

# Operating Instructions

## Model ADM-18A Automotive Multimeter



### PLEASE READ THESE OPERATING INSTRUCTIONS CAREFULLY

Misuse and or abuse of these instructions cannot be prevented by any printed word and may cause injury and or equipment damage.

Please follow all these instructions and measurement procedures faithfully and adhere to all standard industry safety rules and practices.

## **A.W. SPERRY INSTRUMENTS INC.**

*2150 Joshua's Path, Suite 302, Hauppauge, N.Y. 11788*

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## 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 purchaser, provided the instrument has not been misused, damaged due to negligence, neglect or unauthorized repair, abused or used contrary to the operating instructions. Instruments and proof of purchase in the form of a legible copy or original of the sales receipt clearly identifying the distributor, model number and date of purchase must be returned to A.W. Sperry Instruments, Inc. Attention: Customer Service Center, *2150 Joshua's Path, Suite 302, Hauppauge, N.Y. 11788*, Postage prepaid for examination of verification of manufacturing defect under warranty. A.W. Sperry Instruments, Inc. shall be the sole judge of such defect. Liability of A.W. Sperry Instruments, Inc. shall be limited to the repair or replacement at its sole option of any defective product.

NOTE: Recommended calibration should not exceed one year. Calibration service charges are not covered under terms and conditions of warranty.

## WARRANTY REGISTRATION

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

## WARRANTY RETURN

Refer to "Return for Repairs" for complete instructions. All warranty returns must include a legible copy or original of the sales receipt clearly identifying the model number, serial number and date of purchase.

## RETURN FOR REPAIRS

Before returning your digital multimeter 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, loose or intermittent 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  
2150 Joshua's Path, Suite 302  
Hauppauge, NY 11788

State in writing what is wrong with the instrument. All warranty repairs must include proof of purchase in the form of a legible or original copy of the sales receipt clearly identifying the distributor, model number and date of purchase and must have a warranty card on file. See warranty statement on page 1 for full warranty disclosure. Repair estimate will be furnished if requested for out of warranty instruments. Be sure to include all accessories which may be related to the problem, and a note describing the malfunction you observed.

## DISCLAIMER

\*This manual tells you how to use the meter to perform basic diagnostic tests and to find possible locations of vehicle problems. It does not tell you how to correct the problems.

\*All information illustrations, and specifications contained in this technical manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

## SEC-1 FEATURES

- One Year Limited Warranty
- 3.5 Digit LCD Display
- Built-in Tilt Stand
- Overload Protection on All Ranges
- TACH and Dwell Functions
- Computer Safe

## SEC-2 PACKAGING

Model ADM-18A comes packed in a see through set of TL-51 Test Leads one (1) F-27 Fuse and Optional Accessory AG-941 Screw-on Alligator

## SEC-3 SPECIFICATIONS

- **Display:** 3.5 digit LCD Display with a maximum
- **Polarity:** Automatic (-) negative polarity indicator
- **Overrange Protection:** "1" or "-1"
- **Measurement Rate:** 3 times per second
- **Operating Environment:** 0° to 50° C at < 70%
- **Storage Environment:** -20° to 60° at 80% F from unit
- **Power Supply:** One (1) 9V battery, NEDA 1
- **Battery Life:** 150 hours typical w/carbon zinc
- **Fuse:** 10A/250V, 5x20mm fast acting Part #
- **Dimensions:** 6" H x 2¾" W x 1.5" D (150 x
- **Weight:** 7 oz. (200g)

# ELECTRICAL SPECIFICATIONS

Accuracies are  $\pm$  (reading plus # of digits). At  $23 \pm 5$  degrees Celsius and less than 75% RH

## DC Voltage

Range	Resolution
200mV	100 $\mu$ V
2V	1mV
20V	10mV
200V	100mV
1000V	1V

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**Accuracy:**  $\pm$  (1% rdg + 2d)

**Input Impedance** 10 M $\Omega$

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**OL Protection** 500VDC/350 VAC RMS

