

## SPECIFICATION

The electrical characteristics listed in Table 1-4 apply when the following conditions are met: (1) Adjustment of the instrument must have taken place at an ambient temperature between +20°C and +30°C; (2) the instrument must be allowed a 30-minute warm-up period; (3) all specifications are valid at an ambient temperature of 0° to +50° C, unless otherwise stated; (4) the instrument must be in an environment that meets the limits described in Table 1-5. Any applicable conditions not listed above are expressly stated as part of that characteristic.

Items listed in the Performance Requirements column are verified by completing the Performance Check in this manual. Items listed in the Supplemental Information column are not verified in this manual; they are either explanatory notes or performance characteristics for which no limits are specified.

**Table 1-4**  
**ELECTRICAL CHARACTERISTICS**

Characteristic	Performance Requirement	Supplemental Information
<b>VERTICAL SYSTEM</b>		
Deflection Factor	Compatible with all 7-series plug-in units.	
Accuracy	Less than 1% difference between vertical compartments.	
Low-frequency linearity	0.1 div or less compression or expansion of a center-screen two-division signal when positioned anywhere vertically within the graticule area.	
Bandwidth	Varies with amplifier plug-in selected. See Table 1-7, Vertical System Specification.	
Isolation Between Vertical Compartments (eight-division reference signal)	At least 100:1 from dc to 250 MHz; decreasing to at least 40:1 from 250 MHz to 500 MHz.	
Chopped Mode		
Repetition rate		1 MHz $\pm$ 20%.
Time segment from each compartment		0.4 to 0.6 $\mu$ s.
Delay Line		Permits viewing of leading edge of triggering signal.
Difference in Delay Between Compartments		0.1 ns or less.
Vertical Display Modes		Selected by front-panel VERTICAL MODE switch.
LEFT:	Left vertical unit only.	
ALT:	Dual-trace, alternates between vertical units.	
ADD:	Added algebraically.	
CHOP:	Dual-trace, chopped between vertical units.	
RIGHT:	Right vertical unit only.	
Trace Separation Range for Dual-Sweep Modes		B trace can be positioned approximately +4 and -4 div from the A trace.

Table 1-4 (cont)

**ELECTRICAL CHARACTERISTICS**

Characteristic	Performance Requirement	Supplemental Information
TRIGGER SYSTEM		
Trigger Source		Selected by front-panel A TRIGGER SOURCE AND B TRIGGER SOURCE switches. VERT MODE position automatically provides optimum trigger source for each vertical display mode.
VERT MODE:	Determined by vertical mode.	
LEFT VERT:	From left vertical unit only.	
RIGHT VERT:	From right vertical unit only.	
HORIZONTAL SYSTEM		
Deflection Factor	Compatible with all 7-series plug-in units.	
Deflection Accuracy	Less than 1% difference between compartments.	
DC Linearity	0.1 div or less error at each graticule line after adjusting for no error at the second and tenth graticule lines.	
Bandwidth 10 div reference	dc to at least 1 MHz.	
Fastest Calibrated Sweep Rate	0.5 ns/div	With 7B92A time-base unit only. Other 7B-series units are uncalibrated for first 60 ns of sweep time when used with 7904.
Horizontal Display Modes		Selected by front-panel HORIZONTAL MODE switch.
A:	A horizontal unit only.	
ALT:	Dual-sweep, alternates between horizontal units.	
CHOP:	Dual-sweep, chopped between horizontal units.	
B:	B horizontal unit only.	
Phase Shift Between Vertical and Horizontal Deflection Systems		
Without phase correction	2° or less from dc to at least 35 kHz.	
With phase correction (Option 2)	Adjustable to less than 2° from dc to 1 MHz.	
Chopped Mode Repetition rate	200 kHz $\pm$ 20%.	
Time segment from each compartment	2.0 to 3.0 $\mu$ s.	
Display Factor	At least 75%.	

