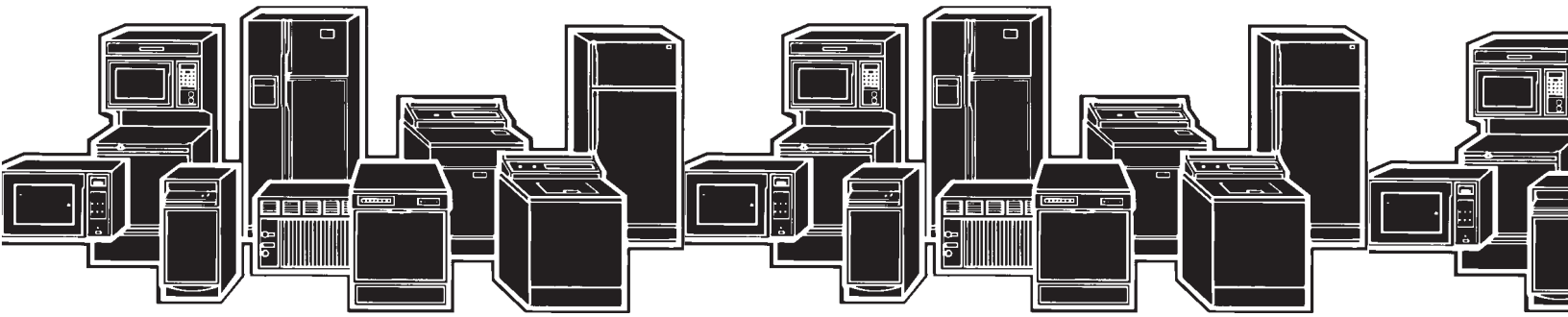
Whirlpool CORPORATION

CONSUMER SERVICES TECHNICAL EDUCATION GROUP PRESENTS

G-21

USING TEST EQUIPMENT

JOB AID
Part No. 4322537A



THE VOLT-OHMMETER (VOM)

INTRODUCTION

The volt-ohmmeter, usually referred to as a ”VOM,” or ”Multimeter,” combines two individual instruments into one. These instruments are the:

- Ohmmeter for measuring resistance (in ohms - Ω).
- Voltmeter for measuring voltage (AC and DC).

Technicians prefer the convenience of this single meter that combines both measuring functions. Some multimeters offer other functions, such as AC ampere, DC millivolt, and temperature measurements.

FEATURES & FUNCTIONS

Most VOMs offer the following standard features and functions:

DISPLAY — The window that shows the variable pointer, and the printed measuring scales for the different types of readings. A digital VOM does not use a pointer or printed scales. Instead, it displays its measurements in actual numbers.

RANGE SELECTOR — A rotary switch that performs two functions:

1. Chooses the type of reading (AC volts, DC volts, and Ohms) to be measured.
2. Selects the range of the highest expected reading. Some meters use jacks instead of a selector switch, or a combination of jacks and switches.

METER ZERO ADJUST — A control (usually a screw or knob) that aligns the pointer with the zero mark on the measuring scales to increase accuracy.

OHMS ZERO ADJUST — A control (usually a small knob) that aligns the pointer with the zero mark on the Ohms scale. An internal battery supplies a small voltage for making resistance measurements. As the condition of the battery changes over time, the Ohms Zero Adjust control allows the user to easily zero the pointer to compensate for these changes.

PROBE JACKS — Connection terminals for the test leads that are used to make electrical measurements. The jacks and terminals are marked with a (+) and a (–) symbol. They are also color-coded (usually red and black) to ensure proper connections and polarity when making DC measurements. If the leads are reversed when making a DC voltage reading, the meter pointer will move in the direction opposite of the meter scale. Some meters have a polarity reversing switch that internally reverses the (+) and (–) leads when the range switch is set to DC.

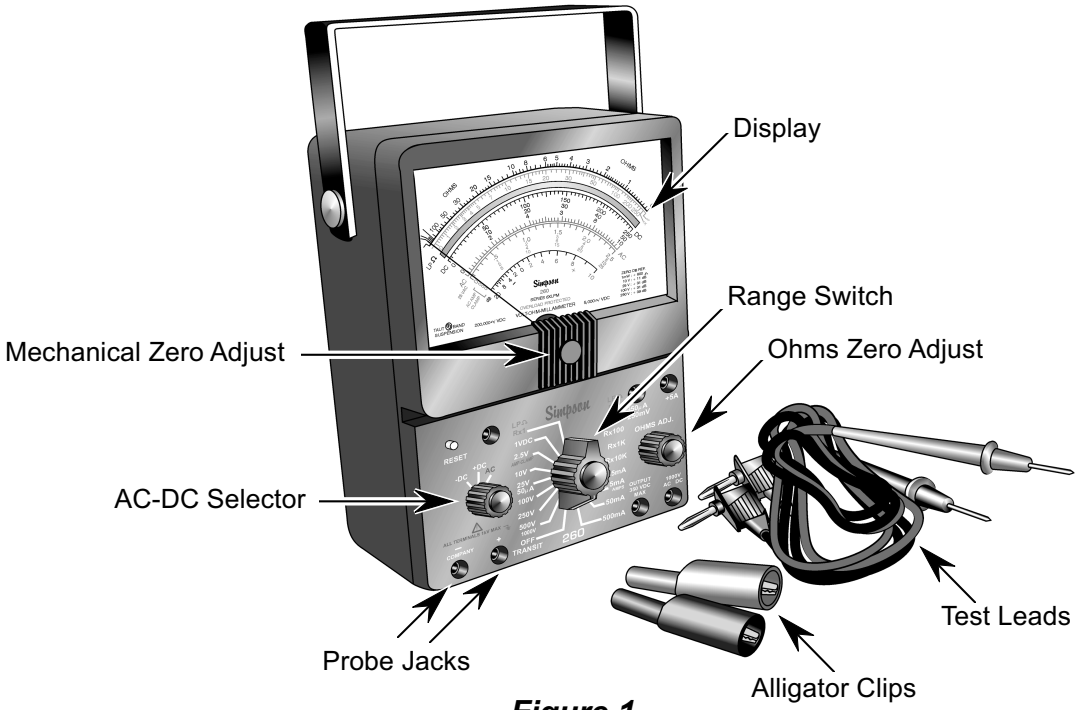


Figure 1

Simpson 260 Series 6XLMP Meter

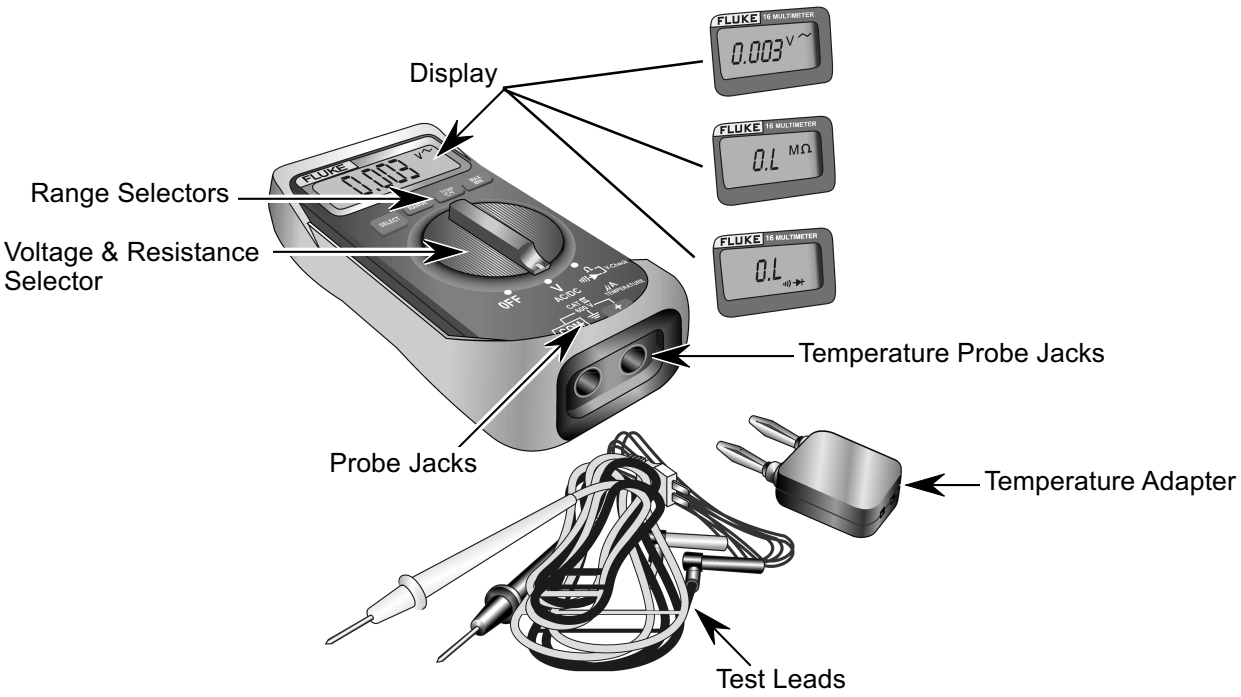


Figure 2

Fluke 16 Multimeter

HOW THE METER MOVEMENT OPERATES

In order for the VOM to register a measurement, the meter's pointer must be made to move, or rotate, across the scale. For this to happen, the base of the pointer is mounted on a pivot, and placed between the poles of a permanent magnet. In addition, a coil of very fine wire is wound around the base of the pointer.

As current passes through the coil, a small magnetic field is produced. This field reacts with the field produced by the permanent magnet. The amount of pointer movement is determined by the amount of current passing through the coil, and the size of its magnetic field.

When current stops flowing through the coil, the pointer returns to zero. It is very important to handle a VOM carefully, since a sudden jolt can unseat the pointer from its pivot, and damage the movement.

MAKING ACCURATE MEASUREMENTS

To make your measurements as accurate as possible, use the following steps:

1. Carefully read the operating instructions and safety information in the VOM manual.
2. Check the meter and make sure that the pointer is set to “zero.” Use the Mechanical Zero Adjust for the voltage scale, and the Ohm Zero Adjust for the resistance (Ω) scale.
3. Make sure that the test leads are firmly inserted into their jacks. Insert the black test lead into the negative (–) jack, and the red test lead in the positive (+) jack.
4. When making a measurement, keep the metal probe tips firmly in contact with the leads of the device being tested to insure good metal-to-metal contact. Poor contact will cause inaccurate or fluctuating readings.
5. Do not touch the metal probes while taking a measurement. If you touch the probes during that time, you could receive a serious electrical shock. Touching the metal probes while making a resistance measurement can cause the reading to be inaccurate because of skin resistance.
6. Always select the range that will provide a ***midscale reading*** for the resistance you want to measure.

7. Look straight at the meter pointer and scale. If you view them at an angle, you can get an inaccurate reading. Some meters have a mirrored scale to help prevent reading errors. With this type of scale, you know that you are viewing straight if the pointer hides its reflection in the mirror (see Figure 3).

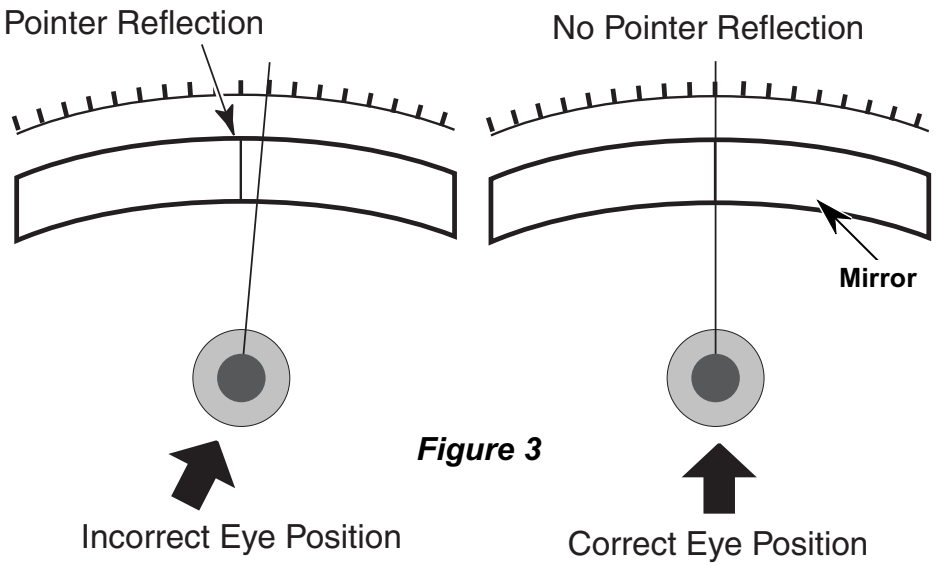


Figure 3

8. Select the appropriate voltage or resistance range so that the readings are in the center portion of the scale. This will give a more accurate reading (see Figure 4).

