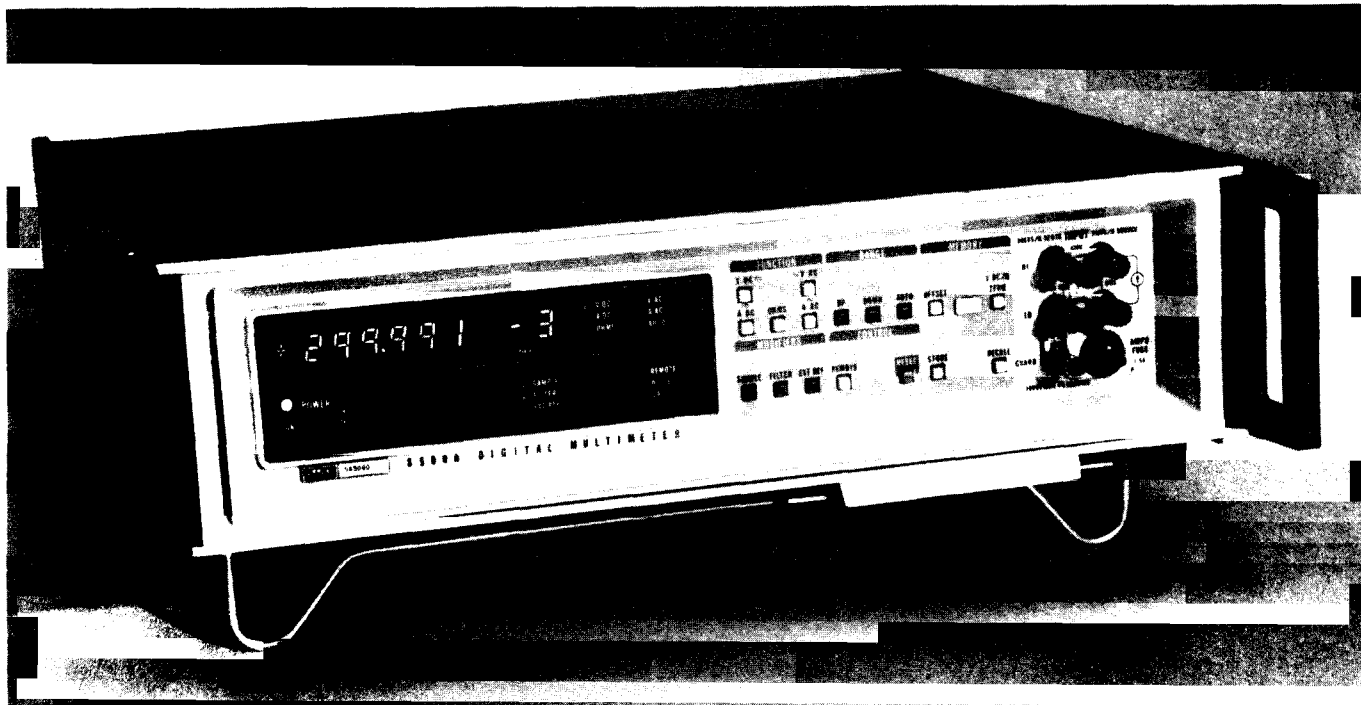


DIGITAL VOLTMETERS & DMM's

Versatile Bench/System

8500A/8502A



8500A

Introduction

The Fluke Model 8500A and 8502A Multimeters are among the most sophisticated DMM's you can buy. Yet they are clean and simple to use. Constructed using plug-in circuit card modules, you can buy only the capabilities you need to get the performance you want. Also, if requirements change you can add later what you need later. That means economical insurance against early obsolescence. Modularity simplifies servicing too, another economic benefit.

The 8500A and 8502A Digital Multimeters are very similar. When used in a system under the control of a programmed instrument controller, the performance of the 8500A and 8502A are practically identical. But the 8500A is primarily for use in a system so does not have as many front panel controls as the 8502A. For example, you can't enter digits from the front panel to be stored and used as a scaling factor, limit, etc. With the 8502A, every measurement that maybe controlled remotely may also be controlled from the front panel, making the 8502A as capable on the bench as in a system.

