The Teaching Oscilloscope

Capturing Your Signal:
Easy as 1, 2, 3
1. Set the vertical scale (volts/div).
2. Set the horizontal scale (sec/div).
3. Set the trigger type, source and levels.

Acquisition Modes
Determine how the oscilloscope digitizes the signal before displaying it. Typically chosen in the "Acquire" menu.
- Sample: Samples are taken in evenly spaced intervals to construct the waveform. This mode accurately represents signals most of the time.
- Peak Detect: The highest and lowest values of the input signal are captured and used to construct the waveform. This mode will capture narrow pulses that may be missed in Sample Mode.
- Average: Several waveforms are acquired and averaged point-by-point to obtain the average voltage at each time sample in the acquisition. This mode is used to reduce random noise.

Probing Tips
- Choose a probe that exceeds the signal’s bandwidth by 5 times for accurate reconstruction of the signal.
- Remember to connect the probe’s ground clip to a known ground in the circuit under test. Measuring a signal requires two connections: the probe tip connection and the ground connection.
- Don’t forget to compensate passive voltage probes to the oscilloscope.

Integrated Counter
- Use internal counters to monitor frequency measurements.

Tektronix Oscilloscopes
- Easy to Use
- Dedicated Front-panel Controls
- Automatic Measurements including FFT
- Intuitive User Interface
To find which oscilloscope is right for you, visit us at: www.tektronix.com/oscilloscopes

Vertical Controls
- Position
  - Moves the waveform up and down on the display.
- Scale (Volts-Per-Division)
  - Varies the size of the waveform on the screen.
- Bandwidth Limit
  - Limits the bandwidth of the oscilloscope to the frequency selected to reduce displayed noise. Restricts frequencies above the limit from being displayed and also from affecting the trigger.
- Input coupling
  - Determines which part of the signal is displayed.
  - DC Coupling: Shows all of the input signal.
  - AC Coupling: Blocks the DC component of the signal, containing the waveform at 0 volts.
- Ground Coupling
  - Disconnects the input signal to show where 0 volts is on the screen.

Autoset
- Identifies the type of waveform and adjusts controls to produce a usable display of the input signal.
- Scale
  - Changes the zoom scale factor.
- Position
  - Changes the position of the zoom window.

Zoom Controls
- The zoom function magnifies captured waveforms to show more signal detail.
- Scale: Moves the waveform left and right on the display.
- Scale (Seconds-Per-Division): Determines the amount of time displayed.

Aliasing
- Aliasing occurs when the oscilloscope does not sample the signal fast enough to construct an accurate waveform record. When this happens, the oscilloscope displays a waveform with a frequency lower than the actual input waveform, or triggers and displays an unstable waveform.

Advanced Triggering
- Modes
  - Auto Mode: The oscilloscope sweeps, even without a trigger.
  - Normal Mode: The oscilloscope only sweeps if the input signal reaches the set trigger point; otherwise, the last acquired waveform remains on the display.
  - Single Sequence Mode: After a trigger is detected, the oscilloscope acquires and displays one waveform.
- Coupling
  - Noise: Trigger coupling only affects the signal passed to the trigger system, not the bandwidth or coupling of the signal on the screen.
  - DC Coupling: Passes all components of the signal.
  - AC Coupling: Blocks DC components.
- HF Reject: Attenuates the high frequency components of the signal.
- LF Reject: Blocks the DC component and attenuates the low frequency components of the signal.
- Noise Reject: Adds hysteresis to the trigger circuitry to reduce the chance of falsely triggering on noise.

Having Problems?
- If you do not see a signal, check the following:
  - Is the channel on?
  - Is the waveform off screen?
  - Is the waveform on screen?
- Adjust vertical position and scale.
  - Adjust vertical coupling if the signal has a large DC component.
- If your waveform is indistinguishable, adjust the horizontal scale.