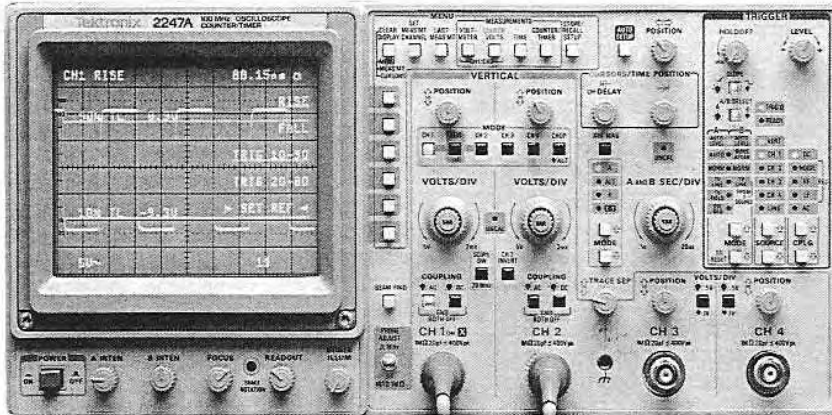


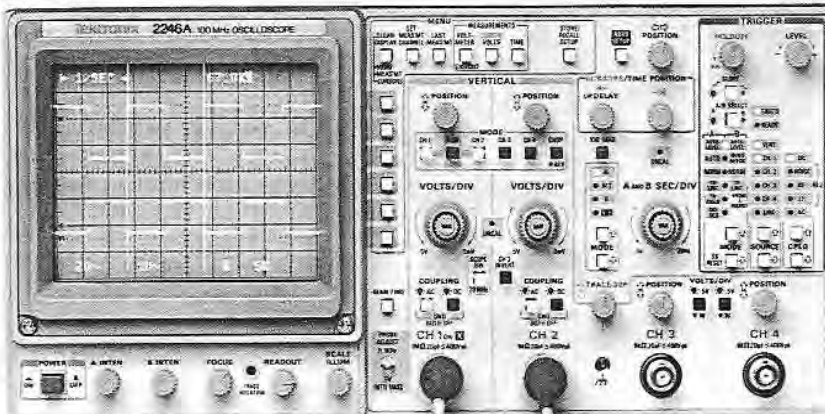
100 MHz ANALOG OSCILLOSCOPES

2247A/2246A
2245A

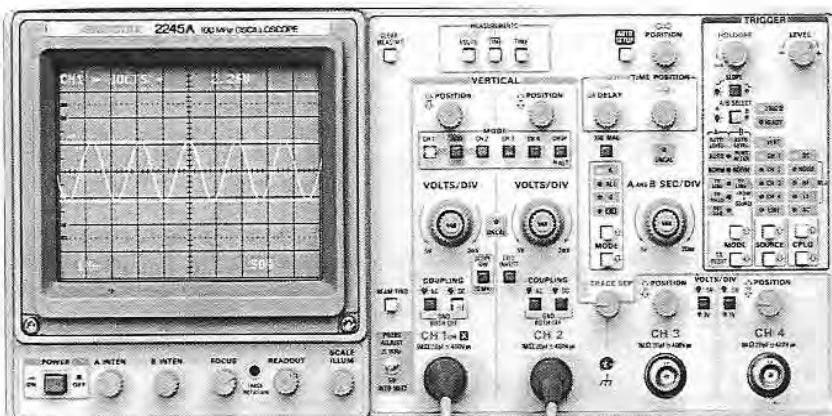
NEW



NEW 2247A: Packed with time saving automation like full or partial auto setup. Make automatic measurements with the built-in voltmeter and integrated counter/timer. Ideal for service, manufacturing, and design applications where precise time and amplitude measurements are often required



2246A: Highly suitable for work in service, manufacturing, and design where push button measurements and ease of use are important. Make automatic measurements with the built-in voltmeter.



2245A: The best buy for troubleshooting, general repair, and design where cursors with readout are valued. Time and voltage cursors make short work of precise measurements.

