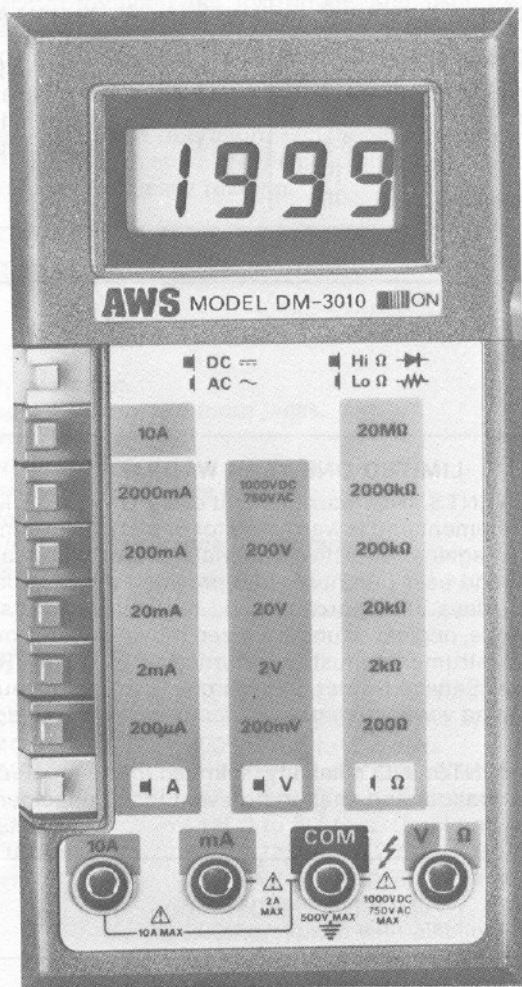


OPERATING INSTRUCTIONS

Model DM-3010

3½ Digit Digital Multimeter



A.W. SPERRY INSTRUMENTS INC.
The Measurable Advantage.

245 MARCUS BLVD., HAUPPAUGE, N.Y. 11788 • (516) 231-7050/51

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Sec. 1 WARRANTY

LIMITED ONE YEAR WARRANTY

A.W. SPERRY INSTRUMENTS, INC. warrants that every DM-3010 DMM is carefully tested and inspected prior to shipment and is warranted for one (1) year from the date of purchase by the original end user against defective materials and/or workmanship. This warranty covers only the original end user purchaser and provided the completed warranty card is returned within ten (10) days after purchase and the instrument has not been misused, damaged due to negligence, neglect or unauthorized repair, abused, or used contrary to the operating instructions. Instruments must be returned to: A.W. SPERRY INSTRUMENTS, INC.: Attention Customer Service Center, 245 Marcus Blvd., Hauppauge, New York 11788, prepaid for examination and verification of manufacturing defect under warranty, we being the sole judge.

A.W. SPERRY INSTRUMENTS, INC.'s liability is limited to the repair or replacement at our option of any defective product and shall in no event include incidental or consequential commercial damages of any kind.

WARRANTY REGISTRATION

To validate warranty, please complete the warranty registration card enclosed with the instrument and return to A.W. Sperry Instruments, Inc., 245 Marcus Blvd., Hauppauge, New York 11788, within 10 days after purchase. No postage required.

Sec. 2 DESCRIPTION

The DM-3010 is a truly unique 3½ Digit Handheld Digital Multimeter (DMM) capable of reading six functions on a total of 34 ranges. With basic DC Volt accuracy of 0.5% of reading this DMM offers a powerhouse of measurement capability in one small self-contained housing. It is designed for the professional at work in the field or in the laboratory.

Safety was a prime consideration in the design of this DMM. Housed in shock resistant ABS plastic this instrument stands up to the use and abuse of everyday service and electrically insulates the user from potential shock hazards. Overload protection is provided on all ranges. Special protection was designed into the resistance ranges. These ranges incorporate solid state (no fuse blow) protection to 500V AC/DC protecting the instrument and user from potentially dangerous misapplications. Test leads and their connections into the DMM are safety designed to minimize exposed connections, again protecting the user from possible shock hazard.

Operation is simple and safe. Function and range selection is accomplished by eight push button switches designed for easy one hand operation. Functions are color coordinated with the input jacks and switch positions selected to minimize the possibility of operator error. A built in tilt stand and large ½" LCD numerals provide easy reading.

