



7904A/R7903

500 MHz at 10 mV/Div

700 ps Rise Time (7904A)

500 ps/Div Fastest Calibrated Sweep Rate

Greater Than 7 cm/ns Writing Speed With Optional CRT (Option 13) and WSEN

CRT Readout

Over 30 Compatible Plug-Ins

900 MHz FET Probe Available

TYPICAL APPLICATIONS

Digital Design
Radar
Laser Research

See page 220 for available Application Notes.

The 7904A and 5.25 inch rackmount R7903 are high bandwidth, general purpose oscilloscopes. The 7A29 Amplifier/7904A mainframe attains 500 MHz at 10 mV/div. A 7A29 variable delay option allows for the matching of signal transit times of two plug-ins and their probes to better than 50 ps.

The P6201 1X FET probe gives you high impedance and wide bandwidth. It has a

900 MHz bandwidth by itself, and in combination with the 7A29/7904A, it provides a system bandwidth of 450 MHz at 10 mV.

The CRT, the major contributor to the performance of the 7904A and R7903, has good visual brightness and an 8 cm x 10 cm display area.

For high photographic writing speed applications, Option 13 provides BE (P11) phosphor and a reduced scan CRT yielding greater than 7 cm/ns photographic writing rate. Addition of WSEN (writing speed enhancer described on page 441) increases writing speed to >7 cm/ns. For comparison of 7000 Series photographic writing speeds, see page 186.

CHARACTERISTICS

The following characteristics are common to the 7904A and R7903, except those noted under the R7903.

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 page 218.

Rise Time — Determined by mainframe and plug-in unit. See page 218.

Deflection Factor — Determined by plug-in unit. See page 218.

Display Mode — Left, Alt, Add, Chop, Right. Chopped mode repetition rate is ≈ 1 MHz.

Trace Separation Range — (7904A only) In dual sweep modes, positions B trace at least four divisions above and below A trace.

Delay Line — Permits viewing leading edge of displayed waveform when using 7B80 and 7B90 Series time bases. 7B50 Series not recommended.

HORIZONTAL SYSTEM

Channels — 7904A: Two right-hand plug-in compartments. R7903: One right-hand plug-in compartment. 7904A and R7903: Compatible with 7B80 and 7B90 Series time bases, 7000 Series vertical amplifiers and specialized plug-ins.

Bandwidth — Dc to at least 1 MHz.

Display Modes — A, Alt, Chop, B. Chopped mode repetition rate is ≈ 200 kHz.

Fastest Calibrated Sweep Rate — 500 ps/div with the 7B92A.

X-Y Mode — With Delay Compensation: Phase shift is within 2° from dc to 1 MHz. Without Delay Compensation: Phase shift is within 2° from dc to 35 kHz.

CRT AND DISPLAY FEATURES

For CRT phosphor data see page 186.

CRT — Internal 8 x 10 division (0.85 cm/div) graticule with variable illumination. Accelerating potential is 24 kV. GH (P31) phosphor is standard.

Option 04, CRT With Reduced Area — Internal 4 cm x 5 cm graticule with variable illumination. Accelerating potential is 24 kV. GH (P31) phosphor is standard.

Option 13, Maximum Brightness CRT With Reduced Area — Internal 4 cm x 5 cm graticule with variable illumination. Accelerating potential is 24 kV with BE (P11) phosphor.

Option 78, BE (P11) Phosphor — Replaces standard GH (P31) phosphor.

Typical Photographic Writing Speed*1

CRT	Camera	Lens	Writing Speed cm/ns
Opt 04 4 cm x 5 cm	C-51P	f/1.2 1.0.5	2
Opt 13 4 cm x 5 cm			7
Opt 78 8 cm x 10 cm			2.5

*1 Using Polaroid Type 612 20,000 ASA Film without film fogging.

In typical applications, GH (P31) phosphor has approximately one-half the writing speed of BE (P11) phosphor. The writing speed can be increased by using controlled film fogging with a writing speed enhancer (camera accessory). See page 441.

Autofocus — Reduces the need for additional manual focusing with changes in intensity after focus control has been set.

Beam Finder — Aids in locating offscreen signal.

External Z-Axis Input — 2 V p-p for full intensity range. A positive signal blanks the trace. Maximum input voltage is 15 V (dc + peak ac) and p-p ac. Input is dc coupled.

