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## Digital and Analog Oscilloscopes

2232

**Characteristics**

**DIGITAL STORAGE SYSTEM**

**Sample Rate** - 100 MS/s per channel. Effective sample rates up to 2 GS/s in repetitive storage mode (0.5  $\mu$ s/div and faster in single-channel mode, 0.2  $\mu$ s/div and faster dual-channel).

**Resolution** - Vertical: 8 bits (25 levels per division), up to 12 bits in average mode. Horizontal: 10 bits (100 points per division), 9 bits per channel in dual channel mode.

**Record Length** - 4K or 1K selectable. 2K or 512 per channel in dual channel mode.

**Pre/Post Trigger** - 1/8, 1/2, or 7/8 trigger position selectable, point-selectable through the menu.

**Acquisition Modes** - Peak Detect (10 ns glitch capture at all available sweep speeds); Accumulated Peak Detect; Average (weight-selectable from 1/1 to 1/256 in a binary sequence); and Sample.

**Save Reference Memory** - One 4K or three 1K acquisitions. Battery-backed memory stores waveforms for up to 3 years.

**Additional** - 26K of extended memory (store up to 26 waveform sets).

**VERTICAL SYSTEM (2 IDENTICAL CHANNELS)**

**Bandwidth (-3 dB) and Rise Time** - 100 MHz and 3.5 ns (0 to +35 degrees C); 80 MHz and 4.4 ns (2 mV/div or +35 to +50 degrees C)

**Deflection Factor and Accuracy** - 2 mV/div to 5 V/div  $\pm$ 2% (+15 to +35 degrees C);  $\pm$  3% (0 to +50 degrees C)

**Vertical Operating Modes** - CH 1, CH 2, CH 2 INVERT, ADD, ALT, CHOP (500 kHz), and XY

**CMRR** - At least 10:1 at 50 MHz

**Input R and C** - 1 Megohm 20 pF

**Max Input Voltage** - 400 V (DC + peak AC), 800  $V_{p-p}$

**Channel Isolation** - 100:1 at 50 MHz

**HORIZONTAL SYSTEM**

**Sweep Speeds** - A sweep: 0.5 s/div to 0.05  $\mu$ s/div, extended to 5 ns/div with X10 magnification. 5 s/div to 0.05  $\mu$ s/div in store mode

**Additional** - B Sweep: 50  $\mu$ s/div to 0.05  $\mu$ s/div

**Accuracy** -

Nonstore Mode: X1:  $\pm$ 2%; X10:  $\pm$ 3% (+15 to +35 degrees C). X1:  $\pm$ 3%; X10:  $\pm$ 4% (0 to +50 degrees C)

Store Mode:  $\pm$ 0.1% over full 10.24 divisions

**Horizontal Operating Modes** -

Nonstore Mode: A, ALT (A intensified by B and B), B

Store Mode: A, A intensified by B, B, 4K COMPRESS

**Delay Jitter** - 5000:1

**Delay Time Accuracy** -  $\pm$ 1% (+15 to +35 degrees C);  $\pm$ 2% (0 to +50 degrees C)

**TRIGGER SYSTEM**

**Trigger Sensitivity (A and B) -**

Internal: 0.35 div at 10 MHz, 1.5 div at 100 MHz

External: 40 mV at 10 MHz, 150 mV at 100 MHz

**Trigger Operating Modes** -

A-Mode: P-P AUTO (also for TV LINE), NORM, TV FIELD, SGL SWP

(Additional) B-Mode: Runs-After-Delay, Triggered-After-Delay

**Trigger Source** -

A Trigger: VERT MODE, CH 1, CH 2, LINE, EXT

(Additional) B Trigger: VERT MODE, CH 1, CH 2

### **Trigger Coupling -**

With Internal Source: AC with P-P AUTO, TV LINE, or TV FIELD mode; DC with NORM or SGL SWP mode

With external source: AC, DC, or DC/10. With either source: HF REJECT (attenuates above 40 kHz), LF REJECT (attenuates below 40 kHz)

**Variable Holdoff -** At least 10:1

### X-Y OPERATION

**Deflection Factors -** Same as vertical system

### **Bandwidth -**

X-Axis: 2.5 MHz in nonstore mode, up to 100 MHz in store mode

Y-Axis: same as vertical system

**Phase Difference -**  $\pm 3$  degrees from DC to 150 kHz

### ADVANCED FUNCTIONS

#### **Cursor Function and Accuracy -**

DeltaVolts:  $\pm 3\%$  of reading

DeltaTime:  $\pm 1$  display interval (5 s/div to 1  $\mu$ s/div);  $\pm [2$  display intervals +500 ps] (0.5  $\mu$ s/div to 0.05  $\mu$ s/div)

**X-Y Plotter Output -** Plots all displayed waveforms, CRT readout, and graticule (selectable)

**External Clock Input -** DC to 1 kHz (roll mode), DC to 100 kHz (record mode)

#### **ANSI/IEEE-488 GPIB Interface (Opt. 10) -**

Function Subsets Implemented: SH1, AH1, T5, L3, SR1, RL2, PP0, DC1, DT0, C0, E2

Plotter Devices: HPGL, Epson FX-Series, HP ThinkJet

Data Transfer Rate: approximately 1 KB

#### **EIA Std RS-232C Interface (Opt. 12) -**

Baud Rate: 50 to 2400 for interactive use, up to 4800 for driving plotters

Plotter Devices: HPGL, Epson FX-Series, HP ThinkJet

Connectors: DCE (female), DTE (male)

### CRT SYSTEM

**Display -** 8 cm x 10 cm, 14 kV nominal voltage

### **Controls -**

A INTENSITY, TRACE ROTATION, BEAM FIND, FOCUS, STORAGE/READOUT INTENSITY, GRATICULE ILLUMINATION

(Additional): B INTENSITY

**Z-Axis -** 5 V causes noticeable modulation. Usable to 20 MHz.

### POWER REQUIREMENTS

**Line Voltage Range -** 90 VAC to 250 VAC

**Line Frequency -** 48 Hz to 440 Hz

**Max. Power Consumption -** 85 W (150)

### ENVIRONMENTAL/SAFETY CHARACTERISTICS

Instrument meets in part, the environmental requirements of MIL-T-28800D or C for Type III, Class 3, Style D or C equipment described as below.

#### **Ambient Temperature -**

Operating: 0 to +50 degrees C

Nonoperating: -40 to +71 degrees C

**Humidity -** 95%, five cycles (120 hours) referenced to MIL-T-28800D, paragraph 4.5.5.1.2.2

#### **Altitude -**

Operating: to 4,500 m (13,716 ft.); Max. operating temperature decreases 1 degrees C for every 303 m (1,000 ft.) above 1,515 m (5,000 ft.)

Nonoperating: to 15,240 m (50,000 ft.)

**EMC** - Meets Class B requirements per VDE 0871-B for radiated and conducted emissions and FCC requirements

**Vibration** -

Operating: 15 minutes along each of the three major axes. 0.015 inch p-p displacement 10 Hz to 55 Hz to 10 Hz in one-minute cycles. Holds for 10 minutes at 55 Hz (2.4 g at 55 Hz).

**Shock** -

Operating: 30 g, 1/2 sine, 11 ms duration, 3 shocks per axis along each major axis. Total of 18 shocks.

**Safety** - UL listed 1244, Certified to CSA C22.2 No. 231-M39

**PHYSICAL CHARACTERISTICS**

Dimensions	mm	in.
Height	137	5.4
Width (with handle)	360	14.2
Depth (without front cover)	440	17.3
Net	8.2	18



Product(s) are manufactured in ISO registered facilities.



Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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