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## DC CURRENT

Range	Resolution
10A	1mA

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**Accuracy:**  $\pm$  (2% rdg + 2d)

**OL Protection** 10 A Unfused  
10A/250V Fuse

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## Resistance

Range	Resolution
200 $\Omega$	100m $\Omega$
2K $\Omega$	1 $\Omega$
20K $\Omega$	10 $\Omega$
200K $\Omega$	100 $\Omega$
2M $\Omega$	1K $\Omega$
20M $\Omega$	10K $\Omega$

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**Accuracy:** 200-200K $\Omega$   $\pm$  (1% rdg + 2d)

2M $\Omega$   $\pm$  (1.5 rdg + 2d)

20M $\Omega$   $\pm$  (2% rdg + 2d)

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**OL Protection** 250VDC / AC RMS within 10 seconds)

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<b>Continuity Threshold</b>	<b>Response Time</b>
< 100	< 500 mS
<b>OL Protection</b>	250 VDC/ AC RMS (within 10 seconds)
<b>Diode Test</b>	Test Voltage 1.5mA, Test Voltage 3.2V max

### RPM (TACH)x10

<b>Range</b>	<b>Resolution</b>	
10,000 RPM	10 RPM	
<b>Accuracy</b>	± (1.5 % rdg +2d)	
<b>OL Protection</b>	200 VDC/AC Peak (within 20 seconds)	
<b>Dwell Range</b>	<b>Degrees</b>	<b>Resolution</b>
3 cyl	0-120°	0.1°
4 cyl	0-90°	0.1°
5 cyl	0-72°	0.1°
6 cyl	0-60°	0.1°
7 cyl	0-45°	0.1°
<b>Accuracy</b>	± (1.5 rdg + 2d)	
<b>OL Protection</b>	200VDC/ AC peak (within 20 seconds)	

## SEC-4 SAFETY PRECAUTIONS:

The following safety precautions must be observed to ensure maximum personal safety during the operation, service and repair of this meter.

### DANGER

- Engines produce carbon monoxide which is odorless, causes reaction time, and can lead to serious injury. When the engine is operating, keep service areas WELL VENTILATED or attach the vehicle exhaust system to the shop exhaust removal system.
- Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles: The parking brake does not hold the drive wheels.

• Wear an eye shield when testing or repairing vehicles.

1. Read these operating instructions thoroughly and completely before operating your meter. Pay particular attention to WARNINGS which will inform you of potentially dangerous procedures. The instructions in these warnings must be followed.
2. Always inspect your meter, test leads and accessories for any sign of damage or abnormality before every use. If any abnormal conditions exist (eg-broken test leads, cracked cases, display not reading, etc.), do not attempt to take any measurements. Refer to Return for Repair section.
3. Do not expose the instrument to direct sunlight, extreme temperature or moisture.
4. Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.
5. To avoid electric shock use CAUTION when working with voltages above 40 Vdc or 20 Vac. Such voltages pose a shock hazard.
6. Never exceed the maximum allowable input value of any function when taking a measurement. Refer to the specifications for maximum inputs.
7. Never touch exposed wiring, connections or any live circuit when attempting to take measurements.
8. Do not attempt to operate this instrument in an explosive atmosphere (i.e. in the presence of flammable gases or fumes, vapor or dust).
9. When testing for the presence of voltage, make sure the voltage function is operating properly by reading a known voltage in that function before assuming that a zero reading indicates a no-voltage condition. Always test your meter before and after taking measurements on a known live circuit.

10. Calibration and repair of any instrument should only be performed by qualified and trained service technicians.
11. Do not attempt calibration or service unless trained and another person capable of rendering first aid and resuscitation is present.
12. Do not install substitute parts or perform any unauthorized modification of the instrument. Return the instrument to A.W. Sperry Instruments for service and repair to insure that safety features are maintained.
13. Remember: Think Safety, Act Safely.

## **SEC-5 OPERATION**

Before making any measurements read section-Safety Precautions. Always examine the instrument and accessories to be 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 terminals. If any abnormal condition exists, do not attempt to take any measurements.

