The oscilloscope report example

Media, Television

Theory

An oscilloscope is an instrument that is useful for measuring natural phenomena and is applied in industry when non-constant electrical signal changes need to be measured. The instrument used in the lab was a cathode-ray tube (CRT) to display changes in an electrical voltage. The changes are termed oscillations. Modern technology has produced oscilloscopes that mimic the CRT on a liquid crystal display (LCD). Computers can employ LCD, CRT or gas plasma displays to show the waveform connected to an oscilloscope, so options are now available. The basic concept of the purpose of the oscilloscope is the same. An electron is forced to move across the screen so that its behavior can be observed. The behavior of the electron is measured in real time by drawing a graph of the position of the electron each instant of its movement. For example, voltage can be measured as a function of time even when the electron is creating waveforms very quickly. A horizontal sweep measures time in seconds per division or as a fraction of a second per division (i. e. ms, nanosecond). A vertical sweep measures the voltage per division.

Figure 1 Time delay versus Microphone Distance with Error Bars

Figure 2 Time delay versus Microphone Distance with Percentage Error

Figure 3 Microphone distance vs. Time Delay Slope = ~ 4 (y = 3. 9311)

Question 1. What is speed of sound? What is percent discrepancy? The speed of sound is 3. 911 cm/s but the degree of error is 30 percent which is a large error.

Question 2. Why does your value for speed of sound differ from the known value of speed of sound? The errors in the experiment include inexperience

using the oscilloscope. This is evident from the large size of the error bars at each data point and the slope which does not correlate with a straight line. From the distances of 40 cm to 100 cm very little sound signal was recorded on the oscilloscope.

Question 3. How do you expect the Vrms values to be related? Ideally the Vrms should show a linear relationship if graphed against the Time Delay, because as the time increases the voltage would be expected to increase. On the other hand, Vrms would be expected to decrease as microphone distance increases.

Conclusion

The laboratory experiment using the oscilloscope was a practical, hands-on opportunity to learn to operate the instrument. The oscilloscope very sensitive and this first trial to predict the speed of sound by the measurements taken was not successful. The experience was good and more practice with the instrument would bring better results.