



**Advanced Test Equipment Rentals**  
**www.atecorp.com 800-404-ATEC (2832)**

**Tektronix**

**11A34**  
**Four Channel Amplifier**  
**070-5921-01**

**Please check for change information at the rear  
of this manual.**

First Printing: September 1988  
Revised: November 1988

# Section 4

## Specification

### Performance Conditions

The specifications that follow apply when the instrument is in the condition of Enhanced Accuracy. Enhanced Accuracy is initiated by pushing the **E A**, button on the specific host mainframe after the system has reached thermal equilibrium, which requires 20 minutes warmup. Enhanced Accuracy is indicated on the CRT display and remains in effect as long as the mainframe internal temperature change is less than 5° C from the temperature at which the calibration was performed. When the 5° C change does occur the accuracy condition becomes Not-Enhanced. In the Not-Enhanced condition those Characteristics that are temperature sensitive may not remain within the limits of these specifications. The instrument specifications are valid at an ambient temperature of 0° to +50° C, unless otherwise stated.

TABLE 4-1  
Electrical Characteristics

Circuit	Characteristic	Performance Requirement		
Display Deflection Factor (Sensitivity)	Calibrated Range	1 mV to 10 V/div.		
	Enhanced DC Accuracy <sup>1</sup> , either polarity, any HF Limit of 11A32 in 11300 Series mainframes, with on-screen cursors.			
	Without Probes			
	Volts/Div	$\Delta V$ DC Acc.	DC Balance	DC Offset Acc.
	1 mV to 99.5 mV	$\pm(1.0\% + 0.04 \text{ div})$	$\pm(1 \text{ mV} + 0.13 \text{ div})$	$\pm(0.20\% + 0.50 \text{ mV})$
	100 mV to 995 mV	$\pm(1.0\% + 0.04 \text{ div})$	$\pm(10 \text{ mV} + 0.13 \text{ div})$	$\pm(0.25\% + 5 \text{ mV})$
1 V to 10 V	$\pm(1.0\% + 0.04 \text{ div})$	$\pm(100 \text{ mV} + 0.13 \text{ div})$	$\pm(0.25\% + 50 \text{ mV})$	
With P6134 Probe calibrated from 11300-series Mainframe Calibrator output				
Volts/Div	$\Delta V$ DC Acc.	DC Balance	DC Offset Acc.	
10 mV to 995 mV	$\pm(1.0\% + 0.04 \text{ div})$	$\pm(12 \text{ mV} + 0.13 \text{ div})$	$\pm(0.25\% + 5 \text{ mV})$	
1 V to 9.95 V	$\pm(1.0\% + 0.04 \text{ div})$	$\pm(120 \text{ mV} + 0.13 \text{ div})$	$\pm(0.25\% + 50 \text{ mV})$	
10 V to 100 V	$\pm(1.0\% + 0.04 \text{ div})$	$\pm(1.2 \text{ V} + 0.13 \text{ div})$	$\pm(0.25\% + 0.5 \text{ V})$	
Probe tip TC term	100 ppm/°C	na	na	

<sup>1</sup>For absolute DC accuracy of single-point measurements using Offset, add the DC Offset Accuracy, DC Balance and  $\Delta V$  DC Accuracy terms. Apply the  $\Delta V$  DC Accuracy only to the difference between the Vertical Position setting and the measurement point.

