

390AD

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)

10-Bit Resolution

2048 Word Memory Per Channel
(4096 Single Channel Mode)

Cursor-Based Measurements

Sample-Rate Switching

Direct Plotter Output Capability

APPLICATIONS

Extracting Information from Signals Contain-
ing Components from dc to 15 MHz

Ultrasonics/Stress/Strain

Mechanical/Vibration

Audio

ATE

Laser Spectroscopy

Biomedical Research

LIDAR

Geo-Seismic

Used for low-to-medium-speed signals, the 390AD Programmable Waveform Digitizer provides crystal-controlled, 30-MHz sampling on two channels. Or, a single channel of data may be digitized at up to 60 megasamples per second.

Features include 10 bit vertical resolution, dual-channel synchronized digitizing, pretriggering and posttriggering, sample-rate switching during acquisition, internal cursors for two-point time or voltage measurements and 2048 words of memory per channel. Excellent dynamic accuracy is achieved using a two-stage flash-conversion process.

The X versus Y display mode coupled with the shift mode function provides a powerful tool for visual comparison of related phenomena.

To ensure reliable operation the 390AD includes built-in self calibration and self-test features that are automatically employed at power-on and may be activated during operation by the user.

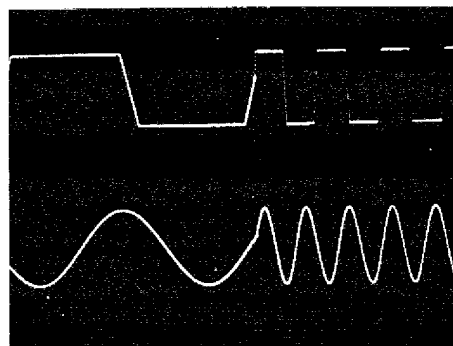


Figure 1. Photo showing sample of Rate Switching. In this example switching occurs at the 1024th sample, to extend the display window. The sample rate can be either increased or decreased at the trigger point. A minor time discontinuity may occur at the trigger point under some conditions.

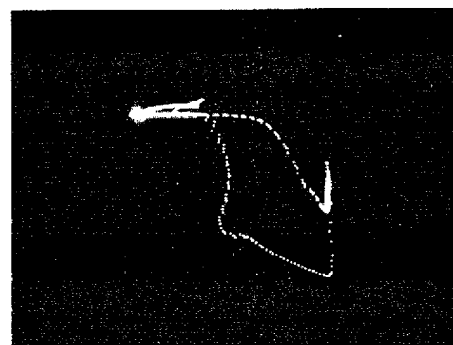


Figure 2. The 390AD display is set to X vs Y mode. Rolling channel 1 or 2 will produce a "correlation" indicative figure.

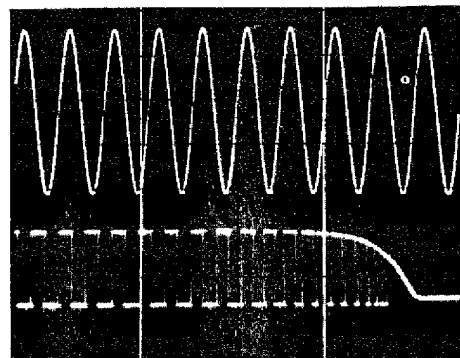


Figure 3. Two cursors may be positioned by the user or controller, at points of interest on either waveform. The voltage difference, time difference, or 1/time difference, as well as the absolute values may be directly read from the LED display, or sent to a controller. Positioning may be precisely accomplished with the aid of the "zoom" feature.

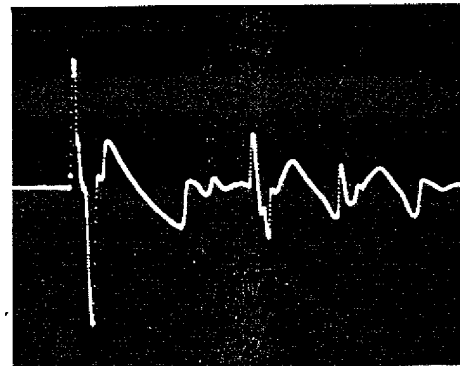


Figure 4. Complex manual set-ups may be avoided by recording the desired instrument settings for a particular measurement on a system peripheral device, then sending the English-like command string to the 390AD. (e.g., the above signal was digitized with a horizontal record of 4k samples as per the instructions of the 4052A Desktop Computer (Figure 5 following page)).

