



22-802.fm Page 1 Friday, August 6, 1999 1:15 PM



Cat. No. 22-802



# OWNER'S MANUAL

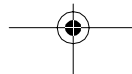
Please read before using this equipment.



## Pocket Size Auto-Ranging LCD Digital Multimeter



**RadioShack®**





## FEATURES

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Your RadioShack Pocket Size Auto-Ranging LCD Digital Multimeter is a portable, compact multimeter that is ideal for field, lab, shop, and home applications. Its  $3\frac{3}{4}$ -digit digital display means it can display up to 3,999 units. It measures AC and DC voltage up to 400 V, and resistance up to 4 MW.

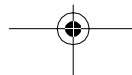


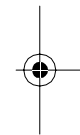
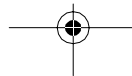
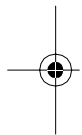
Your meter's modern semiconductor technology brings "big meter" performance to a pocket-sized instrument. Here are some of the features that make your new multimeter a real winner.



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**Fully Auto-Ranging** — automatically selects a range when you measure voltage or resistance, making your meter easier and safer to use.

**Overload Indicators** — the meter displays a warning and sounds a warning tone if you try to measure voltage that exceeds the meter's range.

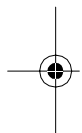
**Diode Check Function** — lets you safely check semiconductors for open, shorted, or normal junctions.

**Continuity Function** — the meter quickly checks the continuity of wires or traces, and buzzes if the wire or trace is continuous.

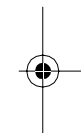


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**Auto Power Shut-off** — helps conserve battery power by automatically turning off if you do not change any settings for about 30 minutes.



**Full Auto-Polarity Operation** — protects your meter and gives valid measurements even when you connect the leads in reverse polarity.

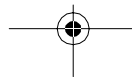


**Low Battery Indicator** — appears when you need to replace the batteries.

**Pocket Size** — the meter's case folds to easily fit in a shirt pocket.



**Latest IC and Display Technology** — ensures reliability, accuracy, stability, and ease of operation.





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**Hard Case** — protects the meter and secures the test leads inside its cover.



**UL Listed** — passes the stringent safety tests required by Underwriters Laboratories.

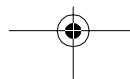


**Note:** Your meter comes with two 357A 1.5V button cell batteries which you must install before using the meter.



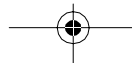
**Important:**

- This meter is not designed for commercial, industrial, or outdoor use.





- 
- Completely read this manual before you use the meter.
  - If you are not familiar with multimeters and testing procedures, we suggest you read *Using Your Meter* (RadioShack Cat. No. 62-2039, not supplied) before using the meter.





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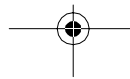
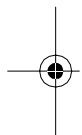
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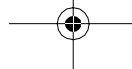
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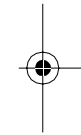
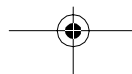
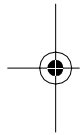
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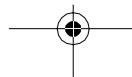
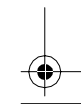
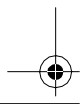
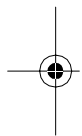
## A WORD ABOUT SAFETY

We have taken every precaution in designing this meter to ensure that it is as safe as we can make it. But safe operation depends on you, the operator. We recommend that you follow these simple safety rules.

- Never apply voltages to the meter that exceed the limits given in the specifications. Never apply more than 400V DC or 400V RMS AC between the test leads and ground.
- Use extreme caution when working with voltages above 100V. Always disconnect power from the circuit you are measuring before you connect test leads to high-voltage points.



- 
- Never connect to a source of voltage when you select the diode check or resistance measurement function.
  - Always discharge any capacitors of the circuit under test before you attach test leads.
  - Always turn off power and disconnect the test leads from the circuit you are testing before you replace the meter's batteries.
  - Never operate the meter unless its battery compartment cover is fully closed with the screw fully tightened.

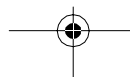


- 
- This equipment is rated for installation category II (maximum 3600 VA).
  - Because many AC/DC sets have a potentially hot chassis, be sure the top of your workbench and the floor underneath it are made of non-conductive materials.
  - This meter is fully calibrated and tested. Under normal use, no further adjustment should be necessary. If the meter requires repair, do not try to adjust it yourself. Take it to your local RadioShack store.

