FOLD MODE DMM
OPERATOR'S
MANUAL
37772

1. SAFETY INFORMATION

This multimeter has been designed according to IEC -1010 concerning electronic measuring instruments with an overvoltage category (CAT II) and pollution 2.
Follow all safety and operating instructions to ensure that the meter is used safely and is kept in good operating condition.

1.1 PRELIMINARY

- When using this meter, the user must observe all normal safety rules concerning:
  - Protection against the dangers of electronic current.
  - Protection of the meter against misuse.
- Full compliance with safety standards can be guaranteed only if used with test leads supplied. If necessary, they must be replaced with the same model or same electronic ratings. Measuring leads must be in good condition.

1.2 DURING USE

- Never exceed the protection limit values indicated in specifications for each range of measurement.
- When the meter is linked to measurement circuit, do not touch unused terminals.
- When the value scale to be measured is unknown beforehand, set the range selector at the highest position.
- Before rotating the range selector top change functions, disconnect test leads from the circuit under test.
- When carrying out the measurements on TV or switching power circuits, always remember that there may be high amplitude voltage pulses at test points which can damage the meter.
- Never perform resistance measurements on live circuits.
- Never perform capacitance measurements unless the capacitor to be measured has been discharged fully.
- Always be careful when working with voltage above 60V dc or 30V ac rms.

1.3 SYMBOLS

⚠ Important safety information, refer to the operating manual.
⚠ Dangerous voltage may be present.
⏚ Earth ground
⧈ Double insulation (Protection class II)

1.4 MAINTENANCE

- Before opening the meter, always disconnected test leads from all sources of electric current.
- For continued protection against fire, replace fuse only with the specified voltage and current rating: F 200mA/250V (quick acting).
- If any faults or abnormalities are observed, the meter can not be used any more it has to be checked out.
- Never use the meter unless the back cover is in place and fastened fully.
- Do not use abrasives or solvents on the meter, use a damp cloth and mild detergent only.

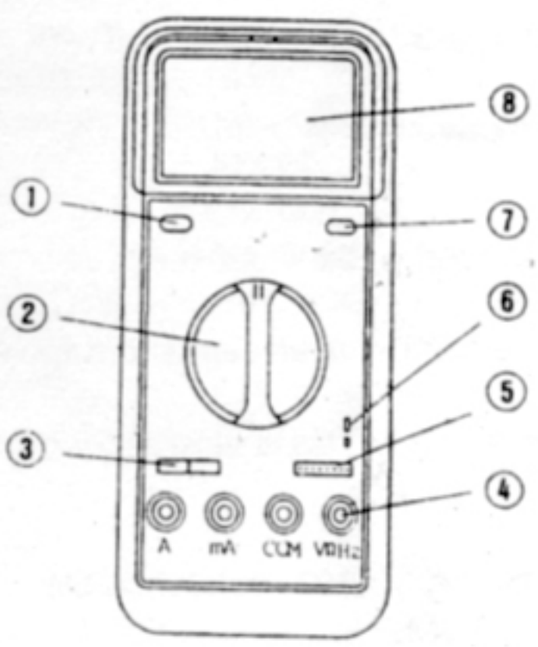
2. DESCRIPTION

This meter is one of a series fold professional measuring instrument, capable of performing functions:

- DC and AC voltage measurement
- DC and AC current measurement
- Resistance measurement
- Diode and Transistor test
- Audible continuity test

Some models of this series also provide functions:

- DC 200μA, 2A and AC 200μA, 2A current ranges
- 200MΩ resistance range
- Capacitance measurement
- Frequency measurement
- Temperature measurement



1. POWER SWITCH
2. ROTARY SWITCH
3. CAPACITOR MEASURING SOCKET
4. INPUT JACKS
5. TRANSISTOR TESTING SOCKET
6. TEMPERATURE MEASUREMENT
7. HOLD SWITCH
8. LCD DISPLAY BOX

2.1 FUNCTION AND RANGE SELECTOR

There are different functions and 30 ranges provided. A rotary switch is used to select functions as well as ranges.

2.2 POWER SWITCH

A push – push switch is used to turn the meter on or off.

2.3 HOLD SWITCH

A push – push switch is used data hold (Push ON, push OFF, All DCV, ACV, DCV, ACA, Hz, C ranges with this feature)

2.4 LCD DISPLAY BOX

As a general rule, the LCD display box is in a state of lock. Pull it on the top of the meter and rotate it. The display angle of the meter may be changed. To make your look at measuring reading more comfortable.

2.5 INPUT JACKS

This meter has four input jacks that are protected against overload to the limits shown. During use connect the black test lead to COM jack and connect red test lead depending on the function elected.

⚠ WARNING

Before attempting to insert transistor, capacitor or thermocouple for testing, always be sure that test leads have been disconnected from any measurement circuits.

