Operating Instructions
Model DM-9100
Data Acquisition Digital Multimeter

A.W. SPERRY INSTRUMENTS INC.
The Professional's Choice®

245 MARCUS BLVD., HAUPPAUGE, NEW YORK 11788
1-800-645-5398 or 516-231-7050 • FAX: 516-434-3128

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 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 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, 245 Marcus Boulevard, Hauppauge, NY 11788, Postage prepaid for examination of verification of manufacturing defect under warranty. Liability of A.W. Sperry Instruments, Inc. shall be the sole judge of such defect. 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 Maintenance Section 8 "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.

TABLE OF CONTENTS

INTRODUCTION

SECTION 1

This exceptional 3¾ digit, handheld, digital multimeter has the capacity of reading up to 14 functions on up to 38 ranges. This DMM offers a powerhouse of measurement capability in a self-contained housing. It is designed for the professional at work in the field or in the laboratory, yet simple enough to operate making it perfect for the hobbyist too.

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. Electronic overload protection against accidental application of voltage to resistance and continuity circuits, combines with rugged construction make it a durable and reliable instrument.

FEATURES

SECTION 2

3¾ digit 4,000 count auto ranging and 4 digit 10,000 count frequency counter with full annunciators and analog bargraph.

True RMS AC measurements

Dual Display for Frequency, AC Voltage and Temperature

RS-232C Interface

10 Location Memory

Time Mode with Alarm, Clock and Stopwatch

MIN/MAX AVG and Relative Mode

Decibel Measurement

Capacitance and Inductance Measurement

Temperature Measurement in °C or °F

Pulse Signal Injection Function for Logic and Audible Testing, etc.

Continuity and Diode Test

Logic Probe Function

Auto Power Off and "Keep On" Mode

Fused 20A Input with Warning Beeper

Back Light

Data Hold and Run Mode

Low Battery and Polarity Indicator

Overload Protection and Safety Design in Compliance with UL 1244 and IEC 1010/1

1. PANEL CONFIGURATION

Fig. 1

- RS 232 Conn
- LCD
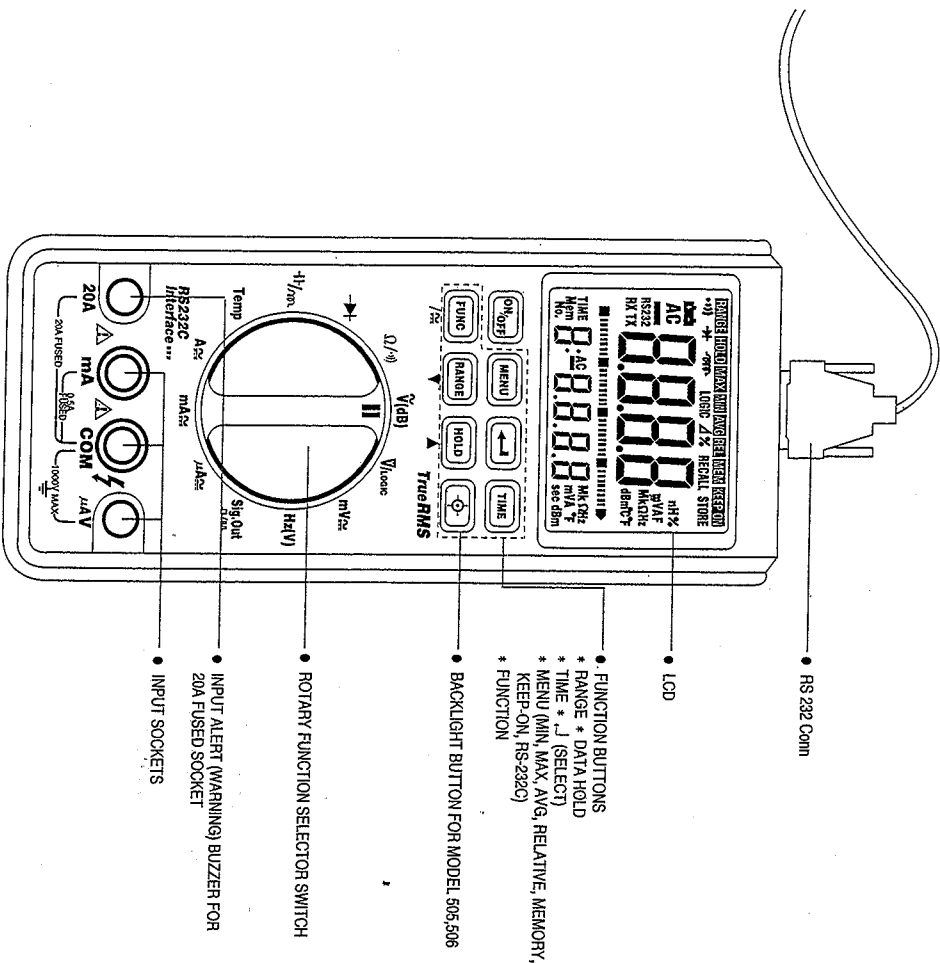- BACKLIGHT BUTTON FOR MODEL 505,506
- FUNCTION BUTTONS
  * RANGE * DATA HOLD
  * TIME * ↵ (SELECT)
  * MENU (MIN, MAX, AVG, RELATIVE, MEMORY, KEEP-ON, RS-232C)
  * FUNCTION
- ROTARY FUNCTION SELECTOR SWITCH
- INPUT ALERT (WARNING) BUZZER FOR 20A FUSED SOCKET
- INPUT SOCKETS