Smart Scopes with 100 MHz, Four Channels, and Choice of Features like Built-in Voltmeter, Store/Recall of Front Panel Setups and Integrated Counter/Timer.

- Four Independent Channels
- Two-Step Auto Setup of Instrument Front Panel
- On-Screen Scale Factor Readouts
- Dual Time Base with Delayed Sweep
- Cursor Time/Voltage Measurements
- Pre-Set TV Trigger Slope
- Store/Recall of 20 Front Panel Setups (2246A, 2247A Only)
- Hands-Off Voltmeter Measurements (2246A, 2247A Only)
- SmartCursor™ Track Voltmeter Measurements (2246A, 2247A Only)
- Initialized Time Cursors (2246A, 2247A Only)
- Delayed Sweep Cursors (2246A, 2247A Only)
- Phase Measurements (2247A Only)
- Gated Voltmeter Measurements (2246A, 2247A Only)
- Integrated Counter/Timer (2247A Only)
- Gated Counter Measurements (2247A Only)
- Automatic Rise/Fall Time and Propagation Delay Time Measurements (2247A Only)

Selection Guide

Features	2247A	2246A	2245A
Bandwidth	100 MHz	100 MHz	100 MHz
Channels	4	4	4
Time Base	Dual	Dual	Dual
Scale Factor			
Readout	Yes	Yes	Yes
Trigger Level Readout	Yes	Yes	No
Auto Setup	Yes	Yes	Yes
Store/Recall	Yes	Yes	No
Time/Volts Cursors	Yes	Yes	Yes
Voltmeter with Smart Cursors™	Yes	Yes	No
Counter/Timer	Yes	No	No
Automatic Measurements	Yes	Yes	No

To order, call your local Tektronix Sales Office, or call Tek's National Marketing Center.
Toll free: 1-800-426-2200, Ext. 99.

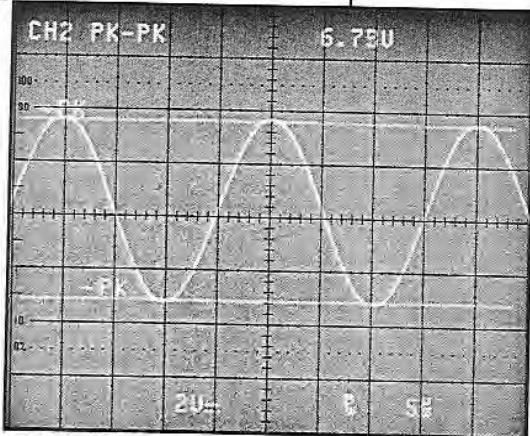
NEW

2247A/2246A
2245A

100 MHz ANALOG OSCILLOSCOPES

HIGHER PERFORMANCE, LOWER PRICE

For automation, versatility, accuracy, and performance at a low cost, nothing beats the 2245A, 2246A, and new 2247A portable oscilloscopes. They offer a wide range of features to enhance productivity plus better performance than any scope in their price range.



Make instant hands-off voltage measurements. SmartCursors™ automatically track the signal level you select.

PRODUCTIVITY FEATURES

For starters, these scopes offer 100 MHz bandwidth, the industry standard for today...and the future. Plus, you get plenty of automation to speed your work on the line, the bench or in the field. You get Auto Setup for perfect displays at the push of a button, time and voltage cursors along with CRT readouts for goof-proof measurements and four channels for multiple signals.

AUTO SETUP

Just press a button and you're ready to measure. A single button sets the 100 MHz 2245A, 2246A, or 2247A to acquire and display an unknown input signal. Auto setup automatically adjusts vertical, horizontal, triggering and display controls to display a waveform. In

seconds a stable, automatically triggered display of your probed waveform appears on-screen with an optimized front panel setup.

Auto Setup is two step. Press the button to automatically set all front panel controls for optimal display. Press and hold to set only vertical and horizontal scale factors leaving other control settings where you preset them.

Cursors and READOUT

Cursors make time, frequency and voltage measurements pushbutton simple. CRT readout gives you a numerical display of the waveform parameter you are measuring. There is no need for arithmetic or counting of graticule divisions.

