

Calibration Manual. Equivalent instruments can be substituted if the recommended models are not available. The Calibration Adjustment procedure is called out as part of the Troubleshooting procedure. The DMM and Oscilloscope are also required for fault isolation; how-

ever, in some cases a logic probe, e.g., the Tektronix P6401, may be substituted for the Oscilloscope.

1-6. SPECIFICATIONS

1-7. Table 1-2 lists the 8520A specifications.

Table 1-1. Test Equipment

ITEM	SPECIFICATIONS (MINIMUM)	NOMENCLATURE
DMM Oscilloscope DC Voltage Standard Ratio Standard AC Calibrator Power Amplifier Standard Resistor w/Accessories	5½ digits 0.005% dc accuracy General Purpose 0.001% Accuracy 0.1 ppm Resolution, 1 ppm Terminal Linearity ≥0.03% Accuracy @ 20 kHz ≥0.044% Accuracy @ 20 kHz	FLUKE 8800A TEKTRONIX T900 Series FLUKE 382D or 335D FLUKE 720A FLUKE 5200A FLUKE 5205A or 5215A ESI 1010 100Ω and 10 kΩ, ESI 1050 1 MΩ, ESI SB103 shorting bars, ESI PC101 Parallel Compensation Network
Load	1 MΩ/1μF	1 MΩ ±1% 1/8 W, mF resistor in parallel with a 1 μF ±20% 10V capacitor

Table 1-2. 8520A Specifications

DC VOLTS**Input Characteristics**

RANGE	FULL-SCALE	RESOLUTION	INPUT RESISTANCE
100 mV	199.999	1 μ V	$\geq 10,000$ M Ω
1V	1.99999	10 μ V	$\geq 10,000$ M Ω
10V	15.0100	100 μ V	$\geq 10,000$ M Ω
100V	130.000	1 mV	10 M Ω
1000V	1024.00	10 mV	10 M Ω

Accuracy: +(% of input + number of digits)

RANGE	24 HOURS 23°C \pm 1°C	90 DAYS 18°C to 28°C	1 YEAR 18°C to 28°C	PLUS TEMP. COEFFICIENT PER °C *
100 mV	0.003 + 5	0.0065 - 6	0.011 + 10	0.0005 + 0.5
1V	0.003 1	0.006 - 2	0.011 + 2	0.0005 + 0.15
10V	0.002 + 1	0.005 - 1	0.009 + 1	0.0004 - 0.10
100V	0.003 + 1	0.007 + 2	0.012 + 2	0.0005 - 0.15
1000V	0.0035 - 1	0.0065 1	0.011 - 11	0.0005 - 0.10

*From 22°C to 0°C or 24°C to 50°C, 24 hours specification

From 18°C to 0°C or 28°C to 50°C, 90 day or 1 year specification

High Speed Accuracy: \pm (% of input + least significant bit)*

RANGE	90 DAYS 18°C to 28°C	1 YEAR 18°C to 28°C	PLUS TEMP. COEFFICIENT PER °C
100 mV	0.01 + 1	0.015 + 1	0.001 + .1
1V	0.01 - 1	0.015 1	0.001 - .05
10V	0.01 1	0.015 + 1	0.001 - .05
100V	0.01 + 1	0.015 + 1	0.001 - .05
1000V	0.01 + 1	0.015 1	0.001 + .05

*Typical with 60 Hz line, remote operation, 500 readings per second, 2-byte binary output with 14 bits of data.

Typical Normal Mode Rejection

LINE FREQ	FILTER SETTLING TIME					
	25 ms	50 ms	100 ms	200 ms	500 ms	1s
50 Hz	65 dB	68 dB	71 dB	80 dB	*83 dB	86 dB
60 Hz	65 dB	68 dB	71 dB	85 dB	*88 dB	91 dB
400 Hz	53 dB	56 dB	60 dB	120 dB	*123 dB	126 dB

*Guaranteed minimum rejection

Common Mode Rejection True 100 dB at 50 Hz and 60 Hz with 1 k Ω unbalance in either lead.
Effective CMR is equal to normal mode rejection plus true CMR.

Maximum Input \pm 1000V Peak. HI to LO or GUARD to chassis terminals, and -200V
Peak. GUARD to LO terminals, for any range.

