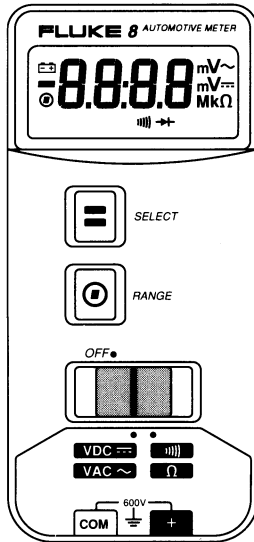


8 AUTOMOTIVE METER

Users Manual



FLUKE®



PN 106150

December 1994

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LIMITED WARRANTY

Please record the date of purchase and your instrument serial number from the back of your meter. **In addition, we recommend you record the serial number on your purchase invoice and keep it in a safe place** separate from your multimeter.

Date of purchase _____ Serial number _____

Fluke warrants to the original product purchaser that each product it manufactures will be free from defects in material and workmanship under normal use and service. The warranty period is controlled by the warranty document furnished with each product and begins on the date of shipment. Fluke's warranty does not apply to fuses, batteries, CRTs or any product which, in Fluke's opinion, has been misused, altered, neglected, or damaged by accident or abnormal conditions of operation or handling.

To obtain warranty service in the U.S.A., call 1-800-825-9810 for information. Outside the U.S.A. contact your nearest Fluke sales or service representative. Fluke assumes no risk for damage in transit. Fluke will, at its option, repair or replace the defective product free of charge or refund your purchase price. However, if Fluke determines that the failure was caused by misuse, alteration, accident or abnormal condition of operation or handling, you will be billed for the repair and the repaired product will be returned to you transportation prepaid.

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE. FLUKE WILL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR LOSS OF DATA, WHETHER IN CONTRACT, TORT, OR OTHERWISE.


Some states do not allow the exclusion or limitation of incidental or consequential damages, or implied warranty periods, so the above limitations may not apply to you. Other rights may vary from state to state.

For application or operation assistance or information on Fluke products, call:

800-44-FLUKE (800-443-5853) in U.S.A. and Canada
31 40 723-220 in Europe
206-356-5500 from other countries

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P.O. Box 9090
Everett, WA
98206-9090

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P.O. Box 1186
5602 B.D. Eindhoven,
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Overload Alert is a trademark of the Fluke Corporation.

READ FIRST: SAFETY INFORMATION

This meter has been designed and tested in accordance with IEC Publication 1010. To ensure that the meter is used safely, follow all safety and operating instructions in this manual. If the meter is not used as described in this manual, the safety features of the meter might be impaired.

- Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
- Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
- Do not apply more than 600V rms between a terminal and earth ground.
- Use caution when working above 60V dc or 30V ac rms. Such voltages pose a shock hazard.
- When using the probes, keep your fingers behind the finger guards on the probes.
- Disconnect the live test lead before disconnecting the common test lead.

DISPLAY

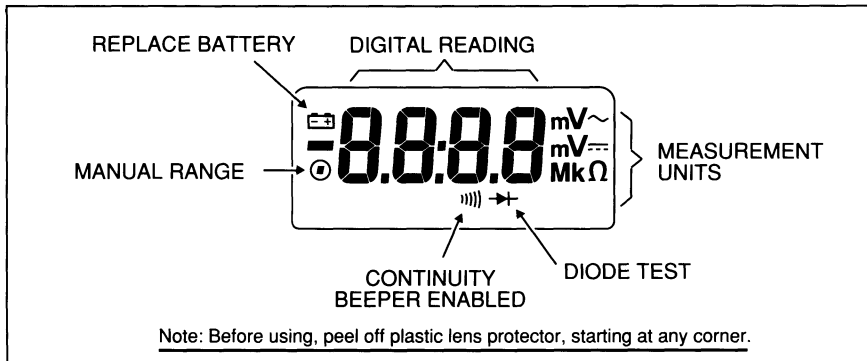


Figure 1. Display

STANDBY MODE

In Standby mode, the display goes blank to preserve battery life. The meter beeps and enters Standby if it is LEFT ON BUT IS INACTIVE for more than 45 minutes. Press any pushbutton to resume operation.