Sec. 3 FEATURES

- *Built in tilt stand.*
- *200 hour battery life.*
- *10A AC/DC range.*
- *One hand push button operation.*
- *Color coordinated range, function and input jacks.*
- *Auto zero, Auto polarity.*
- *Overload protection on all ranges.*
- *500V AC/DC protection on all resistance ranges.*
- *Hi Power Ohms for in circuit resistance measurements.*
- *Low Power Ohms for in circuit resistance measurements.*
- *UL1244 type test leads.*

Sec. 4 SPECIFICATIONS

DISPLAY:

3½ digit LCD 0.5" numerals with polarity.

OVERANGE INDICATION:

3 least significant digits blanked.

MAXIMUM COMMON MODE VOLTG:

500 V DC or AC peak.

OPERATING ENVIRONMENT:

0° to 35° C at <80% relative humidity.

35° to 50° C at <70% relative humidity.

-15° C to 50° C.

(0° to 18° C and 28° to 50° C).

Less than 0.1 x applicable accuracy specification per °C.

9V transistor type battery. (NEDA 1604) AWS Part #B-4.

200 hrs typical with alkaline cells.

100 hrs. typical with carbon-zinc cells.

"LO BAT" appears on display when less than 10% battery life remains.

6¾"H x 3½"W x 1½"D

10 oz. (283g)

AWS Part # F-11

2A, 250 V, 5 x 20mm fast acting

POWER SOURCE:

BATTERY LIFE:

BATTERY INDICATOR:

DIMENSIONS:

WEIGHT:

FUSE:

DC Volts

RANGE	RESOLUTION	18°-28°C ACCURACY	INPUT IMPEDANCE
200mV	100μV	± (0.5% rdg + 1d)	10MΩ
2V	1mV	"	"
20V	10mV	"	"
200V	100mV	"	"
1000V	1V	"	"

Overload Protection: 1000 Vdc or peak ac non-switched
750 Vdc or peak ac switched

Normal Mode Rejection Ratio: > 46 dB at 50/60 Hz (1K unbalance)

AC Volts (average responding, calibrated in RMS of a sinewave)

RANGE	RESOLUTION	18°-28°C ACCURACY 45-500 Hz*	INPUT IMPEDANCE
200mV	100μV	± (1% rdg + 5d)	10MΩ shunted by < 100 pF
2V	1mV	"	"
20V	10mV	"	"
200V	100mV	"	"
750V	1V	"	"

Overload Protection: 1000 Vdc or peak ac non-switched or
750 Vdc or peak ac switched. Continuous except 200mV range, 15 sec. max. above 300V.
*45-120 Hz on 200V and 750V ranges.

DC Current

RANGE	RESOLUTION	18°-28°C ACCURACY	FULL SCALE VOLTAGE BURDEN
200μA	100nA	± (1% rdg + 1d)	0.25V maximum
2mA	1μA	"	"
20mA	10μA	"	"
200mA	100μA	"	"
2000mA	1mA	± (2% rdg + 1d)	0.5V
10A	10mA	± (2% rdg + 5d)	0.3V

Overload Protection: 2A/250V fuse on mA inputs.
15A for 15 sec. on 10A input.

AC Current (average responding, calibrated in RMS of a sinewave)

RANGE	RESOLUTION	18°-28°C ACCURACY 45-500 Hz**	FULL SCALE VOLTAGE BURDEN
200μA	100nA	± (4% rdg + 5d)**	0.25Vrms maximum
2mA	1μA	± (2% rdg + 5d)	"
20mA	10μA	"	"
200mA	100μA	"	"
2000mA	1mA	± (3% rdg + 5d)	0.5Vrms
10A	10mA	"	0.3Vrms

Overload Protection: 2A/250V fuse on mA inputs.
15A for 15 sec. on 10A input.
**60Hz only on 200μA range.

