



DIGITAL VOLTMETERS

5½/6½-digit DVM with Auto Cal

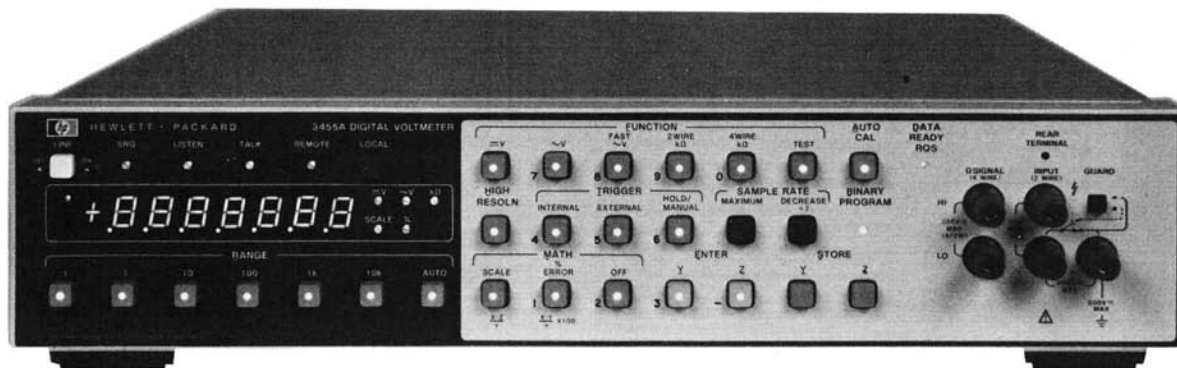
Model 3455A

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- AutoCal
- Self test
- Bench/system

- AD/DC/OHMs
- High speed
- Removable reference



HP-IB

Description

Hewlett-Packard's 3455A Digital Voltmeter is a microprocessor controlled 5½- or 6½-digit integrating voltmeter for bench or systems applications. The standard instrument measures DC volts, AC volts, and resistance. HP-IB I/O for systems applications is also standard.

Measuring speed

The 3455A is fully guarded and has greater than 60 db normal mode noise rejection at reading rates of up to 24 readings per second on all DC ranges. Ohms reading rates are up to 12 readings/second and an AC fast mode gives reading rates of up to 13 readings/second at frequencies above 300 Hz.

Performance

DC measurements can be made with up to 1 µV sensitivity. Ohms measurements are made with either a 2-wire or 4-wire mode. The High Resolution (6½-digit) mode gives DC and Ohms measurements with greater than 1 part per million resolution. AC voltage measurements can be made from 30 Hz to 250 kHz with the optional average responding converter.

True rms

The standard true rms converter gives AC measurements from 30 Hz to 1 MHz. Complex signals with crest factors of up to 7:1 at full scale can be measured.

Math

The math functions provide the user with unique computational capability. The Scale mode ($\frac{X-Z}{Y}$) allows the user to offset, take ratios, or scale readings to give readouts in physical units. The % Error mode ($\frac{X-Y}{Y} \times 100$) converts readings into percentage change from Y which is entered as a reference. For the math functions X is the present reading. Y and Z are previously entered readings or numbers entered from the front panel or by remote program.

Auto Cal

The auto cal feature gives the user accurate DC volts and ohms measurements and simplifies calibration of these functions. The DC and ohms operating circuits are checked against internal references and any errors are corrected digitally. All dc and ohms adjustments are in a removable reference assembly.

Serviceability

The self-test feature is used to aid in troubleshooting as well as verifying operation of the 3455A. Test verifies proper operation of the DC measuring circuits by comparing their parameters against predetermined limits. If a problem is found, the display is used to assist in finding the problem area by indicating which parameter is in error. Detailed troubleshooting can then be used to quickly isolate the problem.

Routine maintenance and calibration has been simplified with the removable reference assembly. Calibration of DC and ohms functions can be done by replacing the reference assembly with a recently calibrated one. Extra reference assemblies are available as HP accessory number 11177A. A spare assembly is ideal for one or more 3455A's. Calibrate DC and ohms in a 3455A without removing it from the bench or system. Just return the extra reference assembly to the cal lab or HP for calibration and have it back in time to calibrate the 3455 next time.

Data-sheet systems

The 3455A is included as part of two standard systems. The 3051A and 3052A are fully integrated, tested, verified and specified as systems and come with complete systems software and documentation. These systems provide complete solutions to many of your measurement problems.

3051A Programmable Data Logger

The 3051A Programmable Data Logger has been specifically designed to solve your dedicated, long term data logging problems.

The 3051A consists of:

- 3455A DVM
- 3495A Scanner
- 9815A Calculator
- Special Data Logger ROM

Your data logging problems can be simplified with such features as:

- Thermocouple linearization
- Thermocouple reference junction
- Data analysis and processing
- Decision making and control capabilities
- Data formatting and storage
- Power fail-restart

Typical applications areas are:

- Plant monitoring
- Process monitoring
- Parameter testing

3052A Automatic data acquisition system

The 3052A Automatic Data Acquisition System has been designed to solve your data acquisition, control and automatic testing problems.

