- **VARIABLE PERSISTENCE STORAGE**
- **DC-to-100 MHz BANDWIDTH**
- **EXTREMELY BURN RESISTANT CRT**
- **5¼-INCH RACKMOUNT**

The TEKTRONIX 7613 Storage Oscilloscope offers Variable Persistence operation with a stored writing speed of 5 div/μs or conventional (nonstorage) operation. Stored traces can be viewed up to 60 minutes on a display area of 8 x 10 div (0.9 cm/div). The 7613 CRT is extremely burn resistant and doesn't require any special operating precautions.

Note—All 7000-Series plug-ins with lighted push buttons do not light in the vertical or horizontal compartments.

VERTICAL SYSTEM

Channels—Two left-hand plug-in compartments; compatible with all 7000-Series plug-ins. Bandwidth determined by mainframe and plug-in unit, see Storage FAMILY Vertical System Specification Chart.

Modes of Operation—LEFT, ALT, ADD, CHOP, RIGHT.

Chopped Mode—Repetition rate is approximately 1 MHz.

Delay Line—Permits viewing leading edge of displayed waveform.

HORIZONTAL SYSTEM

Channels—One right-hand plug-in compartment; compatible with all 7000-Series plug-ins.

Fastest Calibrated Sweep Rate— 5 ns/div.

X-Y Mode—The phase shift between vertical and horizontal channels is 2° from DC to 35 kHz. Bandwidth is DC to at least 2 MHz.

CRT AND DISPLAY FEATURES

Variable Persistence Storage CRT—Internal 8 x 10 div (0.9 cm/div) graticule with variable illumination.

Option 1, Without CRT Readout—Deletes CRT READOUT.

Option 6, Special Internal Graticule (Spectrum Analyzer)—Internal 8 x 10 div (0.9 cm/div) with variable illumination including LIN, LOG and FREQUENCY markings.

Accelerating Potential— 8.5 kV.

Phosphor—P31.

Non-Store Mode—For displaying waveforms in the conventional (non-storage) mode.

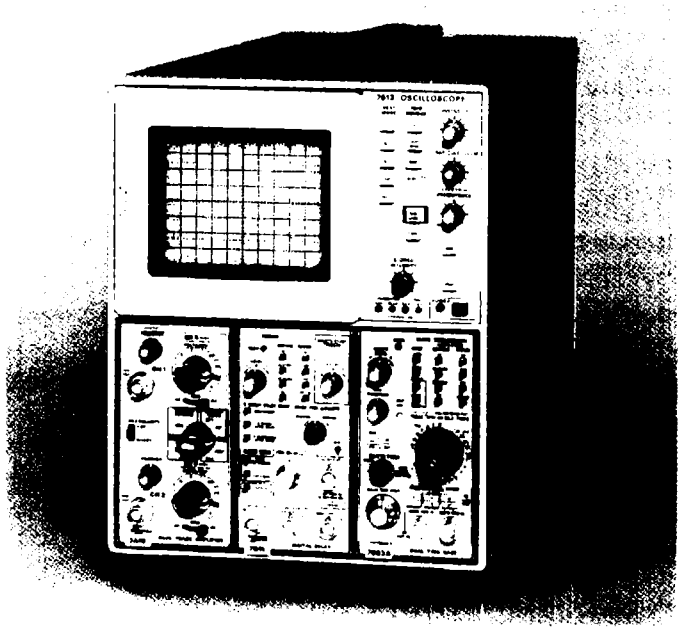
Store Mode—For displaying waveforms utilizing the variable persistence storage feature.

Maximum Stored Writing Speed—Greater than 5 div/μs.