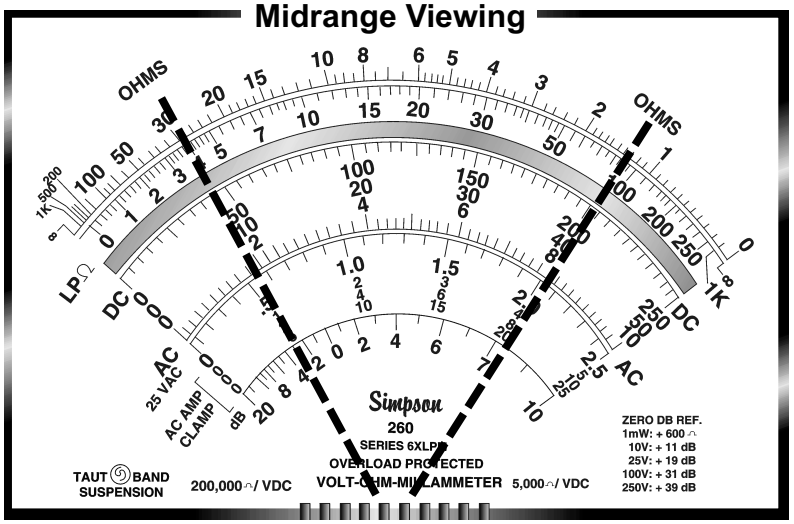


Figure 4

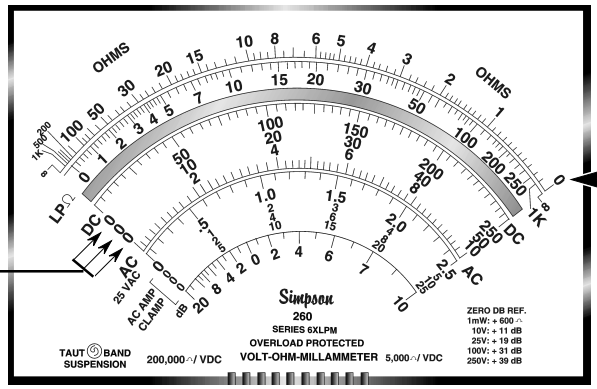
RESISTANCE

MEASURING RESISTANCE (Ω)

When a resistance measurement is made, the test probes connect the meter in series with the component, or load. To prevent damage to the meter during a resistance measurement, the circuit or component is always disconnected from the power source.

A very small current is needed to obtain a resistance measurement, and is provided by a battery inside the VOM.

Note that the resistance, or ohm's scale (Ω) of the meter, is the reverse of the volts scales (see Figure 5). That is, the zero on each scale is at the opposite ends of the meter.



Zero Ohms

Zero Volts

Less Current Flow
More Resistance

More Current Flow
Less Resistance

Figure 5

When the maximum amount of current is flowing through the circuit, the pointer will rotate all the way to the zero end of the ohms scale.

When very little current is flowing, the pointer will remain at, or near, the infinity (∞), or maximum resistance, end of the ohms scale. The Range switch has various resistance values built into the meter, which allows for the proper measurement of resistance.

Before making a resistance reading, any changes in the battery condition must be compensated for to assure accuracy. In order to do this:

1. Touch the test lead probe tips together to obtain the maximum current flow from the battery.
2. Zero the resistance scale pointer with the Ohms Zero Adjustment knob.
3. Zero the meter each time the range switch is changed.

CHOOSING THE CORRECT RESISTANCE RANGE

Four resistance ranges are available on the meter, as shown in Figure 6. Each of these ranges show the user how much to multiply the meter indication by. The four range scales are read as follows:

a) R x 1 = Reading on Scale x 1.

b) R x 100 = Reading on Scale x 100.

c) R x 1 K = Reading on Scale x 1,000.

d) R x 10K = Reading on Scale x 10,000.

The easiest way to remember how much to add to the meter reading, is to add zeros to it. For example, if the meter indicates 5, and the Range switch is set to R x 100, then adding two zeros to the 5, would equal 500. If the meter indicates 37 and the Range switch is set to R x 10K, then adding four zeros (10,000) would make the reading 370,000.

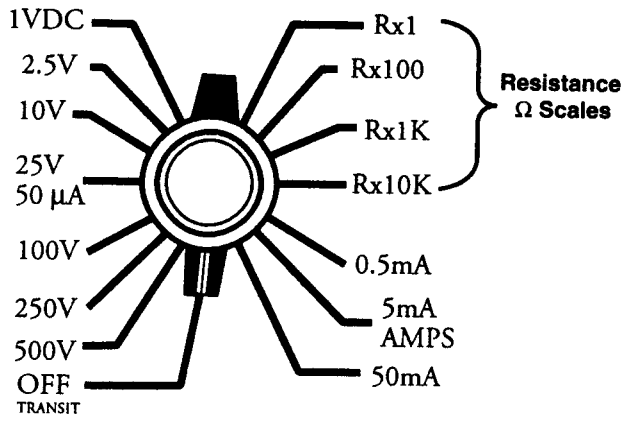


Figure 6

Unlike voltage scales, the scale used for resistance measurements is not divided into equally-spaced increments. As resistance becomes higher, the numbers on the scale are grouped closer together, making an accurate reading difficult (see Figure 7).

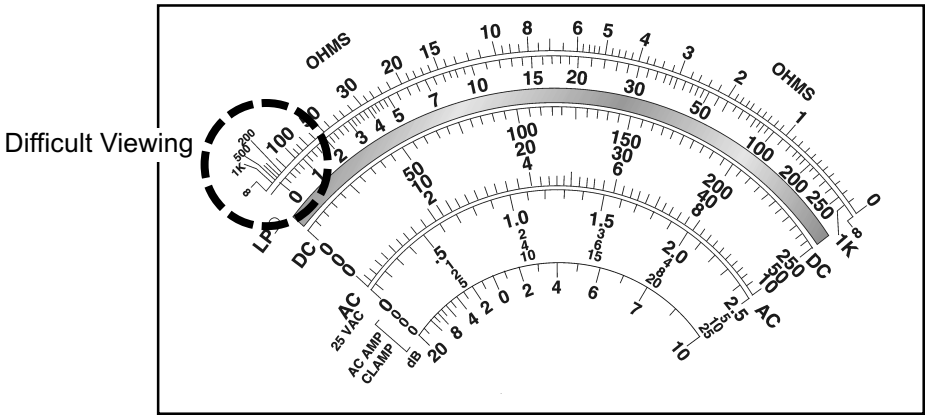
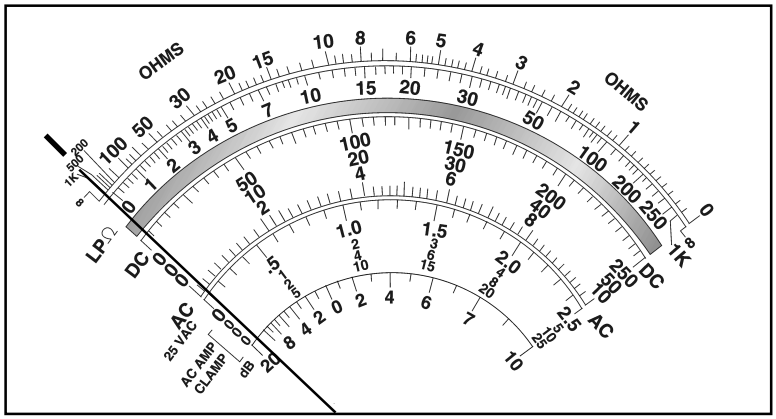
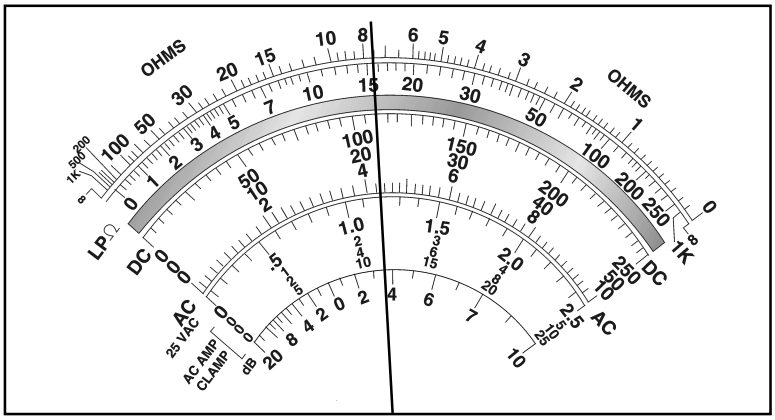


Figure 7

When making resistance measurements, it is important to try to get a lower, or “midscale” reading, whenever possible (see Figure 8).



750 Ω On R x 1 Scale



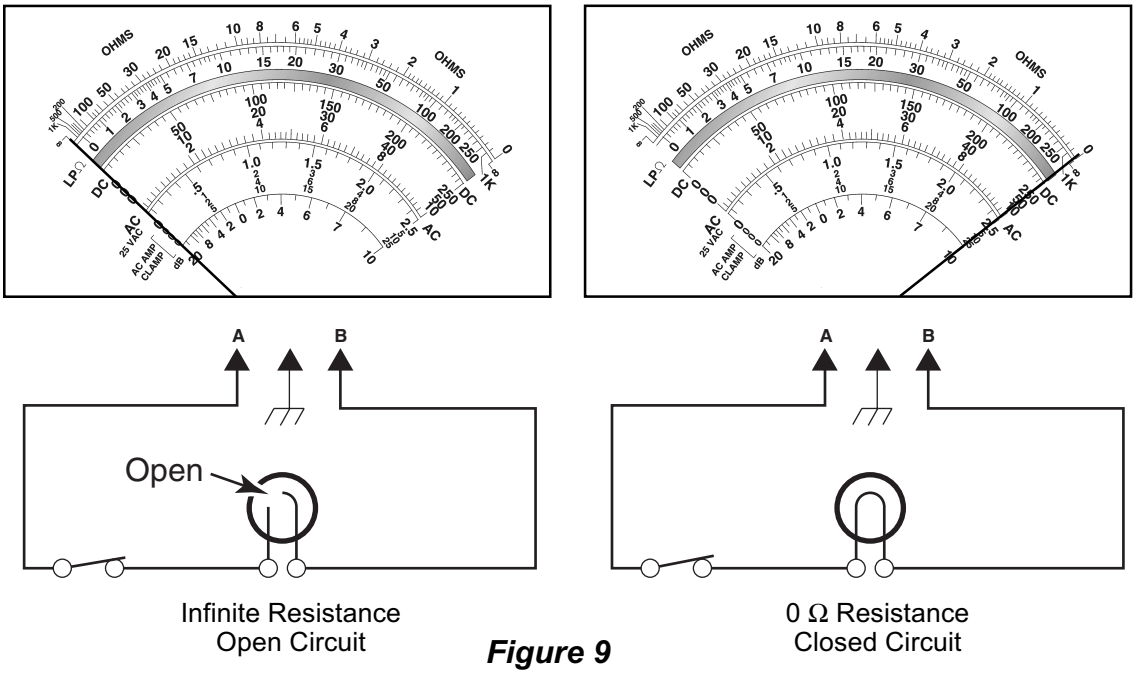
750 Ω On R x 100 Scale

Figure 8

MEASURING CONTINUITY

The ohmmeter can also be used to check continuity in a circuit. Continuity is a “continuous,” or “closed” circuit. An open circuit means that the continuous circuit has been broken at some point. In this case, the meter would indicate “infinite” resistance.

Figure 9 shows an open and a closed circuit.



Infinite Resistance
Open Circuit

0 Ω Resistance
Closed Circuit

Figure 9

BASIC RULES FOR MEASURING RESISTANCE

When making a resistance measurement, remember several basic rules:

a) Always disconnect the circuit, or component being checked, from the voltage source before connecting the meter probes.

