

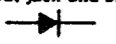
## (2) DC/AC Current Measurement

1. Connect red test lead to 'mA' input jack for current measurement up to 200mA, and black one to 'COM'.
2. Set rotary/function switch to desired 'DC' or 'AC' current position. If magnitude of current is not known, set rotary/function switch to the highest range and reduce until satisfactory reading is obtained.
3. Open the circuit to be measured, and connect test leads in series with the load in which current is to be measured.
4. Read current value on digital display.
5. Turn off all power to the circuit being tested and discharge all capacitors prior to disconnecting test lead.
6. To measure in the 10A range, use the '10A' jack as input jack. Be sure to measure within 10 seconds to avoid high-current hazard.

## (3) Resistance Measurement

1. Connect red test lead to 'V · Ω' input jack and black one to 'COM'.
2. Set rotary/function switch to desired 'Ω' position.
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 point even if insulated, because some insulators have a relatively low insulation resistance, causing the measured resistance to be lower than the actual resistance.
5. Read resistance value on digital display.


## (4) Diode Test

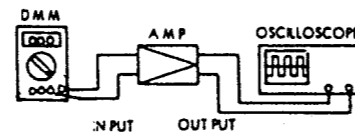
1. Connect red test lead to 'V · Ω' input jack and black one to 'COM'.
2. Set rotary/function switch to . (Same as 2000Ω resistance range.)
3. If the semiconductor junction being measured is connected to circuit, turn off power to circuit being tested and discharge all capacitors.
4. Connect test leads to the device and read forward value on digital display.
5. If the digital display reads overrange (1), reverse the lead connections. The placement of test leads when forward reading is displayed indicates the orientation of diode. The red lead is positive and the black lead is negative. If overrange(1) is displayed with both lead connections, the junction is open.

## (5) Continuity Test

1. Connect red test lead to 'V · Ω', and black one to 'COM'.
2. Set rotary/function switch to 'BUZZ' (same as 200Ω resistance range).
3. Buzzer sounds if the resistance between two leads is less than appr. 50 ohms.

## (6) Signal Injector

1. Connect black test lead to the "COM" and red one to the "V · Ω" input jack.
2. Set rotary/function switch to the signal injector position(  ).
3. Sound test or oscilloscope.



## 4. Operation Maintenance.

### 4-1 Battery & Fuse Replacement

#### CAUTION

BEFORE ATTEMPTING BATTERY REMOVAL OR REPLACEMENT, DISCONNECT TEST LEADS FROM ANY ENERGIZED CIRCUITS TO AVOID SHOCK HAZARD.

Fuse rarely needs replacement and blows almost always as a result of operator error. To replace Battery & Fuse remove the 2 screws in the bottom of the case. Simply remove the old, and replace with a new one. Be sure to observe polarity when replacing battery.

## 4-2 Calibration Procedure

It is normally not necessary to recalibrate for long intervals.

If needed, adjustment should be done with highly accurate standards(better than 0.1% accuracy).

Remove the 2 Phillipshead screws. Carefully remove the plastic back cover. With the instrument operating, set to the 200mV DC range, apply 190mV DC from an accurate source. With a small screwdriver inserted into the semi fixed resistor, SVRI, carefully turn the variable resistor into the reading until the reading reads 190mV

## 5. SAFETY SYMBOLS



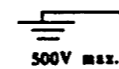
This marking adjacent to another marking or a terminal or operating device indicates that the operator must refer to an explanation in the Operating Instructions to avoid damage to the equipment and/or to avoid personal injury.



This WARNING sign denotes a hazard. It calls attention to a procedure, practice or the like, which if not correctly performed or adhered to, could result in personal injury.



This CAUTION sign denotes a hazard. It calls attention to a procedure, practice or the like, which if not correctly adhered to could result in damage to or destruction of part or all of the instrument.



This marking advises the user that the terminal(s) so marked must not be connected to a circuit point at which the voltage, with respect to earth ground, exceeds (in this case) 500 Volts.



This symbol adjacent to one or more terminals identifies them as being associated with ranges that may in normal use be subjected to particularly hazardous voltages. For maximum safety, the instrument and its test leads should not be handled when these terminals are energized.

