

OPERATING INSTRUCTIONS
Model DM-7100
DUAL DISPLAY DIGITAL MULTIMETER
WITH AUTO OFF



PLEASE READ THESE OPERATING INSTRUCTIONS CAREFULLY. Misuse and or abuse of these instruments 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.

245 MARCUS BLVD, HAUPPAUGE, NEW YORK 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, 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 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, 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 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. THIS WARRANTY GIVES YOU SPECIFIED LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

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

MODEL DM-7100

Sec. 1 DESCRIPTION

This exceptional 3 ³/₄ digit, handheld, digital multimeter has the capacity of reading up to 19 functions on up to 29 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 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, combined with rugged construction make it a durable and reliable instrument.

Sec. 2 FEATURES

- Auto/Manual Ranging
- 10A AC/DC Range (Fused)
- Auto Power Off
- Designed to IEC-348 Class II Standards
- Overload Protection on All Ranges
- Capacitance Ranges
- Transistor HFE
- Continuity, Diode Test
- Rel/Rel % Functions
- Frequency/AC & Frequency
- Auto Hold
- Timer Function
- Min, Max Function
- Large 3 ³/₄ Digit LCD Display With Annunciators And Analog Bargraph
- One Year Limited Warranty

Sec. 3 SPECIFICATIONS

- **Display:** 3³/₄ digits, 15mm large LCD maximum reading 3999 with function and units sign Annunciators.
- **Ovrange:** O.L. is displayed.
- **Low Battery Indication:** The "⎓" is displayed when the battery voltage drops below the operating level.
- **Sampling Rate:** 4 times/second nominal.
- **Measurement Method:** Dual-slope integration A/D conversion.
- **Operating Environment:** 0°C to 40°C (32 F to 104 F) at < 70% R.H.
- **Storage Environment:** -10°C to 50°C (14° to 122°F) at < 80% R.H.
- **Power Source:** 9-volt transistor type battery, (NEDA #1604, JIS006P, IEC 6F22) AWS Part #B-4.
- **Battery Life:** 300hrs typical with carbon-zinc.
- **Fuse:** 0.5A/250V, 5x20mm fast acting AWS Part #F-710A/250V, 1/4 x 1 1/4" time delay AWS Part #F-23.
- **Dimensions:** 7.5"H x 3.6"W x 1.3"D (189H x 91W x 32mm)
- **Weight:** Approx. 11 oz. (310g) including battery.

RANGES:

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

DC Volts

DM-7100

| Range | Resolution | Accuracy |
|-------|-------------|-----------------|
| 400mV | 100 μ V | \pm (0.3% +2) |
| 4V | 1mV | \pm (0.1% +2) |
| 40V | 10mV | \pm (0.1% +2) |
| 400V | 100mV | \pm (0.1% +2) |
| 1000V | 1V | \pm (0.1% +2) |

Input Impedance: 10M Ω on all ranges.

Overload Protection: 1000VDC or Peak AC on all ranges.

AC Volts

| Range | Resolution | Accuracy (50Hz to 500Hz) |
|-------|------------|--------------------------|
| 4V | 1mV | $\pm(1\% +5)$ |
| 40V | 10mV | $\pm(0.5\% +5)$ |
| 400V | 100mV | $\pm(0.5\% +5)$ |
| 750V | 1V | $\pm(0.5\% +5)$ |

Input Impedance: 10M Ω on all ranges.

Response: Average responding calibrated in RMS of sine wave.

Overload Protection: 1000VDC or Peak AC on all ranges.

DC Current

| Range | Resolution | Accuracy |
|-------|-------------|-----------------|
| 400mA | 100 μ A | $\pm(1\% +5)$ |
| 10A | 10mA | $\pm(1.5\% +5)$ |

Voltage Burden: 100mV max. on 10A range, 400mV max. on 400mA range.

Overload Protection: 500mA/250V fuse on mA input (fast blow fuse).

10A/250V fuse on 10A input (time delay fuse).

AC Current

| Range | Resolution | Accuracy (50Hz to 500Hz) |
|-------|-------------|--------------------------|
| 400mA | 100 μ A | $\pm(1.5\% +5)$ |
| 10A | 10mA | $\pm(2\% +5)$ |

Voltage Burden: 100mV max. on 10A range, 400mV max. on 400mA range.

Overload Protection: 500mA/250V fuse on mA input (fast blow fuse).

10A/250V fuse on 10A input (time delay fuse).

