PROMAX

HEAVY DUTY DIGITAL MULTIMETER

INSTRUCTION MANUAL

PD-693

PLEASE READ THIS OPERATORS MANUAL CAREFULLY

Misuse and or abuse of this 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.

Sec.1 DESCRIPTION

This exceptional 3½ digit, handheld, digital multimeters have the capacity of reading up to 9 functions on up to 33 ranges. This DMM offer a powerhouse of measurement capability in a self-contained housing. It is designed for the professional at work in the field or in the loabratory, yet simple enough to operate making it perfect for for the hobbyist too.

Safety was a prime consideration in the design of this DMM. Housed in shock resistant plastic, these instruments stand 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, combine with rugged construction make it a durable and reliable instrument.

Sec.2 FEATURES

- **33 Ranges, 9 Functions**
- **Drop Proof to 5 feet**
- **Meets IEC-348, UL-1244 safety standards**
- **Large LCD with annunciators**
- **20A DC / AC ranges**
- **Capacitance measurements**
- **Transistor hFE Test**
- **Built-in hanger and tilt stand**
- **Overload protection on all ranges**

Sec.3 SPECIFICATIONS

- **Display:** 3½ digits, 17mm large LCD maximum reading 1999 or -1999 with function and units sign annunciators.
- **Polarity:** automatic, (-) negative polarity indication.
- **Overrange:** (1) or (-1) is displayed.
- **Low battery indication:** the "BAT" is displayed when the battery voltage drops below the operating level.
- **Measurement rate:** 2.5 per second, nominal.
- **Operating Environment:** 0°C to 50°C at < 70% R.H.
- **Storage Temperature:** -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.
- **Power:** single standard 9-volt battery, NEDA 1604, JIS 006P, IEC 6F22.
- **Battery life:** 200 hours typical with carbon-zinc.
- **Fuse:** 0.5A / 250V fast acting.
- **Dimensions:** 7.5"H x 3.4"W x 1.5"D (189H x 87W x 37D mm)
- **Weight:** Approx. 12.9 oz. (370g) including battery.

RANGES:

DC Volts

Range	Resolution	Accuracy 18°C to 28°C	Input Impedance
200mV	100uV	±(0.5% rdg+1d)	10MΩ
2V	1mV	±(0.5% rdg+1d)	10MΩ
20V	10mV	±(0.5% rdg+1d)	10MΩ
200V	100mV	±(0.5% rdg+1d)	10MΩ
1000V	1V	±(0.5% rdg+1d)	10MΩ

Overload Protection: 1200VDC or Peak AC
500VDC or Peak AC on 200mV range.

AC Volts

Range	Resolution	Accuracy (50Hz to 500Hz)	Input Impedance
200mV	100μV	±(1.2% rdg+3d)	10MΩ
2V	1mV	±(1.2% rdg+3d)	10MΩ
20V	10mV	±(1.2% rdg+3d)	10MΩ
200V	100mV	±(1.2% rdg+3d)	10MΩ
750V	1V	±(1.5% rdg+3d)	10MΩ

Response: Average responding calibrated in RMS of sine wave.
Overload Protection: 1200VDC or Peak AC
500VDC or Peak AC on 200mV range.

DC Current

Range	Resolution	Accuracy 18°C to 28°C	Burden Voltage
200μA	0.1μA	±(1.0% rdg+1d)	400mV
2mA	1μA	±(1.0% rdg+1d)	400mV
20mA	10μA	±(1.0% rdg+1d)	400mV
200mA	100μA	±(1.0% rdg+1d)	400mV
20A*	10mA	±(2.0% rdg+2d)	600mV

Overload Protection: 500mA/250V fuse on mA inputs (fast blow fuse)
*10A continuous, 20A for 60 seconds maximum

AC Current

Range	Resolution	Accuracy (50Hz to 500Hz)	Burden Voltage
20mA	10μA	±(1.5% rdg+4d)	400mV
200mA	100μA	±(1.5% rdg+4d)	400mV
20A*	10mA	±(2.5% rdg+4d)	600mV

Overload Protection: 500mA/250V fuse on mA inputs (fast blow fuse)
*10A continuous, 20A for 60 seconds maximum