## OPERATOR'S INSTRUCTION MANUAL



## Model 2702 Digital Multimeter



**READ AND UNDERSTAND THIS MANUAL  
BEFORE USING THE INSTRUMENT.  
Failure to understand and comply with the  
WARNING and operating instructions can  
result in serious or fatal injuries and/or  
property damage.**

### 1. FEATURES

- \* Wide measuring ranges : 27 ranges for AC/DC Voltage & Current, Resistance, Diode Test.
- Option : Signal Injector, Continuity Test, Temperature.
- \* 10M $\Omega$  Input Impedance.
- \* Large LCD for easy reading.
- \* Heavy-duty & Safe design to meet UL1244 & IEC 1010 safety requirements.
- \* Tilt Stand

### 2. SPECIFICATIONS

#### 2-1 General Specifications

|                         |  |
|-------------------------|--|
| Display                 | 3 $\pm$ LCD 0.95" height, max. reading of 1999.  |
| Polarity                | Automatic "-" sign for negative polarity.  |
| Overrange Indication    | Highest digit of "1" or "-1" is displayed.   |
| Operating Temperature   | 0°C to 50°C<br>less than 80% relative humidity up to 35°C<br>less than 70% relative humidity from 35°C to 50°C |
| Storage Temperature     | -15°C to 50°C  |
| Temperature Coefficient | 0°C to 18°C and 28°C to 50°C<br>less than 0.1 $\times$ applicable accuracy specification per °C.               |
| Power                   | 9V Alkaline or carbon zinc battery (NEDA 1604)   |
| Battery Life (typical)  | 100 hours with carbon zinc cells.<br>200 hours with alkaline cells.  |
| Dimension               | 88(W) $\times$ 171(L) $\times$ 36(H) mm  |
| Weight                  | Approx. 292g   |
| Accessories             | Safety Test Lead 1 pair<br>Operator's manual 1pc.<br>K-type Temperature probe 1pc (option)                     |

#### 2-2 Measurement Ranges (Accuracy : 1 Year, 18°C to 28°C)

| DC Voltage | Range | Resolution  | Accuracy                        | Maximum Input       |
|------------|-------|-------------|---------------------------------|---------------------|
|            | 200mV | 100 $\mu$ V | $\pm 0.25\%$ of rdg $\pm 2$ dgt |                     |
|            | 2V    | 1mV         | $\pm 0.6\%$ of rdg $\pm 4$ dgt  |                     |
|            | 20V   | 10mV        | "                               | DC 1000V or peak AC |
|            | 200V  | 100mV       | "                               |                     |
|            | 1000V | 1 V         | $\pm 0.8\%$ of rdg $\pm 4$ dgt  |                     |

NORMAL MODE REJECTION RATIO : greater than 46dB at 50Hz, 60Hz (1K unbalance)

#### AC Voltage

| Range | Resolution  | Accuracy                       | Maximum Input |
|-------|-------------|--------------------------------|---------------|
| 200mV | 100 $\mu$ V | $\pm 1.2\%$ of rdg $\pm 3$ dgt |               |
| 2V    | 1mV         | "                              |               |
| 20V   | 10mV        | "                              | AC 750V max.  |
| 200V  | 100mV       | "                              | 50-60Hz       |
| 750V  | 1V          | $\pm 1.5\%$ of rdg $\pm 5$ dgt |               |

#### Resistance

| Range   | Resolution | Accuracy                        | Test Current | Input Protection |
|---------|------------|---------------------------------|--------------|------------------|
| 200ohm  | 0.1ohm     | $\pm 0.8\%$ of rdg $\pm 4$ dgt  | Approx       |                  |
| 2Kohm   | 1ohm       | "                               | 1.2mA        |                  |
| 20Kohm  | 10ohm      | "                               |              |                  |
| 200Kohm | 100ohm     | "                               |              | PTC              |
| 2Mohm   | 1Kohm      | $\pm 1.5\%$ of rdg $\pm 5$ dgt  |              |                  |
| 20Mohm  | 10Kohm     | $\pm 3.0\%$ of rdg $\pm 10$ dgt |              |                  |

