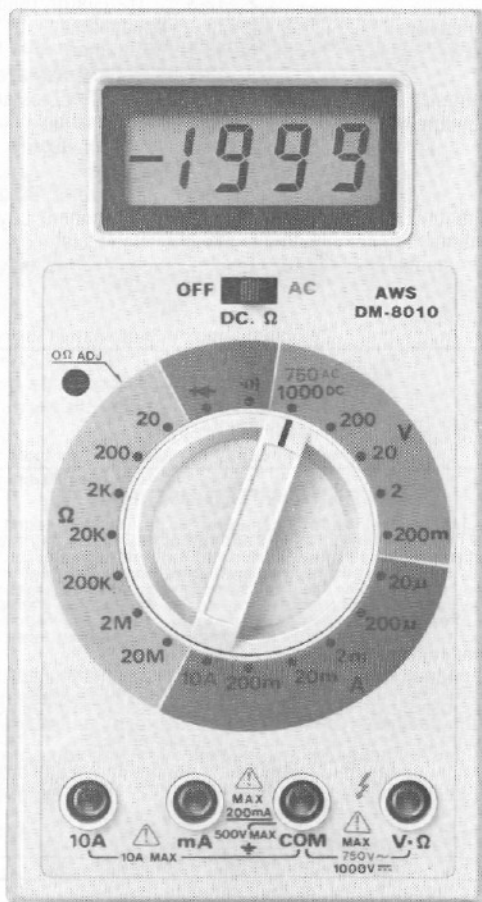


OPERATING INSTRUCTIONS

Model DM-8010

3½ Digit Digital Multimeter



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

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

CONTENTS

Section	Title	Page	Section	Title	Page
1	Warranty	2	11-4	Continuity Measurements (Audible)	10-11
2	Description	3	11-5	Diode Measurements	11
3	Features	3	12	Accessories	11
4	Specifications	3	12-1	AC Current Measurement	11
5	Front Panel Controls, Indicators and Connectors	5	12-2	High Voltage DC Measurement	11-12
6	Rear Panel Parts Identification	6	12-3	Transistor/Diode Test Adaptor	12
7	Think Safety - Act Safely	6	13	Maintenance	12
8	Preparation for Use	7	13-1	Cleaning	12
8-1	Unpacking and Contents Check	7	13-2	Battery Replacement	12
8-2	Pre-operation procedure	7	13-3	Fuse Replacement	12
9	Battery Replacement	8	13-4	Calibration	12-13
10	Fuse Replacement	8	14	Return for Repairs	13
11	Operation	9	15	Diagrams	14-16
11-1	Voltage Measurements	9	15-1	Schematic Diagram	14
11-2	Current Measurements	9-10	15-2	Component Layout Diagram	15
11-3	Resistance Measurements	10	15-3	Parts List	16

Sec. 1 WARRANTY

ONE YEAR LIMITED WARRANTY

A.W. Sperry Instruments Inc., warrants that this AWS Instrument has been carefully tested, inspected, and warranted for one (1) year from the date of purchase by the original end user against defects in material or workmanship. This warranty covers only the original end user purchaser 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 Boulevard, Hauppauge, New York 11788, postage prepaid for examination and verification of manufacturing defect under warranty. A.W. Sperry Instruments Inc. shall be the sole judge of the existence of such defect. The liability of A.W. Sperry Instruments Inc., shall be limited to the repair or replacement at its sole option of any defective product.

THIS WARRANTY AND THE OBLIGATIONS AND LIABILITIES OF SELLER THEREUNDER ARE EXCLUSIVE AND IN LIEU OF AND BUYER HEREBY WAIVES ALL OTHER REMEDIES, EXPRESS WARRANTIES, GUARANTEES OR LIABILITIES OF AND FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR WHETHER OR NOT OCCASIONED BY SELLER'S NEGLIGENCE. THIS WARRANTY SHALL NOT BE EXTENDED, ALTERED OR VARIED EXCEPT BY A WRITTEN INSTRUMENT SIGNED BY SELLER AND BUYER. SOME STATES ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL DAMAGES, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIED LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

NOTE: This warranty supersedes any previously printed warranties pertaining to this AWS product.

