

OPERATING INSTRUCTIONS
for

AMPROBE®

Digital Pen Multimeter
Model PMM-1



See "PRECAUTIONS FOR PERSONAL AND
INSTRUMENT PROTECTION" on Page 3.

See "LIMITED WARRANTY" on Page 2

 **AMPROBE INSTRUMENT**
DIVISION OF CORE INDUSTRIES INC.
Lynbrook, N.Y. 11563

LIMITED WARRANTY

Congratulations! You are now the owner of an AMPROBE® instrument. It has been crafted according to the highest standards of quality and workmanship. This instrument has been inspected for proper operation of all of its functions. It has been tested by qualified factory technicians according to the long-established standards of AMPROBE INSTRUMENT.

Your AMPROBE instrument has a limited warranty against defective materials and/or workmanship for one year from the date of purchase provided the seal is unbroken or, in the opinion of the factory, the instrument has not been opened, tampered with, or taken apart.

Should your instrument fail due to defective materials, and/or workmanship during the one-year warranty period, return it along with a copy of your dated bill-of-sale which must identify the instrument by model number and serial number.

IMPORTANT: For your protection, please use the instrument as soon as possible. If damaged, or should the need arise to return your instrument, place it in a shipping carton packed with sufficient cushioning material. It must be securely wrapped, Amprobe is not responsible for damage in transit. Be sure to include a packing slip (indicating model and serial number) along with a brief description of the problem. Make certain your name and address appears on the box, as well as packing slip.

Ship prepaid via Air Parcel Post insured or U.P.S. (where available) to:

Service Division
AMPROBE INSTRUMENT
630 Merrick Road (use for U.P.S.)
P.O. Box 329 (use for or Parcel Post)
Lynbrook, NY 11563-0329

Outside the U.S.A. the local Amprobe representative will assist you. Above limited warranty covers repair and replacement only and no other obligation is stated or implied.

PRECAUTIONS FOR PERSONAL AND INSTRUMENT PROTECTION

- 1) Read these instructions thoroughly and follow them carefully.
- 2) In many instances, you will be working with dangerous levels of voltage and/or current. Therefore, it is important that you avoid direct contact with any uninsulated, current carrying surfaces. Appropriate insulating gloves, clothing and eye protection should be worn.
- 3) To avoid electrical shock to the user and/or damage to the instrument, do not apply more than 600V between any terminal and ground.
- 4) Before applying test leads to circuit under test, make certain that leads are plugged into proper jacks and switches are set to proper range and function.
- 5) Before using any electrical instruments or tester for actual testing, the unit should be checked on a low energy high impedance source. **Do not use power distribution lines or any other high energy sources.**
- 6) Do not attempt to measure a voltage unless you are already certain that the voltage is below 600 VAC or 600 VDC.
- 7) If the instrument should indicate that voltage is not present in circuit, do not touch circuit until you have checked to see that all instrument switches are in proper position and instrument has been checked on a known live line.
- 8) Make certain no voltage is present in circuit before connecting ohmmeter to circuit.

IMPORTANT: Plug in only one accessory probe or set of test leads at any one time, except as directed.

IMPORTANT: Failure to follow these instructions and/or observe the above precautions may result in personal injury and/or damage to the instrument and/or accessories.

SAFETY

This Instruction Manual has warnings and safety precautions which must be followed in order to ensure safe operating conditions.

CAUTION

To avoid damage to the meter:

- 1) Disconnect the test leads from circuit under test before changing functions.
- 2) Never connect instrument to a voltage source with switch in the Ohms position.

INTRODUCTION

Amprobe's Model PMM-1 Digital Pen Multimeter is a versatile meter that allows you to do a multiple of tasks with a wide array of accessories.

Features Include:

3200 Count LCD display, 65 segment analog bargraph, auto-manual ranging, 0.7% DCV accuracy, 1.7% ACV accuracy, 1.0% ohms accuracy, 600 V protection on all ranges, fast continuity beeper, data hold function, auto power off, carrying case included, rugged, fire retardant, high impact plastic case

Unpacking and Inspection of Contents

Upon removing your new instrument from its packing, you should have the following items:

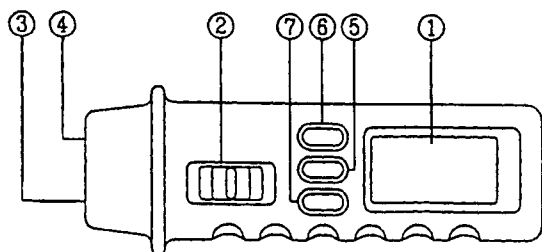
1. Digital Multimeter
2. Test lead (one black), PMTL-4
3. Red Test Probe Set, one each of PMTL-1, PMTL-2
4. Alligator accessory, PMTL-3
5. Carrying case, SV-12
6. Instruction Manual

Front Panel

Refer to Figure 1 and to the following numbered steps to familiarize yourself with the meters front panel controls and connectors.

