

TAS 465

TAS 475

TAS 485

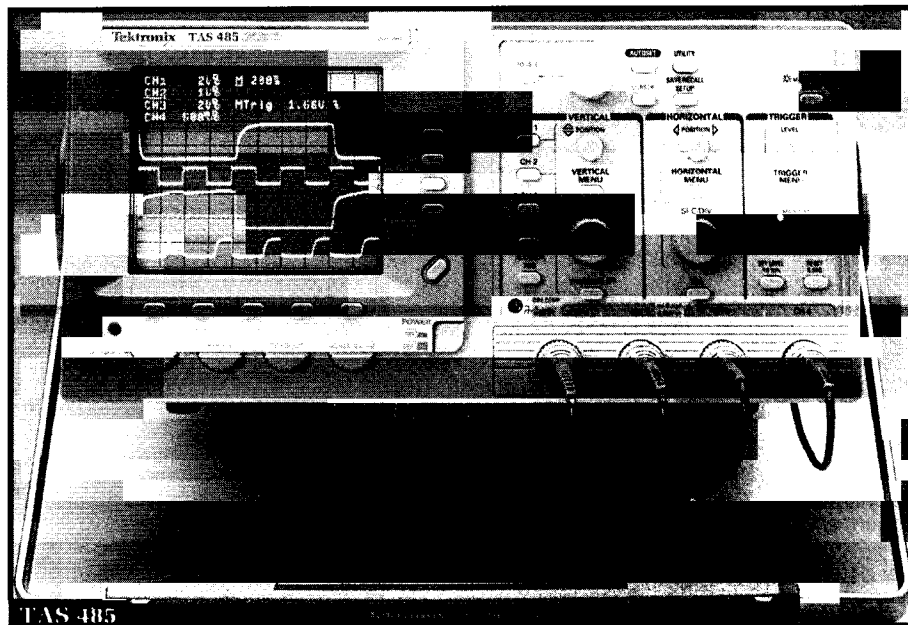
New level of power and reliability to general purpose scopes.

TAS 400 SERIES

- Bandwidths of 100 MHz to 200 MHz
- Two or Four True Input Channels
- Auto Setup
- Store/Recall of Four Setups
- Video Triggering
- Dual Time Base
- Measurement Cursors
- Trigger Level Indicator
- Ground Reference Indicator
- Highly Integrated Design
- Three Year Free Replacement Warranty

Analog Oscilloscopes

100 MHz to 200 MHz

**TAS 400 Series**

By incorporating features from higher-end scopes, the low-cost Tektronix TAS 400 Series of scopes brings an advanced level of power and reliability to general purpose scopes. This family of instruments offers 2 or 4 input channels and 100 MHz to 200 MHz bandwidths.

STREAMLINED INTERFACE

Modeled after the brilliant TDS Series interface, the TAS interface simplifies scope operation without limiting the instrument's capabilities.

Important and frequently used functions, such as horizontal and vertical position, are controlled directly with buttons and knobs. Secondary functions are menu driven, eliminating the profusion of buttons found on most low-cost analog scopes.

For instance, to trigger on most signals, you simply press the SET LEVEL TO 50% button and the scope will set the trigger level to the midpoint of the signal. Because a trigger signal's level often changes, these scopes have Auto Level to retain the triggered signal. Adjusting the trigger level control indicates the trigger point on the screen.

ADVANCED FEATURES

The TAS 400 Series brings leading-edge innovation to low-cost analog scopes with a comprehensive set of features.

Auto Setup instantly delivers meaningful waveforms. Pressing the AUTOSSET button automatically adjusts the horizontal, vertical, and triggering controls to display a stable signal.

Indispensable when trying to trigger and display unknown waveforms, Auto Setup also helps inexperienced users display useful waveforms quickly.

Cursors with readouts in the display greatly ease the task of measuring waveforms. Complete with menus, the cursors can measure frequency, delta time, delta volts, and absolute volts from the ground reference.

Save/Recall Setup stores up to four front-panel setups. With this feature you can save complex setups and recall them within seconds.

Comprehensive Video Triggering simplifies triggering on complex video waveforms. With line or field (odd, even, or both) composite video selections and positive or negative sync, you can cleanly trigger on any NTSC, PAL, or SECAM video signal. And the scopes' dual time bases let you zoom in on any portion of a waveform for closer examination.

The TAS 400 Series' Rugged Probes are the result of years of design innovation and customer feedback. These passive probes have a slim, pen-like design with a patented, one-piece, resilient rubber body.