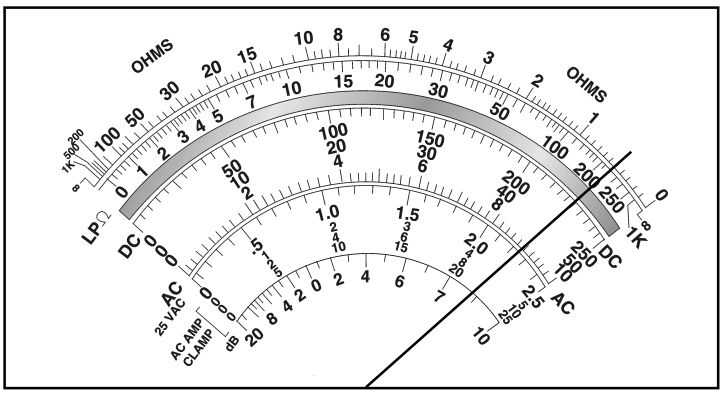
b) Isolate the component being checked by disconnecting one side of the component from the circuit. This assures that meter current will flow only through the component being checked.

c) Use the Range switch, and select the resistance range you will be measuring.

d) Zero the meter with the Zero Ohms Adjust knob.

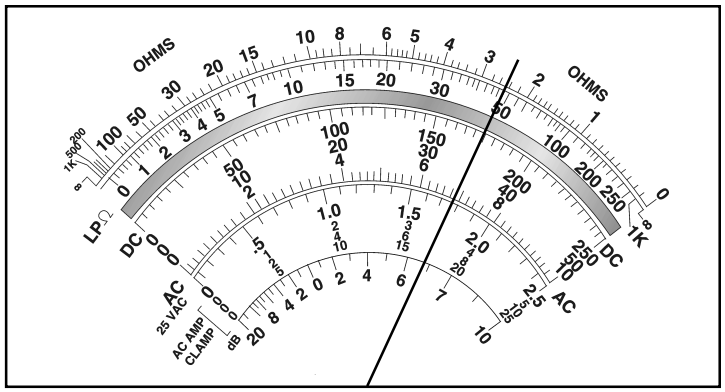
PRACTICE EXERCISE 1
READING THE RESISTANCE SCALE

Write the correct resistance reading in the space provided by each illustration. The resistance ranges are shown.

1. 

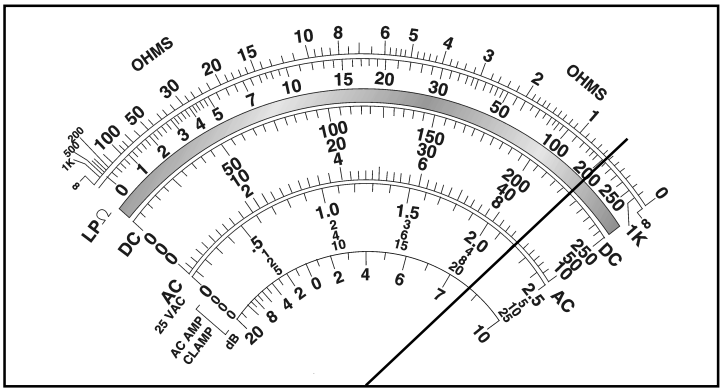
R x 10K

_____

2. 

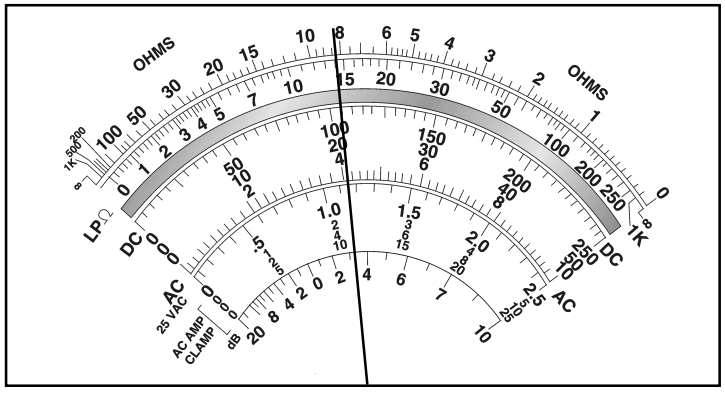
R x 1K

_____

3. 

R x 1

_____

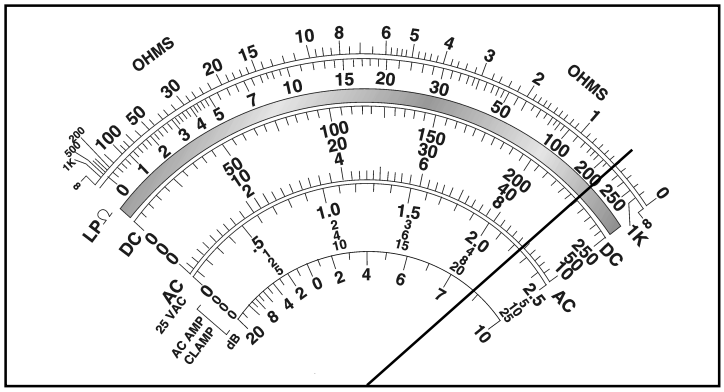
4. 

R x 100

_____

PRACTICE EXERCISE 1 ANSWERS
READING THE RESISTANCE SCALE

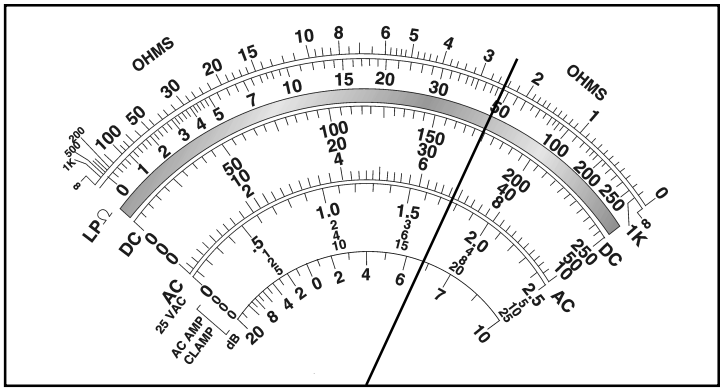
1.



R x 10K

5000 Ω

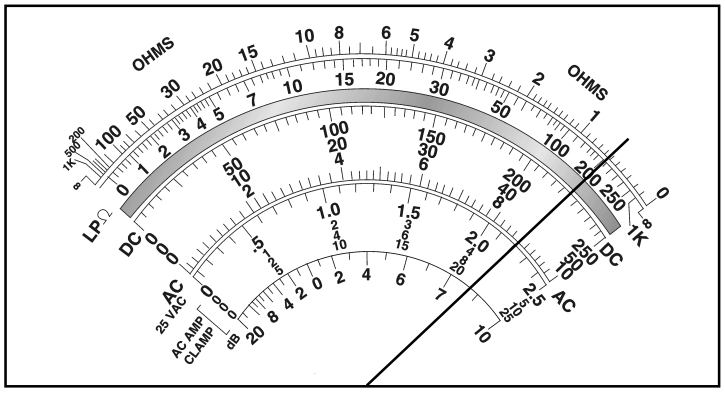
2.



R x 1K

2500 Ω

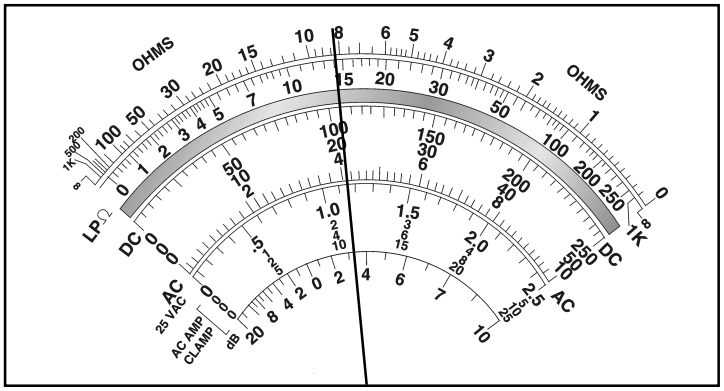
3.



R x 1

.6 Ω

4.



R x 100

820 Ω

VOLTAGE

THE RANGE SWITCH

The Range switch has various settings for DC volts and for AC volts. Both types of voltage have ranges with six settings: 2.5, 10, 25, 100, 250, and 500 volts (see Figure 10). The AC - DC Selector switch selects the type of voltage being measured (–DC, +DC, AC).

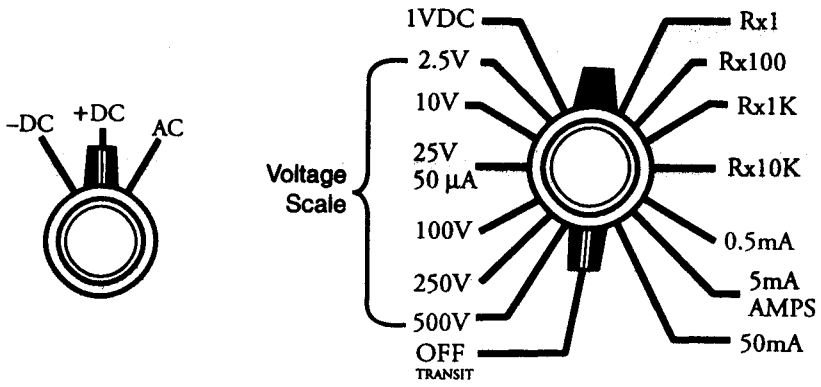


Figure 10

THE VOLTAGE SCALE

The meter has three scales which are divided into the following increments (see Figures 11 A, B, & C). NOTE: The small division lines between the numbers on the scales help make the readings more exact:

a) The ***0 - 10*** scale is used to read voltages when the 10 or 100 volt ranges are selected.

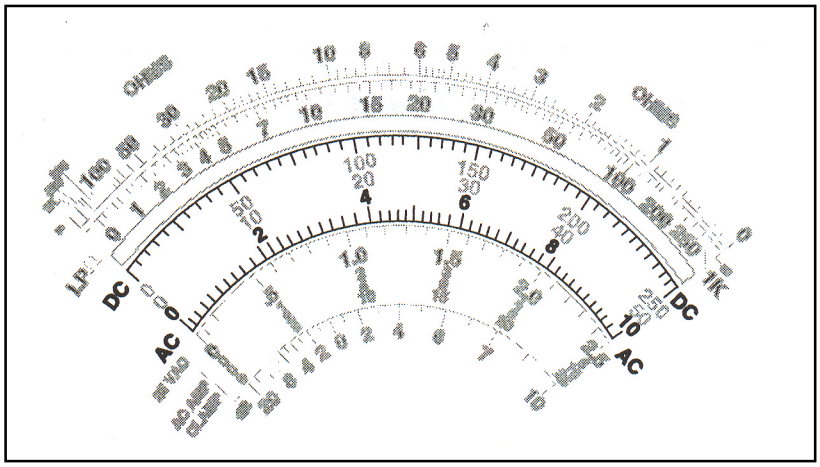


Figure 11A

b) The ***0 - 50*** scale is used with the 500 volt range.

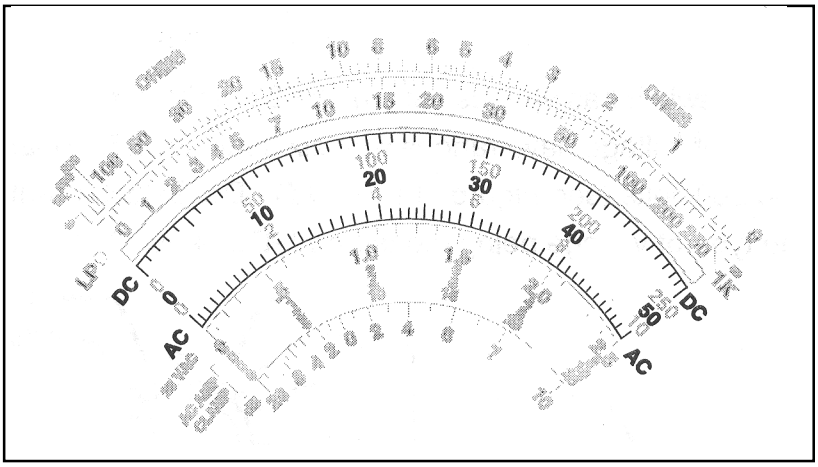


Figure 11B

c) The ***0 - 250*** scale is used with the 2.5, 25, or 250 volt ranges.

