Three *Special Editions* and Five Options

2465DVS

2465

2465/2445

- 300 MHz Bandwidth at Probe Tip (2465)
- 150 MHz Bandwidth at Probe Tip (2445)
- 500 ps/Div Sweep Rate (2465)
- 1 ns/Div Sweep Rate (2445)
- 2 mV/Div Vertical Sensitivity
- 500 MHz (2465) and 250 MHz (2445) Minimum Triggering Bandwidth
- Four Independent Channels
- Waveform Cursors
- Three-Year Warranty—Five Years Optional

GPIB IEEE-488

The 2465/2445 Option 10, 2465CTS, 2465DMS and 2465DVS comply with IEEE Standard 488-1978 and with Tektronix *Standard Codes and Formats*.

2465CTS Special Edition

2465 Performance PLUS:
- 10 ps Time Interval Resolution
- Crystal Controlled Time Base
- 0.001% Accuracy
- 150 MHz Counter/Timer
- Delay-By-Events Triggering
- Boolean Logic Triggering
- 17-Bit Word Recognizer Probe
- Fully Programmable

The 2465 Special Editions are also configured in an MP 2903 measurement package. See page 336. Also available is EZ-TEK 2400 Software for test program generation.

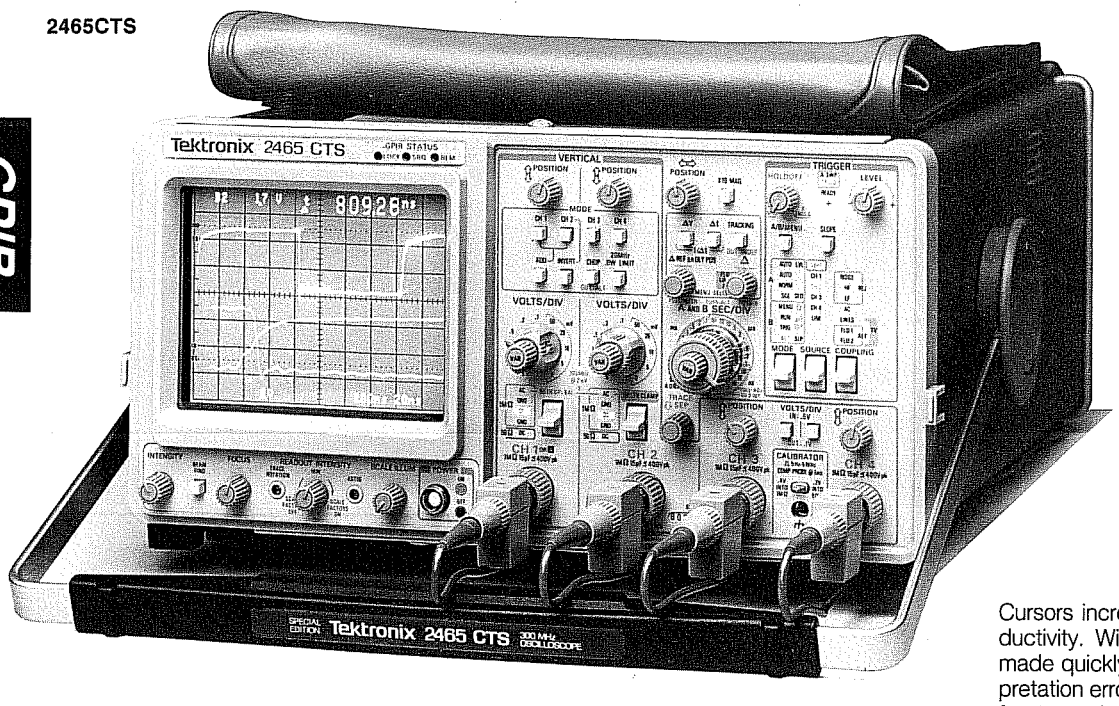
2465DMS Special Edition

2465CTS Performance PLUS:
- 4 1/2 Digit Autoranging Digital Multimeter
- True RMS Ac Volts and Current
- Continuity Beeper
- DMM Calibration via Front Panel and GPIB
- 10 μV Resolution on Dc Volts
- Fully Programmable

2465DVS Special Edition

2465DMS Performance PLUS:
- TV Waveform Measurement System
- This System Includes all the 2465 Measurement Options for the Upmost in Versatility and Performance

2465CTS



The 300 MHz 2465 and 150 MHz 2445 represent the leading edge of technology, establishing higher standards in both value and performance for today's portable oscilloscopes. They enable faster and more precise measurements than ever before possible in a portable oscilloscope. For even more value, Tektronix is offering three *specially priced* products, the 2465DVS, 2465DMS, and 2465CTS. Each is configured with new options to greatly simplify complex measurements and substantially increase user productivity.

Options

Five options can be ordered with the 2465 or 2445. Their descriptions follow the 2400 Series characteristics.

GPIB IEEE Standard 488 Programmable for Semiautomatic Measurement Systems (Option 10)

150 MHz Counter/Timer/Trigger (CTT) with 17-Bit Word Recognizer (Option 09)

150 MHz Counter/Timer/Trigger (CTT) (Option 06)

TV Waveform Measurement System (Option 05)

4 ½ Digit Autoranging DMM (Option 01)

Multiple Option Allowance

When more than one option is ordered, a Multiple Option Allowance is applied to the purchase.

Special Edition 2465DVS, 2465DMS, and 2465CTS

For maximum versatility and high-resolution video applications, choose the *2465DVS*. This is a *specially priced* and configured 2465 with five options: (1) a 4½ digit autoranging digital multimeter (Option 01); (2) a crystal-controlled time base, 150 MHz counter/timer/trigger and 17-bit word recognizer (Option 09); (3) an IEEE Standard 488 Interface Bus (Option 10) which provides complete talker/listener control, making the 2465DVS programmable; (4) the TV waveform measurement system (Option 05) and (5) two additional P6131 probes (Option 22).

For automatic test and measurement applications, the *2465DMS*, is a *specially priced* and configured 2465 with Options 01, 09, 10, 22.

The *2465CTS* is a *specially priced* and configured 2465 with Options 09, 10, and 22. It is ideal for automatically measuring frequency, period pulse width, and time between events. For moderate speed signals risetimes and falltimes can be automatically measured.

For more information about these instruments, refer to the characteristics and ordering information for the 2465 and the individual options.

Precision Measurements

Crystal Controlled Time Base (Option 09/06)

ΔVolts and ΔTime Cursors

Adjustable Channel 1—Channel 2 Delay Matching

Time-Interval Resolution to 20 ps (10 ps Option 09/06)

Calibrated Horizontal Variable

The 2465/2445 Family oscilloscopes set new norms in measurement precision. With 1% horizontal system accuracy and 2% vertical deflection accuracy, they give you greater measurement confidence than ever before. On-screen vertical and horizontal cursors deliver immediate and accurate results of voltage, time, frequency, ratio, and phase measurements.

Cursors increase accuracy and operator productivity. With them, measurements can be made quickly, with almost no chance of interpretation errors and no CRT linearity error. The front-panel-controlled Channel 1—Channel 2 delay-matching adjustment compensates probe and vertical-channel delay differences.

CRT Readouts

Vertical and Horizontal Scale Factors

Trigger Level

Voltage, Time, Frequency, Phase, and Ratio Measurement Values

50 Ω Overload Condition

Mode Indicators

Probe Identification

Readouts permit easy setup and interpretation of waveform displays. The horizontal time base always remains calibrated with three significant digits and a decimal point, even if variable settings are used.

Versatile Triggering

Hands-Off Auto Level Triggering

Predictable Triggering on Logic Thresholds and Intermittent Signals

Delay-By-Events and Boolean Triggering (Option 09/06)

These oscilloscopes can trigger on any one of the four channels. Auto-level circuitry gives you convenient hands-off triggering, even with changing trigger-signal amplitudes. With the position-independent triggering, trigger level remains constant whenever you reposition the display. And the trigger-level readout enables you to preset the amplitude for predictable triggering on both logic thresholds and transient events.

