PROGRAMMABLE WAVEFORM DIGITIZER

GPIB
IEEE-488

The 390AD complies with IEEE Standard 488-1978, and with Tektronix Standard Codes and Formats.

True Dual Channel 30 MHz Sampling Rate (60 MHz in Single Channel Mode)

2048 Word Memory Per Channel (4096 Single Channel Mode)

10-Bit Resolution

Bislope Triggering

Sample-Rate Switching

Cursor-Based Measurements

Direct Plotter Output Capability

Applications

- Extracting Information from Signals Containing Components from dc to 15 MHz
- Ultrasonics/Stress/Strain
- Mechanical/Vibration
- Audio
- ATE
- Laser Spectroscopy
- Biomedical Research
- LIDAR
- Geo-Seismic

The SONY/TEKTRONIX 390AD is a high-resolution transient waveform digitizer designed for applications involving analysis of low-to-medium speed signals – signals containing frequency components of dc to 15 MHz.

The 390AD is a true dual-channel digitizer with separate analog-to-digital converters for each channel. A two-stage flash-conversion process yields 10-bit vertical resolution with excellent dynamic accuracy.

An internal crystal-based source provides sampling rates selectable from 30 MHz to 5 Hz (60 MHz maximum for single channel operation) with provision for sample-rate switching during acquisition.

Record length is 2048 words for each channel, with the entire 4096-word memory available for single-channel applications. Two cursors are provided for making accurate single-point or point-to-point time and voltage measurements on single waveforms or between selected points on channels 1 and 2. A zoom feature enables precise cursor positioning.

An X versus Y display mode and shift mode function provides a powerful tool for visual comparison of related phenomena.

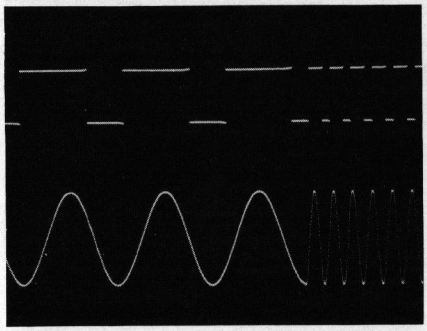

Figure 1. Photo showing sample rate switching. In this example, switching occurs at the 1620th sample, to extend the display window. The sample rate can be either increased or decreased at the trigger point. A minor time discontinuity may occur at the trigger point under some conditions.

Bislope triggering ensures capturing the data of interest for those applications where trigger polarity cannot be predetermined. Selectable pretriggering and posttriggering provides extensive flexibility in windowing the data available for acquisition.

Measurement accuracy and proper functioning of the 390AD are confirmed by self-calibration and self-test procedures that are automatically performed at power-on and which the user can activate during operation.

The 390AD is designed for use as a system component, thus is fully programmable via the GPIB (IEEE-488). The 390AD conforms to the Tektronix Standard codes and formats.

Analog outputs for direct connection to a monitor and X-Y plotter are provided.

The 390AD is available in both cabinet and rackmount configurations.

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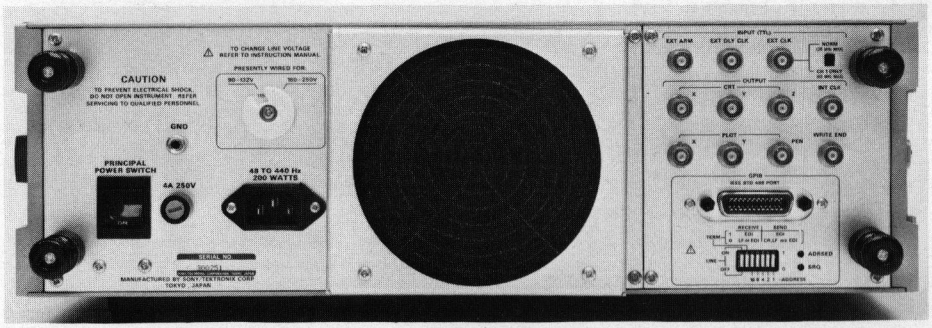

Figure 2. The 390AD Rear Panel connectors and switches.

CHARACTERISTICS

VERTICAL

Input Channels — Two, single ended.

Sensitivity — ±100 mV to ±50 V full scale (200 mV peak-to-peak to 100 V peak-to-peak) 9 steps, 1-2-5 sequence.

Input R and C — 1 MΩ ±2%; ≈24 pF.

Max Input Voltage
Dc Coupled — 250 V (dc + peak ac).
Ac Coupled — 500 V (dc + peak ac).

Bandwidth — Dc to 15 MHz (−3 dB); Lower −3 dB point, Ac coupled: 10 Hz.

Input Dc Offset Voltage — 0 to ±99% full scale, 1% step. Accuracy: <0.5%.

Automatic Calibration
Gain Accuracy — ±0.4%
Dc Drift Accuracy — <±0.1%.

TIME-BASE A AND B

Sample Rate
Internal — CH 1 Only: 5 Hz to 60 MHz, 23 steps, 1-2-5 sequence except 30 MHz and 60 MHz. DUAL: 5 Hz to 30 MHz, 22 steps.
External — Normal: 30 MHz maximum. CH 1 ONLY: 60 MHz maximum.

Clock — 60 MHz ±10 ppm, crystal-controlled.

TRIGGERING

Sources — Internal CH 1 and CH 2 or external.

Coupling — Ac, dc, HF REJ.