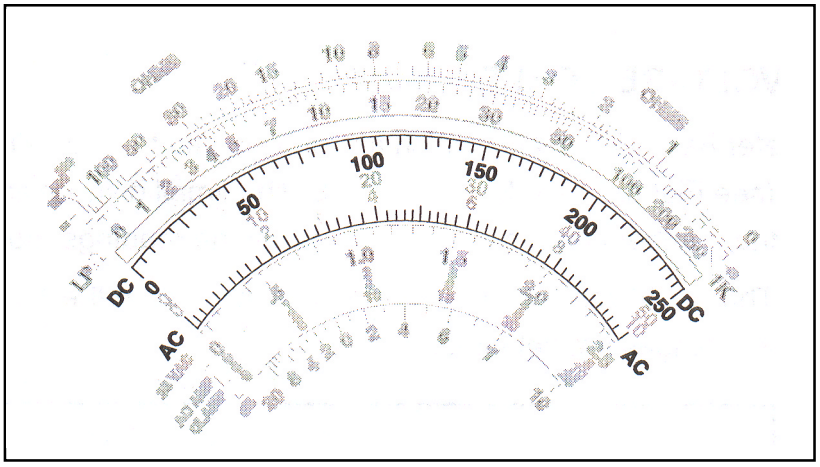


Figure 11C

CHOOSING THE CORRECT VOLTAGE RANGE

Six voltage ranges are available on the meter, as shown in Figure 12. Note that each one of the ranges has numbers that correspond to the three meter scales. The Range switch and meter scales correspond to each other in the following manner:

a) 2.5V Range = the 0 - 250 scale*

b) 10V Range = the 0 -10 scale

c) 25V Range = the 0 - 250 scale***

d) 100V Range = the 0 - 10 scale**

e) 250V Range = the 0 -250 scale

f) 500V Range = the 0 - 50 scale**

* When using this Range and scale combination, divide the reading by 100 (subtract two zero's from the reading).

** When using this Range and scale combination, multiply the reading by 10 (add a zero to the reading).

*** When using this Range and scale combination, divide the reading by 10 (subtract a zero from the reading).

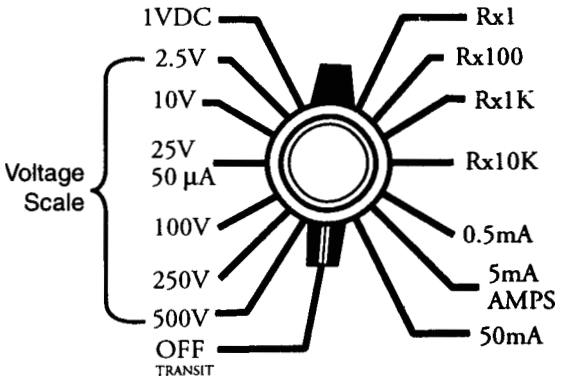


Figure 12

BASIC RULES FOR MEASURING VOLTAGE

When measuring voltage, use the following procedure:

a) Determine the type of voltage to be measured (DC or AC).

b) Set the AC - DC Selector switch for the correct type of voltage.

c) Set the Range switch for the maximum amount of voltage to be measured (see the WARNING below).

REMEMBER: To insure accuracy, always select the range that provides a midscale reading for the voltage, or resistance, you are measuring. **Selecting a voltage range that is LOWER than the amount being measured can severely damage the VOM.**

WARNING: When an unknown voltage is being measured, always begin by setting your meter to the HIGHEST range. Then, as necessary, remove the probes from contact with the circuit, and step the Range switch down to the next range. Continue this procedure, one range at a time, until the meter provides a midscale reading. This practice will help provide an accurate measurement, and prevent damage to the meter.

MEASURING VOLTAGE

Example 1

To measure a 9-volt battery, touch the meter probes to the battery terminals. The needle moves across the voltage scale to the point, shown in Figure 13.

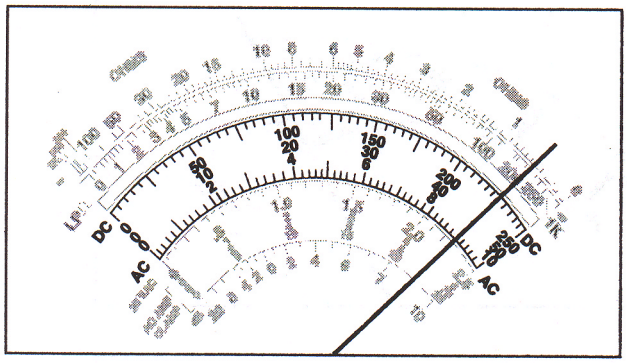


Figure 13

Since the 10-volt range is selected, the reading will be taken on the ***0 - 10*** scale. Each increment on the scale represents .2 volts. Read the pointer location on the scale between the 8 and the 10. It should indicate approximately 9 volts.

Example 2

To measure a 20-volt battery:

a) Set the Range switch to the 25V position.

b) Touch the meter probes to the battery terminals.

c) Read the pointer on the ***0 - 250*** scale.

d) The pointer should indicate approximately 200 on the scale. Since the range switch is set for 25V, divide the reading by 10 (200 ÷ 10 = 20).

Example 3

To measure a 280-volt circuit:

a) Set the Range switch to the 500V position.

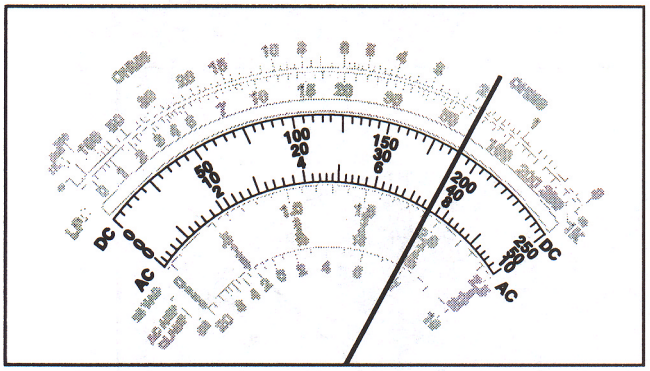
b) Touch the meter probes to the circuit terminals.

c) Read the pointer on the ***0 - 50*** scale.

d) The pointer should indicate approximately 28 on the scale. Since the range switch is set for 500V, multiply the reading by 10 (28 x 10 = 280).

PRACTICE EXERCISE 2
READING THE VOLTAGE SCALES

Write the correct meter reading in the space provided by each illustration. The voltage ranges are shown below.

1. 

25V

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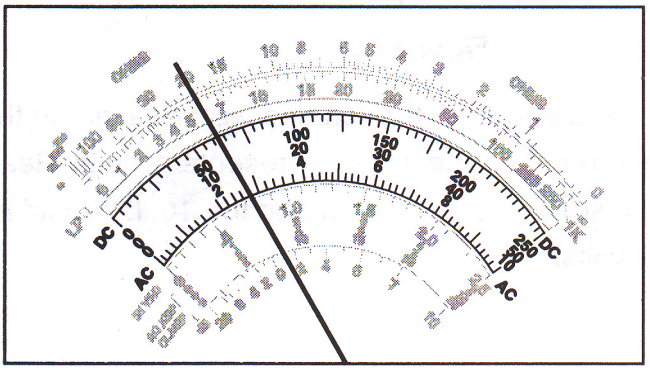
2. 

10V

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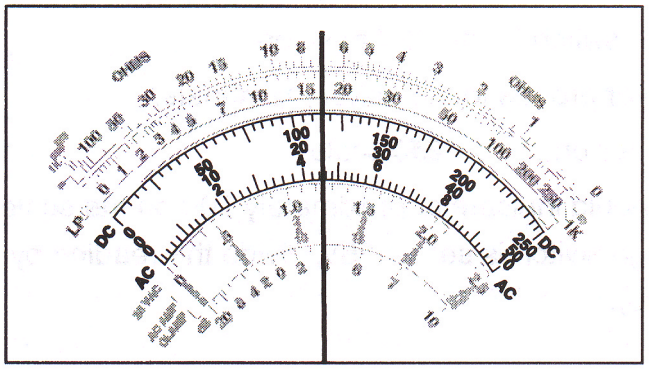
3. 

100V

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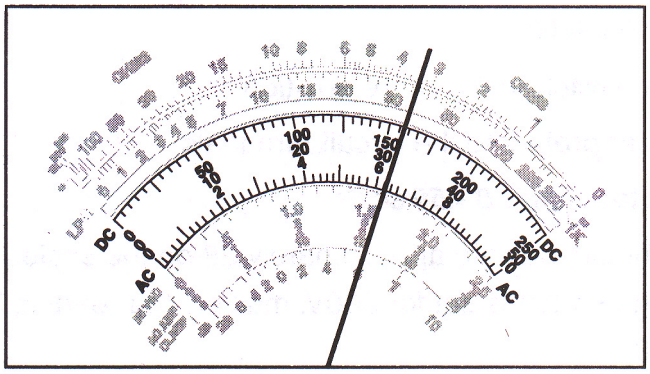
4. 

500V

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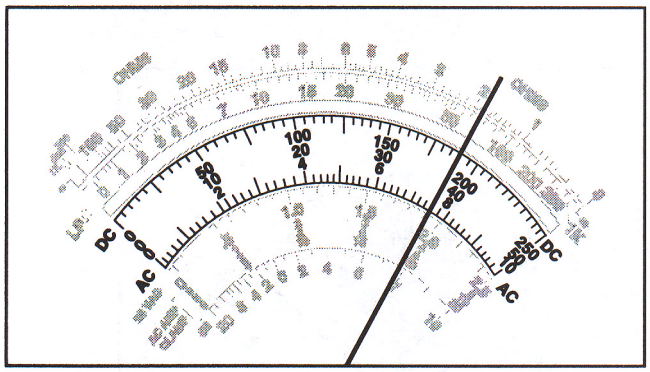
— NOTES —

PRACTICE EXERCISE 2 ANSWERS
READING THE VOLTAGE SCALES

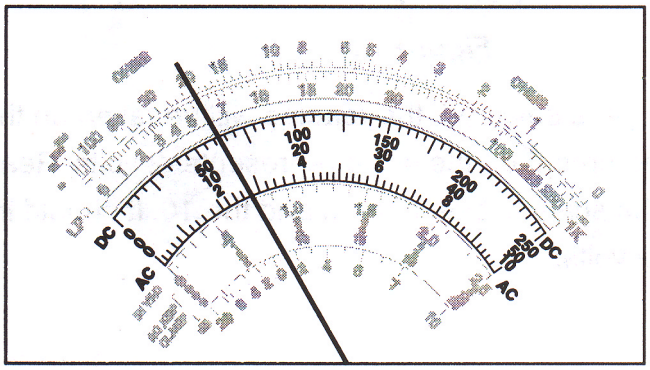
1.



25V

19V

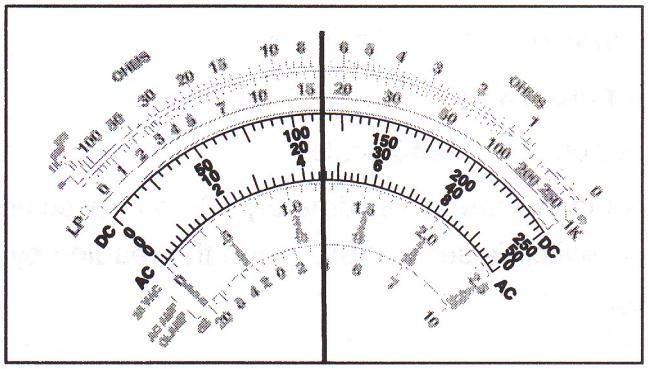
2.



10V

2.8V

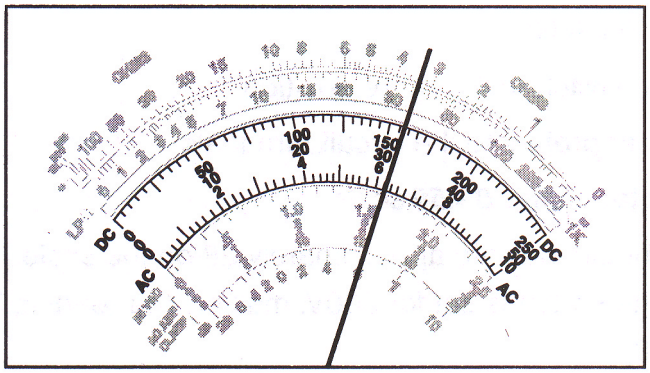
3.



