



2246/2245

- Bright, Crisp Display With High Writing Rate
- Four Independent Channels
- 100-MHz Bandwidth With 3-ns/Div Time Base
- On-Screen Scale-Factor Readouts
- Flexible Triggering: Auto Level and Auto HF, LF, Noise Reject, TV Line and TV Field
- Delayed Sweep
- Control Status Lights
- 2% Vertical and Horizontal Accuracy
- 2 mV/Div Vertical Sensitivity at Full Bandwidth
- Specially Designed Probe Improved,

Rugged Tip Hybrid Circuitry for Improved Performance

- New Labeled Volts Cursors With Ground-Referenced Readings and On-Screen Readouts (2246)
- Meets or Exceeds MIL-28466 for Harsh Environments (2246 Opt 1Y)
- Hands-Off Voltmeter Measurements:
 - Peak and -Peak
 - Peak-to-Peak
 - Quasi Peaks
 - Quasi Peak-to-Peak
 - DC (2246)
- New "SmartCursor™" Track Voltmeter Measurements Visually Indicate Trigger Level and Ground (2246)

- Time Measurements With Cursors or Alternate Delayed Sweep (Time)
- Three-Year Warranty—Five-Year Option
- UL Listed, CSA Certified

TYPICAL APPLICATIONS

- Logic Design and Repair
- Communications
- Power Supply Design

Higher Performance, Lower Price

The performance-price ratio for portable oscilloscopes has been substantially upgraded. No other portable scope can offer the range of productivity-enhancing features and performance characteristics at a comparable low price than the Tektronix 2245 and 2246.

Features That Promote Productivity

Four independent channels speed troubleshooting and design tasks by allowing simultaneous observation of multiple test points. Front-panel set-ups are simplified by pushbutton-activated functions and on-screen scale factor readouts. With buttons that light up, settings can be verified at a glance.

New Triggering Flexibility

Hands-free triggering, made possible by the Auto-Level mode, automatically places a stable display of almost any waveform on screen. The LF, HF, and Noise Reject modes, together with a 10-to-1 lockoff range, deliver stable triggering on complex waveforms. The built-in TV Line and TV Field triggering capability extends measurements to most video-related applications with performance for the broadcast industry.

Performance Plus

The NEW 2246 and 2246 oscilloscopes have low-noise vertical systems that produce sharp, bright traces. Their 2-ns time base and 100-MHz bandwidth bring out the details on high-speed signals and render measurements with good timing resolution.

Low-level signal measurements are easily managed by the 2 mV/Div vertical sensitivity, even at full bandwidth, and by trigger sensitivity that extends to 0.25 div at 50 MHz (1.0 div at 100 MHz).

Voltage Measurements With the Push of a Button

A pushbutton-actuated measurement system on the 2246 enhances productivity even more. This scope turns out virtually hands-off measurements quickly of -peak, +peak, peak-to-peak, dc, and quasi volts, all with convenient on-screen readout of values.

If more visual indication is desired, the major cursor system can provide feedback showing exactly where on the waveform an automatic measurement is being made. These feedback cursors, when selected, even show ground and trigger-level locations.

There is also the ability to use cursors in the conventional manual mode for making point-to-point time and voltage measurements, including time-interval measurements between a point on the source waveform and a point on any of four other displayed waveforms.

Three-Year Warranty

As with all of our high quality 2000 Series oscilloscopes, the 2245 and 2246 (including the CRT) are covered by the Tektronix three-year instrument warranty, making ownership more cost effective than ever.

CHARACTERISTICS

Characteristics are common to both the 2245 and 2246, except where indicated.

VERTICAL SYSTEM

Display Modes—CH 1, CH 2, CH 3, CH 4, Add CH 1+CH 2, Invert CH 2, Alternate and Trigger display selecting for all channels, at 20-MHz bandwidth limiting.

CHANNEL 1 AND CHANNEL 2

Frequency Response—3 dB Bandwidth—10 MHz to 20 MHz; -35°C to +55°C; 50 MHz; -35 to +50°C Coupled Load—50 Ω Frequency—10 MHz, less with 1X probe, 1 Hz or less with standard accessory 50 Ω probe.

Gain Response—±1.5% for temperatures 0 to 50°C, +35°C, ±2.5% for temperatures -35 to +50°C (rise times calculated at: $t_r = 0.50/200$).

Deflection Factor Range—2 mV/div to 5 V/div at 1-2-5 sequence of 18 steps.

Maximum Error—±2% (5 to 20°C) (add ±1% for 0 to 10°C and from 20 to 50°C).

Variable Range—Continuously variable between Video-Div step settings. Increases step setting by at least 2.5 Volts.

Unclipped Indicators—A symbol appears across when deflection factor is between desired Video-Div step settings.

Maximum Isolation—50 dB or more attenuation of desensitized channel at 20 MHz, 24 dB (more at 100 MHz (measured with an eight input signal and equal Video-Div settings on all channels from 2 mV/div to 5 V/div)).

Signal Delay With Respect to CH 1—100 ps difference.

Input Characteristics—1 MΩ ±0.1% (rated by 50 pF, ±0.5 pF. Maximum Input Impedance: 400 V (dc+peak ac), 800 V at p-p at 50 Hz or less.

Common-Mode Rejection Ratio (CMR Mode)—CH 2 (Inverted)—At least 10:1 at 50 MHz. Common mode signals of eight div or less with the Video-Div control adjusted for full 800 mV at 50 MHz at any Video-Div setting.