OPERATING FEATURES

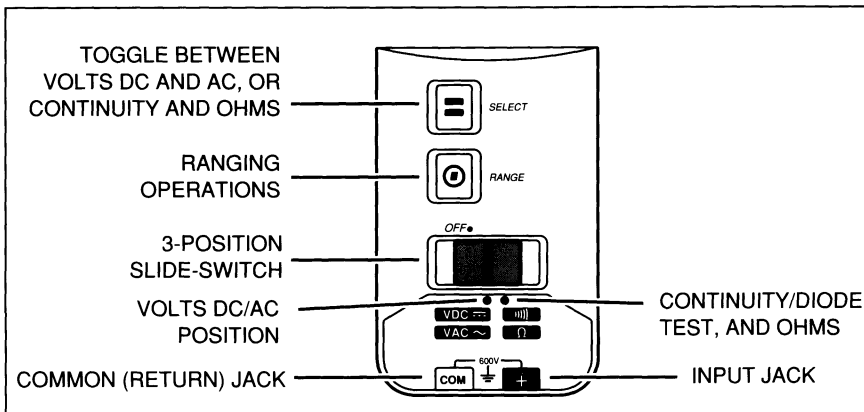



Figure 2. Operating Features

INTERNATIONAL SYMBOLS


 Important Information. See manual.

 AC

 DC

 Diode

 Ground

 Double Insulation

[⊖] AUTORANGE AND MANUAL RANGE MODE

The input range for each function (see SPECIFICATIONS) determines the highest value the meter can measure. If the range is too low, the meter displays OL (overload) and beeps an Overload Alert™. If the range is too high, the display shows fewer digits of resolution. The meter has an autorange and manual range mode. In autorange, the meter selects the range automatically. The meter defaults to autorange when you turn it on. In manual range, you lock the meter in a range. To manually select a range:

1. Press [⊖] to lock the meter in the present range. ⊖ is displayed.
2. Press [⊖] to step through the ranges. NOTE: The 4000 mV range, which can only be entered in manual range, is convenient when using accessories.
3. To return to autorange, press [⊖] for 2 seconds (until ⊖ is no longer displayed), or change the measurement function.

MEASURING VOLTAGE

1. Insert the test leads in the jacks.
2. To select a voltage function, put the slide-switch in the middle position. See Figure 3.

Press [≡] to toggle between dc and ac.

3. Touch the probes to the test points.
4. Read the display. The meter beeps an Overload Alert when OL (overload) is displayed.