The 8502A is designed to give an operator the same kind of manual control over measurements as a modern programmable measurement system provides. In other words, it is designed to provide a person having no programming skills all the residual power available in the 8502A as a systems component. It does this by making the keyboard-like pushbuttons on the front panel provide strings of program instructions without anyone even needing to know what they were. The labels near the pushbuttons are in human language and operation is very simple to learn. For example, practically any number displayed on the readout may be stored and recalled from the front panel. This includes numbers entered directly with the numeric keys on the front panel. Some keys, such as the numeric keys, serve two purposes, depending on what you wish to accomplish and what other key was pushed immediately prior. This keeps the panel simple and uncluttered. The bus-structured, microprocessor-based 8502A provides nearly equal benefits to the systems designer and to the bench top user.

Circuit Card Modules

The basic 8500A and 8502A measures dc voltage or the ratio of two dc voltages. With optional plug-in circuit card modules it will also measure resistance, ac or dc current, and ac voltage, or the ratio of such a quantity to an external dc voltage.

One option is for resistance, one is for current, and two are for ac voltage—either True RMS for non-sinusoidal waveforms, or average-sensing for sinewaves. The current-measuring option is good for both dc and ac current. All the measurement capabilities may be included in one instrument if you wish, except that only the True RMS or the average-sensing measurement module can be included at one time.

Accuracy and Resolution

Accuracy and resolution of the 8500A and 8502A are the best you can buy in a Fluke DMM. For dc voltages, accuracy is 0.0006% of input (6 ppm) for 24 hours when temperature is held to $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$. Normal, full scale resolution for the same scale is 4 ppm and may be switched to high resolution (0.4 ppm) when desired, for all but the lowest input range, for very stable sources.

For the same limits of time and temperature, resistance measurement accuracy is 24 ppm for full scale reading, and resolution for the same scale is 4 ppm. Typically, the instrument will drift less than 3 parts per million over a 24 hour period in a controlled environment and less than 10 parts per million over a 90 day period in a production environment.

Sampling and Noise Rejection

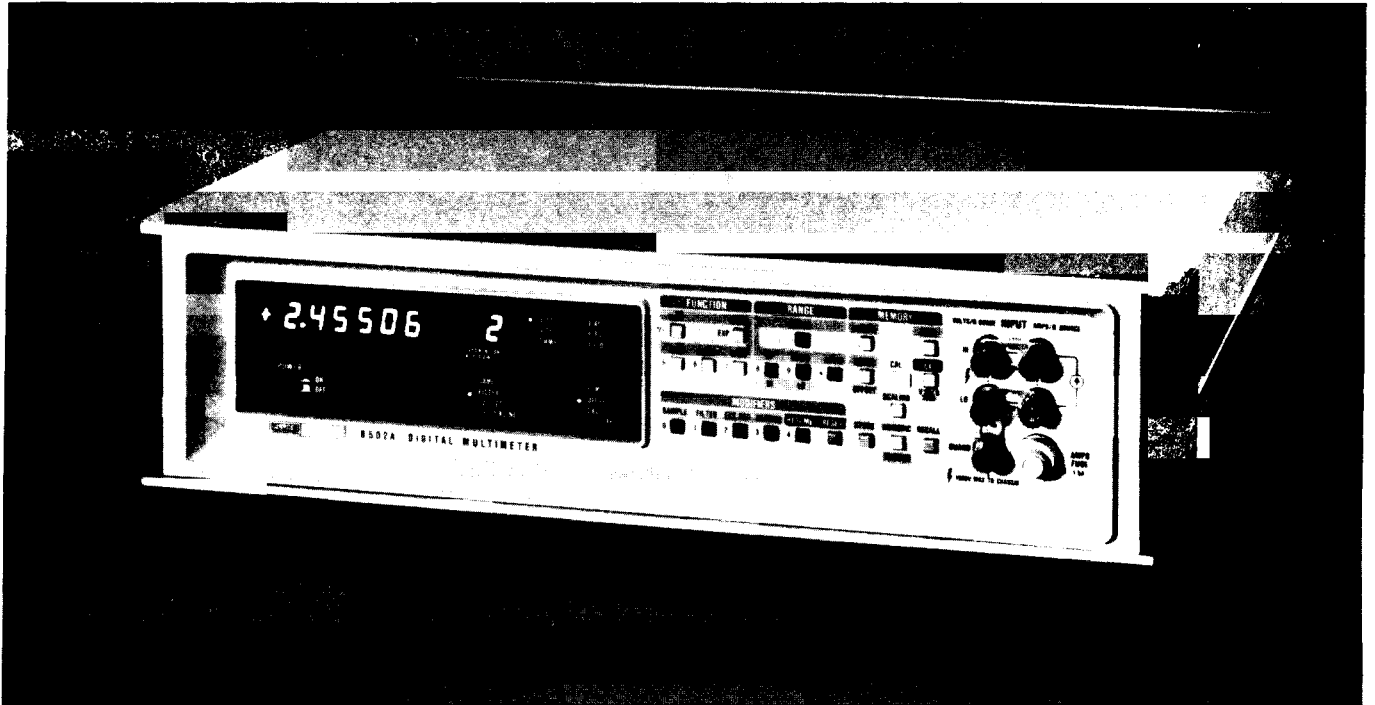
The 8500A and 8502A digitize using a high-speed version of the Fluke- designed and patented "recirculating remainder" technique. For integrating noise out of a measurement, the microprocessor directs that a number of readings be taken in synchronism with the line noise signal, then averages the readings for near-perfect rejection. In fact, as a bench instrument the 8502A averages 32 readings over eight periods of