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2. DUAL DISPLAY

No	Function	Main	Secondary	N/A Function Mode
1	ACV(dB)	ACV	dBm	
2	Hz (ACV)	Hz	ACV	
3	Temp.	°C	°F	
4	Continuity	Open, Shrt	Ω	
5	Diode	Open, Shrt, Good	DCV	
6	Logic	Hi, Lo, ----	DCV	
7	Time	Measuring	Time	Hz, C, L
8	Memory	Measuring	Memory Location	Logic, Signal Out, →+, ·)))
9	Hold	Hold	Current Measuring value	Signal Out,
10	MAX	MAX	Measuring	Logic, Signal Out, →+, ·)))
11	MIN	MIN	Measuring	Logic, Signal Out, →+, ·)))
12	AVG	AVG	Measuring	Logic, Signal Out, →+, ·)))
13	REL	REL	Measuring	Logic, Signal Out, →+, ·)))

3. SPECIAL ANNUNCIATORS

Symbol	Description
·)))	Continuity test
→+	Diode check
(battery)	Low battery indicator
REL _	Relative value (Measured-Reference)
REL %	Relative percent (REL _ /Ref. x 100)
MEM	Memory mode
RECALL	Recall the stored data from memory
STORE	Storage of the measured data into memory
Keep on	Continuous use without auto power off
RS232C	Serial data interface with computer
RX	Serial data receiving
TX	Serial data transmitting
ꟷ	Inductance test
dBm	Decibel measurement unit (1mW, 600Ω)

4 RANGE SELECTION

No.	Function	Ranges	Selection method		
				Press key	
1	ACV(dBm)	4	Auto & manual	Range	
2	DCV	4	Auto & manual	Range	
3	mV(AC/DC)	1	Fixed		
4	Hz (ACV)	4	Auto		
5	Resistance	6	Auto & manual	Range	
6	μA (AC/DC)	1	Fixed		
7	mA(AC/DC)	1	Fixed		
8	20A(AC/DC)	1	Fixed		
9	Continuity	1	Fixed		
10	Logic	1	Fixed		
11	Diode	1	Fixed		
12	Capacitance	1	Fixed		
13	Inductance	1	Fixed		
14	Temp	1	Fixed		
15	Signal out	3	Manual	Func	

1. Selection method
2. Over range indication
   "OL" appears on the display.
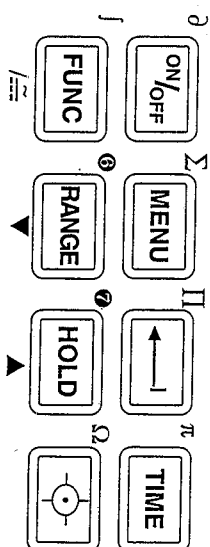
Note

on some special functions such as MAX, MIN, AVG, REL etc.
"3999" is displayed instead of "OL".

5. BUTTON KEY OPERATION

1) Power on/off switch

When not used for a long period of time, we recommend that you turn this switch off rather then depend on the auto power off function.

The auto power off function will drain the battery if the meter remains on for longer than 2 months approximately.

2) Menu key

Push this key once to go into the menu mode. Pushing key for more than 1 second releases meter from menu mode. Once this key is pushed, all the menu annunciators turn on, and only one annunciator at the cursor position blinks rapidly, the previously selected menu annunciator blinks slowly.

MAX MIN AVG REL MEM KEEP ON RS232

Push menu key to move the cursor and select one of the functions shown in the above figure.

3) Enter Key

Press enter key to display on the screen the function selected by the menu key. The selected function will appear on the screen and all other indicators will disappear. If however, the "Keep on" or "RS232" indicator had been selected previously, they will remain on the screen.

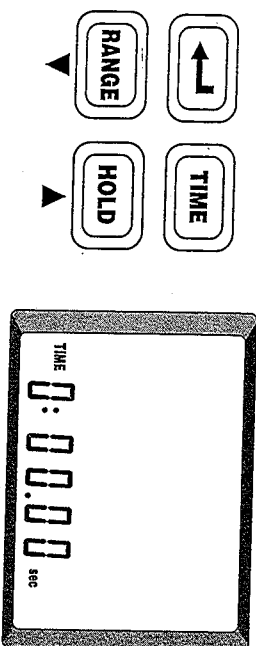To exit (MIN, MAX, AVG) function, press menu key once, then the return key once.

4) Time Key

This is used for setting the time function.

When this key is pushed, 0 hours 00 minutes 00 seconds is shown on the secondary display area on the LCD. (see fig. below)

Another push of time key discards the time function and the previous normal mode is restored. The keys for up "(▲)" or down "(▼)" are used for starting the time count up or down.

During time count up or down, if 0:00.00 or 9:59.59 is reached. The buzzer will sound indicating the end of time count. Pressing the time key will shut off the buzzer. The time function also has a preset function. After the first push of time key, if the return key is pushed, the left most digit will blink. Pushing the up or down key will increase or decrease the value of the blinking digit. After the digit you want is displayed, pushing the return key fixes the blinking digit and causes the next digit to start blinking in that way, time can be preset and counting up or down can be done from the preset time.

5) Function Key [FUNC]

This key is used for selecting the alternate function. (When position of the rotary switch remains unchanged.)

No.	Rotary switch	#1	#2	#3
1	V/Logic	DCV	Logic	
2	mV	DCmV	ACmV	
3	Sig. out	2048H	4096Hz	8192Hz
4	μA	DCμV	ACμV	
5	mA	DCmA	ACmA	
6	20A	DC20A	AC20A	
7	Ω/•))	Ω	•))	
8	╫/◖◗	╫	◖◗	

(Note)

1) #1: No key pushed (default status)
   #2: The first push of the function key selects alternate measurement function.
   #3: The second push of the function key selects second alternate function only in case of "Sig Out".

2) The function key when operated toggles to another alternate function each time it is pushed.

6) Range Key [RANGE]

This key is used for changing from auto ranging mode to manual range mode.

When in time mode or Memory mode, this key is used for selecting functions which are described in detail in the previous item 4 (section-3-5) time key and (3–6).

There are two types of range operations.