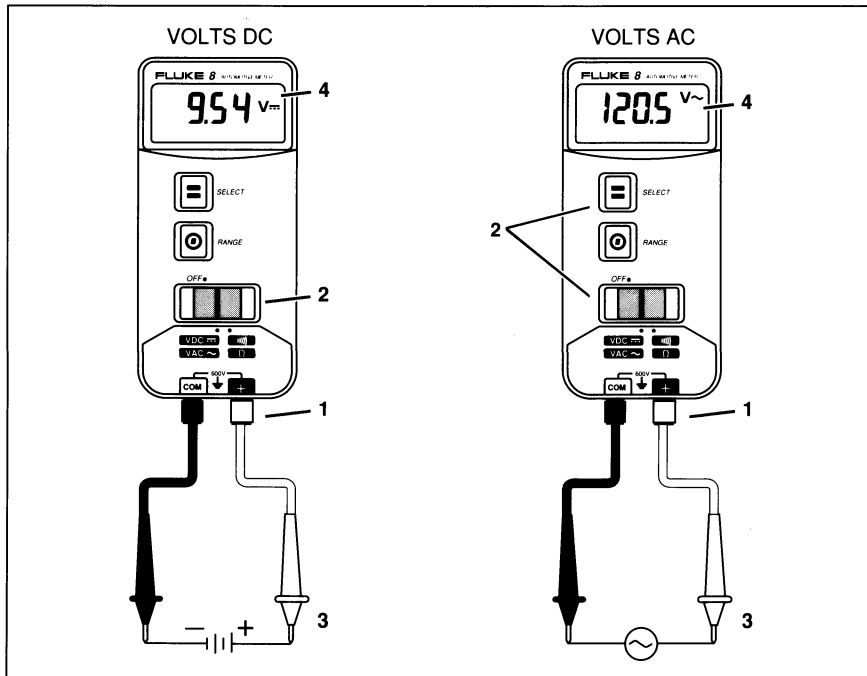


Figure 3. Measuring Voltage

TESTING CONTINUITY AND MEASURING RESISTANCE

1. Insert the test leads in the jacks, and turn off power to the circuit under test. External voltage across the components causes invalid readings.
2. Put the slide-switch in the continuity/ohms position (Figure 4). The meter selects the continuity/diode or ohms function.

Press **[⇄]** to toggle between the continuity/diode and ohms functions.

3. Touch the probes to the test points.
4. In ohms, read the resistance on the display.

In continuity test, the beeper sounds continuously if continuity exists (resistance $<25\Omega$). Opens and shorts longer than $250\ \mu\text{s}$ are detected.

TURNING BEEPER OFF

To disable all beeper functions, press and hold down **[⊙]** for 2 seconds while turning the meter on.

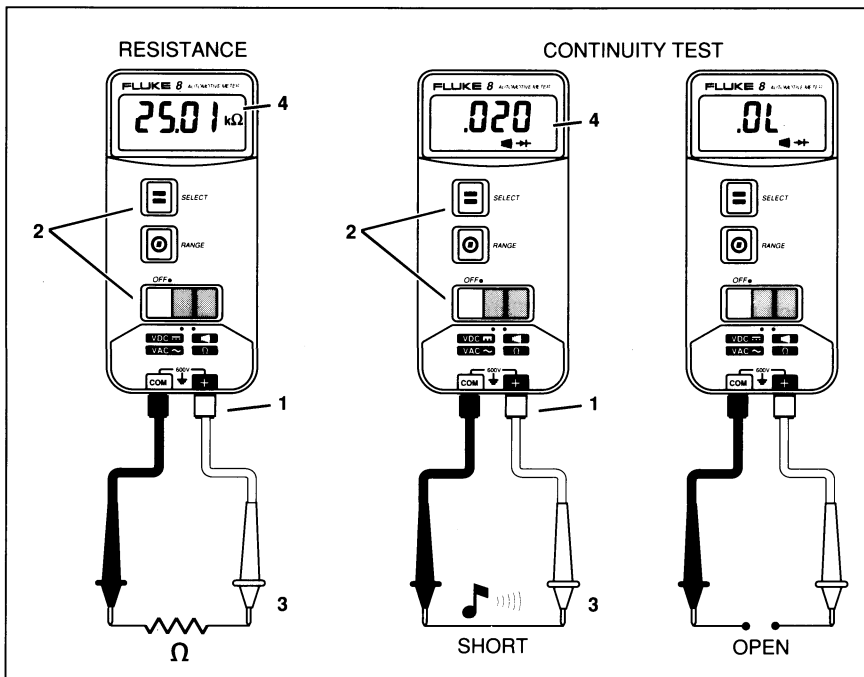






Figure 4. Continuity and Resistance Measurements

TESTING DIODES

1. Insert the test leads in the jacks.
2. Put the slide-switch in the continuity/ohms position. The meter selects either the continuity/diode () or ohms (Ω) function.

If ohms is selected, press  to toggle to the continuity/diode function. To toggle the beeper on or off in continuity/diode test, press .  is displayed when the beeper is enabled.

3. Touch probes to the diode (Figure 5A). A forward-voltage drop of about 0.6V (typical for a silicon diode) causes the meter to beep once.
4. Reverse probes (Figure 5B). If the diode is good, OL is displayed.

If the diode is shorted (Figure 5C), the beeper sounds continuously in at least one direction.

If the diode is open, OL is displayed in both directions.

