TESTMATE 175A

INSTRUCTION MANUAL

MODEL SERIES 1

Digital Multimeters

MODEL. 1 SERIES SELECTION GUIDE

MOD. No.	DC VOLTAGE	AC VOLTAGE	DC CURRENT	AC CURRENT	RESISTANCE 20Ω—MΩ	RESISTANCE UP TO 2000MΩ	CAPACITANCE	DIODE TEST	HFE TEST	LOG TEST	AUDIBLE CONTINUITY	FREQUENCY MANSUREMENT 2KHz-10MHz	LED TEST	TEMPERATURE MEASUREMENT	
115	√	√	√	√	√	√		√	√		√				
125	√	√	√	√	√	√	√	√	√	√	√				
135	√	√	√	√	√	√	√	√	√		√			√	
175 A	√	√	√	√	√	√	√	√	√	√	√	√	√		

1. SPECIFICATIONS

1.1 General Specifications

Display	• 3½digit liquid crystal display (LCD) with a maximum reading of 1999.
Polarity	• Automatic, (—) negative polarity indication.
Zero adjustment	• Automatic.
Overrange indication	• Highest digit of (1) or (—1)is displayed.
Low battery	• The (LO BAT) is displayed when the battery voltage drops below the operating voltage.
Measurement rate	• 3 measurements per second, nominal.
Operating temperature	• O°C to +50°C-70%RH.
Storage temperature	• −20°C to +60°C 0-80%RH with battery removed.
Accuracy	• Accuracy specifications at 23 ± 5°C, less than 75%RH.
Power	• Single, standard 9-volt battery, NEDA 1604, JIS 006P, IEC 6F 22.
Battery life (typical)	• 1. High-Power Zinc-Carbon Premium-200 hours.
Dimensions	• 6.3" (16cm) long 3.3" (8.4cm) wide 1" (2.6cm) high
Weight	• 9 ounces (250grams) including battery.
Accessories	• Test leads (pair), spare fuse (2A) battery, operators manual.

1.2 Electrical Specifications

Accuracies are ± (% reading plus number of digits). At 23 ± 5°C, less than 75%RH.

DC VOLTAGE	
RANGE	: 200mV, 2V, 20V, 200V, 1000V
ACCURACY	: ALL RANGE ±0.5%RDG + 1DGT
RESOLUTION	: 100μV
INPUT IMPEDANCE	: 10MΩ
OL. PROTECTION	: 500VDC/350VAC FOR 15 SEC. ON 200mV RANGE, 1200VDC/800VAC ON ALL OTHER RANGE.

AC VOLTAGE	
RANGE	200mV, 2V, 20V, 200V, 750V
ACCURACY	200mV-200V, @50-500Hz, ±1%RDG + 4DGTS 750V @50 – 500Hz, ±1.5%RDG + 4DGTS
RESOLUTION	100μV
INPUT IMPEDANCE	10MΩ
OL. PROTECTION	500VDC/350VAC FOR 15 SEC. ON THE 200mV RANGE, 1200VDC/800VAC ON ALL OTHER RANGE.

DC CURRENT	
RANGE	200μA, 2μA, 20μA, 200μA, 10A
ACCURACY	10A RANGE, ±2%RDG + 3DGTS OTHER RANGE, ±1%RDG + 1 DGT
RESOLUTION	100μA
VOLTAGE BURDEN	10A RANGE 700mV MAX.
OL. PROTECTION	10A INPUT, UNFUSE, UP TO 12A FOR 30 SEC. OTHER RANGE INPUT, 0.8A/250V FUSE.

AC CURRENT	
RANGE	200μA, 2μA, 20μA, 200μA, 10V
ACCURACY	10A RANGE @50 – 500Hz ±2%RDG + 4DGTS OTHER RANGE @50 – 500Hz ±1.2%RDG + 4DGTS
RESOLUTION	100nA
VOLTAGE BURDEN	10A RANGE 700mV MAX.
OL. PROTECTION	10A INPUT, UNFUSE, UP TO 12A FOR 30 SEC. OTHER RANGE INPUT, 0.8A/250V FUSE.

CAPACITANCE	
RANGE	2000PF, 20 F, 200 F, 2μF, 20μF
ACCURACY	ALL RANGE ±3%RDG + 10DGTS
TEST FREQUENCY	400Hz
TEST VOLTAGE	50mV
RESOLUTION	1PF

RESISTANCE	
RANGE	200Ω, 2KΩ, 20KΩ, 200KΩ, 20MΩ 2000MΩ
ACCURACY	200MΩ, 2000MΩ, ±5%(RDG-10 DGTS) + 1DGT 20MΩ ±3%RDG + 1DGT 200Ω ±1%RDG ±3DGTS OTHER RANGE, ±0.8%RDG + 1DGT
RESOLUTION	100mΩ
OL. PROTECTION	500V DC/AC
TEST VOLAGE	200Ω RANGE 3.2V MAX. 20MΩ RANGE 0.3V MAX. 200MΩ, 2000MΩ RANGE 3.2V MAX. OTHER RANGE 0.3V MAX.