One is automatic range selection (which is the default condition at power on).

The other is manual range (which is selected when the range key is pressed).

With the first push of this key, manual range mode is set up and fixed to the next range mode. Each push there-after selects the next higher range. Range is advanced step by step each time the key is pressed. If the range key is pressed down for more than 1 sec, the manual range mode is released and restored to auto range mode.

7) Hold Key [HOLD] .

This key has 2 functions

One function is hold, and the other is the up (▲) function.

The up (▲) function is used for time and memory application and is described in detail in time (section 3-5).

The Hold function is used for "freezing" the data measured at the time the key is pressed.

With the key pressed, Hold annunciator turns on and the secondary restores the current measuring data. See, Fig. below. Another push of the hold key restores the previous testing mode.

— Main display with the data frozen.

— Sub display with the data running.
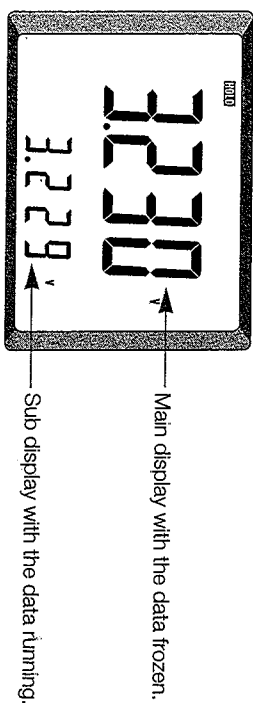
8) Back light key [⟐]

This key is used for lighting the display.

The first push turns on the back light.

The second push turns the back light off.

About 20 mA current is required to operate LED Back Light.

This back light has an auto shutoff function, which will automatically extinguish the back light in about 2 minutes after the light turns on.
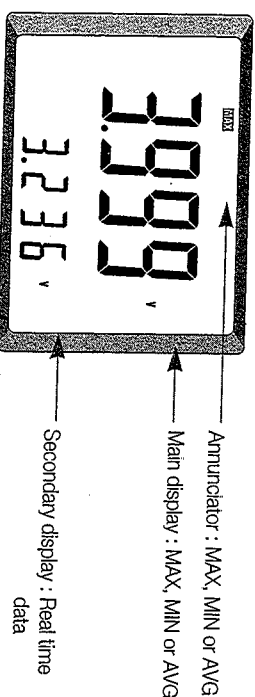
Use of this auto-off feature saves battery life.

6. MENU FUNCTIONS

1) MAX MIN AVG   **MAX** **MIN** **AVG**

These functions are used for obtaining the Maximum, Minimum or Average value of the measured data.

[MENU] [↵]

— Annunciator : MAX, MIN or AVG

— Main display : MAX, MIN or AVG

— Secondary display : Real time data

Once MAX is selected the maximum value is shown on the main display while the secondary display shows the present readings. Likewise for MIN and AVG.

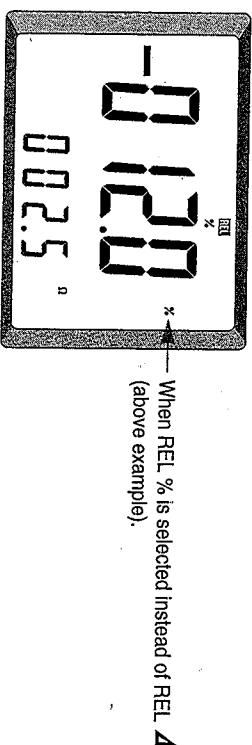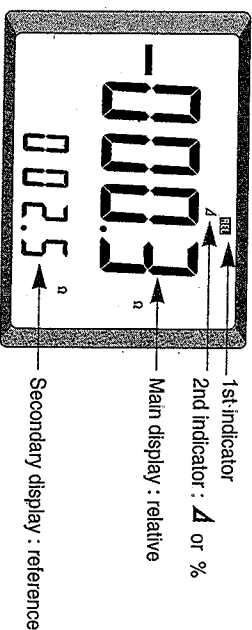MAX, MIN and AVG functions have only the fixed range.

Manually select the desired range before you set meter to MIN, MAX or AVG modes. When the Maximum or Minimum value is reached on a selected range (i.e. 3.999 or -3.999) that value will be displayed instead of O.L.

The AVG mode calculates true average for all the measured data acquired during the period in AVG.

2) REL   **REL**

Relative mode allows the operator to measure values with respect to a reference value other than zero.

Relative (REL) ... = Measured — Reference

— 1st-indicator

— 2nd indicator : ▲ or %

— Main display : relative

— Secondary display : reference

When REL % is selected instead of REL ▲ (above example).

The relative value is expressed as a percent of the reference value.

REL % = 100 × Relative / Reference
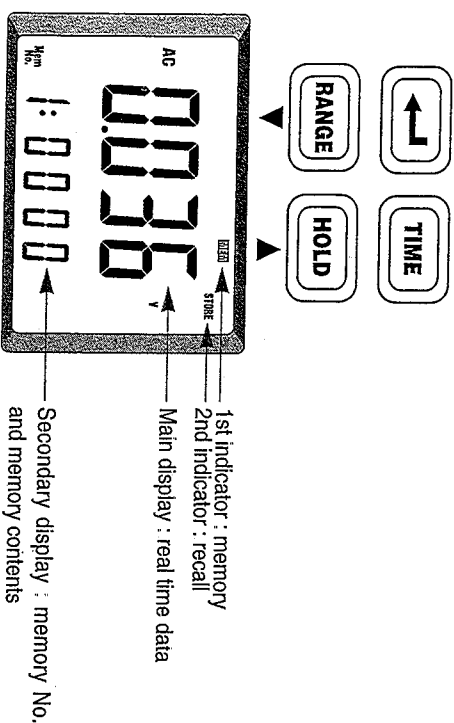

1. Push menu key to display menu. Move the cursor to REL using menu key.

2. Push return key, Indicators of _ and % will appear, _ will blink, but % will not.

3. Each push of menu key makes the cursor move and the related indicator blink so _ or % can be selected as needed.

4. Push the return key, and the relative mode will be set up and the relative measurement will be made.

* This REL mode is only available for numerical value measurement. It is not available for logic, continuity and signal out.