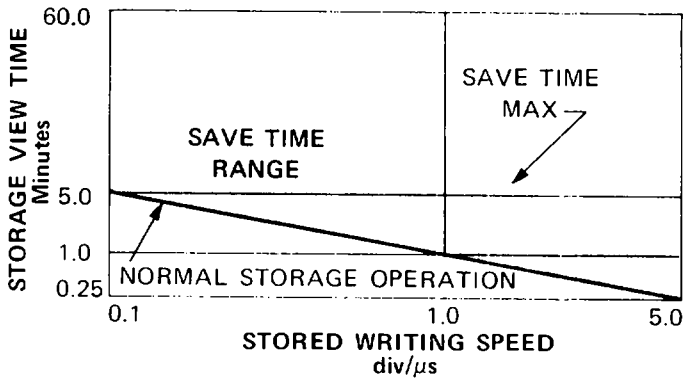
Storage View Time—(See chart) may be increased by selecting SAVE and adjusting for reduced viewing brightness with SAVE TIME control.

Erase Time— 0.5 s or less.

Persistence—Continuously variable, persistence may be turned off when not needed to provide high contrast stored displays without the characteristic fading of variable persistence.



Save—Prevents erasing and storing additional displays, also extends viewing time of stored displays.



External Z-Axis Input— 2 V P-P for full intensity range from DC to 2 MHz, intensity range diminishes to 20% of full range at 10 MHz. A positive signal blanks the trace. Maximum input voltage is 10 V (DC + Peak AC) and P-P AC.

Auto-Focus—Reduces the need for additional manual focusing with changes in intensity after focus control has been initially set.

Beam Finder—Limits display within Graticule area.

OUTPUTS/INPUTS

Sawtooth—Sawtooth starts 1 V or less from ground (into 1 MΩ). Output voltage is 50 mV/div (±15%) into 50 Ω, 1 V/div (± 10%) into 1 MΩ. Output R is 950 Ω within 2%.

Gate—Positive pulse of the same duration and coincident with sweep. Output voltage is 0.5 V (± 10%) into 50 Ω, 10 V (± 10%) in 1 MΩ. Risetime is 20 ns or less into 50 Ω, output R is 950 Ω within 2%. Source is selectable from Main, Delay or Auxiliary Gate.

Sig Out—Selected by TRIGGER SOURCE switch. Output voltage is 25 mV/div (+10%) into 50 Ω, 0.5 V/div (±10%) into 1 MΩ. The bandwidth depends upon vertical plug-in, see Storage Family Vertical System Specifications Chart. Output R is 950 Ω within 2%.

External Single Sweep Reset—Ground closure, rear panel BNC provides input to reset sweep.

Remote Erase—Ground closure, rear panel BNC provides input to erase stored trace.

Option 7, Without Signals Outputs/Inputs—Deletes previously described OUTPUTS/INPUTS.

CAMERA POWER OUTPUT

Three-prong connector to the left of the CRT provides power, ground, and remote single-sweep reset access for the C-50-Series Cameras.

CALIBRATOR

Voltage Output—Rectangular waveshape, positive-going from ground. (DC voltage available when selected by internal jumper.) Ranges are 40 mV, 0.4 V, 4 V into 1 MΩ; 20 mV, 0.2 V, 0.4 V into 50 Ω. Amplitude accuracy is within 1% (+15°C to +35°C); within 2% (0°C to +50°C). Repetition rate is approx 1 kHz.

Current Output— 40 mA DC or 40 mA rectangular waveshape with optional current-loop accessory (012-0259-00) connected between 4 V and GND pin jacks.

POWER REQUIREMENTS

Line Voltage Ranges— 100, 110, 120, 200, 220 and 240 V AC +10%; internally selectable with quick-change jumpers.

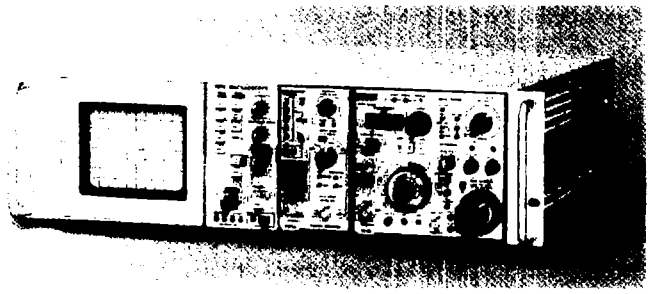
Line Frequency— 50 Hz to 60 Hz.