**TABLE 4-1 (cont)**  
**Electrical Characteristics**

Circuit	Characteristic		Performance Requirement	
<b>Display Deflection Factor (Sensitivity) (cont)</b>	With P6231 Probe calibrated from 11300-series Mainframe Calibration output			
	<b>Volts/Div</b>	<b><math>\Delta V</math> DC Acc.</b>	<b>DC Balance</b>	<b>DC Offset Acc.</b>
	10 mV to 995 mV	$\pm(1.1\% + 0.04 \text{ div})$	$\pm(10 \text{ mV} - 0.13 \text{ div})$	$\pm(0.20\% + 2 \text{ mV})$
	$\geq 1 \text{ V}$	$\pm(1.1\% + 0.04 \text{ div})$	$\pm(100 \text{ mV} - 0.13 \text{ div})$	$\pm(0.20\% + 2 \text{ mV})$
	Probe Tip TC term	100 ppm/ $^{\circ}$ C		
	<b>Enhanced DC Accuracy<sup>1</sup>, either polarity, any BW Limit, of 11A34 in 11401 and 11402 mainframes.</b>			
	Without Probes			
	<b>Volts/Div</b>	<b><math>\Delta V</math> DC Acc.</b>	<b>DC Balance</b>	<b>DC Offset Acc.</b>
	1 mV to 99.5 mV	$\pm(0.9\% + 0.012 \text{ div})$	$\pm(1 \text{ mV} + 0.10 \text{ div})$	$\pm(0.20\% + 0.50 \text{ mV})$
	100 mV to 995 mV	$\pm(0.9\% + 0.012 \text{ div})$	$\pm(10 \text{ mV} + 0.10 \text{ div})$	$\pm(0.25\% + 5 \text{ mV})$
1 V to 10 V	$\pm(0.9\% + 0.012 \text{ div})$	$\pm(100 \text{ mV} - 0.10 \text{ div})$	$\pm(0.25\% + 50 \text{ mV})$	
With P6134 Probe calibrated from 11401 and 11402 Calibrator output				
<b>Volts/Div</b>	<b><math>\Delta V</math> DC Acc.</b>	<b>DC Balance</b>	<b>DC Offset Acc.</b>	
1 mV to 995 mV	$\pm(0.9\% + 0.012 \text{ div})$	$\pm(7.0 \text{ mV} + 0.10 \text{ div})$	$\pm(0.25\% + 5 \text{ mV})$	
1 V to 9.95 V	$\pm(0.9\% + 0.012 \text{ div})$	$\pm(70 \text{ V} + 0.10 \text{ div})$	$\pm(0.25\% + 50 \text{ V})$	
10 V to 100 V	$\pm(0.9\% + 0.012 \text{ div})$	$\pm(0.7 \text{ V} + 0.10 \text{ div})$	$\pm(0.25\% + 0.5 \text{ V})$	
Probe tip TC term	100 ppm/ $^{\circ}$ C	na	na	
With P6231 Probe calibrated from 11401 and 11402 Calibrator output.				
<b>Volts/Div</b>	<b><math>\Delta V</math> DC Acc.</b>	<b>DC Balance</b>	<b>DC Offset Acc.</b>	
10 mV to 995 mV	$\pm(1.0\% + 0.012 \text{ div})$	$\pm(5 \text{ mV} + 0.10 \text{ div})$	$\pm(0.20\% + 2 \text{ mV})$	
$\geq 1 \text{ V}$	$\pm(1.0\% + 0.012 \text{ div})$	$\pm(50 \text{ mV} + 0.10 \text{ div})$	$\pm(0.20\% + 2 \text{ mV})$	
Probe Tip TC term	100 ppm/ $^{\circ}$ C			

<sup>1</sup>For absolute DC accuracy of single-point measurements using Offset, add the DC Offset Accuracy, DC Balance and  $\Delta V$  DC Accuracy terms. Apply the  $\Delta V$  DC Accuracy only to the difference between the Vertical Position setting and the measurement point.

TABLE 4-1 (cont.)  
Electrical Characteristics

Circuit	Characteristic	Performance Requirement
Display Deflection Factor (Sensitivity) (cont)	Coarse Resolution	1, 2, 5 sequence.
	Fine Resolution	Depends on Deflection Factor, as follows:  Rotating the Fine control one increment will change the Deflection Factor by 1% of the next more-sensitive Coarse setting.  For example, with deflection factor set to 198 mV, rotating the Fine control counterclockwise will cause this sequence of sensitivities: 199 mV, 200 mV, 202 mV, etc. Rotating the Fine control clockwise from 204 mV/div will cause the reverse sequence (202 mV, 200 mV, 199 mV, etc.).
Display Offset	Accuracy	See <i>Deflection Factor Accuracy</i> , which precedes this characteristic.
	Range, Resolution depend on Deflection Factor, as follows:  Between 1 mV and 99.5 mV/div.  Between 0.1 V and 0.995 V/div.  Between 1 V and 10.0 V/div.	  $\pm 1$ V. Coarse and fine resolution are 0.25 div. (250 $\mu$ V) and 0.025 div. (25 $\mu$ V), respectively.  $\pm 10$ V. Coarse and fine resolution are 0.25 div. (2.5 mV) and 0.025 div. (250 $\mu$ V), respectively.  $\pm 100$ V. Coarse and fine resolution are 0.25 div (25 mV) and 0.025 div. (2.5 mV), respectively.

