

**TDS 420**  
**TDS 460**

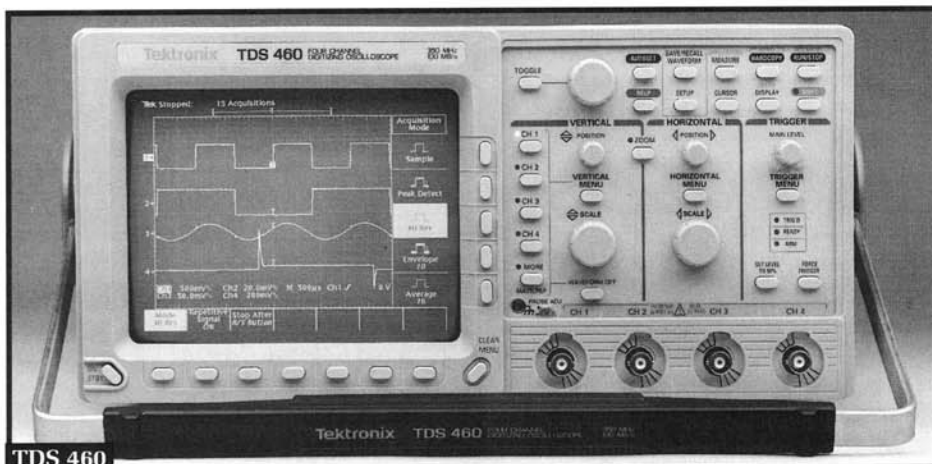
# Digitizing Oscilloscopes

DIGITIZING OSCILLOSCOPES

*Ideal for digital,  
analog and video  
circuit design;  
electro-  
mechanical  
research;  
electronic product  
service and  
manufacturing  
test.*

## TDS 420/TDS 460

- 150 and 350 MHz Bandwidths
- 100 MS/s Sampling Rate on 4 Channels
- 1 mV/div to 10 V/div Sensitivity
- 10 ns Peak Detect Mode for High Speed Glitch Capture
- 8 Bit Vertical Resolution
- Hi-Res Mode for up to 15 Bits of Vertical Resolution
- Infinite and Variable Persistence Displays
- 1.5% Vertical Accuracy
- 22 Automatic Measurements



## SIGNAL ACQUISITION SYSTEM

**Bandwidth** – 150 MHz (TDS 420), 350 MHz (TDS 460).

**Channels** – 4.

**Digitizers** – 4.

**Sample Rate** – 100 MS/sec on all channels.

**Sensitivity** – 1 mV to 10 V/div (with calibrated fine adjust).

**Position Range** –  $\pm 5$  Divisions.

**Offset Range** –  $\pm 1$  V from 1 to 99.5 mV/div;  $\pm 10$  V from 100 mV to 995 mV/div;  $\pm 100$  V from 1 to 10 V/div.

**DC Gain Accuracy** –  $\pm 1.5\%$ .

**Vertical Resolution** – 8 bits (256 levels over 10.24 vertical divisions).

**Analog Bandwidth Selections** – 20 MHz, 100 MHz, and full.

**Input Coupling** – AC, DC or GND.

**Input Impedance Selections** – 1 M $\Omega$  in parallel with 15 pF, or 50  $\Omega$  (AC and DC coupling).

**Maximum Input Voltage** –  $\pm 400$  V (DC + peak AC). Derate at 20 dB/decade above 1 MHz. 1M $\Omega$  or GND coupled.

**Channel Isolation** –  $>100:1$  at 100 MHz for any two channels.

**AC Coupled Low Frequency Limit** –  $\leq 10$  Hz when AC 1 M $\Omega$  coupled.  $\leq 200$  kHz when AC 50  $\Omega$  coupled.