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

A truly unique 3½ Digit Handheld Digital Multimeter (DMM) capable of reading seven functions on a total of 31 ranges. With basic DC Volt accuracy of 0.25% 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 the DM-8010. 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 DM-8010 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 using the rotary switch in conjunction with the AC/DC selector.

Sec. 3 FEATURES

- *Built in tilt stand.*
- *200 hour battery life.*
- *Instant continuous buzzer.*
- *10A AC/DC range.*
- *UL 1244 type test leads.*
- *Color coordinated range, function and input jacks.*
- *Auto zero, Auto polarity.*
- *Overload protection on all ranges.*
- *500V AC/DC protection on all resistance ranges.*
- *Diode test function.*
- *Low Power Ohms for in circuit resistance measurements.*
- *Recessed safety designed input jacks.*

Sec. 4 SPECIFICATIONS

RANGES:

See other side.

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.

STORAGE ENVIRONMENT:

-15°C to 50°C.

TEMPERATURE COEFFICIENT:

(0° to 18°C and 28° to 50°C).

POWER SOURCE:

Less than 0.1 x applicable accuracy specification per °C.

BATTERY LIFE:

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

200 hrs. typical with alkaline cells.

100 hrs. typical with carbon-zinc cells.

BATTERY INDICATOR:

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

FUSE:

AWS Part F-14; 0.2A, 250V, 5 x 20mm Fast Acting

DIMENSIONS:

6.7"H x 3.43"W x 1.65"D

WEIGHT:

12.1 oz. (343g)

DC Volts

RANGE	RESOLUTION	18°-28°C ACCURACY	INPUT IMPEDANCE
200mV	100µV	± (0.25% rdg + 1d)	10MΩ
2V	1mV	"	"
20V	10mV	"	"
200V	100mV	"	"
1000V	1V	"	"

Overload Protection: 1000 Vdc or peak ac on all ranges

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 45-500Hz	INPUT IMPEDANCE
200mV	100µV	± (0.5% rdg + 5 d)	10MΩ shunted by < 100 pF
2V	1mV	"	"
20V	10mV	"	"
200V	100mV	"	"
750V	1V	± (1.0 rdg + 5d)	"

Overload Protection: 1000 Vdc or 750 Vac Continuous except 200mV range, 15 sec. max. above 300 V.

DC Current

RANGE	RESOLUTION	18°-28°C ACCURACY	FULL SCALE VOLTAGE BURDEN
20µA	10nA	± (0.75% rdg + 1d)	0.25V maximum
200µA	100nA	± (0.5% rdg + 1d)	0.25 "
2mA	1µA	"	0.25 "
20mA	10µA	"	0.4 "
200mA	100µA	+ (0.75% rdg + 1d)	1.9 "
10A	10mA	± (1.5% rdg + 5d)	1.7V maximum

Overload Protection: 0.2A/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
20µA	10nA	± 1% rdg + 5d)	0.25Vrms maximum
200µA	100nA	± (0.75 rdg + 5d)	0.25 "
2mA	1µA	"	0.25 "
20mA	10µA	"	0.4 "
200mA	100µA	"	1.9 "
10A	10mA	± (2% rdg + 5d)	1.7 Vrms maximum

Overload Protection: 0.2A/250V fuse on mA inputs.

15A for 15 sec. on 10A input.

Resistance

RANGE	RESOLUTION	18°-28°C ACCURACY	FULL SCALE VOLTS	SHORT CIRCUIT CURRENT
20Ω	10mΩ	± (3% rdg + 5d)	35mV ± 20%	1.8mA ± 20%
200	0.1Ω	± (0.5% rdg + 3d)	400mV "	2.3mA "
2K	1Ω	± (0.3% rdg + 1d)	250mV "	240µA "
20K	10Ω	"	320mV "	45µA "
200K	100Ω	"	330mV "	5µA "
2M	1KΩ	± (0.75 rdg + 2d)	330mV "	0.5µA "
20M	10KΩ	± (1.5 rdg + 1d)	330mV "	0.05µA "

Overload Protection: 500V ac/dc all ranges.

