

## 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 also to one input of a dual channel oscilloscope (make this the trigger channel).

Next using a screened (coaxial) cable connect the output of the microphone to the second 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 waveform above the microphone waveform).

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 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 moves.

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=fλ

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.

## **IPC Irwin**

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# Velocity of Sound Apparatus Setup



### CONTENTS.

This kit contains:-

- 1 x Loudspeaker (IPC-4678-W)
- 1 x Microphone (IPC-4220-W)
- 1 x Set of User Instructions

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