## ACQUISITION MODES

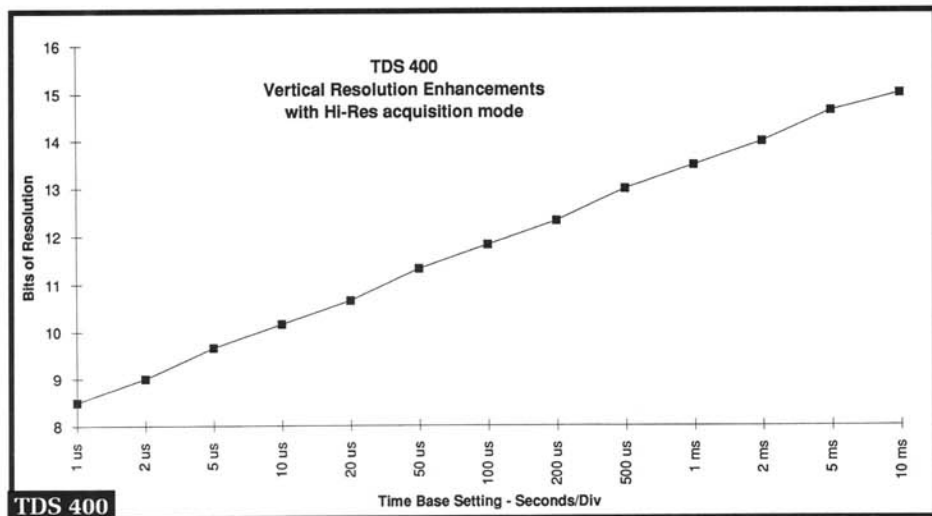
**Peak Detect** – High frequency and random glitch capture. Captures glitches of 10 ns using acquisition hardware at all real-time sampling rates.

**Sample** – Sample data only.

**Envelope** – Max/min values acquired over one or more acquisitions, selectable from 2 to 2000, infinite.

**Average** – Waveform averages selectable from 2 to 10000.

**Hi-Res** – Vertical resolution improvement and noise reduction on low-frequency signals, e.g. 15 bits at 10 ms/div and slower.



**TD**  
Product also available within 24 hours through TekDirect. Call 1-800-426-2200

To order, contact your local sales office (listed on the inside back cover) or call the National Marketing Center at 1-800-426-2200, Ext. 99.

**GPIB IEEE-488**  
The TDS Series complies with IEEE Standard 488.2-1987, and with Tektronix Standard Codes and Formats.

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**TDS 420**  
**TDS 460**

DIGITIZING OSCILLOSCOPES



**TDS 420**

## TIME BASE SYSTEM

**Time Bases** – Main, Delayed.

**Time/Division Range** – 1 ns to 20 s/div.

**Time Base Accuracy** – 0.005% over any interval  $\geq 1$  ms.

**Record Length** (real time and equivalent time) – Sample points per channel: 500 to 5,000. Opt. 1M offers 30,000 points.

**Pre-Trigger Position** – Selectable from 0 to 100% of record.

## TRIGGERING SYSTEM

**Triggers** – Main, Delayed.

**Main Trigger Modes** – Auto, Normal.

**Delayed Trigger** – Delayed by time or events.

**Time Delay Range** – 0 ns to 20 s.

**Events Delay Range** – 2 to 10,000,000 events.

**External Rear Input** –  $> 1.5$  k $\Omega$ ; Max input voltage is  $\pm 6$  V (DC + AC peak).

**Video Trigger Types** – NTSC, PAL, SECAM, and Custom; TV Field, field 2 or both, Any line within a field. Line Rates–10 kHz to 64 kHz, interlaced, non-interlaced, composite.

**Video Trigger Sensitivity** – 0.5 divisions of composite synch will achieve a stable display.

## DISPLAY

**Waveform Style** – Dots or vectors. Infinite and variable persistence from 250 ms to 10 s.

**Gray Scaling** – With variable persistence selected, waveform points gradually decay through 16 levels of intensity, providing “z-axis” information about rapidly changing waveforms.

**Update Rate** – 200 ea 500 point waveforms per sec with infinite persistence mode selected.

**Graticules** – Full, grid, cross hair, frame.

**Format** – YT and XY.

**VGA Out** – Drives VGA display monitors.

## ZOOM

The zoom feature allows waveforms to be expanded, compressed and positioned in both vertical and horizontal axes. Allows precise comparison and study of fine waveform detail without affecting ongoing acquisitions. When used with Hi-Res or Average acquisition modes, Zoom provides an effective vertical dynamic range of 1000 divisions or 100 screens.