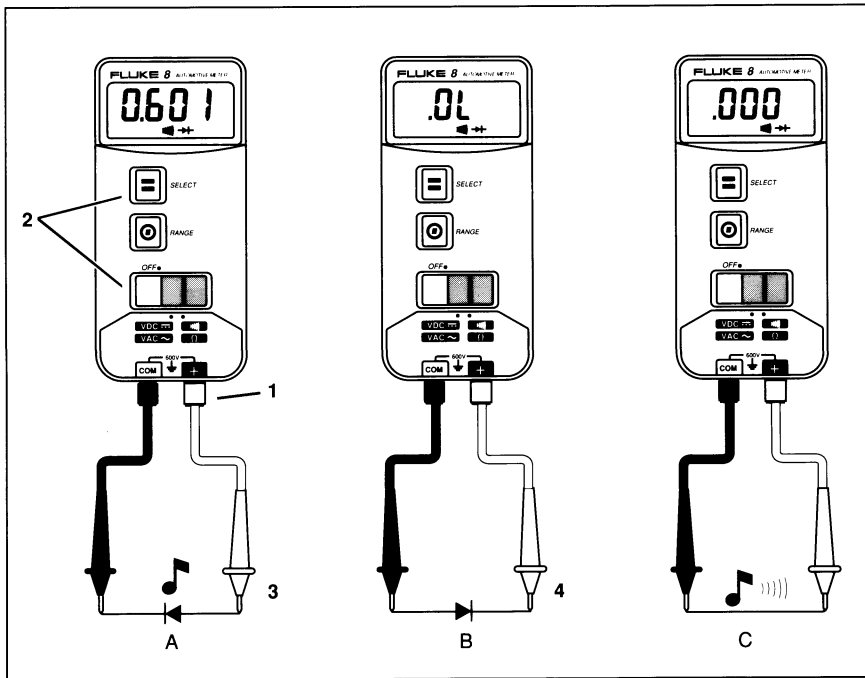


Figure 5. Testing Diodes

MAINTENANCE

WARNING: TO AVOID ELECTRICAL SHOCK OR DAMAGE TO THE METER, DO NOT GET WATER INSIDE THE CASE, AND REMOVE THE TEST LEADS AND ANY INPUT SIGNALS BEFORE OPENING THE CASE.

Periodically wipe the case with a damp cloth and detergent. Do not use abrasives or solvents.

REPLACING THE BATTERY

The meter uses a 9V battery. To replace the battery, remove the four screws from the back of the meter and lift off the front. Remove the battery from the case bottom.

REPLACING THE TEST LEADS

The meter uses double-insulated test leads. When replacing the test leads, order Fluke TL-75 PN 855705 only.

SERVICE AND PARTS

This meter should be serviced only by a qualified service technician. To order the service manual (PN 900824) and other parts or for service information, in the USA call 1-800-825-9810. Outside the USA, contact the nearest Fluke service center (see back of manual).

ACCESSORIES

When using accessories, put the slide-switch in the volts position, and manually select the 4000 mV range for ease of reading.

SPECIFICATIONS

This meter complies with Part 15 of FCC Rules. Operation is subject to the following conditions: (1) This meter may not cause harmful interference, and (2) this meter must accept any interference received, including interference that may cause undesired operation.

Accuracy is specified for a period of one year after calibration, at 18°C to 28°C (64°F to 82°F) with relative humidity to 90%. AC conversions are ac-coupled, average responding, and calibrated to the rms value of a sine wave input. Accuracy Specifications are given as:

$$\pm([\% \text{ of reading}] + \text{number of least significant digits})$$

Maximum Voltage Between any Terminal and Earth Ground

600V rms

Display

3 3/4-digits, 4000 counts, updates 4/sec

Operating Temperature

-10°C to 50°C

Storage Temperature

-30°C to 60°C indefinitely (to -40°C for 100 hrs)

Temperature Coefficient

0.1 x (specified accuracy)/°C (<18°C or >28°C)

Relative Humidity

0% to 90% (-10°C to 35°C); 0% to 70% (35°C to 50°C)

Battery Type

9V, NEDA 1604 or IEC 6F22

Battery Life

Alkaline, 650 hrs continuous. Carbon-zinc, 450 hrs continuous

Shock, Vibration

1 meter shock. Vibration per MIL-T-28800D for a Class 3 Instrument

Size (HxWxL)

1.35 x 2.75 x 5.55 inches; (3.46 x 7.05 x 14.23 cm) Weight 10 oz (286 g)

Safety

Designed to Protection Class II requirement of UL1244, ANSI/ISA-S82, CSA C22.2 No 231, and VDE 0411, and IEC 1010 overvoltage category III.

