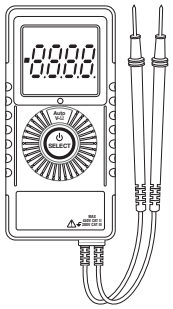
INSTRUCTION MANUAL

GREENLEE®
A Textron Company

PDMM-20

Multimeter



Read and **understand** all of the instructions and safety information in this manual before operating or servicing this tool.

999 5193.2 REV 1 7/04

Description

The Greenlee PDMM-20 Multimeter is a hand-held testing device with the following measurement capabilities:

- Automatic selection of AC voltage, DC voltage, and resistance
- Manual selection of AC voltage, DC voltage, resistance, continuity, capacitance, and frequency

It also has non-contact and single-probe voltage detection capability.

Safety

Safety is essential in the use and maintenance of Greenlee tools and equipment. This instruction manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

Purpose of This Manual

This instruction manual is intended to familiarize all personnel with the safe operation and maintenance procedures for the Greenlee PDMM-20.

Keep this manual available to all personnel. Replacement manuals are available upon request at no charge.

KEEP THIS MANUAL

Important Safety Information

SAFETY ALERT SYMBOL

This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.

⚠DANGER

Immediate hazards which, if not avoided, WILL result in severe injury or death.

⚠WARNING

Hazards which, if not avoided, COULD result in severe injury or death.

⚠CAUTION

Hazards or unsafe practices which, if not avoided, MAY result in injury or property damage.

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Important Safety Information

⚠WARNING

Read and **understand** this material before operating or servicing this equipment. Failure to understand how to safely operate this tool could result in an accident causing serious injury or death.

⚠WARNING

Electric shock hazard:

Contact with live circuits could result in severe injury or death.

⚠WARNING

Electric shock hazard:

- Do not apply more than the rated voltage between any two input terminals, or between any input terminal and earth ground.
- Do not contact the test lead tips or any uninsulated portion of the accessory.

Failure to observe these warnings could result in severe injury or death.

Important Safety Information

⚠WARNING

Electric shock and fire hazard:

- Do not expose this unit to rain or moisture.
- Do not use the unit if it is wet or damaged.
- Inspect the test leads or accessory before use. They must be clean and dry, and the insulation must be in good condition.
- Use this unit for the manufacturer's intended purpose only, as described in this manual. Any other use can impair the protection provided by the unit.

Failure to observe these warnings could result in severe injury or death.

⚠WARNING

Electric shock hazard:

- Do not operate with the case or battery cover open.
- Before opening the case or battery cover, remove the test leads from the circuit and shut off the unit.

Failure to observe these warnings could result in severe injury or death.

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Important Safety Information

⚠WARNING

Electric shock hazard:

- Unless measuring voltage, shut off and lock out power. Make sure that all capacitors are discharged. Voltage must not be present.
- Using this unit near equipment that generates electromagnetic interference can result in unstable or inaccurate readings.

Failure to observe these warnings could result in severe injury or death.

⚠CAUTION

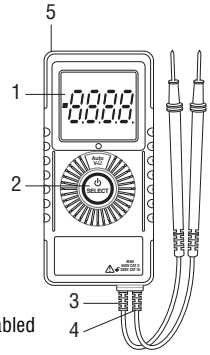
Electric shock hazard:

- Do not change the measurement function while the test leads are connected to a component or circuit.
- Do not use the meter to measure voltages in circuits that could be damaged by the Auto V•Ω mode's low input impedance (approximately 160 kΩ).
- Do not attempt to repair this unit. It contains no user-serviceable parts.
- Do not expose the unit to extremes in temperature or high humidity. Refer to "Specifications."

Failure to observe these precautions may result in injury and can damage the unit.

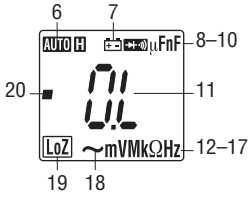
NOTE: The test leads of this unit are not removable. Do not attempt to remove them.