Option 5, Line Frequency Change (50 - 400 Hz)—Converts the 7613 and R7613 to 50 - 400 Hz operation.

Max Power Consumption— 180 Watts, 2.0 Amps at 115 V line, 60 Hz. Cooling is provided by a fan for both models.

DIMENSIONS AND WEIGHTS

Please refer to the 7623 dimensions and weights chart.



The R7613 requires only 5¼ inches of rack height in a standard 19-inch rack. It is fan-cooled and comes complete with slide-out chassis tracks.

Included Accessories—(For 7613 and R7613) 20-inch cable (two-pin-to-BNC) (175-1178-00); CRT filter (Gray 378-0625-02). The R7613 includes rackmounting hardware.

ORDERING INFORMATION

(Plug-ins not included)

7613 STORAGE OSCILLOSCOPE	$2500
R7613 STORAGE OSCILLOSCOPE	$2600

7613 OPTIONS

Option 1	W/O CRT READOUT	Sub $400
Option 3	EMI MODIFICATION	Add $75
Option 5	LINE FREQ CHANGE (50 - 400 Hz)	Add $100
Option 6	SPECIAL INT GRATICULE (Spectrum Analyzer)	No Charge
Option 7	W/O SIG OUT/IN	Sub $50

R7613 OPTIONS

Option 1	W/O CRT READOUT	Sub $400
Option 3	EMI MODIFICATION	Add $50
Option 5	LINE FREQ CHANGE (50 - 400 Hz)	Add $100
Option 6	SPECIAL INT GRATICULE (Spectrum Analyzer)	No Charge
Option 7	W/O SIG OUT/IN	Sub $50

7613 CONVERSION KITS

040-0656-00	CRT READOUT	$400
040-0663-00	EMI MODIFICATION	$75
040-0629-00	SIG OUT/IN	$50

R7613 CONVERSION KITS

040-0676-00	CRT READOUT	$400
040-0678-00	EMI MODIFICATION	$75
040-0633-00	SIG OUT/IN	$50

- **200 cm/μs STORED WRITING SPEED**
- **LONG VIEW TIME**
- **MULTIMODE STORAGE**
- **DC-to-100 MHz BANDWIDTH**
- **EXTREMELY BURN RESISTANT CRT**
- **5¼-INCH RACKMOUNT**

The TEKTRONIX 7623 (Option 12) Storage Oscilloscope delivers 200 cm/μs Stored Writing Speed. The standard 7623 performs at 100 div/μs (0.9 cm/div). A new proprietary TEKTRONIX storage CRT is used to achieve these fast stored writing speeds. The CRT incorporates a special high-speed target and uses a unique mesh-to-mesh TRANSFER TECHNIQUE. This unparalleled design and operation provides the extremely fast writing speed without compromising viewing time. This means stored traces can be viewed for hours or even days, without fading. The CRT is extremely burn resistant. This means that there are no special operating precautions to be observed.

The instrument has four operating modes: Fast Bistable Storage, Bistable Storage, Variable Persistence Storage, and Conventional (nonstorage). Now, in just one oscilloscope, the operator can select the mode that best satisfies his measurement requirements.

Note—All 7000-Series plug-ins with lighted push buttons do not light in the vertical or horizontal compartments.

VERTICAL SYSTEM

Channels—Two left-hand plug-in compartments; compatible with all 7000-Series plug-ins. Bandwidth determined by mainframe and plug-in unit, see Storage FAMILY Vertical System Specification Chart.

Modes of Operation—LEFT, ALT, ADD, CHOP, RIGHT.

Chopped Mode—Repetition rate is approximately 1 MHz.

Delay Line—Permits viewing leading edge of displayed waveform.

HORIZONTAL SYSTEM

Channels—One right-hand plug-in compartment; compatible with all 7000-Series plug-ins.

Fastest Calibrated Sweep Rate— 5 ns/div.

X-Y Mode—The phase shift between vertical and horizontal channels is 2° from DC to 35 kHz. Bandwidth is DC to at least 2 MHz.

CRT AND DISPLAY FEATURES

Standard Storage CRT—Internal 8 x 10-div (0.9 cm/div) graticule with variable illumination.