Single-sequence triggering can capture a single event or multiple events by displaying a single sweep of each trace on the CRT. At the end of the sequence, scale factors and other readout data are briefly displayed and graticule illumination flashes on momentarily, allowing waveform photography.

Measurement Convenience

Four Independent Channels

B Sweep Displays A-Sweep Trigger Event

Selectable 50 Ω and 1 MΩ Input Impedances with 50 Ω Overload Protection

Four channels produce clear and complete views to simplify complex measurements. With the B sweep you can display any portion of the A sweep, including the A-sweep trigger event. Sweep-delay range is adjustable down to zero delay. This combination allows easy timing measurements to be made on highly asymmetric or jittering waveforms. It provides accurate delayed- and Δ-time measurements—from the first pulse on the trace—and allows the operator to examine the A-trigger event in detail.

Input impedance is selectable between 1 MΩ and 50 Ω on Channels 1 and 2, eliminating the need for external 50-Ω terminators. Overload protection is also ensured. If excessive signal is applied while 50-Ω coupling is selected, coupling automatically switches to 1-MΩ coupling to prevent possible damage.

Environmental

Exceptional electromagnetic compatibility qualities make the 2465/2445 Family oscilloscopes attractive for use in high-RF situations such as computer manufacturing, testing, and servicing. These instruments are also UL listed and CSA certified for safety. Their rugged design meets MIL-T-28800C environmental requirements for Type III, Class 3, Style C equipment.

Reliability

Because of our confidence in their trouble-free performance, Tektronix offers a three year warranty. It covers all labor and parts, including CRT and excluding probes. You can also economically extend the warranty coverage up to five years by choosing from five practical service plans. These optional plans are designed to meet specific maintenance needs and are available in most countries.

CHARACTERISTICS

Characteristics are common to the 2465/2445 Family except where indicated.

VERTICAL SYSTEM

Display Modes — CH 1, CH 2, CH 3, CH 4, Add (CH 1 + CH 2); Invert (CH 2 only); Alternate and Chopped. Bandwidth Limit (20 MHz). If Var V/Div knob is rotated out of detent, efficient RATIO measurements can be performed with ΔV cursors.

CHANNEL 1 AND CHANNEL 2

Deflection Factor — 2 mV/div to 5 V/div in a 1-2-5 sequence.

Accuracy — ±2% for ≤5 div signals centered vertically for temperatures from +15°C to +35°C. Add ±1% of reading for temperatures from −15°C to +15°C and +35°C to +55°C. For 50 Ω Coupling, add ±1%. For CH 2 Invert, add ±1%.

ΔV Accuracy — ±(1.25% of reading + 0.03 div + signal aberrations) for temperatures from +15°C to +35°C. Add 1% of reading for temperatures from −15°C to +15°C and +35°C to +55°C. For 50 Ω Coupling, add ±1%. For CH 2 Invert, add ±1%. Measured with cursors, over the entire graticule area.

ΔV Range — ±8 times the Volts/Div switch setting.

Variable Range — Continuously variable between Volts/Div switch settings. Extends maximum deflection factor to at least 12.5 V/div.

Frequency Response (3 dB Bandwidth and Risetime*[1]) — With a 6 div signal, terminated in 50 Ω, with Var Volts/Div in calibrated detent.

2465	Volts/Div Setting	With Standard Accessory Probe or Internal 50 Ω Termination
−15°C to +35°C	≥5 mV	Dc to 300 MHz, 1.17 ns
+35°C to +55°C	≥5 mV	Dc to 250 MHz, 1.4 ns
−15°C to +55°C	2 mV	Dc to 100 MHz, 3.5 ns
2445		
−15°C to +35°C	≥5 mV	Dc to 150 MHz, 2.33 ns
+35°C to +55°C	≥5 mV	Dc to 100 MHz, 3.5 ns
−15°C to +55°C	2 mV	Dc to 80 MHz, 4.38 ns

*[1] *Risetime calculated from: Bandwidth x Risetime = 0.35*

Ac Coupled Lower −3 dB Point — With 1X Probe: 10 Hz or less. With 10X Probe: 1 Hz or less.

Common-Mode Rejection Ratio — At least 20:1 at 50 MHz for common-mode signals of 8 div or less, with Var Volts/Div control adjusted for best CMRR at 50 kHz at any Volts/Div setting ≥5 mV. At least 20:1 at 20 MHz at 2 mV/div.

Channel Isolation — 100:1 or greater attenuation of the deselected channel at 100 MHz; 50:1 or greater attenuation at 300 MHz (for 2465); 50:1 or greater attenuation at 150 MHz (for 2445). Measured with an eight-division input signal, deflection factors from 2 mV/div to 500 mV/div, and with equal Volts/Div switch settings on both channels.

Displayed CH 2 Signal Delay with Respect to CH 1 Signal — Adjustable through a range of at least ±500 ps.

Input Z (1 MΩ) — 1 MΩ ±0.5% shunted by 15 pF, ±2 pF. The maximum input voltage is 400 V (dc + peak ac); 800 V p-p ac at 10 kHz or less, for ac and dc coupling.

Input Z (50 Ω) — 50 Ω ±1%, with vswr of ≤1.3:1 from dc to 300 MHz (for 2465), or from dc to 150 MHz (for 2445). Maximum input voltage is 5 V RMS with 1-s averaging internal, ±50 V peak.

Cascaded Operation — CH 2 Signal Out is coupled into CH 1 input. Bandwidth is dc to 50 MHz or greater and the deflection factor is 400 μV/div ±10%.

CHANNEL 3 AND CHANNEL 4

Deflection Factor — 0.1 V/div and 0.5 V/div ±10%.

Frequency Response (Bandwidth and Risetime)*[1]

2465	With Standard Accessory Probe (−3 dB)	With 50 Ω External Termination
−15°C to +35°C	Dc to 300 MHz 1.17 ns	Dc to 300 MHz, (−4.7 dB) 1.4 ns
+35°C to +55°C	Dc to 250 MHz 1.4 ns	Dc to 250 MHz, (−4.7 dB) 1.75 ns
2445		
−15°C to +55°C	Dc to 150 MHz 2.33 ns	Dc to 150 MHz, (−3 dB) 2.33 ns

*[1] *With a 6 div signal, from a 50 Ω terminated source.*

Input Z — 1 MΩ ±1%, shunted by 15 pF ±3 pF.

Maximum Input Voltage — ±400 V (dc + peak ac): 800 V p-p ac at 10 kHz or less.

Channel Isolation — 50:1 or greater attenuation of the deselected channel at 100 MHz with an 8 div input signal.

ALL CHANNELS

Low Frequency Linearity — 0.1 div or less compression or expansion of a 2 div, center-screen signal when positioned anywhere within the graticule area.

Bandwidth Limiter — Reduces upper 3 dB bandpass to a limit of 13 MHz to 24 MHz.

Vertical Signal Delay — At least 30 ns of the signal is displayed before the triggering event is displayed on the A sweep for settings ≥10 ns/div. At least 10 ns of delay is displayed at 5 ns/div for the 2465.

Chopped Mode Switching Rate — 2.5 MHz ±0.2% from 2 μs/div to 20 μs/div (1.25 MHz dual channel cycle rate). At All Other Sweep Speeds: 1 MHz ±0.2% (500 kHz dual channel cycle rate).

HORIZONTAL SYSTEM

Display Modes — A, A Intensified, B Delayed, Alternate (A Intensified and B Delayed), B ends A for increased intensity in the delayed mode. For X-Y operation Channel 1 supplies the x-axis (horizontal) deflection.

A Sweep Time Base Range

2465: 0.5 s/div to 5 ns/div in a 1-2-5 sequence of 25 steps. X10 Mag feature extends maximum sweep speed to 500 ps/div.

2445: 1 s/div to 10 ns/div in a 1-2-5 sequence of 25 steps. X10 Mag feature extends maximum sweep speed to 1 ns/div.