100V

45V

4.



500V

315V

MEASURING LINE VOLTAGE

Line voltage is the voltage coming from the wall outlet. Line voltage can be measured under no load (no appliance is connected or the appliance is connected and turned off) or under a load (appliance is turned on).

To measure the line voltage:

1. Attach the test probes to the meter.
    - Plug the black probe into the outlet marked negative (–).
    - Plug the red probe into the outlet marked positive (+).
2. Set the function switch to AC VOLTS.

IMPORTANT: Be sure the meter is set on the AC voltage scale and not the Ohms scale.

3. Select a range that will include the voltage you are measuring.
    - Higher than 125 volts AC if you are measuring 120 volts.
    - Higher than 250 if you are measuring 220 volts.

To measure with no load:

1. Insert the test leads into the slots of the AC outlet (see Figure 14).
2. Read the meter and interpret the reading. The reading should be between 115 and 120 volts.

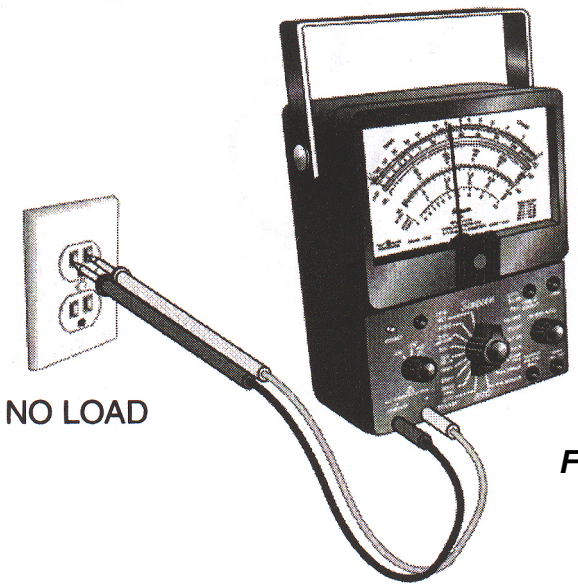


Figure 14

To measure with a load:

1. Plug the appliance into the receptacle and turn on the appliance (see Figure 15).
2. Insert the meter probe tips into the empty receptacle.
3. Read the meter. Under load conditions, the reading may be slightly less than under no load conditions.

IMPORTANT: Appliances with heavy drive motors, such as washers and dishwashers, should also be tested at the moment of start. If the voltage drops more than ten percent, (less than 108 volts), when the motor is started, it means that there is a problem with the electrical supply (the electricity coming into the receptacle). Mark this on the service invoice. State that there is a problem with the circuit, and that the customer has been informed.

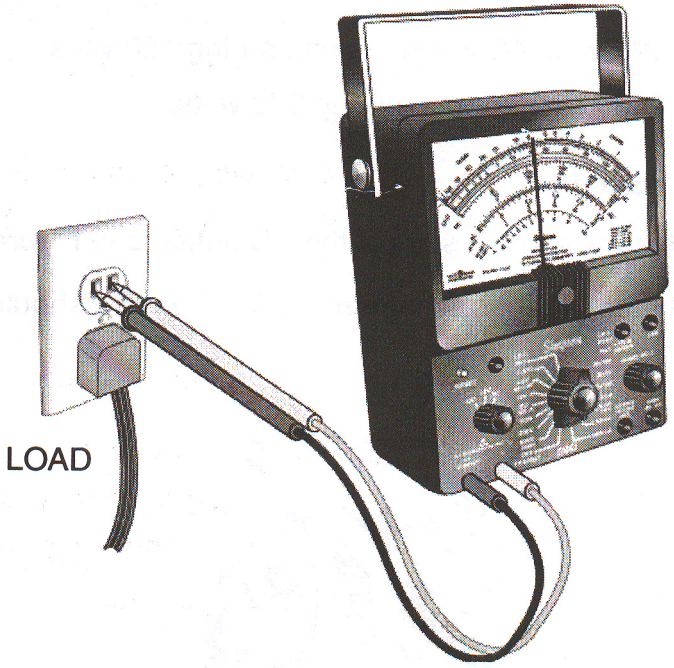


Figure 15

TESTING FOR GROUND AND POLARITY

A ground is a voltage reference point. Polarity is a check to make sure that the outlet is wired correctly.

To test for proper grounding:

1. Test for line voltage (if there is no voltage you can not test for ground).
2. Test for voltage between the short slot and the ground receptacle (the round hole) (see Figure 16A).
    - The receptacle has a long and a short slot. If the outlet has been mounted correctly, the longer slot will be on the left (see Figure 16B).
    - If there is line voltage between these two points it means the receptacle is grounded.

IMPORTANT: Due to recent electrical code changes, you may begin to see receptacles mounted upside down. This is done to make it easier to put power cords into the outlet.

- If there is no round hole (ground receptacle), touch one of your probes to the screw that fastens the cover plate to the outlet (see Figure 16C).
- No voltage indicates that the outlet is not grounded.
- To be grounded, the wire or tab must be attached to the screw.

CAUTION: IF THE OUTLET IS NOT GROUNDED, YOU WILL NOT GET A READING. WRITE ON THE SERVICE ORDER: *THE APPLIANCE IS NOT GROUNDED AND THIS IS A DANGEROUS CONDITION. THE CUSTOMER MUST CONTACT A QUALIFIED ELECTRICIAN TO CORRECT THE SITUATION.*

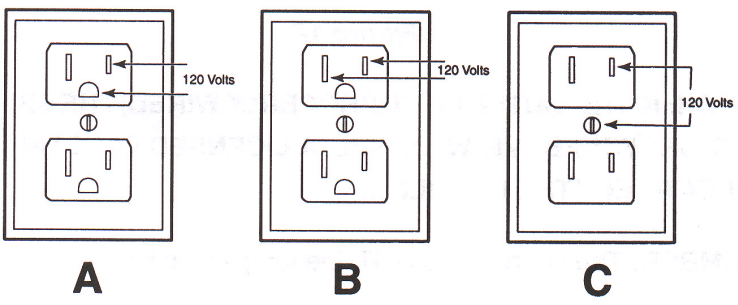


Figure 16

To test for polarity:

1. Test that there is line voltage between the long and short slots (120 volts) (see Figure 17A).
2. Test that there is line voltage between the short slot and the round hole (ground receptacle) (see Figure 17B), or the center screw (120 volts) (see Figure 17C).
3. Test that there is NO VOLTAGE between the long slot and the ground receptacle (see Figure 17D), or center screw (see Figure 17E).

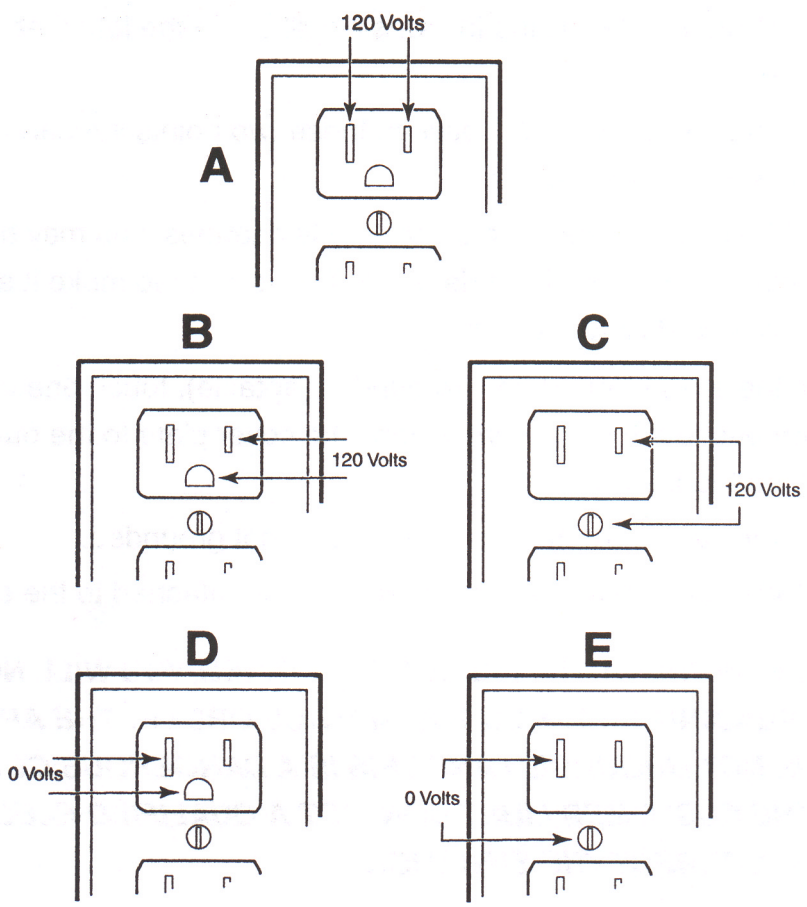


Figure 17

CAUTION: IF THE OUTLET IS IMPROPERLY WIRED, THE THREE TESTS, SHOWN ABOVE, WILL FAIL. A LICENSED ELECTRICIAN MUST CORRECT THE PROBLEM.

REMEMBER: The short slot is HOT, the long slot is NOT.

MEASURING 240 VOLTS AC (3-WIRE RECEPTACLE)

CAUTION: When measuring 240 volts AC, extreme care must be taken not to touch the metal test probes.

To measure the 240 volt line:

1. Attach the test probes to the meter.
    - Plug the black probe into the outlet marked negative (–).
    - Plug the red probe into the outlet marked positive (+).
2. Set the function switch to AC VOLTS.

IMPORTANT: Be sure the meter is set on the AC voltage scale and not the Ohm's scale.

3. Select a range that will include the voltage you are measuring.
    - Higher than 250 if you are measuring 240 volts.
4. Touch the meter probe tips to the indicated outlet openings (see Figure 18). The meter should measure approximately 240 volts AC.

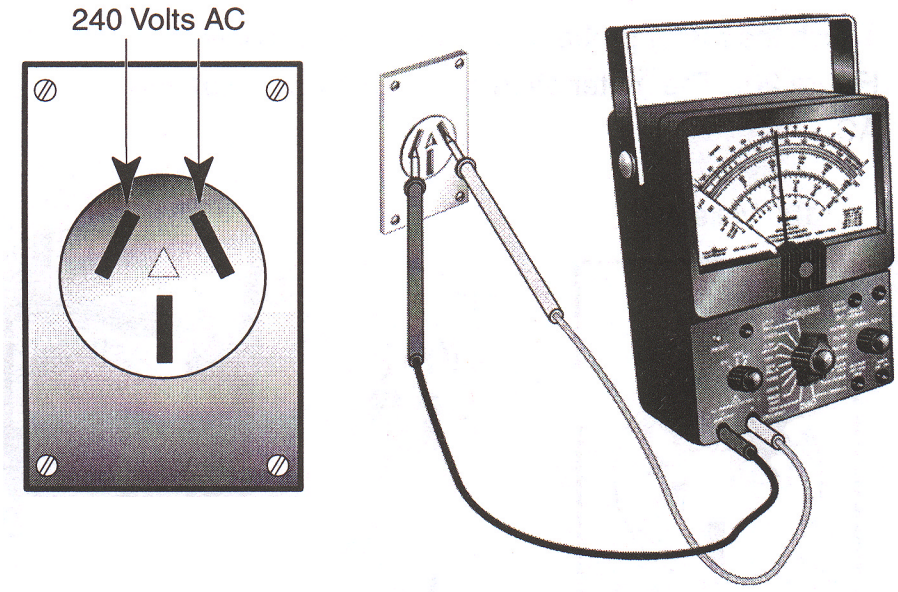


Figure 18

5. Touch the meter probe tips to the indicated outlet openings (see Figure 19). The meter should measure approximately 120 volts AC.