Resistance

| Range | Resolution | Accuracy |
|---------------|--------------|-----------------|
| 400 Ω | 0.1 Ω | $\pm(0.3\% +5)$ |
| 4k Ω | 1 Ω | $\pm(0.2\% +5)$ |
| 40k Ω | 10 Ω | $\pm(0.2\% +5)$ |
| 400k Ω | 100 Ω | $\pm(0.2\% +5)$ |
| 4M Ω | 1k Ω | $\pm(0.3\% +5)$ |
| 40M Ω | 10k Ω | $\pm(0.8\% +5)$ |

Open Circuit Voltage: 2.6 Vdc on 400 Ω , 1.2 VDC on 4k-400k, .6 VDC on 4M-40M

Overload Protection: 250 VDC or peak AC - Electronic (No Fuse Blow).



Continuity

| Range | Audible Indication | Response Time | Open Circuit Volts |
|-------|-----------------------|---------------|--------------------|
| 2V | Less than 10 Ω | Approx. 100ms | 2.6 Vdc |

Overload Protection 250VDC or peak AC - Electronic (No Fuse Blow).

Diode Test

| Range | Resolution | Accuracy | Test Current | Open Circuit Volts |
|-------|------------|--------------------|--------------|--------------------|
| 2V | 1mV | $\pm(1.0\%rdg+1d)$ | 1.0mA | 3.0Vdc |

Overload Protection: 250 VDC or peak AC - Electronic (No Fuse Blow)

Frequency

| Frequency Range | Resolution | Accuracy |
|-----------------|------------|--------------------|
| 10–100KHz | 1–100Hz | $\pm(2.0\%rdg+5d)$ |
| –150KHz | 100Hz | $\pm(3.0\%rdg+5d)$ |

Minimum Input 10Hz sensitivity 3Vrms

Overload Protection: 250 VDC or rms- Electronic (No Fuse Blow)

Usable above 150KHz(up to 200KHz)

Capacitance

| Range | Resolution | Accuracy |
|---------------|-------------|--------------------|
| 4n - 40 μ | 100p - 10nf | $\pm(3.0\%rdg+5d)$ |

Overload Protection: 250VDC or Peak AC - Electronic (No Fuse Blow)

Transistor HFE

| Range | Base Current | Collector Emitter Volts | Transistor Types |
|-------|----------------------|-------------------------|------------------|
| 0–400 | 10 μ Adc Approx. | VCE=3.0Vdc Approx. | NPN or PNP |

Overload Protection 250VDC or peak AC - Electronic (No Fuse Blow).

Sec. 4 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 (e.g. broken test leads, cracked cases, display not read, 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 voltages above 40 Vdc or 20 Vac. 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.)

Sec. 5 UNPACKING AND CONTENTS CHECK

The DM-7100 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.

- Operation Instructions #230
- TL-58 Test Leads 1 red, 1 black heavy duty with prod tips connected to 90° shielded banana plugs. Use with DM-7100.
- 9V Transistor Type Battery (AWS Part #B-4) See Battery Replacement section 10.2 for proper installation.
- Two fuses installed, One F-23 time delay, ceramic 10 Amp, 250 Vac rating 6.4x32mm. One F-7 fuse, fast acting, 0.5A, 250 Vac rating 5x20mm. One spare F-7 fuse. See Fuse Replacement section 10.3.

Sec. 6 BATTERY REPLACEMENT

This DMM has a self-contained power supply consisting of One 9V Transistor Type Battery (NEDA #1604, AWS Part #B-4). When the multimeter displays the "⎓" the battery must be replaced to maintain proper operation.

WARNING

TO PREVENT ELECTRICAL SHOCK HAZARD, TURN OFF THE MULTIMETER AND DISCONNECT TEST LEADS BEFORE REMOVING THE BACK COVER.

1. After disconnecting test leads and turning off the multimeter, remove back cover by removing the three screws, then lift off the back cover.
2. Replace the battery.
3. Replace the back cover and back case screws before using the instrument.

Sec. 7 FUSE REPLACEMENT

The DM-7100 uses two fuses. A 0.5A 250V 5x20mm fast acting fuse AWS Part #F-7 is installed in the instrument and used to protect the 400mA ranges along with other solid state components.

