

## SECTION I

### GENERAL INFORMATION

#### 1-1. INTRODUCTION.

1-2. This section contains general information concerning the -hp- Model 3465A Multimeter. Included is an instrument description, specifications, information about instrument and manual identification, option and accessory information and safety considerations.

#### 1-3. DESCRIPTION.

1-4. The -hp- Model 3465A Multimeter is a 4-1/2 digit, five function digital multimeter. The five functions are dc volts, ac volts, dc current, ac current and ohms. Measurements can be made to four significant digits with a sample rate of 2-1/2 readings per second. Throughout this manual, the 3465A Multimeter will be referred to as Multimeter.

#### 1-5. SPECIFICATIONS.

1-6. Instrument specifications are listed in Table 1-1. These specifications are the performance standards or limits against which the instrument is tested. Any change in the specifications due to manufacturing, design or traceability to the U.S. National Bureau of Standards will be covered by revised pages to this manual. Additional information describing the operating characteristics are not specifications but are supplemental information for the user.

#### 1-7. INSTRUMENT AND MANUAL IDENTIFICATION.

1-8. Hewlett-Packard uses a two-section serial number. The first section (prefix) identifies a series of instruments. The last section (suffix) identifies a particular instrument within the series. If a letter is included with the serial number, it identifies the country where the instrument was manufactured. This manual is kept up-to-date with the instrument at all times by revision. If the serial prefix of your instrument differs from the one on the title page of this manual, refer to Section VIII for backdating information that will adapt this manual to your instrument. All correspondence with Hewlett-Packard should include the complete serial number.

#### 1-9. OPTIONS.

1-10. Multimeter options are available to provide alternate methods of powering the instrument. The standard instrument is powered by rechargeable NiCad batteries or can be powered from an ac source of 86 to 127 V or 172 to 254V, 48 to 66 Hz.

#### 1-11. Option 001.

1-12. Option 001 allows ac line operation only. Power is

derived from an ac source of 86 to 127 V or 172 to 254 V, 48 to 66 Hz. Two NiCad Battery Packs can be installed at any time to allow portable operation of the Multimeter.

#### 1-13. Option 002.

1-14. Option 002 is powered by four "D" type dry cell batteries (U2 in Europe). Alternate power can be derived from most Hewlett-Packard hand-held calculator battery chargers such as the Model 82002A Battery Charger/AC Adapter through a special rear panel input connector.

#### 1-15. ACCESSORIES.

1-16. The following accessories are available to extend the usefulness of your Multimeter:

1. Model 11096A RF Probe, 100 kHz to 500 MHz (down 3 dB at 10 kHz and 700 MHz), for use on the 10 V and 100 V ranges in the DCV function only.
2. Model 11002A Test leads, dual banana to dual alligator.
3. Model 11003A test leads, dual banana to probe and alligator.
4. Submodule front handle, -hp- Part No. 5061-2001.
5. Handle Kit (Rack), -hp- Part No. 5061-0088.
6. Rack adapter kit (includes 1/2 module filler), -hp- Part No. 5061-0054.
7. Nickel Cadmium Battery Pack (2 required) -hp- Part No. 00035-60024.
8. Model 82002A Battery Charger/AC Adapter, alternate power (battery elimination) for the Option 002 Multimeter.
9. 11129A Binding Post Kit.

#### 1-17. SAFETY CONSIDERATIONS.



1-18. This operating and service manual contains cautions and warnings alerting the user to hazardous operating and maintenance conditions. This information is flagged by a caution or warning heading and/or the symbol . The  symbol appears on the front panel and is an international symbol meaning "refer to the Operating and Service Manual". This symbol flags important operating instructions located in Section III. To ensure the safety of the operating and maintenance personnel and retain the operating condition of the instrument, these instructions must be adhered to.

Table 1-1. Specifications.

