

GPIB



**336**

**GPIB**  
IEEE-488

The 336 with Option 01 complies with IEEE Standard 488-1978, and with Tektronix *Standard Codes and Formats*.

- 1 MS/s, 140 kHz Useful Storage Bandwidth
- Cursors for Time and Voltage Measurements
- Signal Averaging
- Envelope Mode
- GPIB and 8 Screen Memory Option (16 k)
- 50 MHz Nonstorage Bandwidth
- CRT Readout

**TYPICAL APPLICATIONS**

- \* Medical Systems
- \* Communication Equipment Service
- \* Electronic Design
- \* X-Ray Equipment Maintenance

The SONY/TEKTRONIX 336 is a combination nonstorage and digital storage portable oscilloscope. It is capable of displaying analog and digitized waveforms simultaneously, and can store up to 18 digitized waveforms for recall and display. The 336 is a microprocessor controlled instrument that incorporates alphanumeric CRT readouts of the vertical and horizontal scale factors, the delay time position, and voltage and time readouts of the cursor positions. Many of the oscilloscope features and modes are chosen from a menu displayed on the CRT rather than from hard-wired front-panel switches. Also included is an Auto mode for both vertical volts per division and horizontal time per division, allowing "hands off" operation in many applications.

The 336 has a dual-channel, dc-to-50 MHz vertical deflection system for both nonstorage and equivalent-time digitizing. Storage bandwidth for single sweep events (waveforms acquired as the result of a single triggering event) is dc-to-140 kHz. The vertical channels have calibrated deflection factors from 5 mV to 10 V per division with a choice of either ac or dc input coupling. In the Nonstore mode, the 336 operates like a conventional oscilloscope.

GPIB (talker only) is optional on the 336. Included in the option is a memory backup of up to eight screens (two 1 k waveforms each) of information.

**CHARACTERISTICS**  
**DIGITIZER AND MEMORY**

**Speed** — Digitizing rates up to 1 megasample/s.

**Useful Storage Bandwidth** — Real Time Sampling: Dc to 140 kHz (-3 dB). Equivalent Time Sampling: Dc to 50 MHz (-3 dB).

**Resolution** — Vertical: Eight bit. Horizontal: Ten bit.

**Memory Size** — Standard: 2 kbyte (one frame of two waveforms). Option 01: 16 kbyte (up to eight frames of two 1 k waveforms each storage capacity). Data Retention: At least 3 days (after 8 hours of operation).

**VIEW DISPLAY MODE**

This is the saved "store" waveform (saved from Store display mode). Process functions are the same as Store display mode.

DIGITAL STORAGE SCOPE

## NONSTORED AND STORED DISPLAY MODES

The following characteristics apply to both modes unless otherwise indicated.

### VERTICAL SYSTEM (2 IDENTICAL CHANNELS)

#### Bandwidth and Risettime\*1

0°C to +40°C	+40°C to +55°C
Dc to at least 50 MHz	Dc to at least 40 MHz

\*1 At all deflection factors from a 50 Ω source.

**Deflection Factor** — Range: 5 mV/div to 10 V/div. Accuracy is ±3%. Uncalibrated, continuously variable between steps, and to at least 25 V/div.

**Vertical Modes** — Stored Mode: CH 1, CH 2, Chop, Dual and Trigger View. Nonstored Mode: CH 1, CH 2, Chop and Dual.

**Normal Mode (Store Mode Only)** — Acquired displayed signal.

**Envelope Mode (Store Mode Only)** — 1, 8, 16, 32, 64, 128, 256 sweeps, or continuous at s/div settings of 2 ms/div to 0.2 s/div.

**Average Mode (Store Mode Only)** — 8, 16, 32, 64, 128 or 256 sweep averages.

**Process Mode (Store and View Mode Only)** — Waveform: CH 1 + CH 2 is within 6%. CH 1 - CH 2 is within 6%. CH 1 X CH 2 is within 7%. Parameters (Selectable): RMS is within 3% + 6% of V/div setting. Mean is within 3% + 4% of V/div setting. P-p is within 3% + 4% of V/div setting. Store or view waveforms must acquire initial ground reference level.