DIGITAL VOLTMETERS & DMM's

Versatile Bench/System

8500A/8502A

IEEE-488



8502A

60 Hz line interference in the "fast" (7½ readings/sec) mode. At "normal" speed on the bench (1 7/8 readings/sec) 128 individual samples are averaged over 32 complete noise periods for an unprecedented 95 dB of rejection at line frequency. If still more rejection is required, a three-pole active filter can be called to increase NMR to 100 dB.

Multimeter With a Memory

The 8500A and 8502A are controlled by microcomputer circuits that include memory. Some memory is put to work in ways that simplify front panel operation. For example, when making very accurate measurements of low voltage or resistance the input terminals of a DMM should be shorted together to check for a residual count. However, by pushing the STORE pushbutton then the ZERO pushbutton, the count is remembered and instantly subtracted from the display and from future measurements.

Expanding upon the memory capabilities that allow zero correction, the standard 8500A or 8502A incorporates the ability to add or subtract a stored offset from the display. In other words, any voltage, current, or resistance bias that should be eliminated from the measurement is simply keyed into memory, setting the indication to zero. All further readings will then be strictly above or below this reference point.

Either voltage, current, or resistance offset values may be stored. The values may be up to 1000V dc or ac, up to 1.28A dc or ac, and up to 262 megohms of resistance. By using an offset in the ohms mode, lead resistance can be quickly eliminated from the measurement regardless of whether the unit is used in the two-terminal or four-terminal configuration. In a variety of testing applications, standard values of voltage, current, or resistance can be conveniently offset and only excursions displayed.

Multimeter That Calculates

When you realize that the 8500A or 8502A will remember numerical values and subtract them when you wish, you realize

that the power of a calculator is built in. Of course it does more than subtract. Measured values may also be scaled (multiplied) by a factor before a numerical value is displayed. Or you may both scale and offset before displaying a numerical value. Calculations will follow this form:

$$Y = mX + B$$

Where m = Scaling factor,

X = Value of analog input signal

B = Offset factor, and

Y = The numerical result and display

On the 8500A and 8502A, the scaling factor may be entered from either the front panel pushbuttons, the Ext Ref Voltage input, or programmed remotely. This capability allows you to convert measurements directly to percent error. Or, when the electrical value is from a transducer, you may convert the data directly to the engineering units that the value represents.

Peaks, Valleys, and Limits

The 8500A or 8502A may be operated to store the highest and the lowest values in a series of measurements for determining deviations, either directly or as a percentage. Or, where measurements are for testing whether certain values are within acceptable limits, preset limits may be entered and stored for comparison. Then, measurements within limits are classified simply as PASS. Measurements that fall outside of limits, however, are classified as either HI or LO, depending on whether they exceed a high limit or fall below a low limit. These classifications appear in the display whether it is operated remotely or operated from the front panel.