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**WARNINGS:**

- USE EXTREME CAUTION IN USE OF THIS DEVICE. IMPROPER USE OF THIS DEVICE CAN RESULT IN INJURY OR DEATH. FOLLOW ALL SAFEGUARDS SUGGESTED IN THIS OWNER'S MANUAL IN ADDITION TO NORMAL SAFETY PRECAUTIONS IN DEALING WITH ELECTRICAL CIRCUITS. DO NOT USE THIS DEVICE IF YOU ARE UNFAMILIAR WITH ELECTRICAL CIRCUITS AND TESTING PROCEDURES. NOT FOR COMMERCIAL OR INDUSTRIAL USE.



- 
- IF THIS EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.
  - TO REDUCE THE RISK OF FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.

## SPECIAL PANEL MARKINGS

For your safety, we have added special markings to the meter's panel to remind you of the measurement limitations.

 **MAX 400V**

The maximum voltage that can be measured is 400 volts DC or AC. Refer to the complete operating instructions. To avoid electrical shock or instrument damage, do not connect the test leads to any source that exceeds 400 volts with respect to earth ground.

|                                                                                   |                                                                                                               |
|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|  | <b>Caution: Risk of electric shock!</b> Refer to the complete operating instructions.                         |
|  | <b>Caution:</b> Be extra careful when making high-voltage measurements. DO NOT TOUCH TERMINALS OR PROBE ENDS. |
|  | This meter is protected by double insulation.                                                                 |



## SPECIFICATIONS



Display ..... LCD 3<sup>3</sup>/<sub>4</sub>-digit digital display

### DC VOLTS



400 mV – 4 V – 40 V – 400 V .....  $\pm 2.0\%$  of reading,  $\pm 0.2\%$  of full scale,  
 $\pm 1$  in last digit (Max. Measurement 400 Volts)

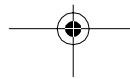


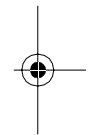
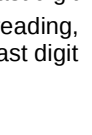
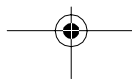
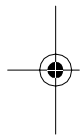
### AC VOLTS

400 mV – 4 V – 40 V – 400 V (at 50/60 Hz) .....  $\pm 2.5\%$  of reading,  
.....  $\pm 0.5\%$  of full scale,  $\pm 3$  in last digit (Max. Measurement: 400 Volts RMS)



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45–100 Hz at 400 mV Range .....  $\pm 3.0\%$  of reading,  
 $\pm 0.5\%$  of full scale,  $\pm 3$  in last digit  
45–500 Hz at 40 V Range .....  $\pm 3.0\%$  of reading,  
 $\pm 0.5\%$  of full scale,  $\pm 3$  in last digit

**RESISTANCE**

4 – 40 –400 KW – 4 MW .....  $\pm 2.0\%$  of reading,  
 $\pm 0.2\%$  of full scale,  $\pm 1$  in last digit  
400 W .....  $\pm 2.0\%$  of reading,  
 $\pm 0.2\%$  of full scale,  $\pm 5$  in last digit



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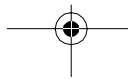
### MISCELLANEOUS

Automatic Power Off ..... 30 minutes after last selection is made

Range Control ..... Fully Auto-Ranging

Low Battery Indicator ..... **BATT** appears when  
battery voltage drops below approx. 2.4 V

Input Impedance ..... 10 MW (DC V/AC V)/  
More than 100 MW on 400 mV DC/AC range



Overrange Indication ..... **OL** (overload) display and audible beep  
during AC V and DC V measurement

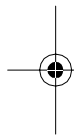
**Caution:** When **OL** flashes and the meter beeps, it indicates that the  
measurement exceeds the absolute maximum reading. Unless you are  
measuring resistance, exceeding the maximum limits of any range can  
damage the meter.

Polarity ..... Automatic

Continuity Function .... Buzzer sounds at less than nominal 50 W ( $\pm 30$  W)  
input resistance within 150 ms (typical) after input is shorted



Over Voltage Protection ..... DCV/ACV: 400 V MAX Diode Check/  
KW/Continuity: 240 V (1 minute)



Operating Temperature ..... 41 to 104°F  
(5 to 40°C)



Storage Temperature ..... -4 to 140°F  
(-20 to 60°C)



Relative Humidity 80% (maximum) for temperatures up to 87.8°F (31°C),  
decreasing linearly to 50% at 104°F (40°C)