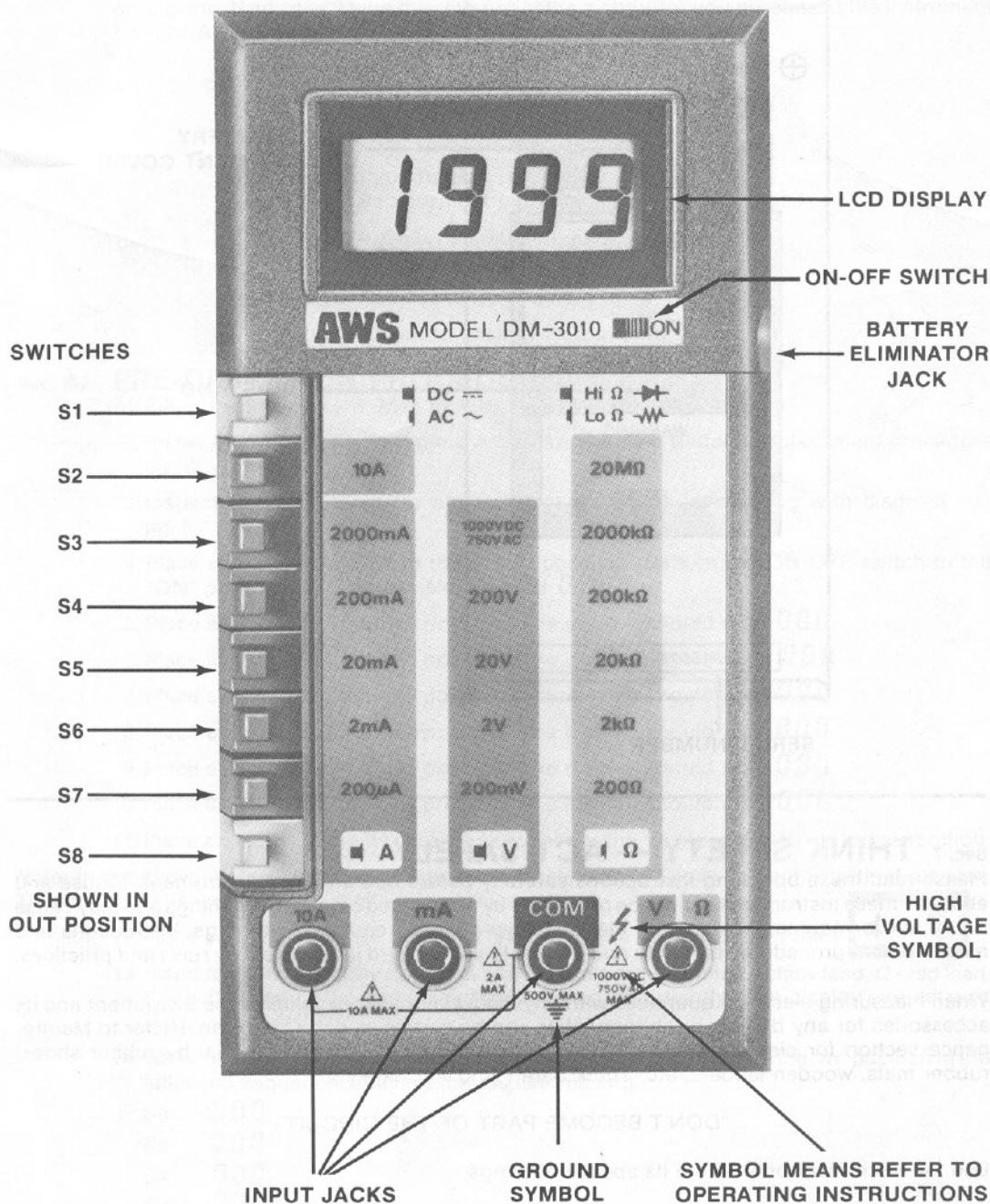
Resistance

RANGE	RESOLUTION	18°-28°C ACCURACY	FULL SCALE VOLTS (approximate)	SHORT CIRCUIT CURRENT (approx.)
200	0.1Ω	± (0.5% rdg + 4d)	Hi 0.24V Lo 0.029V	Hi 1.2mA Lo 0.16mA
2K	1Ω	± (0.5% rdg + 1d)	1.2 0.11	0.90 0.098mA
20K	10Ω	"	1.8 0.15	0.24 0.020mA
200K	100Ω	"	1.9 0.15	28μA 2.2μA
2M	1KΩ	± (1% rdg + 1d)	1.8 0.14	2.9μA 0.2μA
20M	10KΩ	± (2% rdg + 1d)	1.2 0.090	0.2μA 0.02μA

