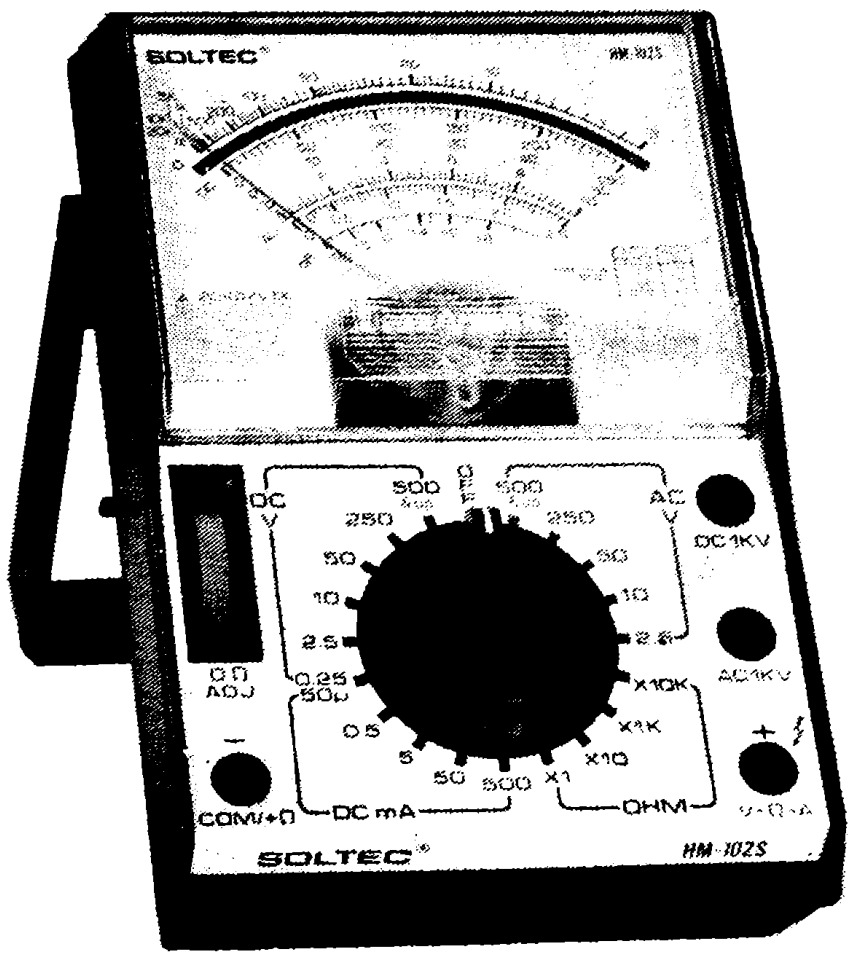
OPERATORS MANUAL

VOM-MULTITESTER

20,000 ohms/volts DC

model HM-102S



SOLTEC®

DISTRIBUTION

SECTION 1
INTRODUCTION

1. 1 GENERAL

1. 1. 1 The SOLTEC HM-102S Volt-Ohm-Milliammeter (hereafter referred to as the HM-102S or the Instrument) is a high sensitivity instrument (20,000 ohms/volt DC and 8,000 ohms/volt AC), ideal for use where measurements must not appreciably disturb the circuit being tested.

1. 1. 2. Built in a modern high-impact case, the HM-102S is a quality product in both performance and appearance. Available are seven DC and six AC voltage ranges, five dB ranges, five DC current ranges and four resistance ranges. A mirrored dial is included to help eliminate errors in readings due to parallax and a dB conversion chart is printed on the dial face. Special circuitry has been included to protect the meter movement against accidental overloads. Another feature of the Instrument is a built-in, convenient carrying handle which can also be used to position the HM-102S at an angle for easy reading. An optional carrying case is also available.

1. 2. SPECIFICATIONS

1. 2. 1. DC Voltage

Ranges: 0-0.25, 2.5, 10, 50, 250, 500, 1000V (separate jack)
Sensitivity: 20,000 ohms/volt
Accuracy: ±3% of full scale

1. 2. 2. AC Voltage

Ranges: 0-2.5, 10, 50, 250, 500, 1000V (separate jack)
Sensitivity: 8,000 ohms/volt
Accuracy: ± 5% of full scale

1. 2. 3. DC Current

Ranges: 0-50μA, 0.5, 5, 50, 500mA
Accuracy : ±3% of full scale

1. 2. 4. Decibels

Ranges : -20dB to 56dB in 5 ranges (0dB: 1mW @ 600Ω)

1. 2. 5. Resistance

Ranges : 0-20 megohms in 4 ranges (center scale at 20, 200, 20K, 200KΩ).
Accuracy : ±3° of arc

1. 2. 6. Power Requirements: Two 1.5 volt "AA" type batteries, NEDA type 15F, and one 9 volt battery, NEDA type 1604.

