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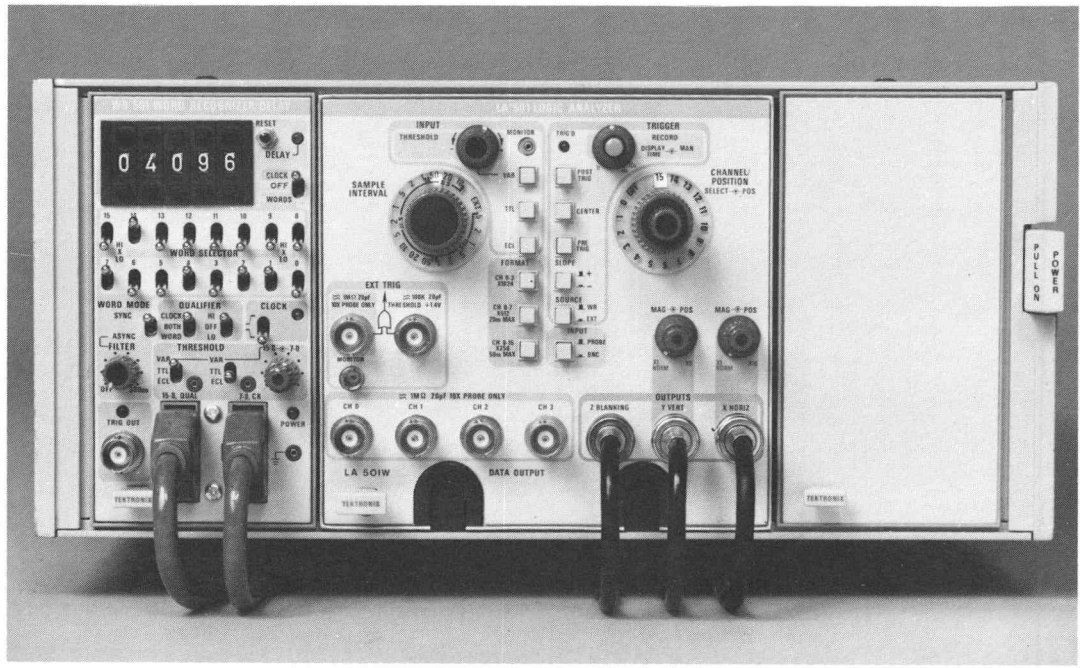
LA 501W LOGIC ANALYZER



Acquires 16 Channels Simultaneously

Captures Single-Shot Data

Stores 4096 Bits in 4, 8, or 16 Channel Format

Displays Data Preceding Trigger

16-Bit Parallel Word Recognizer with up to 99,999 Word Delay

High-Z Probes

Samples Data Synchronously and Asynchronously

Selectable Trace Positioning

Tick Marks for Easy Timing Comparisons

The LA 501W Logic Analyzer, made up of the LA 501 Logic Analyzer and WR 501 Word Recognizer plug-ins, operates in any 3, 4, 5, or 6-compartment TM 500-Series Power Module Mainframe. This combination complements virtually any oscilloscope or X - Y monitor to provide a versatile logic analysis system.

