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IPC Irwin Velocity of Sound Kit

Part Number IPC-4805-W

User Instructions



INTRODUCTION.

This kit offers both a transmitter and receiver for measurement of the 'Velocity of Sound' by a modification of Hebb's method. The kit is used in conjunction with a Signal Generator to operate the transmitter and an Oscilloscope to measure the receiver signal.

DESCRIPTION.

The Velocity of Sound Kit consists of a separate Loudspeaker (transmitter) and Microphone (receiver), both mounted in plastic cases and fitted with a pair of 4mm connection sockets. The loudspeaker can be driven directly by a signal generator, while the electret condenser type microphone comes supplied with a battery and can be fed directly into an oscilloscope.

INSTRUCTIONS.

Connect the output of a signal generator (see the available range of IPC Irwin Signal Generator) to the Loudspeaker terminals and also to the 'channel 1' input of a dual channel oscilloscope (set this as the trigger channel).

Next using a screened (coaxial) cable connect the output of the Microphone to the 'channel 2' input of the oscilloscope.

Now place the Loudspeaker and the Microphone facing each other (approx. 10cm apart), switch on the signal generator and set to a sinewave waveform at a frequency of 3kHz, finally adjust the amplitude to give an acceptable volume from the Loudspeaker. Now switch on the Microphone and then set the oscilloscope accordingly to show both channel waveforms (ideally with the Loudspeaker input waveform positioned above the Microphone output waveform).

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Next move the Microphone so that the two waveforms are in phase with each other and mark the position of the Microphone. Now slowly move the Microphone away from the Loudspeaker until a 360 degree phase shift between the waveforms has been achieved, as displayed on the oscilloscope screen. This can be done with both waveforms displayed simultaneously or with the oscilloscope set in the X-Y mode. The simultaneous display method allows students to see the actual phase shift of the Microphone output as the Microphone is moved.

Finally measure the distance between the new position and the original position of the Microphone. The difference between the two is equal to one wavelength of the sound.

The velocity of sound can then be calculated using:-

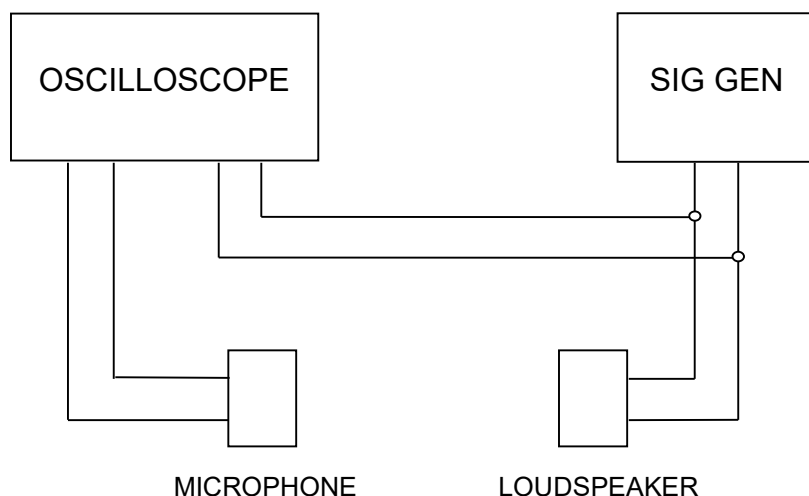
$$V=f\lambda$$

where: v is the velocity of sound in metres per second.

f is the frequency of sound in hertz.

λ is the wavelength of sound in metres.

VELOCITY OF SOUND APPARATUS SETUP.



SPECIFICATIONS.

Electrical Supply	= Microphone requires 9V Battery, type: PP3 (supplied).
Dimensions	= Microphone: 68 x 120 x 36mm & Loudspeaker: 55 x 110 x 22mm.
Mass	= Microphone: 0.15kg & Loudspeaker: 0.11kg.
Microphone Spec.	= Sensitivity: -42db, Range: 20Hz to 20kHz, Impedance: 2.2k ohms.
Loudspeaker Spec.	= Power Rating: 0.5W, Range: 20Hz to 20kHz, Impedance: 8 ohms.

Please Note: This Equipment is for Education, Training, or research Purposes Only.

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