An application might be to measure and sort resistors so all resistors within each group match one another very closely. Starting with a nominal value and a selected percentage of precision, the tested resistors could be quickly sorted into three groups — one that was within tolerance, one that was out of tolerance on the high side, and another that was out of tolerance on the low side. Subsequent measurements could be made of the

DIGITAL VOLTMETERS & DMM's

Versatile Bench/System

8500A/8502A



two groups that were out of tolerance to match or classify them as you choose.

Calibration Memory

With Option -04 installed, the 8500A or 8502A has a very unique and valuable feature: A very quick and convenient means is provided for recalibrating any or every range of any or every measurement function without downtime in the calibration laboratory. Digital correction factors are stored (and automatically used) for at least a year whether power remains on or not, by using an internal battery.

Triggered Measurements & Interfaces

With Interface Option -08A installed, each measurement may be initiated externally with a simple trigger signal. Although Option -08A is primarily for systems applications which also require one of three interface options (-05, -06, or -07) it is also useful for less automated applications. The trigger signal may be derived from TTL circuits or any source that delivers a nominal 0 to +5V transition. A foot switch, for example, could be used by an operator for batch production work.

Option -05 is for equipment designed to be compatible with IEEE Standard 488-1978. Option -06 is compatible with equipment designed to EIA Standard RS-232-B, RS-232-C, or current-loop interfaces. Option -07 is compatible with most minicomputer systems using a 16-bit duplex register.

Some modes of operation as a system component usually differ from bench operation modes. For example, samples are normally at a much higher speed (250 per second). And there may be a high number of samples averaged before presenting a reading.

With the 8500A or 8502A you have seventeen choices of how many samples may be taken before the average of the readings is displayed. The choices are equal to powers of ten, such as 2, 4, 8, 16, 32, etc. They go to 131,072 (2^{17}).

Practically all such modes are available on the 8502A whether operated as a system component or as a bench instrument.

Specifications, Options

The performance specifications of the 8502A are the same as those for the 8500A and are listed on the following pages. Except as noted, the options described are also for either the 8502A or 8500A. The description of programming commands that follow are nearly identical for both instruments.

Remote Control

Regardless of whether you use Interface option -05, -06, or -07, the same characters and character strings are used to control the operation of the 8500A and 8502A. For a simple overview of what commands there are and the characters that correspond to those commands, refer to the charts that follow. After power-up or after pushing the RESET pushbutton either instrument will be in a state that corresponds with the following string of characters: V R4 S5 F0 T0 P0 X0 U0 V0 D0 L0 Y0 J0 M0.

Function Commands

V	DC Volts
VA	AC Volts
C	DC coupled AC Volts
I	Direct Current
IA	Alternating Current
Z	Ohms (Ω)
Z1	Ohms function fast mode activated

Range Commands

R	Autoranging
R0	100 mV dc, 100 μ A, 10 Ω , Vac autoranging
R1	1V dc, 1V ac, 1 ma, 100 Ω
R2	10V dc, 10V ac, 10 mA, 1 k Ω
R3	100V dc, 100V ac, 100 mA, 10 k Ω
R4	1000V dc, 1000V ac, 1A, 100 k Ω
R5	1 M Ω , other functions autoranging
R6	10 M Ω , other functions autoranging
R7	100 M Ω , other functions autoranging

Sample Rate Commands

S0	2^0 samples per reading (4 ms)
S1	2^1 samples per reading (8 ms)
S2	2^2 samples per reading (17 ms)
S3	2^3 samples per reading (33 ms)
S4	2^4 samples per reading (67 ms)
S5	2^5 samples per reading (134 ms)
S6	2^6 samples per reading (267 ms)
S7	2^7 samples per reading (534 ms)
H0	2^8 samples per reading (1.1 sec)
H1	2^9 samples per reading (2.1 sec)
H2	2^{10} samples per reading (4.3 sec)
H3	2^{11} samples per reading (8.5 sec)
H4	2^{12} samples per reading (17.1 sec)
H5	2^{13} samples per reading (34.1 sec)
H6	2^{14} samples per reading (68.3 sec)
H7	2^{15} samples per reading (2 min. 17 sec)
H8	2^{16} samples per reading (4 min. 33 sec)
H9	2^{17} samples per reading (9 min. 6 sec)