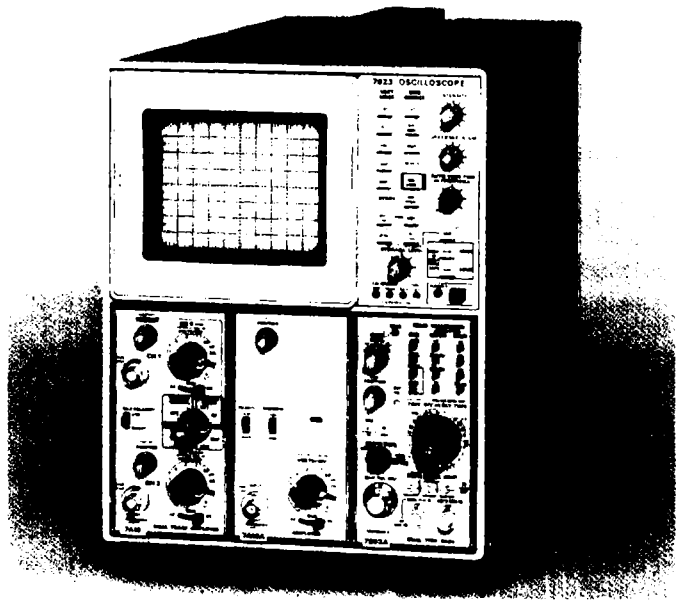
Option 1, Without CRT Readout—Deletes CRT READOUT.

Option 12, Fast Writing Speed CRT—Offers 200 cm/μs stored writing speed. Internal 8 x 10-div (0.9 cm/div) graticule with variable illumination.

Accelerating Potential— 8.5 kV.

Phosphor—P31.

Storage Display Modes—Nonstore, Fast, Variable Persistence, Bistable.



STORAGE WRITING SPEED

DISPLAY MODE	FAST	VARIABLE PERSISTENCE	BISTABLE
STORED WRITING SPEED	200 cm/μs - Opt 12* (220 div/μs) 100 div/μs - Std*	0.5 div/μs	30 div/ms
VIEW TIME	until erased	15 s at max writing speed** 1 minute at 100/div/ms**	until erased
ERASE TIME	1 s or less	1 s or less	1 s or less

*Measured over center 4 x 5 div area, derated toward display edges.
**May be extended by selecting SAVE mode.

The fast storage writing speed of 100 div/μs (200 cm/μs Opt 12) will allow the capture of a non-recurring (single shot) signal to be stored and held for examination with at least the following characteristics.

WRITING SPEED	APPROX SINEWAVE FREQUENCY (5 or more cycles/display)	STEP RESPONSE		
		Tr	P-P AMP.	SWEEP SPEED
222 div/μs	1.0 div at 60 MHz (10 ns/div)	5 ns	1.2 div	10 ns/div
	4.0 div at 15 MHz (50 ns/div)	20 ns	4.9 div	10 ns/div
100 div/μs	1.0 div at 30 MHz (20 ns/div)	10 ns	1.1 div	20 ns/div
	4.0 div at 7.5 MHz (50 ns/div)	50 ns	5.4 div	20 ns/div

Persistence—(Variable Persistence mode only) Continuously variable, persistence may be turned off when not needed to provide high contrast stored displays without the characteristic fading of variable persistence.

Auto Erase (Fast Mode only)—Viewing time continuously variable up to 12 s. The sequence begins with the arrival of the signal. The signal initiates a sweep. After each sweep, the stored display is retained and further sweeps are locked out for the viewing interval selected by the VIEW TIME control. Then, the display is erased and the time base is enabled for the next sweep. This cycle will automatically repeat itself as long as a signal is available. The stored display may also be erased by the MANUAL control.

Save—Prevents erasing and storing additional displays, also extends viewing time in variable persistence mode.

Integrate—Provides additional writing speed for repetitive signals by allowing the storage target to integrate the written information over several signal repetitions.