3) MEM MEM

Up to 10 measurements can be stored in memory and recalled at any-time, by using the menu, return, up(s)and down (▼)keys. To enter memory mode push menu key to select memory function. Push menu key to select store or recall.

1st indicator : memory
2nd indicator : recall

Main display : real time data

Secondary display : memory No. and memory contents

In memory store mode, the memory No. "0" has a special function, which can be used to input an arbitrary numerical value by manual operation of up, down and return keys.

After entering the memory store mode, if you go to memory no. zero with the up or down key the memory No. "0" will blink. Now push the return and the up or down key, and "—" indicator will blink. If return key is pushed the "—" indicator is fixed and the next digit will blink.

Any numerical value you want can be set by using the up or down key.

After this, if the return key is pushed, the next right digit will blink. That way all the rest of the digits can be set. Finally the memory No "0" will blink again. Now you can go to other memory No. using the up or down key or exit to other test mode using the menu key.

Other memories except for No. "0" memory are used for storing measure-ment data. Whenever the key is pushed the memory is updated and stored with the present measurement value. In memory recall mode, up to 10 memory locations can be recalled at anytime.

This 10 memory will not be erased even with the meter in the auto power off mode.

4) Keep on KEEP ON

When the meter is to be used continuously for more than 30 minutes the auto power off function should be disabled.

The "keep on" function disables auto power off function for continuous use of the meter until the battery is drained.

1. Push menu key

2. Move the cursor to the "keep on" position

3. Push return key

4. Then the annunciator "keep on" will be turned on to indicate that the meter is in the "Keep on" mode.

5. The "keep on" mode remains on regardless of any mode change with button key or rotary switch.

6. To exit the "keep on" mode, one method is to use the menu key another method is to turn the power off. The "keep on" mode operates independent of other modes and functions.

5) RS232 RS232

This RS232 mode is also operated independent of other modes and functions.

Refer to the chapter 8 for detailed description.

7. MODES APPLICATION

No.	Functions	MAX	MIN	AVG	REL	MIN/MAX	keep on	RS232	RNG	HOLD	TIME
1	ACV(dB)	o	o	o	o	o	o	o	o	o	o
2	DCV	o	o	o	o	o	o	o	o	o	o
3	Logic							o	o		o	o
4	DC mV	o	o	o	o	o	o	o		o	o
5	AC mV	o	o	o	o	o	o	o		o	o
6	Sig Out						o	o		o	o
7	Hz(ACV)	o	o	o	o	o	o	o		o	
8	DC μA	o	o	o	o	o	o	o	o	o	o
9	AC μA	o	o	o	o	o	o	o	o	o	o
10	DC mA	o	o	o	o	o	o	o	o	o	o
11	AC mA	o	o	o	o	o	o	o	o	o	o
12	DC 20A	o	o	o	o	o	o	o	o	o	o
13	AC 20A	o	o	o	o	o	o	o	o	o	o
14	RESISTANCE	o	o	o	o	o	o	o		o	o
15	CONTINUITY					o	o	o		o	o
16	DIODE					o	o	o		o	o
17	CAPACITANCE	o	o	o	o	o	o	o		o	o
18	INDUCTANCE	o	o	o	o	o	o	o		o	
19	TEMPERATURE	o	o	o	o	o	o	o		o	

SPECIFICATIONS:

Display:	3¾ Digit with Bargraph for V,A,Ω
Range Section Selection:	Auto Manual
Operating Environment:	0 - 50°C (32 - 122° F) at < 80% RH
Storage Environment:	-40 - 70°C (-22 - 158° F) at < 95% RH with batteries removed
Relative Mode:	- / %
Time Mode:	10 hours/ 1 sec.
Auto Power Off:	Approx. 30 Minutes
Dual Display:	Hz/V, V/dB, °C/°F
Back Light:	Approx. 135 seconds
Input Warning:	
Low Battery Indication:	20A Range
Signal Out:	6.9V ± 0.6V
	2048Hz, 4096Hz, 8192Hz
Fuse Protection:	250V/20A Fused
Safety:	In compliance with UL-1244 VDE 0411
Dimensions:	8"L X 3½"W X 1½"D (88mm x 37mm x 199mm)
Weight:	1.1lb (450G) approx.

RANGES:

* Accuracy is given as ± ([% of reading] + [number of least significant digits]) at 18°C to 28°C, with relative humidity up to 70%.

DC VOLTAGE

Range	Resolution	Accuracy	Input Impedance
400mV	0.1mV	± (0.3% rdg + 2d)	
4V	0.1mV		>1GΩ
40V	1mV	± (0.5% rdg + 2d)	
400V	10mV		10MΩ
1000V	1V		

Overload Protection: 1000VDC or 750VAC RMS. 250Vrms 400mV.

AC VOLTAGE

Range	Resolution	Accuracy	Input Impedance
400mV	0.1mV	±(1% rdg + 3d) 50Hz-1KHz	>1GΩ
4V	1mV	±(1.5% rdg + 3d) 50Hz-100KHz	
40V	10mV		10MΩ
400V	100mV	±(1.5% rdg + 5d) 50Hz-500KHz	
7500V	1V		

Overload Protection: 1000VDC or 750VAC RMS. 250Vrms 400mV.
Crest Factor: 3±1.7% max.

