

SEARS

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OWNER'S MANUAL

BENCH ANALOG MULTITESTER 41 RANGE



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WARNING: USE EXTREME CAUTION IN USE OF THIS
DEVICES. IMPROPER USE OF THIS DEVICE CAN RESULT
IN INJURY OR DEATH. FOLLOW ALL SAFEGUARDS SUG-
GESTED IN THE OWNER'S MANUAL IN ADDITION TO
NORMAL SAFETY PRECAUTIONS IN DEALING WITH ELE-
CTRICAL CIRCUITS. DO NOT SERVICE THIS DEVICE IF
YOU ARE NOT QUALIFIED. NOT FOR COMMERCIAL OR
INDUSTRIAL USE.

DESCRIPTION

This multimeter is designed to measure AC and DC Voltages, DC currents, Resistance, Battery condition, and in conjunction with a power supply, capacitance and inductance with accuracy and ease. A slide switch allows checking of different batteries and doubles the AC and DC voltage and DC current ranges for more precise measurement.

Ideal for use where measurements must not load the circuit being tested, this unit features suitable sensitivities for this purpose. (See specifications for details). An "OFF" position is provided for meter protection when not being used or during transportation.

A convenient carrying handle built into the case can also be used to position the meter for easy reading.

SAFETY

This meter has been designed to be safe in use, but the operator must use caution in its operation. The rules listed below should be followed for safe operation.

Never apply voltage or current to the meter that exceeds the specified maximum. (1000 volts AC or DC and 500mA DC).

Use extreme caution when working with higher voltages.

Never connect the meter to a test point that has voltage on it when the meter is in the current or resistance function.

Always discharge filter capacitors in power supplies and disconnect the power when making resistance measurements.

Always turn off the power and disconnect the test leads before opening the back to replace the fuse or battery.

Never operate the meter unless the back cover is in place and fastened.

SPECIFICATIONS

FUNCTIONS OFF	RANGES Meter Movement	ACCURACY Short Circuited	SENSITIVITY
DC Volts (DC-V)	0/125mv/250mv/ 1.25/2.5/5/10/ 25/50/125/250/ 500/1000V	±3% of full scale	50kΩ/V(V-A-/2) 25kΩ/V(V-Ω-A)
AC Volts (AC-V)	0/5/10/25/50/ 125/250/500/ 1000V	±4% of full scale	10kΩ/V(V-A-/2) 5kΩ/V(V-Ω-A)
DC Currents (DC-A)	0/25uA/50uA/ 2.5mA/5mA/25mA/ 50mA/250mA/500mA	±3% of full scale	
Resistance	0/2K/20K/200K/ 2M/20M	±3% of full scale	
Decibels	—20 to +62 on ACV ranges		
Battery Test	1.5V AAA/AA Cell 125mA Load Current 1.5V C/D Cell 250mA Load Current 9.0V Cell 10mA Load Current		
Batteries	Requires one 9 volt battery for the R x 10k range and one 1.5V "AA" cell for all other ohms ranges.		
Fuse:	0.63A, 250V type 5 φ x 20mm		
Accessories			
Included:	Test Leads-One pair of 44 inch banana plug type. One spare fuse (located inside case).		
Optional			
Accessories:	Carrying Case		
Weight:	11b. 4oz. (566 g)		
Size:	6 3/4 x 5 x 2 inches (171.5mm x 127mm x 51mm)		

PREPARING FOR OPERATION

INSTALLING THE BATTERIES

WARNING: TO AVOID ELECTRIC SHOCK, DISCONNECT THE TEST LEADS FROM ANY SOURCE OF VOLTAGE BEFORE REMOVING THE BACK OF THE METER.

1. Disconnect the test leads.
2. Open the back of the cabinet by loosening the two screws.
3. Insert the 9V and 1.5V "AA" batteries into their respective compartments (see markings inside compartments) observing correct polarity.
4. Replace the back cover and tighten the screws.

