
Science Practical

Determination of the velocity of sound using a resonance tube.

◆ **Aim**

To obtain a value for the velocity of sound in air.

◆ **Introduction**

You will produce stationary waves in an air column by listening for resonance of different frequencies of sound. By taking appropriate measurements the wavelength of the sound can be determined and therefore the velocity.

◆ **Safety**

Control Measures
- You are reminded of the need of good laboratory practice in order to maintain a safe working environment.

Hazards

General hazard   Take care not to spill water.

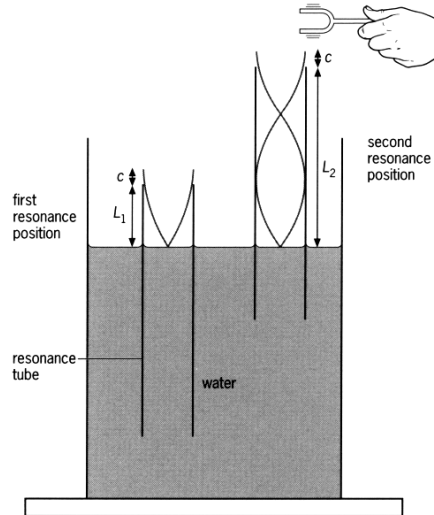## ◆ Apparatus Required

Assorted tuning forks, metre rule, plastic tubing, large measuring cylinder, water, measuring jug.

◆ Procedure

1. Place the resonance tube well down in the water and raise it gradually whilst a vibrating tuning fork is held over the mouth of the tube.

2. When resonance occurs and you hear a loud sound, notes the length of the tube L above the water as accurately as possible.

3. Repeat with the same fork and determine an average value for L.

4. Repeat the entire procedure using tuning forks of different frequency.

Frequency f (Hz)	1 / f (s)	Length L (m)	Length L (m)	Average Length L (m)
512				

Theory

At the first position of resonance the following stationary wave is produced.

The antinode occurs some distance c above the end of the tube. This is referred to as the end correction.

$$L + c = \lambda / 4$$

Since $v = f\lambda$ then

$$L + c = v/4f$$

$$\text{or } L = \frac{v}{4} \times \frac{1}{f} - c$$

Therefore a graph of length of the tube L against 1/f should be a straight line of slope v/4 and intercept – c

Thus the velocity of sound in air and the end correction of the tube can be found.

Analysis & Evaluation

5. Plot a suitable graph to determine the speed of sound in air. Suggest reasons for the number of significant figures used in your final answer.

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6. Comment on some limitations of the experiment, and focus on one of them and how it affected the value of the speed of sound calculated.

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