1. 2. 7. Fuse: Littlefuse 2112.002 (2A) Fast Acting (or equivalent)

1. 2. 8. Dimensions: 3½" wide x 5¼" long x 1½" high

1. 2. 9. Weight: 10.8 ounces (including batteries).

1. 3. ITEMS FURNISHED WITH INSTRUMENT

One set of test leads, one 9 volt and two 1.5 volt batteries, one fuse and an operator's manual.

SECTION II
CONTROLS AND JACKS

2. 1. GENERAL

2. 1. 1. All operating and adjustment controls, and jacks are described in this section. The operator should become familiar with each item prior to operating the Instrument.

1. **Function and Range Switch:** This control is located in the lower center of the front panel and it combines the operations of selecting the function and desired range as well having an "OFF" position. To extend the life of the batteries, the switch should be in this 'OFF" position when the Instrument is not in use.

2. **Zero Ohms Adjust Control:** Located on the left side of the front panel this control is used to obtain a "0" indication on the ohms scale when the test leads are shorted together. During operation, the zero indication should be checked each time the ohmmeter is to be used. This permits compensation for the aging of the internal batteries. If the zero adjustment cannot be made, replace batteries.

3. **Zero Mechanical Adjust:** This adjustment is the plastic screw located in the bottom center of the dial cover and is used to correct any pointer error (off "0"). when the Instrument is in an operating position.

4. **(–)COM/+Ω Jack :** Plug in connection for black (negative) test lead.

5. (+)V—Ω—A Jack: Plug in connection for red (positive) test lead for all ranges except when measuring AC and DC voltages exceeding 500.

6. DC 1KV Jack : Plug in connection for red test lead when making measurements between 500 and 1000 volts DC. Function and Range switch must be set in the "500 & UP" position.

7. AC 1KV Jack : Plug in connection for red test lead when making measurements between 500 and 1000 volts AC. Function and Range switch must be set in the "500 & UP" position.

SECTION III
OPERATION

3. 1. SAFETY PRECAUTIONS

3. 1. 1. Instruments of this type are intended to be used only in low-power product type applications such as radio, TV, personal computers and the like.

3. 1. 2. Frequently inspect the test leads and the Instrument for damage and/or deteriorating insulation and replace faulty items immediately.

3. 1. 3. Never work alone with high voltage circuits.

3. 1. 4. Before connecting the Instrument to a circuit, become familiar with the circuit to determine the highest voltage levels likely to be encountered.

3. 1. 5. The small size of this Instrument might tempt the user to hold it while making measurements. Avoid this practice especially when working in circuits that might contain a shock hazard.

3. 1. 6. Develop safe habits by turning off the power to the measured circuit and discharge any capacitors before handling the test leads.

3. 1. 7. If the approximate value of the voltage or current to be measured is not known, always set the Instrument to its highest range for the first measurement to determine the proper range to be used.

3. 1. 8. Electrical measurements to be made in the

presence of humidity or moisture are particularly hazardous. Hands, shoes, floor and workbench must be dry.

3. 1. 9. When making resistance measurements, all power to circuits must be removed and capacitors discharged.

3. 2. PARALLAX ERRORS

3. 2. 1. To avoid such errors, take the reading when the reflection of the pointer in the mirror is directly behind the pointer (one image only).

3. 3. MEASURING DC VOLTAGES

a. Select the required DC voltage range.
b. Connect the black lead to the (—) jack and the red lead to the (+) jack for all voltage ranges except the 1KV range. For the 1KV range connect red lead to the DC 1KV jack.
c. Turn on power in the circuit to be measured.
d. Observing polarity, connect the test leads across the circuit or component where the voltage is to be measured.
e. Read the DC voltage on the appropriate scale.

