The Oscilloscope
Basic Features & Functions

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 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.

Trigger Controls
The trigger circuit acts as a comparator. When the signal matches the trigger setting, the oscilloscope generates a trigger and captures the signal. Edge triggering is used most often; it captures the signal on a rising or falling edge.
- Source - Determines which signal is compared to the trigger settings.
- Level - Determines where on the edge the trigger point occurs.
- Slope - Determines whether the trigger point is on the rising edge (positive slope) or the falling edge (negative slope) of a signal.

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.
- AC Coupling: Shows all of the input signal.
- DC Coupling: Blocks the DC component of the signal, centering the waveform at 0 volts.
- Ground Coupling: Disconnects the input signal to show where 0 volts is on the screen.

Horizontal Controls
- Position - Moves the waveform left and right on the display.
- Scale (Seconds-Per-Division) - Determines the amount of time displayed.

Autoset
- Identifies the type of waveform and adjusts controls to produce a usable display of the input signal.

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.

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

Tektronix Oscilloscopes
Tektronix oscilloscopes are easy to use, with dedicated front-panel controls, automatic measurements including FFT, and intuitive user interfaces. To find which oscilloscope is right for you, visit us at: www.tektronix.com/oscilloscopes

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