CALIBRATOR

Output Waveshape — Rectangular positive-going from ground.

Voltage Ranges — 40 mV, 0.4 V, 4 V into an open circuit. 4 mV, 40 mV, 0.4 V into 50 Ω . Amplitude accuracy is within 1%. Repetition rate is 1 kHz within 0.25%.

Current Output — 40 mA with optional current loop accessory (012-0341-00) connected to calibrator output. Output R is 450 Ω .



The R7903 requires only 5.25 inches of rack height in a standard 19-inch rack. It is fan-cooled and comes complete with slideout chassis tracks.

OUTPUTS/INPUTS

+Sawtooth — Sawtooth starts 1 V or less from ground into 1 M Ω . Front panel selectable from A or B horizontal. Output voltage is 50 mV/div ($\pm 15\%$) into 50 Ω , 1 V/div ($\pm 10\%$) into 1 M Ω . Output R is $\approx 950 \Omega$.

+GATE — Positive-going rectangular waveform derived from A, B, or Delayed Gate, front panel selectable. Output voltage is 0.5 V ($\pm 10\%$) into 50 Ω , 10 V ($\pm 10\%$) into 1 M Ω . Rise time is 5 ns or less into 50 Ω .

Vertical Signal Out — Selected by B Trigger Source switch. Output voltage is 25 mV/div into 50 Ω , 0.5 V/div into 1 M Ω . Output R is $\approx 950 \Omega$. Bandwidth depends upon vertical plug-in. See page 218.

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

Probe Power — Two rear panel connectors for two active probes.

POWER REQUIREMENTS

Line Voltage Ranges — 90 V to 132 V ac and 180 V to 250 V ac.

Line Frequency — 48 Hz to 440 Hz.

Maximum Power Consumption — 210 W, 3.5 A at 90 V line, 60 Hz.

ENVIRONMENTAL AND SAFETY

Ambient Temperature — Operating: 0°C to +50°C. Nonoperating: -55°C to +75°C.

Altitude — Operating: 5000 m (15,000 ft). Nonoperating: 15 000 m (50,000 ft).

Vibration — Operating: 15 minutes along each of the three major axes. 0.04 cm (0.015 in) p-p displacement 10 Hz to 55 Hz to 10 Hz in one minute cycles. Held for three minutes at 50 Hz.

Humidity — Operating and Nonoperating: 95%, five cycles (120 hours), referenced to MIL-E-16400F.

Shock — Nonoperating: 30 g's, $\frac{1}{2}$ sine, 11 ms duration in each direction along each major axis. Total of six shocks.

EMC Capability — (Option 03) Meets MIL-STD-461B requirements when tested in accordance with certain test methods of MIL-STD-462. Contact your Tektronix representative for more information.

Safety — UL listed (UL 1244) and CSA certified (CSA 556B).

PHYSICAL CHARACTERISTICS

Dimensions	Cabinet		Rackmount	
	mm	in	mm	in
Width	306	12.0	483	19.0
Height	345	13.6	135	5.3
Depth	577	22.7	579	22.8
Weights	kg	lb	kg	lb
Net	16.9	37.2	12.3	27.0
Shipping	21.4	47.0	23.6	52.0

CHARACTERISTICS (R7903)

The following characteristics for the R7903 are in addition to or in lieu of those listed previously.

HORIZONTAL SYSTEM

Channel — Single right-hand plug-in compartment. Compatible with 7B80 Series, 7B90 Series, 7000 Series vertical amplifiers and specialized plug-ins.

Fastest Calibrated Sweep Rate — 500 ps/div with the 7B92A.

CRT AND DISPLAY FEATURES

Option 10, Pulsed Graticule — Provides a means of pulsing the graticule lights at a preset level coincident with a single-shot event in one exposure. The graticule lights may be pulsed by the event, an external ground closure, or a front panel pushbutton. If the mainframe is equipped with CRT readout, Option 10 provides additional controls and inputs for CRT readout pulsed operation.

CALIBRATOR

(NOT AVAILABLE WITH OPTION 10)

Voltage Ranges — 4 mV, 40 mV, 0.4 V, 4 V into an open circuit; 4 mV, 40 mV, 0.4 V into 50 Ω .

Current Output — 40 mA rectangular wave-shape with optional current-loop accessory (012-0341-00) connected to calibrator output. Output R is 450 Ω .