- 1. DIGITAL DISPLAY** - The digital display has a 3200 count LCD readout with a 65 segment analog bar graph, auto polarity positive implied negative shown "—", decimal point, low battery annunciator , AC, DC, Range, H for data hold,  continuity, diode check, mv, M, K Ω , or Ω .
- 2. FUNCTION SWITCH** - Select the function and range desired.
- 3. COM INPUT TERMINAL** - Ground Input Connector.
- 4. V- Ω INPUT TERMINAL** - Positive input connector for Volts, Ohms and Diode.
- 5. RANGE SWITCH/PUSHBUTTON (Manual Range)** - "Range" switch is pushed to select manual ranging and to change ranges. When "Range" switch is pushed once, "Range" annunciator on the LCD will appear. Push "Range" switch to select appropriate range to be used. Push "Range" switch and hold for 2 Seconds to return to AUTORANGING.
- 6. $\tilde{V}$ $\bar{V}$, Ω , ,  Selection Pushbutton** - Push the YELLOW switch alternately to measure AC Voltage or DC Voltage in the voltage mode or to measure ohms, continuity or diode in the Ω , ,  mode.
- 7. Hold (H) PushButton** - This switch is used to hold or freeze a measured value for all functions, when activated an "H" annunciator will appear in the LCD. This is not a Peak hold function, the display will not update but only freeze the reading when the button is depressed.

FIGURE 1



SPECIFICATIONS

2-1 GENERAL SPECIFICATIONS

This instrument has been designed in accordance with UL 3111-1 and IEC publications 1010 Pt1, Class II, Safety Requirements for Electrical Equipment for measurement, Control and Laboratory use. This level of safety can only be guaranteed while the limits of 2.2 are observed.

DISPLAY: The Liquid Crystal Display (LCD) has a maximum reading of 3200 counts along with a 65 segment bargraph.

Polarity Indication: Automatic, positive implied, negative indicated.

Overrange Indication: "OL" or "-OL"

Low Battery Indication: "  " is displayed when the battery voltage drops below operating Voltage.

Sampling: 2 times per second for digit, 12 times per second for the analog bargraph.

Auto Power Off: Approximately 10 minutes.

2-2 ENVIRONMENTAL CONDITIONS

Maximum Altitude: 2000 meters

Installation Category: To level III protected against transients to 6KV.

Pollution Degree: Level III

Operating Temperature: 0 degree C to 50 degree C, 0 to 80% R.H.

Storage Temperature: -20 degree C to 60 degree C, 0 to 80% R.H. when battery is removed from the meter.

Temperature Coefficient: 0.15 x (Spec. Acc'y/ Degree C, < 18 Degree C or > 28 Degree C.

Power requirements: IEC LR03, AM4 or AAA size 1.5v x 2.

Battery Life: Alkaline 800 hours.

Dimensions: (WxHxD) 42 mm x 145 mm x 24 mm

Weight: 120 grams, without probes

Accessories: Battery (installed) , operators manual, leads and SV-12 carrying case.

2-3 ELECTRICAL SPECIFICATIONS

Accuracy is + or - (% reading + number of digits) at 23 Degree C +/- 5 degree C, less than 75% R.H.

1. DC Voltage
Range 320mv to 600V

Range	Res.	Accuracy	Over Voltage Protection
320mv	100uV	+/- (0.7% + 2dgt)	600VDC or 600VRMS
3.2V	1mV	"	
32V	10mV	"	
320V	100mV	"	
600V	1V	"	

Input Impedance: 10 Meg Ohms

2. AC Voltage
Range: 3.2 V to 600V

Range	Res.	Accuracy	Over Voltage Protection
3.2V*	1mV	+/- (1.7%rdg + 5 dgt)	600VDC or 600Vrms
32V**	10mV	+/- (1.7%rdg + 5 dgt)	
320V	100mV	40 to 500Hz	
600V	1V	"	