Maximum Open Circuit Volts: 500mV ± 20%, except 20Ω and 200Ω ranges 2.8V ± 20%.

Continuity

Buzzer sounds at approximately less than 200Ω

Response time: less than 100m Sec.

Open circuit voltage: 2.8 Vdc ± 20%

Overload protection: 500 Vac/dc

Diode Test (Display will indicate resistance in kΩ)

Open circuit voltage: 2.2 Vdc ± 20%

Maximum test current: 3 mA dc ± 20%

Full scale voltage: 1.4 Vdc ± 20%

Overload protection: 500 Vac/dc

Sec. 5 FRONT PANEL CONTROLS AND INDICATORS

LOW BATTERY WARNING



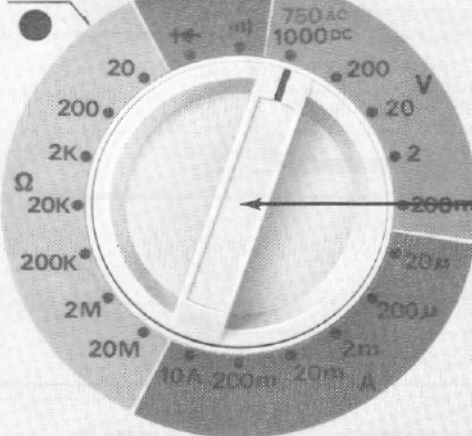
LCD DISPLAY

OFF  AC
DC. Ω

ON-OFF
FUNCTION
SWITCH

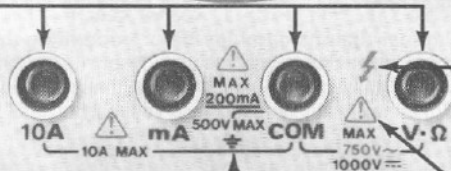
AWS
DM-8010

0 Ω ADJ



RANGE
SELECTOR
SWITCH

INPUT JACKS

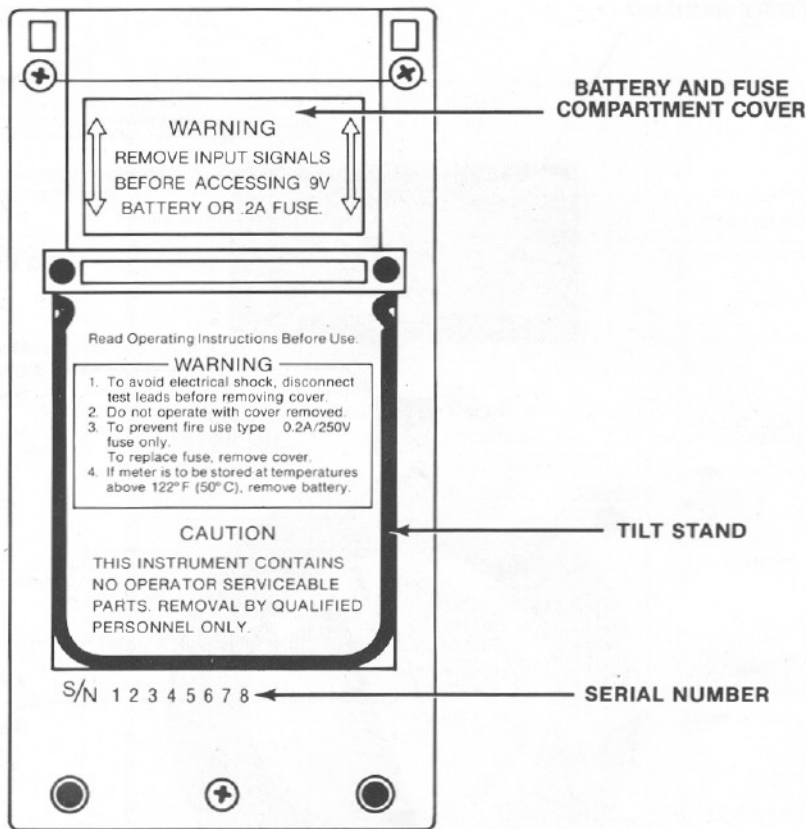


HIGH VOLTAGE
SYMBOL

GROUND
SYMBOL

SYMBOL MEANS REFER TO
OPERATING INSTRUCTIONS

REAR PANEL PARTS IDENTIFICATION



THINK SAFETY — ACT SAFELY

Please read these operating instructions carefully before operating this instrument. Misuse and 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, instruction 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 rubber shoe, 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.

PREPARATION FOR USE

UNPACKING AND CONTENTS CHECK

The DM-8010 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 #147-1.

Warranty card.

Test leads TL-42 one black, one red.

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

See Battery Replacement pg. 8 for proper installation.

Fuse F-14; 0.2A, 250V, 5x20mm, Fast acting installed.

See Fuse Replacement pg. 8.

Tilt Stand attached to back of instrument.

PRE-OPERATION PROCEDURE

1. Install the 9V transistor type battery AWS part B-4. See Battery Replacement procedure on pg. 8.