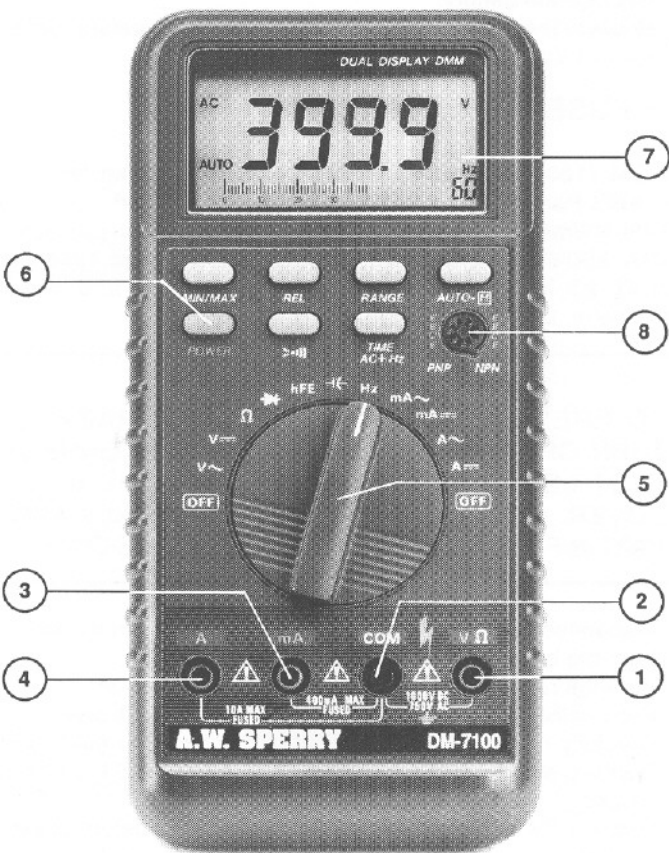
A 10A 250V 6.4 x 31.8mm time delay ceramic fuse AWS Part #F-23 is also installed in the instrument and used to protect the 10A range.

WARNING

TO PREVENT ELECTRICAL SHOCK HAZARD, TURN OFF THE MULTIMETER AND DISCONNECT TEST LEADS BEFORE REMOVING THE BACK COVER. REPLACE THE FUSES WITH ONLY AWS PART #s F-7 AND F-23 OR APPROVED EQUALS ONLY.

1. Disconnect the test leads from any energized circuit and then from the instrument.
2. Turn the range selector switch to the "OFF" position.
3. Remove the three back case screws, then lift off the back cover.
4. Carefully remove the fuse (F-7 or F-23) from the base holder. Replace with AWS F-7 for 400mA ranges or AWS F-23 for 10A ranges.
5. Replace the back cover and backcase screws before using the instrument.

8 FRONT PANEL CONTROLS



1. **V Ω Volt, Ohms, Capacitance, Diode, Frequency Input Terminal**

This is the positive input terminal for all functions except current measurements. Connection is made here using the accessory red test lead.

2. **COM Common Terminal**

This is the negative (ground) input terminal for all measurement modes. Connection is made to it using the accessory black test lead.

3. **mA Milliamp/Input Terminal**

This is the positive input terminal for current measurement (ac or dc) up to 400mA Connection to it using the accessory red test lead.

4. **10A 10 Amperes Input Terminal**

This is the positive input terminal for current measurement (ac or dc) up to 10A. Connection is made to it using the accessory red test lead.

5. **Function Selector Rotary Switch**

This rotary switch selects the measurement function when aligned with function symbols on the panel.

6. **Auto Power Off**

Auto power-off extends the life of the battery by turning the meter off after approximately 30 minutes. The meter turns back on when the power switch is pressed.

7. **Liquid Crystal Display (LCD)**

This liquid crystal display provides a 3 ³/₄ digit measurement data display having a maximum count of 4000 as well as unit and function annunciators.

8. **Transistor Test Socket**

In the transistor measurements, insert the transistor leads into this socket.

| | | |
|-----------|--|-----------------------|
| | Primary display | Secondary display |
| Hz(AC+Hz) | V ac | Input frequency |
| MIN/MAN | MIN/MAX value | Current reading value |
| Rel | Relative value | Reference value |
| CMP | $\frac{\text{Cur}-\text{Ref}}{\text{Ref}} \times 100\%$ or "OL" | Reference value |
| TIME | Input value | Time |
| AUTO HOLD | Stable signal | First date hold |

Cur: input value, Ref: Reference value

Sec. 8.1 SPECIAL FUNCTIONS

- Hz(AC+HZ)**

The instrument can measure two different values on the same signal, frequency and V ac. Press "TIME (AC+Hz)" key on frequency range to display V ac on the primary display.