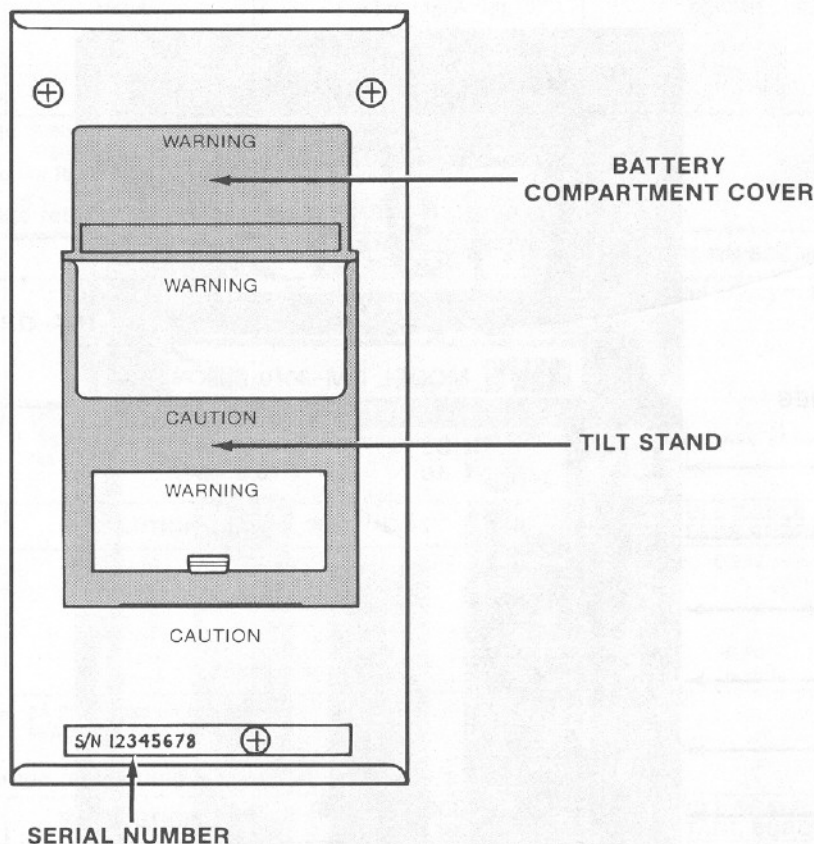
Overload Protection: 500V ac/dc all ranges

Maximum Open Circuit Volts: Less than 2.8V dc in Hi
Less than 280mV dc in Lo

Sec. 5 **FRONT PANEL CONTROLS, INDICATORS
AND CONNECTORS**



Sec. 6 REAR PANEL PARTS IDENTIFICATION



Sec. 7 THINK SAFETY — ACT SAFELY

Please read these operating instructions carefully before operating this instrument. Misuse or abuse of these instruments cannot be prevented by any printed caution or warnings and may cause injury and/or equipment damage. Please follow all these cautions, warnings, instructions, and measurement procedures faithfully and adhere to all standard industry safety rules and practices.

When measuring electrical quantities with any instrument always examine the instrument and its accessories for any defects or abnormalities and be certain all parts are clean. (Refer to Maintenance section for cleaning). Always insulate yourself from ground potential by using rubber shoes, rubber mats, wooden ladders, etc. Think Safety and Act Safely.

"DON'T BECOME PART OF THE CIRCUIT"

Use the instrument only within its specified ratings.

Sec. 8 **PREPARATION FOR USE**
Sec. 8-1 **UNPACKING AND CONTENTS CHECK**

The DM-3010 comes complete and ready to use. Check the following contents list when unpacking. If any pieces are missing notify the distributor you purchased the instrument from or A.W. Sperry Instruments Inc.

Operating Instructions SPB-136

Warranty card

Test leads TL-39. One black, one red.

9V transistor type battery (AWS Part B-4).

See Battery Replacement pg. 8 for proper installation.

Fuse F-11; 2A, 250V, 5 x 20 mm, Fast acting installed.

See Fuse Replacement pg. 8.

Spare Fuse. See Fuse Replacement pg. 8.

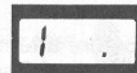
Tilt Stand attached to back of instrument.

Sec. 8-2 **PRE-OPERATION PROCEDURE**

1. Fill out warranty card. Mail to A.W. Sperry Instruments Inc.
2. Install 9V transistor type battery AWS part B-4. See Battery Replacement procedure pg. 8.
3. Inspect the instrument for any external defects by comparing with diagram on pg. 5.
4. Place all switches S1-S8 in their "out" position and turn the ON-OFF switch to the "ON" position. The display should read **000**
5. Place switch S7 in the "in" position. The display should read **000**
6. Place switch S6 in the "in" position. The display should read **.000**
7. Place switch S5 in the "in" position. The display should read **000**
8. Place switch S4 in the "in" position. The display should read **000**
9. Place switch S3 in the "in" position. The display should read **000**
10. Place switch S2 in the "in" position. The display should read **000**
11. Place switch S1 in the "in" position and then to the "out" position to verify its operation.