WARNING: DO NOT OPERATE YOUR METER UNTIL THE COVER IS IN PLACE AND FASTENED DOWN.

CONTROLS AND JACKS

1. RANGE switch: Used to select the type of measurement and the range.
2. V- Ω -A slide switch: When in the V- Ω -A setting, the meter reads the AC or DC voltage or DC current directly. When in the V-A/2 position, the meter reading must be divided by 2 for the correct value. Also is used in the "BAT CHECK" position of the range switch to choose the correct load for the battery to be tested.
3. OHMS ADJ control: Used to set the dial pointer to "0" on the ohms scale when the two test leads are shorted together for checking calibration.
4. Mechanical adjust: Used to set the dial pointer to "0" on the left side of the scales when the meter is in the "OFF" mode.
5. COM (-) Jack: Plug-in connection for the black, negative test lead for all measurements.
6. V- Ω -A jack: Plug-in connection for the red, positive test lead for all measurements except battery test and DC voltage measurements between 250V and 1000V.

- 7 1000V Jack: Plug-in connection for the red, positive test lead for DC voltage measurements between 250V and 1000V. Range switch must be set to the 250 & 1000V position and V-Ω-A slide switch must be set to the V-Ω-A position.
8. BAT Jack: Plug-in connection for the red, positive test lead for testing batteries. Range switch must be set to BAT and the V-Ω-A slide switch set to the type of battery to be tested.

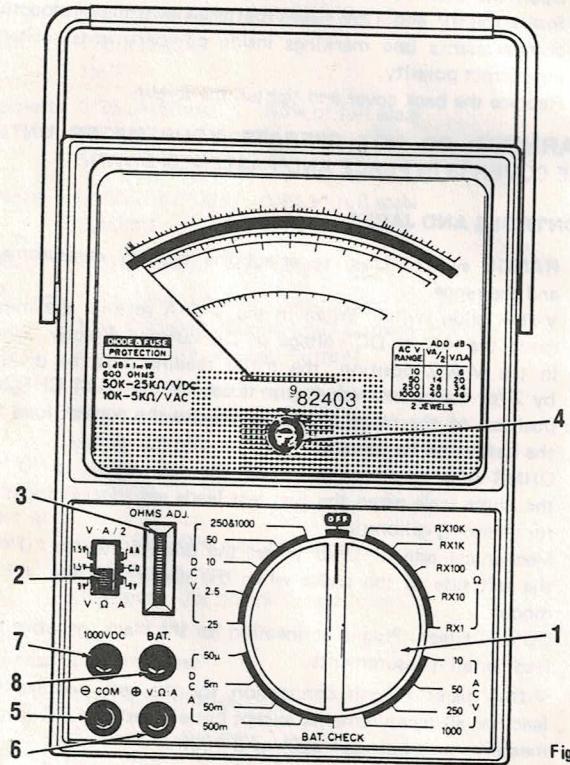


Fig. 1

PRELIMINARY ADJUSTMENTS

Insert the black test lead banana plug into the negative (-) jack (COM) and the red test lead banana plug into the positive (+) jack (V- Ω -A).

If the dial pointer does not normally rest exactly over the "0" at the left side of the scale, use the mechanical adjust screw in the lower center of the meter face to bring the dial pointer to "0".

Set the function selector to the R x 10K range and touch the test probe tips together. Use the OHMS ADJ control to bring the dial pointer to "0" on the top OHMS (green) scale. If the pointer will not go to the "0", the 9V battery needs replacement.

Set the function selector to the R x 1 range and touch the test probe tips together. Use the OHMS ADJ control to bring the dial pointer to "0" on the top OHMS (green) scale. If the pointer will not go to the "0", the 1.5V "AA" battery needs replacement.

GENERAL OPERATING INSTRUCTIONS

For most accurate readings, keep the meter laying flat on a non-metallic surface. The meter carrying handle can be set to tilt the meter if this position is more convenient.