**DC VOLTMETER**

Ranges: 10 mV, 100 mV, 1 V, 10 V, 100 V, 1000 V

Overrange: 100% on all ranges except 1000 V max. on the 1000 V range.

Accuracy: (90 days,  $+23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

RANGE	SPECIFICATION $\pm$ (% Reading + % Range)
10 mV	$\pm (0.03\% + 0.02\%)$
100 mV through 100 V	$\pm (0.02\% + 0.01\%)$
1000 V	$\pm (0.025\% + 0.01\%)$

Temperature Coefficient ( $0^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ ):  $\pm 0.003\%$  of Reading/ $^{\circ}\text{C}$

Effective Common-Mode Rejection (with 1 k $\Omega$  imbalance in either lead):

AC:  $> 120\text{ dB}$  at 50/60 Hz  $\pm 0.1\%$

AC Normal-Mode Rejection:

$> 60\text{ dB}$  at 50/60 Hz  $\pm 0.1\%$

Input Resistance:

10 mV through 1 V ranges: (80% R.H.)  $\geq 10^{10}\ \Omega$

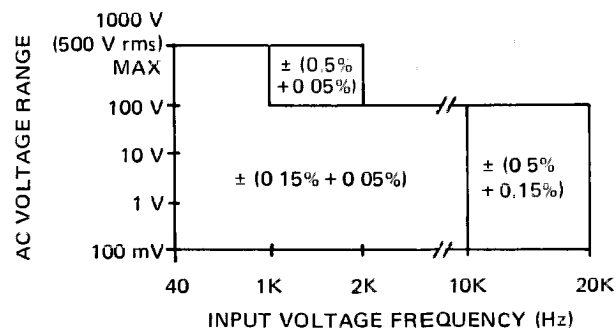
10 V through 1000 V ranges: 10 M $\Omega \pm 1\%$

**AC VOLTMETER**

Ranges: 100 mV, 1 V, 10 V, 100 V, 1000 V (500 V Max)

Overrange: 100% on all ranges to 10 kHz decreasing linearly to 0% at 20 kHz. Maximum input voltage on the 1000 V range is 500 V rms.

Accuracy: (90 days,  $+23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )  $\pm$  (% Reading + % Range)



Temperature Coefficient ( $0^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ ):  $\pm (0.005\%$  of Reading +  $0.002\%$  of Range)/ $^{\circ}\text{C}$

Input Impedance: 1 M  $\pm 1\%$  shunted by  $< 100\text{ pF}$

**DC AMMETER**

Ranges: 100  $\mu\text{A}$ , 1 mA, 10 mA, 100 mA, 1000 mA

Overrange: 100% on all ranges

Accuracy: (90 days,  $+23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

RANGE	SPECIFICATION $\pm$ (% of Reading + % of Range)
100 $\mu\text{A}$ , 1 mA	$\pm (0.07\% + 0.01\%)$
10 mA	$\pm (0.11\% + 0.01\%)$
100 mA, 1000 mA	$\pm (0.6\% + 0.01\%)$

Temperature Coefficient ( $0^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ ):

RANGE	SPECIFICATION $\pm$ (% of Reading)/ $^{\circ}\text{C}$
100 $\mu\text{A}$	$\pm 0.006\%$
1 mA, 10 mA	$\pm 0.004\%$
100 mA, 1000 mA	$\pm 0.01\%$

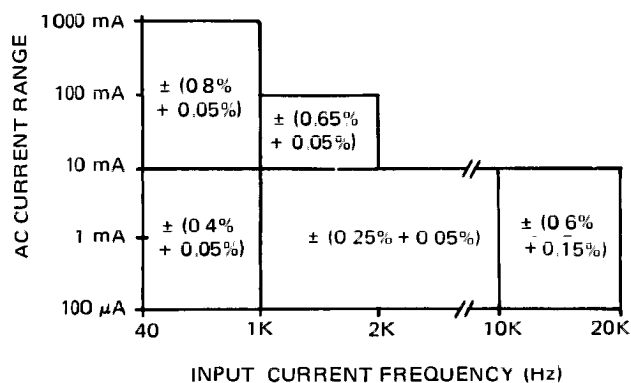
**AC AMMETER**

Ranges: 100  $\mu\text{A}$ , 1 mA, 10 mA, 100 mA, 1000 mA

Overrange: 100% on all ranges to 10 kHz decreasing linearly to 0% at 20 kHz

Accuracy: (90 days,  $+23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

$\pm$  (% of Reading + % of Range)