Table 1-4 (cont)

## ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement	Supplemental Information
<b>CALIBRATOR</b>		
Wave Shape	Square wave and dc.	
Polarity	Positive-going with baseline voltage at zero.	
Output Voltage		Selected by front-panel CALIBRATOR switch.
Open circuit	4 mV, 40 mV, 0.4 V, 4 V, 40 V.	
Into 50 ohms	2 mV, 20 mV, 0.2 V, 0.4 V.	
Output Current	40 mA through front-panel current loop.	
Amplitude Accuracy (Voltage and Current)		
+15°C to +35°C	Within 1%.	
0°C to +50°C	Within 2%.	
Repetition Rates	1 kHz.  1/2 repetition rate of B Sweep gate.  Dc.	Selected by front-panel RATE switch.
1 kHz Accuracy (Voltage and Current)		
+15°C to +35°C	Within 0.25%.	
0°C to +50°C	Within 0.5%.	
Dual Cycle	50% within 0.1%.	
Risetime and Faltime		
4 mV through 4V and 40 mA	Less than 0.25 $\mu$ s.	
40 V	Less than 2 $\mu$ s with 10 pF load.	

Table 1-4 (cont)

## ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement	Supplemental Information
<b>EXTERNAL Z-AXIS INPUT</b>		
Sensitivity	2 V p-p provides trace modulation over full intensity range.	Approximately 0 V input produces no intensity change.
Polarity of Operation	Positive-going signal decreases trace intensity; negative-going signal increases trace intensity.	
Intensity Circuit Pulse Performance (Between Rear-Panel Connector and crt) Low-frequency limit		Dc
Response to negative-going input		Approximately 10 ns.
Response to positive-going input		Approximately 20 ns.
Propagation delay		Approximately 25 ns.
Recovery time in response to positive input step		Approximately 50 ns.
Recover time in response to negative input step		Approximately 0 ns.
Input Resistance at Dc		500 $\Omega \pm 10\%$ .
Maximum Safe Input Voltage		15 V (dc + peak ac)
+Sawtooth Source	A HORIZ time-base unit or B HORIZ time-base unit.	Selected by internal Sweep switch.
Polarity		Positive-going with baseline at 0 V within 1 V (into 1 M $\Omega$ ).
Output voltage Rate of rise	50 mV/unit of time selected by the time base TIME/DIV switch, within 15%.	
Into 50 $\Omega$	100 ns/div maximum.	
Into 1 M $\Omega$ (parallel with 150 pF)	1 V/unit of time selected by the time-base TIME/DIV switch, within 10%. 1 $\mu$ s/div maximum.	
Peak voltage		
Into 50 $\Omega$	At least 500 mV.	
Into 1 M $\Omega$	At least 10 V.	

Table 1-4 (cont)  
ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement	Supplemental Information
<b>EXTERNAL Z-AXIS INPUT (cont)</b>		
Output resistance		950 $\Omega \pm 10\%$ .
+Gate Source	A HORIZ time-base unit.	Selected by internal Gate switch.
	B HORIZ time-base unit. Delaying time-base unit (in either horizontal compartment).	
Polarity		Positive-going with base-line at 0 V within 0.1 V (into 1 M $\Omega$ ).
Output voltage Into 50 $\Omega$	0.5 V within 10%.	
Into 1 M $\Omega$	10 V within 10%.	
Risetime into 50 $\Omega$		3 ns or less.
Output resistance		950 $\Omega \pm 10\%$ .
Vertical Signal Output Source	Determined by B TRIGGER SOURCE switch.	
Output voltage Into 50 $\Omega$	25 mV/div of vertical deflection $\pm 25\%$ .	
Into 1 M $\Omega$	0.5 V/div of vertical deflection $\pm 25\%$ .	
Bandwidth	Varies with amplifier plug-in unit selected; see System Specifications.	
Output resistance		950 $\Omega \pm 10\%$ .
<b>READOUT DISPLAY</b>		
Readout Modes	Free-run independent of sweep.	Selected by internal Readout Mode switch.
	Triggered at end of selected sweep.	
	Single-shot controlled through rear-panel Remote Control Connector J90.	
Word Location		See Fig. 2-5.
Character Height	0.25 div to 0.5 div.	