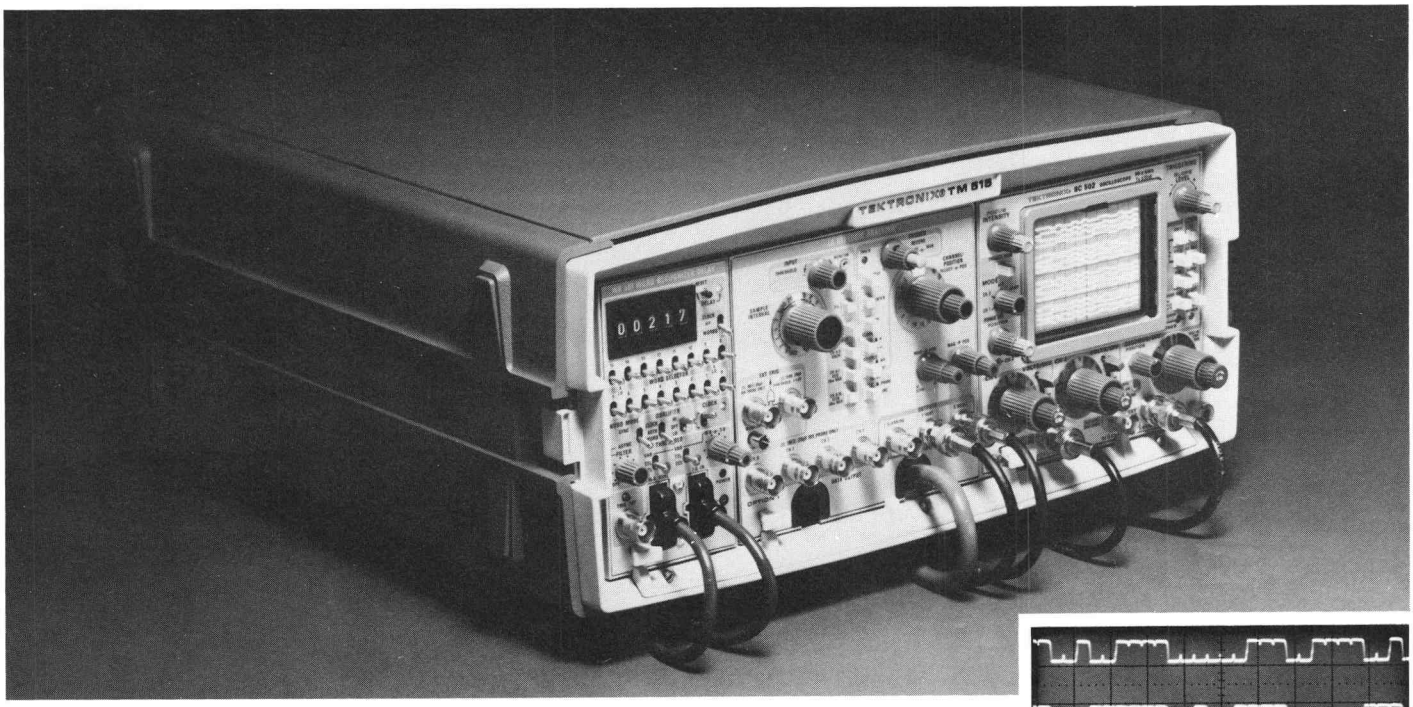
4096 bits of storage may be formatted as 4 channels x 1024 bits, 8 channels x 512 bits, or 16 channels x 256 bits to best fit your application. With a selectable asynchronous sampling rate of up to 100 MHz (4-channel operation only), the LA 501 provides timing resolution to 15 ns. Data can also be synchronously (externally) clocked to 50 MHz. Pre, center, or post-trigger data can be recorded at a sample rate from 10 ns to 5 ms.

Two active P6451 probes feature a high input impedance—1 MΩ paralleled by 5 pF. They provide a total of 18 inputs to the WR 501—16 data input channels, one clock input, and one qualifier input. There are separate threshold controls (TTL, ECL, and variable ± 10 V) for each probe.

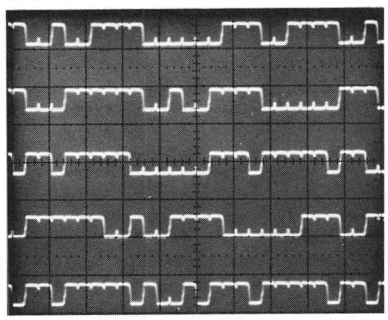
The stored data is displayed as a timing diagram in groups of four. Each trace displays high and low logic states. Vertical and horizontal position and magnifier controls provide the capability to zoom in on any segment of the timing diagram. Biphase timing tick marks on each channel provide excellent visual resolution and also indicate whether an inactive line is high or low. Channel-to-channel timing comparisons are easy because any trace can be moved vertically and thus positioned next to any other.

The WR 501 16-bit parallel word recognizer with digital delay produces triggers when it recognizes a preselected parallel word. This gives you fast access to almost any location in the data stream. The WR 501 can be operated as an independent trigger source or interfaced with the LA 501.

The LA 501W Logic Analysis System may be combined with counters, pulse generators, multimeters, and oscilloscopes into a compact package using TM 500 Series Power Module/Mainframes. The TM 500 Series also offers you a choice of benchtop, rackmount, rollabout, or portable configurations to match your application.