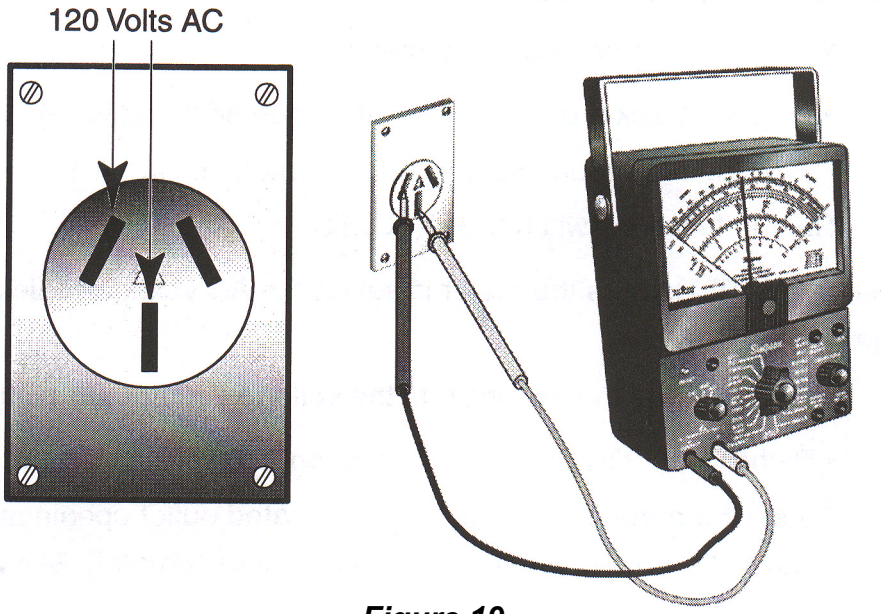


Figure 19

6. Touch the meter probe tips to the indicated outlet openings (see Figure 20). The meter should measure approximately 120 volts AC.

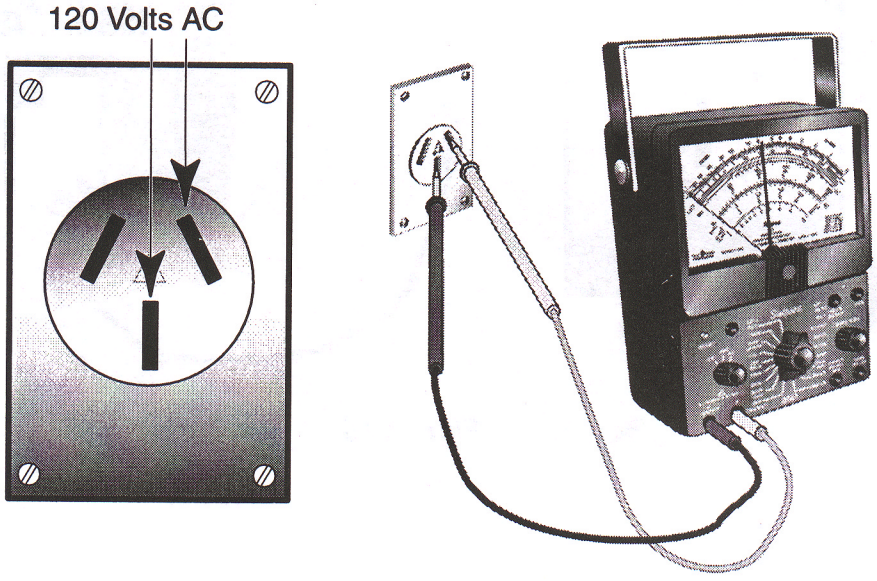


Figure 20

MEASURING 240 VOLTS AC (4-WIRE RECEPTACLE)

CAUTION: When measuring 240 volts AC, extreme care must be taken not to touch the metal test probes.

To measure the 240 volt line:

1. Attach the test probes to the meter.
    - Plug the black probe into the outlet marked negative (–).
    - Plug the red probe into the outlet marked positive (+).
2. Set the function switch to AC VOLTS.

IMPORTANT: Be sure the meter is set on the AC voltage scale and not the Ohm's scale.

3. Select a range that will include the voltage you are measuring.
    - Higher than 250 if you are measuring 240 volts.
4. Touch the meter probe tips to the indicated outlet openings (see Figure 21). The meter should measure approximately 120 volts AC.

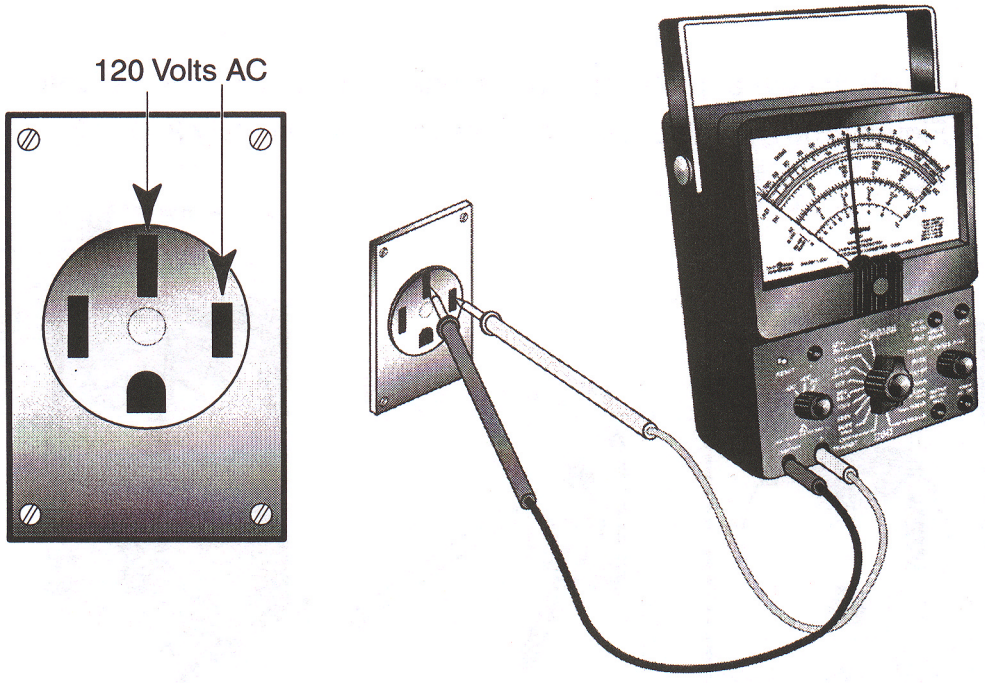


Figure 21

5. Touch the meter probe tips to the indicated outlet openings (see Figure 22). The meter should measure approximately 120 volts AC.

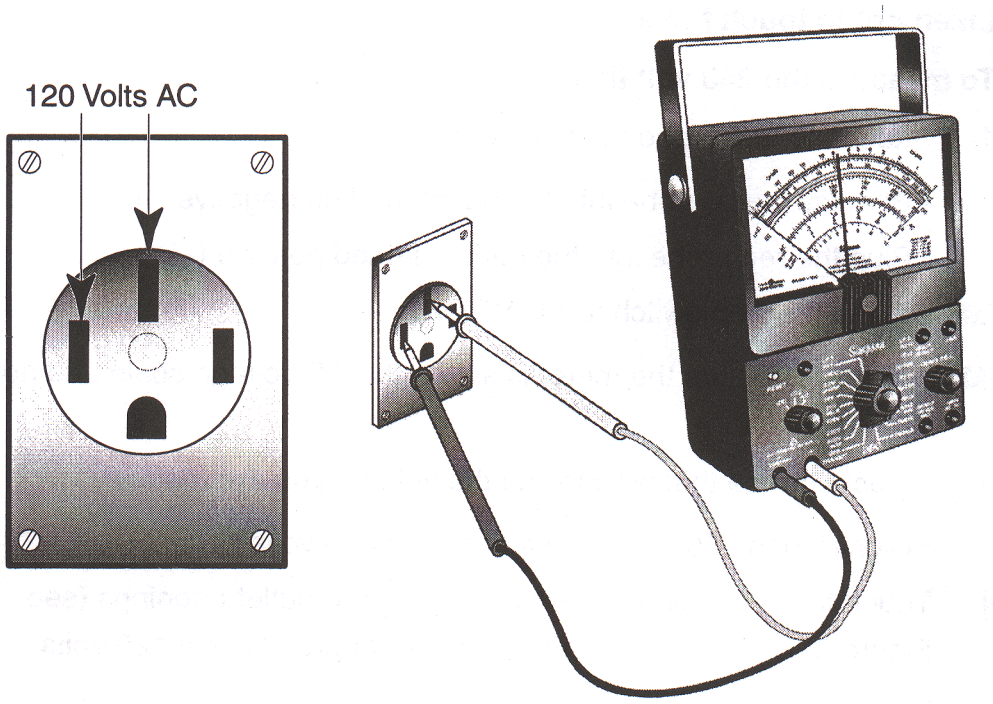


Figure 22

6. Touch the meter probe tips to the indicated outlet openings (see Figure 23). The meter should measure approximately 240 volts AC.

