SPECIFICATION AND PERFORMANCE CHECK

SPECIFICATION

Performance Conditions

The electrical characteristics are valid only if the SC 504 has been calibrated at an ambient temperature between +20° C and +30° C and is operating at an ambient temperature between 0° C to +50° C unless otherwise noted.

Items listed in the Performance Requirements column of the Electrical Characteristics 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.

ELECTRICAL CHARACTERISTICS

Table 2-1

VERTICAL DEFLECTION SYSTEM

Characteristics	Performance Requirements		Supplemental Information	
Bandwidth at −3 dB points	0° C to +35° C	0° C to +50° C		
	DC to at least 80 MHz.	DC to at least 70 MHz.		
			0° C to +35° C	0° C to 50° C
Risetime (calculated)			4.4 ns or less.	5.0 ns or less.
AC low frequency response (Lower 3 dB point)	10 Hz, or less.		1 Hz with 10X probe.	
Deflection factor				
Calibrated range			5 mV to 10 V/div; 11 steps in a 1-2-5 sequence.	
	+15° C to +35° C	0° C to +50° C		
Accuracy	±2%	±3%	Variable in cal position (fully cw); gain correctly set at 10 mV/div.	
	Add 1% to above figures for channel 2 in CH1-CH2 (differential) mode.			
Attenuator step balance			Less than 1 division of shift as each VOLTS/DIV switch is rotated throughout its range.	

Table 2-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
Variable balance		Less than 2 divisions of shift as each variable (CAL) control is rotated throughout its range.
Uncalibrated (variable) range	Continuously variable between calibrated steps. Extends maximum attenuator step to at least 25 V/div.	At least a 2.5:1 range.
Input R and C		1 MΩ ±1% paralleled by approximately 20 pF.
Maximum input voltage		
Peak (dc + Peak ac)		250 V (dc coupled). 400 V (ac coupled).
Peak-to-peak (ac component)		500 V at 1 kHz or less, derates to 10 V at 100 MHz.
Common mode rejection ratio	At least 50:1 up to 1 MHz and 10:1 up to 10 MHz when using same attenuator settings; common mode signal 6 divisions or less.	
Step Response (aberrations)		
First 300 ns:		
5 mV/div to .2 V/div		
Positive-going step		
15° C to 35° C		±3%
0° C to 50° C		±6%
Negative-going step		
15° C to 35° C		±5%
0° C to 50° C		±8%
(CH1 + CH 2) mode		
15° C to 35° C		±5%
0° C to 50° C		±8%
(CH 1 − CH 2) mode		
15° C to 35° C		±8%
0° C to 50° C		±11%
After 300 ns:		
5 mV/div to 2 V/div		±2%
5 V/div and 10 V/div		±3%

Table 2-1 (cont)

Characteristics	Performance Requirements	Supplemental Information
Position effect 15°C to 35°C		Typically 5% or less change in aberrations as a 5 division step is vertically positioned over the graticule area.
CH2 invert trace shift		Less than 2 div when switching from CH1 + CH2 to CH1 − CH2.
Signal isolation		
Display related	At least 50:1 up to 20 MHz.	
Input related		
a. Between front panel inputs	At least 80 dB up to 10 MHz.	
b. Between rear interface inputs		At least 40 dB up to 20 MHz.
c. From front panel input to rear interface input (each channel)		At least 40 dB up to 20 MHz.
d. From rear interface input to front panel input (each channel)		At least 80 dB up to 40 MHz.
Position Range		At least ±6 divisions.
Signal delay between channels		≤1 ns.
Delay line		Permits viewing leading edge of displayed waveform.
Dual-trace modes		
Rate		
Chop		At least 250 kHz.
Duty cycle		Approximately 60%.
Alt		Every other sweep.

Table 2-2

TRIGGERING

Characteristics	Performance Requirements			Supplemental Information		
	Source	Minimum Signal Required		Source	Minimum Signal Required	
Trigger sensitivity						
DC coupling		dc to 30 MHz.	30 MHz to 80 MHz.	Interface	35 mV	80 mV
	CH1, CH2	0.4 div.	1.5 div.			
	External	60 mV	150 mV			
AC coupling				Requirements increase below approximately 50 Hz.		
AC LF REJ coupling				Requirements increase below approximately 10 kHz.		
HF REJ coupling				Requirements increase above approximately 50 kHz.		
External triggering level range (Normal mode)	At least ±1.4 V.					
External triggering input						
Input R and C				1 mΩ ±10% paralleled by approximately 24 pF when selected. 750 kΩ ±10% paralleled by approximately 28 pF when not selected.		
Maximum input voltage						
Peak (dc + Peak ac)				250 V.		
Peak-to-peak (ac component)				250 V at 1 kHz or less, derates to 5 V at 100 MHz.		
Auto mode	Sweep free-runs in the absence of a triggering signal.			TRIGGER LEVEL range is reduced to approximately the peak to-peak range of the triggering signal. Internal and external trigger sensitivity reduced below approximately 100 Hz.		
Single Sweep	Triggering requirements same as for normal sweep. When triggered, sweep generator produces one sweep only.					

Table 2-3

HORIZONTAL DEFLECTION SYSTEM

Characteristics	Performance Requirements				Supplemental Information
Sweep generator					
Calibrated sweep rates					0.2 s to 50 ns/div, 21 steps in a 1-2-5 sequence.
Accuracy (measured over center 8 divisions, excluding first 50 ns and all after the first 100 divisions of magnified sweep)					
	+15° c to +35° C		0° C to +50° C		
	Unmagnified	Magnified X10	Unmagnified	Magnified X10	
20 ms/div to .2 μs/div	±2%	±3%	±3%	±4%	
Linearity (any 2 division portion within the center 8 divisions)	±5%	±6%	±6%	±7%	
.2 s/div to 50 ms/div, and .1 μs/div and 50 ns/div	±3%	±4%	±4%	±5%	
Linearity (any 2 division portion within the center 8 divisions)	±6%	±7%	±7%	±8%	
Uncalibrated (variable) range	The SECONDS/DIV CAL (variable) control (selected by an internal switch) provides sweep rates that are continuously variable between the calibrated rates, and extends the slowest sweep rate to at least 0.5 s/div.				
Trigger holdoff					The SECONDS/DIV CAL (variable) control (selected by an internal switch) increases trigger holdoff time by a factor of approximately 20.

Table 2-3 (cont)

Characteristics	Performance Requirements	Supplemental Information
X-Y operation		
Bandwidth		Dc to at least 2 MHz.
Deflection factor		Selected by channel 2 controls and horizontal mag x1, x10.
Accuracy		±5%.
X and Y amplifier phase difference	Less than 3° at 50 kHz or less.	
Ac low frequency response (lower −3 dB point)	10 Hz or less.	1 Hz with 10X probe.
Input R and C		1 MΩ ±1% paralleled by approximately 20 pF.
Maximum safe input voltage		
Peak (dc + peak ac)		250 V (dc coupled). 400 V (ac coupled).
Peak-to-peak (ac components)		500 V at 1 kHz or less, derates to 10 V at 100 MHz.

Table 2-4

CATHODE RAY TUBES

Characteristics	Performance Requirements	Supplemental Information
Geometry	Bowing or tilt 0.1 major division or less.	
Orthogonality		90°C ±1.4°C.
Phosphor		P31.
Acceleration potential		12 kV.
Graticule		Scale is 8 x 10 divisions with 0.25 inch/div with internal graticule lines.

Table 2-5

POWER SUPPLIES AND CALIBRATOR

Characteristics	Performance Requirements	Supplemental Information
Calibrator		
Voltage	0.6 V, ±1%.	
Frequency		Approximately 1 kHz.
Power consumption		Approximately 26 watts operating.
		Less than 1 W, with TRIGGER SOURCE switch set to STBY (stand by).

Table 2-6

REAR INTERFACE INPUT AND OUTPUT SIGNALS

Characteristics	Performance Requirements	Supplemental Information
Input Signals		
Channel 1 vertical input Channel 2 vertical input		Selected by CH1 and CH2 coupling switches in INT DC interface) position.
		Input R: 50 Ω. Maximum input voltage: 40 V peak, 5 V rms. Maximum input power: 1/2 W.
Trigger input		Selected by TRIGGER SOURCE switch in INT DC (interface) position.
		Input R: 50 Ω when selected, 25 Ω when not selected. Maximum input voltage: 40 V peak. Maximum input power: 1/4 W, 2.5 V rms.
Z-axis input		Input Resistance: approximately 1.5 kΩ; +5 V turns beam ON from OFF condition. −5 V turns beam OFF from ON condition.
Input signals		
External (delayed) Gate input		Ecl balanced input with the input resistance approximately 100 Ω and operating between +5 V and ground.
Gate select input		Open selects the internal gate. Ground (1 kΩ or less) selects the external gate.

Table 2-6 (cont)

Characteristics	Performance Requirements	Supplemental Information
Intensify input		Ecl input. A low (≤3.4 V) intensifies. A high, or open circuit (≥4.0 V) does not intensify. Ecl circuit operates between +5 V and ground.
Output signals		
Channel 1 trigger output		At least 50 mV/div. Bandwidth at least 30 MHz. Output resistance ≤50 Ω.
Triggered gate output		Ecl balance output operating between +5 V and ground.
Holdoff output		Ecl balanced output operating between +5 V and ground.
Ramp output		0 to +10 V ramp. Output resistance approximately 500 Ω.

ENVIRONMENTAL CHARACTERISTICS

Table 2-7

ENVIRONMENTAL CHARACTERISTICS

Characteristics	Description
Temperature	
Operating	0°C to +45°C. To +50°C in mainframes equipped with fan.
Storage	−40°C to +75°C.
Altitude	
Operating	To 15,000 feet; maximum operating temperature decreased by 1°C/1000 feet from 5,000 to 15,000 feet.
Storage	To 50,000 feet.
Shock	
Operating and non-operating	30 g's, 1/2 sine, 11 ms duration, 3 shocks in each direction along 3 major axes, for a total of 18 shocks.
Vibration	
Operating and non-operating	With the instrument operating, the vibration frequency is swept from 10 to 55 to 10 Hz. Vibrate 15 minutes in each of the three major axes at 0.015" total displacement. Hold 10 minutes at any major resonance or, if none, at 55 Hz. Total time, 75 minutes.

PHYSICAL CHARACTERISTICS

Table 2-8

PHYSICAL CHARACTERISTICS

Characteristics	Description
Net weight	Approximately 6.0 lbs (2.7 kg).
Dimensions	5.3 in (13.5 cm) W x 12.2 in (30.99 cm) D x 5 in (12.7 cm) H.