Filter Commands

F	Slow filter, time out disabled (panel indicator ON)
F0	Fast filter, time out disabled (panel indicator OFF)
F1	Filter bypassed
F2	Slow filter, time out delay (500 ms) (panel indicator ON)
F3	Fast filter, time out delay (50 ms) (panel indicator OFF)

Trigger Commands

T	Continuous readings line synchronized
T0	Single reading line synchronized
T1	Continuous readings line asynchronous
T2	Single reading line asynchronous

Offset Commands

P	Offset feature activated
P0	Offset feature disabled

Ext Ref — Scaling Commands

X	External reference activated
X0	External reference/scaling disabled
X1	Scaling mode activated

Limits-Peak Value Storage Commands

U	Activate limits testing (value must be preset)
U0	Disables limits and peak value storage testing
U1	Activate peak value storage

DIGITAL VOLTMETERS & DMM's

Versatile Bench/System
8500A/8502A



Control Commands

B	Single byte binary
B0	Single character ASCII
B1	Double byte binary (16 bit-parallel)
B2	Double character ASCII (16 bit-parallel)
D	Disable front panel display (creates a local lockout)
D0	Activate front panel display
L	Activate local lockout
L0	Deactivate local lockout
Y	Echo capability activated (Full Duplex)
Y0	Echo capability disabled (Half Duplex)
J	Suppress line feed character
J0	Transmit line feed character
J1	Suppress all output
M	Inhibit Cal memory factors
M0	Enable Cal memory factors

Memory Commands

K	Store last reading as offset
K0	Store last reading as VDC zero
K1	Store last reading as ohms zero
KNP	Store following numeric value as offset
KNX	Store following numeric value as scaling factor
KNU	Store following numeric value as upper limit
KNL	Store following numeric value as lower limit
G	Recall and transmit on trigger previous reading
G0	Recall and transmit on trigger DC zero
G1	Recall and transmit on trigger status
GNP	Recall and transmit on trigger offset
GNX	Recall and transmit on trigger external reference
GNU	Recall and transmit on trigger upper limit
GNL	Recall and transmit on trigger lower limit
GNQ	Recall and transmit on trigger lowest peak value found
GNW	Recall and transmit on trigger highest peak value found

Termination Commands

.	Execute previous command string
?	Execute, trigger and transmit reading
@	Execute and trigger — interrupt when ready

Immediate Characters

*	Reset
%	Halt
#	Go to local/lockout remote (not for IEEE)
!	Enter high-speed reading mode
\$	Clear Command String Buffer
/	Toggle the parallel interface mode

Specifications

DC Volts

Input Characteristics:

Range	Full Scale	Normal Resolution	Resistance
100 mV	312 mV	1 μ V	>10,000 M Ω
1V	2.5V	10 μ V	> 10,000 M Ω
10V	20V	100 μ V	> 10,000 M Ω
100V	160V	1 mV	10 M Ω
1000V	1200V	10 mV	10 M Ω

Reading Rate (Bench Operation):

Fast: 7½ rdgs/s (60 Hz line); 6¼ rdgs/s (50 Hz line)

Slow: 17/8 rdgs/s (60 Hz line); 1½ rdgs/s (50 Hz line)

Accuracy, 6½-Digit: \pm (% of input + no. 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 (2)
100 mV (1)	0.002+4	0.003+5	0.005+8	0.0003+0.5
1V	0.001+6	0.002+8	0.004+9	0.0003+0.1
10V	0.0006 or 6*	0.001+8	0.002+9	0.0002+0.5
100V	0.001+6	0.002+8	0.004+9	0.0003+1
1000V	0.001+6	0.002+8	0.004+9	0.0003+0.5

* Whichever is greater

(1) 5½-digit accuracy on lowest range

(2) 18°C to 0°C and 28°C to 50°C

Normal Mode Noise Rejection:

Filter	Programmed 4 Samples/rdg	50 Hz 1½ rds/s	60 Hz 1 7/8 rds/s
50 Hz, Fast	60 dB	75 dB	—
50 Hz, Slow	85 dB	95 dB	—
60 Hz, Fast	60 dB	—	75 dB
60 Hz, Slow	90 dB	—	100 dB