**TABLE 4-1 (cont.)  
Electrical Characteristics**

Circuit	Characteristic	Performance Requirement			
<b>Display Frequency Response</b> (0° to +35° C)	High Frequency Limit (-3 dB point) of Display, Auxiliary, & Trig signals, Z <sub>in</sub> =50 Ω and Calculated Rise Time	Type of Mainframe			
	Volts/Division	11301(A)	11302(A)	11401	11402
	≥10 mV	250 MHz 1.4 ns	250 MHz 1.4 ns	300 MHz 1.2 ns	300 MHz 1.2 ns
	5 mV – 9.95 mV	200 MHz 1.8 ns	250 MHz 1.4 ns	250 MHz 1.4 ns	250 MHz 1.4 ns
	2 mV – 4.98 mV	200 MHz 1.8 ns	200 MHz 1.8 ns	200 MHz 1.8 ns	200 MHz 1.8 ns
	1 mV – 1.99 mV	150 MHz 2.3 ns	150 MHz 2.3 ns	150 MHz 2.3 ns	150 MHz 2.3 ns
	High Frequency -3 dB point  100 MHz Limit  20 MHz Limit	100 MHz ±30%  20 MHz ± 30%			
	Low Frequency -3 dB point, AC coupled Display, Trig, and Auxiliary signals	10 Hz maximum.			

**TABLE 4-1 (cont.)**  
**Electrical Characteristics**

Circuit	Characteristic	Performance Requirement
<b>Input</b>	Maximum Input Voltage, DC Coupled, $Z = 1\text{ M}\Omega$	$\pm 500\text{ V}$ (DC +peak AC). Derate at 20 dB per decade from 1 MHz to 5.0 V at 100 MHz.
	Maximum Input Voltage, AC Coupled, $Z = 1\text{ M}\Omega$	$\pm 500\text{ V}$ (DC +peak AC). Derate at 20 dB per decade from 1 MHz to 5.0 V at 100 MHz.
	Maximum Input Voltage, AC or DC Coupled, $Z = 50\ \Omega$	5 Vrms (0.5 W) or 0.5 watt-second pulses not exceeding 25 V peak.
	Input Disconnect Threshold	5 Vrms minimum.
	Input Impedance ( $50\ \Omega$ , DC coupled)	$50\ \Omega$ within 1/2%; VSWR less than 1.25:1 for $V/\text{div} < 1\text{ V}$ ; VSWR less than 1.3:1 for $V/\text{div}$ from 1 V to 10 V, DC to 350 MHz.
	Input Impedance ( $1\text{ M}\Omega$ , DC coupled)	$1\text{ M}\Omega$ within 1/2% in parallel with approximately 15 pF.
	Input Impedance ( $1\text{ M}\Omega$ , AC coupled)	$1\text{ M}\Omega$ within 1/2%, in series with $0.022\ \mu\text{F}$ and in parallel with approximately 15 pF.
	Input Bias Current ( $0^\circ$ to $+30^\circ\text{ C}$ )	Less than 100 pA.