### **5.1 VOLTAGE MEASUREMENTS**

1. Connect red test lead to V- $\Omega$  input terminal and black test lead to COM input terminal.
2. Set Function Switch to desired DC V position. If magnitude of voltage is not known, set switch to highest range and reduce until a satisfactory reading is obtained.
3. Turn on power to the device or circuit being tested and discharge all capacitors.
4. Connect the test leads to device or circuit being measured. Voltage value will appear on digital display.
5. Turn off power to the device or circuit being tested and discharge all capacitors prior to disconnecting test leads.



## **WARNING**

To avoid possible electric shock and/or instrument damage, do not attempt to take any voltage measurements if the voltage is above 1000Vdc or if the voltage is unknown. 1000Vdc is the maximum voltage that this meter is designed to measure. The black (-) test lead potential should not exceed 500V measured to earth ground.

## **5.2 CURRENT MEASUREMENTS**

1. Insert the black and red test leads into the respective "COM" and "10A" terminals.
2. Place the function switch to the 10A position.

**CAUTION:** The 10A range is unprotected and has a very low internal resistance. Do not attempt to take a current measurement if the current is unknown or above 10Adc. The "COM" terminal potential should not exceed 500V measured to the ground.

3. Completely de-energize the circuit in which the current is to be measured. Place the DMM in a series with the conductor carrying the current which is to be measured. Energize the circuit.
4. The reading will be indicated on the display.

## **5.3 RESISTANCE AND DIODE MEASUREMENTS**

### **WARNING**

Attempting resistance or continuity measurements on live circuits can cause electrical shock, damage to the instrument and damage to the equipment under test. Resistance measurements must be made on de-energized (DEAD) circuits only for maximum personal safety. The electronic overload protection installed in this instrument will reduce the possibility of damage to the instrument but not necessarily avoid all damage or shock hazard.

1. Connect red test lead to  $\Omega$  input terminal and black test lead to the COM input terminal.

2. Set Function Switch to desired Ohm position. (The test range measures resistance from 000 up to 1999 and is used to test the forward resistance value of diodes) If magnitude of resistance is not known, set switch to highest range and reduce until a satisfactory reading is obtained.
3. If the resistance being measured is connected to a circuit, turn off power to the circuit being tested and discharge all capacitors.
4. Connect test leads to the circuit being measured. When measuring high resistance, be sure not to contact adjacent points even if insulated, because some insulators have a relatively low insulation resistance.
5. Read resistance value on digital display if a high resistance value is shunted by a large value of capacitance, allow digital LCD to stabilize.

#### **5.4 CONTINUITY MEASUREMENTS**

1. Set the function switch at the (·))) position.
2. Continuity between probe tips will be indicated by the audible buzzer when resistance is below 100 ohm.

#### **5.5 TACHOMETER**

1. Set function switch to desired # of cycles.
2. Attach black lead to ground.
3. Attach red lead to (-) negative side of the coil.
4. With engine running, take reading.  
Note: If you have a 10 cylinder engine set meter on 5 cyl and divide reading by two.

#### **5.6 DWELL MEASUREMENTS**

1. Set function switch to desired # of cylinders.
2. Hook up test leads the same as per Tachometer (5.5)
3. With engine running, take reading.

### **SEC-6 BASIC DIAGNOSTIC TESTING**

#### **6.1 BATTERY (no load testing)**

1. Set function switch to 20 DCV.
2. Take voltage measurements as per section 5.1
3. To perform the no load test, turn on the headlights for approximately one minute.

4. Turn off headlights and observe readout

## NO LOAD TEST

Meter Reading	Battery Charge
12.6V	100%
12.4V	75%
12.2V	50%
12.0V	25%

A reading of less than 12.4V indicates an under-charged battery. Recharge before testing.