B Sweep Time Base Range

2465: 50 ms/div to 5 ns/div in a 1-2-5 sequence of 22 steps. X10 Mag feature extends maximum sweep speed to 500 ps/div.

2445: 50 ms/div to 10 ns/div in a 1-2-5 sequence of 21 steps. X10 Mag feature extends maximum sweep speed to 1 ns/div.

Variable Time Control — Continuously variable and calibrated between settings of the Sec/Div switch. Extends slowest A sweep speed to 1.5 s/div. Operates in conjunction with the A Sec/Div switch when A and B are locked together; operates in conjunction with the B Sec/Div switch when A and B are not locked together. When Var is out of detent position, the ΔT cursors give RATIO measurements, where five horizontal div are 100%. The variable control causes 1/ΔT cursors to give PHASE measurements where five horizontal div are 360°.

CALIBRATED SWEEP DELAY

Timing Accuracy — Measured with Sec/Div switches set to 0.1 s/div or faster and temperature from +15°C to +35°C. (Refer to note below.)

Parameter	Unmagnified	Magnified
A and B Sweep*1	±(0.7% of time interval +0.6% of full scale)	±(1.2% of time interval +0.6% of full scale)
ΔTime (with Cursors)*2	±(0.5% of time +0.3% of full scale)	±(1% of time inteval +0.3% of full scale)
ΔTime (with Delayed B Sweep)*3	±(0.3% of time interval +0.1% of full scale)	
Delay Time*4	±(0.3% of delay setting +0.6% of full scale), +0 ns, −25 ns	

*1 *Time interval is measured on the center horizontal graticule line with Var Sec/Div control in detent (0.6% full scale is 0.06 div).*

*2 *Time interval is measured with cursors, anywhere on the graticule.*

*3 *Time interval is measured with Delayed B Sweep and with both delays set at 1% or more of full scale from minimum delay (no "?" displayed in readout).*

*4 *Delay time is from A Sweep trigger point to start of B Sweep.*

NOTE: With the A Sec/Div switch set to either 0.5 s or 0.2 s, add 0.5% of time interval to all accuracy specifications.

With the A Sec/Div switch set to 1 s (2445 only), add 2% of time interval to all accuracy specifications.

With the Var Sec/Div control out of detent, add 2% to both the A Sweep and the B Sweep accuracy specifications (except 1 s/div setting for 2445).

For temperature from −15°C to +15°C and from +35°C to +55°C, add 0.2% of time interval to all ΔTime and Delay Time specifications; add 0.5% of time interval to the A Sweep and the B Sweep accuracy specifications.

ΔTime Readout Resolution
2465: Greater of either 10 ps or 0.025% full scale.
2445: Greater of either 20 ps or 0.025% full scale.

ΔTime Range — ±10 times the A Sec/Div switch setting.

Delay Pickoff Jitter — Within 0.004% (one part or less in 25,000) of the maximum available delay, plus 100 ps.

Delay Time Position Range — 0 to 9.95 times the A Sec/Div switch setting. Main sweep triggering event is observable on delayed sweep with minimum delay setting.

TRIGGERING

The minimum p-p signal amplitude for stable triggering is stated for CH 1 or CH 2 source. The signal amplitude for CH 3 or CH 4 source is one-half of CH 1 or CH 2 source specification. For multiple channel source (Alternate Vertical Mode) add 1 div to the single channel source specification.

Dc Coupled — 0.35 div from dc to 50 MHz, increasing to 1.5 div at 500 MHz (250 MHz for 2445).

Noise Reject Coupled — 1.2 div from dc to 50 MHz, increasing to 4.5 div at 500 MHz (250 MHz for 2445). An amplitude sensing mode, defined by increased trigger hysteresis. For signals within the vertical bandwidth, triggering *will not* occur (signal reject) with 0.4 div or less.

Ac Coupled — 0.35 div from 60 Hz to 50 MHz, increasing to 1.5 div at 500 MHz (250 MHz for 2445). Attenuates signals below 60 Hz.

HF Reject Coupled — 0.5 div from dc to 30 kHz.

LF Reject Coupled — 0.5 div from 80 kHz to 50 MHz, increasing to 1.5 div at 500 MHz (250 MHz for 2445).

Jitter — Less than 50 ps at 300 MHz with A and B Sec/Div set for 5 ns/div sweep and 10X Mag on (100 ps at 150 MHz and 10 ns/div for 2445).

Trigger Level Control Range — CH 1 or CH 2: ±18 times the Volt/Div setting. CH 3 or CH 4: ±9 times the Volts/Div setting.

Trigger Level Control Readout Accuracy — For triggering signals with transition times >20 ns.

Channel 1 or Channel 2 Source (Dc Coupled): ±[3% of Level setting +3% of p-p signal +0.2 div + 0.5 mV + (0.5 mV x probe attenuation factor)] for temperatures from +15°C to +35°C. Add 1.5 mV x probe attenuation factor for temperatures from −15°C to +15°C and +35°C to +55°C.

Channel 1 and Channel 2 (50 Ω Coupled, Channel 2 Invert): Add ±1% of setting to dc coupled specification at +15°C to +35°C.

Channel 1 or Channel 2 Source (Noise Reject Coupled): Add ±0.6 div to the dc coupled specification.

Channel 3 or Channel 4 Source (Dc Coupled): ±[3% of Level control setting +4% of p-p signal +0.1 div +(0.5 mV x probe attenuation factor)].

Channel 3 or Channel 4 Source (Noise Reject Coupled): Add ±0.3 div to the Dc Coupled specification.

Auto Level Mode Maximum Triggering-Signal Period — At least 20 ms with A Sec/Div settings <10 ms/div. At least four times the A Sec/Div setting with settings from 10 ms/div to 50 ms/div. At least 200 ms with A Sec/Div switch settings >50 ms/div.

Auto Mode Maximum Triggering-Signal Period — At least 80 ms with A Sec/Div settings <10 ms/div. At least 16 times the A Sec/Div settings from 10 ms/div to 50 ms/div. At least 800 ms with A Sec/Div setting >50 ms/div.

Auto Level Mode Trigger-Acquisition Time — From 8 to 100 times the specification for Auto Level Mode Maximum Triggering-Signal Period, depending on the triggering-signal period and waveform.

Slope Selection — Conforms to trigger-source waveform or ac power-source waveform.

A Trigger Holdoff — An adjustable control permits a stable presentation of repetitive complex waveforms. Extends A sweep holdoff to at least 10 times Sec/Div setting. At the fully clockwise setting, B sweep ends A sweep.

X-Y OPERATION

Three-Channel X-Y Display — Channel 1 supplies the X-axis (horizontal) deflection signal. Any or all of the vertical channels (including Channel 1) can supply the Y-axis (vertical) deflection signal(s).

X-Axis Deflection Factor Range, Variable Range, and Accuracy — Same as Channel 1.

X-Axis Bandwidth — Dc to 3 MHz.

Input Z — Same as Channel 1.

Phase Difference Between X and Y (Without Bandwidth Limit) — ≤1° from dc to 1 MHz, ≤3° from 1 MHz to 2 MHz.

X-Axis Low-Frequency Linearity — 0.2 div or less compression or expansion of a two-div, center-screen signal when positioned within the graticule area.

CURSOR AND FRONT PANEL DISPLAY

ΔVolts Cursor Position Range — At least the center 7.6 vertical divisions.

ΔTime Cursor Position Range — At least the center 9.6 horizontal divisions.

Power Down Memory — Front panel settings will be stored in nonvolatile memory provided no controls are moved for at least 10 s before power down.

Z-AXIS INPUT

Sensitivity — Positive voltage decreases intensity. From dc to 2 MHz, +2 V blanks a maximum-intensity trace. From 2 MHz to 20 MHz, +2 V p-p modulates a normal-intensity trace.

Input Resistance — 9 kΩ ±10%.

Maximum Input Voltage — ±25 V peak; 25 V p-p ac at 10 kHz or less.