FOUR CHANNELS

Four independent channels allow simultaneous observation of signals, making these scopes ideal for high speed digital troubleshooting. Channels 1 and 2 have full sensitivity range while channels 3 and 4 are optimized for logic signals.

ENHANCED PERFORMANCE, TOO.

As if advanced features weren't enough, these scopes incorporate high performance and accuracy that enhance all your design, testing and service tasks.

The 2 ns time base and 100 MHz bandwidth bring out the details on high speed signals, producing measurements with good timing resolution.

Low noise vertical systems produce sharp, bright traces. Low-level signal measurements are easily managed by the 2 mV/div vertical sensitivity and a trigger sensitivity that extends to 150 MHz. With 2% vertical and horizontal accuracy, measurements are made with confidence.

Auto level trigger mode automatically places a stable display of almost any waveform on-screen. Low frequency, high frequency and noise reject modes, together with 10-to-1 holdoff range, deliver stable triggering on complex waveforms. Built-in TV line and field triggering extends measurements to most video related applications.

BUILT-IN VOLTMETER AND STORE/RECALL

Make voltage measurements at the push of a button. The 2246A and 2247A feature a pushbutton activated measurement system which simplifies measurements of +peak, -peak, peak-to-peak, dc and gated volts, all with convenient on-screen readout of values. Tek's unique SmartCursors™ make interpretation even easier. They automatically track changes in voltmeter measurements and visually indicate where ground and trigger levels are located. The built-in voltmeter along with Smart Cursors™ delivers instant answers.

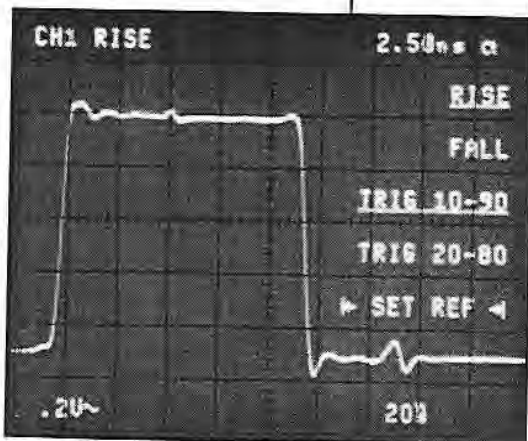
Repetitive testing or servicing is simpler with automated assistance from the impressive 2246A and 2247A. As many as 20 front panel setups can be stored in non-volatile memory for recall when and where they are needed. Switching between setups is easy - just two buttons recall a complete setup.

INTEGRATED COUNTER/TIMER

The new Tek 2247A offers the most complete set of capabilities ever assembled in a low-cost analog scope. Combining an integrated counter/timer and built-in automation, it delivers the crystal controlled accuracy, measurement power and productivity needed for digital systems.

You can measure frequency, period, width, and frequency ratio directly from the 2247A's vertical inputs, and measure gated time intervals with the push of a button. Rise and fall time (10-90% and 20-80%) plus propagation delay time measurements are made automatically.

In fact, with the built-in voltmeter along with the integrated counter/timer, you get at least 11 different automatic voltage and time measurements, plus many gated measurements for closer analysis of a chosen portion of your waveform.



Make difficult measurements faster and more accurate. Rise time measurements are made automatically with the integrated counter/timer on the 2247A.

CHARACTERISTICS

Characteristics are common to the 2245A, 2246A, and 2247A except where noted.¹

VERTICAL SYSTEM (4 channels)

Bandwidth (-3dB) and Rise Time— 100 MHz and 3.5 ns (-10°C to +35°C); 90 MHz and 3.9 ns (2 mV/div or +35°C to +55°C). Bandwidth limit: 20 MHz.

Deflection Factor and Accuracy— CH 1&2: 2 mV/div to 5 V/div; CH 3&4: 0.1 V/div and 0.5 V/div; all at ±2% (±3% outside +15°C to +35°C). CH 1&2 variable at least 2.5:1.

Vertical Operating Modes— CH 1, 2, 3, 4, CH 2 INVERT, ADD, ALT, CHOP (625 kHz).