Temperature Coefficient ( $0^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ ):  $\pm 0.01\%$  of Reading/ $^{\circ}\text{C}$

**OHMMETER**

Ranges: 100  $\Omega$ , 1 k $\Omega$ , 10 k $\Omega$ , 100 k $\Omega$ , 1000 k $\Omega$ , 10 M $\Omega$

Overrange: 100% on all ranges

Accuracy: (90 days,  $+23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )

RANGE	SPECIFICATION $\pm$ (% of Reading + % of Range)
100 $\Omega$	$\pm (0.02\% + 0.02\%)$
1 k $\Omega$ through 1 M $\Omega$	$\pm (0.02\% + 0.01\%)$
10 M $\Omega$	$\pm (1\% + 0.01\%)$

Temperature Coefficient ( $0^{\circ}\text{C}$  to  $50^{\circ}\text{C}$ ):

RANGE	SPECIFICATION $\pm$ (% of Reading)/ $^{\circ}\text{C}$
100 $\Omega$ through 1 M $\Omega$	$\pm 0.0015\%$
10 M $\Omega$	$\pm 0.004\%$

Table 1-2. General Information.

<b>Maximum Input Voltages:</b>		<b>Nominal current through unknown resistance:</b>	
Between Input HIGH (V, $\Omega$ ) and COM:		<b>RANGE</b>	<b>CURRENT</b>
<b>FUNCTION</b>	<b>MAX VOLTAGE</b>	100 $\Omega$	1 mA
DC Volts	1000 V (dc + peak ac)	1 K $\Omega$	1 mA
AC Volts	600 V dc; 500 V ac rms; 800 V peak ac	10 K $\Omega$	10 $\mu$ A
Ohms	350 V (dc + peak ac)	100 K $\Omega$	10 $\mu$ A
		1000 K $\Omega$	1 $\mu$ A
		10 M $\Omega$	0.1 $\mu$ A
Between AMPS (A), HIGH (V, $\Omega$ ) and COM terminals and ground:		<b>Power Requirements:</b>	
$\pm 500$ V (dc + peak ac)		Standard	ac source: 86 to 127 V; 48 to 66 Hz
ACA and DCA Voltage Burden (nominal at full-scale):			172 to 254 V; 48 to 66 Hz
1000 m range: < 250 mV			batteries: 2 rechargeable NiCad battery packs
All other ranges: < 125 mV		Option 001	ac source: 86 to 127 V; 48 to 66 Hz
<b>Reading Rate:</b> 2.5 samples per second			172 to 254 V; 48 to 66 Hz
<b>Overload Indication:</b> Display Blanks except for overrange "1" and decimal point (also polarity sign on DCV or DCA FUNCTIONS)		Option 002	batteries: 4 "D" type dry cells (U-2 cells in Europe)
<b>Ohms Terminal Characteristics:</b>			battery elimination: Most Hewlett-Packard hand-held calculator chargers such as the Model 82002A Battery Charger/AC Adapter
Configuration: 2 wire		<b>Environmental Considerations:</b>	
Open-circuit voltage: < 5 V max.		Operating temperature: 0°C to 55°C (32°F to 131°F)	
Overload protection: 350 V (dc + peak ac)		Humidity range: 95% at 40°C	
		Storage temperature: -40°C to +75°C (-40°F to 167°F)	