SIGNAL OUTPUTS

Calibrator — Measured with the Sec/Div setting at 1 ms/div.

Output Voltage and Current: 0.4 V ±1% into a 1 MΩ load, 0.2 V ±1.5% into a 50 Ω load, or 8 mA ±1.5% into a short circuit.

Repetition Period and Accuracy: Two times the A Sec/Div setting for settings from 100 ns/div to 100 ms/div. Accuracy is ±0.1%, measured during sweep time or with Single Sequence A Trigger Mode selected.

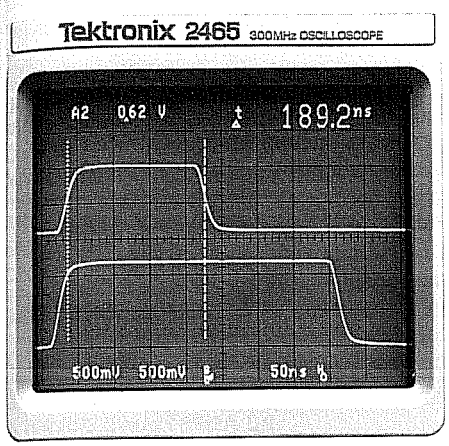
Symmetry: Duration of high-portion output cycle is 50% of the output period ±(the lesser of 500 ns or 25% of period).

Pulse-Period or Pulse-Width Jitter: 10 ns or less.

CH 2 Signal Out: Output Voltage: 20 mV/div ±10% into 1 MΩ, 10 mV/div ±10% into 50 Ω. Offset: ±10 mV into 50 Ω when dc balance has been performed within ±5°C of the operating temperature.

A Gate Out and B Gate Out: Output Voltage: 2.4 V to 5 V positive going pulse, starting at 0 V to 0.4 V. Output Drive: Will supply 400 μA during HI state; will sink 2 mA during LO state.

CRT READOUT AND WAVEFORM INFORMATION



Your eyes never have to leave the screen to obtain front panel settings and measurement results.
In the CRT example above, the top area of the display provides trigger source, trigger voltage level, and Δtime results. The lower area displays the selected volts/div and seconds/div scale factors and that bandwidth limit and holdoff are activated.

CRT AND DISPLAY FEATURES

Standard CRT — 80 mm x 100 mm (8 cm x 10 cm).

Standard Phosphor — GH (P31) is standard.

Nominal Accelerating Potential — 16 kV.

POWER REQUIREMENTS

Line Voltage Ranges — 115 V: 90 V to 132 V ac. 230 V: 180 V to 250 V ac.

Line Frequency — 48 Hz to 440 Hz.

Power Consumption — Typical: 70 W (140 VA). Maximum: 120 W (180 VA).

ENVIRONMENTAL AND SAFETY

The 2465/2445 Family oscilloscopes meet or exceed the environmental requirements of MIL-T-28800C for Type III, Class 3, Style C equipment, tested for humidity 4.5.5.1.2.2, low temperature 4.5.5.1.3 and high temperature 4.5.5.1.4.

Ambient Temperature — Operating: −15°C to +55°C. Nonoperating: −62°C to +85°C.

Altitude — Operating: To 4600 m (15,000 ft). Maximum operating temperature decreases 1°C for each 1,000 ft above 5,000 ft. Nonoperating: To 15 000 m (50,000 ft).

Vibration — Operating: 15 minutes along each of three axes at a total displacement of 0.025 inch p-p (4 g's at 55 Hz), with frequency varied from 10 Hz to 55 Hz in one-minute sweeps. Held 10 minutes at each major resonance, or if none existed, held 10 minutes at 55 Hz (75 minutes total test time).

Packaged Transportation Vibration — Meets the limits of the National Safe Transit Association Test Procedure 1A-B-1; excursion of 1 inch p-p at 4.63 Hz (1.1 g) for 30 minutes.

Humidity — Operating and Nonoperating: Stored at 95% relative humidity for 5 cycles (120 hours) from +30°C to +60°C, with operational performance checks at +30°C and +55°C.

Shock — Operating and Nonoperating: 50 g's,half-sine, 11 ms duration, three shocks on each face, for a total of 18 shocks.

Electromagnetic Compatibility — Meets MIL-STD-461B for the following tests: RE02 Part 4 and 7; CE01 Part 2; CE03 Part 2; CS01 Part 2; CS02 Part 2; CS06 Part 2; RS01 Part 2; RS03 1 V/meter up to 1 GHz.

Meets FCC Rules and Regulations, Part 15, Subpart J, Class A. Meets VDE 0871, Category B.

Safety — UL listed (UL 1244) and CSA certified (CSA 556B).

Drip Proof — With Cover On: Meets MIL-T-28800C Para. 4.5.5.5.3.

Transit Drop — Not in Shipping Package: 12-inch drop on each corner and each face (MIL-T-28800C, para 4.5.5.4.2).

Packaged Transportation Drop — Meets the limits of the National Safe Transit Association Test Procedure 1A-B-2; 10 drops of 36 inches.

Bench Handling — With and Without Cabinet Installed: MIL-STD-810C, Method 516, Procedure V (MIL-T-28800C, para 4.5.5.4.3).

Topple — Operating and Cabinet Installed: Set on rear feet and allowed to topple over onto each of four adjacent faces.

PHYSICAL CHARACTERISTICS

For Standard Scope & Options	Cabinet		Option 1R Rackmount	
Dimensions	**mm**	**in**	**mm**	**in**
Width			483	19.0
(with handle)	330	13.0		
Height			178	7.0
(with feet/pouch)	190	7.5		
(without pouch)	160	6.3		
(with Opt 01, with feet/pouch)	230	9.0		
(with Opt 01, w/o pouch)	199	7.8		
Depth			419	16.5
(with front panel cover)	434	17.1		
(with handle extended)	505	19.9		
Weights	**kg**	**lb**	**kg**	**lb**
Net (w/o accessories & pouch)	9.3	20.5	13.3	29.3
(with Opt 01 w/o accessories and pouch)	9.9	22.0		
(with accessories & pouch)	10.2	22.4	14.2	31.2
(with Opt 01 with accessories and pouch)	13.0	28.8		
Shipping	12.8	28.2	19.1	42.0
(with Opt 01)	14.9	33.0		

Ordering Information — See page 267.

Option 10 GPIB Interface

GPIB IEEE-488

Bus Interface complies with IEEE Standard 488-1978 and with Tektronix *Standard Codes and Formats.*

All of the High Performance Characteristics of Standard 2465/2445 Oscilloscopes Plus Programmability

Remote Control of Front Panel Functions

Selectable at Front Panel:
Device Address, Talk/Listen Mode, Message Terminator

Front Panel Status Indicators:
REM (Remote), SRQ (Service Request), LOCK (Local Lockout)

Compatible with All Other 2465/2445 Options

User Generated SRQ:
To Signal Controller During Program Control

RQS Control:
Optional Enable or Disable of SRQ Reporting

Option 10, which adds the ability to communicate over the General Purpose Interface Bus, transforms the 2465/2445 Family oscilloscopes into ideally suited components for use in a variety of semiautomatic test or measurement systems.

A host controller, such as the Tektronix 4041 can be easily programmed to assist the oscilloscope operator in performing a complete sequence of tests and measurements. Front panel settings can be remotely set or changed. It is possible not only to display scope parameters and settings on the CRT, but also to read them back over the GPIB to the controller. Similarly, the results of voltage, time, frequency, phase, and ratio measurements can be both displayed on the CRT and communicated back over the bus.

The ability to display prompting messages (by embedding them in control programs) reduces the chance of operator error at critical points in a test procedure.

Message structure for the 2465/2445 Family, like that for other Tektronix GPIB-controllable instruments, conforms with Tektronix *Standard Codes and Formats.* The abilty to select message termination characters facilitates use with most types of controllers.

CHARACTERISTICS

The set of characteristics is the same as specified for standard 2465/2445 oscilloscopes and includes the following additions:

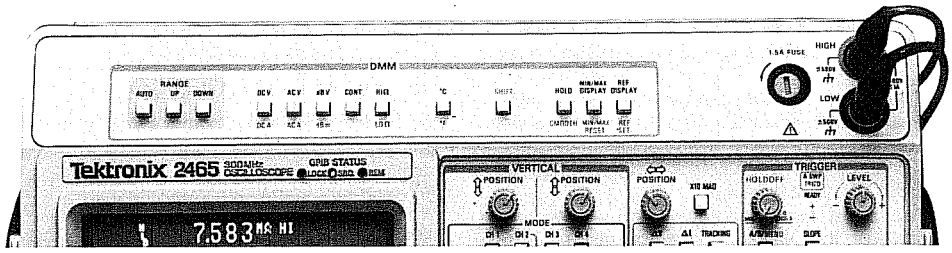
Standard Interface Functions Implemented — SH1, AH1, T6, L3, SR1, RL1, DC1, E1 DTØ CØ, PPØ.

Vertical Position Accuracy —

Channel 1 and Channel 2 (Noninverted): ±[0.3 div +3% of distance (in divisions) from center screen +0.5 mV divided by the Volt/Div setting]. Channel 2 Inverted: Add 0.2 div for −15°C to +55°C (excluding +15°C to +35°C) add 1.5 mV divided by the Volt/Div setting.

Channel 3 and Channel 4: ±[0.7 div +3% of distance (in div) from center screen].

Ordering Information — See page 267.



Option 01 Digital Multimeter

All of the High Performance Characteristics of Standard 2465/2445 Oscilloscopes Plus a 4½ Digit Autoranging Digital Multimeter

True RMS Ac Volts from 20 Hz to 100 kHz

True RMS Ac Current from 20 Hz to 10 kHz

10 μV Resolution on Dc Volts

Continuity Beeper

UL Listed, CSA Certified

Temperature Probe −62°C to +230°C

Calibration via Front Panel without Removing Instrument Covers

Convenience Features Include:
Set Reference, Hold, Smooth, Minimum/Maximum, dBV, and dBm

Option 01 (DMM) complements the measurement demands placed on the 2400 Series oscilloscopes. This 4½ digit DMM offers features not normally found on other DMMs in its class, such as: (1) Direct readout of dBV and dBm; (2) Continuity with audible tone; (3) Display of minimum or maximum values of readings that occurred since the last reset or function change; (4) Averaging blocks of accumulated measurement values to create a smoothing or filtering effect when desired; (5) Rugged, designed to meet or exceed the requirements of MIL-T-28800C, Class 3 environment, thus ensuring reliable operation under the same temperature and humidity extremes as the 2400 Series oscilloscopes; (6) UL listed and CSA certified.

CHARACTERISTICS

The set of characteristics is the same as specified for standard 2465/2445 oscilloscopes and includes the following additions:

All accuracy specifications are stated with an operating temperature range of +18°C to +28°C and a relative humidity of 95% or less.

DC VOLTAGE

Ranges — 200 mV, 2 V, 20 V, 200 V, 500 V.

Resolution — 10 μV (4½ digits).

Accuracy — ±(0.03% of reading +0.01% of full scale). For 500 V range ±(0.03% of reading + 0.04% of full scale).

Input Resistance — >100 GΩ on the 0.2 V and 2 V ranges, 10 MΩ on the higher ranges. Resistance can be changed to 10 MΩ on all ranges.

Normal-Mode Rejection Ratio — ≥60 dB at 50 Hz and 60 Hz.

Common-Mode Rejection Ratio — 100 dB at dc, >80 dB at 50 Hz and 60 Hz with 1 kΩ imbalance.

Maximum Input Voltage — 500 V RMS, 700 V peak between inputs and ground.

Response Time — <2 s in Auto, <1 s in Manual range.

AC RMS VOLTAGE

Ranges — 200 mV, 2 V, 20 V, 200 V, 500 V.

Resolution — 10 μV (4½ digits).

Accuracy — ±(% of reading +% of full scale).

Ranges	200 mV to 200 V	500 V
20 Hz to 40 Hz	±(0.7% +0.1%)	±(0.7% +0.2%)
40 Hz to 10 kHz	±(0.3% +0.1%)	±(0.3% +0.2%)
10 kHz to 20 kHz	±(0.7% +0.1%)	±(0.7% +0.2%)
20 kHz to 100 kHz	±(5% +0.1%)	±(5% +0.2%)

Crest Factor — ≤4 at full scale.

Common-Mode Rejection Ratio — ≥60 dB at 50 Hz and 60 Hz with 1 kΩ imbalance.

Response Time — <3 s in Auto, <2 s in Manual range.

Input Impedance — 1 MΩ in parallel with <100 pF.

Maximum Input Voltage — 500 V RMS, 700 V peak between inputs and ground, not to exceed 10^7 V-Hz product.

dBV, dBm — Calculated reading of ac voltage measurements. dBV is the display result equal to 20 Log (V_{UNK}/V_{REF}) where V_{REF} = 1 V. dBm is referenced 1 mW into 600 Ω

HI Ω RESISTANCE

Ranges — 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ 20 MΩ.

Accuracy — ±(0.1% of reading +0.01% of full scale) for 2 kΩ to 2 MΩ, ±(0.5% of reading +0.01% of full scale) for 20 MΩ. For Relative Humidity (RH) above 70%, add 2% of reading per 10% RH for the two highest resistance ranges.

Maximum Input Voltage — 500 V RMS 700 V peak.

Full Scale Voltage — 2 V.

Open Circuit Voltage — <6 V.

Resolution — 0.1 Ω (4½ digits).

Response Time — <2 s in Auto, <1 s in Manual range. <5 s in 20 MΩ range.

LO Ω RESISTANCE

Ranges — 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ.

Accuracy — ±(0.1% of reading +0.1% of full scale) for 200 Ω, ±(0.1% of reading +0.01% of full scale) for 2 kΩ to 200 kΩ, ±(0.25% of reading +0.01% of full scale) for 2 MΩ. For Relative Humidity (RH) above 70%, add 2% of Reading per 10% RH for the two highest resistance ranges.

Maximum Input Voltage — 500 V RMS, 700 V peak.

Full Scale Voltage — 0.2 V.

Open Circuit Voltage — <6 V.

Resolution — 0.01 Ω

Response Time — <2 s in Auto, <1 s in Manual range.

Continuity — An audible tone indicates <10 Ω. Reponse time is ≈0.1 s.

DC AMPS

Ranges — 100 μA, 1 mA, 10 mA, 100 mA, 1 A.

Accuracy — ±(0.1% of reading +0.02% of full scale).

Burden Voltage — <150 mV up to 100 mA increasing to <500 mV at 1 A.

Resolution — 10 nA.

Response Time — <2 s in Auto, <1 s in Manual range.

AC (RMS) AMPS

Ranges — 100 μA, 1 mA, 10 mA, 100 mA, 1 A.

Accuracy — ±(0.6% of reading +0.1% of full scale) from 20 Hz to 10 kHz.

Burden Voltage — <150 mV up to 100 mA increasing to <500 mV at 1 A.

Resolution — 10 nA.

Response Time — <3 s in Auto, <2 s in Manual range.

TEMPERATURE

Range — −62°C to +230°C, ±(2% of reading +1.5°C). Readout may be in °C or °F with a resolution of 0.1°.

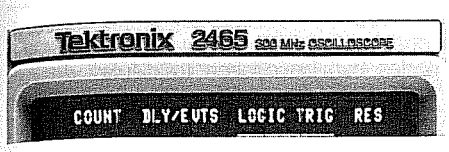
OTHER CHARACTERISTICS

Reading Rate — Three readings/s nominal except 1.5 readings/s on 20 MΩ range.

Temperature Coefficient — ≤0.1 x the accuracy specification/°C from −15°C to +18°C and from +28°C to +55°C.