CMRR— At least 10:1 at 50 MHz.

Input R and C— 1M Ω, 20 pF.

Max Input Voltage— 400 V (dc +peak ac) or 800 V p-p.

Channel Isolation— 50:1 at 100 MHz.

HORIZONTAL SYSTEM

Sweep Speeds— A Time Base: 0.5 s/div to 20 ns/div; B Time Base: 5 ms/div to 20 ns/div (X10 MAG to 2 ns/div A and B).

Accuracy— ±2%; Magnified ±3% (degrade by 1% outside +15°C to +35°C).

Horizontal Operating Modes— A, ALT, B, X-Y.

Delay Jitter— 20,000:1.

Delay Accuracy— ±0.5% + 5% of one div + 25 ns.

TRIGGER SYSTEM

Trigger Sensitivity (A and B)— dc: 0.35 div to 25 MHz, 1.0 div at 150 MHz. Noise Reject: 1.4 div to 25 MHz, 2.2 div at 100 MHz. HF Reject: attenuates above 70 kHz. LF Reject: attenuates below 50 kHz. ac: Same as dc, attenuates below 25 Hz. TV Line, TV Field: 0.5 div of composite sync for stable display.

2247A Counter Sensitivity (A and B Trigger)— 0.5 div at 10 MHz, 2.0 div at 100 MHz.

Trigger Operating Modes— A mode: AUTO LEVEL, AUTO, NORM, TV LINE, TV FIELD, SINGLE SEQ. B mode: RUNS AFTER DELAY, AUTO LEVEL, NORM, TV LINE (from A source).

Trigger Source (A and B)— VERT, CH 1, 2, 3, 4, LINE.

Variable Holdoff— At least 10:1.

X-Y OPERATION

Deflection Factors— Same as vertical system.

X-Y Operating Modes— X: CH 1; Y: CH 1, 2, 3, 4, and ADD.

Bandwidth— X-Axis: 3 MHz; Y-Axis same as vertical system.

Phase Difference— ±3° from dc to 50 kHz.

CRT SYSTEM

Display— 8 cm x 10 cm, 16.5 kV nominal voltage.

Controls— BEAM FIND, FOCUS, A and B READOUT INTENSITY, TRACE ROTATION and SCALE ILLUM.

Z-Axis— 3.8 volts causes noticeable modulation. Usable to 10 MHz.

ADVANCED FUNCTIONS

Cursors— Time, 1/Time: ±0.5% +2% of one div; Delta Time, 1/Delta Time, Delta Phase (2247A): ±0.5% +1% of one div; Volts: ±5% +2% of one vertical div.

Voltmeter (2246A and 2247A)— DC Volts: ±(0.5% of reading +2% of one vertical div +250 μV); Plus or Minus Peak Volts: ±(2% of reading + 10% of one div +1.0 mV) and Pk-Pk Volts (25 Hz to 25 MHz): ±(2% of reading +15% of one div +1.5 mV).

Counter/Timer (2247A)— Time Base and Accuracy: 200 MHz and 10 ppm (0.001%). **Frequency:** 0.01 Hz to 100 MHz. Max resolution: 0.0000001 MHz. Max accuracy same as time base. **Period:** 100 s to 5 ns. Max resolution: 0.1 ps. Max accuracy same as time base.

Width: 100 s to 5 ns. Max resolution: 1 ps. Max accuracy same as time base ±5 ns. **Totalize:** 100,000,000 counts. **Delta Time:** 0 to 5 s. Max resolution: 1 ps. Max accuracy same as time base ±100 ps. **1/Delta Time:** 0.2 Hz to 10 GHz. **Rise/Fall:** 0 to 5 s. Max resolution: 1 ps. Max accuracy same as time base ±2 ns. **Propagation Delay:** 0 to 5 s. Max resolution: 1 ps. Max accuracy same as time base ±100 ps. **External C/T Timebase Input:** 10.1 kΩ ac coupled. Sensitivity: 1 V p-p. Max input V: 35 V dc + peak ac. Frequencies: 1, 5, and 10 MHz.