DC CURRENT

Range	Resolution	Accuracy	Overload Protection
400µA	0.1µA		250V RMS
400mA	0.1mA	(1% rdg + 2d)	1/2A 250V
20A	0.01A		20A 250V

AC CURRENT

Range	Resolution	Accuracy (50Hz to 60Hz)	Overload Protection
400µA	0.1µA		250V rms
400mA	0.1mA	±(1.5% rdg + 2d)	0.5A/250V fuse
20A	0.01A		20A/250 fuse

RESISTANCE

Range	Resolution	Accuracy	Open Circuit volts
400Ω	0.1Ω		2.5V
4KΩ	1Ω	±(0.5% rdg + 2d)	
40KΩ	10Ω		
400KΩ	100Ω		
4MΩ	1KΩ	±(1% rdg + 2d)	1.2V
40MΩ	10KΩ		

Overload Protection: 250VDC or AC RMS.

CONTINUITY

Audible Threshold	Open Circuit Volts	Response Time
Less than 100	100mΩ	<0.7mA

Overload Protection: 250VDC or AC RMS.

DIODE TEST

Resolution	Accuracy	Test Current	Open Circuit Volts
4V	±(2.0% rdg + 2dgts)	0.6mA typical	3.0Vdc typical

Overload Protection: 250VDC or AC RMS.

LOGIC (TTL Level)

	Sensitivity
Lo	<0.8V
Hi	>2.0V
—	0.8V - 2.0V

FREQUENCY

Range	Resolution	Accuracy	Sensitivity
10KHz	1Hz		
100KHz	10Hz	±(0.1% rdg + 1d)1.5V rms	1.5V rms
1MHz	100Hz		
10MHz	1KHz		

TEMPERATURE

Range	Resolution	Accuracy
-17°C to 1200°C	1°C	±(2% + 3d)up to 350°C(660°F)
0°F to 2000°F	1°F	±(3% + 3d) 350°C to 1200°C (660°F to 2132°F)

CAPACITANCE (Autoranging)

Range	Resolution	Accuracy
0 to 100µF	0.01µF	±(3% + 5d)

INDUCTANCE

Range	Resolution	Accuracy
0 to 100H	0.01H	±(3% + 5d)

TIME

Range	Resolution	Accuracy
10 hours	1 sec.	±(0.2% + 1d)

SIGNAL OUT

Frequency	Output Level	Accuracy	Output Impedance
2048Hz	4V P-P Min.		
4086Hz	Square Wave	±0.01%	1.5KΩ
8192Hz			

PACKAGING:

The DM-9100 comes complete with C-77 Carrying Case, TL-42 Test Leads, B-4 Battery, RS232C Cable, 3½" Software Diskette, C-78 Holster, TP-800K Temperature Probe, (1) F-7 Fuse and (1) spare, (1) F-26 Fuse, Temperature Adapter and Instruction Manual.

OPTIONAL ACCESSORIES:

CA-200, CA-250, CA-600 Snap-Around Jaw Adapters, TP-750K, TP-800K, TP-850K, K Type Temperature Probes.

SAFETY RULES

1. Read these operating instructions thoroughly and completely before operating your DMM. Pay particular attention to WARNINGS and CAUTIONS which will inform you of potentially dangerous procedures. These instructions must be followed.

2. Always inspect your DMM test leads and accessories for any sign of damage or abnormality before every use. If any abnormal conditions exist (i.e. broken test leads, cracked cases, display not reading, etc.) do not attempt to take any measurements. Refer to section 14 Return for repair.

3. 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.

4. Never touch exposed wiring, connections or any live circuit conductors when attempting to take measurements.

5. Never replace the protective fuse inside the DMM with any other than the AWS part number specified or approved equal.

6. Remember, Think Safety and Act Safely.

7. When testing for the presence of voltage make sure the voltage function is operating properly by reading a known voltage in that range before assuming that a zero reading indicates a no-voltage condition.

8. Calibration and repair should be performed by qualified maintenance personnel only.

9. Do not attempt calibration or service unless another person capable of rendering first aid and resuscitation is present.

10. 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.

11. To avoid electric shock use CAUTION when working with voltage above 40Vdc or 20Vac. Such voltages pose a shock hazard.

12. Do not operate this instrument in an explosive atmosphere (i.e in the presence of flammable gases or fumes, vapor or dust).

1. DCV

1. Select V̄/logic with the rotary function switch.
2. Attach the probe tips to the voltage source as shown below.
3. The LCD will display the measured value along with the Bargraph.
4. If the measurement is too high, "OL" will appear.

*Direct Voltage Test*
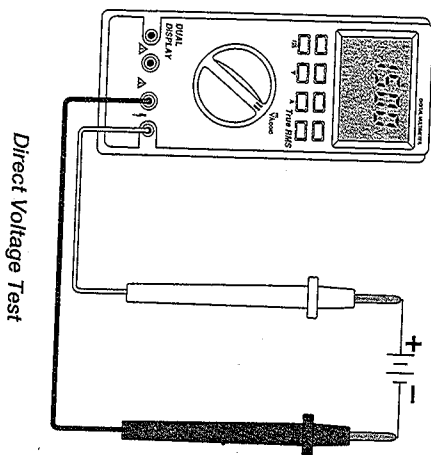
2. ACV

1. Select Ṽ(dB) with the rotary function switch.
2. Attach the probe tips to the voltage source
3. The voltage will appear on the display.
4. Bargraph indicator will move to the appropriate position on the Bargraph scale.
5. If the voltage is too high, the measurement range will be changed to the next higher range automatically. When the range is in the highest or in the manual range, too high a voltage makes the display read "OL".
6. The secondary will show the decibel value calculated by the formula of dBm = 20 log [V/0.7746].