Thresh Drift—Between Video-Div Step Settings: 0.2 div or less. The Video-Div Rotated Between Extremes: 1 div or less. Inverting CH 2: 1 div or less. Between Gnd and DC Input Coupling: ±0.5 div from 0 to +25°C; ±0.5 mV from 50 to 50°C.

Position Range—At least ±11 div from graticule center.

CHANNEL 3 AND CHANNEL 4

Frequency Response—Same as CH 1 and CH 2.
Step Response—Same as CH 1 and CH 2.
Deflection Factor—Settings: 0.1 Volts and 0.2 V/div.

Maximum Error—Same as CH 1 and CH 2.
CH Isolation—34 dB or more attenuation of desensitized channel at 100 MHz (measured with an eight div input signal).

CH 4 Signal Delay With Respect to CH 3—100 ps difference.

Input Characteristics—1 MΩ ±1% (rated by 2 pF, ±0.5 pF. Maximum Input Voltage: 400 V (dc+peak ac), 800 V p-p at 50 kHz or less).

Thresh Drift—Between Video-Div Settings: 1 div or less.

Position Range—Same as CH 1 and CH 2.

ALL CHANNELS

Low Frequency Linearity—±0.05 div compression or expansion of a 2 div center-screen signal when positioned anywhere within the graticule area.

Bandwidth Limiter—Reduces upper -3 dB bandwidth to a limit of 17 to 20 MHz.

Strip Separation Range—±4 div.

Strip Mode Switching Rate—400 MHz (10% CH 3 or CH 4 signal Delay With Respect to Either CH 1 or CH 2)—<200 ps difference.

HORIZONTAL SYSTEM

Display Modes—A (main sweep), A Alternate with B (delayed sweep), and B. In XY mode, CH 1 provides X-axis (horizontal) deflection.
A Sweep Time Base Range—0.5 ns/div to 20 ns/div in a 1-2-5 sequence of 20 steps. 100 magnification extends fastest sweep rate to 2 ns/div.

B Sweep Time Base Range—0.5 ns/div to 20 ns/div in a 1-2-5 sequence of 20 steps. 100 magnification extends fastest sweep rate to 2 ns/div.

Variable Timing Range—Continuously variable between Scan-Div calibrated step settings. Extends slowest A sweep and B sweep speeds by a factor of at least 2.5 times. Adjusts the A Scan-Div setting with the A display mode affects the B Scan-Div setting with the A display mode.

A Sweep Timing Accuracy**

Range	Unmagnified	Magnified
±15 ns ±50°C	±2%	±2%
0 to +50°C		
+35 to +50°C	±2%	±2%

** Applies over the center eight div. Excludes the first 0.25 div of the magnified sweep and sweep beyond the 1000x magnified div.

Linearity—±1% over any two div of the center eight div, on both Unmagnified and magnified displays.

Delay Time—Range: ±0.1 div to >100 div of the A sweep. (Maximum value does not exceed one of the A sweep.) Rate: 1/20,000 pF (0.0005) (viewed over two seconds).

Jitter—Range: 0 to >0.5 div (right of the delay time setting shows not exceed end of the A sweep.) Accuracy: ±0.05 of reading ±1% of one A sweep div).

TRIGGERING

Trigger Sensitivity—From CH 1, CH 2, CH 3, CH 4 (Invert).

DC Coupled—0.25 div or greater trigger from dc to 50 MHz, increasing to 1 div at 120 MHz.

Noise Reject Coupled—0.5 div or more triggers; 0.5 div or less does not trigger.

RF Coupled—0.25 div or greater triggers from dc to 50 MHz; 0.25 div or less does not trigger above 500 MHz.

LP Reject Coupled—0.25 div or greater triggers from 100 kHz to 50 MHz; 0.25 div or greater does not trigger from dc to 10 kHz.

AC Coupled—0.25 div or greater triggers from 50 Hz and 50 MHz; 0.25 div or less does not trigger from dc to 5 Hz.

For dc, LP Reject, and ac coupling above 50 MHz, triggering speed requirement increases to 1.0 div at 120 MHz.

Trigger Sensitivity From TV Line or TV Field Source—0.5 div or less of composite sync achieves stable display.

Lowest Usable Frequency With Auto Level Function—10 Hz.

Level Control Range—±20 div (referenced to the selected source).

Level Readout Accuracy—±0.2% of reading ±0.1 div).

Variable Holdoff Time—Increases the A sweep holdoff time by at least a factor of 10.

XY OPERATION

Deflection Factor—Same as vertical system (The Video-Div is calibrated defect).

Maximum Error

Range	Y-Axis	X-Axis
±0 to +25°C	±2%	±2%
0 to +50°C		
+35 to +50°C	±2%	±2%

X-Axis—3 dB Bandwidth—0 MHz or more.

Phase Difference Between X and Y—±1° (for dc coupled signals from dc to 50 kHz with bandwidth limiter off).

CURSOR AND FRONT PANEL DISPLAY

Controls—Separate X and Y cursors; X Interval, Readout Interval, Poses, Scan Poses, Time Rotation, and Scale Indication.

CRT—4- to 20-cm internal graticule markings; 8 major div vertically and 10 major div horizontally, with auxiliary markings.

Standard Phosphor—GH (P10).

X-Axis Orthogonality—±0.1 div over eight vertical div; no adjustment.