3. 4. MEASURING AC VOLTAGES

a. Select the required AC voltage range.
b. Connect the test leads as noted in paragraph 3.3 b (above), except for the 1KV range. For the 1KV range connect the red lead to the AC 1KV jack.
c. Turn on power to the circuit to be measured.
d. Connect the test leads across the circuit or component where the voltage is to be measured.
e. Read the AC voltage on the appropriate scale.

3. 5. MEASURING DC CURRENT

a. Select the required DC current range.
b. Connect the test leads to the(+) and(—) jacks.
c. Turn on power in the circuit to be measured.
d. Observing polarity, connect the test leads in series with the circuit or component to be measured
d. Observing polarity, connect the test leads in series with the circuit or component to be measured with the most positive potential to the(+) jack.
e. Read the DC current on the appropriate scale.

3. 6. MEASURING RESISTANCE

a. Select the required OHM range.
b. Connect the test leads to the(+) and (−)jacks
c. Short the contact ends of the test leads and observe the indication on the Instrument.
d. Set the 0Ω AJD knob for a meter pointer indication of 0 ohms (full scale). If unable to adjust for 0, replace both 1.5 volt batteries or if the R x 10K range scale is affected replace the 9V battery (refer to paragraph 4. 2).
e. Connect test leads across the resistance which is to be measured. Observe polarity if there is a "forward" or "backward" resistance (as in the case of diodes).The polarity of output when in OHM ranges is opposite to jack markings, i.e., the + jack is negative with respect to the − jack.
f. Read the indication on the Ω (ohms) scale at the top of the dial. Note that the arc reads from right to left for increasing values.
g. Multiply the reading by the multiplier factor selected in the switch range position.

3. 7. MEASURING DECIBELS

a. Select the 500 & UP ACV range (if voltage is unknown).
b. Connect the test leads as noted in paragraph 3.5 b (above).
c. Turn on the power in the circuit to be measured.
d. Connect the test leads across the circuit or component where the voltage is to be measured.
3. Read the dB scale. Adjust ranges "downward", if appropriate, until the largest scale indication is attained.

NOTE: The dB scale is calibrated to a reference level of one milliwatt into 600Ω where 0dB is 0.774V and read directly on the 2.5 VAC range. For readings of greater than 10dB, greater voltage ranges are required and the dB values that are to be "added" to the direct scale reading are exhibited in a conversion table on the lower right hand corner of the dial face.

Example: Using the 10 ACV range the total dB's measured would be the direct scale reading plus 12. On the 50 ACV range, plus 26, etc..

SECTION IV
MAINTENANCE

4. 1. REMOVAL OF CASE BACK

4. 1. 1. The Instrument has been designed to provide easy access for all necessary replacement of parts. It is only necessary to remove one screw from the back of the Instrument (center of the case) to remove the back of the case to gain access to the batteries and the fuse.

4. 2. BATTERY REPLACEMENT

4. 2. 1. Remove the back of the case.

4. 2. 2. Note the orientation and location of all the batteries. When the Ohms Adjust control cannot be adjusted for zero ohms (with shorted test leads) it is generally an indication that one or both of the 1.5 volt "AA" batteries needs replacement for any or all the ranges except the R x 10K. (It is recommended that both batteries be replaced at the same time.) The R x 10K range battery is the 9 volt battery.

4. 2. 3. Remove the old batteries and replace with new, noting the + indication in the 1.5 volt battery compartments. The 9 volt battery has a self-polarizing snap-on connector. Make sure that the battery terminals in each compartment make good contact with the battery, otherwise resistance measurements would be erroneous.

4. 2. 4. Replace back of case, insert the plastic screw and tighten snugly, being careful not to overtighten.

4. 3. FUSE REPLACEMENT

4. 3. 1. Should the Instrument stop working it is possible that the fuse has blown.