Table 1-2. 8520A Specifications (cont)

Maximum Reading Rate

OPERATION	RESOLUTION	LINE	READING RATE
Local/Remote	5½ digits	50 Hz 60 Hz	200 rdgs/sec 240 rdgs/sec
Remote	4½ digits	50 Hz 60 Hz	>500 rdgs/sec >500 rdgs/sec

Input Current ≤ 50 pA for 30 days @ 18° to 28°C**AC VOLTS (TRUE RMS)****Input Characteristics**

RANGE	FULL-SCALE	RESOLUTION	INPUT IMPEDANCE
1V	1.99999	10 μ V	1 M Ω , ≤ 100 pF at the V/ Ω INPUT terminal
10V	16.0100	100 μ V	
100V	130.100	1 mV	
650V	650.000	10 mV	

Accuracy: \pm (% of input + % of full-scale)**

For 650V range multiply % FS

FREQUENCY	24 HOURS 23°C $\pm 1^\circ$ C			90 DAYS 23°C to 28°C			1 YEAR 18°C to 28°C		
	% of INPUT	+ % FS AC	- % FS AC-DC	% of INPUT	+ % FS AC	+ % FS AC+DC	% of INPUT	- % FS AC	+ % FS AC-DC
10 Hz to 20 Hz*	3.0	0.5	0.6	3.0	0.6	0.7	3.5	0.6	0.7
20 Hz to 40 Hz*	0.4	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.7
40 Hz to 20 kHz	0.08	0.02	0.06	0.1	0.03	0.06	0.15	0.05	0.16
20 kHz to 100 kHz	1.0	0.3	0.4	1.0	0.3	0.4	2.0	0.6	0.8
100 kHz to 300 kHz	2.4	0.6	0.6	2.4	0.6	0.6	4.0	1.0	1.0
300 kHz to 1 MHz	8.0	2.5	2.5	8.0	2.5	2.5	15.0	5.0	5.0

*Assumes smoothing using the Statistics Math Program (~8).

**From 0.1% of Range to Full Scale

Temperature Coefficient	18°C to 0°C or 28°C to 50°C, to 20 kHz.
AC MODE	\pm (.007% of input + .007% FS)/°C
AC + DC MODE	\pm (.007% of input - .014% FS)/°C
Maximum Input	± 1000 V, Peak HI to LO or GUARD to chassis terminals, and ± 200 V Peak GUARD to LO terminals for any range.
Volt-Hertz Product	$\leq 2 \times 10^7$ (slew rate ≤ 177 V/ μ Sec)
Crest Factor	Exceeds 4:1 @ full scale, increasing downscale.
Maximum Reading Rate	10 rdgs/sec (for < 300 Hz use reading rates of 5, 2, or 1 rdg/sec to insure stated accuracy)

Table 1-2. 8520A Specifications (cont)

OHMS**Input Characteristics**

RANGE	FULL-SCALE	RESOLUTION	CURRENT THRU UNKNOWN	OPEN CURRENT VOLTAGE
10 Ω	19.9999	100 $\mu\Omega$	10 mA	<8V
100 Ω	199.999	1 m Ω	10 mA	
1000 Ω	1999.99	10 m Ω	1.0 mA	
10 k Ω	19.9999	100 m Ω	0.1 mA	
100 k Ω	199.999	1 Ω	14.5 μ A(max)	
1 M Ω	1.99999	10 Ω	1.5 μ A(max)	
10 M Ω	19.9999	1 k Ω	1.5 μ A(max)	

Accuracy \pm (% of input + number of digits)

RANGE	24 HOURS 23°C \pm 1°C	90 DAYS 18°C TO 28°C	1 YEAR 18°C TO 28°C	PLUS TEMP. COEFFICIENT PER °C*
10 Ω	0.0045 + 6	0.0080 + 7	0.0140 12	0.0007 - 0.2
100 Ω	0.0035 2	0.0070 2	0.0125 + 3	0.0007 - 0.2
1000 Ω	0.0035 - 2	0.0070 + 2	0.0125 3	0.0007 - 0.2
10 k Ω	0.0035 + 2	0.0070 - 2	0.0125 - 3	0.0007 + 0.2
100 k Ω	0.0040 2	0.0090 - 2	0.0140 - 3	0.0012 0.2
1 M Ω	0.0090 - 2	0.0160 2	0.0200 + 3	0.0020 + 0.2
10 M Ω	0.0300 - 1	0.0440 + 1	0.0450 - 3	0.0030 + 0.2

*From 18°C to 0°C or 28°C to 50°C

Maximum Input \pm 400V peak for any range.**Maximum Reading Rate:** 10/sec at 100 k Ω and above.