2. Inspect the instrument for any external defects by comparing with the diagram on pg. 5.
3. Insert the test leads into the "COM" and "V- Ω " jacks. Connect the two ends of the test leads together using the screw on Alligator Clips supplied.
4. Place the range selector switch and On-Off Function Switch in the following positions shown in the chart below. Check for the appropriate meter response.

Range Selection Switch	On-Off Function Switch	Meter Response (All reading ± 2 digits)
200mV	DC • Ω	± 00.0
2V	DC • Ω	$\pm .000$
20V	DC • Ω	± 0.00
200V	DC • Ω	± 00.0
1000V	DC • Ω	± 000
750V	AC	000
⌋)	DC • Ω	Hear Tone
⌋	DC • Ω	000
20 Ω	DC • Ω	0.00 ← adjust using "zero ohm adj."
200 Ω	DC • Ω	00.0
2K Ω	DC • Ω	.000
20K Ω	DC • Ω	0.00
200K Ω	DC • Ω	00.0
2M Ω	DC • Ω	.000
20M Ω	DC • Ω	0.00
10A	DC • Ω	± 0.00
200mA	DC • Ω	± 00.0
20mA	DC • Ω	± 0.00
2mA	DC • Ω	$\pm .000$
200 μ A	DC • Ω	± 00.0
20 μ A	DC • Ω	± 0.00
20 μ A	AC	0.00

Sec. 9 BATTERY REPLACEMENT

The DM-8010 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 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 top of the instrument.
4. Remove the battery from the compartment and unsnap the battery connector.
5. Replace the battery with a 9V transistor type battery (NEDA 1604), AWS Part #B-4). For maximum battery life, alkaline cells are recommended.
6. Reverse the above procedure to complete battery replacement.

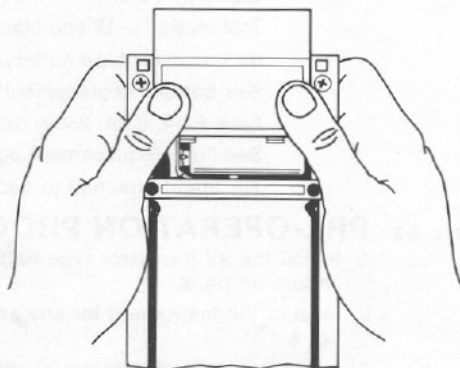


Fig. 1

Sec. 10 FUSE REPLACEMENT

A 0.2A, 250V, 5x20mm fast acting fuse, AWS Part F-14 is installed in the instrument and used to protect the ampere ranges (other than the 10A range) along with other solid state components. A spare fuse located inside the Battery and Fuse compartment is included for replacement purposes.