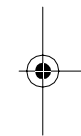
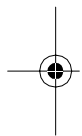
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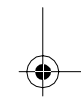
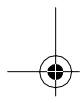
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Power Source ..... Two 357A 1.5V batteries  
(RadioShack Cat. No. 23-115)

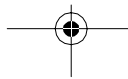


Power Consumption ..... 10 mW (Typical)  
Dimensions (HWD) .....  $4\frac{1}{4} \times \frac{3}{4} \times 2\frac{1}{4}$  Inches  
(108 × 21 × 55 mm)

Weight (with batteries) ..... 3.4 oz  
(96 g)



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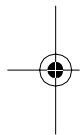


## PREPARATION

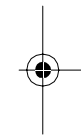
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### INSTALLING THE BATTERIES

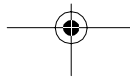
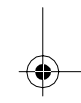
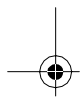


Your meter comes with two 357A 1.5 V button-cell batteries (Cat. No. 23-115), packed separately.



**Warnings:**

- To avoid electrical shock, disconnect both of the meter's test leads from any equipment before you install or remove the meter's batteries.

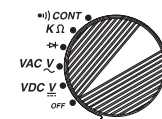


- 
- Do not operate your meter until batteries are properly installed and the battery compartment cover is in place and secured.
  - Keep button-cell batteries out of reach of children. Swallowing a button-cell battery can be fatal.

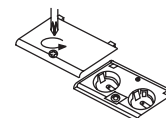
**Cautions:**

- Use only fresh batteries of the required size and recommended type.
- Do not mix old and new batteries or different types of batteries (standard or alkaline).

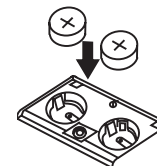
1. Set the selector to **OFF** to turn off the meter if it is on.



2. Use a Phillips screwdriver to loosen the screw in the battery compartment cover, then lift off the cover.



3. Install the button-cell batteries in the battery compartment with the positive (+) sides up.



4. Replace the cover and secure it with the screw.

When **BATT** appears on the display or the display dims, replace both batteries.

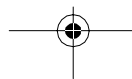
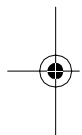


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**Cautions:**

- Always remove old or weak batteries. Batteries can leak chemicals that can destroy electronic parts.
- Dispose of old batteries promptly and properly. Do not bury or burn them.

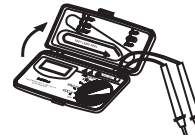
If you are not going to use the meter for a few weeks, remove the batteries.



## USING THE METER

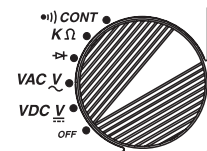
**Caution:** Do not try to measure voltage greater than 400V DC/400V RMS AC.

To use the meter, open the meter's case by pulling the tabs on the case in opposite directions. Then unwind the test leads from inside the cover.



**Caution:** The test leads are permanently attached to the meter. Do not try to remove them.

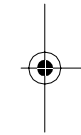
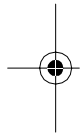
Rotate the selector to the function you want to use. (When you switch between different functions, the meter's buzzer sounds.) Then connect the test leads to the circuit you want to measure. To measure different circuits, see "Making Measurements" on Page 36.





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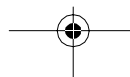
Your meter automatically sets itself to the range that gives the best reading. See the unit of measure on the display to distinguish the range. For example, **mV** appears in the 400 mV range and **V** appears in the 400 V range.



Also, note the position of the decimal. For example, if **.000 V** appears, the meter is set to measure less than 4 volts. If **.0 mV** appears, the meter is set to measure up to 400 millivolts. If **.0 V** appears, the meter is set to measure up to 400 volts.



Read the range in volts or ohms as indicated by the position of the decimal point:



| Selector Setting                                                                  | Range            | Display    |
|-----------------------------------------------------------------------------------|------------------|------------|
| VDC <u>V</u> / VAC <u>V</u>                                                       | 400 mV           | ddd . d mV |
| VDC <u>V</u> / VAC <u>V</u>                                                       | 4 V              | d . ddd V  |
| VDC <u>V</u> / VAC <u>V</u>                                                       | 40 V             | dd . dd V  |
| VDC <u>V</u> / VAC <u>V</u>                                                       | 400 V            | ddd . d V  |
|  | 4V (Fixed Range) | d . ddd V  |

