I. DISPLAY FUNCTIONS & SYMBOLS

<p>| | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Diode Test</td>
<td>Battery Test</td>
</tr>
<tr>
<td>V~</td>
<td>AC - Alternating Current</td>
<td>mA \approx mA - Millamp</td>
</tr>
<tr>
<td>V…</td>
<td>DC - Direct Current</td>
<td>10A \approx A - Amp</td>
</tr>
<tr>
<td>Ω</td>
<td>Ohm - Resistance</td>
<td>OFF</td>
</tr>
</tbody>
</table>

II. SAFETY WARNINGS

- This instruction manual contains warnings and safety rules which must be observed by the user to ensure safe operation of the instrument and retain it in safe condition.
- Read through and understand the instructions contained in this manual before using the instrument.
- Keep the manual at hand to enable quick reference whenever necessary.
- The instrument is to be used only in its intended applications.
- Understand and follow all the safety instructions contained in the manual.
- It is essential that all safety instructions are adhered to.
- Failure to follow the safety instructions may cause injury, instrument damage

The symbol \( \Delta \) indicated on the instrument means that the user must refer to the related parts in the manual for safe operation of the instrument. It is essential to read the instructions wherever the symbol appears in the manual.
DANGER is reserved for conditions and actions that are likely to cause serious or fatal injury.

WARNING is reserved for conditions and actions that can cause serious or fatal injury.

CAUTION is reserved for conditions and actions that can cause injury or instrument damage.

**DANGER**

- Never make measurement on a circuit in which voltage over 1000V exists.
- Do not exceed the CAT rating of the measuring device.
- Do not attempt to make measurement in the presence of flammable gases. The use of the instrument may cause sparking, which can lead to an explosion.
- Never use the instrument if its surface or your hand is wet.
- Do not exceed the maximum allowable input of any measuring range.
- Never open the battery cover during a measurement.
- The instrument is to be used only in its intended applications or conditions. Use in other than as intended may cause instrument damage or serious personal injury.

**WARNING**

- Never attempt to make any measurement if any abnormal conditions are noted, such as broken case, cracked test leads and exposed metal part.
- Do not turn the function selector switch with plugged in test leads connected to the circuit under test.
- Do not install substitute parts or make any modification to the instrument. Return the instrument to your distributor for repair or recalibration.
- Do not try to replace the batteries if the surface of the instrument is wet.
- Always switch off the instrument before opening the battery compartment cover for battery replacement.

**CAUTION**

- Set the Function Switch to an appropriate position before starting measurement.
- Firmly insert the test leads.
- Disconnect the test leads from the instrument for current measurement.
- Do not expose the instrument to the direct sun, high temperature and humidity or dewfall.
- Be sure to power off the instrument after use. When the instrument will not be in use for a long period, place it in storage after removing the batteries.
- Use only a soft cloth dampened with water or neutral detergent for cleaning the meter. Do not use abrasives, solvents or harsh chemicals. Allow to dry thoroughly before use.

**Measurement categories (Over-voltage categories)**

To ensure safe operation of measuring instruments, IEC61010 establishes safety standards for various electrical environments, specified as CAT I through CAT IV, and called measurement categories. Higher-numbered categories correspond to electrical environments with greater momentary energy, so a measuring instrument designed for CAT III environments can endure greater momentary energy than one designed for CAT II.

- **CAT I**: Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.
- **CAT II**: Primary electrical circuits of equipment connected to an AC electrical outlet by a power cord.
- **CAT III**: Primary electrical circuits of the equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets.
- **CAT IV**: The circuit from the service drop to the service entrance, and to the power meter and primary over current protection device (distribution panel).
GENERAL SPECIFICATIONS
Calibration is guaranteed for 1 year.

OPERATING INSTRUCTIONS

WARNING
To avoid electrical shock hazard and/or damage of the instrument, do not measure voltages that might exceed 500V above earth ground.

WARNING
Before the use of instrument, inspect test leads, connectors and probes for cracks, breaks, or crazes in the insulation.