Identification



1. LCD display
2. Selector button
3. Negative, common (COM), or ground input terminal for all measurements
4. Positive (+) input terminal for all measurements
5. EF antenna

Display Icons



6.	AUTO	Automatic ranging is enabled
7.	⊞	Low battery indicator
8.	μ	micro (10^{-6})
9.	F	Farad
10.	n	nano (10^{-9})
11.	*O.L*	Overload indicator
12.	m	milli (10^{-3})
13.	V	Volts
14.	M	Mega (10^{6})
15.	k	kilo (10^{3})
16.	Ω	Ohms
17.	Hz	Hertz
18.	~	AC measurement is selected
19.	LoZ	Low input impedance is active
20.	−	Polarity indicator

Note: Unidentified icons are not used on this model.

Symbols on the Unit

⚠ Warning—Read the instruction manual

⧈ Double insulation

Using the Features

- **Low Impedance Auto V•Ω Mode** In this mode, the meter automatically selects the proper measurement based on the input.
  - If there is no input, “Auto” appears on the display.
  - If voltage above approximately 2 volts AC or DC is present, voltage is displayed. The meter beeps once when switching from Auto to voltage measurement.
  - If both AC and DC voltages are present, the larger voltage is displayed.
  - If no voltage is present and there is resistance less than 6 MΩ, resistance is displayed.

  This mode features low input impedance to mask stray or “ghost” voltage pickup. The input impedance is approximately 160 kΩ.

  Overload Alert Feature: When above rated voltage is present (450 V), the meter displays “OL”, with a warning beep tone. Disconnect the test leads from the voltage source immediately.

  Function Lock Feature: When a measurement is being displayed in Auto V•Ω mode, pressing the button one time will lock in that function. Pressing the button again will return the multimeter to Auto V•Ω mode. It is sometimes useful to “lock in” a function. This may be helpful for measuring low voltages.
- **Intelligent Automatic Power Off (APO)** To extend battery life, the meter shuts itself off after approximately 3 minutes of inactivity. Inactivity occurs when the selector button is not pressed. The meter will not enter APO when there are significant readings over 10% of the range or non-OL readings for resistance and continuity.

Operation

⚠WARNING

Electric shock hazard:

Contact with live circuits could result in severe injury or death.

⚠CAUTION

Electric shock hazard:

- Do not change the measurement function while the test leads are connected to a component or circuit.
- Do not use the meter to measure voltages in circuits that could be damaged by the Auto V•Ω mode's low input impedance (approximately 160 kΩ).

Failure to observe these precautions may result in injury and can damage the unit.

Operation (cont'd)

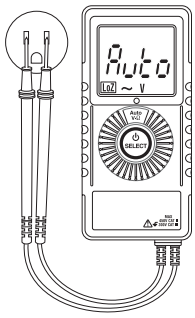
1. Press and hold the selector button for 1 second to turn the meter on. The default mode is Auto V•Ω.
2. The Settings Table shows the meter's functions. To change to the next function, momentarily press the selector button. Refer to "Typical Measurements" for specific measurement instructions.
3. Test the unit on a known functioning circuit or component.
   - If the unit does not function as expected on a known functioning circuit, reset the microprocessor by pressing and holding the selector button for 6 seconds.
   - If the unit still does not function as expected, replace the battery.
   - If the unit still does not function as expected, send the unit to Greenlee for repair. Refer to the instructions under the Warranty.
4. Take the reading from the circuit or component to be tested.

Operation (cont'd)

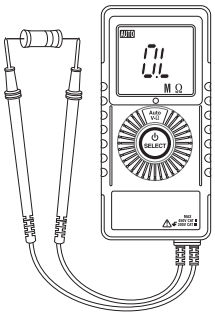
Settings Table

To measure this value	Continue to momentarily press SELECT until these icons appear on the display
Auto V•Ω	AUTO Auto
Continuity	0.000
EF	EF
Volts AC	AUTO 0.000 LoZ ~ V
Volts DC	AUTO 0.000 LoZ V
Resistance	AUTO OL MΩ
Frequency	AUTO 0.000 Hz
Capacitance	AUTO nF 0.000