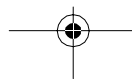
| Selector Setting | Range    | Display    |
|------------------|----------|------------|
| κW               | 400 ohms | ddd . d W  |
| κW               | 4 KW     | d . ddd KW |
| κW               | 40 KW    | dd . dd KW |
| κW               | 400 KW   | ddd . d KW |
| κW               | 4 MW     | d . ddd MW |



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#### Notes:

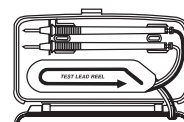
- The display might show a phantom reading in some DC and AC voltage ranges when the test leads are not connected to a circuit. This is normal. The high input sensitivity produces a “wandering” effect. When you connect the test leads to a circuit, a real measurement occurs.
- Your meter conserves power by automatically turning off about 30 minutes after the last time you changed settings (even if you are taking measurements). To turn the meter back on, set the selector to **OFF**, then to the setting you want.





When you finish using the meter:

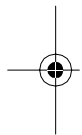
1. Set the selector to **OFF**.
2. Wrap the test leads around the reel inside the cover to secure them.
3. Close the cover.



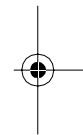


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## OVERRANGE INDICATIONS

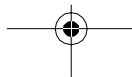


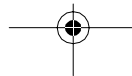
The meter's buzzer sounds an intermittent tone when a measurement exceeds the maximum value and the selector is set to **VDCV** or **VACV**. **.OL** also flashes.



**.OL** appears steadily and the buzzer does not sound if:

- The measured value exceeds 4 MW during resistance measurements or 400W during a continuity check.





- 
- No resistance is connected across the test leads in either the KW or continuity functions.
  - The voltage between the two test leads exceeds 2V during the diode check function.

**Caution:** If **.OL** (overload) appears when you are measuring voltage, the value you are measuring exceeds the meter's maximum range. Immediately disconnect the probes from the circuit. Otherwise, your meter might be damaged.

## MAKING MEASUREMENTS

### MEASURING DC/AC VOLTAGE

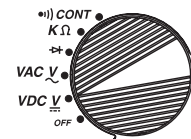
#### Warnings:

- Never clamp on to a hot wire (usually red, black, or blue in AC wiring circuits). If you do so and then touch the other test lead connected to the meter, you could receive an electric shock.
- The maximum input limit for voltage measurement is 400V DC and 400V AC (RMS). To avoid electrical shock and damage to the meter, never try to measure a DC voltage above 400 volts or an AC voltage above 400 volts RMS.

**Note:** When you select **VDC** or **VAC**, the display might show small changes in lower ranges before you connect the test leads to a circuit under test. This is normal. A high input impedance produces this wandering effect. When you connect to a circuit, you get the normal accurate measurement.

Follow these steps to measure DC or AC voltage.

1. Set the selector to **VDC** (to measure DC voltage) or **VAC** (to measure AC voltage).



2. Connect the test leads to the circuit you want to test. The meter automatically moves to the range that gives the best reading, and **V** or **mV** appears.

When you measure AC voltages, **AC** appears.

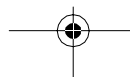
380.0 mV

AC 380.0 mV  
↑

**Note:** In the 400 V and 400 mV ranges, the decimal point appears in the same position (one place to the left). To distinguish between the two ranges, **mV** appears in the 400 mV range and **V** appears in the 400 V range.

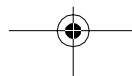
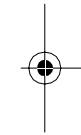
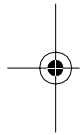
380.0 mV

380.0 V



When you measure DC voltages,  appears on the left side of the display if you connected the black test lead to a point that has a higher voltage potential than the point where you connect the red test lead.

 380.0 mV



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**Hint:** When you use the meter to probe for a voltage in a high-voltage circuit, we recommend you do not try to position both test leads at once. Instead, use an insulated alligator clip such as Cat. No. 270-354 (not supplied) to clamp one test lead to the circuit's neutral or ground lead (usually a bare, green, or white lead in AC wiring circuits). Then place your free hand in your pocket or behind your back and probe for voltages with the other test lead. This helps prevent you from accidentally touching a hot wire, since you only need to concentrate on one test lead.

## MEASURING AC VOLTAGE RIDING ON A DC SOURCE BIAS

To measure an AC voltage superimposed on a DC voltage source bias, you must first measure the DC and AC voltages separately, then compute the peak voltage using this formula:

$$\text{Peak voltage} = \text{DC voltage} + \frac{\text{AC voltage}}{.707}$$

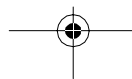
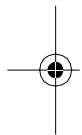
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**Warning:** To avoid injury to yourself or damage to your meter, never try to measure an AC voltage that is riding on a DC source bias where the peak voltage exceeds 100 V with respect to earth ground.

