

Velocity of Sound Kit  
IPC-4805-W

Introduction

This equipment is designed to allow the measurement of the velocity of sound in air using a loudspeaker, a microphone, a signal generator and an oscilloscope.

Operation

Connect the output of a signal generator to the loudspeaker terminals and to one input of a dual channel oscilloscope.

Connect the output of the microphone to the second input of the oscilloscope.

On the bench place the loudspeaker and the microphone approximately 120mm apart, facing each other.

Switch on the signal generator and adjust the frequency and amplitude of the output and the sensitivity of the oscilloscope to give the best traces on the oscilloscope screen. Record the frequency used.

N.B. The experiment will work most successfully and will produce the best results at a frequency of approximately 4.5kHz. This is due to the frequency response of the microphone.

Position the microphone so that the displayed traces are in phase and mark the position of the microphone. Move the microphone away from the loudspeaker until a 360 degree phase shift has been achieved, as displayed on the oscilloscope screen. This can be done with both traces 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.

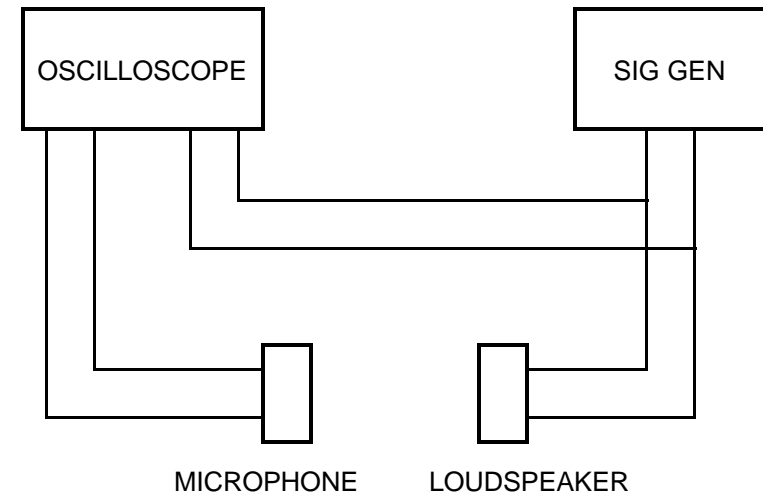
Measure the distance between the new position and the original position of the microphone. The difference between the two is equal to one wavelength of the sound.

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  
 $\lambda$  is the wavelength of sound in metres

Velocity of Sound Apparatus Set Up



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This kit contains:

- 1 loudspeaker IPC-4678-W
- 1 microphone IPC-4220-W