OUTPUTS/INPUTS (STANDARD)

+Sawtooth — Sawtooth starts 1 V or less from ground (into 1 M Ω). Output voltage is 50 mV/div ($\pm 15\%$) into 50 Ω , 1 V/div ($\pm 10\%$) into 1 M Ω . Output R is $\approx 950 \Omega$.

+GATE — Positive-going rectangular waveform derived from Main or Auxiliary Gate. Output voltage 0.5 V ($\pm 10\%$) into 50 Ω , 10 V ($\pm 10\%$) into 1 M Ω . Rise time is 7 ns or less into 50 Ω . Output R is $\approx 950 \Omega$.

Vertical Signal Out — Selected by Trigger Source switches. Output voltage is 25 mV/div into 50 Ω , 0.5 V/div into 1 M Ω . Output R is $\approx 950 \Omega$. Bandwidth depends upon vertical plug-in. See page 219.

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

Single Sweep Ready Output — Rear panel BNC provides 5 V out to indicate single sweep ready condition.

Probe Power — Two front panel connectors for two active probes. Not available for Option 10.

CRT Readout — Inhibit: Ground closure, rear panel BNC input locks out CRT readout. Not available with Option 10. Single Shot: Ground closure, rear panel BNC input initiates one frame of CRT readout. Not available with Option 10 separately, but in combination with the pulsed graticule input.

OUTPUTS/INPUTS (OPTIONS)

Option 10, Pulsed Graticule — No CRT readout single-shot input, CRT readout inhibit input, calibrator, and probe power. Single-shot graticule and CRT readout (ground closure) rear panel BNC input is added. Initiates one frame of CRT readout and pulsed graticule.

POWER REQUIREMENTS

Line Voltage Ranges — 90 V to 132 V ac and 180 V to 264 V ac.

Maximum Power Consumption — 160 W, 2 A at 115 V line, 60 Hz.

ORDERING INFORMATION (PLUG-INS NOT INCLUDED)

Ordering information is common to the 7904A and R7903 unless otherwise noted.

7904A Oscilloscope **\$10,115**

Includes: Power cord (161-0066-00); instruction manual (070-4593-00).

R7903 Oscilloscope **\$9,560**

Includes: Power cord (161-0066-00); test adaptor (012-0092-00); two 18 in test leads (012-0087-00); slide guide (351-0314-01); hardware kit (016-0099-00); instruction manual (070-1464-00).

OPTIONS

Option 02 — (7904A only) X-Y Horizontal Compensation. Adds X-Y delay compensation network to equalize the signal delay between the vertical and the B horizontal compartments. **+ \$260**

Option 03 — EMC Capability. Adds special shielding for protection to the instrument when operated in severe EMC environments. **+ \$395**

Option 04 — (R7903 only) Reduced Scan 4 cm x 5 cm CRT Display. GH (P31) Phosphor is standard. **+ \$500**

Option 10 — (R7903 only) Pulsed Graticule. **+ \$260**

Option 13 — Maximum Brightness 4 cm x 5 cm CRT Display with BE (P11) Phosphor. **+ \$600**

Option 78 — BE (P11) Phosphor. **+ \$100**

CONVERSION KITS

X-Y Horizontal Compensation — (7904A only) Order 040-0606-00 **\$440**

EMC Capability — (7904A) Order 040-0570-00 **\$450**

(R7903) Order 040-0647-00 **\$375**

CRT Readout — (R7903 only) Order 040-0605-05 **\$520**

INTERNATIONAL POWER PLUG OPTIONS

Option A1 — Universal Euro 220 V, 50 Hz.

Option A2 — UK 240 V, 50 Hz.

Option A3 — Australian 240 V, 50 Hz.

Option A4 — North American 240 V, 60 Hz.

Option A5 — Switzerland 220 V, 50 Hz.

OPTIONAL ACCESSORIES

Recommended Plug-ins — See page 218.

Recommended Probes — See pages 219 and 464.

Recommended Cameras — See pages 218 and 442.

Recommended Carts —

K213 Option 12 (7904A), see page 462.

K217 (R7903), see page 462.

TRAINING

Tektronix offers service training classes on the 7904A General Purpose Oscilloscope. For further training information, contact your local Sales/Service Office or request a copy of the Customer Service Training Catalog on the return card in the back of this catalog.