Still comfortable to handle, the probes' sturdy construction protects their internal circuitry. The TAS 400 Series' probes can withstand extreme mechanical abuse while maintaining their superior measurement capability.

Product available through an Authorized Tektronix Distributor (listed on pages 570-571) or through TekDirect. Call 1-800-426-2200

Analog Oscilloscopes

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PERFORMANCE AND RELIABILITY WITH REDUCED MAINTENANCE

A sophisticated hybrid circuit houses the entire acquisition system, including the vertical, horizontal, and trigger functions. Virtually a scope-on-a-chip, the hybrid gives TAS scopes more than three times the reliability of previous models. The hybrid, which is manufactured in-house at Tektronix, easily meets its specs over thousands of hours of use.

Another advantage of reduced circuitry with few connectors is a 50% improvement in mean-time-to-calibration. When calibration is necessary, there are fewer than fourteen manual adjustments.

THREE-YEAR FREE REPLACEMENT WARRANTY

These new designs are so reliable that if any TAS scope fails within the three year warranty period, Tektronix will replace it at no charge. While the TAS 400 Series was developed for the service, education, and electronic design fields, these are scopes that even a cost accountant can love.

Characteristics

Except as noted, the following specifications are common to the TAS 400 Series.

Bandwidth – 100 MHz (TAS 465), 100 MHz (TAS 475), 200 MHz (TAS 485)

Rise Time – ≤ 3.5 ns (TAS 465), ≤ 3.5 ns (TAS 475), ≤ 1.8 ns (TAS 485).

VERTICAL SYSTEM

Deflection Factor – 2 mV/div to 5 V/div, continuously variable between V/div settings.

Deflection Factor DC Accuracy – $\pm 2.5\%$.

Bandwidth Limit – 20 MHz, independent channel control.

Input Coupling – AC, DC, GND.

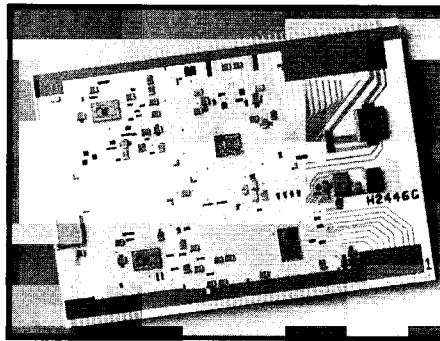
Max Input Voltage – ± 400 V (DC + peak AC); derate at 20 dB/decade from 100 KHz to 13 V at 3 MHz.

Input R and C – 1 M Ω $\pm 1\%$ in parallel with 20 pF ± 2.0 pF.

Channel Isolation – ≥ 50 dB at 10 MHz, ≥ 35 dB at 100 MHz. For 485: ≥ 32 dB at 200 MHz.

Vertical Control (2 CH, 465) – CH1; CH2; ADD CH1+CH2; INVERT either CH1 and/or CH2; ALTERNATE or CHOP between CH1 and CH2 for multiple channel displays.

Vertical Control (4 CH, 475/485) – CH1; CH2; CH3; CH4; ADD CH1+CH2; ADD CH3+CH4; INVERT any/all channels; ALTERNATE or CHOP between all channels.



On the hybrid, two LSI bipolar ICs and two CMOS ICs house all of the vertical, horizontal, and trigger functions.

AC-Coupled Lower -3 dB Point – ≤ 10 Hz with a 1X probe. The AC-coupled lower frequency limits are reduced by a factor of 10 when 10X passive probes are used.

Common Mode Rejection Ratio – $\geq 10:1$ at 50 MHz.

HORIZONTAL SYSTEM

Main Sweep Time Base Range – 0.5 s/div to 20 ns/div (to 2 ns/div with X10 magnification). For 485: to 10 ns/div (to 1 ns/div with X10 magnification).

Delayed Sweep Time Base Range – 5 ms/div to 20 ns/div (to 2 ns/div with X10 magnification). For 485: to 10 ns/div (to 1 ns/div with X10 magnification).

Time Base Accuracy – $\pm 2\%$, $\pm 3\%$ magnified.

Delay Jitter – 25,000 to 1 for sweep speeds slower than 1 ms/div. 10,000 to 1 for all other sweep speeds.

TRIGGERING

Main Mode Selections – AUTO LEVEL (with auto baseline), AUTO, NORMAL, TV LINE, TV FIELD (odd, even, or both), SGL SEQ.