Resistance

Range	Resolution	Accuracy 18°C to 28°C	Open Circuit Volts
200Ω	0.1Ω	±(1.0% rdg+4d)	3.3Vdc
2KΩ	1Ω	±(0.75% rdg+2d)	0.3Vdc
20KΩ	10Ω	±(0.75% rdg+2d)	0.3Vdc
200KΩ	100Ω	±(0.75% rdg+2d)	0.3Vdc
2MΩ	1KΩ	±(0.75% rdg+2d)	0.3Vdc
20MΩ	10KΩ	±(1.5% rdg+5d)	0.3Vdc

Overload Protection: 500VDC or peak AC-Electronic (NO FUSE BLOW)

Continuity

Range	Audible Indication	Response Time	Open Circuit Volts
2V	Less than 150Ω	Approx. 100ms	3.3Vdc

Overload Protection: 500VDC or peak AC-Electronic (NO FUSE BLOW)

Diode Test

Range	Resolution	Accuracy	Test Current	Open Circuit Volts
2V	1mV	±(1.0% rdg+1d)	1.0mA	3.3Vdc

Overload Protection: 500VDC or peak AC-Electronic (NO FUSE BLOW)

Transistor HFE

Range	Base Current	Collector emitter-v	Transistor Types
0-1000	10μAdc Approx.	VCE=3.45Vdc Approx.	NPN Or PNP

Capacitance

Range	Resolution	Accuracy 18°C to 28°C	Test Frequency
2nF	1pF	±(3.0% rdg+4d)	400Hz
20nF	10pF	±(3.0% rdg+4d)	400Hz
200nF	100pF	±(3.0% rdg+4d)	400Hz
2μF	1nF	±(3.0% rdg+4d)	400Hz
20μF	10nF	±(3.0% rdg+4d)	400Hz

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 reading, etc.), do not attempt to take any measurements.
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 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.
11. To avoid electric shock use CAUTION when working with voltages above 40Vdc or 20Vac. 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

This Multimeter come 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.

- Operating Instructions
- Test Leads (one black, one red)
- One Spare Fuse 0.5A / 250V, Fast acting (See Fuse Replacement section)

Sec.6 BATTERY REPLACEMENT

This DMM have a self-contained power supply consisting of One 9V Transistor Type Battery (NEDA # 1604).

When the multimeter displays the "BAT" 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.

Sec.7 FUSE TEST AND REPLACEMENT

Use the following steps to test the internal fuses of the meter:

1. Turn the function / range switch to the (⊣◀) position. Plug a test lead into the VΩ input connector.
2. Touch the probe to the μA, mA input connector.
   The display should indicate 700 or less, otherwise the fuse probably bad.

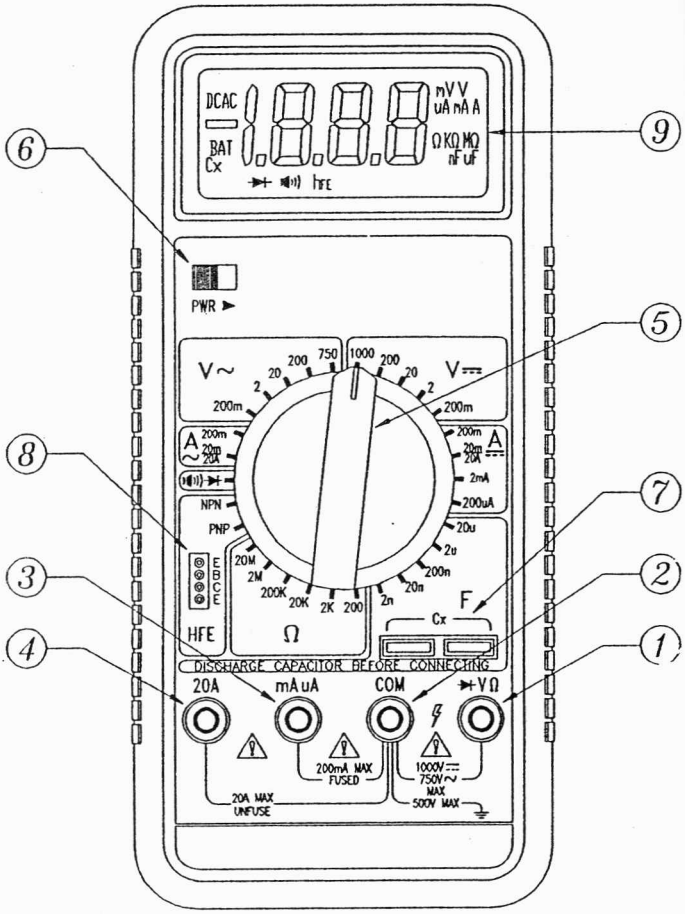
WARNING!