GPIB Compatibility for Semiautomatic Measurement Systems — When combined with Option 10, the DMM (Option 01) oscilloscope combination is fully programmable. Complies with Tektronix *Standard Codes and Formats.*

Ordering Information — See page 267.



Option 09

Counter/Timer/Trigger (CTT) with Word Recognizer (WR)

All of the High Performance Characteristics of Standard 2465/2445 Oscilloscopes Plus Crystal-Controlled Time Base

0.001% Accuracy

Totalize up to 9,999,999 Events

Delay-By-Events Triggering up to a Total of 4,194,303 Events

Boolean Logic Triggering on Both Digital and Analog Signals

17-Bit Word Recognizer Probe

Adding Option 09 to the 2400 Series oscilloscopes provides crystal-controlled time base accuracy for several time related measurements. Its use is fully integrated with the operation of the oscilloscope and with user on-screen menus. Four new 2400 Series capabilities are provided by this option: (1) Precision time-interval measuring; (2) Event and frequency counting; (3) Delay-by-events triggering; (4) Boolean logic triggering.

A 17-Bit word recognizer probe is available for a variety of applications, such as triggering on a word occurrence, counting words, or delaying the B sweep by a number of words.

CHARACTERISTICS

The set of characteristics is the same as specified for standard 2465/2445 oscilloscopes and includes the following additions:

Sensitivity — Signal input requirements for Frequency, Period, Totalize, Delay-by-Events and Logic Trigger.

Input	Displayed Signal	Frequency Range
CH 1, CH 2	1.5 div	Dc (0.5 Hz for Frequency and Period) to 50 MHz
CH 3, CH 4	0.75 div	
CH 1, CH 2	4.0 div	50 MHz to ⩾150 MHz
CH 3, CH 4	2.0 div	

Source — A trigger or word recognizer for Frequency, Period, and Totalize.

FREQUENCY

Range — Autoranging over input frequency from 0.5 Hz to 150 MHz.

Resolution — $\pm\left[\text{LSD} + 1.4 \times \frac{\text{TJE}}{\text{N}} \times (\text{F})^2\right]$

Where: LSD = Least Significant Digit (0.1 ppm of full scale)
TJE = Trigger Jitter Error
N = Number of cycles of measured frequency during measurement interval (0.5 s or 1 period of the input signal, whichever is greater).

Display — Seven digits, updates twice per second or every two periods, whichever is slower.

Accuracy — Resolution ±0.001% of reading over entire temperature range of −15°C to +55°C.

PERIOD

Range — Autoranging over an input period from 6.666667 ns to 2 s.

Resolution — $\pm\left(\text{LSD} + 1.4 \times \frac{\text{TJE}}{\text{N}}\right)$

Where: LSD = Least Significant Digit (0.1 ppm of full scale)
TJE = Trigger Jitter Error
N = Number of cycles of measured frequency during measurement interval (0.5 s or 1 period of the input signal, whichever is greater).

Display — Seven digits, updates twice per second or every two periods, whichever is slower.

Accuracy — Resolution ±0.001% of reading over entire temperature range of −15°C to +55°C.

ACCURACY AND RESOLUTION DEFINITIONS

TJE (Trigger Jitter Error) =

$$\sqrt{\frac{(\text{en1})^2 + (\text{en2})^2}{\text{Input Slew Rate}}}$$

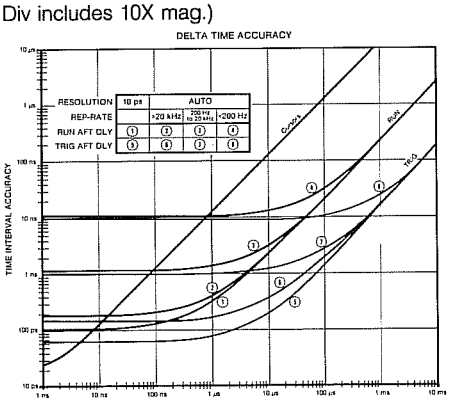
Where: en1 = RMS noise of vertical system in div on screen.
en2 = RMS noise voltage of input signal in divs.

Volts/Div	Trigger Coupling	
	en1 Dc and Noise Rej	en2 HF Reject
2 mV	0.15 div	0.05 div
5 mV to 5 V	0.1 div	0.05 div

ΔTIME, 1/ΔTIME

TRIG AFT DLY Accuracy — ±(LSD +0.01 x B Time/div + 0.001% x A Sec/div +0.001% of reading +50 ps). Measured with signals (visually superimposed) having minimum Trigger Jitter Error and with channel-to-channel delay mismatch nulled out. (B Time/div includes 10X mag.)

RUN AFT DLY Accuracy — ±(LSD +0.0008 x A Sec/Div +0.01 x B Time/Div + 83 ps). (B Time/Div includes 10X mag.)



Note: Input Signal is five vertical div with a 2 ns risetime.
Measured times are four horizontal div.
TJE is negligible for Slew Rates >0.1 div/ns.
ΔTime-TRIG AFT DLY assumes visual superposition.

Display Update Rate — Auto resolution, twice per second or every four sweeps, whichever is slower. Depends on trigger and sweep rates with selectable resolution.

PULSE WIDTH (ALT SLOPE)

When selected, displays the time interval defined by opposite slopes of a waveform using triggered delayed sweep.

Accuracy — Same as Δtime Triggered Mode.

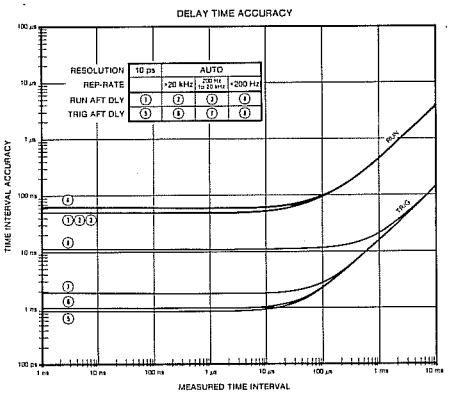
Minimum Pulse Width — ⩾1 ns.

Display Update Rate — Same as Δtime Mode.

DELAY TIME

TRIG AFT DLY Accuracy — ±(LSD +0.001% of reading +0.5 ns +A trigger slew error +B trigger slew error). Add 0.5 ns for dual channel measurements.
Where: Trigger slew error equals trigger level control readout accuracy ÷ trigger signal slew rate at the trigger point.
When measured using word recognizer on the B Trigger: Add 100 ns using external clock; add 200 ns without external clock.

RUN AFT DLY Accuracy — ±(LSD +0.0012 x A Sec/Div +0.03 x B Time/div +50 ns). (B Time/div includes 10X mag.)
If measured using word recognizer on the B Trigger: Add 100 ns using external clock; add 200 ns without external clock.



Note: Input Signal is five vertical div with a 2 ns risetime.
Measured times are four horizontal div.
TJE is negligible for Slew Rates >0.1 div/ns.
ΔTime-TRIG AFT DLY assumes visual superposition.

Display Update Rate — Auto, twice per second or once for each sweep, whichever is slower. Depends on trigger and sweep rate for selectable resolution.

LSD Table

A Sec/Div	Selected Resolution	LSD
10 ns to 1 s	AUTO	See Auto Resolution on next page
10 ns to 5 μs	10 ps 100 ps 1 ns	10 ps 100 ps 1 ns
10 μs to 50 μs	10 ps or 100 ps 1 ns	100 ps 1 ns
100 μs to 500 μs	10 ps to 1 ns	1 ns
1 ms to 5 ms	10 ps to 1 ns	10 ns
10 ms to 50 ms	10 ps to 1 ns	100 ns
100 ms to 500 ms	10 ps to 1 ns	1 μs
1 s	10 ps to 1 ns	10 μs

Auto Resolution

A Sec/Div	Trigger Repetition Rate	LSD
10 ns to 2 μs	>20 kHz	100 ps
10 ns to 2 μs	200 Hz to 20 kHz	1 ns
5 μs to 200 μs	>200 Hz	1 ns
10 ns to 200 μs	<200 Hz	10 ns
500 μs to 5 ms	Any	10 ns
10 ms to 50 ms	Any	100 ns
100 ms to 500 ms	Any	1 μs
1 s	Any	10 μs

Note: 2445 A Sec/Div settings range from 20 ns to 1 s. 2465 A Sec/Div settings range from 10 ns to 500 ms.