Delayed Mode Selections – RUNS AFTER DELAY, TRIGGERABLE AFTER DELAY, and TV LINE (from MAIN source).

Trigger Coupling – DC, Noise Reject, HF Reject, LF Reject, and AC for both Main and Delayed.

Lowest Frequency for Successful Operation of "Set Level to 50%" Function – 50 Hz with 1 division internal, 100 mV EXT or 1 V EXT/10 SOURCE.

Trigger Source (465) – CH1, CH2, EXT, LINE, ADD, EXT/10.

Trigger Source (475/485) – CH1, CH2, CH3, CH4, LINE, ADD CH1 + CH2, ADD CH3 + CH4.

Holdoff Control Range – Increases Main sweep holdoff time by a factor of at least 10.

External Trigger Input (465) – 1 M Ω $\pm 2\%$ in parallel with 20 pF ± 2.0 pF.

Maximum Input Voltage – ± 400 V (DC + peak AC); derate at 20 dB/decade from 100 KHz to 13 V at 3 MHz.

TRIGGER SENSITIVITY

DC – 0.3 division from DC to 25 MHz, increasing linearly to 1 div. at 150 MHz (465/475), 1.5 div at 250 MHz (485).

Noise Reject – 1.2 division from DC to 25 MHz, increasing linearly to 2.2 div. at 150 MHz (465/475), 3.5 div at 250 MHz (485); 0.5 div or less will not trigger.

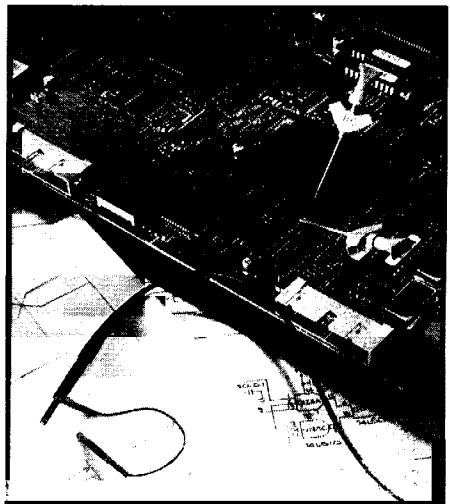
HF REJ – 0.3 division from DC to 10 kHz; attenuates signals above the upper -3 dB cutoff frequency of 50 kHz.

LF REJ – 0.3 division from 100 kHz to 25 MHz, increasing linearly to 1 div at 100 MHz (455), at 150 MHz (465/475), 1.5 div at 250 MHz (485); attenuates signals below the lower -3 dB cutoff frequency of 50 kHz.

AC – 0.3 division from 350 Hz to 25 MHz, increasing linearly to 1 div. at 150 MHz (465/475), 1.5 div at 250 MHz (485); attenuates signals below the lower -3 dB cutoff frequency of 160 Hz.

• ACCESSORY •

Direct access to SMD Packages



P6561AS

- SMD Package Support: 50 MIL, 25 MIL JEDEC, 0.65 mm and 0.5 mm EIAJ.
- DC to 200 MHz Bandwidth.
- < 11 pF/10 M Ω Loading.
- 10X Attenuation.

For complete information on all Accessory products see page 424.

TAS 465**TAS 475****TAS 485****X-Y OPERATION****Sensitivity Range** – Same as Vertical Deflection System.**X-Y Accuracy** – $\pm 4\%$.**X-Axis Bandwidth** – DC to ≥ 3 MHz.**Phase Difference Between X and Y** – $\pm 3^\circ$ DC to 150 kHz.**CRT SYSTEM****Display** – 8 cm x 10 cm, 14 kV nominal voltage.**Z-Axis Input** – Positive voltage decreases intensity; +2 V blanks maximum intensity trace usable to 20 MHz.**Controls** – Sweep Intensity, Focus, Readout Intensity, Scale Illumination, Trace Rotation.**PROBE COMPENSATOR OUTPUT****Output Voltage** – 0-5 V $\pm 10\%$ into 1 M Ω load.**Frequency** – 1 kHz $\pm 5\%$.**Typical Rise Time** – ≤ 500 ns.**Typical Aberrations** – $\leq \pm 1\%$ after the first 10 μ s following the square wave transition.**NONVOLATILE SETUP MEMORY****Number of Nonvolatile Setup Memories** – 4.**Retention Time** – Typically 10 years.