Components should not be connected to the hFE or capacitor socket and the thermocouple has been removed when making voltage measurements with test leads.

FUNCTION	RED LEAD CONNECTION	INPUT LIMITS
200mV ⎓ & 200mV ~	V/Ω or V/Ω/ Hz	250Vdc or rms ac
V ⎓ & V~	V/Ω or V/Ω/ Hz	1000Vdc, 700V ac (sine)
◄ ⏽	V/Ω or V/Ω/ Hz	250Vdc or rms ac
Hz	V/Ω or V/Ω/ Hz	250Vdc or rms ac
Ω	V/Ω or V/Ω/ Hz	250Vdc or rms ac
(μA)mA ⎓ & (μA) mA ~	mA	200mAdc or rms ac
2A ⎓ & 2A ~	A	2Adc or rms ac
20A ⎓ & 20A~	20A	10A dc or rms ac continuous 20A for 15 seconds maximum

3. OPERATING INSTRUCTION

3.1 MEASURING VOLTAGE

Connect the black test lead to the COM jack and the red test lead to the V/Ω/Hz jack.
Set the rotary switch at the desired V ⎓ or V ~ range position and connect test leads across the source or load under measurement.
The polarity of the red lead connection will be indicated along with the voltage value when making DC voltage measurement.
When only the figure "1" is displayed, it indicates overrange situation and the higher range has to be selected.

3.2 MEASURING CURRENT

1. Connect the black test lead to the COM jack and the red test lead to the mA jack for a maximum of 200mA current. (Some models of this series are 2A, connect the red test lead to a jack for a maximum of 2A). For a maximum of 20A, move the red lead to the 20A jack.
   (IMPORTANT: This advice can only measure 20 Amps for a maximum of 15 seconds. At the 20 Amp setting this unit can measure a maximum of 10Amp continuously.)

Set the rotary switch at desired A ⎓ or A ~ range position and connect test leads in series with the load under measurement.
The polarity of the red lead connection will be indicated along with the current value when making DC current measurement.
When only the figure "1" displayed, it indicates overrange situation and the higher range has to be selected.

3.3 MEASURING RESISTANCE

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω/Hz jack. (The polarity of red lead is "+")

Set the rotary switch at desired Ω position and connect test leads across the resistor under measurement.

NOTE:

1. If the resistance being measured exceeds the maximum value of the range selected or the input is not connected, an overrange indication "1" will be displayed.

When checking in – circuit resistance, be sure the circuit under test has all power removed and that all capacitors have been discharged fully.
For measuring resistance above 1MΩ, the meter may take a few seconds to get stable reading. This is normal for high resistance measurement.
At 200MΩ range display reading is around 10 counts when test leads are shorted.
These counts have to be subtracted from measuring results. For example, when measuring 100MΩ resistance the display reading will be 101.0 and the correct measuring result should be 101.0 – 1.0 = 100.0MΩ.

3.4 MEASURING CAPACITANCE

1. Set the rotary switch at desired F position.
2. Before inserting capacitor under measurement into capacitance testing socket, be sure that the capacitor has been discharged fully.
3. When measuring capacitors with shorter leads, a testing adapter is provided with the meter. Insert the adaptor into the capacitance testing socket on the front panel to continue measurements.

⚠ WARNING

To avoid electric shock, be sure the capacitor measuring adaptor has been removed before changing to another function measurement.

3.5 MEASURING FREQUENCY

1. Connect the black test to the COM jack and the red test lead to the V/Ω/Hz jack.
2. Set the rotary switch at the KHz position and connect test leads across the source or load under measurement.

NOTE:

1. Reading is possible at input voltages above 10Vrms, but the accuracy is not guaranteed.
2. In noisy environment, it is preferable to use shield cable for measuring small signal.

3.6 TESTING DIODE

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω/Hz jack. (The polarity of red lead is "+")

Set the rotary switch at ⊣◀ position and connect red lead to the anode, black lead to the cathode of the diode under testing. The meter will show the approx. Forward voltage drop of the diode. If the lead connection is reserved, only figure "1" displayed.

3.7 TESTING TRANSISTOR

1. Set the rotary switch at hFE position.
2. Determine whether the transistor to be tested is NPN or PNP type and locate the Emitter, Base and Collector leads. Insert leads of the transistor into proper holes of the transistor testing socket.
3. The meter will show the approx. hFE value at test condition of base current 10μA and Vce 3.2V.

3.8 CONTINUITY TEST

1. Connect the black test lead to the COM jack and the red test lead to the V/Ω jack. (The polarity of the red lead is positive "+")
2. Set the rotary switch at ◀•)) position and connect test leads across two points of the circuit under testing. If continuity exists (i.e., resistance less than about 50Ω), built – in buzzer will sound.