Note: In the above steps 4 - 11, the "-" sign may appear on the display in an intermittent manner. This is normal as well as a ± 1 digit variance from zero.

12. Place switch S8 and S7 in the "in" position. The display should read



13. Insert test leads into the common and Ω terminals. Common - black lead, Ω - red lead. Place the tips of the test leads together and hold tightly. The display should read **000 ± 2 digits.**

14. While holding the tips together place the following switches into the "in" position in the following sequence verifying the display reading.

S6 **.000**

S5 **.000**

S4 **.000**

S3 **.000**

S2 **.000**

Sec. 9 BATTERY REPLACEMENT

The DM-3010 has a self contained power supply consisting of one popular transistor type battery (NEDA 1604, AWS Part #B-4). When less than 10% of the battery life remains "LO BAT" appears on the LCD display.

CAUTION

Before attempting to replace the battery first disconnect the test leads from any energized circuit and then disconnect the test leads from the instrument.

1. Disconnect test leads from any energized circuit and then from the instrument.
2. Turn the ON-OFF switch to the OFF position.
3. Remove the tilt stand from the back of the instrument by squeezing the two sides of tilt stand where it is hinged into the back of the instrument.
4. Remove the battery compartment cover by grasping the instrument with two hands and both thumbs on the compartment cover. Using both thumbs slide the compartment cover towards the bottom of the instrument.
5. Remove the battery from the compartment and unsnap the battery connector.
6. Replace the battery with a 9V transistor type battery (NEDA 1604, AWS Part #B-4). For maximum battery life, alkaline cells are recommended.
7. Reverse the above procedure to complete battery replacement.

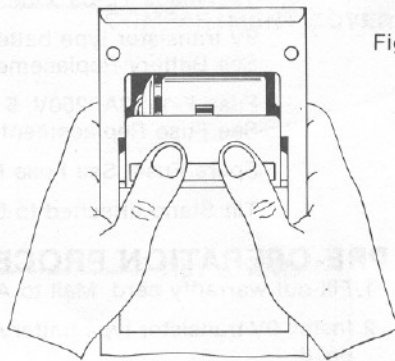


Fig. 1

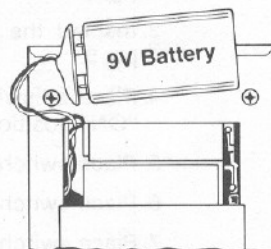


Fig. 2

Sec. 10 FUSE REPLACEMENT

A 2A/250V fuse, 5 x 20mm fast acting, AWS part #F-11 is used to protect the ampere ranges (other than 10A range) along with other solid state components. There is a spare fuse located inside the instrument in addition to the fuse installed in the circuit. See Figs. 3 & 4 on pages 8 & 9.

CAUTION

Before attempting to replace the fuse, disconnect the test leads from any energized circuit and then disconnect the test leads from the instrument.

1. Follow Battery Replacement procedure on pg. 8 steps 1-5.
2. Lay the instrument face down on a flat padded surface. Do not lay on a hard surface since the ON-OFF switch extends above the front face.
3. Using a Philips head screwdriver, remove the three screws holding the back case in place.
4. Remove the back cover by lifting up gently. The RF shield might stick slightly to the back cover. Gently separate the shield and back cover taking care not to excessively bend the shield.
5. Gently bend the bottom section of the shield up to expose the fuse installed in the circuit near the bottom of the instrument. See Fig. 3.