## MEASUREMENT SYSTEM

**Automatic waveform measurements –**

Period	Frequency
High	Low
+ Width	- Width
Maximum	Minimum
Rise	Fall
Peak to Peak	Amplitude
+ Duty cycle	- Duty cycle
+ Overshoot	- Overshoot
Propagation delay	Burst Width
Mean	Cycle Mean
RMS	Cycle RMS

Continuous update of up to four measurements on any combination of waveforms.

**Thresholds** – Settable in percentage or voltage.

**Cursor Measurements** – Absolute, delta, Volts, Time, Frequency.

**Cursor Types** – Horizontal bars (volts); Vertical bars (time).

## WAVEFORM PROCESSING

**Waveform Functions** – Interpolate-selectable  $\sin(x)/x$  or linear.

**Arithmetic Operators** – Add, Subtract, Multiply, Invert.

**Autosetup** – Single button, automatic setup on selected input signal for vertical, horizontal and trigger systems.

## COMPUTER INTERFACE

**GPIB (IEEE-488.2) Programmability** – Full talk/listen modes. Control of all modes, settings, and measurements.

## HARD COPY/DESKTOP PUBLISHING

**Printer** – HP Thinkjet, Epson, PostScript, Deskjet, Laserjet.

**Plotter** – HPGL.

**Standard Interface** – GPIB.

**Export File Formats** – EPS (Encapsulated PostScript), Interleaf.

## STORAGE

**Waveforms** – 60,000 waveform points of non-volatile storage.

**Setups** – 10 front panel setups.

## CRT

**Type** – 7 in. diagonal, magnetic deflection. Horizontal raster-scan. P31 green phosphor.

**Resolution** – 640 horizontal by 480 vertical displayed pixels.

## POWER REQUIREMENTS

**Line Voltage Range** – 90 to 250 V RMS.

**Line Frequency** – 47 to 63 Hz.

**Power Consumption** – 250 Watts max.

*Continued on next page.*

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## ENVIRONMENTAL & SAFETY

**Temperature** – Operating: 0 to +50°C.  
Nonoperating: -40 to +75°C.

**Humidity** – Operating and nonoperating: Up to 95% relative humidity at or below +40°C; to 75% relative humidity from +41 to +50°C.

**Altitude** – Operating: 15,000 ft., nonoperating: 40,000 ft.

**Electromagnetic Compatibility** – Meets MIL-STD-461C, CE-03, Part 4, Curve # 1, RE-02, Part 7; meets VDE 0871, Category B, FCC rules and regulations, Part 15, Subpart J, Class A.

**Safety** – Listed UL 1244, CSA Bulletin 556B, Sept. 1973; Tektronix self-certification to comply with IEC 348 recommendations.

## PHYSICAL CHARACTERISTICS

Dimensions	mm	in.
Height	164	6.4
w/acc. pouch	177	7.5
Width	362	14.25
Depth		
w/front cover installed	491	19.25
w/handle extended	576	22.2
<b>Weight</b>	<b>kg</b>	<b>lbs.</b>
Net ≈	9.1	22.5
Shipping ≈	12.5	32

## ORDERING INFORMATION

**TDS 420**  
4 Channel Digitizing Oscilloscope..... **TD \$5,595**

**TDS 460**  
4 Channel Digitizing Oscilloscope..... **TD \$7,495**

**Both include:** Probe (2 P6138 10X Passive Probes); Quick Reference Guide (070-8035-00); Tutorial/User Manual (070-8034-00); Programmer's Manual (070-8318-01); U.S. Power Cord (161-0230-01).