3. DC μA

1. Select μA with the rotary function switch.
2. Break the circuit point to be measured.
3. Connect the two test leads to complete the broken circuit.
4. If the measured current is too high, the display will indicate "OL". In this case, the higher current range (mA or 20A) should be selected.
5. The bargraph segments will indicate the measured value.
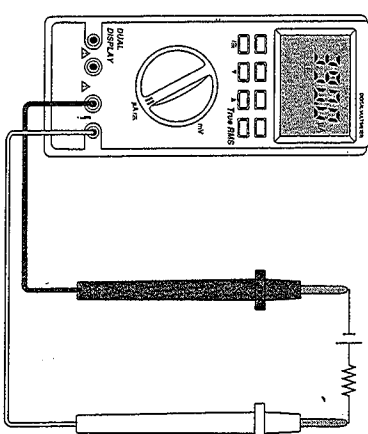
4. DC mA

1. Select mA with the rotary function switch.
2. Insert the red test lead into the input socket marked as "mA".
3. The measuring procedure is the same as that of DC μA

DC Test

5. DC 20A

1. Select 20A with the rotary function switch.
2. Insert the red test lead into the input socket marked as "20A".
3. The measuring procedure is the same as that of DC mA or μA.
* The 20A input socket has a special function designed for safety, which is called "Warning Beep".

When the rotary switch is set up to other than the 20A function, wrong insertion of the test lead plug into the 20A input socket will cause the warning beeper to sound.
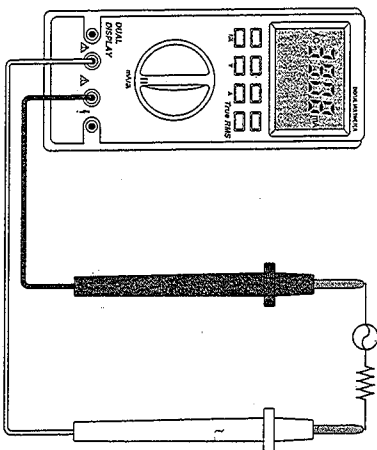
6. AC µA

1. Select AC µA ≅ with the rotary function switch. Press the function key once. This will select AC µA measuring mode.
2. The testing procedure is the same as that of DC µA.

7. AC mA

1. Select AC mA ≅ with the rotary function switch. Press the function key once. This will select AC mA measuring mode.
2. The measuring procedure is the same as for DC mA.

AC Test

8. AC 20A

1. Select 20A ≅ with the rotary function switch. Press the function key once. This will select 20A AC measuring mode.
2. The measuring procedure is the same as for 20A DC.

AC Test

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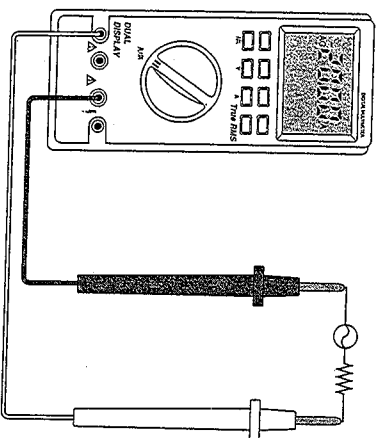
9. RESISTANCE

1. Select Ω/·))) with the rotary function switch.
2. "Open" leads will display "OL" on the display.
3. "Shorting" the test leads will display zero or an extremely low value of resistance (Test Lead Resistance).
4. Relative mode is useful to get rid of this error by subtracting the test lead resistance from the measured resistance.
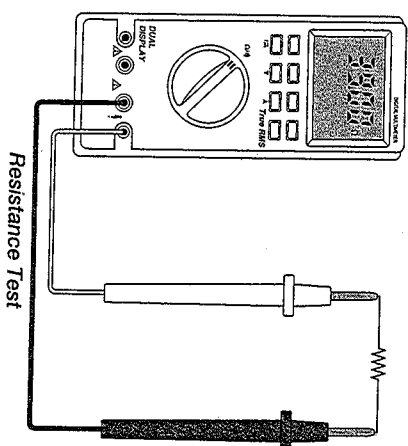
Resistance Test

10. CONTINUITY

1. Select Ω/·))) with the rotary function switch.
2. Press the function key one time.
3. The annunctor of "·)))" appears on at the upper left of the display. The resistance value is now read in the secondary display, and the main display reads either "OPEn" or "Shrt" insteadof numerical value.
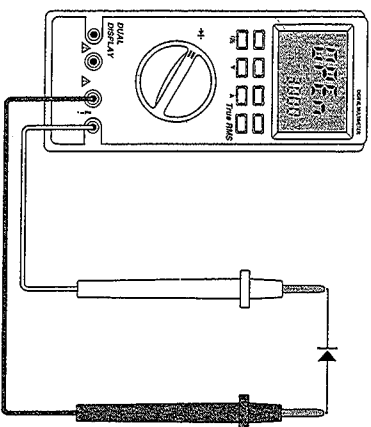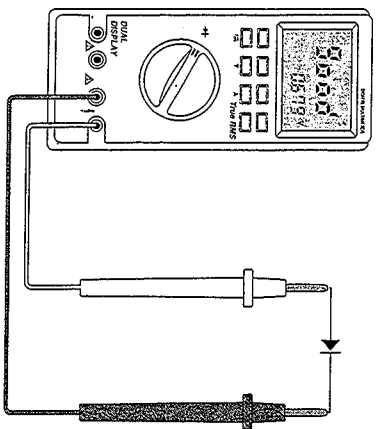
Below 100Ω : Shrt together with
beep sound

Above 100Ω : OPEn
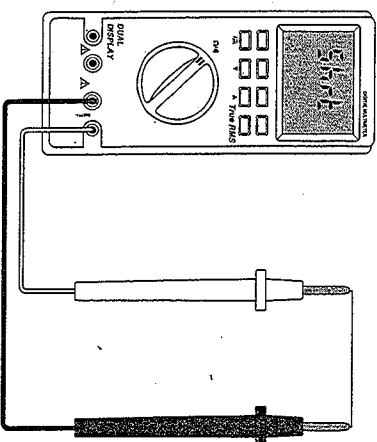
Continuity Test

11. DIODE

1. Select →+ with the rotary switch.
2. Annunciator "→+" will appear
3. Main display will read;

   OPEn : Open circuit or above 1.0v
   Shrt : Short circuit or below 0.5v
   Good : Good diode or 0.5 upto 1.0v