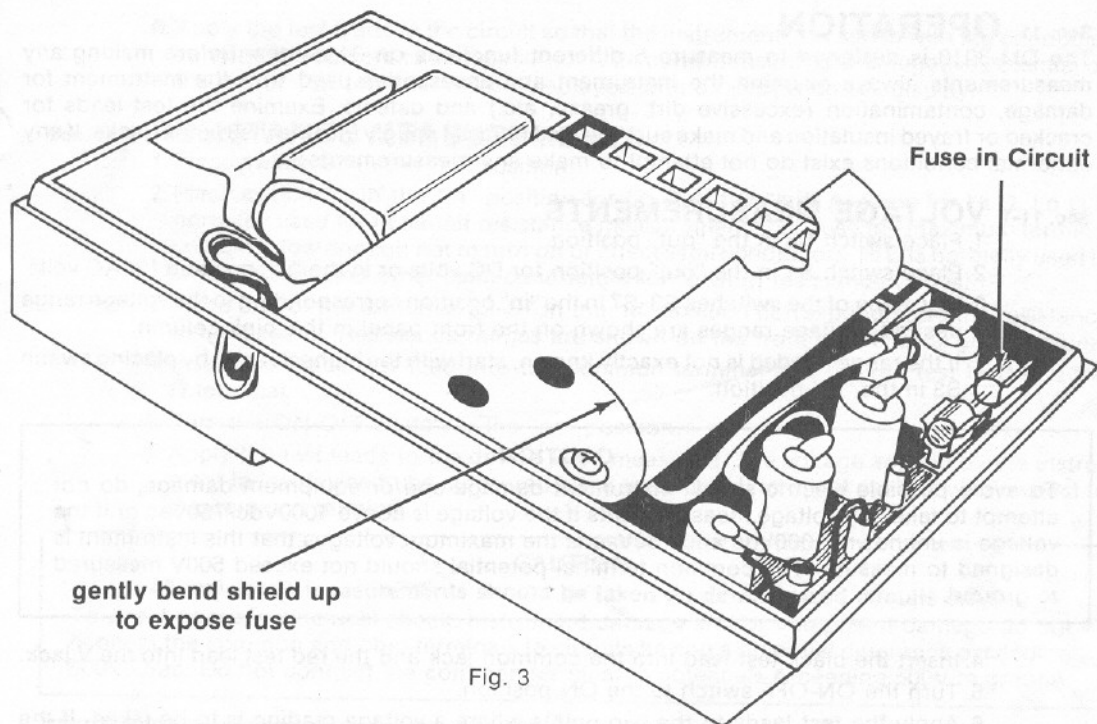


Fig. 3

6. Remove the fuse installed in the fuse clips. Replace fuse with AWS part #F-11 type 2A, 250V, 5 x 20mm, fast acting. If using the spare fuse, check the rating before installing as a replacement.

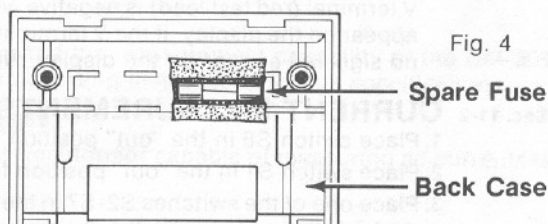


Fig. 4

7. Bend shield back down over exposed fuse. Place plastic strip on switches S1-S8 as shown in Fig. 5.

8. Replace back cover making sure to feed battery connector through the opening in the back cover into the battery compartment. When seating the back cover, make sure that no wires are pinched between the covers. Replace the three Philips head screws.

9. Replace the battery, battery cover and tilt stand. See Battery Replacement pg 8 if necessary.

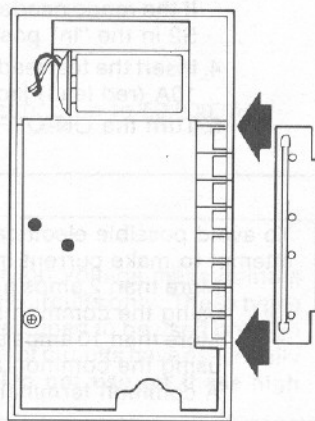


Fig. 5

Sec. 11 OPERATION

The DM-3010 is designed to measure 6 different functions on 34 ranges. Before making any measurements always examine the instrument and accessories used with the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation and make sure the lead plugs fit snugly into the instrument jacks. If any abnormal conditions exist do not attempt to make any measurements.

Sec. 11-1 VOLTAGE MEASUREMENTS

1. Place switch S8 in the "out" position.
2. Place switch S1 in the "out" position for DC volts or in the "in" position for AC volts.
3. Place one of the switches S3-S7 in the "in" position corresponding to the voltage range desired. Voltage ranges are shown on the front panel in the pink column.
If the range needed is not exactly known, start with the highest range by placing switch S3 in the "in" position.

