

# PRACTICE WITH OSCILLOSCOPES

**Purpose:** To gain familiarity with the oscilloscope as a voltage measuring device

**Equipment:** dual channel oscilloscope, signal generator, 2 small speakers, modeling clay, microphone, various connecting wires and adaptors

## Introduction:

Turn on the oscilloscope and push the AUTASET button. You should see a bright horizontal trace across the screen. Adjust the vertical position control and center the trace vertically. Adjust the time base (SEC/DIV) to various positions to see the effect on the motion of the trace. Relate the numbers on the time base dial to the grid on the screen.

Note: **In each of the three procedures below, be sure to make careful sketches in your lab book of what is observed on the oscilloscope screen and any relevant settings on the oscilloscope. Also make diagrams to show the various devices that you connect together for each procedure.**

## Procedure:

### 1. Observing Waveforms:

Connect the output of a signal generator to Channel 1 of the oscilloscope. On the signal generator select a sinusoidal waveform at a frequency of 100 kHz. Adjust the output of the signal generator so the amplitude of the wave is approximately 2 volts. Adjust the time base of the oscilloscope so that two or three cycles of the waveform are present. Adjust the vertical gain control so that the waveform fills the screen and measure the voltage amplitude of the wave using the oscilloscope. Measure the period of the wave with the oscilloscope and verify the frequency of the signal. Play with the trigger level (look for “coupling source” on the oscilloscope) to see its effect. Adjust other controls on the oscilloscope and signal generator to see their effects.

### 2. Lissajous Patterns:

Connect another signal generator to Channel 2 on the oscilloscope and set the scope to operate in **X-Y** Format. Push Display button and set to X-Y Format. This may involve settings on the time base, coupling source, or other location. Adjust the frequency of each signal generator to approximately 1 kHz and observe the resulting Lissajous pattern. Adjust the vertical gain controls (Channel 1 and Channel 2) so that the pattern fills the oscilloscope screen. Set one generator to a frequency that is half the other and observe the pattern. Play with other frequency multiples and see if you can explain the patterns that you see.

### 3. Beats:

Return the oscilloscope to normal operation (YT Format). Connect the output of the signal generators to two speakers. Adjust the frequency of one signal generator to ~1 KHz and the other to ~950 Hz. Set the speakers vertical (using clay to hold them in place), about 15 cm (6 in) apart, and facing each other. Hold the speakers only by the edge—they are delicate! Set a microphone in between the speakers and connect the output of the microphone to Channel 1 of the oscilloscope. Adjust the output of each signal generator to be equal by observing the sound waveform from each separately on the scope. Adjust the vertical gain (on the scope) and the time base for convenient viewing. Turn both signal generators on and adjust the time base and triggering level to observe the beats created by interference of the two waves.

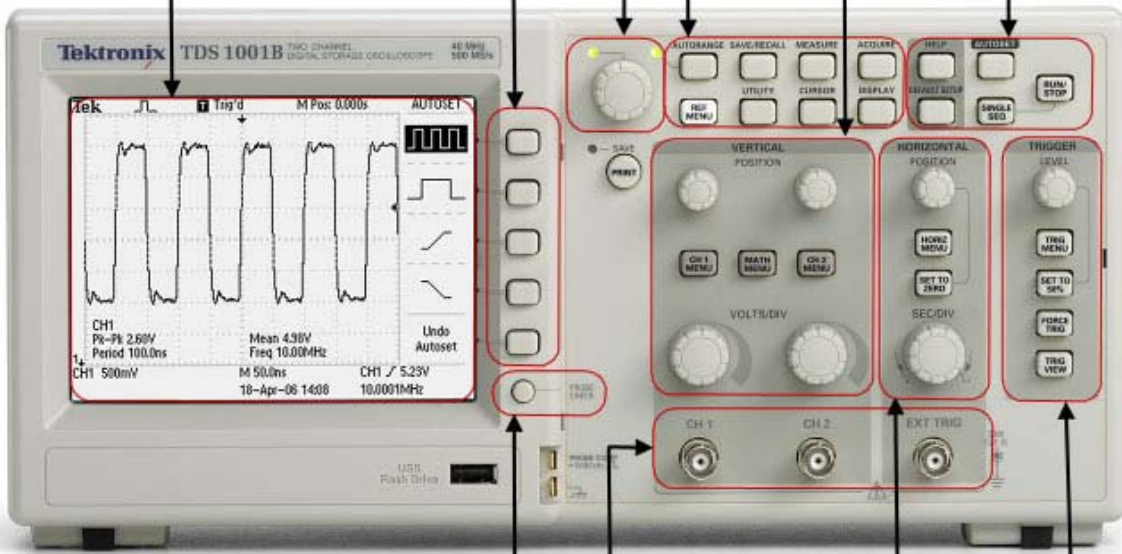
Oscilloscope Display

Multipurpose knob  
Side-screen menu buttons

Menu function buttons

Enhanced controls

VERTICAL controls



PROBE CHECK

HORIZONTAL controls

BNC input connectors

TRIGGER controls