3.9 MEASURING TEMPERATURE

1. Set the rotary switch at TEMP position and the LCD display will show the current environment temperature.
2. Insert "K" type thermocouple into the temperature measuring socket on the front panel and contact the object to be measured with the thermocouple probe. Read the LCD Display.

⚠ WARNING: To avoid electric shock, be sure the thermocouple has been removed before changing to another function measurement.

4. SPECIFICATIONS

Accuracy is specified for a period one year after calibration and at 18°C to 28°C (64°F to 82°F) with relative humidity to 80%.

4.1 GENERAL

MAXIMUM VOLTAGE BETWEEN TERMINALS AND EARTH GROUND	1000Vdc OR 700 rms ac (sine)
FUSE PROTECTION	mA: F200mA/250V, 20A: unfused
POWER SUPPLY	9V battery
DISPLAY	LCD, 1999 counts, updates 2-3/sec
MEASURING METHOD	Dual – slope integration A/D converter
OVERRANGE INDICATION	"1" figure only on the display
POLARITY INDICATION	" – " displayed for negative polarity
OPERATING TEMPERATURE	0°C to 40°C (32°F to 104°F)
STORAGE TEMPERATURE	-10°C to 50°C (14°F to 122°F)
LOW BATTERY INDICTION	"🔋" appears on the display
SIZE (H x W x L)	42mm x 91mm x 192mm
WEIGHT	370g (including battery)

4.2 DC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	± 0.5% of rdg ± 1 digit
2V	1mV	± 0.5% of rdg ± 1 digit
20V	10mV	± 0.5% of rdg ± 1 digit
200V	100mV	± 0.5% of rdg ± 1 digit
1000V	1V	± 0.5% of rdg ± 2 digits

Input Impedance: 10MΩ

4.3 AC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	± 1.2% of rdg ± 3 digits
2V	1mV	± 0.8% of rdg ± 3 digits
20V	10mV	± 0.8% of rdg ± 3 digits
200V	100mV	± 0.8% of rdg ± 3 digits
700V	1V	± 1.2% of rdg ± 3 digits

Input Impedance: 10MΩ
Frequency Range: 40Hz to 400Hz
Response: Average, calibrated in rms of sine wave

4.4 DC CURRENT

Range	Resolution	Accuracy	Burden Voltage
200μA	0.1μA	± 0.8% of rdg ± 1 digit	1.0mV / μA
2mA	1μA	± 0.8% of rdg ± 1 digit	100mV / mA
20mA	10μA	± 0.8% of rdg ± 1 digit	11mV / mA
200mA	100μA	± 1.5% of rdg ± 1 digit	2.0mV / mA
2A	1mA	± 1.5% of rdg ± 1 digit	0.4V / A
10A	10mA	± 2% of rdg ± 5 digits	0.03V / A

4.5 AC CURRENT

Range	Resolution	Accuracy	Burden Voltage
200μA	0.1μA	± 1.8% of rdg ± 3 digits	1.0mV / μA
2mA	1μA	± 1.0% of rdg ± 3 digits	100mV / mA
20mA	10μA	± 1.0% of rdg ± 3 digits	11mV / mA
200mA	100μA	± 1.8% of rdg ± 3 digits	2.0mV / mA
10A	10mA	± 3.0% of rdg ± 7 digits	0.03V / A

Frequency Range: 40Hz to 400Hz
Response: Average, calibrated in rms of sine wave

4.6 RESISTANCE

Range	Resolution	Accuracy
200Ω	0.1Ω	± 0.8% of rdg ± 3 digits
2KΩ	1Ω	± 0.8% of rdg ± 1 digit
20KΩ	10Ω	± 0.8% of rdg ± 1 digit
200KΩ	100Ω	± 0.8% of rdg ± 1 digit
2MΩ	1KΩ	± 0.8% of rdg ± 1 digit
20MΩ	10KΩ	± 1.0% of rdg ± 2 digits
200MΩ	10KΩ	± 5.0% of (rdg-10 digits) ± 10 digits

Note: On 200MΩ range, if short input, display will read 1MΩ, this 1MΩ should be subtracted from measurement results.