**Opt. 02** – Front Cover and Accessories Pouch..... **+\$60**

**Opt. 05** – VideoTrigger ..... **TD +\$995**

**Opt. 1K** – K212 Scope Cart ..... **+\$395**

**Opt. 1M** – 30,000 Point Record Length..... **TD +\$995**

**Opt. 2A** – VideoTrigger and 30,000 Point Record Length..... **TD +\$1,500**

**Opt. 1P** – HC100 4 Pen Plotter..... **+\$1,180**

**Opt. 1R** – Rack Mount ..... **+\$350**

**Opt. 22** – Two additional P6138 Probes ..... **+\$350**

**Opt. 23** – Two P6205 FET Probes..... **+\$990**

**Opt. 9C** – NIST and MIL-STD-45662A Calibration Certificate..... **+\$125**

**Opt. B1** – Module Level Service Manual ..... **+\$125**

### INTERNATIONAL POWER PLUG OPTIONS

**Opt. A1** – Universal Euro 220 V, 50 Hz ..... **NC**

**Opt. A2** – UK 240 V, 50 Hz ..... **NC**

**Opt. A3** – Australian 240 V, 50 Hz ..... **NC**

**Opt. A4** – North American 240 V, 60 Hz..... **NC**

**Opt. A5** – Switzerland 220 V, 50 Hz..... **NC**

See General Customer Information Section for additional description.

### WARRANTY-PLUS SERVICE OPTIONS

Three years warranty, covering all labor and parts, including CRT, and excluding probes.

**Opt. M2** – Repair Protection.  
TDS 420..... **+\$495**

TDS 460..... **+\$545**

**Opt. M8** – Calibration Service.  
TDS 420..... **+\$290**

TDS 460..... **+\$290**

### SOFTWARE

**TDS Data Manager Software** – for TDS400, TDS500, TDS600 and TDS800 Scopes with Manual. For use on RIC386 and 2402A controllers or other DOS computers that have a National Instruments PCII/PCIIA GPIB cards. Does not support National Instrument PC-AT or PC-MC GPIB cards.  
Order S34TDS1..... **\$795**

### PROBES

See Probe Section on page 423 for complete description and full line of probes.

**Active** – 750 MHz, 2 pF/1 MΩ, 1.5 m. Order P6205..... **\$495**

**Differential** –  
100 MHz, Active Differential, 6 ft. Order P6046..... **\$2,195**

**High Voltage** –  
100X, 120 MHz, 1500 V, 2.5 pF/10 MΩ, 9 ft. Order P6009..... **\$265**  
1000X, 75 MHz, 20 kV, 3.0 pF/100 MΩ, 10 ft. Order P6015A..... **\$895**

**General Purpose** –  
1X, 15 MHz, 54 pF/1 MΩ, 2m. Order P6101B..... **\$60**  
10X, 350 MHz, 10.0 pF/10 MΩ, 1.3m. Order P6138..... **\$175**

**50 Ω Divider** – 50 Ω Inputs, 2 Tips: 10X, 100X.  
10X: 3.5 GHz, 1 pF/500 Ω, 1.5m 100X: 3 GHz, 1 pF/5000 Ω, 1.5m. Order P6156 with Opt. 25..... **\$325**

**Logic** – 20 MHz, 17 bit, Word Recognizer/Trigger.  
Order P6408..... **\$425**

**Micro/Fixed** – See Probe Section, pages 440-441.

**Spring Contact** – See Probe Section, pages 440-441.

**Current** –  
(AC only), 120 Hz to 60 MHz, 7.5 A peak. Order P6021..... **\$545**  
(AC only), 935 Hz to 120 MHz, 3 A peak. Order P6022..... **\$595**

(DC & AC), DC-50 MHz System, includes AM503A, A6302 20A probe. Order AM503S..... **\$2,595**

**Carts** – Order K212..... **\$395**

**TDS Scope with TD100** – With Keyboard Tray.  
Order K220 and 436-0240-00..... **\$775**

### CAMERAS/HARD COPY DEVICE

**Camera** – Order C9 with Opt. 1A and Opt. 04..... **\$730**

**Head Adapter** – Order 016-1154-00..... **\$60**

**Plotter** – with GPIB and Centronics Interface.  
Order HC100 with Opt. 01..... **\$1,180**

### ADDITIONAL ACCESSORIES

**Security Cable** – Order 012-1388-00..... **\$42**

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