EMI Regulations

Complies with FCC Part 15, Class B, and VDE 0871B.

Function	Range	Resolution	Accuracy (50 to 400 Hz)
V_{\sim}	4000 mV*	1 mV	$\pm(2.9\%+3)$
	4.000V	0.001V	$\pm(2.9\%+3)$
	40.00V	0.01V	$\pm(2.9\%+3)$
	400.0V	0.1V	$\pm(2.9\%+3)$
	600V	1V	$\pm(2.9\%+3)$
$V_{\text{---}}$	4000 mV*	1 mV	$\pm(1.5\%+2)$
	4.000V	0.001V	$\pm(1.5\%+2)$
	40.00V	0.01V	$\pm(1.5\%+1)$
	400.0V	0.1V	$\pm(1.5\%+1)$
	600V	1V	$\pm(1.5\%+1)$
Ω	400.0 Ω	0.1 Ω	$\pm(1.5\%+2)$
	4.000 k Ω	0.001 k Ω	$\pm(1.5\%+1)$
	40.00 k Ω	0.01 k Ω	$\pm(1.5\%+1)$
	400.0 k Ω	0.1 k Ω	$\pm(1.5\%+1)$
	4.000 M Ω	0.001 M Ω	$\pm(1.5\%+1)$
	40.00 M Ω	0.01 M Ω	$\pm(1.9\%+3)$
$\text{ } \rightarrow \vdash$	2.000V	0.001V	$\pm(1.5\%+2)\dagger$

* The 4000 mV range can only be entered in manual range mode. Use the 4000 mV range with accessories.

† The beeper is guaranteed to come on at $<25\Omega$ and turn off at $>250\Omega$. The meter detects opens or shorts of 250 us or longer.

Function	Overload Protection*	Input Impedance (Nominal)	Common Mode Rejection Ratio (1 k Ω Unbalance)	Normal Mode Rejection	
V \equiv	600V dc	>10 M Ω <100 pF	>100 dB at dc, 50 Hz, or 60 Hz	>50 dB at 50 Hz or 60 Hz	
V \sim	600V rms	>5 M Ω <100 pF (ac-coupled)	>60 dB dc to 60 Hz		
Ω		Open Circuit Test Voltage	Full Scale Voltage To 4.0 MΩ 40 MΩ		Short Circuit Current
	600V rms	<1.5V dc	<450 mV dc	<1.5V dc	<500 μ A
\rightarrow +	600V rms	2.4-3.0V dc	2.400V dc	0.95 mA (typical)	
* 3 x 10 ⁶ V Hz Maximum					