DC & AC VOLTAGE MEASUREMENT
1. Connect the red test lead to the to “VΩmA” input, and the black test lead into the “COM” input.
2. Set the RANGE switch to the desired VOLTAGE position, if the voltage to be measured is not known beforehand, set the RANGE switch to the highest range to protect the meter. Then reduce the range until a satisfactory reading is obtained.
3. Connect test leads to device or circuit being measured.
4. The reading will appear on the digital display along with the voltage polarity.

DC CURRENT MEASUREMENT
1. Connect the red test lead to the “VΩmA” input, and the black test lead to the “COM”.
   *Note: Connect the red test lead to the “10A” input for measurements between 200mA and 10A.
2. Set the RANGE switch to the desired DC Amperage position.
3. Connect the test leads in-series with the circuit to be measured.
4. The reading will appear on the digital display.
   *Note: The “10A” function is designed for intermittent use only. Testing should not last more than 15 seconds at a time to protect the user and the meter.

RESISTANCE MEASUREMENT
1. Insert the red test lead into the “VΩmA” input and the black test lead into the “COM” input.
2. Set the RANGE switch to the desired OHM position.
3. If the resistance being measured is connected to a circuit, turn off power and discharge all capacitors before measurement.
   *Note: If the resistance being measured is connected to a circuit, TURN OFF the power and discharge all capacitors before making any measurement.
4. Connect test leads to circuit being measured.
5. The resistance value will be appear on the digital display.

DIODE MEASUREMENT
1. Insert the red test lead into the “VΩmA” input and the black test lead into the “COM” input.
2. Set the RANGE switch to the “”.
3. Connect the RED test lead to the anode of the diode and the BLACK test lead to the cathode.
4. The forward voltage drop in mV will be displayed. If the diode is reversed, a “1” will be shown.

TRANSISTOR hFE MEASUREMENT
1. Set the RANGE switch to the hFE position.
2. Determine whether the transistor is PNP of NPN type and locate the emitter base and collector leads. Insert the leads into the proper holes of the hFE SOCKET on the front panel.
3. The meter will display the approximate hFE value at the condition of the base current 10μA and Vce2.8V.

BACK-LIGHT FUNCTION
This meter has back-light function, you can push the LIGHT button to light the back-light LED.
BATTERY AND FUSE REPLACEMENT
1. If “bat” appears in the display, it is indicating that the battery should be replaced.
2. Turn the meter on its face and remove the 2 screws.
3. Remove the back panel and locate the battery or fuse.
4. Replace the battery or fuse, re-attach the back cover and re-install the screws.

CAUTION
Before attempting to open the case, be sure to disconnect the test leads to avoid electrical shock.

ACCESSORIES
• Operator's instruction manual
• Set of test leads
• 9-volt battery, NEDA 1604 6F22 type.
• Fuse (500mA/250V)

TECHNICAL SPECIFICATIONS

DC VOLTAGE

<table>
<thead>
<tr>
<th>RANGE</th>
<th>RESOLUTION</th>
<th>ACCURACY</th>
</tr>
</thead>
<tbody>
<tr>
<td>200mV</td>
<td>100μV</td>
<td>±(0.5% of rdg + 3D)</td>
</tr>
<tr>
<td>2000mV</td>
<td>1mV</td>
<td>±(0.8% of rdg + 2D)</td>
</tr>
<tr>
<td>20V</td>
<td>10mV</td>
<td>±(1.0% of rdg + 2D)</td>
</tr>
<tr>
<td>200V</td>
<td>100mV</td>
<td>±(1.0% of rdg + 2D)</td>
</tr>
<tr>
<td>1000V</td>
<td>1V</td>
<td>±(1.0% of rdg + 2D)</td>
</tr>
</tbody>
</table>

OVERLOAD PROTECTION: 220V rms AC for 200mV range and 1000V DC or 750V rms for all ranges.