Analog Oscilloscopes

100 MHz to 200 MHz

PHYSICAL CHARACTERISTICS

Dimensions	TAS 400 Series		Rackmount	
	mm	in.	mm	in.
Width w/ handle	362	14.3	483	19
Height w/ feet, pouch	191	7.5		
w/o pouch	165	6.5	178	7
Depth (stand alone)	471	18.6	471	18.6
w/ front cover	490	19.3		
handle extended	564	22.2	517	20.4
Weight	kg	lb.	kg	lb.
Stand alone	7.7	17	*1	
Net w/ accessories and pouch	9.3	20.5	4.5	10*1
Domestic Shipping	13.6	30	15.4	33.9

*1 Weight of conversion kit only. The rear support kit adds 7.3 kg/16 lb.

Cursors**Cursor Functions** – Δ Time, $1/\Delta$ Time, Absolute Volts, Δ Volts.**Accuracy** – Δ Time: $\pm 2\%$, $\pm 3\%$ magnified of reading plus 0.1 Div; $1/\Delta$ Time: Readouts calculated using; Δ Time.Absolute Volts: -10°C to $+30^\circ\text{C}$ is \pm (1% of reading + 2% of one vertical division + HF display errors + 0.5 mV + trace shift errors); $+30^\circ\text{C}$ to $+55^\circ\text{C}$ is \pm (1% of reading + 2% of one vertical division + HF display errors + 4 mV + trace shift errors). Δ Volts: \pm (1.6% of reading + 2% of one vertical division + HF display errors).**POWER REQUIREMENTS****Line Voltage Ranges** – 115 V: 90-132 VAC RMS. 230 V: 180-250 VAC RMS.**Line Frequency** – 48 to 440 Hz.**Maximum Power Consumption** – ≤ 85 W.**MECHANICAL CHARACTERISTICS****Cooling Method** – Forced-air circulation with no air filter.**ENVIRONMENTAL AND SAFETY**

The TAS Series scopes are designed to meet specific environmental conditions, as described in MIL-T-28800E for Type III, Class 3, Style D equipment, as specified below. Other environmental characteristics are available.

Temperature – -10°C to $+55^\circ\text{C}$ (operating); -51°C to $+71^\circ\text{C}$ (nonoperating).**Humidity** – Operating and nonoperating, up to 95% RH at or below $+40^\circ\text{C}$; up to 75% RH from 41°C to 55°C .**Altitude** – 15,000 ft/4572 m (operating); 40,000 ft/12192 m (nonoperating).**Random Vibration** – 0.31 g's RMS (operating); 2.46 g's RMS (nonoperating), from 5 to 500 Hz, 10 minutes each axis.**Electrostatic Discharge Susceptibility** –

Up to 8 kV with no change to control settings or impairment of normal operation; up to 15 kV with no damage that prevents recovery of normal operation by the user.

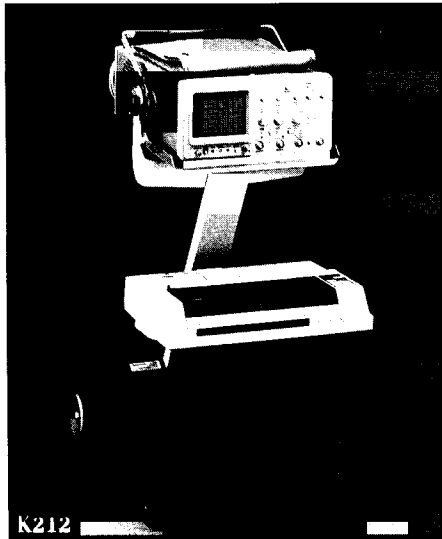
Safety – UL 1244 Listed, Certified to CAN/CSA 22.2 No. 231 – M89.**Emissions** – VFG 243, Category B; FCC Code, Part 15, Subpart B, Class A.

Analog Oscilloscopes

100 MHz to 200 MHz

TAS 465
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ANALOG OSCILLOSCOPES



• ACCESSORY •

K212 Portable Instrument Cart

- Sturdy, mobile platform with two nylon safety straps.
- Tilttable top tray.
- Large wheel base for stability.
- Four outlet power strip; circuit breaker optional.

For complete information on all Accessory products see page 424.