CAUTION

To avoid possible electric shock, instrument damage and/or equipment damage, do not attempt to take any voltage measurements if the voltage is above 1000Vdc/750Vac or if the voltage is unknown. 1000Vdc and 750Vac is the maximum voltages that this instrument is designed to measure. The common terminal potential should not exceed 500V measured to ground.

4. Insert the black test lead into the common jack and the red test lead into the V jack.
5. Turn the ON-OFF switch to the ON position.
6. Apply the test leads to the two points where a voltage reading is to be taken. If the V terminal (red test lead) is negative with respect to the common terminal a "-" sign will appear on the display. If the V terminal is positive with respect to the common terminal, no sign will appear on the display. No sign is shown for AC measurements.

Sec. 11-2 CURRENT MEASUREMENTS

1. Place switch S8 in the "out" position.
2. Place switch S1 in the "out" position for DC amps or in the "in" position for AC amps.
3. Place one of the switches S2-S7 in the "in" position corresponding to the current range desired. Current ranges are shown on the front panel in the blue column.
If the range needed is not known, always start with the highest range by placing switch S2 in the "in" position.
4. Insert the test leads into the common (black lead) and mA (red lead) terminals. Use the 10A (red lead) jack if switch S2 is selected.
5. Turn the ON-OFF switch to the ON position.

CAUTION

To avoid possible electrical shock, instrument damage, and/or equipment damage, do not attempt to make current measurements on circuits having the following characteristics.

- *More than 2 amps ac/dc or a possible voltage difference exceeding 250 Vac/dc when using the common and mA terminals.
- *More than 10 amps ac/dc or a possible voltage difference exceeding 0.3 Vac/dc when using the common and 10A terminals.
- *A common terminal voltage exceeding 500V to ground.

6. Apply the test leads to the circuit so that the instrument is in series with the conductor carrying the current to be measured. A dc current resulting in a negative potential on the mA or 10A terminal will be displayed with a "-" sign on the display.

Sec. 11-3 RESISTANCE MEASUREMENTS

1. Place switch S8 in the "in" position.
2. Place switch S1 in the "in" position for Lo Ω or the "out" position for Hi Ω . Lo Ω is normally used for in circuit resistance measurements because the maximum terminal voltage is low enough not to turn on or effect semi conductors. Hi Ω is normally used to check diodes and other semi conductors for forward resistance values.
3. Place one of the switches S2-S7 in the "in" position corresponding to the resistance range desired. Resistance ranges are shown on the front panel in the green column.
4. Insert the black test lead into the common terminal and the red test lead into the Ω terminal.
5. Turn the ON-OFF switch to the "on" position.
6. Apply the test leads to the device to be measured. The voltage applied by the instrument to the device to be measured has a polarity of V terminal positive with respect to the common terminal.

CAUTION

All resistance measurements should be taken on de-energized circuits only.

To avoid possible electrical shock, instrument damage and/or equipment damage do not connect the common and ohm terminals to circuits having a potential difference exceeding 500Vdc/ac. Do not connect the common terminal to potentials exceeding 500V to ground.

Sec. 12 ACCESSORIES

The following accessories are available to expand the measurement capability of the DM-3010 DMM. Refer to their respective data sheets or operating instructions for full specifications.

Sec. 12-1 AC CURRENT MEASUREMENT

Model SJA-870 is a split core current transformer capable of measuring ac currents up to 1200 Aac.

Input: 0 - 1200 Aac max
Output: 0 - 12 Vac at $\geq 1M\Omega$ load
Accuracy: $\pm 3\%$ of FS
Freq: 50 - 400Hz

Sec. 12-2 HIGH VOLTAGE DC MEASUREMENT

Model HVP-860 is a high voltage probe capable of measuring up to 50,000 Vdc.

Input: 0 - 50,000Vdc
Output: 0 - 50 Vdc at $10M\Omega$ load
Accuracy: $\pm 1.5\%$ of FS

CAUTION

The HVP-860 is designed to be used by technicians trained in High Voltage measurement techniques. It is designed for use on high impedance, low energy circuits only. These types of circuits are normally found in electronic equipment. It is not designed to be used on High Voltage electrical distribution equipment and circuits. These type of circuits have essentially unlimited energy where special equipment is recommended. **Do not use on these high energy circuits!**

Sec. 12-3 TRANSISTOR/DIODE TEST ADAPTOR

Model HFE-840 tests transistors for common-emitter current gain (hFE) and emitter-collection reverse current (I_r). Diodes are tested for forward voltage drop (V_f) and reverse current leakage.

hFE : 0 - 2000 at $I_b = 2.5\mu A_{dc}$ (Transistor)

I_r : at $V_{ce} \pm 9V_{dc}$ (Transistor)

V_f : at approx $1mA_{dc}$ (Diode)

I_r : at approx $9V_{dc}$ (Diode)

HFE-840 can be used with any digital multimeter having 200mV/2V/20Vdc ranges with a minimum input impedance of 100K Ω .