AC VOLTAGE

<table>
<thead>
<tr>
<th>RANGE</th>
<th>RESOLUTION</th>
<th>ACCURACY</th>
</tr>
</thead>
<tbody>
<tr>
<td>200V</td>
<td>100mV</td>
<td>±(1.2% of rdg + 10D)</td>
</tr>
<tr>
<td>750V</td>
<td>1V</td>
<td></td>
</tr>
</tbody>
</table>

RESPONSE: Average responding, calibrated in rms of a sine wave.
FREQUENCY RANGE: 45Hz ~ 450Hz
OVERLOAD PROTECTION: 1000V DC or 750V rms for all ranges.

DC CURRENT

<table>
<thead>
<tr>
<th>RANGE</th>
<th>RESOLUTION</th>
<th>ACCURACY</th>
</tr>
</thead>
<tbody>
<tr>
<td>200μA</td>
<td>0.1μA</td>
<td>±(1.8% of rdg + 2D)</td>
</tr>
<tr>
<td>2000μA</td>
<td>1μA</td>
<td>±(2.0% of rdg + 2D)</td>
</tr>
<tr>
<td>20mA</td>
<td>10μA</td>
<td>±(2.0% of rdg + 2D)</td>
</tr>
<tr>
<td>200mA</td>
<td>100μA</td>
<td>±(2.0% of rdg + 2D)</td>
</tr>
<tr>
<td>10A</td>
<td>10mA</td>
<td>±(2.0% of rdg + 2D)</td>
</tr>
</tbody>
</table>

OVERLOAD PROTECTION: 500mA 250V fuse (10A range unfused).
MEASURING VOLTAGE DROP: 200mV

RESISTANCE

<table>
<thead>
<tr>
<th>RANGE</th>
<th>RESOLUTION</th>
<th>ACCURACY</th>
</tr>
</thead>
<tbody>
<tr>
<td>200Ω</td>
<td>100MΩ</td>
<td>±(1.0% of rdg + 10D)</td>
</tr>
<tr>
<td>2000Ω</td>
<td>1Ω</td>
<td>±(1.0% of rdg + 4D)</td>
</tr>
<tr>
<td>20KΩ</td>
<td>10Ω</td>
<td></td>
</tr>
<tr>
<td>200KΩ</td>
<td>100Ω</td>
<td></td>
</tr>
<tr>
<td>2000KΩ</td>
<td>1KΩ</td>
<td></td>
</tr>
</tbody>
</table>

MAXIMUM OPEN CIRCUIT VOLTAGE: 3.2V.
OVERLOAD PROTECTION: 15 seconds maximum 220Vrms.
SPERRY INSTRUMENTS LIMITED LIFETIME WARRANTY

Subject to the exclusions and limitations detailed below, Sperry Instruments provides a limited lifetime warranty on products of its manufacture will be free from defects in materials and workmanship under normal use and service.

Limited

Limited means that Sperry Instruments warrants to the original purchasers of products from Sperry Instruments authorized distributors at the time of shipment such products shall be free of defects in material and workmanship while the tool is used under normal working conditions. Standard wear and tear, dulling over time, overloading, misuse, and acts of God are not covered under warranty. This warranty does not cover batteries, fuses, or test leads.

When a warranty claim arises, the purchaser must contact Sperry Instruments. If the defect comes under the terms of this limited warranty, Sperry Instruments will arrange, at its sole discretion, one of the following options:

• Product will be replaced

The purchaser is solely responsible for determining the suitability of Sperry products for the purchaser’s use or resale, or for incorporating them into articles or using them in the purchaser’s applications. The distributor is authorized to extend the foregoing limited warranty to its original purchasers in connection with the sales of Sperry products, provided that such products shall not have been altered by the distributor. The distributor shall be fully responsible for any warranties the distributor makes to its purchasers which are broader or more extensive than Sperry’s limited warranty.

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No warranty will be honored unless an invoice or other proof of purchase date is provided to Sperry Instruments. Hand written receipts or invoices will not be honored.

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- See more at: http://www.sperryinstruments.com/en/resources/warranty-page#sthash.4sNKZu3b.dpuf