LA 501W Logic Analyzer packaged with the SC 502 Oscilloscope in a TM 515 Traveler Mainframe Power Module.



Waveform from LA 501W showing timing tick marks which help simplify timing comparisons.

LA 501W CHARACTERISTICS

The LA 501W acquires 4, 8, or 16 channels of data and stores the data in memory. Data storage format is selectable as 4 channels x 1024 bits, 8 channels x 512 bits, or 16 channels x 256 bits.

DATA INPUTS

Data Channels — 16 channels divided between two probes. Channels 0-7 (and clock) are in probe 1. Channels 8-15 (and qualifier) are in probe 2.

Input Impedance — 1 MΩ paralleled by 5 pF.

Sensitivity at Probe Tips — 500 mV p-p minimum centered around threshold.

Threshold at Probe Tips — Switch selects fixed TTL (1.4 V ± 0.2 V), ECL (-1.26 V ±0.01 V), or variable (at least -10 V to at least + 10 V). Front panel jack on WR 501 for monitoring variable threshold settings.

Maximum Safe Input Voltage ± 60 V.

Interface — A high-speed interface provides transfer of the incoming data signals to the LA 501 Logic Analyzer through internal cables. This enables the WR 501 probes to provide input for both plug-ins.

MEMORY

Storage — 4096 bits.

Format — Front panel selectable.

Data Channels Displayed	Bits per Channel
0-3	1024
0-7	512
0-15	256

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DATA TIMING

Asynchronous (internal clock) — Sampling intervals are selectable from 10 ns to 5 ms (±0.005%) in a 1-2-5 sequence.

Data Channels Displayed	Maximum Sampling Rate	Minimum Sampling Interval	Minimum Data Pulse Width
0-3	100 MHz	10 ns	15 ns
0-7	50 MHz	20 ns	25 ns
0-15	20 MHz	50 ns	55 ns

Synchronous (external clock)

Data Channels Displayed	Maximum Clock Freq.	Minimum Clock Width*	Minimum Data Setup Time	Minimum Data Hold Time
0-3	50 MHz	10 ns	18 ns	0 ns
0-7	50 MHz	10 ns	18 ns	0 ns
0-15	20 MHz	25 ns	23 ns	0 ns

*High and low clock width

TRIGGER

Source — Pushbutton provides selection of trigger source from the WR 501 or External Trigger inputs.

Triggered Light — Indicates display trigger has occurred.

Modes — Three pushbuttons to select pre-trigger, center-trigger and post trigger modes. In the pre-trigger mode ≈90% of the displayed data occurs before the trigger and ≈10% after. In the center-trigger mode ≈50% occurs before the trigger and ≈50% after. In the post-trigger mode ≈10% occurs before the trigger and ≈90% after.

Slope — Selects positive or negative slope as the active edge external triggers. Selects word or $\overline{\text{word}}$ on WR (internal) triggers with digital delay set at 0 or OFF.

WORD RECOGNIZER

Inputs — 16 data inputs plus a clock and qualifier.

Word Selection — Made using sixteen three-position toggle switches. Positions are HI, X(don't care), and LO.

Qualifier — Can expand the word recognizer to 17 bits, act as a gate for the external clock or do both.

Clock — Selects positive or negative going edge of clock input signal. Used for synchronous operation.

Modes — Front panel selection of synchronous word recognition (a trigger is produced only when the operator selected word occurs at a clock edge; either position, positive or negative edge, may be selected), or asynchronous word recognition (a trigger is produced anytime the recognized word occurs).

Synchronous Mode —

Minimum Set-up time	18 ns or less
Minimum Hold time	0 ns

(Filter is automatically disabled)

Asynchronous Mode and Filter —

Minimum coincidence time is variable from 15 ns or less to 300 ns or more.

DIGITAL DELAY

Provides a delay by events for the trigger pulse produced by the WR 501.

Delay Selection — Five thumbwheel switches provide selection of any delay by events or words from 0 to 99,999.

Modes — Three position switch selects events to be counted. These can be clock pulses, trigger pulses for recognized words, or OFF.

Indicator — An LED is lit during the delay interval.

Reset — Pushbutton resets the delay counter.

Output Connector (TRIG OUT) — The trigger from the WR 501 is available via the internal interface to the LA 501, or at a front panel BNC connector. This produces a trigger after word recognition and the delay selected. The signal is TTL compatible.