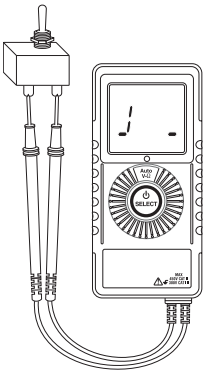
Typical Measurements



Voltage Measurement



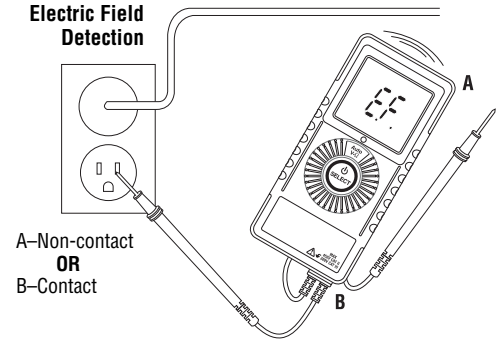
Resistance Measurement



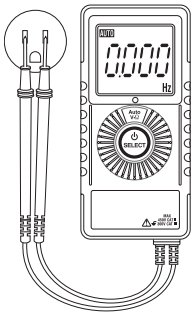
Continuity Check

Typical Measurements

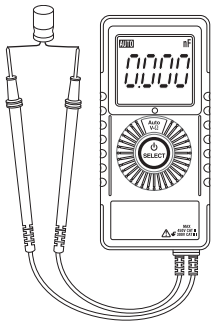
Electric Field Detection



A–Non-contact
OR
B–Contact



Frequency



Capacitance Measurement

Accuracy

Refer to “Specifications” for operating conditions and temperature coefficient.

Accuracy is specified as follows: ± (a percentage of the reading + a fixed amount) at 23 °C ± 5 °C (73 °F ± 9 °F), less than 75% relative humidity.

DCV

Range	Accuracy
6.000 V	± (0.5% + 0.003 V)
60.00 V	± (1.0% + 0.05 V)
450.0 V	± (1.2% + 0.5 V)

Input impedance: 160 kΩ, 160 pF

Resistance (Auto V•Ω mode)

Range	Accuracy
6.000 kΩ	± (1.2% + 0.006 kΩ)*
60.00 kΩ	± (1.0% + 0.04 kΩ)
600.0 kΩ	± (1.0% + 0.4 kΩ)
6.000 MΩ	± (2.0% + 0.004 MΩ)

Open circuit voltage: 0.4 V typical

* Add 0.040 kΩ to specified accuracy when reading is below 1.200 kΩ.

Accuracy (cont'd)

Wireless Electric Field Detection (EF)

Typical Voltage	Bar graph indication
15 V to 55 V	–
30 V to 85 V	– –
45 V to 145 V	– – –
75 V to 190 V	– – – –
above 105 V	– – – – –

Indication: Bar graph segments and audible beep tones are proportional to the field strength.

Detection frequency: 50/60 Hz

Detection antenna: Top left meter corner

ACV

Range (50 to 60 Hz)	Accuracy
6.000 V	± (1.5% + 0.005 V)
60.00 V	± (1.5% + 0.05 V)
450.0 V	± (1.5% + 0.5 V)

CMRR is less than 60 dB @ DC to 60 Hz, Rs = 1 kΩ

Input impedance: 160 kΩ, 160 pF

Accuracy (cont'd)

Capacitance

Range	Accuracy
100.0 nF	± (3.5% + 0.6 nF)
1000 nF	± (3.5% + 6 nF)
10.00 μF	± (3.5% + 0.06 μF)
100.0 μF	± (3.5% + 0.6 μF)

Accuracy below 50 nF is not specified.

Accuracies with film capacitor or better

Specified with battery voltages above 2.8 V

Frequency

Range	Accuracy	Specified at
10.00 Hz to 30.00 kHz	± (0.5% + 4d)	less than 20 V sine RMS

The small letter d, under accuracy, in the table above refers to the least significant digit.

The sensitivity is approximately 3 V RMS for compatibility with logic level signals. The frequency of voltage sources up to 450 VAC can be measured, but noise may cause inaccurate readings.