CAUTION

Before attempting to replace the fuse, disconnect the test leads from any energized circuit and then disconnect the test leads from the instrument. Replace the fuse with AWS part F-14 or approved equal. Always use fast acting, high current interrupting type fuses.

1. Turn the On-Off switch to the Off position.
2. Remove the Battery and Fuse 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 top of the instrument.
3. Remove the fuse installed in the metal fuse clips using the end of the one test lead as shown in fig. 2.
4. Install the replacement fuse being certain it meets the AWS part F-14 specifications.
5. Replace the Battery and Fuse compartment cover.

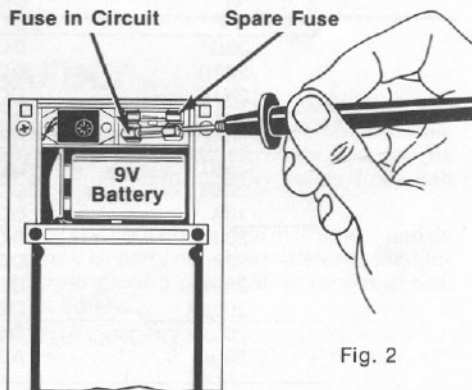


Fig. 2

Sec. 11 OPERATION

The DM-8010 is designed to measure 7 different functions on 31 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 the range selector switch in the 1000 Vdc position. Always start in the highest range.
2. Place the On-Off function switch in the "DC • Ω " position for a DC Volt measurement or in the "AC" position for an AC Volt measurement.
3. Insert the black and red test leads into the respective "COM" and "V • Ω " jacks.

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. 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.
5. If the reading on the display is less than 199 digits then select the next lower voltage range. Continue to switch to the next lowest range if the display reading is still below 199 digits. When the display reading is greater than 199 but less than 1999 you have selected the voltage range which results in the most accurate reading.
8. Remove the test leads from the points of voltage measurement and then remove the test leads from the instrument.

Sec. 11-2 CURRENT MEASUREMENTS

1. Place the Range Selector Switch into the 10A position. Always start with the highest range.
2. Place the On-Off function switch into the "DC • Ω " position for a DC current measurement or into the "AC" position for an AC current measurement.
3. Insert the black and red test leads into the respective "COM" and "10A" terminals.

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 0.2 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.

4. Connect 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 "10A" or "mA" terminal will be displayed with a "-" sign on the display.
5. If the reading obtained on the 10A range is less than 0.19 Amps then you can change to a lower range to obtain a higher accuracy reading.

To change to a lower range first disconnect the test leads from the circuit under test and then move the red lead from the "10A" to the "mA" terminal. Select the 200mA range using the Range Selection Switch. Reconnect the test leads to the circuit under test. Continue to select a lower range until the display reading is greater than 199 digits but less than 1999 digits.

CAUTION

When changing current ranges from one range to another there is an open circuit between the "MA" and "COM" terminals during range switching. Always short circuit the points of test lead connection to the circuit before changing ranges.

6. Disconnect test leads from the circuit under test and then disconnect the test leads from the instrument when measurements are completed.

Sec. 11-3 RESISTANCE MEASUREMENTS

1. Place the Range Selector switch into the Ω range desired for a measurement.
2. Place the On-Off function switch into the "DC \bullet Ω " position.
3. Insert the black and red test leads into the respective "COM" and "V \bullet Ω " terminals.
4. Connect the test lead probe tips together to obtain a zero reading on the display. The zero ohm adjustment on the front panel should only be used to adjust for the 20 Ω range.

How??

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.

5. Apply the test leads to the resistive 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.

Sec. 11-4 CONTINUITY MEASUREMENTS (AUDIBLE)

1. Place the range selector switch into the " \bullet Ω " position.
2. Place the On-Off Function Switch into the DC \bullet Ω position.
3. Insert the black and red test leads into the respective "COM" and "V \bullet Ω " terminals.

CAUTION

All continuity 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.