TOTALIZE

Maximum Count — To 9,999,999 events.

DELAY BY EVENTS

A or B Sweep — The A trigger or 17-bit word recognizer defines start events. The B trigger or 17-bit word recognizer defines delay events. Maximum delay count up to 4,194,303. Minimum time from start event to any delay event ≥4 ns. Minimum pulse width ≥3.3 ns. With A sweep in the delayed by events mode, the B sweep is delayable by time.

LOGIC TRIGGER

Combination Trigger — A sweep can be triggered from logical combinations of A and B triggers (A and B) or (A or B), or the word recognizer. B sweep can be triggered from the word recognizer. Minimum time to satisfy logic combinations ≥4 ns.

WORD RECOGNIZER

Input — P6407 Word Recognizer Probe (010-6407-01), 17 bits plus clock. (No CRT display from P6407.)

All Inputs	Threshold	Load	Safe Limit
Hi	<2.0 V	<20 μA	5.5 V
Lo	>0.6 V	>−0.6 mA	−0.5 V

Display Radix — Hexadecimal, octal, binary.

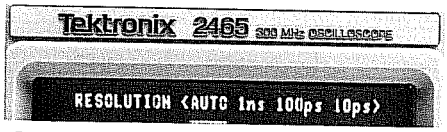
Data Rate — 0 MHz to ≥20 MHz with clock, 0 MHz to ≥10 MHz without clock.

Data Setup Time — 25 ns.

Data Hold Time — 0 ns.

GPIB Compatibility for Semiautomatic Measurement Systems — When combined with Option 10 the CTT/WR (Option 09) Oscilloscope combination is fully programmable. Complies with Tektronix *Standard Codes and Formats.*

Ordering Information — See page 267.

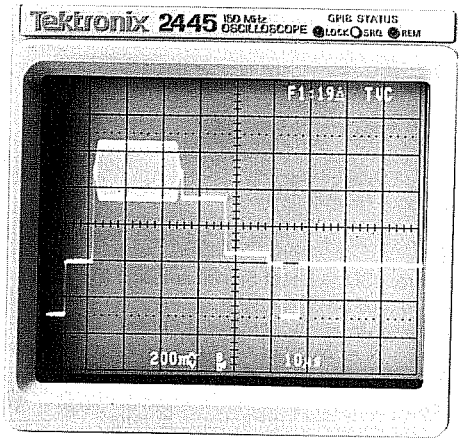


Option 06

Counter/Timer/Trigger (CTT)

The Counter/Timer/Trigger is available without the word recognizer probe as Option 06. Specifications and included accessories (except WR probe) are the same as Option 09. The word recognizer cannot, however, be added to Option 06 after delivery (field retrofit kits are not available).

Ordering Information — See page 267.



This sample waveform and CRT readout show a 2445's high-fidelity display of the Vertical Interval Reference Signal on Line 19, Field 1 with the television blanking-level clamp (TVC) engaged. The instrument used is also equipped with Option 10 (GPIB).

Option 05

TV Waveform Measurement System

All of the High Performance Characteristics of Standard 2465/2445 Oscilloscopes Plus Television Waveform Analysis Capabilities

Selectable System-M and Nonsystem-M Protocols

Selectable Triggering on any Line with a Field, with Line-Number Readout

Compatible with Composite Video having 13.1 kHz to 77 kHz Line Rates

TV Blanking-Level Clamp (Back-Porch)

Optimized Vertical Response Comparable to High Performance TV Waveform Monitors

Option 05 extends 2465/2445 oscilloscopes to versatile television waveform measurement systems. Enhanced features make these instruments especially useful for testing and troubleshooting any equipment that combines raster display with video signals. Scopes equipped with Option 05 have practical application in virtually every stage of the product life cycle—design engineering, production lines, calibration facilities, QA areas, and service/maintenance functions.

Back-porch clamp circuitry delivers a stable display of composite video, even when signals are characterized by changing average picture level and low frequency hum.

Direct CRT readout of the triggering line number is a feature unique to Tektronix 2465/2445 oscilloscopes with Option 05. By eliminating operator line counting, we removed the uncertainty that is inherent with less-advanced oscilloscope television options.

New circuitry optimizes triggering on television signals. Any of four trigger coupling modes can be chosen to display desired portions of the composite signal—Lines, Field 1, Field 2, Field 1 alternating with Field 2.

CHARACTERISTICS

The set of characteristics is the same as specified for standard 2465/2445 oscilloscopes and includes the following additions:

VERTICAL SYSTEM (CHANNEL 1 AND CHANNEL 2)

Frequency Response — For Volts/Div switch settings between 5 mV and 0.2 V with Var Volts/Div control in calibrated detent and using a 5-div, 50 kHz reference signal from a 50 Ω or 75 Ω system.

Range	Frequency Reponse	
	With Full BW	With BW Limiting
50 kHz to 5 MHz	±1%	+1%, −4%
>5 MHz to 10 MHz	+1%, −2%	*1
>10 MHz to 30 MHz	+2%, −3%	*1
>30 MHz	*1	*1

**1 Same as 2445/2465.*

Squarewave Flatness — 1% p-p for both 60 Hz and 15 kHz squarewaves, from a 50 Ω or 75 Ω system using a 1.0 V input with a 50 mV/div setting and using a 0.1 V input at 20 mV/div setting. 1.5% p-p using a 0.1 V input with 5 mV/div and 10 mV/div settings. Setup with 1 MΩ dc input coupling, external 50 Ω termination, Var Volts/Div control in calibrated detent, and fast-rise input signal (risetime ≤1 ns). Exclude first 50 ns following step transition. For signals with risetimes ≤10 ns, add 2% p-p between 155 ns and 165 ns after step transition.

Television Blanking-Level Clamp (Back-Porch) 60 Hz Rejection (Channel 2 Only) — ≥18 dB at 60 Hz; with calibrated Volts/Div settings between 5 mV and 0.2 V, and a 6-div reference signal.

Television Blanking-Level Clamp (Back-Porch) Reference — Within 1.0 div of ground reference.

TRIGGERING

Sync Separation — Stable sync separation from sync-positive or sync-negative composite video on systems with 525 to 1280 lines/frame, 50 Hz or 60 Hz field rate, interlaced or noninterlaced scan.

Trigger Modes — LINES, FLD 1, FLD 2, and ALT (FLD 1-FLD 2) coupling.

Input Signal Amplitude for Stable Triggering Channel 1 and Channel 2 — 1.0 div for composite video and 0.3 div for composite sync signals (dc + peak video-signal amplitude must be within 18 div of input ground reference).

Channel 3 and Channel 4 — 0.5 div for composite video and 0.25 div for composite sync signals (dc peak video-signal amplitude must be within 9 div of input ground reference).

GPIB Compatibility for Semiautomatic Measurement Systems — When combined with Option 10, the TV Waveform Measurement Systems (Option 05)/oscilloscope combination is fully programmable. Complies with Tektronix *Standard Codes and Formats.*

ORDERING INFORMATION

2465 300 MHz Oscilloscope **$5,350**
Includes: Two P6131 10X 1.3 m probes with accessories (010-6131-01); 2 A, 250 V fuse (159-0021-00); zip lock accessory pouch (016-0537-00); blue plastic CRT filter (378-0199-03); clear plastic CRT filter; snap accessory pouch (016-0692-00); front cover; power cord (161-0104-00); operator manual (070-3832-00); reference guide (070-4180-00).

2445 150 MHz Oscilloscope **$3,590**
Includes: Same as 2465, except two P6133 10X 2 m probes (P6133) and operator manual (070-3830-00).