4.7 CAPACITANCE

Range	Resolution	Accuracy
2nF	1pF	± 4.0% of rdg ± 3 digits
20nF	10pF	± 4.0% of rdg ± 3 digits
200nF	100pF	± 4.0% of rdg ± 3 digits
2μF	1nF	± 4.0% of rdg ± 3 digits
20μF	10nF	± 4.0% of rdg ± 3 digits

4.8 FREQUENCY

Range	Rssplution	Accuracy
20KHz	10Hz	± 1.5% of rdg ± 5 digits

Sensitivity: 200mV rms and input no more 10V rms

4.9 TEMPERATURE

Range	Resolution	Accuracy		
		-20°C to 0°C	0°C to 400°C	400°C to 1000°C
-20°C to 1000°C	1°C	± 5.0% of rdg ± 4 digits	± 1.0% of rdg ± 3 digits	± 2.0% of rdg

5. ACCESSORIES

5.1 SUPPLIED WITH THE MULTIMETER

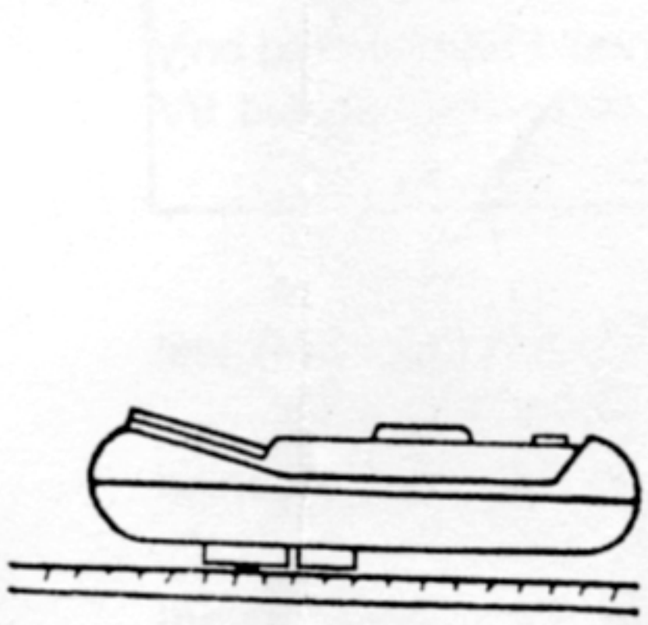
Test leads — Electric Rating 1500V, 10A
Battery — 9V NEDA 1604 or 6F22
Operating Manual
Holster

5.2 OPTIONAL ACCESSORY

"K" type thermocouple

5.3 HOW TO USE THE HOLSTER

The holster is used to protect the meter, the figure show how to use the holster.



6. BATTERY & FUSE REPLACEMENT

If the sign " ⊟+ "appears on the LCD display, it indicates that battery should be replaced.
Removed screws on the back cover and open the case. Replaced the exhausted battery with a new one.
Fuse rarely need replacement and blow almost always as a result of the operator's error. Open the case as mentioned above, and then take the PCB out from the front cover. Replace the blown fuse with same ratings.

⚠ WARNING

Before attempting to open the case, be sure that test leads have been disconnected from measurement circuits to avoid electric shock hazard.
For protecting against fire, replace fuse only with specified ratings: F 200mA/250V (quick acting).

ITEM 37772

Multimeter

Important Supplemental Warning information

This sheet has warnings and cautions that must be followed <u>in addition to</u> those in the manual. Read and adhere to both this sheet and the manual in their entirety BEFORE setting up or using the Multimeter. If all warnings and safety precautions on this sheet and in the owner's manual are not followed completely, the protection provided by this product will be reduced.

On this sheet, and in the included manual:

WARNING indicates a potentially hazardous situation which, if not avoided, could result in **death** or **serious personal injury**.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in a **minor/moderate personal injury** or damage to this tool or the unit being tested by it.

⚠ WARNING

1. Inspect the Multimeter before use. In addition to a general inspection, look specifically for:
   a. Pay special attention to the insulation protecting the connectors.
   b. Check the leads for exposed metal, damaged insulation, and continuity. Replace damaged test leads immediately, before use.
2. Remove the test leads before performing maintenance, opening the case, or the battery compartment.
3. Do not use the multimeter if:
   a. The test leads are damaged in any way.
   b. The battery is low.
   c. Near any explosive gasses or fumes.
   d. Any abnormal operation is detected. (If in doubt about the condition of the meter, have it serviced.)
   e. The battery cover is open.
4. This meter should be powered only by a single, correctly installed 9V battery.

Safety Precautions

1. Use caution when working near voltages above 30 VAC rms, 42 VAC peak, or 60 VDC. Voltages this high present a risk of electric shock.
2. Disconnect the circuit's power before connecting the meter in series, when measuring current.
3. Connect the common (COM) test lead first and disconnect it last.
4. Hold the probes with fingers behind guards.
5. When possible, have an assistant nearby.

CAUTION

1. Prior to testing capacitors, resistance, diodes, or continuity; disconnect all power to the circuit and discharge all high-voltage capacitors.
2. Check fuse before testing current.
3. Use the proper settings, terminals, techniques, and range for the tests performed. Always start with the range stated in the instructions.

SAVE THIS WARNING SHEET.

11/04