

# SPECIFICATION AND PERFORMANCE CHECK SPECIFICATION

The following electrical characteristics are valid only if the instrument has been calibrated at an ambient temperature between +20°C and -30°C, the instrument is operating at an ambient temperature between 0°C and -50°C (unless otherwise noted), and each plug-in must be operating (fully installed) in a calibrated system.

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 may not be verified in this manual; they are either explanatory notes or performance characteristics for which no limits are specified.

## ELECTRICAL CHARACTERISTICS

Table 2-1  
VERTICAL AMPLIFIER

Characteristics	Performance Requirements	Supplemental Information
Input Signal Amplitude (Differential Input)		50 mV/displayed div
Bandwidth	Dc to at least 2 MHz with a calibrated 5A18N.	
Channel Switching Chop Time Segment/Channel		Approximately 5 $\mu$ s ( $\approx$ 4 $\mu$ s) displayed. $\approx$ 1 $\mu$ s blanked.
Mainframe Compartment Chop Switching Sequence		Left, left, center, center...
Amplifier Channel Chop Switching Sequence		2 channel amplifier: Ch 1, Ch 2... 4 channel amplifier: Ch 1, Ch 2, off, off, Ch 3, Ch 4, off, off...
Alternate Frequency	Sweep rate (once each sweep).	
Mainframe Compartment Alternate Rate	One-half sweep rate (once every two sweeps).	
Amplifier Channel Alternate Rate	One-fourth sweep rate (once every four sweeps).	
Sensitivity Change		Accuracy degrades by up to 1% when operated in split-screen storage
Signal Outputs (Option 7) Left Out, Center Out Signals	Gr-related vertical signals.	Derived from interface signal output pins.
Sensitivity	0.5 V/div, $\pm$ 3% into $\geq$ 100 k $\Omega$ .	
DC Offset		$\pm$ 500 mV max.
Output Impedance	Approximately 1 k $\Omega$ .	
Dynamic Range		+4 V min.
Amplifier Bandwidth	$\geq$ 500 kHz up to $\pm$ 2 V output into $\leq$ 50 pF.	
Common Mode Rejection Ratio		$\geq$ 28 dB at 1 kHz.
Noise and Chop Breakthrough <sup>1</sup>	$\leq$ 100 mV at each output connector.	

If excessive noise and chop breakthrough occur, refer to the following discussion, **Modifications to Pre-Option 7 Amplifier Plug-Ins in Section 4 Maintenance.**

**Table 2-2  
HORIZONTAL AMPLIFIER**

Characteristics	Performance Requirements	Supplemental Information
Input Signal Amplitude (Differential Input)		50 mV/divided div.
Horizontal Centering		0.5 division or less.
Bandwidth	Dc to at least 2 MHz with a calibrated 5A18N having a serial number above B128130.	
X-Y Phase Difference Between Vertical and Horizontal Compartments	1° or less to 100 kHz.	Checked with two plug-ins of the same type.
Sensitivity Change		Accuracy degrades by up to 1% when operated in split-screen storage.
Signal Outputs (Option 7) Right Out Signal		Crt-related sweep signal. Derived from interface signal output pins.
Sensitivity	0.5 V/crt div, ±3% into ≥100 kΩ.	
Polarity and Output Voltage		Positive-going ramp, ≥5 V. DC offset provided by timebase position control.
Output Impedance	Approximately 1 kΩ.	
Gate Out Signal		Crt-related Z-axis signal. Selected by time-base unit.
Output Levels		TTL compatible. Low: Sinking 1.6 mA, ≤0.4 V. High: Supplying 40 μA, ≥2.4 V.
Risetime		≤1.5 μs into ≤50 pF.
Falltime		≤300 ns into ≤50 pF.

**Table 2-3  
Z-AXIS AMPLIFIER**

Characteristics	Performance Requirements	Supplemental Information
External Intensity Input Useful Input Voltage	5 V will turn on display to a normal brightness level from an off level; -5 V will turn off display from a normal brightness level.	
Usable Frequency Range	Dc to 1 MHz.	
Input R and C		Approximately 10 kΩ, paralleled by approximately 40 pF.
Maximum Safe Input		±5 V (dc + peak ac).

**Table 2-4  
DISPLAY**

Characteristics	Performance Requirements	Supplemental Information
Cathode-Ray Tube		
Deflection		Electrostatic.
Phosphor		Equivalent to P1.
Accelerating Voltage		3.5 kV.
Orthogonality		90°, within 1°.
Geometry		0.1 division or less.
Storage		
Writing Speed	At least 20 div/ms (center 6 x 8 div).	At least 50 div/ms enhanced (center 6 x 8 div).
Option 3	At least 200 div/ms (center 6 x 8 div).	At least 800 div/ms enhanced (center 6 x 8 div).
Storage Time		1 hour.
Erase Time		Approximately 250 ms.
Beam Finder		Limits display to within graticule area and intensifies display if brightness level is low.

**Table 2-5  
CALIBRATOR AND POWER INPUT**

Characteristics	Performance Requirements	Supplemental Information
Calibrator		
Voltage		400 mV, within 1%.
Current		4 mA, within 1%.
Frequency		Twice the line frequency.
Power Input		
Line Voltage (RMS)		Nominal 100 V, 110 V, 120 V, 200 V, 220 V, 240 V +10% (250 V max.).
Fuse Data		1.6 A slow blow (120 V ac). 1 A slow blow (240 V ac).
Line Frequency		48 to 440 Hz.
Power Consumption		Typical mainframe only: 63 W. With 3 typical plug-ins: 74 W. Maximum: 110 W.
Insulation Voltage		1500 V rms minimum at 50 to 60 Hz for 10 seconds duration minimum.
Ground Continuity		Less than 0.1 Ω between safety ground and instrument.

## ENVIRONMENTAL CHARACTERISTICS

Table 2-6

### ENVIRONMENTAL

Characteristics	Information
Temperature	
Operating	0° C to -50° C
Storage	40° C to -70° C.
Altitude	
Operating	To 15,000 feet (4.57 km).
Storage	To 50,000 feet (15.23 km).
Vibration	
Operating and Non-operating	With the instrument complete and operating, vibration frequency swept from 10 to 50 to 10 Hz at 1 minute per sweep. Vibrate 15 minutes in each of the three axes at 0.015" (0.038 cm) total displacement. Hold 3 minutes at any resonance, or if none, at 50 Hz. Total time, 54 minutes.
Shock	
Operating and Non-Operating	30 g's, 1/2 sine, 11 ms duration, 2 shocks in each direction, along 3 major axes for a total of 12 shocks.
Transportation	Qualified under National Safe Transit Committee Test Procedure 1A, Category II.

## PHYSICAL CHARACTERISTICS

Table 2-7

### PHYSICAL

Characteristics	Information	
	Bench Oscilloscope	Rack Oscilloscope
Overall Dimensions		
Height	12.0 in. (305 mm).	5.2 in. (132 mm).
Length	20.4 in. (518 mm).	20.4 in. (518 mm). Rack depth required: 19.9 in. (483 mm)
Width	8.4 in. (214 mm).	19.9 in. (483 mm).
Net Weight	Approximately 22.5 lbs. (10.2 kg).	Approximately 23.6 lbs. (10.7 kg).
Shipping Weight	Approximately 30.0 lbs. (13.6 kg).	Approximately 39.0 lbs. (17.7 kg).
Export Weight	Approximately 45.0 lbs. (20.4 kg)	Approximately 59.0 lbs. (26.8 kg).
Finish	Anodized aluminum front panel. Blue-vinyl coated cabinet.	