- TIME**

Timer goes up to 10 minutes by pressing TIME key. Time returns back to "0.00.0" second after reaching 9 minutes & 59.9 seconds.

- MIN/MAX**

The MIN/MAX key makes it possible to select min or max mode. The minimum/maximum value is displayed on the primary display. The current input value is displayed on the secondary display.

- AUTO HOLD**

On this mode set, the secondary display captures the first input value. It is same as Data-hold function. The primary display updates when a new measurement which has been stable for over 1 second is entered. Overload in resistance mode and under 10 counts in the other are considered as no input and are to be ignored.

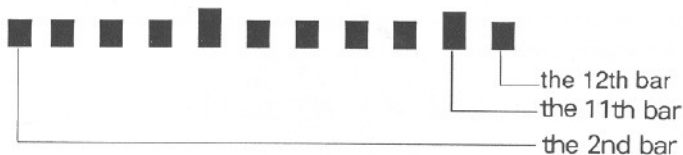
- **REL**

The relative value is calculated, which is the difference between current input value and the reference value set on the "REL" key pressed to select REL mode, to be shown on the primary display. In this mode, the secondary display keeps the reference value.

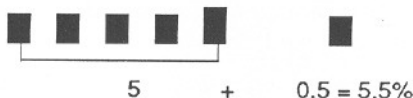
- **COMPARE (Rel %)**

The meter has a compare function for in-tolerance limits testing. The function is available when REL key is pressed once more after the REL model set. Upper-and lower- limits of 0% to $\pm 10\%$ in the step 0.5% can be given by the ">-11)" key. The initial default limit is 0%. Buzzer informs of in-or out-tolerance with primary display shows the percentage of tolerance, as $\{[(\text{current input value} - \text{Reference value}) / \text{Reference value}] \times 100\}\%$. "OL" of the primary display indicates over 30% of tolerance. Bar graph indicates the selected limit as follows:

The 12th bar means 0.5% and 2nd to 11th bars means 1% to 10%.



So, you can verify the set limit by adding the number of displayed the 2nd to 11th bars and 0.5 when the 12th bar is being displayed or non when that is not being displayed.



NOTE: When the meter performs as abnormal function, press the "POWER" key twice within 1 second, and then the meter will restart.

AVAILABLE SPECIAL FUNCTIONS ON MODE

| MODE | MIN/MAX | REL,COMPARE | RANGE | A-H | >-11) | TIME(AC+Hz) |
|-------|---------|-------------|-------|-----|-------|-------------|
| V | Y | Y | Y | Y | N | Y |
| A | Y | Y | N | Y | N | Y |
| OHM | Y | Y | Y | Y | Y | Y |
| Diode | N | N | N | N | N | Y |
| CAP | N | N | N | N | N | Y |
| hFE | N | N | N | N | N | Y |
| FREQ | N | N | N | N | N | AC+Hz |

Sec. 9 OPERATION

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. Instead refer to Sec. 14 Return for Repairs.

Sec. 9.1 VOLTAGE MEASUREMENTS

1. Insert the black and red test leads into the respective "COM" and "V- Ω " terminals.
2. Place the range selector switch into the 1000Vdc position if a dc voltage is to be measured or into the 750 Vac position if an ac voltage is to be measured. Always start in the highest range of the function to be measured.

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 1000 Vdc/750 Vac or if the voltage is unknown. 1000 Vdc and 750 Vac is the maximum voltages that this instrument is designed to measure. The "COM" terminal potential should not exceed 500V measured to ground.

3. Apply the test leads to the two points at which the voltage reading is to be taken. Be careful not to touch any energized conductors with any parts of your body.
4. Turn the range selector switch to the next lower range for a more accurate reading only if the reading is within that next lower range.
5. When measurements are completed, disconnect the test leads from the circuit under test. Remove the test leads from the instrument.

(See Section 9.6 for Dual Display AC Voltage & Frequency Measurements.)

Sec. 9.2 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. Always start with the highest range of the function to be measured.

CAUTION

Do not attempt to take a current if unknown or above 10A ac/dc. The mA input terminal is protected by a 500mA/250V fast fuse. The 10A input terminal is protected by a 10A/250V time delay ceramic fuse.