Common Mode Rejection: 100 dB at 60 Hz with 1 k Ω unbalance

Overload: \pm 1200V dc or 1400V pk ac, may be applied continuously to any range with permanent damage

Common Mode Noise Rejection: \geq 120 dB, dc to 60 Hz, with 100 Ω unbalance

Ratio

Measurements of dc or ac voltage, dc or ac current, or resistance is divided by the measurement of an externally applied dc voltage and displayed as a ratio. The measurements are made on two separate isolated sets of terminals but there should be no more than 20,000 ohms between the Sense LO terminal and either the HI or LO Reference input terminal. Input characteristics of the Sense terminals depend on the function selected. Characteristics of the rear panel Ext Ref input are as follows:

Input Resistance: > 10,000 M Ω

Max Reference Voltage: 40V dc between Ext Ref HI and LO terminals, providing neither terminal is greater than \pm 20V relative to the Sense LO or Ohms Guard terminal.

Minimum Ext Reference Voltage: Equal to the input (voltage, current, or resistance) divided by 10X the range selected or 100 μ V, whichever is greater

Ratio reading: <10 times the value of the volts, amps, or ohms range selected

Normal Mode Noise Rejection: \geq 100 dB for dc and 1X and 2X line frequency

Common Mode Noise Rejection: \geq 75 dB for 1X and 2X line frequency

Overload: \pm 180V peak, 127V rms relative to Sense LO terminal or Ohms Guard terminal

Accuracy: For reference voltages of 20V to 40V accuracy is \pm (A + B + 10 ppm), where A = 10V dc range accuracy and B = input voltage, current, or resistance range accuracy. For reference voltages less than 20V, accuracy is

$$\pm(A + B + \frac{200 \text{ ppm}}{V_{\text{ref}}})$$

DIGITAL VOLTMETERS & DMM's

Versatile Bench/System
8500A/8502A



True RMS AC Volts Option (-09A)

Input Characteristics:

Range	Full Scale	Normal Resolution	Impedance
1V	2.5V	10 μ V	1 M Ω , < 100 pF
10V	20V	100 μ V	
100V	160V	1 mV	
1000V	1000V	10 mV	

Accuracy: \pm (% of input + % of full scale)(ac) or (ac + dc)

Frequency	90 Day, 18°C to 28°C		
	% of Input	+% FS (AC)	+% FS (AC + DC)
DC	0.1	—	0.03
10 Hz to 20 Hz	1.0	0.04	0.06
20 Hz - 50 Hz	0.5	0.012	0.03
50 Hz to 10 kHz	0.1	0.012	0.03
10 kHz to 30 kHz	0.2	0.04	0.06
30 kHz to 50 kHz	0.3	0.1	0.12
50 kHz to 100 kHz	1.0	0.3	0.3
100 kHz to 300 kHz	2.0	0.5	0.5
300 kHz to 1 MHz	3.3	1.8	1.8

1. Filter must be used for full accuracy below 400 Hz
2. Volt-Hertz product not to exceed 2×10^7 ; 300 kHz to 1 MHz, not to exceed 1×10^7 .
3. For inputs above 500V, multiply accuracy by $(200V + V_{in}) \div 2000V$

Common Mode Noise Rejection: ≥ 120 dB, dc to 60 Hz, with 100 Ω unbalance

Crest Factor: > 7 at full scale, increasing down scale by:
 $7\sqrt{V} \text{ Range} \div V \text{ Input}$

Average-Sensing AC Volts Option (-01)

Input Characteristics:

Range	Full Scale	Normal Resolution	Impedance
1V	2.5V	10 μ V	1 M Ω , < 100 pF
10V	20V	100 μ V	
100V	160V	1 mV	
1000V	1000V	10 mV	

Accuracy: \pm (% of input + no. of digits)

Frequency	90 Day, 18°C to 28°C	
	0 to 500V	Above 500V
30 Hz to 50 Hz	0.5 + 5	0.55 + 5
50 Hz to 10 kHz	0.05 + 5	0.1 + 5
10 kHz to 40 kHz	—	0.15 + 5
10 kHz to 50 kHz	0.1 + 5	—
50 kHz to 100 kHz	0.5 + 5	—