**Caution:** Never try to measure any voltage more than 30V AC on a DC source bias.

Follow these steps to measure AC voltage:

1. Set the selector to **VDC** **V**.

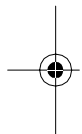


- 
2. Connect the test leads to the circuit you want to test. The display shows the DC voltage.
  3. Disconnect the test leads from the circuit.
  4. Set the selector to **VAC** .
  5. Connect a 0.1microfarad/100V Mylar capacitor in series with the positive terminal of the voltage source and the positive (+) test lead.
  6. Connect the test leads to the circuit you want to test. The display shows the AC voltage.
  7. Compute the peak voltage using the formula on Page 42.



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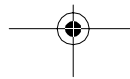
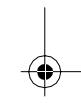
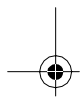
## MEASURING RESISTANCE



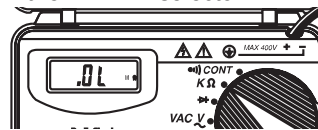
The resistance measuring circuit in your meter compares the voltage gained through a known internal resistance with the voltage developed across an unknown resistance.



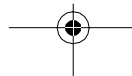
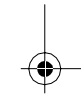
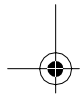
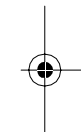
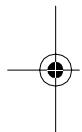
**Warning:** Be sure the circuit under test has all power removed and any associated capacitors are fully discharged before you make a resistance measurement.



1. Set the selector to KW. You see:



**Caution:** Your meter has a circuit to protect the resistance range from over-voltage (240V for 1 minute). However, to prevent accidentally exceeding the protection circuit's rating and to ensure a correct measurement, never connect the test leads to a source of voltage while the selector is set to KW or .



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**Note:** If there is no resistance connected across the test leads or the measured value exceeds 4 MW, **.OL** appears when you set the selector to **KW**. This is normal.

2. Connect the test leads across the circuit you want to measure, or remove one of the component's leads you want to measure from its circuit and connect the test leads across the component. The meter automatically reads and displays the proper range.

**Note:** As with the voltage range, use the measuring units that appear on the display to determine the current resistance range. If only W appears, the values of the measurements are in ohms. If K and W appear, the meter is measuring kilohms (the reading  $\times 1000W$ ). If M and W appear, the meter is measuring megohms (the reading  $\times 1,000,000W$ ).

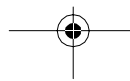
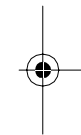
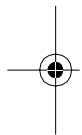
When you touch the ends of the test leads together, the meter selects the 400 W scale and displays a small value. This value is the resistance of the test leads. Note this value and subtract it from the measured value when you measure a very small resistance.



## Resistance Cautions

When you measure resistance, the meter supplies voltage and current to the device you are measuring. The current applied by the meter could damage some devices (such as some integrated circuits).

The following table lists each of the meter's ranges and the voltages and current that the meter supplies in each range. For each range, **A** is the open circuit voltage supplied by the meter, **B** is the voltage supplied by the meter when the resistance being measured is equal to the range the meter is in,

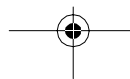


and **C** is the current supplied by the meter. (All values are measured at the meter's jacks and are typical).

| Range | A      | B      | C      |
|-------|--------|--------|--------|
| 400 W | 2.99 V | 315 mV | 760 mA |
| 4 KW  | 0.86 V | 183 mV | 335 mA |
| 40 KW | 0.58 V | 164 mV | 50 mA  |



| Range  | A      | B      | C      |
|--------|--------|--------|--------|
| 400 kW | 0.57 V | 165 mV | 5.7 mA |
| 4 MW   | 0.53 V | 165 mV | 0.5 mA |



## CHECKING DIODES

This measurement lets you check diodes, transistors, and other semiconductors for opens, shorts, and normal operation. It also lets you determine the forward voltage for diodes. (This is handy when you need to match a diode). And, you can also check LEDs using this procedure.

**Caution:** Do not connect the test leads to a source of voltage when you set the selector to . This could damage the meter or circuit being tested.