3. Completely de-energize the circuit in which the current is to be measured. Place the DMM in series with the conductor carrying the current which is to be measured. Energize the circuit.

CAUTION

Before changing ranges, always de-energize the circuit completely. An open circuit exists between the test leads during range change on the DMM.

4. To change to a lower range, move the red test lead to the "mA" jack on the DMM and switch the range selector switch to the 400mA position.

CAUTION

The mA ranges are fuse protected. To avoid possible electrical shock, instrument damage and/or equipment damage do not:

1. Attempt to take mA current readings on circuits having more than 400mA current flow.
2. Impress a voltage between the "COM" and "mA" terminals exceeding 250Vac/dc. Some circuit damage may result for voltages below 250Vac/dc.
3. Raise the "COM" terminal potential above 500V to ground.
4. Energize the circuit. If the reading is within the lower range, switch to that range after completely de-energizing the circuit under test.
5. Completely de-energize the circuit before removing the test leads.

RESISTANCE AND DIODE MEASUREMENTS

1. Insert the black and red test leads into the respective "COM" and "V- Ω " terminals.
2. Place the range selector switch into the Ω or ∇ range desired for a measurement. (The diode check entails injecting a given current into the diode junction to be tested and reading the voltage drop across the diode).

CAUTION

All resistance and diode measurements should be taken on de-energized circuits only. To avoid possible electrical shock, instrument damage and/or equipment damage do not connect the "COM" and "V- Ω " terminals to circuits having a potential difference exceeding 250Vdc/ac. Do not connect the "COM" terminal to potentials exceeding 250V to ground.

3. Completely de-energize the circuit or device which is to be measured. Connect the test leads to the device (the red test lead is positive with respect to the black test lead). When measuring a diode, connect the "V- Ω " terminal to the anode. A reading of "O.L." indicates an overrange condition or the diode junction is reverse biased. This will occur with the test leads open on all resistance or diode ranges. If overrange occurs when taking a reading, switch to the next highest range for resistance measurements.

CONTINUITY MEASUREMENTS

1. Place the range selector switch into (Ω) position.
2. Insert the black and red test leads into the respective "COM" and "V- Ω " terminals.
3. Press the \rightarrow continuity button.

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 250 Vdc/ac. Do not connect the common terminal to potentials exceeding 250 to ground.

4. Touch the test leads to the two points at which continuity is to be tested. The tone will sound if the reading on the display is approximately less than 10Ω .

Sec. 9.5 TRANSISTOR HFE MEASUREMENTS

1. Place the range selector switch into the "HFE" and plug the NPN or PNP transistor into test socket depending on which type of bipolar transistor to be measured.
2. Be sure to observe proper lead connection as shown on the front of the instrument.
3. Read the HFE value in the display.

Sec. 9.6 FREQUENCY MEASUREMENTS

1. Place the range selector switch into the Hz position.
2. Insert the black and red leads into the respective "COM" and "V- Ω " terminals.
3. Apply the test prods to the points across which the frequency is to be measured, and read the result directly from the display.

NOTE: When used as a frequency function, the instrument is in auto ranging mode

CAUTION

The frequency range has overload protection to 250 V AC/DC. Do not exceed this limit. To do so could damage your multimeter.

AC + Hz Dual Range

4. The instrument can measure two different values on the same signal, frequency and Vac. Press "Time (AC + Hz)" button on frequency range to display Vac on the primary display and Hz on the secondary display.

Sec. 9.7 CAPACITANCE MEASUREMENTS

WARNING

All capacitance measurements should be made on de-energized circuits only. Discharge capacitor before taking measurements.

1. Insert the black and red test leads into the respective "COM" and "V- Ω " terminals.
2. Turn off power to the circuit, and make sure that any capacitor being checked is fully discharged.
3. Place the range selector switch into the " $\text{--}\text{f}\text{--}$ " range desired for a measurements.
4. Touch the probes to the capacitor. Always observe polarity markings when measuring polarized capacitors.
5. Read capacitance directly from the display.

Sec. 10 MAINTENANCE

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

Sec. 10.1 **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 "clean" air at less than 25 PSI. Use care and caution around the LCD display protector and areas where water or air could enter the interior of the instrument while drying.

Sec. 10.2 **BATTERY REPLACEMENT**

Required when "☹" appears on display or nothing appears. See BATTERY REPLACEMENT in section 6.

Sec. 10.3 **FUSE REPLACEMENT**

Required when current ranges do not function. See FUSE REPLACEMENT in section 7.