External Z-Axis Input—2 V P-P for useful intensity range from DC to 2 MHz, intensity range diminishes to 20% of full range at 10 MHz. A positive signal blanks the trace. Maximum input voltage is 10 V (DC + Peak AC) and P-P AC.

Auto-Focus—Reduces the need for additional manual focusing with changes in intensity after focus control has been initially set.

Beam Finder—Limits display within graticule area.

OUTPUTS/INPUTS

Sawtooth—Sawtooth starts 1 V or less from ground (into 1 MΩ). Output voltage is 50 mV/div (±15%) into 50 Ω, 1 V/div (±10%) into 1 MΩ. Output R is 950 Ω within 2%.

Gate—Positive pulse of the same duration and coincident with sweep. Output voltage is 0.5 V (±10%) into 50 Ω, 10 V (±10%) into 1 MΩ. Risetime is 20 ns or less into 50 Ω, output R is 950 Ω within 2%. Source is selectable from Main, Delay or Auxiliary Gate.

Sig Out—Selected by TRIGGER SOURCE switch. Output voltage is 25 mV/div (±10%) into 50 Ω, 0.5 V/div (±10%) into 1 MΩ. The bandwidth depends upon vertical plug-in, see Storage Family Vertical System Specifications Chart. Output R is 950 Ω within 2%.

External Single Sweep Reset—Ground closure, rear panel BNC provides input to reset sweep.

Remote Erase—Ground closure, rear panel BNC provides input to erase stored trace.

Option 7 Without Signals Outputs/Inputs—Deletes previously described OUTPUTS/INPUTS.

CAMERA POWER OUTPUT

Three-prong connector to the left of the CRT provides power, ground, and remote single-sweep reset access for the C-50-Series Cameras.

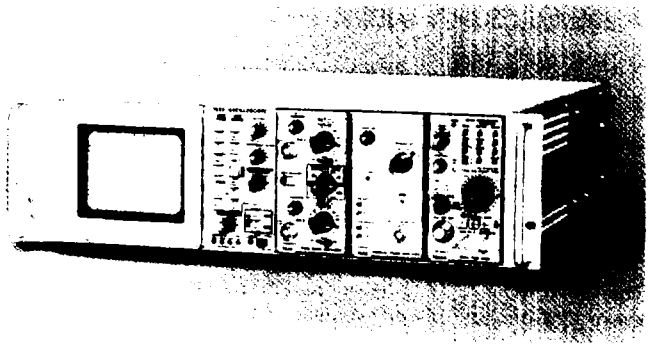
CALIBRATOR

Voltage Output—Rectangular waveshape, positive-going from ground. (DC voltage available when selected by internal jumper.) Ranges are 40 mV, 0.4 V, 4 V into 1 MΩ; 20 mV, 0.2 V, 0.4 V into 50 Ω. Amplitude accuracy is within 1% (+15°C to +35°C); within 2% (0°C to +50°C). Repetition rate is approx 1 kHz.

Current Output—40 mA DC or 40 mA rectangular waveshape with optional current-loop accessory (012-0259-00) connected between 4 V and GND pin jacks.

DIMENSIONS AND WEIGHTS

DIMENSIONS	HEIGHT		WIDTH		LENGTH	
	in	cm	in	cm	in	cm
7313, 7613, 7623	11.4	28.9	8.7	22.1	24.0	60.9
R7313, R7613, R7623	5.25	13.3	19.0	48.2	24.7	62.9
SINGLE-WIDTH PLUG-INS	5.0	12.7	2.8	7.1	14.5	36.9
DOUBLE-WIDTH PLUG-INS	5.0	12.7	5.5	14.0	14.5	36.9
WEIGHTS (Approx)	**NET**		**DOMESTIC SHIPPING**		**EXPORT PACKED**	
	lb	kg	lb	kg	lb	kg
7613, 7623 R7613, R7623	30.0	13.6	42.0	19.0	55.0	25.0
7313, R7313	32.0	14.5	44.0	20.0	57.0	25.8
SINGLE-WIDTH PLUG-INS	2.0	0.9	5.0	2.3	10.0	4.5
DOUBLE-WIDTH PLUG-INS	9.0	4.1	12.0	5.4	17.0	7.7



The R7623 requires only 5¼ inches of rack height in a standard 19-inch rack. It is fan-cooled and comes complete with slide-out chassis tracks.