4. Secondary display will read the voltage of a measured diode.

12. LOGIC

1. Select V̄/Logic with the rotary function switch. Press "Func" key once.
2. Annunciator "Logic" will appear
3. Main display will read

   Hi : above 2.0V
   Lo : below 0.8V
   --- : 0.8V to 2V

4. Secondary display will read the voltage of measured Logic circuit.

Logic Test
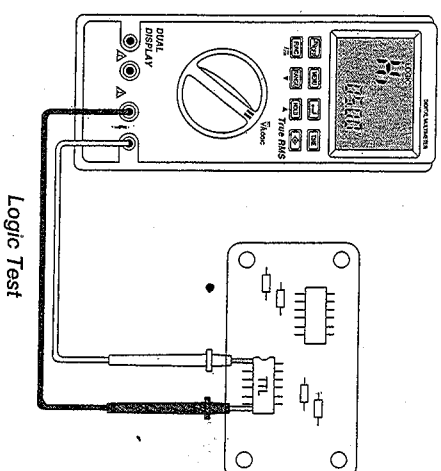
13. FREQUENCY

1. Select Hz(Ṽ) with the rotary function switch.
2. Attach the test lead tips to signal source.
3. Main display will read the measured frequency.
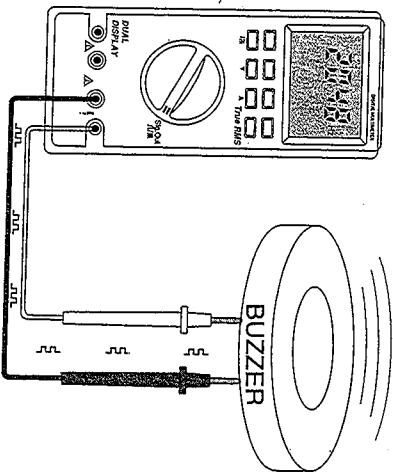4. Secondary display will read measured Voltage.
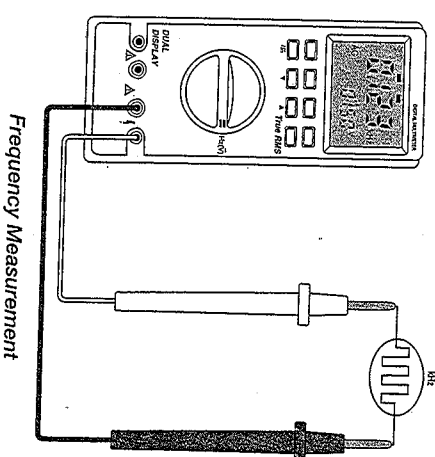
Frequency Measurement

14. SIGNAL OUT

1. Select sign out (⊓_⊓_) with rotary function switch.

2. 2.048kHz 5Vp-p pulse signal is output to test leads.

3. If the function key is pressed one time, the frequency of output signal is changed to 4.096 KHz.

Note

In this function mode, no button key except for Time and Back Light is activated, nor does the Buzzer built in the meter make sound.
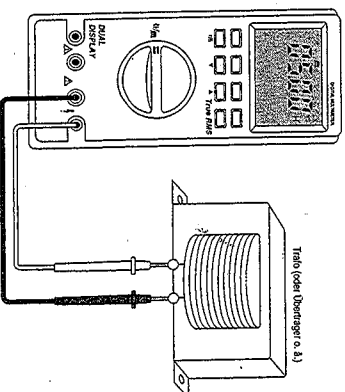
15. CAPACITANCE

1. Select ┤├/◯◯◯ with the rotary function switch.

2. Discharge the capacitor to be measured.

3. Attach the test lead tips to the capacitor.
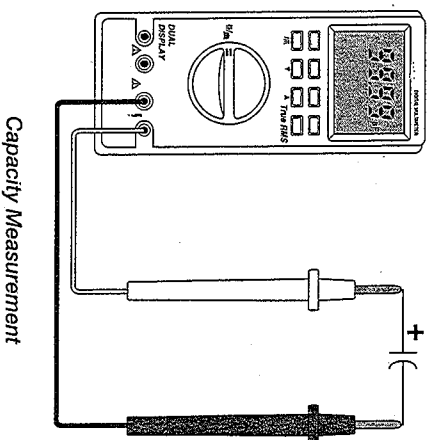
Capacity Measurement

16. INDUCTANCE

1. Select ┤├/◯◯◯ with the rotary function switch.

2. Push the function key once.

3. The annunciator "◯◯◯" will appear.

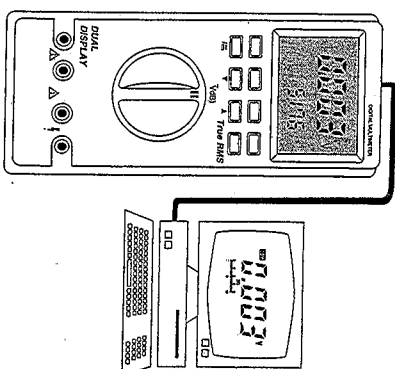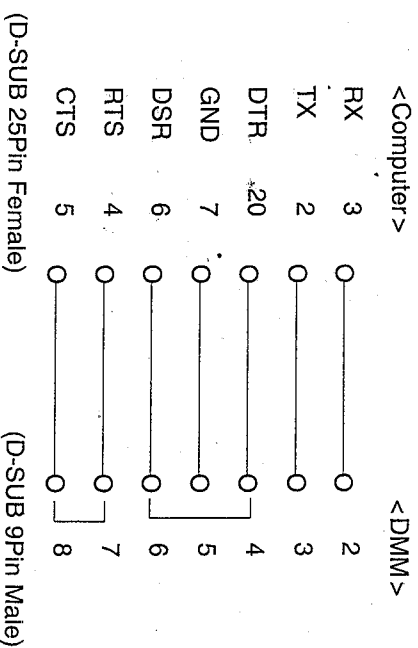4. Main display will show the inductance value of the measured inductor.