Table 1-4 (cont)  
ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement	Supplemental Information
<b>READOUT DISPLAY (cont)</b>		
Zero Display Total characters (Each row)	40 zeros displayed, no overlap, at least 9.5 div in width.	With Q2225 removed
Horizontal Centering	Left side within 0.25 div of 0 graticule line.  Right side within 0.25 div of 10th graticule line.	
Vertical Centering Top Row	CH 1 characters located within upper graticule line.	
Bottom Row	CH 2 characters located within lower graticule line.	

**DISPLAY**

Cathode Ray Tube Graticule Type	Internal, illuminated with variable edge lighting.	
Area Standard instrument	8 div vertical by 10 div horizontal. Each division equals 1 cm.	
Option 4	8 div vertical by 10 div horizontal. Each division equals 0.5 cm.	
Phosphor	P31 standard.	Others available on special order.
Beam Finder		Limits display within graticule area when actuated.
Minimum Photographic Writing Speed with Polaroid* Type 410 Film (without film fogging techniques) Standard instrument  Tektronix C-51R camera with /1.2 lens and 1:0.5 object-to-image ratio		P31: 2.81 cm/ns  P11: 6.1 cm/ns
Option 4  Tektronix C-51R camera with /1.2 lens and 1:0.5 object-to-image ratio		P31: 5.0 cm/ns  P11: 10.0 cm/ns

\*Registered trademark of the Polaroid Corporation.

Table 1-4 (cont)

## ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement	Supplemental Information
<b>POWER SUPPLY</b>		
Live Voltage Range Ac, RMS		Selected by rear-panel Line Selector assembly.
115 V nominal	90 to 132 V.	
230 V nominal	180 to 264 V.	
Line Frequency		48 to 440 Hz.
Maximum Power Consumption		190 W, 2.5 A at 60 Hz, 115 V line.

Table 1-5

## ENVIRONMENTAL

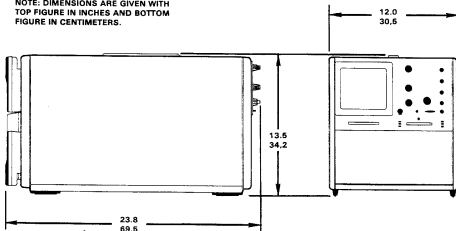
Characteristic	Information
<b>NOTE</b>	
<i>This instrument will meet the electrical characteristics given in the Performance Requirement column of Table 1-4 over the following environmental limits.</i>	
Temperature Range	
Operating	0° to +50° C.
Nonoperating	-55° C to +75° C.
Altitude	
Operating	15,000 feet.
Nonoperating	Test limit 50,000 feet.
EMC (Electro-Magnetic Compatibility) in accordance with MIL-STD-462A (when equipped with Option 3)	<b>NOTE</b> <i>Any unused plug-in compartments must be covered with a blank plug-in panel (EMC shielded) in order to meet EMC specifications. See Instrument Options section for additional information.</i>
Radiated Interference	Interference radiated from the instrument under test within the given limits from 150 kHz to 1000 MHz.
Conducted Interference	Interference conducted out of the instrument under test through the power cord within the given limits from 150 kHz to 25 MHz.
Transportation (packaged instrument, without plug-ins)	Qualifies under National Safe Transit Committee test procedure 1A, Category 11.

Table 1-6

## PHYSICAL

Characteristic	Information
Ventilation	Convection cooling. Automatic resetting thermal cutout protects instrument from overheating.
Warm-up Time	20 minutes for rated accuracy.
Finish	Anodized front- and rear-panel with blue-vinyl painted aluminum cabinet.
Overall Dimension (measured at maximum points); See Fig. 1-2 for dimensional drawing.	
Height	13.5 in. 34.2 cm
Width	12.0 in. 30.5 cm
Length	23.8 in. 69.5 cm
Net Weight (Instrument Only)	30.0 lbs. 13.5 kg

NOTE: DIMENSIONS ARE GIVEN WITH  
TOP FIGURE IN INCHES AND BOTTOM  
FIGURE IN CENTIMETERS.



2390-02

Fig. 1-2. 7904 dimensional drawing.