1. Set the selector to .
2. Remove power from the circuit under test.
3. Connect the test leads across the circuit you want to measure, or remove one of the component's leads you want to measure from its circuit and connect the test leads across the component. Then note the first reading.
4. Reverse the test leads and note the second reading.

This table shows the type and condition of the tested semiconductor device:

| Semiconductor Type | 1st Reading                 | 2nd Reading                 | Condition |
|--------------------|-----------------------------|-----------------------------|-----------|
| Germanium          | 0.2 – 0.4                   | OL                          | Good      |
| Silicon Type       | 0.5 – 0.7                   | OL                          | Good      |
| Germanium/Silicon  | OL                          | OL                          | Open      |
| Germanium/Silicon  | Very small<br>(about 0.1 V) | Very small<br>(about 0.1 V) | Shorted   |

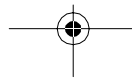
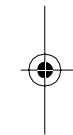
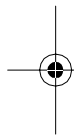


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**Notes:**

- When you test a silicon type semiconductor, the values might vary depending on the temperature.
- The values that appear during the diode check show the actual forward voltage (max. 2.0V). If the voltage exceeds 2.0V, **OL** appears and the diode check cannot be made.

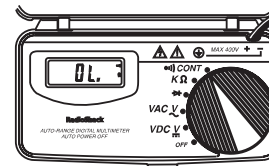


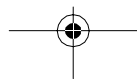
## CHECKING CONTINUITY

You can use the meter to check for shorted or open electrical circuits.

1. Set the selector to **••• CONT.** You see:

**Caution:** Do not connect the test leads to a source of voltage when you set the selector to **••• CONT.** This could damage the meter.



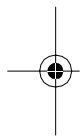


- 
2. Connect the test leads to the circuit to be checked. The display shows the actual resistance value. If the circuit resistance is  $50\Omega (\pm 30\Omega)$  or less, the meter's buzzer sounds continuously.



## CARE AND MAINTENANCE

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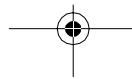


### CARE

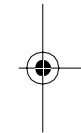
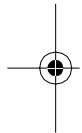
Your RadioShack Pocket Size Auto-Ranging LCD Digital Multimeter is an example of superior design and craftsmanship. The following suggestions will help you care for the meter so you can enjoy it for years.



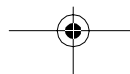
- Keep the meter dry. If it gets wet, wipe it dry immediately. Liquids might contain minerals that can corrode the electronic circuits.



- 
- Use and store the meter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, damage batteries, and distort or melt plastic parts.
  - Handle the meter gently and carefully. Dropping it can damage the circuit boards and case and can cause the meter to work improperly.
  - Use only fresh batteries of the required size and type. Always remove old or weak batteries. They can leak chemicals that destroy electronic circuits.



60



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Modifying or tampering with your meter's internal components can cause a malfunction and might invalidate the meter's warranty. If your meter is not performing as it should, take it to your local RadioShack store for assistance.



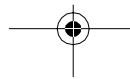
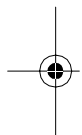
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## CLEANING

To keep the meter looking new, occasionally wipe it with a cloth slightly dampened with water. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the meter.

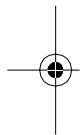
### Warnings:

- Do not let any water drip inside the meter while cleaning it.
- Make sure that the meter is completely dry before using it.





### Limited Ninety-Day Warranty

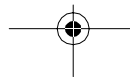


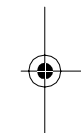
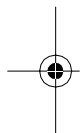
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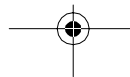
*(Continued)*





*(Continued)* In the event of a product defect during the warranty period, take the product and the RadioShack sales receipt as proof of purchase date to any RadioShack store. RadioShack will, at its option, unless otherwise provided by law: (a) correct the defect by product repair without charge for parts and labor; (b) replace the product with one of the same or similar design; or (c) refund the purchase price. All replaced parts and products, and products on which a refund is made, become the property of RadioShack. New or reconditioned parts and products may be used in the performance of warranty service. Repaired or replaced parts and products are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the product made after the expiration of the warranty period. This warranty does not cover: (a) damage or failure caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, alteration, lightning or other incidence of excess voltage or current; (b) any repairs other than those provided by a RadioShack Authorized Service Facility; (c) consumables such as fuses or batteries; (d) cosmetic damage; (e) transportation, shipping or insurance costs; or (f) costs of product removal, installation, set-up service adjustment or reinstallation.

*(Continued)*



*(Continued)* This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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