**TABLE 4-1 (cont.)  
Electrical Characteristics**

Circuit	Characteristic	Performance Requirement
<b>Miscellaneous</b>	Overdrive Recovery Time	
	1 mV to 99.5 mV/div	<50 ns to 0.3% + 0.2 div for Vin of <2.0 V.
	100 mV to 995 mV/div	<50 ns to 1.0% for Vin of <20 V.
	1.0 V to 10.0 V/div	<50 ns to 1.0% for Vin of <200 V.
	Typical Noise	
	1.0 mV to 1.99 mV/div	0.12 div, rms.
	2.0 mV to 4.98 mV/div	0.06 div, rms.
	5.0 mV to 9.95 mV/div	0.025 div, rms.
	10.0 mV to 99.5 mV/div	0.014 div, rms.
	100 mV to 995 mV/div	0.014 div, rms.
1.0 V to 10.0 V/div	0.014 div, rms.	
DC Drift with Temperature	200 $\mu$ V/ $^{\circ}$ C, or less, at any sensitivity. <sup>1</sup>	
Channel Isolation	At least 50:1 display ratio <sup>2</sup> , DC -300 MHz.	
Common Mode Rejection Ratio	At least 20:1, DC to 50 MHz, 10-div reference signal on each input.	
Probe Compatibility	The 11A34 is compatible with Level 1 and Level 2 TEKPROBES. <sup>3</sup>	

<sup>1</sup>DC drift can be calibrated out by invoking a calibration (Enhanced Accuracy) at any specific operating temperature.

$$^2\text{Display ratio} = \frac{\text{Amplitude (div)} \times \text{V/div (driven channel)}}{\text{Error amplitude (div)} \times \text{V/div (undriven channel)}}$$

<sup>3</sup>TEKPROBE is Tektronix' name for the interface used with probes designed for the 11000-series of oscilloscopes and plug-in units. TEKPROBES have output connectors with one or more spring loaded coding pins. Two categories of TEKPROBES are:

**Level 1**

A level 1 probe, which uses analog encoding to indicate the probe's scale factor to the plug-in unit.

**Level 2**

A level 2 probe, which uses an EEPROM to store data about the probe's transfer units, scale factor, and output voltage scale factor. Such data are serially encoded, then stored in the EEPROM. The probe data is intended to be read once at instrument power-up or when the probe is first connected to a plug-in unit (that is, at probe power-up).

**TABLE 4-2**  
**Environmental Characteristics**

Characteristic	Information
Ambient Temperature (external to main frame)	
Operating within specs.	0° to 50° C., mainframe ambient.
Nonoperating	-40° to +75° C.
Humidity, Operating and Nonoperating	Five days, per MIL-T-28800C. Type III, class 5 as described in 3.9.2.2 and 4.5.5.1.2.2.
Altitude	
Operating	To 4,570 m (15,000 ft.).
Nonoperating	To 15,200 m (50,000 ft.).
Vibration	
Operating, installed on Flexible Extender	MIL-T-28800C, Sec. 4.5.5.3.1, type III, class 5.
Shock, Nonoperating (not installed in mainframe)	MIL-T-28800C, Sec. 4.5.5.4.1, type III, class 5.
Bench Handling (operating and nonoperating)	MIL-T-28800C, Sec. 4.5.5.4.3 type III, class 5.
Packaged Product Vibration and Shock	
Vibration and Bounce of Packaged Product	Meets ASTM D999-75, Method A (NSTA Project 1A-B-1).
Drop of Packaged Product	Meets ASTM D775-61, Paragraph 5 (NSTA Project 1A-B-2).
Electromagnetic Compatibility	MIL. STD. 461B. FCC Part 15, Subpart J, Class A. VDE 0871/6.78, Class B.

**Table 4-3**  
**Physical Characteristics**

Characteristic	Information
Weight (max)	2 lb. 7 oz. (1.1 kg)
Weight of Packaged Product (max)	5 lb. 5 oz. (2.4 kg)
Dimensions (max)	Refer to Figure 4-1.

## Recommended Probes

Tektronix recommends these probes for use with the 11A34:

P6134 Subminiature 10X Passive Probe with ID. With 1 M $\Omega$  inputs, the P6134's input impedance is 10 M $\Omega$  in parallel with 10.5 pF. The P6134 is a Level 1 probe.

P6231 Low Impedance Subminiature 10X Active Probe. The P6231 has a bandwidth of 1.5 GHz, input impedance of 450  $\Omega$ , and DC offset of  $\pm 5$  V controlled by the 11A34. The P6231 is a Level 2 probe.