**Common-Mode Rejection Ratio** — At least 10:1 at 10 MHz (5 MHz storage).

**Input R and C** — 1 MΩ ±2% paralleled by 33 pF.

**Maximum Input Voltage** — 200 V (dc + peak ac) or 200 V p-p ac to 1 kHz.

### HORIZONTAL SYSTEM (NONSTORE MODE ONLY)

**Time Base A** — 0.2 s/div to 0.1 μs/div in a 1-2-5 sequence. X10 MAG extends the maximum sweep rate to 10 ns/div. (At sweep speeds slower than 0.2 s the scope automatically goes to Roll mode.)

**Time Base B** — 50 ms/div to 0.1 μs/div in a 1-2-5 sequence. X10 MAG extends the maximum sweep rate to 10 ns/div.

**Variable Time Control** — Continuously variable between calibrated settings of the A s/div switch. Extends the slowest sweep rate to at least 0.5 s/div.

#### Time Base Accuracy

	+20°C to +30°C	0°C to +55°C
Unmagnified	±2%	±3%
Magnified	±3%	±4%

### DIGITAL STORAGE HORIZONTAL ACQUISITION

**Resolution** — Ten bit. 1024 data points.

**Range** — Equivalent Time Sampling: 50 ns/div to 0.1 ms/div. Single Sweep Storage: 0.2 s/div to 0.1 ms/div. Roll Mode: 20 s/div to 0.5 s/div. Envelope Mode: 0.2 s/div to 2 ms/div.

**Accuracy** — 3% from +20°C to +30°C; 4% from 0°C to +55°C.

**Horizontal Display Modes** — Nonstore: A sweep, B delay, alternate, X-Y. Storage: A sweep, B delay, X-Y.

### CALIBRATED SWEEP DELAY

#### Differential Time Measurement Accuracy (Nonstore Mode)

+15°C to +35°C	within 1% of indicated value
0°C to +55°C	within 2.5% of indicated value

**Delay Time Jitter (Nonstore Mode)** — ≤1 part in 10,000.

**Delay Time Resolution (Store Mode)** — 14 bit.

**Cursor Accuracy (Store Mode)** — ΔV: Within 3%. ΔT: Real time sampling is ±0.1% of full scale. Equivalent time sampling from +20°C to +30°C is ±3%; from 0°C to +55°C is ±4%.

### TRIGGERING A AND B

**A Trigger Modes** — Normal: Sweep generator requires a trigger to generate a sweep. Automatic: Sweep generator free runs in the absence of a trigger. Single sweep: One sweep is initiated by the first trigger after reset.

**Trigger Sources** — Internal, CH 1, CH 2, composite or external.

#### Sensitivity and Coupling

Coupling	To 10 MHz	To 50 MHz
AL	0.3 div above 30 Hz	1.5 div
LF Rej	0.5 div above 50 kHz	1.5 div
HF Rej	0.5 div, 30 Hz to 50 kHz	—
Dc	0.3 div	1.5 div
External	70 mV	350 mV
TV	Stable video rejection and sync separation from sync-negative NTSC or PAL composite video	

**Trigger Jitter** — Nonstore Mode: 1 ns or less at 50 MHz. Storage Mode: ±1 sample period.

**External Trigger View** — Deflection Factor: Ext is 100 mV/div. Ext ÷ 10 is 1 V/div.

**External Trigger Input** — R and C = 1 MΩ paralleled by 33 pF (200 V dc + peak ac) maximum input.

**Acquisition Window Trigger Point** — Pretrigger: 7/8 of waveform occurs before trigger point. Midtrigger: 1/2 of waveform occurs before trigger point. Posttrigger: 1/8 of waveform occurs before trigger point.