Sec. 11 **ACCESSORIES**

The following accessories are available to expand the measurement capabilities of DM-7100. Refer to their respective data sheets or operating instructions for full specifications.

Sec. 11.1 **AC CURRENT MEASUREMENT SJA-870**

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

Input: 0 - 1200Aac max.

Output: 0 - 12Vac at > 1M Ω load

Accuracy: $\pm(3\% \text{ rdg} + 1\text{A})$ with conductor in center of jaw

Frequency: 50 - 400 Hz

Sec. 11.2 AC CURRENT MEASUREMENT CA-200

The CA-200 is a split core current transformer capable of measuring AC current up to 200 Aac.

Input: 0 - 200 Aac

Output: 0 - 200 mV FS at $> 1\text{M}\Omega$

Accuracy: $\pm (1\% \text{ rdg} + 0.2\text{A})$, 50-60 Hz

$\pm (3\% \text{ rdg} + 0.2\text{A})$, 60 - 400 Hz

Frequency: 50 - 400 Hz

Sec. 11.3 AC/DC CURRENT MEASUREMENT CA-250

The CA-250 is a split core current transformer capable of measuring both AC and DC current up to 2000 Aac/dc.

Input: 0 - 200/2000 Aac

0 - 200/2000 Adc

Output: 0-2V FS at $> 1\text{M}\Omega$

Accuracy: $\pm(3\% \text{ rdg} + 2\text{mv})$

Frequency: DC, 50 - 400 Hz

Sec. 11.4 HIGH VOLTAGE DC MEASUREMENT HVP-860

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

Input: 0 - 50,000Vdc

Output: 0 - 50Vdc at a $10\text{M}\Omega$ load

Accuracy: $\pm(1.5\% \text{ of F.S.})$

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 essential unlimited energy where special equipment is recommended. **DO NOT** use on these types of High Energy circuits!

Sec. 11.5 TEMPERATURE ADAPTER - TA-1A

The Model TA-1A is a temperature adapter capable of measuring temperature up to 1300°C/2372°F.

Temperature Range: °F/°C Selectable
 -50°C to 1300°C/-58°F to 2372°F

Output: 1mVdc/°C or °F

Required Load on Output: 10MΩ

Sec. 11.6 CARRYING CASE - C-67

Carrying Case for DM-7100 series

Sec. 11.7 ALLIGATOR CLIPS - AG-940

Two black, Insulated Push-on Alligator Clips.

Sec. 12 **CALIBRATION**

Calibration on these meters should be performed every year. This can be done by sending the instruments prepaid to:

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

Specify in writing that calibration is necessary. The instrument will be returned to you normally within one week. Estimates will be furnished upon request.

CAUTION

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

WARNING

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

Sec. 12.1 **CALIBRATION PROCEDURE**

The procedure should be performed at an ambient temperature of $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 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 back case screw, and carefully pry up the back case.

2. Set the range switch to the "DC V" position and connect it to the "VΩ" and "COM" input terminals.
3. Set the output of the DC calibrator for $20.00\text{ V} \pm 0.02\%$.
4. Adjust VR1 until the display reads $20.00\text{ V} \pm 1$ digit.
5. Carefully inspect the other DCV ranges. Your readings should be within specification listed below.

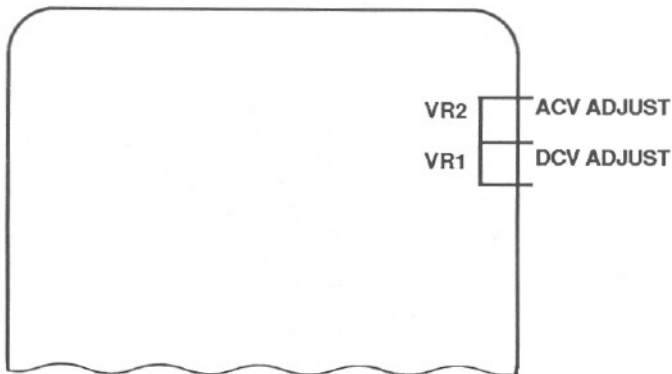
| | |
|-------|---|
| 400mV | Range : $\pm(0.3\% + 2 \text{ digits})$ |
| 4V | Range : $\pm(0.1\% + 2 \text{ digits})$ |
| 40V | Range : $\pm(0.1\% + 2 \text{ digits})$ |
| 400V | Range : $\pm(0.1\% + 2 \text{ digits})$ |
| 1000V | Range : $\pm(0.1\% + 2 \text{ digits})$ |

6. Set the range switch to the "AC V" position and connect it to the "VΩ" and "COM" input terminals.
7. Set the output of the AC calibrator for $200.0\text{ V}/60\text{Hz} \pm 0.02\%$.
8. Adjust VR2 until the display reads $200.0\text{ V} \pm 1$ digit.
9. Carefully inspect the other ACV ranges. Your readings should be within specification list below.