4. Touch the test leads to the two points at which continuity is to be tested. The tone will sound if the resistance is approximately less than 200 Ω .

To obtain an actual resistance reading follow the procedure for Resistance Measurements in Sec. 11-3.

Sec. 11-5 DIODE MEASUREMENTS

1. Place the range selection switch into the " $\rightarrow \leftarrow$ " position.
2. Place the On-Off Function Switch into the "DC • Ω " position.
3. Insert the black and red test leads into the respective "COM" and "V • Ω " terminals.

CAUTION

All diode 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.

4. If the diode (semiconductor junction) being measured is connected in a circuit be certain to de-energize the circuit and discharge all capacitors before attempting any measurements.
5. Connect the test leads to the diode in the forward direction, Red to Anode and Black to Cathode. If the diode is good a value corresponding to the forward resistance in ohms will be displayed. This value will depend upon the diode characteristics. A reading of 000 indicates a shorted diode. A reading of \square indicates an open.
6. Connect the test leads to the diode in the reverse direction, Red to Cathode and Black to Anode. If the diode is good a value of \square will be displayed indicating an open or high resistance. A reading between 000 and 1999 indicates the reverse resistance in ohms and normally indicates a defective diode.

Sec. 12 ACCESSORIES

The following accessories are available to expand the measurement capability of the DM-8010 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% rdg + 1A) with conductor in center of jaw.

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 - 50,000 Vdc

Output: 0 - 50 Vdc at 10M Ω load

Accuracy: \pm 1.5% of FS

(CAUTION - see page 12.)

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/20V $_{dc}$ ranges with a minimum impedance of 100K Ω .

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 page 8.

Sec. 13-3 FUSE REPLACEMENT

Required when current ranges other than 10A $_{ac/dc}$ range do not function. See Fuse Replacement on pg. 8.

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:

This procedure should be performed at an ambient temperature of $23 \pm 2^\circ \text{C}$ and a relative humidity of less than 80%. Allow the instrument to stabilize at this temperature for a minimum of 30 minutes.

1. Remove the battery cover, battery and the three screws holding the back case to the front case.
2. Lay the DM-8010 upside down on a soft non conductive surface and slowly remove the back case.
3. Remove the two wire leads at the base of the circuit board by prying up on the connector with a small screw driver. Do not pull on the wire.
4. Remove the two wire leads at the top left of the circuit board connecting the buzzer to the circuit board and remove the back case.
5. Install the test leads, select the 200 mVdc range and reconnect the 9V battery.
6. Connect the test leads to a 190 mVdc $\pm 0.02\%$ calibrator and adjust the "DC, ADJ" potentiometer until the DM-8010 reads exactly 190.0.
7. Remove the calibrator and switch to the 200 mVac range.
8. Connect the test leads to a 190 mVac $\pm 0.05\%$ calibrator at a frequency of 45-500 hz. Select a frequency at which the highest accuracy is desired. Adjust the "AC, ADJ" potentiometer until the DM-8010 reads exactly 190.0.
9. Remove the calibrator and then the test leads from the instrument.
10. Reverse steps 4 through 1 to replace the back case.

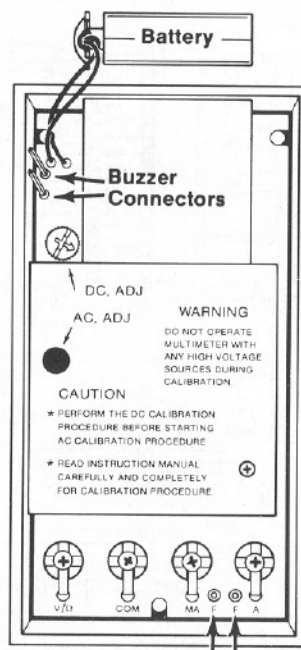


Fig. 3
Connectors at base of Circuit Board

Sec. 14 RETURN FOR REPAIRS

Before returning your DM-8010 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.

SCHEMATIC DIAGRAM



Note: Subsequent revisions to this document may exist. Use for general reference.