Use a range selection that results in the dial pointer being in the upper 1/3 of the meter scale.

When you are not using the meter or are transporting it, place the function selector in the "OFF" position. This will protect the meter from accidental damage.

For sensitivities of the various DC and AC ranges and settings of the V- Ω -A switch, see the specifications.

The meter features a mirror arc to help eliminate parallax errors from readings. You can see a reflection of the dial pointer in the mirror arc. Look straight down onto the meter scale so that you do not see the dial pointer reflection in the mirror.

CAUTION

High voltage circuits, both AC and DC, are very dangerous and should be measured with great care.

DC VOLTAGE MEASUREMENTS

1. Set the range switch to one of the DC V ranges; it is best to start at the highest range and work down.
2. Touch the test probe tips to the circuit under test; be sure to observe correct polarity.
3. Set the range and V-Ω-A switch to obtain a reading in the upper 1/3rd of the scale.
4. Read the voltage on the black DC scales. If the V-Ω-A switch is in the V-A/2 position, the reading on the meter must be divided by 2.
5. For voltages between 250 and 1000, plug the red test lead into the 1000V DC jack and set the range switch to 250 & 1000. For voltages between 250 and 500, set the V-Ω-A switch to V-A/2. (The maximum range is then 500 volts). For voltages between 500 and 1000, set the V-Ω-A switch to V-Ω-A (The maximum range is then 1000 volts).

AC VOLTAGE MEASUREMENTS

1. Set the range switch to one of the AC V ranges; it is best to start at the highest range and work down.
2. Touch the test probe tips to the circuit under test.
3. Set the range and the V-Ω-A switch to obtain a reading in the upper 1/3rd of the scale.
4. Read the voltage on the red AC scale, using the black numbers printed below for the appropriate scale. If the V-Ω-A switch is in the V-A/2 position, the reading on the meter must be divided by 2.

CAUTION: THE PROBE TIPS MAY NOT BE LONG ENOUGH TO CONTACT THE LIVE PARTS INSIDE SOME 240V OUTLETS FOR APPLIANCES SINCE THE METAL CONTACTS MAY BE RECESSED DEEP IN THE OUTLETS. AS A RESULT

THE READING MAY SHOW 0 VOLTS WHEN THE OUTLET ACTUALLY HAS VOLTAGE ON IT. MAKE SURE THE PROBE TIPS ARE CONTACTING THE METAL CONTACTS INSIDE THE OUTLET BEFORE ASSUMING THAT NO VOLTAGE IS PRESENT.

DC CURRENT MEASUREMENTS

1. Set the range switch to the 500mA DCA range (500 milliamps); it is best to start at the highest range and work down.
2. Remove power from the circuit under test and then open up the circuit at the point where you wish to measure current.
3. Touch the black test probe to the negative side of the circuit and the red probe to the positive side of the circuit.
4. Apply power to the circuit under test.
5. Set the range and the V- Ω -A switch to obtain a reading in the upper 1/3 of the scale.
6. Read the current on the black DC scales. If the V- Ω -A switch is in the V-A/2 position, the reading on the meter must be divided by 2.

NOTE: DO NOT ATTEMPT TO MEASURE AC CURRENT.

RESISTANCE MEASUREMENTS

BEFORE TAKING ANY RESISTANCE MEASUREMENTS, DISCONNECT POWER TO THE UNIT UNDER TEST AND DISCHARGE CAPACITORS. IT IS BEST TO REMOVE BATTERIES AND UNPLUG LINE CORDS.

1. Set the range switch to the desired OHMS scale. Set the V- Ω -A switch in the V- Ω -A position. Touch the probes together. Use the OHMS ADJ control to bring the dial pointer to the "0" on the top OHMS (green) scale.
2. Touch the probe tips across the circuit or part under test. If necessary, switch to a different scale for a more accurate reading. (It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance readings).