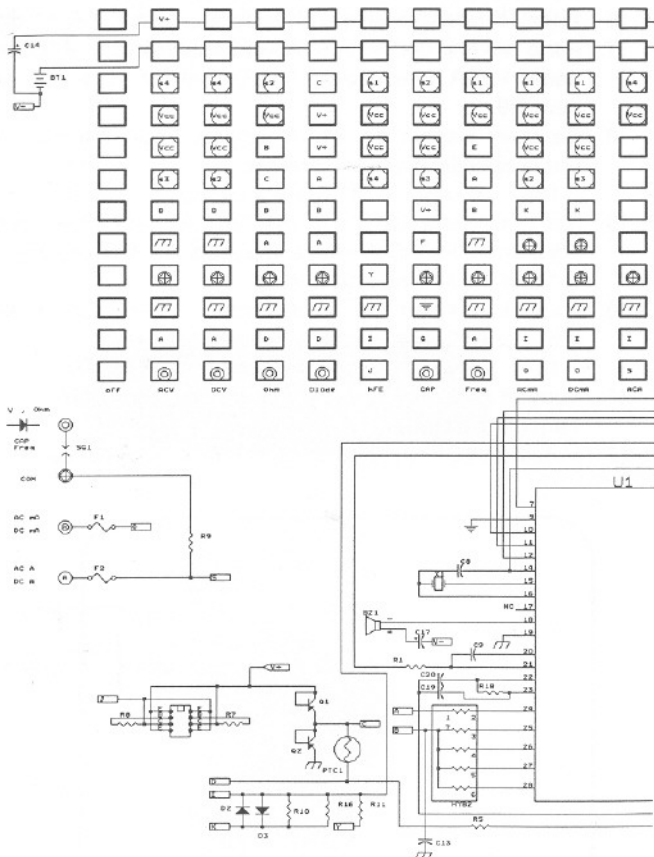
| | 50-60Hz | 45-1KHz |
|------|---|------------------------------|
| 4V | Range : $\pm(1\% + 5 \text{ digits})$ | $\pm(2\%+10 \text{ digits})$ |
| 40V | Range : $\pm(0.5\% + 5 \text{ digits})$ | $\pm(1\%+5 \text{ digits})$ |
| 400V | Range : $\pm(0.5\% + 5 \text{ digits})$ | $\pm(1\%+5 \text{ digits})$ |
| 750V | Range : $\pm(0.5\% + 5 \text{ digits})$ | $\pm(1\%+5 \text{ digits})$ |

10. Set the range switch to the "DC mA" position. There is no adjustment for DCmA range. Connect the mA source to the "mA" and "COM" input terminals.
11. Carefully inspect the DC mA ranges. Your readings should be within the specification listed below.
400mA Range : $\pm(1\% + 5 \text{ digits})$
12. Set the range switch to the "AC mA" position. There is no adjustment for ACmA range. Connect the mA source to the "mA" and "COM" terminals.
13. Carefully inspect the AC mA ranges. Your readings should be within specification listed below.
400mA Range : $\pm(1.5\% + 5 \text{ digits})$ at 45-1KHz.
14. Set the range switch to the "DC A" position.