* Frequency response: 40Hz to 300Hz for 3.2V range

** Frequency response: 50Hz to 60Hz
Input impedance: 10M ohms/less than 100pF

3. RESISTANCE

Range	Res.	Accuracy	Overload Protection
300 Ω	0.1 Ω	+/- (1.2%rdg + 4dgt)	600VDC or 600Vrms
3K Ω	1 Ω	+/- (1.0%rdg + 2dgt)	
30K Ω	10 Ω	"	
300K Ω	100 Ω	"	
3M Ω	1K Ω	+/- (1.5%rdg + 3 dgt)	
30M Ω	10K Ω	+/- (3%rdg + 5dgt)	

Open Circuit Voltage: 1.3 V Approximate

4. DIODE CHECK AND CONTINUITY

Range	Res.	Accuracy	Max. Test Current	Max. Open Circuit Voltage
→	1mV	+/- (1.5%rdg + 5dgt)*	1.5mA	3.3V

* For 0.4 to 0.8V

Overload protection: 600V DC/AC rms max
Continuity: Built-in buzzer sounds when resistance is less than 20 ohms.

5. AUTO POWER OFF

The meter will automatically shut itself off approximately 10 minutes after power on. The meter can be turned back on by pushing the "RANGE" pushbutton.

OPERATION

3-1 PREPARATION AND CAUTION BEFORE MEASUREMENT

- Before measuring, allow the meter to get acclimated with the environment for at least 45-60 seconds after power up.
- When the function switch selector is changed during a measurement, be sure to do so only after removing the test leads from the unit under test!

3-2 VOLTAGE MEASUREMENTS

(See precautions on Page 3)



WARNING! TO AVOID AN ELECTRICAL SHOCK, HAZARD OR DAMAGE TO THE METER, DO NOT ATTEMPT TO MEASURE A VOLTAGE THAT MIGHT EXCEED 600VDC OR 600VAC. DO NOT APPLY MORE THAN 600 DC OR AC RMS BETWEEN THE COMMON INPUT TERMINAL AND THE EARTH GROUND.

- Connect the red test probe to the "V-Ω" input terminal and the Black test lead to the "COM" terminal.
- Set the function switch to " " position.
- Push the Yellow button to select the ACV or DCV function mode.
- Connect the test probes to the device to be measured.

An unstable display may occur especially at the 320mV range even though you don't have the test leads in the input terminals. In this case, if an erroneous reading is suspected, insert the leads and short the voltage/ohm terminal and the common terminal leads, the meter should show a zero on the display. In ACV, an offset of .004 or less may be seen on turn on vs. seeing 0. This offset is not cumulative when taking a measurement

3-3 RESISTANCE MEASUREMENT

(See precautions on page 3)

**CAUTION: RESISTANCE TO BE MEASURED
MUST BE DISCONNECTED FROM ALL
POWER BEFORE APPLYING OHMMETER
TEST LEADS.**

1. Connect the red test probe to the "V-Ω" terminal and the black test lead to the "COM" terminal.
2. Set the function switch to "Ω • ➔" position and push the Yellow key to select resistance function.
3. For correct reading, ensure that the device being tested contains no voltage.
4. Connect the test leads across the resistor to be measured. In order to ensure the best accuracy in measurement of low resistance, short the test leads before measurement and record the test probe resistance, this needs to be subtracted from your actual measurement.

3-4 CONTINUITY CHECK BY BUZZER

Follow the above Caution under
RESISTANCE 3-3

1. Connect the red test probe to the "V-Ω" terminal and the black lead to the "COM" terminal.
2. Set the function switch to "Ω • ➔" position, and push the Yellow button to select the continuity function.
3. Connect the test probe and lead to the circuit to be measured. The buzzer will sound if the resistance of the circuit under test is lower than 20 ohms.

3-5 DIODE CHECK

Follow the above Caution under
RESISTANCE 3-3.

1. Set the function switch at "Ω • ➔" position, and push the Yellow button to select the diode function.

2. Connect the black test lead to the "COM" terminal and the red lead to the "VΩ" input terminal.
3. When using the diode test range for checking silicon diodes, a reading above 0.5 volts in the forward direction (other than an over-range indication) means that the diode is functional. An over-range indication means either (1) that the diode is OPEN or (2) that the test leads are connected in reverse. Reverse the test lead connections. If you still get an over-range indication, the diode is OPEN. If the diode is defective, "000" (short circuit) or "OL" (non-conductance 0 is displayed). Check the manufacturers specifications for other types of diodes.