CONTINUITY BEEPER	
THRESHOLD	<100Ω
RESPONSE TIME	<100mS

HFE TEST	
BASE DC CURRENT	10μA
VCE	2.8±0.4V
RANGE	0 TO 1000

DIODE TEST	
TEST CURRENT	1.0±0.6mA
TEST VOLTAGE	3.2V MAX.

TEMPERATURE	
RANGE	–20°C, TO 750°C 0°F TO 1400°F
ACCURACY	± (3° + 1DGT) UP TO 150°C ± 3% RDG OVER 150°c ± (5° + 2DGTS) UP TO 225°F ± 3% RDG OVER 225°F
RESOLUTION	1°C, 1°F

LED	
OPEN CIRCUIT VOLTAGE	3.2 VOLTAGE MAX.
SHORT CIRCUIT CURRENT	10mA MAX.

FREQUENCY MEASUREMENT	
RANGE	2KHz, 20KHz, 200KHz, 2MHz, 20MHz
INPUT SENSITIVITY	20MHz RANGE, 1VRMS OTHER RANGE, 35mV RMS
ACCURACY	± 1% RDG + 1DGT.
EFFECT READING	10—1999
OL. PROTECTION	500V DC/AC

LOGIC MEASUREMENT	
LOGIC TYPE	TTL
INPUR IMPEDANCE	120KΩ ± 10KΩ
LOGIC THRESHOLD	LOGIC 1 : 2.4V ± 0.2V LOGIC 0 : 0.7V ± 0.2V
FREQUENCY RESPONSE :	20MHz
DETECTABLE PLUSE WIDTH:	25nS, MIN.
OL. PROTECTION :	50V DC/AC

2. OPERATION

2.1 DC Voltage Measurement

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

2.2 AC Voltage Measurements

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

2.3 DC Current Measurement

1. Connect red test lead to the mA input connector for current measurements up to 200 milliamperes. Connect black lead to the COM input connector.
2. Set Function/Range Switch to desired DC and A position. If magnitude of current is not known, set switch to highest range and reduce until satisfactory reading is obtained.
3. Turn off power to the device or circuit being tested and discharge all capacitors.
4. Open the circuit in which current is to be measured. Now securely connect test leads in series with the load in which current is to be measured.
5. Turn on power to the circuit being tested.
6. Read current value on digital display.
7. Turn off all power to the circuit being tested and discharge all capacitors.
8. Disconnect test leads from circuit and reconnect circuit that was being tested.

2.4 AC Current Measurement

1. Connect red test lead to the mA input connect for current measurements up to 200 milliamperes. Connect black lead to the COM input connector.
2. Set Function/Range Switch to desired AC and A position. If magnitude of current is not known, set switch to highest range and reduce until satisfactory reading is obtained.
3. Turn off power to the device or circuit being tested and discharge all capacitors.
4. Open the circuit in which current is to be measured. Now securely connect test leads in series with the load in which current is to be measured.
5. Turn on power to the circuit being tested.
6. Read current value on digital display.
7. Turn off all power to the circuit being tested and discharge all capacitors.
8. Disconnect test leads from circuit and reconnect circuit that was being tested.

2.5 Resistance Measurements

All resistance ranges on the multimeter are low-power ohms except for the 200-ohm range. The low power ohm allows accurte measurements of in-circuit resistance, as test voltage is below that necessary to turn on a diode junction Note: In the 200Ω range, the continuity beeper function is activated.

1. Connected red test lead to the V-Ω input connector and black test lead to the COM input connector.
2. Set Function/Range Switch to desired Ω position. If magnitude of resistance is not known, set switch to highest range and reduce until satisfactory reading is obtained.
3. If the resistance being measured is connected to a circuit, turn off power to the circuit being tested and discharge all capacitors.
4. Connect test leads to the circult being measured. When measuring high resistance, be sure not to contact adjacent points even if insulated, because some insulators have a relatively low insulation resistance, causing the measured resistance to be lower than the actual resistance.
5. Read resistance value on digital display If a high resistance value is shunted by a large value of capacitance, allow digital to stabilize.

NOTE

A. All resistance ranges on the DMM, except the 200Ω range, are low-power ohms. This allows accurate measurements of in-circuit resistance because the test voltage is below that necessary to activate a diode junction.
B. The 2000MΩ range has a fixed 10-count in its reading. When the test leads are shorted together in this range, the meter will display 010 in the 2000MΩ range. This reading must be subtracted in order to obtain a true measurement. For example, when measuring a resistance of 100MΩ on the 2000MΩ range, the display will read 110.