Characteristic	Requirement
Hi	≥ 2.2 V
Lo	≤ 0.6 V
Impedance	≈50Ω

Maximum Trigger Delay —

Word Recognition Mode	Delay to front panel Trigger Output (referred to probe tips—digital delay set to 00,000)
Synchronous	≤ 50 ns from edge of clock input and word pattern match.
Asynchronous	≤ 50 ns + selected filter time from word pattern match.

DISPLAY

Type — Data is displayed as a timing diagram.

Display Time — A rotary control is used to select the time for which stored data will be held for display before a new record cycle starts. Variable from less than 1 s to at least 10 s. A detent position provides indefinite storage of data. A new record cycle can be started at any time by pushing the MANUAL Pushbutton.

Vertical Display Controls (VERT POS/MAG) — A variable vertical magnifier control magnifies the on-screen display from X1 to X5. A concentric vertical position control positions the display within the graticule area.

Horizontal Display Controls (HORIZ POS/MAG) — A variable horizontal magnifier control magnifies the on-screen display from X1 to approximately X10. A concentric horizontal position control positions the display within the graticule area.

Display Format — Selectable by a switch (DATA CHANNELS) —

Format	Bits/Channel	Display
Chan 0-3	1024 bits	1 group of 4 traces
Chan 0-7	512 bits	2 groups of 4 traces each
Chan 0-15	256 bits	4 groups of 4 traces each

Crt Retrace Blanking —

Format	Bits Blanked/Channel
Chan 0-3	2 bits
Chan 0-7	1 bit
Chan 0-15	½ bit

DATA OUTPUT

Connector — A 25 pin connector (inside LA 501W) provides output of stored data from the LA 501W. It also provides control signals necessary for transfer of that data to other equipment.

Parallel Data — 16 pins provide parallel access to stored data. ECL levels.

Serial Data — One pin provides serial access to stored data. ECL levels.

Flag — A positive going edge on this pin indicates the beginning of each channel. ECL levels.

Format — 2 pins are used to identify the stored format as 4 channels x 1024 bits, 8 channels x 512 bits, or 16 channels x 256 bits.

POWER

Line Voltage Ranges — Determined by the TM 500 Series Mainframe.

Power Consumption — 45 W at nominal line voltage.

ENVIRONMENTAL

Temperature — Operating: 0-40°C (0-50°C only in TM 506 and TM 515 Mainframes). Nonoperating: -40°C to +75°C.

Altitude — Operating: to 15,000 ft. Nonoperating: to 50,000 ft.

Vibration — With the operating instrument, vibration frequency swept from 10 to 50 to 10 cps at one minute per sweep. Vibrate for 15 minutes along each of the three major axes at 0.015 inch total displacement. Hold three minutes at any major resonance, or if none, at 50 cps. Total time 54 minutes.

Shock — Operating and nonoperating: 30g's, 1/2 sine, 11 ms duration. Two shocks in each direction along three major axes , for a total of 12 shocks.

Transportation: Qualified under National Safe Transit Committee test procedure 1A, Category 11.

DIMENSIONS

	kg	lb
Weight	3	6.6
Dimensions	**cm**	**in**
Height	12.5	4.9
Width	20.1	7.8
Depth	30.0	11.8

Included Accessories — Two 9-channel P6451 Acquisition Probes, Operators manual, service manual.

ORDERING INFORMATION

LA 501W	Logic Analyzer	$4450
LA 501W	OPT 05 (Add one TM 515 Power Module)	$4775
LA 501W	OPT 49 (Delete one P6451 probe)	$4150
LA 501	Logic Analyzer	$3250
WR 501	Word Recognizer	$1500
WR 501	OPT 49 (Delete one P6451 probe)	$1200
P6108 Probe	10X Attenuation, 2 Meter Cable (010-6108-03)	$ 49
TM 515	Power Module*	$ 325
TM 506	Power Module*	$ 240
TM 504	Power Module*	$ 180
TM 503	Power Module*	$ 160
RTM 506	Rackmount Power Module*	$ 325
040-0806-00	LA 501, WR 501 Interface Mod Kit	$ 185

*Operation of the LA 501W Logic Analysis system requires a TM 500 Series Power Module as well as an X - Y monitor or oscilloscope.