POWER REQUIREMENTS

Line Voltage Ranges—100, 110, 120, 200, 220 and 240 V AC +10%; internally selectable with quick-change jumpers.

Line Frequency—50 Hz to 60 Hz.

Option 5, Line Frequency Change (50 - 400 Hz)—Converts the 7623 and R7623 to 50 - 400 Hz operation.

Max Power Consumption—180 Watts, 2.0 Amps at 115 V line, 60 Hz. Cooling is provided by a fan for both models.

Included Accessories—(For 7623 and R7623) 20-inch cable (two-pin-to-BNC) (175-1178-00); CRT filter (Gray 378-0625-02). The R7623 includes rackmounting hardware.

ORDERING INFORMATION

(Plug-ins not included)

7623 STORAGE OSCILLOSCOPE	$2850
R7623 STORAGE OSCILLOSCOPE	$2950

7623 OPTIONS

Option 1	W/O CRT READOUT	Sub $400
Option 3	EMI MODIFICATION	Add $75
Option 5	LINE FREQ CHANGE (50 - 400 Hz)	Add $100
Option 7	W/O SIG OUT/IN	Sub $50
Option 12	FAST WRITING SPEED CRT	Add $500

R7623 OPTIONS

Option 1	W/O CRT READOUT	Sub $400
Option 3	EMI MODIFICATION	Add $50
Option 5	LINE FREQ CHANGE (50 - 400 Hz)	Add $100
Option 7	W/O SIG OUT/IN	Sub $50
Option 12	FAST WRITING SPEED CRT	Add $500

