EXP.NO. 7: THE SPEED OF SOUND USING THE RESONANCE TUBE CLOSED AT ONE END

Sound waves produced by a tuning fork are sent down a tube filled with a gas. The waves reflect back up the tube from a water surface and interfere with the waves traveling downward. By properly adjusting the water level, a resonance condition can be established. By knowing the frequency of the tuning fork and the position of the water level for two different resonant lengths, the speed at which sound waves travel through the gas is found.

APPARATUS

1-Tuning forks
2- Resonance tube apparatus
3-Thermometer

PROCEDURE

a) Fill the tube until the water level in the tube is within 10 cm of the top of the tube.
b) Hold the thermometer in the tube and measure the temperature, T, of the air.
c) Hold the a tuning fork at its yoke and strike the tines with the rubber mallet.Hold the tuning fork over the open end of the tube and slowly lower the water level in the tube by lowering the water supply container until resonance is achieved. The water level in the tube now represents the position of a node. Record the water level position, L
d) Repeat step (c) for different tuning forks and record f and the length L in a table.

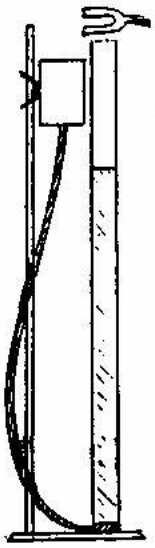
Theory: The length of the column of air in the resonance tube is related to the frequency of the tunning fork by the equation given below.

$L = c/4f - b$ Which is the equation of a straight line.

Draw a graph between L in cm on y-axis and 1/f on x-axis.
Determine the slope. Then the speed of sound is given by:

c= 4x slope.

f Hz	L cm



Also calculate the speed of sound using the equation given below:

$c = 331.4 + 0.6\,T$

where T is temperature in degree Celsius and c in m/sec.