3. Read the resistance on the green OHMS scale. Multiple the reading by the correct number for the range you are using. (X100 if you are on the RX100 scale).

DECIBEL MEASUREMENTS

1. Set the range switch to one of the ACV ranges; it is best to start at the highest ranges and work down.
2. Touch the test probe tips to the circuit under test.
3. Set the range and V-Ω-A switch to obtain a meter reading in the upper 1/3rd of the scale.
4. Read the dB on the black dB scale. On the 10 ACV scale with the V-Ω-A switch in the V-Ω-A position the dB can be read directly; for all other settings of the range and/or V-Ω-A switches, add the appropriate number of dB per the chart on the lower right of the meter face.

NOTE: For absolute dB measurements, circuit impedance must be 600 ohms. 0dB = 1 milliwatt dissipated in a 600 ohm impedance. (Equivalent to 0.775 volts across 600 ohms).

BATTERY CHECK

1. Set the range selector switch to the BAT CHECK position.
2. Remove the red lead banana plug from the positive (+) jack (V-Ω-A) and plug it into the BAT jack.
3. Set the V-Ω-A switch to the battery type you are going to test. The top position marked "AA" is for "AA" and "AAA" batteries, the middle position marked "C,D" is for C and D batteries, and the bottom position marked "9V" is for 9V batteries.
4. Touch the red test probe tip to the + terminal of the battery and the black test probe tip to the - terminal of the battery.
5. Read the condition on the BAT scale. If the pointer is in the red "BAD" zone, the battery needs to be replaced. If the pointer is in the green "GOOD" zone, the battery is good. If the pointer is in the white zone, the battery should be replaced soon, as very little power is left.

INDUCTANCE MEASUREMENTS

- 1) Wire the circuit shown in Fig. 2 using a power transformer and variable AC supply voltage. Connect a 12- or 12.5- K ohm resistor across the test leads. (Note: The 12- or 12.5 K ohm resistor is used across the test leads when measuring inductance and high capacitance. A 310- K ohms resistor is used across the test leads when measuring low capacitance.) Any inductance between 4 and 2000 Henrys can be measured.
- 2) Set the RANGE switch to 10 ACV and the V- Ω -A slide switch to V- Ω -A. Connect the test leads across the secondary of the transformer, as shown in Figure 2. Starting at zero volts, slowly increase the AC voltage until you read 10 volts. Do not change this voltage setting until you have completed the measurements in step 3.
- 3) Connect the unknown inductor (drawn as a rectangular box marked L OR C) as shown in Figure 3. Note the voltage on the 10 volt scale. Use TABLE 1 to determine the inductance in the circuit from the voltage read on the meter. You can interpolate between values if the actual voltage read on the meter is not indicated on the table.

NOTE: Adjust voltage with variac before measuring capacitance or inductance. Transformer voltage and shunt resistor requirements are discussed in the text. Do not change variac voltage after setting has been made.

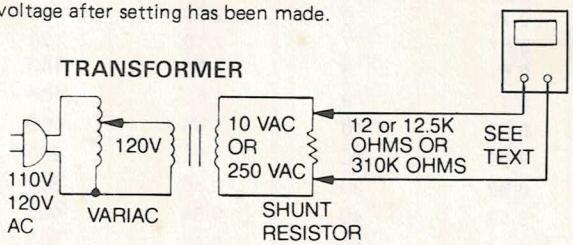
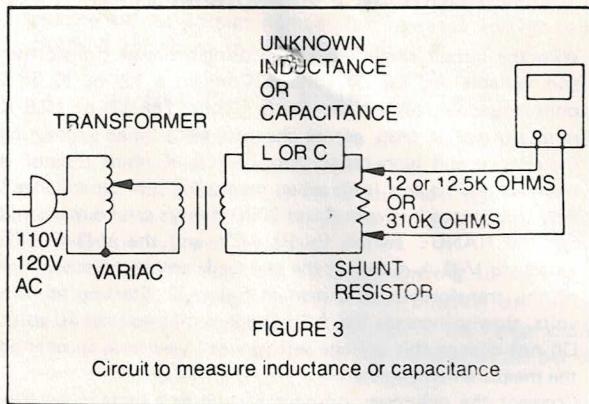