POWER REQUIREMENTS

Line Voltage Range— 90 Vac to 250 Vac.

Line Frequency— 48 Hz to 445 Hz.

Maximum Power Consumption— 100 W (155 VA).

ENVIRONMENTAL CHARACTERISTICS

(See page 142)

PHYSICAL CHARACTERISTICS

Dimensions	mm	in
Height	164	6.4
Width (with handle)	362	14.2
Depth (with front cover)	445	17.5
Weight	kg	lb
Net	7.9	17.3

OTHER CHARACTERISTICS

Safety— UL 1244 listed, CSA certification.

Warranty— 3 years

INSTRUMENT OPTIONS

Opt. 15— Ch 2 and A-Gate output

Channel 2 output bandwidth— dc to 25 MHz; **deflection factor:** 10 mV/div into 50Ω, 20 mV/div into 1MΩ; **dynamic range:** ±7 divisions;

dc offset: < 0.5 divisions.

A-Gate output level— TTL compatible; **drive:** 4 mA (high state), 20 mA (low state).

¹ Military Versions 22461Y/2R/Mod A available as commercial versions of military products. See page 145. Specifications may differ from above, contact your local Tek sales office.

ORDERING INFORMATION

2247A 100 MHz Oscilloscope with Voltmeter/Counter/Timer ☎ \$2,995

Includes: Two 1.5 m 10X Voltage probes (P6109 Opt. 01), Oprs. Manual (070-6373-00), Users Ref. Guide (070-6688-00), 3 Year Warranty, Power Cord

2246A 100 MHz Oscilloscope with Voltmeter ☎ \$2,595

Includes: Two 1.5 m 10X Voltage probes (P6109), Oprs. Manual (070-6556-00), Users Ref. Guide (070-6576-00) 3 year warranty, Power cord

2245A 100 MHz Oscilloscope ☎ \$1,995

Includes: Two 1.5 m 10X Voltage probes (P6109), Oprs. Manual (070-6558-00), Users Ref. Guide (070-6718-00) 3 Year Warranty, Power Cord

INSTRUMENT OPTIONS

Opt. 1R — Rackmounted Instr. +\$350
Opt. 15 — CH2 & A Gate Output +\$100

ACCESSORY OPTIONS

Opt. 02 — Acc. Pouch and Cover +\$50
Opt. 1C — C-5C Opt. 02 Camera +\$500
Opt. 1K — K212 Instrument Cart +\$380
Opt. 1T — Transit Carrying Case +\$280
Opt. 17 — P6408 Logic Probe +\$350
Opt. 22 — Add two P6109
Opt. 01 probes +\$126
Opt. 23 — Add 2 P6062B
1X/10X Probes +\$380

INTERNATIONAL POWER PLUG OPTIONS

Opt. A1 — A5 — Available NC
(See page 142 for descriptions.)

WARRANTY-PLUS SERVICE OPTIONS

Opt. M2 — 2 years service
2247A +\$194
2246A +\$187
2245A +\$176
Opt. M3 — 2 yrs service & 4 cal's
2247A +\$575
2246A +\$521
2245A +\$482
Opt. M4 — 5 calibrations
2247A +\$448
2246A +\$393
2245A +\$359
Opt. M5 — 2 yrs service & 9 cal's
2247A +\$995
2246A +\$889
2245A +\$817
Opt. M7 — 2 calibrations
2247A +\$191
2246A +\$167
2245A +\$153
Opt. M8 — 4 calibrations
2247A +\$382
2246A +\$335
2245A +\$306

RECOMMENDED ACCESSORIES/ FIELD KITS

Service Manuals —
2247A (070-6367-00) \$26
2246A (070-6555-00) \$26
2245A (070-6557-00) \$30
Self-Study Package — \$115
2245A and 2246A (068-0275-XX)
Rackmount Kit — Order 2240F1R \$350
See page 383 for more accessories.

² See page 361 for additional educational information

☎ Product available within 24 hours through Tek Direct. Call 1-800-426-2200.

To order, call your local Tektronix Sales Office, or call Tek's National Marketing Center.
Toll free: 1-800-426-2200, Ext. 99.