ORDERING INFORMATION

TAS 465
100 MHz Two Channel Oscilloscope **ID \$1,995**
Includes: Instruction Manual (070-8523-00); Basics Concept, XYZs of Analog and Digital Oscilloscopes (070-8690-00); Reference Guide (070-8522-00); Two 10X Voltage Probes (P6109B).

TAS 475
100 MHz Four Channel Oscilloscope **ID \$2,395**
Includes: Instruction Manual (070-8688-00); Basics Concept, XYZs of Analog and Digital Oscilloscopes (070-8690-00); Reference Guide (070-88720-00); Two 10X Voltage Probes (P6109B).

TAS 485
200 MHz Four Channel Oscilloscope **ID \$3,595**
Includes: Instruction Manual (070-8688-00); Basics Concept, XYZs of Analog and Digital Oscilloscopes (070-8690-00); Reference Guide (070-88720-00); Two 10X Voltage Probes (P6111B).

TAS 400 SERIES OPTIONS

- Opt. 02** – Pouch and Front Cover **ID +\$60**
- Opt. 3R** – Rackmount Kit **ID +\$400**
- Opt. 22** – Two each P6109B Probes (TAS 475) **+\$160**
- Opt. 22** – Two each P6111B Probes (TAS 485) **+\$260**
- Opt. 23** – Two each P6129B Probes (TAS 465/475) **+\$200**
- Opt. 9C** – Calibration Certification/Test Data **+\$125**
- Opt. M2** – Standard 3-year product warranty plus 2 additional years of repair services for a total of 5 years coverage.
TAS 465 **+\$150**
TAS 475 **+\$160**
TAS 485 **+\$210**
- Opt. M3** – Standard 3-year product warranty plus 4 years of calibration service and 2 years of repair services for a total of 5 years coverage.
TAS 465 **+\$285**
TAS 475 **+\$300**
TAS 485 **+\$400**
- Opt. M8** – Calibration Service
TAS 465 **+\$150**
TAS 475 **+\$160**
TAS 485 **+\$210**

INTERNATIONAL POWER PLUG OPTIONS

- Opt. A1** – Universal Euro 220 V, 50 Hz. Order 00-000-00 **NC**
- Opt. A2** – United Kingdom 240 V, 50 Hz. Order 00-000-00 **NC**
- Opt. A3** – Australia 240 V, 50 Hz. Order 00-000-00 **NC**
- Opt. A4** – North America 240 V, 60 Hz. Order 00-000-00 **NC**
- Opt. A5** – Switzerland 220 V, 50 Hz. Order 00-000-00 **NC**

RECOMMENDED ACCESSORIES

See page 424 for complete selection information.

- Cart** – K212 **ID \$395**
- Camera** – C-9 Opt. 06 **ID \$630**
- Transit Case** – Order 016-0792-01 **\$455**
- Rackmount Kit** – Order 016-1166-00 **\$400**
- Accessory Pouch** – Order 016-1159-00 **\$50**
- Front Cover** – Order 200-3232-01 **\$10**

PROBES

- SMD**
P6561AS – 10X, 200 MHz probe set for ICs on 25 and 50 mil pitch Surface Mount Technology **\$350**
- Differential** –
P6046 – 100 MHz, active differential, 6 ft. **ID \$2,295**
- High Voltage** –
P6009 – 100X, 120 MHz, 1500 V, 2.5 pF/10 M Ω , 9 ft. **ID \$270**
P6015A – 1000X, 75 MHz, 20 kV, 3.0 pF/100 M Ω , 10 ft. **ID \$950**
- General Purpose** –
P6111B – 10X, 200 MHz, 14.1 pF/10 M Ω , 2 m. **ID \$130**
P6109B – 10X, 100 MHz, 13.2 pF/10 M Ω , 2 m. **ID \$80**
P6129B – 1X-10X Switchable; 1X: 8 MHz, 124 pF/1 M Ω , 2 m.; 10X: 100 MHz, 16 pF/10 M Ω , 2 m. **\$100**
P6101B – 1X, 15 MHz **ID \$65**
- Logic** –
P6408 – 20 MHz, 17-Bit, Word Recognizer/Logic Trigger.... **ID \$500**
- Current** –
P6022 – 935 Hz to 120 MHz, 6 A Peak **ID \$595**
P6021 – 120 Hz to 60 MHz, 15 A Peak **ID \$550**
AM503S – DC to 50 MHz System, includes AM503A, and A6302 Current Probe **\$2,745**
- Time Voltage Conversion** –
TVC501 – Time-Interval to Voltage Converter **\$2,495**

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