Maximum Open Circuit Voltage : 2.8V

#### DC Current

| Range       | Resolution  | Accuracy                       | Input Protection |
|-------------|-------------|--------------------------------|------------------|
| 200 $\mu$ A | 100nA       | $\pm 0.8\%$ of rdg $\pm 4$ dgt |                  |
| 20mA        | 10 $\mu$ A  | "                              | 250V/2A Fuse     |
| 200mA       | 100 $\mu$ A | $\pm 1.0\%$ of rdg $\pm 5$ dgt |                  |
| 10A         | 10mA        | $\pm 1.5\%$ of rdg $\pm 5$ dgt | 250V/10A Fuse    |

#### AC Current

| Range       | Resolution  | Accuracy                       | Input Protection |
|-------------|-------------|--------------------------------|------------------|
| 200 $\mu$ A | 100nA       | $\pm 1.2\%$ of rdg $\pm 3$ dgt |                  |
| 20mA        | 10 $\mu$ A  | "                              | 250V/2A Fuse     |
| 200mA       | 100 $\mu$ A | $\pm 1.5\%$ of rdg $\pm 5$ dgt |                  |
| 10A         | 10mA        | $\pm 2.0\%$ of rdg $\pm 5$ dgt | 250V/10A Fuse    |

#### DIODE TEST

Measures forward resistance of a semiconductor junction in K Ohm at max. 1.0mA.

### OPTION

#### Signal Injector

40 $\pm$ 10 Hz Squire Wave, 5V Peak to Peak Voltage (at 30K $\Omega$  Loading)

#### Continuity Test

| Range        | Threshold   | Continuity beeper | Response Time |
|--------------|-------------|-------------------|---------------|
| 200 $\Omega$ | 50 $\Omega$ | 4KHz              | <100ms        |

### 3. Operation

#### 3-1 Preparation and Caution before measurement.

1. If the function must be switched during a measurement, always remove the test leads from the circuit being measured.
2. If the unit is used near noise generating equipment, be aware that the display may become unstable or indicate large errors.
3. Avoid using the unit in places with rapid temperature variations.
4. In order to prevent damage or injury to the unit, never fail to keep the maximum tolerable voltage and current, especially for the 10A current range.
5. Carefully inspect test lead. If damaged, discard and replace.

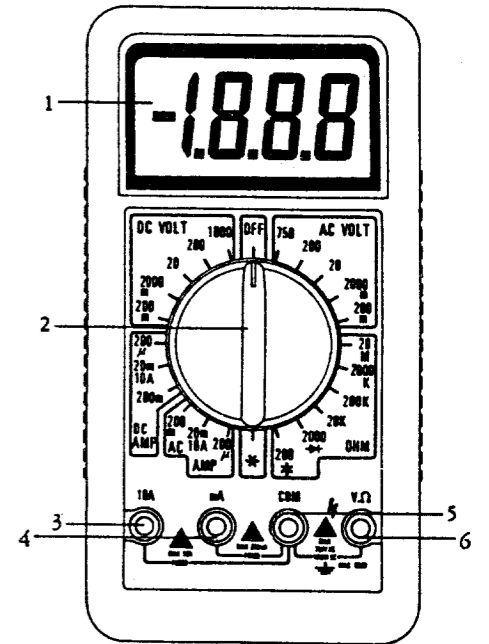
#### 3-2 Panel Description

- |                           |                      |
|---------------------------|----------------------|
| 1. LCD Display            | 4. mA input jack     |
| 2. Rotary/Function switch | 5. Common input jack |
| 3. 10A input jack         | 6. V. Ohm input jack |
- \*\* ; option-signal injector, buzzer, temperature.

#### 3-3 Method of Measurement

##### (1) DC/AC Voltage Measurement

1. Connect red test lead to "V $\Omega$ " input jack and black one to "COM" jack.



2. Set rotary/function switch to desired DC or AC V position.  
If magnitude of voltage is not known, set rotary/function switch to the highest range and reduce until satisfactory reading is obtained.
3. Connect test leads to the device or circuit being measured.
4. Turn on power to the device or circuit being along with voltage polarity.
5. Turn off power to the device or circuit being tested and discharge all capacitors prior to disconnecting test leads.