Pt. No. 947758
4/89

AMPROBE®
MEGOHMMETER

MODEL AMB-1A
(Battery Powered)

AMPROBE INSTRUMENT®
DIVISION OF CORE INDUSTRIES INC., LYNBROOK, NEW YORK 11563

PRECAUTIONS FOR PERSONAL AND INSTRUMENT PROTECTION

Although there is high voltage at the tips of the test leads when the AMB-1A is used as a megohmmeter, low current flow reduces any danger to relatively safe levels. However, contact with the probe tips while the instrument is energized should be avoided.

DO NOT USE IN AN EXPLOSIVE ATMOSPHERE.

If the equipment to be tested was in use up to the time of testing, it will most likely have a capacitive charge built up. This capacitance must be discharged before making any resistance measurements.

Equipment under test with the megohmmeter may build up a capacitive charge from the testing. This charge is automatically discharged by the Model AMB-1A when the "Press-to-Read" button is released.

When the AMB-1A will not be used for a period of time, remove the batteries to avoid possible instrument damage due to a leaking battery.

Before connecting the AMB-1A to any circuit as either an ohmmeter or megohmmeter check for any voltage. The AMB-1A has a 0-600VAC Test Band for this purpose. Do not connect the AMB-1A ohmmeter or megohmmeter to a live circuit.

Always store the instrument in its carrying case.

SPECIFICATIONS Model AMB-1A

Ranges:	0-100 Megohms (2.5 Megohms midscale) Test Voltage 500 VDC 0-100 ohms (4 ohms midscale) Open Circuit Voltage 300mV 0-600 VAC Test Band (May also be used for DC) Battery OK Test Band
Accuracy:	Megohm range 0.1 to 10 Megohms: ±5% of reading Over 10 Megohms: ±10% of reading Ohmmeter range: ±3% of arc
Power:	8 AA Batteries (not supplied)
Fuse:	8 AG-361 1 Amp Littlefuse Fast blow (1 spare supplied)
Size:	4.09" × 6.25" × 2.81 (104mm × 158.8mm × 71.4mm)
Weight:	1 lb. 3 oz. (.54Kg) without batteries

OPERATING INSTRUCTIONS

IMPORTANT: See Precautions for Personal and Instrument Protection before proceeding.

Note that lid of the AMB-1A Carrying Case can be detached from the case and snapped in position on the back of the carrying case.

1. Remove panel on back of instrument by removing large black screw on bottom and install 8 type AA batteries (two Cat. No. 915, Pkge. of 4) observing proper polarity. Note that the instrument is fused and that one spare fuse (Cat. No. 8AG-361 1 Amp Fast Blow) is in battery compartment.
2. Set range switch to "ACV/MΩ" position. Use zero adjust screw located just below window to adjust pointer to "∞" on MΩ scale. ***Do not press red button.***
3. Set range switch to "BATT" (Battery) position. Press the red button. If pointer does not indicate within "BATT. OK" box, replace batteries.
4. Set range switch to "ACV/MΩ" position. Press red button. Pointer should indicate at the "∞" scale division on the MΩ scale. Plug test leads into instrument and short the probe tips together. Press red button. The pointer should indicate at the "0" division on the "MΩ" scale. If not, replace fuse.

⚠ **WARNING! Do not exceed 600 volts AC.**

5a. To use as a megohmmeter or an ohmmeter, disconnect the device or circuit to be tested from the line.
b. Set range switch to the "ACV/MΩ" position. Plug test leads into instrument and apply test probes to circuit or device to be tested. ***Do not press red button.*** If pointer moves up the red ACV band, there is voltage present in circuit or device. Disconnect device or circuit from any voltage supply before proceeding.
c. Set range switch to appropriate position—"ACV/MΩ" for megohms, "Ω" for low ohms.
d. Connect test leads to device or circuit to be tested.
e. Press red button.
f. Take reading on scale corresponding to range switch position.

Why Insulation Resistance Testing?

The primary purpose of insulation is to keep electricity flowing in the desired path. The "perfect" insulation would have infinite resistance which would prevent the flow of any current through the insulation to ground. However, there isn't any "perfect" insulation material so there is always some current flow. Good insulation is one that has and keeps a high resistance value in order to minimize the current flow.

Unless there is accidental damage of some sort, insulation failure is generally gradual rather than sudden. This is because failure is generally a wearing down process due to repeated heating and cooling, the related expansion and contraction, dirt, physical abrasion, vibration, moisture and chemicals.

When insulation starts to fail, its resistance decreases allowing more current to flow through the insulation. If the resistance continues to decrease, the condition of the insulation may reach a point where it may permit a large enough current flow through the insulation to cause 1) a simple blowing of a fuse, 2) equipment damage, or 3) even fatal shock. That's why, if you're responsible for the servicing, maintenance or installation of electrical equipment, you must be concerned about insulation resistance!

An Insulation Resistance Testing Program helps reveal failing insulation before it becomes a serious problem. Such a testing program consists of periodic insulation resistance tests on critical equipment and systems. The results are recorded on a control card or file for each piece of equipment or each test point in a system. Any trend that indicates a decreasing insulation resistance value is an indication that the insulation is failing and that corrective maintenance should be scheduled.

MEASURING INSULATION RESISTANCE

Without going into a great deal of technical explanation, let us state that insulation resistance measurements are affected by a number of factors. Temperature and the duration of the measurement are two primary ones. Humidity may also affect readings so it is a good idea to make a note as to whether the air is dry or humid at the time of the measurement. You may find that insulation resistance readings are lower on humid days and higher on dry days. Wet or flooded equipment should be dried and cleaned as much as possible before measurements are taken. Lastly, dirt or other contaminents (corrosion, chemicals, etc.) can also affect readings, either raising or lowering them. Therefore, steps should be taken to make certain that the contact points at which measurements are to be taken are reasonably clean.