7623 CONVERSION KITS

040-0656-00	CRT READOUT	$400
040-0663-00	EMI MODIFICATION	$75
040-0629-00	SIG OUT/IN	$50

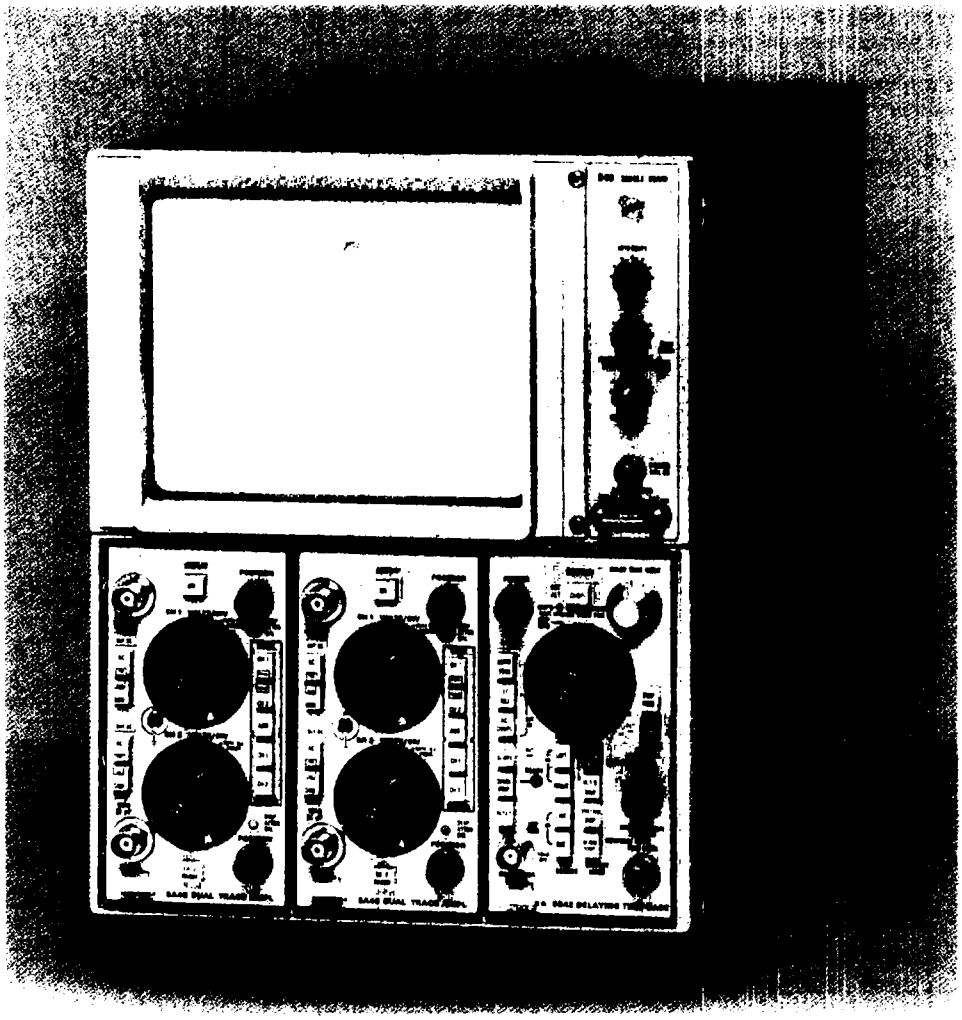
R7623 CONVERSION KITS

040-0676-00	CRT READOUT	$400
040-0678-00	EMI MODIFICATION	$75
040-0633-00	SIG OUT/IN	$50

5400-SERIES OSCILLOSCOPES
5403

New

- **LOW COST**
- **DC to 60 MHz SAMPLING to 1 GHz**
- **CRT READOUT**
- **THREE-PLUG-IN FLEXIBILITY**
- **CHOOSE from 17 PLUG-INS**
- **BENCH-to-RACK CONVERTIBILITY**



The new 5400-Series combines outstanding versatility and low cost in a 60-MHz, general-purpose, plug-in oscilloscope system. It features CRT READOUT of plug-in scale factors, a three plug-in mainframe, a choice of *17 plug-ins, and easy bench-to-rackmount convertability.

CRT READOUT is a feature previously found only on more expensive oscilloscopes. With the plug-in scale factors displayed on the CRT, measurement time is reduced, because the operator can concentrate on the CRT display rather than having to look down at the plug-in knobs. The CRT READOUT reduces operator errors by taking into account magnifiers and probe attenuators. The CRT READOUT can also be accessed externally, a feature found on no other oscilloscope. This unique ability can be used to readout dates, picture numbers, digital clock times, etc.

*Plug-ins with an N suffix, such as 5A13N, 5B12N, etc., do not provide CRT READOUT.

All the plug-ins in the 5000-Series are compatible** with the 5400-Series mainframe. Thus, although the 5400-Series is new, it already has a wide range of measurement capability. The available plug-ins provide multi-trace (up to four) amplifiers, differential amplifiers, a differential comparator amplifier, transistor curve tracer, a 1-GHz sampler and delayed sweep time-bases. More plug-ins utilizing the additional mainframe bandwidth will be available soon.

The 5403/5A48/5B42 provides 5 mV sensitivity at 60 MHz and 1 mV/division sensitivity at 25 MHz. This 1 mV/division sensitivity for example, allows you to look at the heads of tape drive and disc drive units. Problems in these units are often the causes of computer system malfunctions.

If you're looking for a 60-MHz general purpose oscilloscope, the 5400-Series provides you with the most versatility and performance at the lowest price.

**Only the 5B42 permits viewing the leading edge of a triggered waveform when used in the 5403.

5403 MAINFRAME

VERTICAL SYSTEM

Channels—Two plug-in compartments (left and center) compatible with all 5400-Series plug-ins and all 5000-Series plug-ins. CRT READOUT is not available with plug-ins having a suffix N (5A13N, 5B10N, etc.).

Deflection Factor—Determined by plug-in unit.

Bandwidth— 60 MHz maximum, determined by plug-in.

Chopped Mode—The 5403 will chop between channels at an approx 25-kHz to 100-kHz rate, depending on plug-ins used and operating modes.