OPERATION	RESOLUTION	LINE	READING RATE
Local/Remote	5 $\frac{1}{2}$ digits	50 Hz 60 Hz	200 rdgs/sec 240 rdgs/sec
Remote	4 $\frac{1}{2}$ digits	50 Hz 60 Hz	>500 rdgs/sec > 500 rdgs/sec

CONDUCTANCE**Range** 100 nS**Full Scale** 202.00 nS**Resolution** 0.01 nS**Accuracy:** \pm (% of input + number of digits)

24 HOURS 23°C \pm 1°C	90 DAYS 18°C to 28°C	1 YEAR 18°C to 28°C	*PLUS TEMP. COEFFICIENT PER °C
0.04 + 5	0.05 5	0.06 + 5	0.004 + 1

*From 18°C to 0°C or 28°C to 50°C

Maximum Input \pm 400V peak**Maximum Reading Rate** 10 rdgs/sec

Table 1-2. 8520A Specifications (cont)

EXTERNAL REFERENCE

Operating Range $\pm 0.5\text{V}$ dc to $\pm 33\text{V}$ dc as long as external reference is within $\pm 16.5\text{V}$ of input LO terminal.

Input Impedance $10.000\text{ M}\Omega$ between external reference HI or LO terminals and input LO terminals.

Accuracy

X-REF VOLTAGE	ACCURACY
16.5 to 33V 0.5V to 16.5V	$\pm(A + B + 20\text{ ppm})$ $+ A + B + (400\text{ ppm } 1V_{\text{ref}} 1)$

NOTE: *A* = DC 10 volt range accuracy

B = Input voltage or resistance range accuracy

Maximum Input $\pm 180\text{V}$ peak between external reference HI or LO and input LO; $\pm 360\text{V}$ peak between external reference HI and LO.

Transfer Accuracy The following accuracy specifications apply when:
Filter settling time is 500 or 1000 ms.
Measurements are made more than 2 hours after warmup.
Measurements are made within one range.
Standard is checked at least every hour.
Ambient temperature stability within $+1^\circ\text{C}$.

DC VOLTAGE

RANGE	$\pm(\% \text{ OF INPUT} + \text{NUMBER OF DIGITS})$
100 mV	$0.0020 + 4$
1V	$0.0020 + 1$
10V	$0.0010 + 1$
100V	$0.0020 + 1$
1000V	$0.0020 + 1$

AC VOLTAGE (all ranges)

FREQUENCY	$\pm(\% \text{ OF INPUT} + \% \text{ OF FULL-SCALE})$
10 Hz to 20 Hz	$1.0 + 0.2$
20 Hz to 40 Hz	$0.1 + 0.1$
40 Hz to 20 kHz	$0.005 + 0.007$
20 kHz to 100 kHz	$0.100 + 0.030$
100 kHz to 1 MHz	$0.500 + 0.060$

AC VOLTAGE, DC COUPLED Same as AC Voltage except 40 Hz - 20 kHz, $0.005 + 0.010$.

Resistance

RANGE	$\pm(\% \text{ OF INPUT} + \text{NUMBER OF DIGITS})$
10 Ω	$0.0030 + 5$
100 Ω	$0.0020 + 2$
1000 Ω	$0.0020 + 2$
10 k Ω	$0.0020 + 2$
100 k Ω	$0.0020 + 2$
1 M Ω	$0.0050 + 2$
10 M Ω	$0.0100 + 1$

Conductance $\pm(0.02\% \text{ of input} + 0.02\text{ nS})$

Table 1-2. 8520A Specifications (cont)

GENERAL	
Interface	IEEE-488 - 1978 is standard.
Temperature	0°C to 50°C operating; -25°C to +75°C non-operating.
Relative Humidity	≤95% at 25°C, ≤75% at 40°C, ≤45% at 50°C.
Shock and Vibration	Meets MIL-T 28800B for type III, Class 5, Style E.
Power	100, 120, 220, or 240V ac, ±10%; 50, 60, or 400 Hz ±5%, ≤50W.
Size	8.89 cm H/47.00 cm L/43.18 cm W (3½ in H/18½ in L/17 in W) See Figure 1-2.
Weight	9.56 kg (21 lbs)
Protection Class Code 1	Relates solely to insulation of grounding properties in IEC 348.