SONY®/TEKTRONIX® PROGRAMMABLE WAVEFORM DIGITIZER

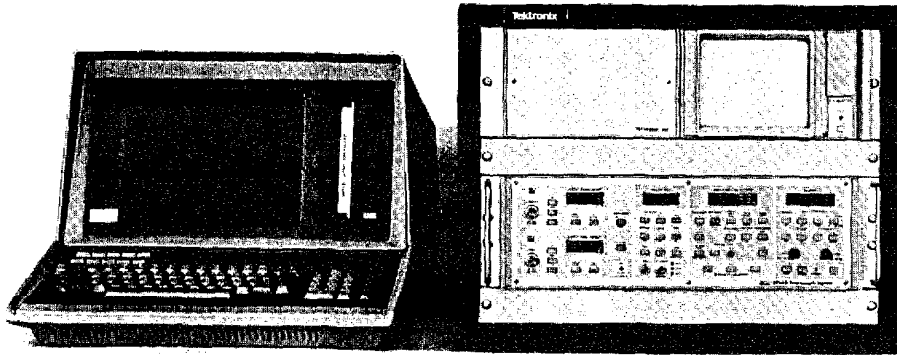
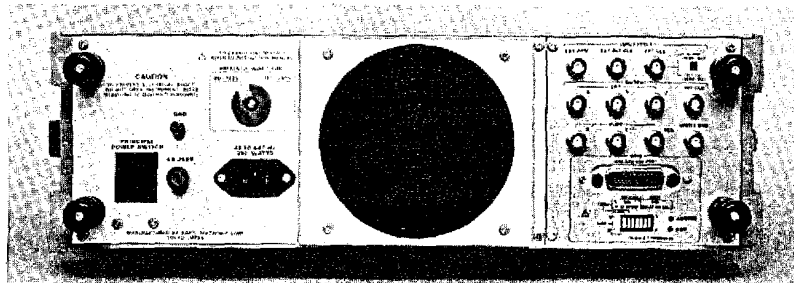


Figure 5. 390AD operating under control of a Tektronix 4052A Desktop Computer equipped with signal processing ROM Packs



390AD Rear Panel connectors and switches

CHARACTERISTICS

VERTICAL

Input Channels — Two, single ended.

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

Input R and C — 1 M Ω $\pm 2\%$; ≈ 24 pF.

Maximum 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 $\pm 99\%$ full scale, 1% step. Accuracy: $< 0.5\%$.

Automatic Calibration
 Gain Accuracy — $\pm 0.4\%$
 Dc Drift Accuracy — $< \pm 0.1\%$.

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 \approx 30 MHz, 22 steps.
 External — Dc to 60 MHz.

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 $\pm 99\%$ full scale, 1% step.
 External — ± 4.95 V, 0.05 V step.

Trigger Sensitivity

Coupling	Trigger Frequency Range	Minimum 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	≥ 8.5
< 10 MHz	≥ 7.5

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.

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).

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

OUTPUTS

CRT Display

X — 1 V p-p Ramp. (Changeable to 5 V p-p 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 ($\pm 10^{-5}$), 4 V ($\pm 1\%$).

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 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 — 200 W.

PHYSICAL CHARACTERISTICS

Dimensions	mm	in
Width	446	17.6
Height	152	6.0
Depth	540	21.3
Weights	kg	lb
Net (without accessories)	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 \$14,530
Option 10 — Rackmount 390AD +\$250

INTERNATIONAL POWER CORD AND PLUG OPTIONS

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

OPTIONAL ACCESSORIES

390AD Service Manual Order 070-4452-00 \$25

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

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.