Alternate Mode—In this mode each plug-in is swept twice before switching to the next. A single-trace amplifier is swept twice and each channel of a dual-trace amplifier is swept once before the 5403 switches to the second amplifier.

HORIZONTAL SYSTEM

Channels—One plug-in compartment (right) compatible with all 5400 and 5000 Series plug-ins. CRT READOUT is not available with plug-ins having a suffix N (5A13N, 5B10N, etc.).

Internal Trigger Mode—LEFT VERT, RIGHT VERT.

Fastest Calibrated Sweep Rate— 10 ns/div, determined by plug-in.

X-Y Mode—The phase shift is within 1° from DC to 20-kHz, checked with two amplifiers of the same type.

OTHER CHARACTERISTICS

Ambient Temperature—Performance characteristics are valid from 0°C to +50°C, unless otherwise specified.

Power Requirements—100, 110, 120, 200, 220 and 240 VAC ±10%; internally selected with quick change jumpers. Line frequency range; 48 to 440 Hz.

D40 SINGLE-BEAM DISPLAY UNIT

The D40 provides a single-beam conventional display for the 5403 Mainframe. The CRT has an 8 x 10 division (1.22 cm/div) display area with internal parallax-free edge-lit graticule. A bright display is provided by a 15-kV accelerating potential. P31 phosphor standard; P7 or P11 optional without extra charge.

CRT READOUT labels the CRT with: deflection factors; sweep speeds; invert and uncalibrated symbols; and identifies the trace and its data. The readout is automatically corrected when magnified sweeps and recommended 10X or 100X probes are used.

Beam Finder—Brings trace within viewing area and intensifies trace.

External Intensity Input— ±5 V will turn the beam on to full brightness from an off level. Frequency range is DC to 2 MHz. Input R and C is approx 10 kΩ, paralleled by approx 40 pF. Maximum input is ±50 V (DC + peak AC).

Calibrator—Voltage amplitude is 400 mV within 1%. Current Maximum input is ±50 V (DC + peak AC).

Minimum Photographic Writing Speed—Using Polaroid film without film fogging. Can be increased by using the TEKTRONIX Writing Speed Enhancer (see Camera Section for more information).

MAINFRAME	WRITING SPEED cm/μs				CAMERA	LENS
	P31		P11			
	10,000 ASA	3,000 ASA	10,000 ASA	3,000 ASA		
5403/D40	180	90	245	125	C-59R	f/2.8 0.67 mag
	330	160	450	230	C-50R * **	f/1.9 0.7 mag

*Slight cropping of the graticule corners.

**Requires optional battery pack (016-0270-00) for operation with the 5403.

Option 1—The 5403 may be ordered without CRT READOUT. This feature may easily be added by installing a conversion kit.

Option 3—User Addressable CRT READOUT. An additional CRT READOUT access is available for the operator to program two 10-digit words such as: time; operator name or test number. The additional display is useful for photographic records and is accomplished by external resistor and switches.

Option 4—Protective Panel Cover (cabinet model only). The 5403 may be ordered with a protective front panel cover. The cover protects the front panel and knobs for transportation and storage.

ORDERING INFORMATION

The 5403 mainframe unit and display unit may be ordered as a cabinet model oscilloscope equipped with a tilt bail or it may be ordered as a 5¼-inch rackmount oscilloscope equipped with a slide-out assembly.

Cabinet (without plug-ins)—
5403/D40 OSCILLOSCOPE, Order 5440 ..... $1175

Rackmount (without plug-ins)—
R5403/D40 OSCILLOSCOPE, Order R5440 ..... $1175

OPTIONS

Option 1	WITHOUT CRT READOUT	Sub $350
Option 3	USER ADDRESSABLE CRT READOUT	Add $60
Option 4	PROTECTIVE PANEL COVER (cabinet model only)	Add $15
Option 76	P7 PHOSPHOR	No Charge
Option 78	P11 PHOSPHOR	No Charge

CONVERSION KITS

Cabinet-to-rackmount, Order 040-0583-01 ..... $33
Rackmount-to-cabinet, Order 040-0584-01 ..... $33
CRT READOUT, Order 040-0691-00 ..... $350