CAUTION

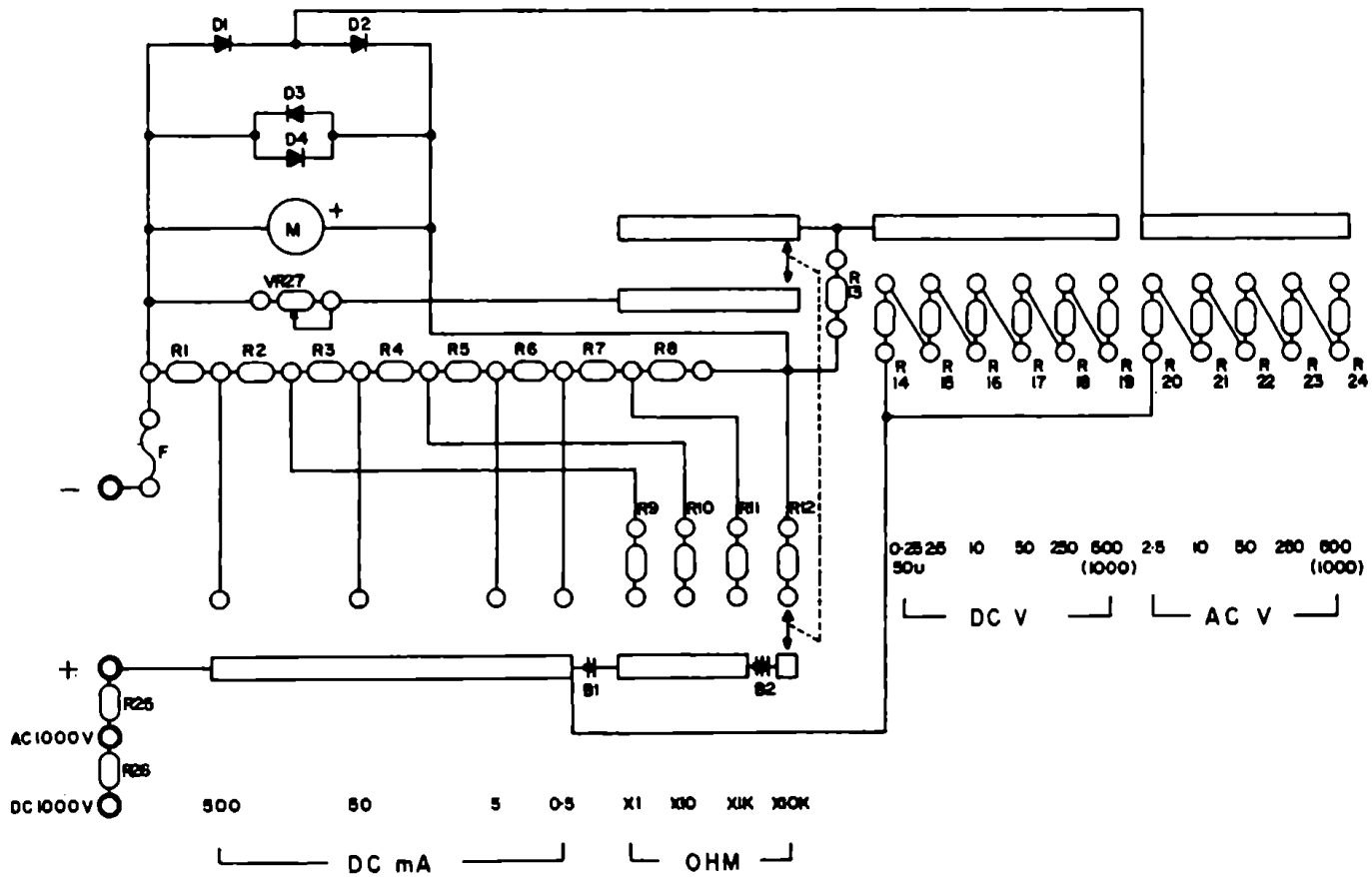
To ensure maximum protection to the Instrument, do not replace the fuse with one of different type voltage rating, or with a "slo-blo" type.

4. 3. 2. Remove the back of the case.

4. 3. 3. Inspect and replace fuse if necessary.

4. 3. 4. Replace back of case.

SCHEMATIC DIAGRAM



R1	0·8
R2	2·5
R3	4·7
R4	25·3
R5	46·7
R6	720
R7	2·53K
R8	4·67K
R9	15·2
R10	166·8
R11	18·1K
R12	198·4K
R13	1·2K
R14	2·2K
R15	45K
R16	150K
R17	800K
R18	4 M
R19	5 M
R20	19·16K
R21	66·2K
R22	365K
R23	1·77M
R24	2·21 M
R25	4·42M
R26	5·7M
VR27	30K

M	2K40 UA
D1,3,4	SI IN914
D2	GEIN 60
B1	1·5V×2 "AA"
B2	9V×1 "006P"
F	2A250V

SOLTEC

DISTRIBUTION