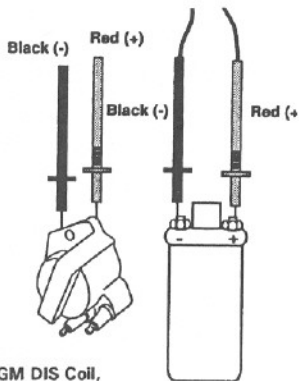
## 6.2 ALTERNATOR

1. Set function switch to 20DCV.
2. Connect the positive (+) lead to the battery (B+) output post on the back of the alternator.
3. Connect the negative (-) lead to the negative (-) battery terminal.
4. Start engine and hold at 1500 RPM. A reading of 13.1-15.5 volts is an acceptable charging rate.

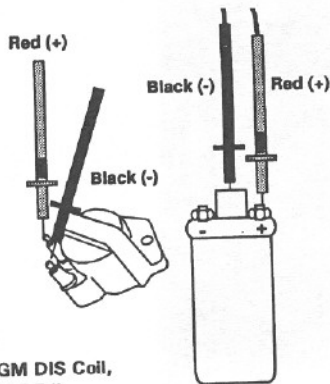
## 6.3 TACHOMETER

Follow procedures outlined in section 5.5

## 6.4 IGNITION COIL (Primary, Secondary)



GM DIS Coil,  
Type II - Both  
primaries  
located on back of coil.



GM DIS Coil,  
TYPE II

#### **6.4.1** This test checks primary winding resistance.

Important: Test the ignition coil cold and hot.

1. Set the function switch to the 200 ohm setting.
  2. Insert the black lead into "COM" terminal
  3. Insert red lead into  $\Omega$  terminal.
  4. Disconnect the coil from the vehicle wiring harness
- Note: The resistance in the test leads must be subtracted to get an accurate measurement at the 0.5-3 $\Omega$  range.

5. Connect the (-) lead to the negative (-) terminal on the coil.
  6. Connect the (+) lead to the positive (B+) terminal on the coil.
- Typical measurements are between 0.5-3 $\Omega$ . Consult the manufactures specifications for required resistance measurements.

#### **6.4.2** This test checks secondary winding resistance.

Important: Test the ignition coil cold and hot.

1. Set the function switch to the 200K ohm setting.
  2. Insert black lead into "COM" terminal
  3. Insert red lead into  $\Omega$  terminal.
  4. Disconnect the coil from the vehicle wiring harness.
  5. Connect the negative (-) lead to the high tension terminal on the coil.
  6. Connect the positive (B+) terminal on the coil.
- Typical measurements are between 6000-30,000 $\Omega$  consult the manufactures specifications for required resistance measurements.

### **6.5 SPARK PLUG WIRES**

This test checks for open circuits or high resistance in the secondary (sparkplug) wires.

Important: Twist and bend the sparkplug wire while measuring the resistance to this test.

1. Set the function switch to the 200K ohm setting.
  2. Insert black lead into "COM" terminal.
  3. Insert red lead into  $\Omega$  terminal.
- Connect the test probes to opposite end of the sparkplug wire. Typical measurements are approximately 1000 $\Omega$  per inch of wire. For example, 10 inch cable = 10,000 $\Omega$  .

## **6.6 DWELL**

Follow procedures outlined in section 5.6

For Further Basic Diagnostic Testing, refer to your vehicle owners manual.

## **MAINTENANCE**

Maintenance consists of periodic cleaning and battery replacement. The exterior of the instrument can be cleaned with a clean dry cloth to remove any oil, grease or grime. Never use liquid solvents or detergents.

## **BATTERY REPLACEMENT**

**WARNING: TO AVOID ELECTRIC SHOCK DISCONNECT MEASURING TERMINALS BEFORE REMOVING BATTERY COVER.**

\*Do not operate the meter or rotate the meter switch when the case is open.

1. To replace the battery, loosen the two screws in the back case and remove the case by lifting up and forward.
2. Replace the battery with a standard 9Volt transistor type battery. Sperry Part# B-4.
2. To replace a fuse, firmly grasp the printed circuit board (PC board) by the edges and lift up and out of the case.

## **IMPORTANT**

- \*To prevent contamination of the circuits, your hands must be clean and the printed circuit board must be held by the edges.
3. Carefully re-insert the PC board into the case. Re-assemble the case, then fasten the two screws.