The 3052A consists of:

- 3455A DVM
- 3437A System Voltmeter
- 3495A Scanner
- 9825A Desktop Computer & ROMs

These 3052A features give you a wide range of problem solutions:

- Signal digitizing (>5000 readings/second)
- High speed scanning (>100 channels/second)
- System timing
- Vectored interrupt system for simultaneous control and processing of multiple tasks
- High speed data access and storage
- Alphanumeric display for easy interaction with the operator

Typical application areas are:

- R & D
- Production testing & QA

For further information on either of these two systems refer to pages 72 and 73 or contact your local HP field engineer.

HP Technology

HP has developed an instrument oriented microprocessor to provide the high performance of the 3455A. The microprocessor has a parallel architecture to give the high speed necessary to control the measurement processes of a bench/systems voltmeter. Two microprocessors are used: one for control of the measurement and the second for interface to the HP-IB and computation of the math functions.

Auto cal is a process by which the 3455A internally checks its DC and ohms operating circuits against internal references and corrects for errors. The benefits of auto cal are high accuracy and simplified calibration. Only four adjustments for calibration of DC and ohms are required and these are in the removable reference assembly. The microprocessor is also used to control the auto cal process and compute the correction factors.

The HP-developed fineline tantalum nitride resistor technology used in several HP digital voltmeters is also used in the 3455A. This technology provides accurate temperature tracking resistors that result in excellent long term DC accuracy.

Specifications

DC Voltage

Ranges		Maximum Display	
High Resolution Off	High Resolution On	High Resolution Off	High Resolution On
0.1	—	±0.149999 V	—
1	1	±1.499999 V	±1.499999 V
10	10	±14.99999 V	±14.99999 V
100	100	±149.9999 V	±149.9999 V
1000	1000	±1000.00 V	±1000.000 V

Performance

(High Resolution Off)

Accuracy

24 hours 23°C ±1°C

10 V range: ±(0.002% of reading + 1 digit).

1 V range: ±(0.003% of reading + 1 digit).

0.1 V range: ±(0.004% of reading + 4 digits).

100 & 1000 V range: ±(0.004% of reading + 1 digit).

90 days 23°C ±5°C

10 V range: ±(0.005% of reading + 1 digit).

1 V range: ±(0.006% of reading + 1 digit).

0.1 V range: ±(0.007% of reading + 4 digits).

100 & 1000 V range: ±(0.007% of reading + 1 digit).

6 months 23°C ±5°C

10 V range: ±(0.008% of reading + 1 digit).

1 V range: ±(0.009% of reading + 1 digit).

0.1 V range: ±(0.010% of reading + 5 digits).

100 & 1000 V range: ±(0.010% of reading + 1 digit).

1 year 23°C ±5°C

10 V range: ±(0.013% of reading + 1 digit).

1 V range: ±(0.014% of reading + 1 digit).

0.1 V range: ±(0.015% of reading + 6 digits).

100 & 1000 V range: ±(0.015% of reading + 1 digit).

(High Resolution On)

Accuracy

24 hours 23°C ±1°C

10 V range: ±(0.002% of reading + 3 digits).

100 & 1000 V range: ±(0.004% of reading + 3 digits).

1 V range: ±(0.003% of reading + 4 digits).

90 days 23°C ±5°C

10 V range: ±(0.005% of reading + 3 digits).

100 & 1000 V range: ±(0.007% of reading + 3 digits).

1 V range: ±(0.006% of reading + 4 digits).

6 months 23°C ±5°C

10 V range: ±(0.008% of reading + 3 digits).

100 & 1000 V range: ±(0.010% of reading + 3 digits).

1 V range: ±(0.009% of reading + 5 digits).

1 year 23°C ±5°C

10 V range: ±(0.013% of reading + 3 digits).

100 & 1000 V range: ±(0.015% of reading + 3 digits).

1 V range: ±(0.014% of reading + 6 digits).

Input characteristics

Input resistance: 0.1 V through 10 V range: >10¹⁰ ohms. 100 V and 1000 V range: 10 megohm ±0.1%.

Maximum input voltage

High to low input terminals: ±1000 V peak.

Guard to chassis: ±500 V peak.

Guard to low terminal: ±200 V peak.

Normal mode rejection (NMR): NMR is the ratio of the peak normal-mode voltage to the peak error voltage in the reading.

NMR at 50 or 60 Hz ±0.1%: >60 dB.

Effective common mode rejection (ECMR): ECMR is the ratio of the peak common-mode voltage to the resultant peak error voltage in the reading.

ECMR with 1 kΩ unbalance in low lead at

DC: >140 db.

50 Hz or 60 Hz ±0.1%: >160 db.

Maximum reading rate

	60 Hz Gate Length		50 Hz Gate Length	
	High Resolution Off	High Resolution On	High Resolution Off	High Resolution On
Local	5 rdg/s	3 rdg/s	3.5 rdg/s	2.5 rdg/s
Remote	24 rdg/s	6 rdg/s	22 rdg/s	5 rdg/s