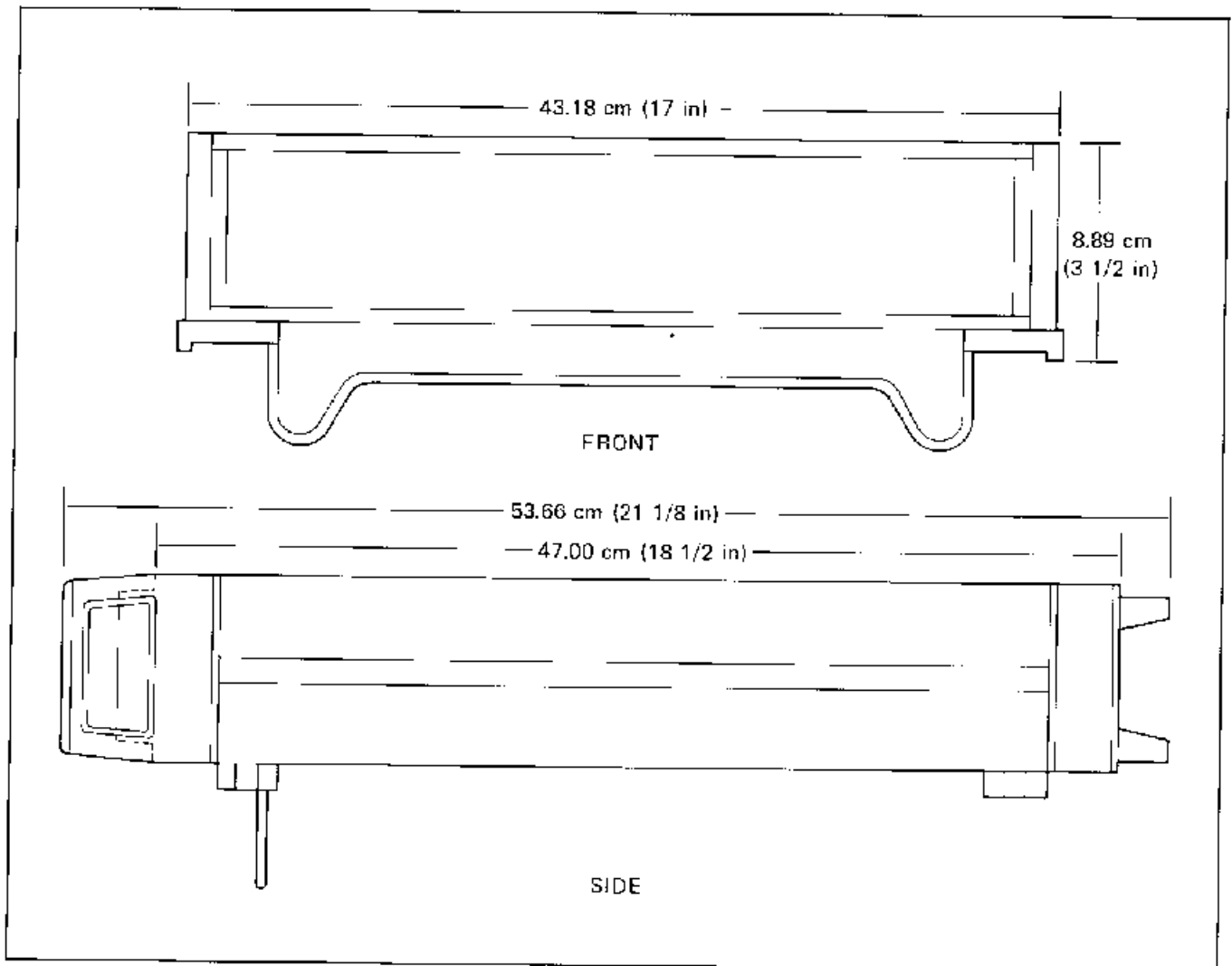


Figure 1-2. Outline Drawing