3-6 USING ACCESSORIES

1. AC CURRENT MEASUREMENT WITH CLAMP-ON TRANSDUCER MODEL PMM-C.

AC current can be measured using a clamp-on current transducer available as an accessory: Model PMM-C for 0.4 amps through 300 amps AC.

1. On PMM-1, move slide switch to "V V" position.
2. Push the Yellow key until you see the **AC** and **V** annunciators in the LCD.
3. Insert the PMM-C transducer into the input terminals firmly so the transducer trigger is to the left and the display is facing you.
4. Press the trigger to open the transformer jaws and clamp around one conductor only, make sure that the jaw is firmly closed around the conductor, then observe the reading on the display.
5. The output voltage is 1mV per 0.1 amp ac. For example a reading of .009V AC is

equated to 0.9 amps, a reading of .090V is equated to 9.0 amps. , 2.85V AC is 285 amps. Jaw opening is 30mm.

6. Please follow the Instruction Manual that comes with the PMM-C.

NOTE: The offset on turn on can be .004 VAC or less when used with the PMM-C. The offset does not affect the readings above 0.4amps through 300 amps AC.

2. AC CURRENT MEASUREMENTS WITH CLAMP-ON TRANSDUCER MODEL A400.

THE A400 is rated at 0.1 amp ac to 400 amps ac RMS. The output is 1mV AC per 1 Amp AC. However, when used with the PMM-1, the rating is 4 amps through 300 amps. Using this transducer allows an extension of 5 feet while holding the PMM-1 readout in the other hand. It is ideal for those hard to reach areas. Follow the A400 Instruction Manual for more information and specifications.

The PMM-1 can also work with the following accessories, contact Amprobe customer service at 516-593-5600 for data sheets for the following items:

Model IR-100, Infrared Differential Temperature Scanning Probe
Model CT600 AC/DC, AC & DC Current Transducer (300 a AC or DC)
Model TMA-1, Multi-Temperature Accessory
Model A-47L, Energizer Line Splitter
Model AW80 & AW-80, Kilowatt/Ampere Transducers

REPLACEMENT PARTS

Model SV-12, PMM-1 Carrying Case
Model PMTL-1, Short Red Test Lead
Model PMTL-2, Long Red Test Lead
Model PMTL-3, Black Alligator Clip
Model PMTL-4, Standard Black Test Lead
Model 912, 1 pc. AAA Battery

3-7 MAINTENANCE AND BATTERY REPLACEMENT

⚠ WARNING! TO REDUCE THE RISK OF ELECTRIC SHOCK, DISCONNECT TEST LEADS BEFORE OPENING THE CASE.

1. Before replacing the battery, disconnect the test leads from any circuit under test and turn off the meter. Remove the test leads from the input terminals.
2. Position the meter face down on a soft surface. Remove the screw from the case bottom. Refer to **FIGURE 2**
3. Lift the end of the case bottom until it gently unsnaps from the case top near the input terminals.
4. Lift the battery holder from the unit and remove the 2 AAA batteries.
5. Re-insert the new batteries and place the battery holder on to the folded foil.
6. Replace the case bottom and install the screw

 screw

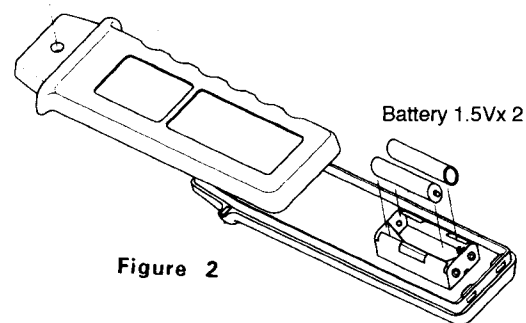


Figure 2

3-8 SERVICE

If the instrument fails to operate, check battery, leads, etc... and replace as necessary. If the instrument still does not operate, double check operating procedure as described in the instruction manual. If the instrument still malfunctions, place it with the packing slip along with a brief description of the problem in sufficient cushioning material in a shipping carton. Be sure to indicate the serial number located on the back of the instrument. Amprobe is not responsible for damage in transit. Make certain your name and address also appears on the box as well as the packing slip; ship prepaid via U.P.S. (where available) or Air Parcel Post insured to:

Service Division
Amprobe Instrument
630 Merrick Road (for UPS)
P.O. Box 329 (use for Parcel Post)
Lynbrook, NY. 11563-0329

Outside the USA, the local Amprobe representative will assist you.

NOTES

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