### X-Y OPERATION (NONSTORE)

**Full Sensitivity X-Y (CH 1 Horizontal, CH 2 Vertical)** — 5 mV/div to 5 V/div with bandwidth of dc to 1 MHz. Phase difference is 3° from dc to 50 kHz.

### CRT AND DISPLAY FEATURES

**CRT** — 8 x 10 div (0.6 cm/div) display, GH (P31) phosphor. 12 kV operating potential.

**Graticule** — Internal. Vertical and horizontal centerlines marked in 5 minor div/major 0.6 cm/div.

**Z-Axis Input** — Range +3 V to +25 V with 1 MHz usable frequency range. Input resistance of at least 10 kΩ.

### ENVIRONMENTAL CHARACTERISTICS

**Ambient Temperature** — Operating: 0°C to +55°C. Nonoperating: -25°C to +75°C. Option 01: -20°C to +55°C.

**Altitude** — Operating: To 4600 m (15,000 ft). Decrease maximum operating temperatures 1°C for each 1000 ft above 5000 ft. Nonoperating: To 15 000 m (50,000 ft).

**Vibration** — 0.025 p-p (4 g's at 55 Hz) displacement, 15 minutes along each axis from 10 Hz to 55 Hz.

**Humidity** — 120 hrs of MIL STD 202D, method 106C, minus freezing and vibration.

**Shock** — 30 g's half sine, 11 ms duration on each axis.

### OTHER CHARACTERISTICS

**Chart Output** — Clock Rate: Fast or slow. Amplitude: 500 mV/div. Output Impedance: 220 Ω.

**Calibrator** — Output Voltage: 0.3 V ±1%. Output Resistance: 5 Ω. Frequency: ≈1 kHz.

**Ac Power Requirements** — Line Voltage Ranges: 90 V ac to 132 V ac, 180 V ac to 250 V ac. Line Frequency: 48 Hz to 440 Hz. Power Consumption: 50 W maximum.

### PHYSICAL CHARACTERISTICS

Dimensions	mm	in
Width	237	9.3
Height	112	4.4
Depth (Handle Not Extended)	370	14.6
Depth (Handle Extended)	482	19.0
<b>Weight</b>	<b>kg</b>	<b>lb</b>
Net	5.0	11.1
Shipping	10.5	23.1

## GPIB Option 01

### GPIB Interface/Extended Memory

Option 01 provides a GPIB interface (talk only) and extended memory. The GPIB interface transfers waveforms and scale factor information to a listener or controller. 16 K total extended memory stores 16 additional waveforms at 2 waveforms per screen.

**IEEE Standard 488-1978 Interface Function Subsets Implemented** — SH1, AH1, T1, L0, SR1, RL0, DC2, DT0, PP0, C0.

### ORDERING INFORMATION

**336 Digital Storage Portable Oscilloscope** **\$4,960**

**Includes:** Two 10X P6148 Attenuator probes (010-6148-13); accessory pouch (016-0718-00); front panel cover (016-0719-00); CRT filter (378-0225-00); operator manual (070-4421-00) and service manual (070-4420-00).

**Option 01** — GPIB Interface/Extended Memory. **+\$875**

### OPTIONAL ACCESSORIES

**Camera** — Order C-30BP Option 01 **\$1,524**

**Camera Mounting Adaptor** — Order 016-0327-01 **\$170**

**Carts** — Order K212 or K117. See page 423 for complete description.

The SONY®/TEKTRONIX® 336 is manufactured and marketed in Japan by Sony/Tektronix Corporation, Tokyo, Japan. Outside of Japan the 336 is available from Tektronix, Inc., its marketing subsidiaries and distributors.

To order, call your local Tektronix Sales Office, or call Tek's National Marketing Center, toll free: 1-800-426-2200, Ext 99. In Oregon call collect: (503) 627-9000, Ext. 99