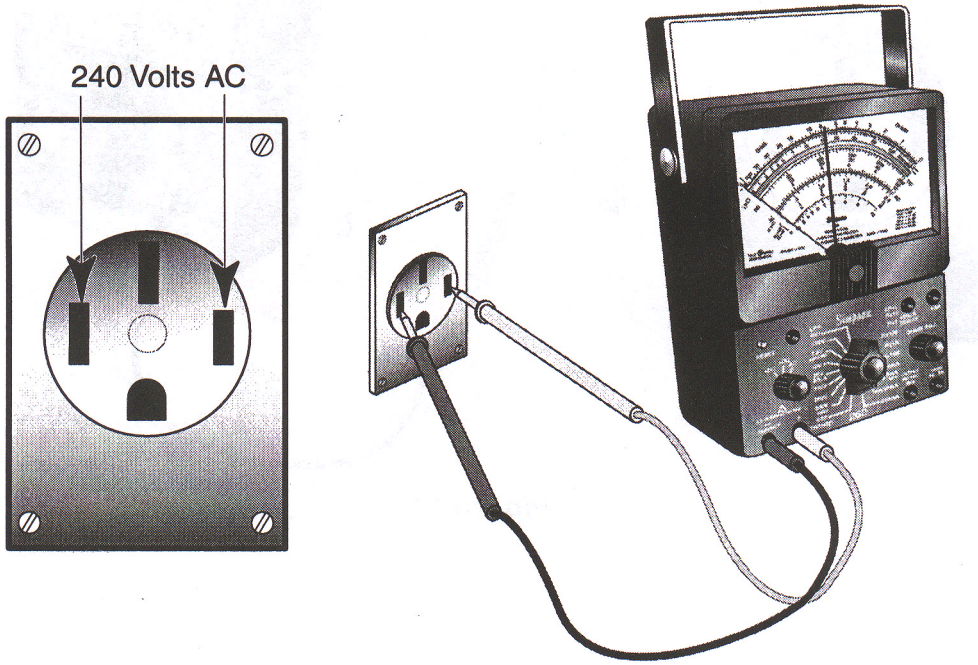


Figure 23

7. Touch the meter probe tips to the indicated outlet openings (see Figure 24). The meter should measure 0 volts.

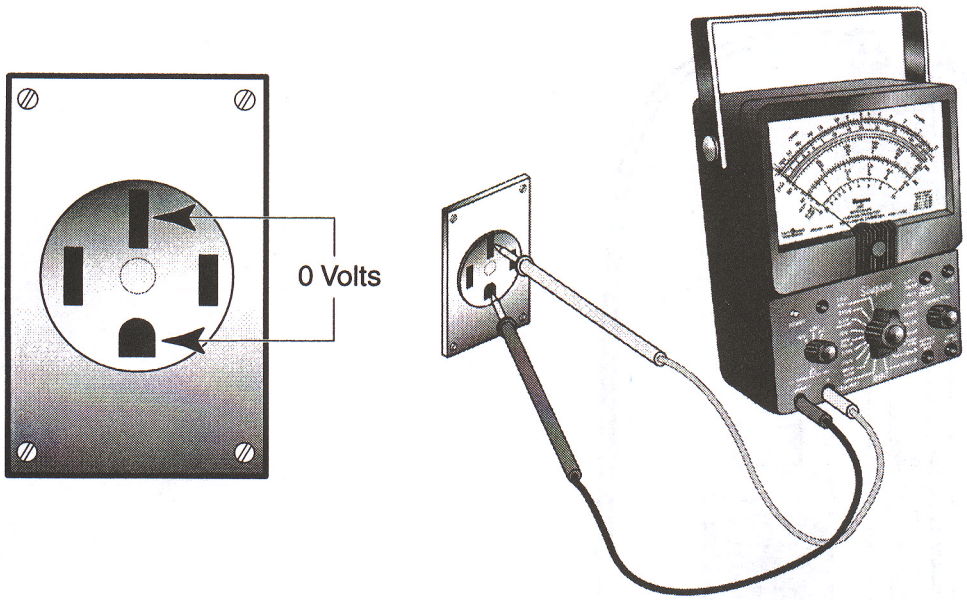
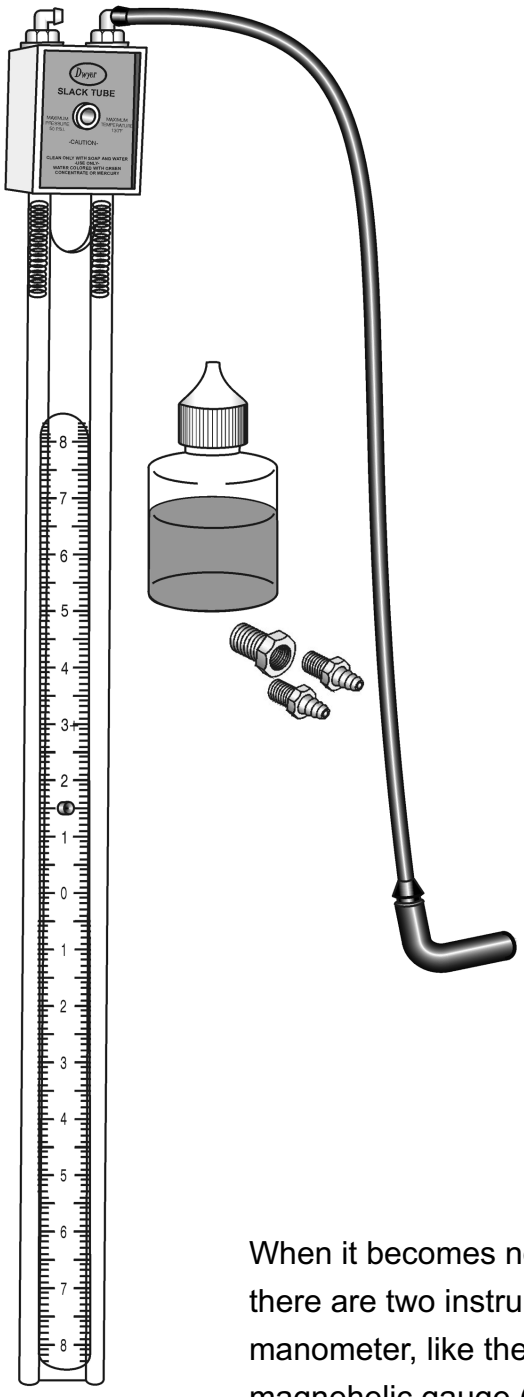


Figure 24

MANOMETER



When it becomes necessary to measure gas pressure, there are two instruments available that you can use: a manometer, like the one shown on this page, and a magnehelic gauge (shown on page 32).

A manometer is basically a U-shaped tube with a scale, marked in inches of water column. To prepare and use the manometer, use the following steps:

1. Check the appliance model/serial plate and note the gas pressure rating.
2. Turn off the gas pressure to the range.
3. Prepare the manometer by filling the U-shaped tube with water so that both sides of the tube fill to the ***zero*** point (see Figure 25). NOTE: Use a little food coloring in the water to help make reading the meter easier.

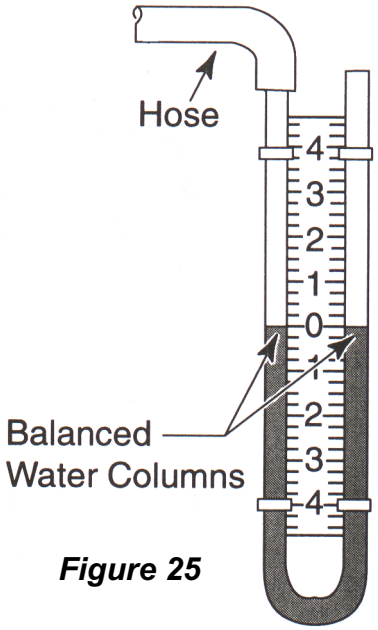


Figure 25

4. Connect the tubing that is supplied with the manometer over one end of the manometer.
5. Remove a burner from the appliance and place the free end of the tubing over the burner orifice.
6. Turn on the gas supply to the range.
7. Turn on the gas valve being tested, and light at least one other burner to serve as a load.
8. Observe the movement of the water in the manometer. The gas pressure is read by adding the water movement in both legs of the tube, as shown in Figure 26. It should measure within the pressure rating stated on the rating plate.

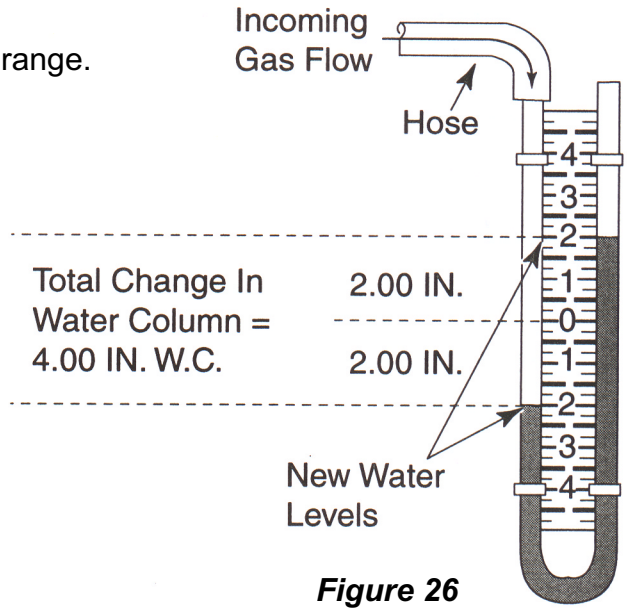
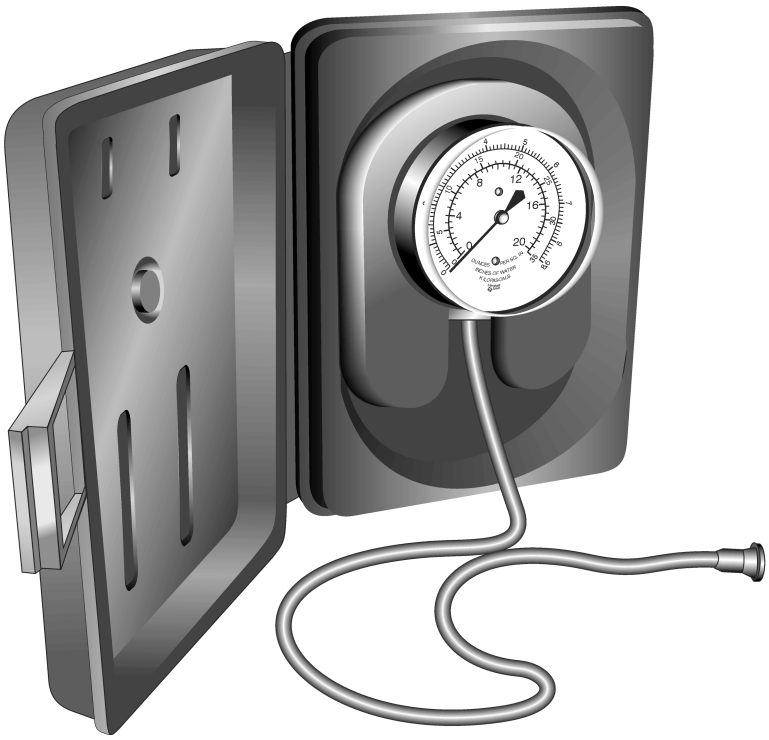


Figure 26

MAGNEHELIC GAUGE



The Magnehelic Gauge measures gas pressure. This type of gauge is easier and faster to use than a manometer.

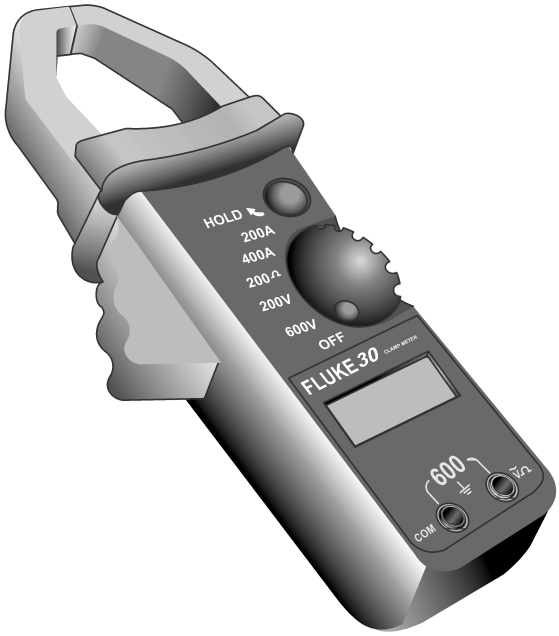
To use the gauge:

1. Check the appliance model/serial plate and note the gas pressure rating.
2. Turn off the gas pressure to the range.
3. Remove a burner from the appliance and place the free end of the tubing over the burner orifice.
4. Turn on the gas supply to the range.
5. Read the gas pressure directly from the scale of the gauge. It should measure within the pressure rating stated on the rating plate. Some gauges have numerous scales on the dial face. Read the water column pressure scale when taking the measurement.

The Model G24507 Magnehelic Gauge is available from:

Marsh Bellafram, Inc.
1-800-727-5646

AMP CLAMP



The Fluke Model 30 Amp Clamp measures AC and DC current and voltage. To use the meter, simply clamp it around the circuit under test, and read the display for the appropriate measurement.

THERMOCOUPLE TEMPERATURE TESTER

A Thermocouple Temperature Tester is helpful whenever it is necessary to measure hot surface temperatures, or when calibrating gas or electric ovens. The Tester is easy to use, and provides accurate temperature measurements from –20˚F to 1350˚F. It is specially useful for measuring temperature inside self-cleaning ranges, because of its high temperature range.

IMPORTANT: Do not "zero" the meter. It should always indicate the ambient (surrounding) temperature.

To use the Thermocouple Temperature Tester, perform the following steps:

1. Place the end of the thermocouple lead inside the area to be tested.
2. For greater accuracy, place the face of the meter in a horizontal position.

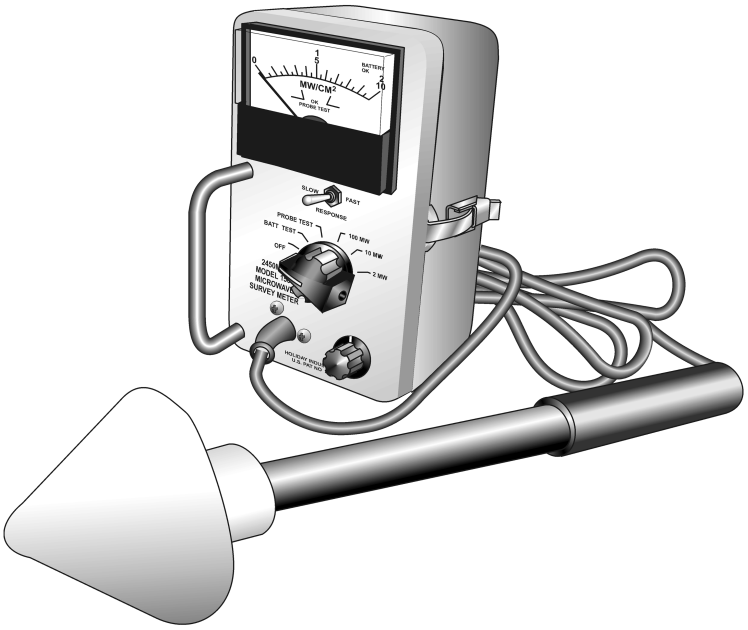
OPERATIONAL NOTES:

1. To avoid inaccurate readings, do not shorten the thermocouple lead, or severely bend it.
2. Do not place the instrument on top of the range during testing. The heat will make it difficult for the internal ambient temperature compensator to function properly.
3. With both the meter movement and the lead stabilized at the same ambient temperature, use the adjustment screw on the meter face to set the meter at the ambient temperature. The ambient temperature can be checked with an accurate glass thermometer.
4. If the instrument is suspected to be defective, check the lead and meter. Replace the lead first. If the problem still exists, the meter movement is faulty.