Sec. 12-4 BATTERY ELIMINATOR

Model SAC-1

Sec. 13 MAINTENANCE

Maintenance consists of periodic cleaning, battery replacement, fuse replacement and recalibration.

Sec. 13-1 CLEANING

The exterior of the instrument can be cleaned with a soft clean cloth to remove any oil, grease or grime from the exterior of the instrument. Never use liquid solvents or detergents. If the instrument gets wet for any reason, dry the instrument using low pressure air less than 25 PSI. Use care and caution around LCD display protector and areas where water or air could enter the interior of the instrument while drying.

Sec. 13-2 BATTERY REPLACEMENT

Required when Lo Batt appears on display or nothing appears. See Battery Replacement on pg. 8.

Sec. 13-3 FUSE REPLACEMENT

Required when current ranges other than 10Aac/dc range do not function. See Fuse Replacement on pg. 8 & 9.

Sec. 13-4 CALIBRATION

Is recommended to be performed every year. This can be done by sending the instrument prepaid to

A.W. Sperry Instruments Inc.
Customer Service Department
245 Marcus Blvd.
Hauppauge, N.Y. 11788

Specify in writing that recalibration is necessary. The instrument will be returned to you normally within one week.

CAUTION

The following procedure should only be performed by persons trained and qualified in electronics and electronic equipment service. Do not attempt this procedure if not qualified.

Calibration Procedure:

1. Follow Fuse replacement procedure on pg 8 steps 1 - 4 to open instrument.
2. Select the 200mVdc range pushing switch S7 to the "in" position.
3. Replace the battery and turn the on-off switch to the "ON" position.
4. Apply 190mVdc $\pm 0.1\%$ to the Volt and common terminals. Using a small insulated screw driver adjust the DC ADJ variable resistor until the instrument indicates 190.0 ± 1 dgt on the LCD display. See Fig. 6.
5. Disconnect applied voltage and push switch S1 to the "in" position selecting 200mVac range.
6. Apply 190mVac $\pm 0.25\%$ at 100Hz. Using a small insulated screw driver adjust the AC Adj variable until the instrument indicates 190.0 ± 1 digit. Check readings at 190mVac 50Hz and 190mVac 500Hz. The instrument should indicate 190.0 ± 10 d.
7. Disconnect the applied voltage. Turn the on-off switch to the "off" position. Remove the Battery from the battery connector.
8. Follow steps 7 - 9 under Fuse Replacement on pg. 9 to close the instrument.

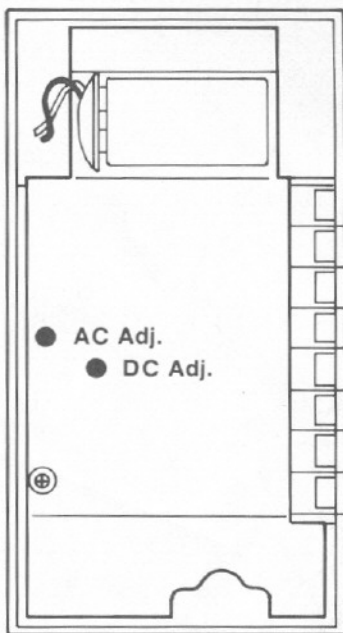


Fig. 6

Sec. 16 RETURN FOR REPAIRS

Before returning your DM-3010 for repair be sure to check that the failure to operate properly is not due to the following:

1. weak battery
2. open fuse
3. open test leads

If these conditions do not exist and the instrument fails to operate properly, return the instrument and accessories prepaid to

A.W. Sperry Instruments Inc.
Customer Service Department
245 Marcus Blvd.
Hauppauge, N.Y. 11788

State in writing what is wrong with the instrument. All warranty returns must state "In Warranty" and we must have a warranty card on file. See Warranty statement on page 2 for full warranty disclosure. Repair estimates will be furnished if requested for out of warranty instruments.