FIGURE 2



**TABLE 1. VOLTAGE TO INDUCTANCE CONVERSION
(4 HENRYS TO 2000 HENRYS)**

RMS VOLTS	INDUCT- ANCE (H)	RMS VOLTS	INDUCT- ANCE (H)
9.88	4	3.14	80
9.83	5	2.81	90
9.75	6	2.56	100
9.67	7	2.16	120
9.57	8	1.86	140
9.47	9	1.63	160
9.35	10	1.45	180
7.99	20	1.31	200
6.63	30	0.88	300
5.52	40	0.64	400
4.67	50	0.53	500
4.04	60	0.27	1000
3.62	70	0.13	2000

**HIGH CAPACITANCE MEASUREMENTS
.005 TO 1 MFD)**

- 1) Connect the circuit shown in Figure 2, using a 12- or 12.5- K ohms resistor.
- 2) Set the RANGE switch to 10 ACV, and the V-Ω-A slide switch to V-Ω-A. Connect the test leads across the secondary of the transformer. Starting at zero volts, slowly increase the AC voltage until you read 10 volts. Do not change this voltage setting until you have completed the measurements in step 3.
- 3) Connect the capacitor (drawn as a rectangular box marked L OR C) as shown in Figure 3. Note the voltage on the 10 volt scale. Use TABLE 2 to determine the capacitance in the circuit from the voltage read on the meter. You can interpolate between values if the actual voltage read from the meter is not indicated on the table.

**TABLE 2. VOLTAGE TO CAPACITANCE CONVERSION
.005 MFD TO 1 MFD)**

RMS VOLTS	CAPACI-TANCE (mfd)	RMS VOLTS	CAPACI-TANCE (mfd)
.19	.005	4.67	.14
.32	.009	5.15	.16
.38	.01	5.61	.18
.73	.02	6.01	.2
1.11	.03	6.86	.25
1.49	.04	7.49	.3
1.85	.05	8.34	.4
2.21	.06	8.83	.5
2.55	.07	9.14	.6
2.87	.08	9.35	.7
3.20	.09	9.50	.8
3.52	.1	9.58	.9
4.12	12	9.67	1

**LOW CAPACITANCE MEASUREMENTS
(100 TO 50,000 PF)**

- 1) Connect the circuit shown in Figure 2, using 310,000-ohm resistor.
- 2) Set the RANGE switch to 250 ACV and the V-Ω-A slide switch to V-Ω-A. Connect the test leads across the secondary of the transformer. Starting at zero volts, slowly increase the AC voltage until you read 250 volts. Do not change the voltage setting until you have completed the measurements in step 3.

**TABLE 3. VOLTAGE TO CAPACITANCE CONVERSION
(.005 MFD TO 1 MFD)**

RMS VOLTS	CAPACI-TANCE (pF)	RMS VOLTS	CAPACI-TANCE (pF)
2.25	100	59	2600
4.5	200	64	2800
6.75	300	68	3000
9.25	400	78	3500
11.8	500	88	4000
14	600	97.5	4500
16	700	105	5000
18.1	800	112	5500
21	900	124	6000
23.3	1000	130	6500
27.7	1200	137	7000
32.7	1400	151	8000
37	1600	161	9000
42	1800	172	10K
46.2	2000	221	20K
51	2200	236	30K
55	2400	245	50K

- 3) Connect the capacitor (drawn as a rectangular box marked L OR C) as shown in Figure 3. To avoid an electric shock, disconnect the variable supply from the power source while working in the circuit, but do not change the voltage setting. Note the voltage on the 250 volt scale. Use TABLE 3 to determine the capacitance in the circuit from the voltage read on the meter. You can interpolate between values if the actual voltage read from the meter is not indicated on the table.