SERVICE CENTERS

USA

Washington

Fluke Service Center
TEL: (206) 356-5560
INTERNATIONAL

Argentina

Coasin S.A.
TEL: 54-1-552-5248
Viditec S.A.
TEL: 54-1-636-1199

Australia

Phillips Customer Support
TEL: 61-3-881-3666

Phillips Customer Support
TEL: 61-2-888-0416

Austria

Fluke Vertriebsges. m.b.H.
TEL: 43-1-614-100

Belgium

N.V. Fluke Belgium/S.A.
TEL: 218-2-331-2777

Bolivia

Coasin Bolivia S.R.L.
TEL: 591-2-340962

Canada

Fluke Elect. Canada Inc.
TEL: 905-890-7600

Chile

Intronica
TEL: 56-2-232-3888

China

Fluke Service Center
TEL: 86-1-512-3435

Colombia

Sistemas E Inst. Ltda.
TEL: 57-1-287-5424

Costa Rica

Elect. Engineering, S.A.
TEL: 506-253-3759

Denmark

Fluke Danmark A/S
TEL: 45-43-44-1900

Ecuador

Proteco Coasin Cia., Ltda.
TEL: 593-2-230283

Fiji

Comm. Pacific, Ltd.
TEL: 679 312744

Finland

Fluke Finland Oy
TEL: 358-0-5026-6247

France

Fluke France S.A.
TEL: 33-1-48-966361

Germany

Fluke Deutschland GmbH
TEL: 49-89-99611-260

Fluke Deutschland
TEL: 49-40-6797-434

Hong Kong

Schmidt & Co (H.K.) Ltd.
TEL: 852-9223-5623

Ireland, Republic of

Fluke U.K. LTD.
TEL: 44-923-240511

India

Hinditron Services Pvt. Inc.
TEL: 91-80-334-8266
TEL: 91-22-837-0013
TEL: 91-11-641-0380
TEL: 91 842-844033

Indonesia

P. T. Daeng Brothers
TEL: 62-21-520-1122

Israel

R.D.T Equip. and Sys. Ltd.
TEL: 972-3-645-0745

Italy

Fluke Italia S.R.L.
TEL: 39-2-268434-435

Japan

Fluke Corporation
TEL: 81-3-3434-0188

Korea

B&P International Co., Ltd.
TEL: 82 02 546-1457

IL MYOUNG, INC.

TEL: 82 2 552-8582-4

Malaysia

CNN. SDN. BHD.
TEL: 60-4-657-9584

Mexico

Mexel Mexicana De Elect.
Industrial, S.A. De C.V.
TEL: 52-5-682-8040

Mexicana De Electronica
Industrial, S.A.
TEL: 52-16-23-02-35

Netherlands

Fluke Europe B.V.
TEL: 31-40-644-226

Fluke Netherland B.V.
TEL: 31-40-722-626

New Zealand

Phillips Customer Support
TEL: 64-9-894-4160

Norway

Fluke Norway A/S
TEL: 47-22-653400

Pakistan (Phillips)

Phillips Electrical Industries of
Pakistan, Ltd.
92-21-587-4641-49

Peru

Importaciones &
Representaciones
Electronicas S.A.
TEL: 51-14-23-5099

Philippines

Spark Electronics Corp.
TEL: 63-2-700-621

Portugal

Fluke Iberica, S.L.
TEL: 351-1-795-1712

Singapore

Fluke Corporation
TEL: 65-276-5161

South Africa

Spescom Measuregraph (PTY) Ltd.
TEL: 27-11-315-0757

Spain

Fluke Iberica S.L.
TEL: 34-1-804-2301

Sweden

Fluke Sverige AB
TEL: 46-8-751-0235

Switzerland

Fluke Switzerland AG
TEL: 41-1-730-3310

Taiwan

Schmidt Electronics Corp.
TEL: 886-2-501-3468

Thailand

Measuretronix Ltd.
TEL: 66-2-375-2733, 375-2734

United Kingdom

Fluke U.K. LTD.
TEL: 44-923-240511

Uruguay

Coasin Uruguay S.A.
TEL: 598-2-789-015

Venezuela

Coasin C.A.
TEL: 58-2-241-0309, 241-1248

Vietnam

Schmidt-Vietnam Co., Ltd.
TEL: 84-4-346186

Warranty Information

Congratulations on your purchase of a Fluke Automotive Meter, which is designed to give you years of troublefree service. Enclosed is our three year warranty and product information card. Please take a few minutes to complete the requested information so that it is possible to send you product safety information and better serve the needs of you, our customer.

Statement of Calibration

Fluke Corporation has calibrated this meter using standards and instruments the accuracy of which is traceable to the National Institute of Standards in the USA or to nationally accepted measuring systems. The standards and instruments used in calibration are supported by a calibration system which meets or exceeds the requirements of MIL-STD-45662.

A serialized and dated Certificate of Calibration for any individual instrument can be obtained by sending the meter to any Fluke Technical Service Center listed in the manual. A nominal calibration fee will be charged.

Corporate Quality Assurance