Continuity

The threshold is between 50 Ω and 300 Ω.

Specifications

Display: 6000-count LCD

Polarity: Automatic

Display Update Rate: 5 per second

Temperature Coefficient: Nominal 0.15 x (specified accuracy) per °C below 18 °C or above 28 °C

Intelligent Automatic Power Off: After 3 minutes of inactivity (approximately)

Noise Rejection:*
- Common Mode Rejection Ratio: > 60 dB from 0 Hz to 60 Hz when measuring ACV
- Common Mode Rejection Ratio: > 100 dB at 0 Hz, 50 Hz, and 60 Hz when measuring DCV
- Normal Mode Rejection Ratio: > 30 dB at 50 Hz and 60 Hz when measuring DCV

Operating Conditions:
- Temperature: 0 °C to 40 °C (32 °F to 104 °F)
- Relative Humidity (non-condensing): 80% maximum for temperatures up to 31 °C (88 °F), decreasing linearly to 50% maximum at 40 °C (104 °F)
- Altitude: 2000 m (6500') maximum
- Indoor use only.
- Pollution Degree: 2

Storage Conditions: –20 °C to 60 °C (–4 °F to 140 °F), 0% to 80% relative humidity (non-condensing)
Remove battery.

Battery: 3 V standard button battery (IEC-CR2032; ANSI-NEDA-54004LC)

Low Battery: Below 2.4 VDC

Overvoltage Protection: 450 VDC/VAC RMS, 50/60 Hz

Specifications (cont'd)

Measurement Categories:
Cat II, 450 V
Cat III, 300 V

Sensing: Average sensing, RMS calibrated

* Noise rejection is the ability to reject unwanted signals, or noise.
  - Normal mode voltages are AC signals that can cause inaccurate DC measurements. NMRR (Normal Mode Rejection Ratio) is a measure of the ability to filter out these signals.
  - Common mode voltages are signals present at the COM and + input terminals, with respect to ground, that can cause digit rattle or offset in voltage measurements. CMRR (Common Mode Rejection Ratio) is a measure of the ability to filter out these signals.

Measurement Categories

These definitions were derived from the international safety standard for insulation coordination as it applies to measurement, control, and laboratory equipment. These measurement categories are explained in more detail by the International Electrotechnical Commission; refer to either of their publications: IEC 61010-1 or IEC 60664.

Measurement Category I

Signal level. Electronic and telecommunication equipment, or parts thereof. Some examples include transient-protected electronic circuits inside photocopiers and modems.

Measurement Category II

Local level. Appliances, portable equipment, and the circuits they are plugged into. Some examples include light fixtures, televisions, and long branch circuits.

Measurement Category III

Distribution level. Permanently installed machines and the circuits they are hard-wired to. Some examples include conveyor systems and the main circuit breaker panels of a building's electrical system.

Measurement Category IV

Primary supply level. Overhead lines and other cable systems. Some examples include cables, meters, transformers, and other exterior equipment owned by the power utility.

Statement of Conformity

Greenlee Textron Inc. is certified in accordance with ISO 9000 (2000) for our Quality Management Systems.

The instrument enclosed has been checked and/or calibrated using equipment that is traceable to the National Institute for Standards and Technology (NIST).

Maintenance

⚠CAUTION

Electric shock hazard:

- Do not attempt to repair this unit. It contains no user-serviceable parts.
- Do not expose the unit to extremes in temperature or high humidity. Refer to “Specifications.”

Failure to observe these precautions may result in injury and can damage the unit.

Battery Replacement

⚠WARNING

Electric shock hazard:

- Do not operate with the case or battery cover open.
- Before opening the case or battery cover, remove the test leads from the circuit and shut off the unit.

Failure to observe these warnings could result in severe injury or death.

1. Disconnect the unit from the circuit. Turn the unit OFF.
2. Remove the screw from the back cover.
3. Remove the back cover.
4. Replace the battery (observe polarity).
5. Replace the cover and screw.

Cleaning

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents.