

# DIGITAL MULTIMETERS

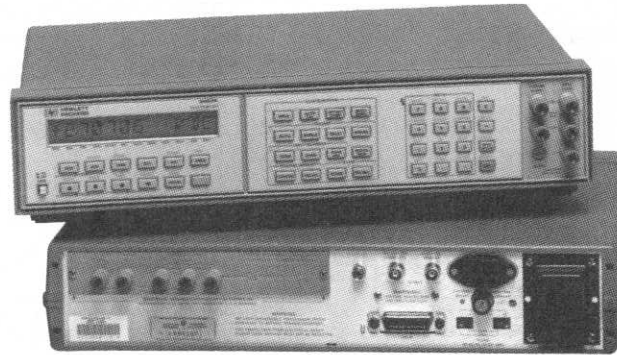
## 3½- to 6½-Digit DMM with Extended Resolution to 7½ Digits

### HP 3457A

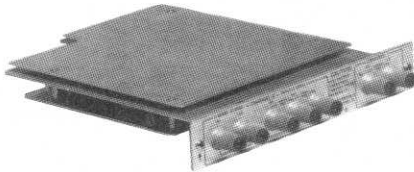
- Over 1,350 readings/sec at 3½ digits
- Seven functions: dcV, acV, dcI, acI,  $\Omega$ , frequency, and period

- Three plug-in multiplexer options
- dc sensitivity to 10 nanovolts
- Outstanding combination of performance and price

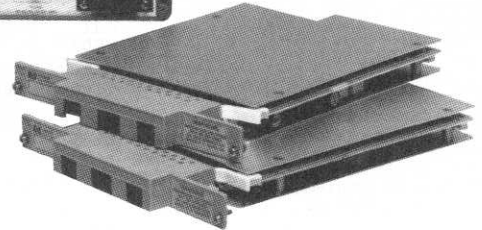
DESIGNED FOR  
**HP-IB**  
SYSTEMS



DESIGNED FOR  
MATE  
SYSTEMS



HP 3457A



### HP 3457A Digital Multimeter

The HP 3457A has seven functions with 3½ to 6½ digits of resolution, extendable to 7½ digits. Reading rates vary from 1 reading every 2 seconds to 1350 rds/s. Basic dc volts accuracy is 5 ppm. The input of the HP 3457A can be expanded to ten channels with either of the optional plug-in multiplexer assemblies. In bench operation, the front panel is extremely flexible and comprehensive. In systems, the Hewlett-Packard Interface Bus (HP-IB) is standard.

### Powerful Measurement Management

The HP 3457A combines superb analog measuring capability with powerful measurement management. More than 3,000 readings or entire measurement sequences can be stored in the HP 3457A. The present digital multimeter (DMM) setup can also be stored in the non-volatile memory for convenient reconfiguration.

Math functions include PASS/FAIL limit testing, NULL, SCALE, THERMISTOR linearization, and others. Total electronic calibration makes it easy to maintain performance.

### System Features

The HP 3457A has all the features you've come to expect, plus more to make interfacing to your computer easy—features like flexible formatting of ASCII, 16-bit binary, or 32-bit binary data and buffer memory. In addition, you'll find the VOLTMETER COMPLETE output and EXTERNAL TRIGGER input signals ideal for synchronizing other instruments with the HP 3457A. Finally, programmable front-rear terminal switching lets you measure two separate inputs without a scanner.

### Control Interface Intermediate Language (CIIL)

With Option 700, the HP 3457A responds to standardized DMM CIIL commands via HP-IB. Physically and functionally identical to the standard HP 3457A, Option 700 adds the CIIL command set with a built-in test module adapter (TMA) to the DMM's standard HPML.

### Three Rear-Panel Plug-In Options

One of three optional assemblies may be used with the HP 3457A. Using the multiplexer assemblies, you can scan up to ten signal channels either sequentially or randomly. All of the capability of the normal front and rear input terminals is available for multiple inputs. Using the high-voltage assembly allows single-channel measurement of either ac or dc voltages at the rear panel.

The HP 44491A armature relay multiplexer assembly offers eight 2-wire channels and two current/actuator channels. Under software control, the eight 2-wire channels can be reconfigured to four 4-wire ohm channels. The two current channels offer automatic make-before-break switching so that the path for current up to 1.5 A is never broken. In addition, these two channels can be used as external device actuator channels. Each channel can switch up to 150 V.

For higher speed scanning, the HP 44492A reed relay multiplexer assembly offers ten 2-wire channels. The HP 44492A is useful for switching Vdc, Vac, 2-wire  $\Omega$ , frequency, and period measurement signals with a maximum amplitude of 125 V.

For measurement of voltages up to 1414 V peak, the HP 44497A high voltage assembly offers a 1000:1 attenuator input (channel 1) for the high-voltage measurements. In addition, the other rear terminal input (channel 0) can be used to take conventional Vdc, Vac, 2-wire and 4-wire  $\Omega$ , period, frequency, dcI, and acI measurements. Using the HP 44497A with the HP 3457A in the 6½-digit mode will yield a resolution of 1 mV for a 1000 V input. Implementing the MATH Scale function will cause the HP 3457A LCD to display the measurement results in kilovolts.

### Abbreviated Technical Specifications

90-day, Tcal  $\pm 5^\circ\text{C}$   
dc Voltage

Range	Maximum reading	Best 6½-digit accuracy $\pm$ (% rdg + cnts)*		Input resistance
		% of reading	Count error	
30 mV	30.30000 mV	0.0040	365	> 10 G $\Omega$
300 mV	303.0000 mV	0.0025	39	> 10 G $\Omega$
3 V	3.030000 V	0.0017	6	> 10 G $\Omega$
30 V	30.30000 V	0.0035	19	10 M $\Omega$ $\pm 1\%$
300 V	303.0000 V	0.0050	6	10 M $\Omega$ $\pm 1\%$

\*After 1-hr warmup, with integration time of 100 power line cycles (PLC). Tcal is the temperature of the calibration environment between 18° and 28° C.

**True rms ac V and (ac + dc)V**

**Bandwidth:** 20 Hz to 1 MHz

**Crest Factor:** 3.5:1 at full scale

**Common Mode Rejection:** (1 k Ω unbalance in LO): >76 dB, dc to 60 Hz

**Accuracy:** (90 day)

Accuracy specified for sine wave inputs, >10% of range. dc component <10% of ac component after 2-hour warmup and within one week of autocal. Integration time is 10 PLC. ac Band set to <400 Hz.

Range	Maximum reading	(100 Hz to 20 kHz) best 5 1/2-digit accuracy ± (% rdg + cnts)				Input impedance
		ac coupled % of reading	Count error	dc coupled % of reading	Count error	
30 mV	32.50000 mV	0.13	116	0.17	364	1 MΩ ± 1% shunted by <90 pf
300 mV	325.0000 mV	0.13	116	0.17	364	
3 V	3.250000 V	0.13	116	0.17	364	
30 V	32.50000 V	0.13	116	0.17	364	
300 V	303.0000 V	0.19	116	0.23	364	

**Resistance (2- and 4-wire Ω) (90 day accuracy)**

Range	Maximum reading	Best 6 1/2-digit accuracy ± (% rdg + cnts)		
		% of reading	Count error	Current output
30 Ω	30.30000 Ω	0.0065	315	1 mA
300 Ω	303.0000 Ω	0.0045	34	1 mA
3 kΩ	3.030000 kΩ	0.0035	6	1 mA
30 kΩ	30.30000 kΩ	0.0035	6	100 μA
300 kΩ	303.0000 kΩ	0.0040	7	10 μA
3 MΩ	3.030000 MΩ	0.0055	12	1 μA
30 MΩ	30.30000 MΩ	0.025	80	100 nA
300 MΩ	303.0000 MΩ	1.6	1000	100 nA
3 GΩ	3.030000 GΩ	16.0	1000	100 nA

For 2-wire Ω, add 200 mΩ to count error specifications. After 1-hr warmup with integration time of 100 power line cycles (PLC). Tcal is the temperature of the calibration environment between 18° and 28° C. For 2-wire Ω only, accuracy is specified following autocal (ACAL), under stable conditions (±1° C).

**Maximum Reading Rates (dc V, dc I, and resistance up to 30 kΩ)**

Power line cycles	Maximum no. of digits	Readings per second 60 Hz (50 Hz)		NMR
		Auto zero on	Auto zero off	
.0005	3 1/2	300	1350	0
.005	4 1/2	280	1250	0
.1	5 1/2	140 (128)	360 (312)	0
1.0	6 1/2	26 (22)	53 (45)	60 dB
10	7 1/2	2.5 (2.0)	4.8 (4.0)	80 dB
100	7 1/2	.25 (0.2)	0.5 (0.4)	90 dB

Reading rates are specified with zero delay, fixed range, display off, and front panel off. The output is to internal reading memory using single integer format and internal timer. Integration time in PLC. Using Math HIRES mode for 7 1/2 digits.

**dc Current (90 day accuracy)**

Range	Maximum reading	Best 6 1/2-digit accuracy ± (% rdg + cnts)		Shunt resistance
		% of reading	Count error	
300 μA	303.0000 μA	0.02	104	1000 Ω
3 mA	3.030000 mA	0.02	104	100 Ω
30 mA	30.30000 mA	0.02	104	10 Ω
300 mA	303.0000 mA	0.07	204	1 Ω
1 A	1.000000 A	0.07	604	0.1 Ω

\*After 1-hr warmup, with integration time of 100 PLC. Tcal is the temperature of the calibration environment between 18° and 28° C.