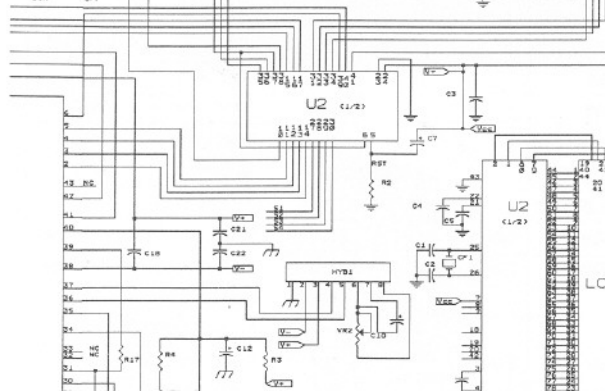
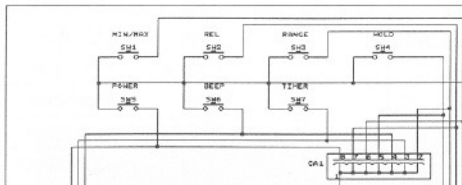
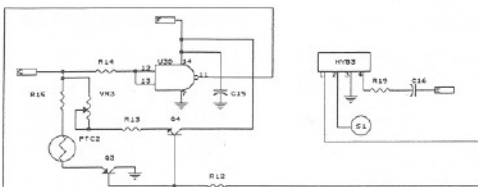
15. Set the output of the DC calibrator for $1.9A \pm 0.02\%$ and connect it to the "A" and "COM" input terminals.
16. Adjust R9 (shunt resistor) until the display reads $1.90A \pm 1$ digit.
17. If the reading is over 1.91A, add solder to R9. If the reading is under 1.89A, shave away lightly some of the solder and metal from R9.
18. Carefully inspect the DC A ranges. Your readings should be within specification listed below.
10A Range : $\pm(1.5\% + 5 \text{ digits})$
19. Set the range switch to the "AC A" position. There is no adjustment for AC A range. Connect the Ampere source to the "A" and "COM" input terminals.
20. Carefully inspect the AC A ranges. Your readings should be within specification listed below.
10A Range : $\pm(2\% + 5 \text{ digits})$ at 45-1KHz.
21. Turn off calibrator and disconnect from the DMM.
Turn off the DMM.
22. Install the back case and insert the back case screw.



CIRCUIT DIAGRAM



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



PARTS LIST

| PART | DESCRIPTION | SIZE |
|-----------|-----------------|-------------|
| U1 | A/D Converter | 44 Pin Flat |
| U2 | CPU | 80 Pin Flat |
| U3 | 4011 | 14 Pin Dip |
| HYB1 | MY66-01 | 8 Pin Sip |
| HYB2 | HC-ADM-V | 7 Pin Sip |
| HYB3 | MY66-03 | 4 Pin Sip |
| X1 | XTAL 32.768KHz | |
| CF1 | Resonator | |
| D1 | 1.2V Ref | |
| D2,D3 | 1N4004 | |
| PTC1,2 | PTC 1.5K Ohm | |
| SG1 | Spark Gap | |
| Q1,2 | KN2907 | |
| Q3 | 2SA1266 | |
| Q4 | 2SC3198 | |
| VR1 | Variable 1K Ohm | |
| VR2 | Variable 500Ohm | |
| VR3 | Variable 20KOhm | |
| C1,2 | 33pF/50V | Cer |
| C3,4,5,6 | 0.1uF/50V | Cer |
| C11,13,15 | | |
| C18,21,22 | | |
| C7,14,17 | 10uF/16V | Elect |
| C8 | 10pF/50V | Cer |
| C9 | 4.7nF/63V | Mylar |

| PART | DESCRIPTION | SIZE |
|---------|----------------|----------|
| C10 | 22uF/16V | Elect |
| C12 | 6.8uF/16V | Elect |
| C16 | 0.47uF/400V | Mylar |
| C19,20 | 0.022uF/50V | Mylar |
| R1 | 604K Ohm | 1/4W MF |
| R2 | 4.7K Ohm | 1/4W C |
| R3 | 3.3K Ohm | 1/4 W C |
| R4,6 | 2.7K Ohm | 1/4W C |
| R5 | 330K Ohm | 1/4/W MF |
| R7,8,19 | 240K Ohm | 1/4W C |
| R9 | Shunt 0.01Ohm | |
| R10 | 0.977 Ohm | 1W |
| R11 | 100 Ohm | 1/4W MF |
| R12 | 10K Ohm | 1/4W C |
| R13 | 100K Ohm | 1W C |
| R14 | 270K Ohm | 1/4W MF |
| R15 | 1K Ohm | 1W C |
| R16 | -RESERVED- | |
| R17 | 1M Ohm | 1/4W MF |
| R18 | 1.2M Ohm | 1/4W MF |
| BZ1 | Buzzer | |
| F1 | Fuse 0.5A/250V | |
| F2 | Fuse 10A/250V | |
| CA1 | -RESERVED- | |
| C23-29 | -RESERVED- | |

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, N.Y. 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.