MAINTENANCE

CARE

Your Multitester will give years of service if the following care of the meter is followed.

Keep the meter dry. If it gets wet, wipe it off.

Use and store the meter in normal temperatures.

Temperature extremes can shorten the life of the electronic parts and distort or melt plastic parts.

Handle the meter gently and carefully. Dropping it can damage the electronic parts, case or meter.

Wipe the case with a damp cloth occasionally to keep it clean. Do not use chemicals, cleaning solvents or detergents.

Use only fresh batteries of the recommended size and type. Remove old or weak batteries so they do not leak and damage the unit.

If the meter is to be stored for a long period of time, the batteries should be removed to prevent damage to the unit from any possible leakage of the batteries.

REPLACING THE BATTERY

When the "0" cannot be set on an ohms scale, the battery for that scale should be replaced. Follow the instructions for installing batteries. Dispose of the old batteries properly.

REPLACING THE FUSE

WARNING: TO AVOID ELECTRIC SHOCK, DISCONNECT THE TEST LEADS FROM ANY SOURCE OF VOLTAGE BEFORE REMOVING THE BACK OF THE METER.

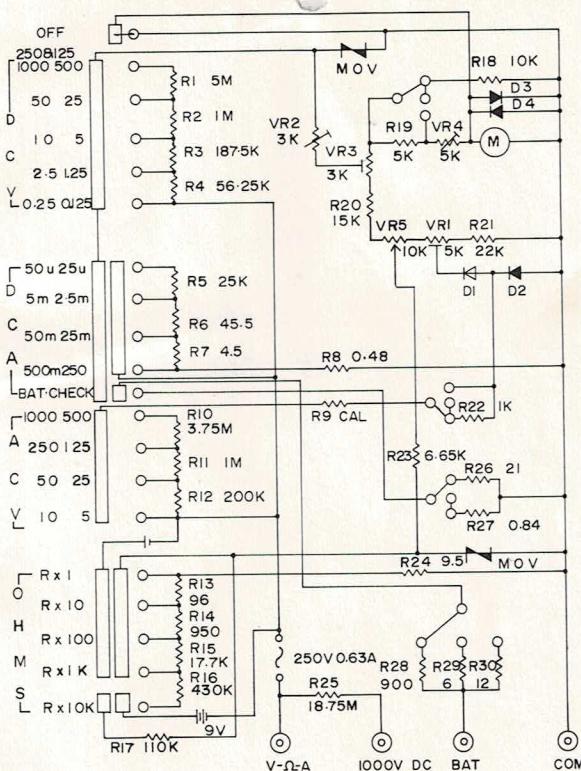
1. Disconnect the leads.
2. Open the back of the cabinet by loosening the screws.
3. Remove the old fuse from its holder gently to prevent breaking it and install the new fuse into the holder.

NOTE: The fuse for your multimeter is a 0.63A, 250V type 5 ϕ x 20mm. A spare fuse is inside the case in a holder.

