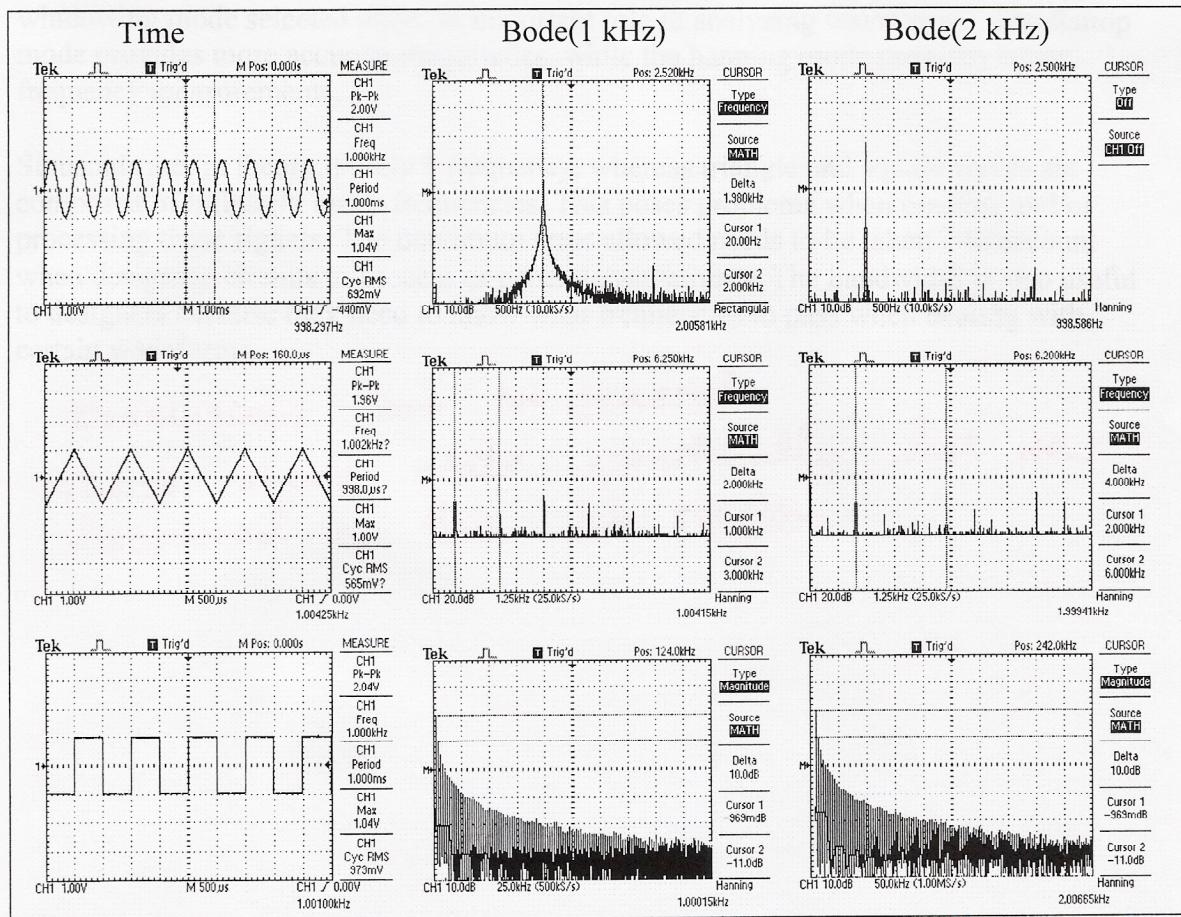


Lab 1 – Electronic Signal Waveforms

Objectives: Gain experience with configuration and display of signal waveforms in the time and frequency domains as used in electronic systems.

Procedure: Three waveforms were studied: sinusoids, triangular, and square waves. A simple connection was made from a signal generator to an oscilloscope. For each wave type, the time and frequency domain amplitude plots were made. The effects of amplitude and frequency were studied by looking at the plots of 1 kHz and 2 kHz, with 1V and 2V peak to peak amplitudes. Figure 1 shows the plots of each wave type, along with their respective frequency plots of both 1 kHz and 2 kHz signals.

Good
use of
scope
captures.



Figures
should be
big enough
to see
details,
and should
be labeled
individually
e.g. (a),
(b), (c), ...

Figure 1: Oscilloscope Screen Captures

Using the tools provided by the oscilloscope, characteristics were found for each type of signal, including the bandwidth required to pass the signal and the spacing of each harmonic. The results are found in Table 1. The harmonics are spaced every 2 kHz for the 1 kHz triangular wave. In general, the spacing is twice the frequency. With square waves, the same harmonics exist, but all other do as well.

Too brief . Need quantitative observations.

Table 1: Gaps and Bandwidth

	Frequency	Peak Gap	Bandwidth
Sinusoidal	1 kHz	N/A	1 kHz
Triangular	1 kHz	2 kHz	15.2 kHz
Square	1 kHz	N/A	175 kHz

Conclusions:

The oscilloscope has many useful functions. The measure functions allow many different measurements to be made. The cursor function allows for more detailed analysis of waveforms. The math function provides a useful spectrum view of a waveform. The windowing mode selected plays an important role in analyzing waveforms. The flattop mode provides more accurate magnitudes, while the hanning mode provides better frequency measurements.

Sinusoids are, in theory, purely 1 frequency, whereas triangle and square waves are composed of infinitely many frequencies. This poses problems when creating and/or processing these signals. The maximum error allowed needs to be taken into account when designing circuits to process or generate waveforms. The bandwidth is also useful to designers because they need to know what frequencies to pass when dealing with certain waveforms.

Conclusions are too general.
These should state specifically what was discovered in this lab section.