**Common Mode Rejection (dB):** 1 kΩ unbalance in low lead; dc ECMR 140 dB; ac ECMR: <1 PLC, 76 dB; ac ECMR >1 PLC, 156 dB for 50, 60 Hz ±.08%

**Memory:** 6235 available bytes that can be partitioned into 3 segments, one devoted to storing measurements, one devoted to storing measurement subprograms, and one devoted to storing instrument states.

**Math Functions:** The HP 3547A performs the following math functions on measurements: NULL, SCALE, OFFSET, RMS FILTER, SINGLE POLE FILTER, THERMISTOR LINEARIZATION, DB, DBM, % ERROR, PASS/FAIL, LIMIT TESTING, and STATISTICS. Two math functions may be used at one time.

**General Specifications**

**Operating Temperature:** 0° to 55° C

**Warmup Time:** One hour to all specifications except where noted

**Humidity Range:** 95% RH, 0° to 40° C

**Storage Temperature:** -40° to +75° C

**Power:** 100/120/220/240 V ± 10%, 48 Hz to 66 Hz, 220 V, ± 10%, 48 Hz to 66 Hz. Fused at .2 A (115 V) or 0.08 A (230 V). <30 V A.

**Size:** 89 mm H (without removable feet) × 425 mm W × 292 mm D (3.5 in × 16.75 in × 11.5 in). Height (with removable feet): 100 mm (4 in). Allow 76 mm (3 in) additional depth for wiring.

**Weight:** Net, 5.05 kg (11.1 lb); shipping, 9.3 kg (20.5 lb)

**Plug-in Options**

**HP 44491A Armature Relay Multiplexer Assembly Input**

**Characteristics:** Eight 2-wire armature relay channels and two current/actuator channels. Maximum voltage (terminal-to-terminal or terminal-to-chassis) 250 V rms. Maximum current (per channel) 1.0 A dc or ac rms. Thermal offset <3 μV. Closed channel resistance (end of relay life) <2 Ω. Maximum switching and measurement speed 33 channels/second.

**HP 44492A Reed Relay Multiplexer Assembly Input Characteristics**

Ten 2-wire reed relay channels. Maximum voltage (terminal-to-terminal or terminal-to-chassis) 125 V peak. Thermal offset <3 μV. Closed channel resistance (end of relay life) <4 Ω. Specified for <100 kHz ac volts and frequency operation. Maximum switching and measurement speed 300 channels/second.

**HP 44497A High-Voltage Attenuator Assembly Input Characteristics**

Two relay channels, channel 1 devoted to high-voltage measurements. Maximum high-to-low voltage of 1000 volts dc or ac rms. Maximum low-to-earth voltage of 350 V peak. Nondestructive over-load voltage of 1700 V peak, 1200 volts dc. Attenuator accuracy to be added to HP 3457A range and function accuracy for total accuracy.

dc	0.030% of reading
20 Hz to 1 kHz	2.8% of reading
1 kHz to 10 kHz	12% of reading

Note: One-year accuracy applies to Tcal ±5%, NPLC = 1 or greater. Specifications are for low-to-earth voltage less than 0.1 times high-to-earth voltage.

**Ordering Information**

<b>HP 3457A</b> Multimeter	<b>Price</b> \$3,260
* <b>HP 44491A</b> Armature Relay Multiplexer Assembly	\$560
* <b>HP 44492A</b> Reed Relay Multiplexer Assembly	\$560
* <b>HP 44497A</b> High Voltage Attenuator Assembly	\$560
<b>Opt 401</b> Side Handle Kit (5061-1171)	+ \$45
<b>Opt 700</b> CHIL Language	+ \$1,000
<b>Opt 907</b> Front Handle Kit (5061-1170)	+ \$70
<b>Opt 908</b> Rack Flange Kit (5061-1168)	+ \$35
<b>Opt 909</b> Rack Flange and Front Handle Kit (5061-1169)	+ \$85
<b>Opt 910</b> Extra Operating and Service Manual	+ \$110
<b>Opt W30</b> Extended Repair Service (see page 624)	+ \$80
<b>Opt W32</b> Three-year customer return repair coverage	

**Accessories**

<b>HP 44493A</b> Screw Terminal Connector for HP 44491A (includes strain relief and housing)	\$70
<b>HP 44494A</b> Screw Terminal Connector for HP 44492A (includes strain relief and housing)	\$70
<b>HP 44414A</b> Four Thermistor Pack	\$63

\*Plug-in options may be ordered and shipped separately without a HP 3457A mainframe. Unless otherwise specified, optional plug-in assemblies will be shipped with the HP 3457A mainframe.