PARTS LIST

PARTS	DESCRIPTION	PARTS	DESCRIPTION
U1	A/D CONVERTER ICL 7106	R7	RESISTOR 9k Ω $\frac{1}{2}$ WC METAL
U2	EX-or GATE CD 4070	R8	RESISTOR 900 Ω $\frac{1}{2}$ WC METAL
BU1, 3, 4	OP AMP TL 061 CP	R9	RESISTOR 400k Ω $\frac{1}{4}$ WF METAL
NE	NEON LAMP	R10	RESISTOR 100k Ω $\frac{1}{4}$ WF METAL
Q1	TR, S1, PNP, 2N2907	R11, R20	RESISTOR 20k Ω $\frac{1}{4}$ WJ CARBON
Q2-7	TR, S1, NPN 2N3904	R12	RESISTOR 1M Ω $\frac{1}{2}$ WJ CARBON
PT	CURRENT LIMITER	R14	RESISTOR 50k Ω $\frac{1}{4}$ WF METAL
D1', 2'D1, D2	DIODE, S1, REC. 1N4001	R15	RESISTOR 20k Ω $\frac{1}{4}$ WF METAL
D5-8	DIODE, SW, S1 1N4148	R16	RESISTOR 2.3k Ω $\frac{1}{4}$ WF METAL
SG	SPARK GAP 1200V DC	R17	RESISTOR 50k Ω $\frac{1}{4}$ WJ CARBON
ZD2	ZENER DIODE 12V 1N 963	R18	RESISTOR 10k Ω $\frac{1}{4}$ WF METAL
C3, 5, 9, 10	CAPACITOR 0.1 μ F/63V METALLIZED	R19	RESISTOR 4.5k Ω $\frac{1}{4}$ WF METAL
C2	CAPACITOR 0.22 μ F/63V METALLIZED	RS	SHUNT 0.01 Ω Mn, WIRE
C1	CAPACITOR 0.047 μ F/63V METALLIZED	BR1	RESISTOR 220k Ω $\frac{1}{4}$ WJ CARBON
C4	CAPACITOR 100pF/100V MICA	BR2	RESISTOR 470k Ω $\frac{1}{4}$ WJ CARBON
C7	CAPACITOR 0.022 μ F/630V MICA	BR3	RESISTOR 430k Ω $\frac{1}{4}$ WJ CARBON
C8, 13, 14	CAPACITOR 4.7 μ F/16V TANTAL	BR4	RESISTOR 1k Ω $\frac{1}{4}$ WJ CARBON
C11	CAPACITOR 1 μ F/16V TANTAL	VR1	SEMI VR 20k Ω
C12	CAPACITOR 10 μ F/16V TANTAL	VR2, VR3	SEMI VR 500 Ω
C15	CAPACITOR 0.01 μ F/16V CERAMIC	BVR1	SEMI VR 200k Ω
C*	CAPACITOR 10 μ F/16V ELECT	RNA1-5	RESISTOR NETWORK 9M Ω , 900k Ω , 90k Ω , 9k Ω , 900 Ω
R1	RESISTOR 100 Ω $\frac{1}{4}$ WJ CARBON	RNB1-3	RESISTOR NETWORK 90 Ω , 9 Ω , 0.9 Ω
R2	RESISTOR 910k Ω $\frac{1}{2}$ WJ CARBON	RNC1-8	RESISTOR NETWORK 1M Ω , 220k Ω , 100k Ω , 200k Ω
R3	RESISTOR 200 Ω $\frac{1}{4}$ WJ CARBON	RND1-4	RESISTOR NETWORK 1M Ω , 10M Ω , 220k Ω
R4	RESISTOR 100 Ω $\frac{1}{2}$ WC METAL	• BZ	ELECTRIC BUZZER
R5	RESISTOR 10k Ω $\frac{1}{4}$ WC METAL		
R6	RESISTOR 90k Ω $\frac{1}{4}$ WC METAL		

Note: Subsequent revisions to this document may exist. Use for general reference.