Inductance Test

17. TEMPERATURE

1. Select temp with the rotary function switch.

2. The main display will show the ambient temperature in centigrade with no test lead inserted into the input sockets. While the secondary display will read the fahrenheit temperature which is calculated by the formula of $^\circ F = (^9/_5 \times ^\circ C) + 32$.

3. The type "K" temp Probe is used for measuring temperature from -$^\circ$C up to 1200 $^\circ$C.

---
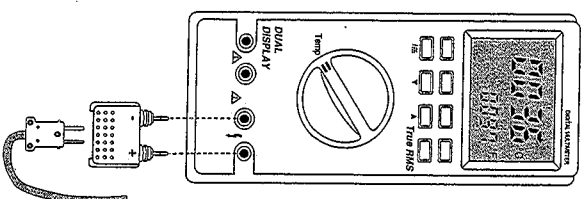
1. RS-232C INTERFACE WITH A PERSONAL COMPUTER

1. Connection of PC and Meter

   Connect the RS-232 cable to the built-in RS-232 connector in the Meter and to the PC serial port.

2. RS232 Cable Pin Connection

<Computer>		<DMM>
RX	3	2
TX	2	3
DTR	20	4
GND	7	5
DSR	6	6
RTS	4	7
CTS	5	8
(D-SUB 25Pin Female)		(D-SUB 9Pin Male)

3. Communication Spec.

- Baud Rate : 1200
- Data Bit : 7
- Stop Bit : 2
- Parity : None

4. Installation Of Supplied Software

The supplied software programs run on IBM PC-Compatible computers only. A read me file is provided.

i) Insert the supplied diskette into the drive.

ii) Copy the files from the diskette to the computer's hard disk drive or make a back up copy.

iii) Please read the readme.TXT file. This file will assist you on setting up our software.

5. Communication With PC

i) Press the menu key on the meter several times until the "RS232" annunciator blinks.

ii) Press the return key on the meter to set the RS232 mode. Now the meter is ready to communicate with PC.

iii) Run the execution file loaded from the supplied diskette by typing the name of the execution file at the DOS prompt.

iv) Push the enter key and you will see the first screen showing some feature of the meter. Push the enter key again and you will see the first screen showing some feature of the meter. Push the enter key again and you will see the measurement screen with the menu.

v) Now you can communicate with the meter and use the menu to access various functions.

6. QBASIC EXAMPLE PROGRAM (DM9100.BAS)

```
10   CLS
20   PRINT
30   PRINT "<RS232 EXAMPLE PROGRAM BY BASIC>"
40   PRINT "DM9100.BAS"
50   PRINT "1200 BAUD"
60   PRINT "NONE PARITY"
70   PRINT "7 DATA BIT"
80   PRINT "2 STOP BIT"
90   PRINT "COM2 PORT"
100  PRINT
110  PRINT "PLEASE"
120  PRINT "PRESS ANY KEY TO EXECUTE OR ESC TO STOP"
130  PRINT
140  RS$="COM2:1200,N,7,2,DS,CS,RS,CD"
150  OPEN RS$ FOR RANDOM AS #2
160  T$=INPUT$(1)
170  IF T$=CHR$(27) THEN 340
180  PRINT #2,T$
190  DIM R$(15)
200  I-1
210  R$(1)=INPUT$(1,#2)
220  IF R$(1)=CHR$(13) THEN 250
230  1=1+1
240  GOTO 210
250  FOR J=1 TO I
260  PRINT R$(J);
270  NEXT J
280  PRINT
290  I$=INKEY$
300  IF I$=CHR$(27) THEN 340
310  FOR K=1 TO 99
320  NEXT K
330  GOTO 180
340  CLOSE #2
350  END
```

Note

This is a sample program which helps users to understand the data format and the data interfacing method, and also to develop their own program

1. GENERAL

1. Do not use abrasive or solvents and Periodically wipe the case with a clean dry cloth.

2. Calibrate the meter once a year to maintain its accuracy specification.

2. BATTERY REPLACEMENT

1. Replacing the battery should be done according to these steps.

2. Remove the screw from the battery cover.

3. Lift the battery cover and the discharged battery from the case.

4. Carefully disconnect the battery snap connector.

5. Snap the battery connector to the new battery connector.

6. Reinsert the new battery into the case. Be careful not to pinch the battery leads between the case and cover.

7. Replace the cover and reinstall the screw with a screw driver.

3. FUSE REPLACEMENT

Replacing the defective fuses should be done according to the following procedure.

1. To avoid electrical shock, remove the test leads and any input signal before opening the case.

2. Remove the battery cover screw, and remove the three screws from the bottom case.

3. Lift the bottom case until it gently unsnaps from the top case.

4. Remove the defective fuse by gently prying loose one end of the fuse and sliding the fuse from the fuse holder.

5. Install a new fuse of the same size and rating. Ensure that the new fuse is centered in the fuse holder.

6. Replace the bottom case, and reinstall all the screws.

> **Note**
>
> Testing the internal fuse

> **Note**
>
> 1. Plug a test lead into the V input socket and touch the test lead tip to the mA input socket.
>
> 2. Set the rotary switch to Ω. The display should read between 0 and 1Ω. A defective fuse will display reading more than 1Ω.
>
> 3. 20A input socket contains split contacts, ensure that the test lead tip is touched to the left half of the input socket.

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
> 245 Marcus Blvd.
> 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.