The Model 14855 Thermocouple Temperature Tester is manufactured by:

Robinair Division
Sealed Power Corporation
Robinair Way
Montpelier, OH 43543

MICROWAVE SURVEY METER
Model HI1501



On every microwave oven service call, a check for microwave energy emission must be performed. A properly operating door and seal assembly will normally register small emissions, but they must be no greater than 4 mw/cm^2.

When checking for R.F. leakage, use an approved R.F. measuring device to assure less than 4mw/cm^2 emission at 5 cm distance with a maximum scan rate of 2.5 cm/second, in compliance with U.S. Government Department of Health, Education and Welfare 21CFR1030, Performance Standard for Microwave Ovens.

IMPORTANT: The meter must not be used without the spacer cone in place.

1. Before each use, both the battery and the probe should be tested.

   To test the battery:

   a) Turn the selector knob to the “Battery Test” position. The meter should read above the green marker line on the meter. If this reading is below the green line, replace the battery.

To test the probe:

a) Turn the selector knob to “Probe Test.” The meter should read between the green lines. If it does not, the probe is damaged and should not be used. A defective probe cannot be replaced in the field and should be returned to the factory for repair.

2. To operate the Microwave Survey Meter:

a) Turn the selection knob to the desired meter range.

b) Allow two (2) minutes for the instrument to stabilize.
NOTE: If the instrument has been stored in a very warm or cold area, it should be allowed to stabilize at room temperature with the selector switch ON until no zero drift is observed.

c) Use the Zero Adjust knob and adjust the meter pointer to true zero. The probe must be shielded or removed from the vicinity of any R.F. field.

d) Keep the probe handle perpendicular, place the tip of the cone against the surface to be measured, and the leakage level will be accurately registered on the meter. The spacer cone automatically gauges the detecting probe 5 cm from the test point. Always use the probe handle. **DO NOT PLACE YOUR HAND NEAR THE CONE END OF THE PROBE.**

e) The “Fast” position of the meter may be used to locate the point of the highest leakage. Compliance readings should be taken with the switch in the “Slow” position.

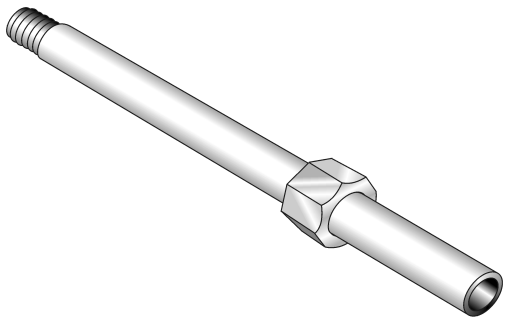
f) Zero the meter after each measurement. If there is a shift in the meter zero, the measurement will not be accurate.

g) The selection knob should be turned to OFF when the meter is not in use.

The Model HI1501 Microwave Survey Meter is manufactured by:

Holiday Industries, Inc.
14825 Martin Drive
Eden Prarie, MN 55344
Phone: 612-934-4920
FAX: 612-934-3604

TAP TOOL
(For Sealed Gas Cooktops)

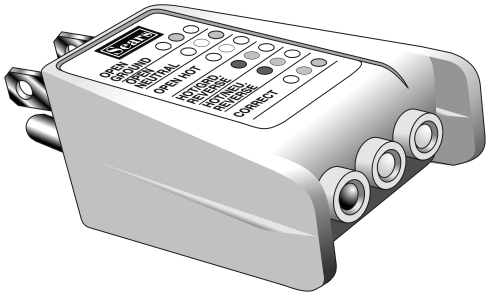


A tap tool (part **#4372141**) is required to perform a gas pressure check on gas ranges with sealed burners. The tap tool is a small extension that is used to lengthen the burner tube up to the cooktop area, so that a hose can be connected from a gas pressure measuring device.

To connect the tap tool:

1. Remove the cooktop burner orifice from the burner to be tested.
2. Insert the tap tool in place of the burner orifice.
3. Perform the gas pressure test.
4. Remove the tap tool from the burner and reinstall the gas orifice.

CIRCUIT TESTER

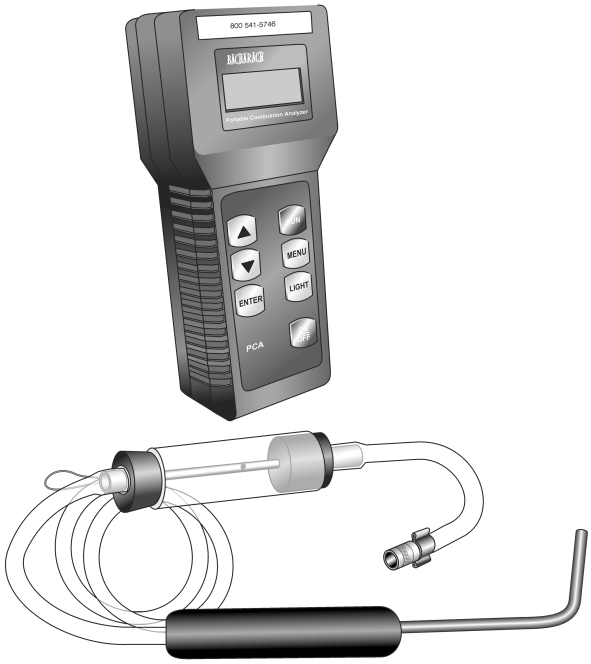


To assure proper operation of any appliance, the correct polarity and grounding of its electrical outlet is necessary. One of the first checks on appliances should be to verify that the wall outlet is wired correctly. A circuit tester can easily and quickly verify that an appliance is connected to a properly wired (120 VAC) wall outlet.

A series of lights within the tester will perform the following tests:

Test Function	*LED Reading*
Open ground	0 ● 0
Open Neutral	0 0 ●
Open Hot	0 0 0
Hot/Ground Reversed	● 0 ●
Hot/Neutral Reversed	● ● 0
Correct	0 ● ●

BACHARACH
CARBON MONOXIDE DETECTOR

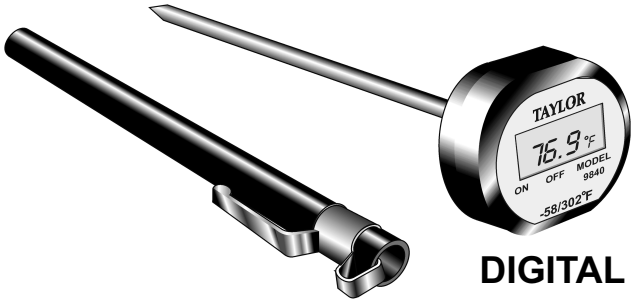


To use the Bacharach Model PCA-12 Carbon Monoxide Detector:

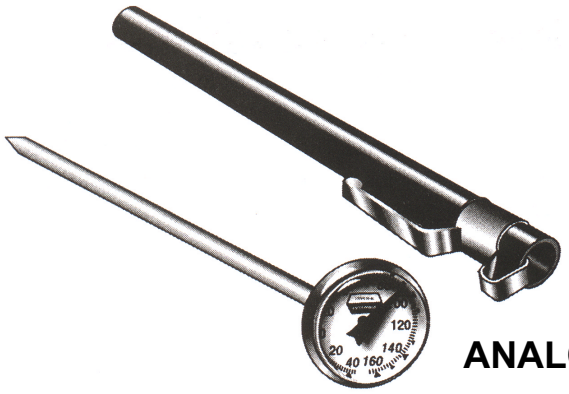
1. Follow the instructions provided with the test equipment to prepare the instrument. The unit will need a minute or so to warm up.
2. Let the oven operate for 7 minutes before taking measurements. Do not position the meter near the oven during this period.
3. Insert the tester probe into the oven vent.
4. Press the RUN keypad.
5. Wait for the CO Air Free reading to stabilize.
6. Record the test results.

The Carbon Monoxide Detector is available by contacting the “Consumer Assistance Center Safety Team” at: **1-800-541-5746.**

POCKET THERMOMETER



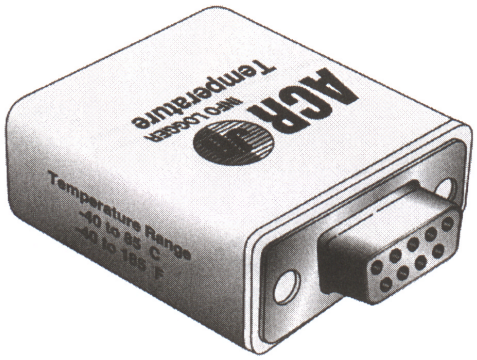
DIGITAL



ANALOG

The pocket thermometer is a handy tool for measuring temperature. For example, it can measure freezer or refrigerator compartments, heated water from microwave ovens, and exhaust temperatures from dryer vents.

TEMPERATURE DATA LOGGER

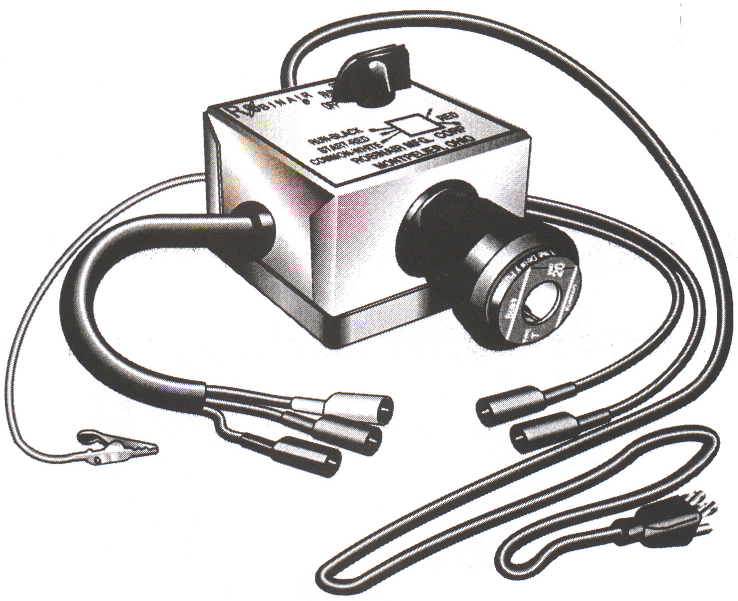


The ACR Jr. Data Logger measures and stores changes in temperature. The Logger is used with a computer to store and retrieve the data. Simply place the ACR Jr. Data Logger wherever you would like to record temperature changes. The logger will automatically read and store data every 2 minutes. When you wish to retrieve the stored data, run the ACR Jr. Graph software on your computer.

ROBINAIRE WATTMETER

The Robinaire Wattmeter, Model 14865, measures voltage, (120 and 240), amperage (up to 99.9 amps), and wattage (power consumption).

COMPRESSOR START TESTER

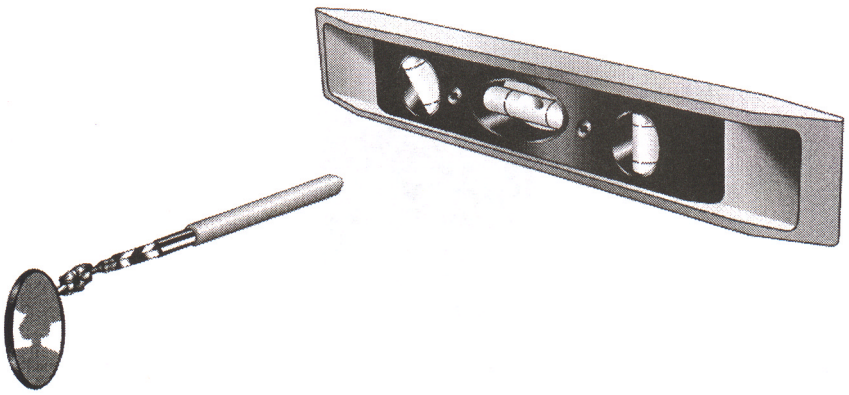


The Compressor Start Tester is used to check the compressor for open grounds and open windings.

ELECTRONIC LEAK DETECTOR

The Electronic Leak Detector detects the presence of any refrigerant escaping from the sealed system.

MACHINE LEVEL & INSPECTION MIRROR



The Machine Level is used to level appliances after they are installed in their mounting locations.

The Inspection Mirror is used to inspect around a brazed joint and should be able to fit in small spaces.

— NOTES —

— NOTES —

Whirlpool
CORPORATION