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

mA Input terminal

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. Remove the battery from the battery compartment, disconnect the battery from the battery connector and set the battery aside.
3. Carefully remove the fuse (5.2 x 20mm) from the fuse holder. Replace with a 500mA / 250V replacement fuse.
4. Re-connect the battery and replace it in the battery compartment.
5. Replace the back cover by reversing the procedure used to remove it.

Sec.8 FRONT PANEL CONTROLS



1 VΩ→|+ Volt, Ohms, Diode 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 mAμA Milliamp / Microamp Input Terminal

This is the positive input terminal for current measurement (ac or dc) up to 200 mA. Connection is made to it using the accessory red test lead.

4 20A 20 Amperes Input Terminal

This is the positive input terminal for current measurement (ac or dc) up to 20A. 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. PWR Power Switch

This switch is used to turn meter ON or OFF.

7. Capacitor Test Socket

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

8. Transistor Test Socket

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

9. Liquid Crystal Display (LCD)

This liquid crystal display provides a 3½ digit measurement data display having a maximum count of 2000, as well as unit and function annunciators.

Symbols/ Units	Descriptions
DC	Appears for the DC current and voltage modes.
AC	Appears for the AC current and voltage modes.
−	Polarity marks which appears when a DC signal measurement value is negative.
Cx	Appears when the capacitance measurement function has been selected.
hFE	Appears when the transistor test mode has been selected.
→|	Appears when the diode test mode has been selected.
)))	Appears when the continuity check has been enabled.
BAT	Lights to indicate that battery voltage has dropped below the operating level.
μF, nF	Units for capacitance measurements.
μA,mA,A	Units for current measurements.
mV, V	Units for voltage measurements.
Ω ,KΩ,MΩ	Units for resistance measurements.

Sec.9 OPERATION

Before making any measurements always examine the instrument and accessories used with the instrument for damage, contamination (excessive dirt, grease, ect.) 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.

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 750Vac 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 1000Vdc / 750Vac or if the voltage is unknown. 1000Vdc and 750Vac 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.

Sec.9.2 CURRENT MEASUREMENTS

1. Insert the black and red test leads into the respective "COM" and "20A" terminals.
2. Place the function switch to the 20A position. Always start with the highest range of the function to be measured.

CAUTION

The 20A range is unprotected and has a very low internal resistance. Do not attempt to take a current is unknown or above 20A ac / dc. The mA input terminal is protected by a 500mA / 250V 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.
4. If the reading is less than 200mA, you can switch to a lower range for greater accuracy. If not, you have completed your measurement.

CAUTION

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

5. 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 "200mA" 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 200mA 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 next lower range, switch to that range at completely de-energizing the circuit under test. Continue changing to lower ranges if the reading is within the next lowest range to obtain the best accuracy.
5. Completely de-energize the circuit before removing the test leads.

Sec.9.3 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 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 deenergized 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 500Vdc/ac. Do not connect the "COM" terminal to potentials exceeding 500V to ground.

3. Completely de-energize the circuit or deive 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 (1) or (-1) indicates an overrange condition, This will occur with the test leads open on all resistance ranges. If overrange occurs when taking a reading, switch to the next highest range.

NOTE: On the diode test range, the display will indicate 3.15 to 3.45V if the diode junction is reverse biased or if the circuit is open

Sec.9.4 CONTINUITY MEASUREMENTS

1. Place the range selector switch into the "))) " position.
2. Insert the black and red test leads into the respective "COM" and "V-Ω" terminals.