Slope — Positive, negative, both.

Level Range
Internal — 0 to ±99% full scale, 1% step.
External — ±4.95 V, 0.05 V step.

Trigger Sensitivity

Coupling	Trigger Frequency Range	MIN Signal Required	
		Internal	External
Ac	25 Hz to 15 MHz	30 LSB	300 mV p-p
HF REJ	25 Hz to 50 kHz	30 LSB	300 mV p-p
Dc	Dc to 15 MHz	30 LSB	300 mV p-p

Arming — AUTO, MANual, EXTernal.

DIGITIZING

Vertical Resolution — 10 bits ($^1/_{1024}$).

Sample Rates
Dual Channel Mode — 30 MHz.
CH 1 Only Mode — 60 MHz.

Aperture Jitter (Including Internal Clock) — 150 ps, nominal.

Dynamic Accuracy* (at Sampling Frequency 30 MHz)

Signal Frequency	Effective Bits
≤ 1 MHz	≥ 8.75
≤ 10 MHz	≥ 8.25
≤ 14 MHz	≥ 7.75

Record Length
Dual Channel Mode — 2048 words/channel.
CH 1 Only Mode — 4096 words.

Modes — Auto, Norm, Single.

Pretrigger Range
CH 1 Only Mode — 0 to 4092.
Dual Channel Mode — 0 to 2046.

**For further information refer to HANDSHAKE Vol 5 No 1, 33-A-4463*

Posttrigger Range

Time Base	Vertical Mode	Range
A	Dual	0 to 9998
	CH 1 only	0 to 9998
A+B	Dual	0 to 2046
	CH 1 only	0 to 4092

A Time Base — Recording is taken at one rate (sample frequency A) continuously.

A+B Time Base
Pretrigger Mode — Sample frequency A is switched to B at trigger. Recording stops at delayed trigger. The transition point (switch point) is well defined.
Posttrigger — Sample frequency A is switched to B at delayed trig and recording stops after total of 2048 (or 4096) samples.

Stored digital data are addressable by key entry while monitoring cursors on the waveform.

Readout Display — 5 digit LED (Reads voltage difference on the same waveform or between CH 1 and CH 2, absolute voltage, time interval, and 1/T.

OUTPUTS

CRT Display
X — 1 V peak-to-peak Ramp. (Changeable to 5 V peak-to-peak by internal strap) 8 ms: Dual. 16 ms: CH 1 only. Mag gain X1 to X10 variable.
Y — 1 V p-p (Changeable to 5 V p-p by internal strap).
Z — 0 to 1 V, (changeable to 0 to 5 V by internal strap), selectable polarity.
X-Y Plot — Output Voltage: 0 to 5 V. Plot Speed: 20, 50, 100 ms/word. Auto Slow. Auto Fast Mode: (Changeable by internal strap).

Voltage Calibrator — Rectangular 1 kHz (±10^{-5}), 4 V (±1%).

Rear Panel Connectors — CRT-X, CRT-Y, CRT-Z, INT CLK-OUT, EXT CLK-IN, EXT ARM-IN, EXT DLY CLK-IN, PLOT-X, PLOT-Y, PLOT-PEN, WRITE END, GPIB.

IEEE STANDARD 488 INTERFACE

Standard — IEEE Standard 488-1978.

Interface Functions — SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, C0, DT1.

Interface Control Message — GTL, LLO, SDC-DCL, GET, SPE-SPD, IFC.

Programmable Functions — All instrument setting and operating modes are programmable, except power switch, vertical/horizontal position, horizontal mag, and external clock mode switch.

Format — Commands in ASCII, Waveform data in 2 byte/point high byte first.

ENVIRONMENTAL CHARACTERISTICS

Temperature Range — Operating: 0 to 40°C. Nonoperating: −25 to +70°C.

Altitude
Operating — Sea level to 4570 m (15,000 ft).
Nonoperating — Sea level to 15 200 m (50,000 ft).

Line Voltage Range — 90 to 132 V ac (115 V); 180 to 250 V ac (230 V).

Line Frequency — 48 to 440 Hz.

Power Consumption—240 W.

PHYSICAL CHARACTERISTICS

Dimensions	mm	in
Width	446	17.6
Height	152	6.0
Depth	540	21.3
Weights	**kg**	**lb**
Net (without access)	15.5	34.0

STANDARD ACCESSORIES

Power cord (161-0066-00); GPIB Cable (012-0630-03); two 4A fast-blow fuses (159-0017-00); 390AD Programming Aid (070-4467-00).

ORDERING INFORMATION

390AD Programmable Waveform Digitizer
390AD Option 10 (Rackmount)

INTERNATIONAL POWER CORD AND PLUG OPTIONS

Option A1 — Universal Euro 220 V/16A, 50 Hz
Option A2 — UK 240 V/13A, 50 Hz
Option A3 — Australian 240 V/10A, 50 Hz
Option A4 — North American 240 V/15A, 60 Hz
Option A5 — Switzerland 220 V/10A, 50 Hz

OPTIONAL ACCESSORIES

390AD Service Manual
Order 070-4452-00

The 624 monitor is recommended for use with the 390AD.

The SONY®/TEKTRONIX® 390AD is manufactured and marketed in Japan by Sony/Tektronix Corporation, Tokyo, Japan. Outside of Japan, the 390AD is available from Tektronix, Inc., its marketing subsidiaries and distributors.

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