2.6 Diode and Transistor Test Measurements

The special Diode Test Function allows relative measurements of forward voltage drops across diodes and transistor junctions. This function also per-

mits measurement of in-circuit semiconductor junctions.

2.6.1 Diode Tests

1. Connect red test lead to the V-Ω input connector and black test lead to the COM input connector.
2. Set Function/Range Switch to the diode test position.
3. If the semiconductor junction being measured is connected to a circuit, turn off power to circuit being tested and discharge all capacitors.
4. Connect test leads to the device.
5. Read forward value on digital display.
6. If the digital display reads overrange (1). reverse the lead connections. The placement of the test leads when the forward reading is displayed indicates the orientation of the diode. The read lead is positive and the black leads is negative. If overrange (1) is displayed with both lead connections, the junction is open. If a low-reading (less than 1,000) is obtained with both lead connections, the junction is shorted internally or (if junction is measured in a circuit) the junction is shunted by a resistance less than 1KΩ. In the latter case the junction must be disconnected from the circuit in order to verify its operation.

2.6.2 Transistor Junction Tests

1. Bipolar transistors Can be tested in the Same manner as diode. junctions formed between the base and emitter and the base and collector of the transistor. Measurement between the collector and emitter also should be made to determine if a short is present.

2.7 Transistor hFE Measurements

1. Transistor must be out of circuit. Set the function/range switch to the hFE position.
2. Plug the emitter, based and collector leads of the transistor into the correct holes in either the NPN or the PNP transistor test socket, whichever is appropriate for the transistor you are checking. Read the hFE (beta, or DC current gain) in the display.

2.8 Capacitance Measurements

1. Set the function/range switch to the desired capacitance range.
2. Short the leads of the capacitor to be tested together to insure that there is no charge on the capacitor.
3. Insert the capacitor leads into the capacitor test socket. Note that there are two groups of thre holes. One lead must be inserted into one hole of group one, and the other lead must be inserted into one of the holes of group two.
4. Read the capacitance value in the display.

2.9 Continuity Measurements

1. Set the selectors switch to the 200Ω or ◻))) position.
2. Continuity between probe tips will be indicated by the audible beeper when resistance is below 100Ω.

2.10 Frequency Measurement

1. Connect the red lead to the "Hz" jack and the black lead to the "COM" jack.
2. Set the RANGE switch to the desired "Hz" position.
3. Connect test leads to device or circuit to be measured.
4. Red frequency on Digital Display.

2.11 Logic Measurement

1. Connected the red leau to the "LOG + " jack and the black lead to the "LOG – " jack.
2. Set the RANGE switch to the logic ( ) position.
3. Connect the red lead to the point to be tested and the black lead to the common buss of the logic circuit. If the circuit is in the Logic 1 state, the high (▲) indicator will appear, if it is in the Logic 0 state, the low (▼) will appear on the Digital Display.

OPERATION:

2.12 Temperature Measurement

Connect a type K thermocouple to the jack on the instrument. Place the probe or thermocouple tip on or in the material to be measured and take the temperature reading directly from the display.

2.13 LED TEST

1. Rotate the Function/Range Switch to the LED position.
2. Plug the LED to be tested into the Test Socket, being sure to observe proper lead connection as shown on the front of the instrument.
3. Read the LED's forward voltage drop in the display.

3. OPERATOR MAINTENANCE

3.1 Troubleshooting

If there appears to be a malfunction during the operation of the meter, the following steps should be performed in order to isolte the cause of the problem:

1. Check the battery.
2. Review the operating instructions for possible mistakes in operating procedure.
3. Inspect and test the Test Probes for a broken or intermittent connection.
4. Inspect and test the fuse. If it is necessary to replace the fuse, be sure to install one of the proper current value.

3.2 Battery and Fuse Relacement

To prevent electrical shock hazard, turn off the multimeter and any device or circuit under test and disconnect the test leads before removing the-battery hatch or the rear cover.

3.2.1 Battery Replacement

1. Remove the battery cover by gently sliding it towards the bottom of the meter.
2. Remove and disconnect the old battery from the meter and replace with a new unit. Wind the excell lead length once around the batter cllp. Install the battery and replace the battery cover.

CAUTION

Failure to turn off the multimeter before installing the battery could result in damage to the instrument and to the battery. if the battery is conncted incorrectly to the multimeter.

3.2.2 Fuse Replacement

1. Remove the battery cover by gently sliding it towards the bottom of the meter.
2. Remove the old fuse and replace with a new fuse of the proper rating. The Model 5335 requires a 0.25 amp, 250 volt fuse while the Model 5318, 53188 and 5325 use fuses rated at 0.8 amps, 250 volts.

WARNING

To prevent fire, use a replacement fuse of the proper rating as shown in section (3.2.2.) above.