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 500Vdc/ac. Do not connect the common terminal to potentials exceeding 500V to ground.

3. 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 150Ω.

Sec.9.5 TRANSISTOR MEASUREMENTS

HFE (DC Current Gain)

1. Place the range selector switch into the "HFE" and select PNP / NPN switch to the NPN or PNP position depending on which type of bipolar transistor to be measured.
2. Plug the transistor to be tested into the Transistor Test Socket, being 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 CAPACITANCE MEASUREMENTS

Never apply voltage to the input jacks. All capacitance tests should be made on de-energized circuits only.

1. Make sure that any capacitor being checked is fully discharged.

WARNING!

All capacitance measurements should be made on de-energized circuits only. Never apply voltage to the test socket. Discharge capacitor before taking measurements.

2. Set the range selector switch to the highest capacitance range.

CAUTION

Always observe polarity markings when measuring plarized capacitors.

3. Insert the capacitor leads into the test socket.

4. Read capacitance directly from the display.

5. Reduce range setting until a satisfactory reading is obtained. A (1) or (-1) indicates an overrange condition.

6. Remove capacitor from test socket being careful not to touch the capacitors bare wires and discharge.

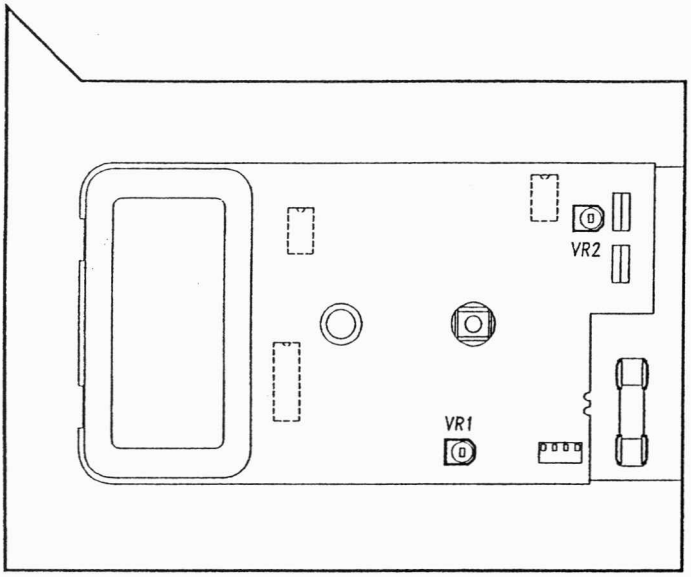
Sec.10 CALIBRATION

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.



Calibration Trimmer Location

Sec.10.1 CALIBRATION PROCEDURE

The procedure should be performed at an ambient temperature of 25°C ± 2°C, and at 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 Function / Range switch to the "200mVdc" position.
3. Set the output of the DC calibrator for 190.0mV ± 0.02% and connect it to the "V-Ω" and "COM" input terminals.
4. Adjust VR1 until the display reads 190.0mV ± 1 digit.
5. Carefully inspect the other DCV ranges. Your readings should be within specification ± 0.5% + 1 digit.
6. There is no adjustment for ACV. Calibrate DCV first.
7. Carefully inspect the ACV ranges. Your readings should be within ± 1.2% + 3 digits of the ACV calibration source.
8. Set the output of the DC calibrator for 10.0A ± 0.02% and connect it to the "20A" and "COM" input terminals.
9. Adjust R13 (shunt resistor) until the display reads 10.00A.
10. If the reading is over 10A, add solder to R13. If the reading is under 10A, shave away lightly some of the solder and metal from R13.
11. Carefully inspect the other DCA ranges. Your readings should be within specification ± 1% + 1 digit.
12. Turn off calibrator and disconnect from the DMM.
13. Set the Range switch to the "200nF" position.
14. Connect a 100nF (0.1μF) standard capacitor to the Cx test socket on the Multimeter.
15. Adjust VR2 until the dispaly reads 100.0 ± 1 digit.
16. Reassemble the back case and secure with three screws.