Common Mode Noise Rejection: ≥ 120 dB, dc to 60 Hz, with 100 Ω unbalance

Resistance Option (-02)

Input Characteristics:

Range	Full Scale	Normal Resolution	Current Through Unknown
10 Ω	31.25 Ω	100 μ Ω	10 mA
100 Ω	250 Ω	1 m Ω	10 mA
1 k Ω	2 k Ω	10 m Ω	1.25 mA
10 k Ω	32 k Ω	100 m Ω	78 μ A
100 k Ω	256 k Ω	1 Ω	9.8 μ A
1 M Ω	4.096 M Ω	10 Ω	4.9 μ A
10 M Ω	32.768 M Ω	100 Ω	0.61 μ A
100 M Ω	262.144 M Ω	1 k Ω	76 nA

Accuracy: \pm (% of input + no. of digits)

Range	24 Hr 23°C \pm 1°C	90 Day 18°C to 28°C	1 Yr. 18°C to 28°C
10 Ω	0.003 + 20	0.005 + 20	0.01 + 20
100 Ω	0.002 + 2	0.003 + 2	0.006 + 2
1 k Ω	0.002 + 1	0.003 + 1	0.006 + 1
10 k Ω	0.002 + 1	0.003 + 1	0.006 + 1
100 k Ω	0.002 + 1	0.003 + 1	0.006 + 1
1 M Ω	0.002 + 1	0.003 + 1	0.006 + 1
10 M Ω	0.01 + 1	0.02 + 1	0.04 + 1
100 M Ω	0.03 + 1	0.05 + 1	0.1 + 1

Open Circuit Voltage:

Range	Voltage	Configuration
10 Ω to 100 Ω	7V max	4-terminal
100 k Ω to 100 M Ω	25V max	2-terminal

Overload: ± 400 V dc to 60 Hz, or 560V peak above 60 Hz max, continuous on any range with no damage

Reading Rate (Bench Operation):

Filter	(Approx No. rdgs/s)			
	60 Hz		50 Hz	
	Fast	Slow	Fast	Slow
Fast	4	1½	3½	1¼
Slow	1¼	5/6	1	¾

Current Option (-03)

Input Characteristics:

Range	Full Scale	Resolution	Voltage Burden
100 μ A	312 μ A	1 nA	< 100 mV
1 mA	2.5 mA	10 nA	< 100 mV
10 mA	20 mA	100 nA	< 200 mV
100 mA	160 mA	1 μ A	< 200 mV
1A	1.28A	10 μ A	< 500 mV

Overload: Fused at 1.5A, ± 140 V ac or peak ac to 60 Hz, 200V peak ac above 60 Hz with no damage

Settling and Digitizing Time: Same as dc volts

DIGITAL VOLTMETERS & DMM's

Versatile Bench/System
8500A/8502A



Direct Current Accuracy: \pm (% of input + no. of digits)

Ranges	24 Hr 23°C \pm 1°C	90 Day 18°C to 28°C	1 Yr 18°C to 28°C
100 μ A	0.02 + 10	0.03 + 10	0.05 + 10
1 mA	0.02 + 10	0.03 + 10	0.05 + 10
10 mA	0.02 + 10	0.03 + 10	0.05 + 10
100 mA	0.03 + 20	0.05 + 20	0.1 + 20
1A	0.03 + 20	0.05 + 20	0.1 + 20

Alternating Current Accuracy: \pm (% of input + no. of digits) from 0.1% of full scale to full scale