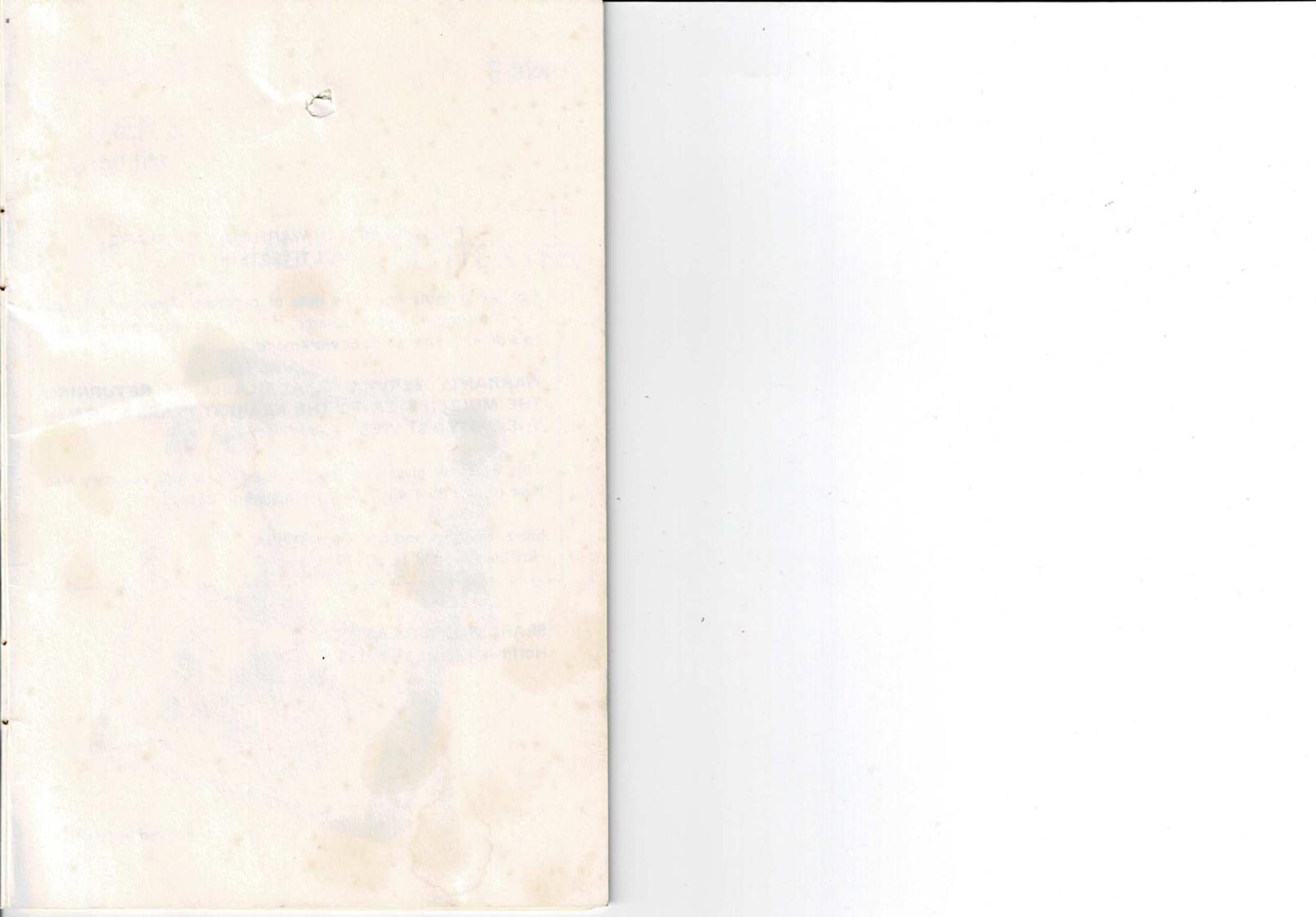
4. Replace the back cover and tighten the screws.

WARNING: DO NOT OPERATE YOUR METER UNTIL THE COVER IS IN PLACE AND FASTENED DOWN.

SCHEMATIC DIAGRAM



— MEMO —



**FULL SIX MONTH WARRANTY ON SEARS
MULTITESTER**

For six months from the date of purchase, Sears will replace this Multitester, free of charge, if it fails to work properly due to a defect in materials or workmanship.

**WARRANTY SERVICE IS AVAILABLE BY RETURNING
THE MULTITESTER TO THE NEAREST SEARS STORE IN
THE UNITED STATES.**

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

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