2465DVS 300 MHz Oscilloscope **$9,200**
Includes: Same as 2465, plus DMM (Option 01), TV (Option 05), CCT/WR (Option 09), GPIB (Option 10), and two additional P6131 probes (Option 22). Provides most cost-effective combination of these options.

2465DMS 300 MHz Oscilloscope **$8,400**
Includes: Same as 2465, plus DMM (Option 01), CCT/WR (Option 09), GPIB (Option 10), and two additional P6131 probes (Option 22). Provides most cost-effective combination of these options.

2465CTS 300 MHz Oscilloscope **$7,150**
Includes: Same as 2465, plus CCT/WR (Option 09), GPIB (Option 10), and two additional P6131 probes (Option 22). Provides most cost-effective combination of these options.

INSTRUMENT OPTIONS

Option 01*3 — Digital Multimeter. **+$1,500**
Includes: Same as 2465 or 2445 instruments, plus probe set (012-0941-00); temperature probe (010-6602-00); probe set accessories (020-0087-00); DMM operator manual (070-4183-00); reference guide (070-5365-00).

Option 05 — TV Waveform Measurement System. **+$1,050**
Includes: Same as 2465 or 2445 instruments plus CCIR graticule CRT filter (378-0199-01); NTSC graticule CRT filter (378-0199-02); polarized collapsible viewing hood (016-0180-00); operator manual (070-4629-00); reference guide (070-5382-00).

Option 06 — Counter/Timer Trigger **+$1,000**
Includes: Same as 2465 or 2445 instruments, plus 20 grabber tips (206-0222-00); two 10 inch 10 wide comb (012-0747-00); operator manual (070-4631-00); reference card (070-5382-00).

Option 09*1*2 — CTT/Word Recognizer **+$1,400**
Includes: Same as 2465 or 2445 instruments, plus a word recognizer probe (010-6407-01); 20 grabber tips (206-0222-00); two 10 inch 10 wide comb (012-0747-00); operator manual (070-4631-00); reference card (070-5366-00).

Option 10 — GPIB Interface **+$900**
Includes: Same as 2465 or 2445 instruments, plus operator manual (070-4633-00); reference guide (070-5364-00).

MULTIPLE OPTION ALLOWANCE (MOA)

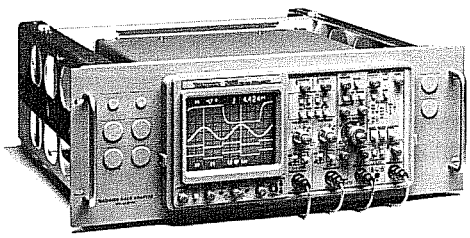
When a 2465 or 2445 is ordered with more than two of the above options, a special price allowance is applied. This allowance is not applicable to the 2465DVS, 2465DMS, or the 2465CTS specially priced edition.

Option 2A — MOA for combining two of the above options. **−$250**

Option 3A — MOA for combining three of the above options. **−$500**

Option 4A — MOA for combining four of the above options. **−$750**

OTHER INSTRUMENT OPTIONS



Rackmount 2465 Option 1R comes complete with slide-out chassis tracks.

Option 1R*3 — Configure Oscilloscope for Rackmount **+$320**
Includes: Same as 2465 or 2445 instrument (except pouch) plus rackmount hardware and slide-out assemblies.

Option 11*1 — Rear Panel Probe Power. **+$165**

Option 22 — Two additional P6131 Probes. **+$250**

**1 Option 11 may not be ordered with Option 09 or the 2445.*

**2 Option 09 includes Option 06.*

**3 Option 1R may not be ordered with Option 01. For rackmounting Option 01, 2465DVS, and 2465DMS contact your Tektronix sales office.*

NOTE: Options 01, 05, 06, 09, and 10 are not retrofitable with field upgrade kits.

INTERNATIONAL POWER PLUG OPTIONS

Option A1 — Universal Euro 220 V/16 A, 50 Hz.
Option A2 — UK 240 V13 A, 50 Hz.
Option A3 — Australian 240 V/10 A, 50 Hz.
Option A4 — North American 240 V/15 A, 60 Hz.
Option A5 — Switzerland 220 V/10 A, 50 Hz.

WARRANTY-PLUS SERVICE PLANS— SEE PAGE 458

M1 — (2465 and Special Editions) 2 Calibrations. **+$265**

M1 — (2445) 2 Calibrations. **+$255**

M2 — (2465 and Special Editions) 2 Years Service. **+$270**

M2 — (2445) 2 Years Service. **+$215**

M3 — (2465 and Special Editions) 2 Years Service and 4 Calibrations. **+$695**

M3 — (2445) 2 Years Service and 4 Calibrations. **+$645**

M4 — (2465 and Special Editions) 5 Calibrations. **+$670**

M4 — (2445) 5 Calibrations. **+$660**

M5 — (2465 and Special Editions) 9 Calibrations + 2 Years Service. **+$1,350**

M5 — (2445) 9 Calibrations + 2 Years Service. **+$1,295**

OPTIONAL ACCESSORIES

Rackmounting Coversion Kit — Not compatible with Option 01. Order 016-0691-01 **$350**

Probe Power Extender Cable for Rackmount 2445/2465 Option 11 — Order 020-0104-00 **$410**

Word Recognizer Extender Cable for Rackmount 2445/2465 Option 09 and 2465CTS — Order 020-0103-00. **$32**

GPIB Cable— Double shield, low EMC.
(1m) Order 012-0991-01 **$135**
(2m) Order 012-0991-00 **$150**

Viewing Hood —
(Polarized Collapsible) Order 016-0180-00 **$40**
(Folding Light Shield) Order 016-0592-00 **$13**
(Folding Binocular) Order 016-0566-00 **$18.50**

Protective Waterproof Blue Vinyl Cover — Order 016-0720-00 **$22**

Carrying Case — Order 016-0792-01 **$340**

Carrying Strap - Order 346-0199-00 **$17**

Dc Power — Order 1107 Dc Inverter. For more information see page 281. **$475**

RECOMMENDED PROBES

P6131 Probe Package — For use with CH 3 or CH 4. Order 010-6131-01 **$140**

P6230 — 10X Bias/Offset Probe. Order 010-6230-01 **$395**

P6133 Probe Package*1 — For use with 2445.

Current Probes — A6302, A6303, P6021, P6022. See pages 443 and 444 respectively.

P6202A — 10X FET Probe. Order 010-6202-03 **$680**

P6602 — Temperature Probe. Order 010-6602-00. **$225**

A6902B Isolator*1 — For floating measurements; see page 437 for complete description.

A6901 Gound Isolator Monitor — See page 438 for complete description. Order A6901 **$650**

**1 To order, contact your local Tektronix Sales Office.*

RECOMMENDED CAMERAS

C-30BP Option 01 — General Purpose. See page 412. **$1,524**

C-5C Option 02 — Low Cost. See page 416. **$465**

RECOMMENDED CARTS

K212 Portable Instrument Cart — For on-site mobility. See page 423. **$330**

K117 Instrument Shuttle — For site-to-site mobility. See page 423. **$265**

SERVICE MANUALS

2445 — Order 070-3829-00 **$20**

2465 — Order 070-3831-00 **$20**

Option 01 — Order 070-4182-00 **$10**

Option 05 — Order 070-4630-00 **$10**

Option 06/09 — Order 070-4640-00 **$15**

SOFTWARE

EZ-TEK 2400 Test Program Generator — for 4041 and 2465 Special Editions or a 2445/2465 configured with Option 10. EZ-Tek 2400 is a versatile software development tool which allows nonprogrammers to easily develop automatic or semiautomatic computer-controlled test procedures. Order S49F101 **$400**

Additional accessories begin on page 403.

SYSTEMS

The 2465 Special Editions are also available configured into an automatic or semiautomatic measurements system MP 2903. This system is a combination of one of the Tektronix Special Editions (2465DVS, 2465DMS, or 2465CTS), 4041 Controller, a 4105A Terminal, EZ Test, and Test Program Generator. Together these can provide automatic or semiautomatic parametric results.