Range	Frequency	90 Day, 18°C to 28°C	
		Avg-Res Current	True RMS Current
100 μ A	10 Hz - 20 Hz	—	1.0 + 110
	20 Hz - 50 Hz	0.8 + 9	0.8 + 35
	50 Hz - 10 kHz	0.4 + 9	0.4 + 35
	10 kHz - 20 kHz	0.7 + 9	1.0 + 110
	20 kHz - 50 kHz	1.5 + 9	1.5 + 260
1 mA and 10 mA	50 kHz - 100 kHz	3.0 + 0	4.0 + 760
	10 Hz - 20 Hz	—	1.0 + 110
	20 Hz - 50 Hz	0.5 + 9	0.5 + 35
	50 Hz - 10 kHz	0.06 + 9	0.11 + 35
	10 kHz - 20 kHz	0.11 + 9	0.2 + 110
100 mA	20 kHz - 50 kHz	0.12 + 9	0.3 + 260
	50 kHz - 100 kHz	0.51 + 9	1.0 + 760
	10 Hz - 20 Hz	—	1.0 + 150
	20 Hz - 50 Hz	0.5 + 55	0.5 + 80
1A	50 Hz - 10 kHz	—	0.26 + 80
	10 Hz - 20 Hz	—	—
	20 Hz - 50 Hz	0.24 + 55	—
1A	50 Hz - 10 kHz	—	1.0 + 160
	10 Hz - 20 Hz	0.5 + 65	0.5 + 90
	20 Hz - 50 Hz	0.24 + 65	0.26 + 90

Crest Factor (True RMS): $>$ 4.5 at full scale, increasing down scale by $4.5 \sqrt{\text{range} \div \text{I input}}$

Calibration Memory Option (-04)

Allows correction factor to be entered and stored for any or all ranges of any or all measurement functions, quickly and conveniently. Prevents downtime in calibration laboratory.

Control: Via front panel pushbuttons

Storage Time: 1 year if not used. Up to five years is used

Calibration Points: Decade value for each range

IEEE Interface Option (-05)

The IEEE Interface provides I/O compatibility per the IEEE-488 Standard specifications.

RS-232 Interface Option (-06)

This bit serial asynchronous interface option provides either voltage loop (EIA Standard RS-232-B or -C) or current loop (20 mA for Teletype) for interfacing to such things as computers, CRT displays, DEC writers, Teletypes, etc. Eight baud rates are available from 110 to 9600 and either one or two stop bits can be set up. Selection is made via rear panel logic switches.

Parallel Interface Option (-07)

This 16-bit-parallel, character-serial interface option allows the 8500A or 8502A to interface to PDP-11, Nova, and other mini-computers at a full 500 readings/sec. Option -07 can be used for interfacing to 8-bit multiplex microcomputers or controllers. Interfacing to different computers is accomplished via plug-in headers. Both ASCII and binary (2's complement) coding are available from this option, selected via command codes.

Interface Isolator Option (-08, -08A)

An interface isolator is required when ordering interface Option -05, -06, or -07. Order -08 for the 8500A or -08A for the 8502A.

General

Temperature: -0°C to 50°C, operating; -40°C to 70°C, non-operating

Overload: LO to guard is 100V max; guard to chassis is 1000V max

Operating Power: $<$ 50W with all options

Warmup: 1 hr to rated accuracy

Dimensions: 10.8 cm H x 42.5 cm L x 43.2 cm W (4.25 in H x 16.75 in L x 17 in W)

Weight: Basic is 9.1 kg (20 lbs). All options are 11.3 kg (25 lbs)

Models

8500A DMM	.....	\$2695
8502A DMM	.....	2795

Options (for 8500A and 8502A)

8500A-01 Average Converter	.....	500
8500A-02 Ohms Converter	.....	450
8500A-03 Current Converter	.....	450
8500A-04 Cal Memory	.....	425
8500A-05 IEEE-488 Interface	.....	300
8500A-06 RS-232-C Interface	.....	300
8500A-07 Parallel Interface	.....	300
8500A-09A RMS Converter	.....	500
8500A-17 Parallel Front/Rear Inputs	.....	125

Options (for 8502A only)

8502A-08A* Interface Isolator	.....	200
8502A-16 Switchable Front/Rear Inputs	.....	300

*Required when ordering any interface option.

Option (for 8500A only)

8500A-08* Interface Isolator	200
------------------------------	-------	-----

Accessories

MIS-7011K Extender Card	.....	110
MIS-7013K Bus Interconnect & Monitor	.....	35
MIS-7190K Static Test Controller	.....	250
MIS-7191K Test Module	.....	475
M00-260-610 18" Rack Slide Kit	.....	90
M04-205-600 5/4" Rack Adapter	.....	95