TEMPERATURE

Insulation resistance can vary significantly with temperature. If your periodic insulation resistance measurements can not be taken at the same temperature, it is important that resistance measurements be adjusted to a base temperature. From IEEE Std 43-1961 for Rotating Machinery. $R_{40C} = K_{t40C} \times R_t$

where R_{40C} = Insulation resistance (in megohms) corrected to 40°C
R_t = measured insulation resistance (in megohms) at t°C
K_{t40C} = temperature coefficient of insulation resistance as observed for temperature t°C see Fig. 1

Example: An insulation has a resistance of 100 megohms at 30°C. From Fig. 3, K_{t40C} is 0.5

$R_{40C} = 0.5 \times 100 = 50$ megohms

For temperature correction factors for cable insulation, refer to specifications of the Insulated Power Cable Engineers Assn. and the Assn. of Edison Illuminating Companies.

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AMPROBE®
MEGOHMMETER
MODEL AMB-2
(Battery Powered)

AMPROBE INSTRUMENT®
DIVISION OF CORE INDUSTRIES INC., LYNBROOK, NEW YORK 11563

PRECAUTIONS FOR PERSONAL AND INSTRUMENT PROTECTION

Although there is high voltage at the tips of the test leads when the AMB-2 is used as a megohmmeter, low current flow reduces any danger to relatively safe levels. However, contact with the probe tips while the instrument is energized should be avoided.

DO NOT USE IN AN EXPLOSIVE ATMOSPHERE.

If the equipment to be tested was in use up to the time of testing, it will most likely have a capacitive charge built up. This capacitance must be discharged before making any resistance measurements.

Equipment under test with the megohmmeter may build up a capacitive charge from the testing. This charge is automatically discharged by the Model AMB-2 when the "Press-to-Read" button is released.

When the AMB-2 will not be used for a period of time, remove the batteries to avoid possible instrument damage due to a leaking battery.

Before connecting the AMB-2 to any circuit as either an ohmmeter or megohmmeter check for any voltage. The AMB-2 has a 0-600VAC Test Band for this purpose. Do not connect the AMB-2 ohmmeter or megohmmeter to a live circuit.

Always store the instrument in its carrying case.

SPECIFICATIONS Model AMB-2

Ranges: 0-100 Megohms (2.5 Megohms midscale)
Test Voltage 500 VDC
0-50 Megohms (1.5 Megohms midscale)
Test Voltage 250 VDC
0-100 ohms (4 ohms midscale)
Test Voltage 300mV
0-600 VAC Test Band (May also be used for DC)
Battery OK Test Band

Accuracy: Megohm range
0.1 to 10 Megohms: ±5% of reading
Over 10 Megohms: ±10% of reading
Ohmmeter range: ±3% of arc

Power: 8 AA Batteries (not supplied)

Fuse: 8AG-361 1 Amp Fast Blow
(1 spare supplied)

Size: 4.09" × 6.25" × 2.81"
(104mm × 158.8mm × 71.4mm)

Weight: 1 lb. 3 oz. (.54Kg) without batteries

OPERATING INSTRUCTIONS

IMPORTANT: See Precautions for Personal and Instrument Protection before proceeding.
Note that lid of the AMB-2 Carrying Case can be detached from the case and snapped in position on the back of the carrying case.

1. Remove panel on back of instrument by removing large black screw on bottom and install 8 type AA batteries (two Cat. No. 915, Pkg. of 4) observing proper polarity. Note that the instrument is fused and that one spare fuse (Cat. No. 8AG-361 1 Amp Fast Blow) is in battery compartment.
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   Use zero adjust screw located just below window to adjust pointer to "∞" on MΩ scale. ***Do not press red button.***
3. Move function switch to "BATT" (Battery) position. Press the red button. If pointer does not indicate within "BATT. OK" box, replace batteries.
4. Move function switch to "ACV/MΩ" position. Press red button. Pointer should indicate at the "∞" scale division on the MΩ scale. Plug test leads into instrument and short the probe tips together. Press red button. The pointer should indicate at the "0" division on the "MΩ" scale. If not, replace fuse.

⚠ **WARNING! Do not exceed 600 volts AC.**

5a. To use as a megohmmeter or an ohmmeter, disconnect the device or circuit to be tested from the line.
b. Move function switch to the "ACV/MΩ" position. Plug test leads into instrument and apply test probes to circuit or device to be tested. ***Do not press red button.*** If pointer moves up the red ACV band, there is voltage present in circuit or device. Disconnect device or circuit from any voltage supply before proceeding.
c. Move function switch to appropriate position—"ACV/MΩ" for megohms, "Ω" for low ohms. If "ACV/MΩ" is chosen, set range switch to either 50 MΩ or 100 MΩ.
d. Connect test leads to device or circuit to be tested.
e. Press red button.
f. Take reading on scale corresponding to range switch position.

Why Insulation Resistance Testing?

The primary purpose of insulation is to keep electricity flowing in the desired path. The "perfect" insulation would have infinite resistance which would prevent the flow of any current through the insulation to ground. However, there isn't any "perfect" insulation material so there is always some current flow. Good insulation is one that has and keeps a high resistance value in order to minimize the current flow.

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Example: An insulation has a resistance of 100 megohms at 30°C. From Fig. 3, K_{t40C} is 0.5

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For temperature correction factors for cable insulation, refer to specifications of the Insulated Power Cable Engineers Assn., and the Assn. of Edison Illuminating Companies.

P/N 947781
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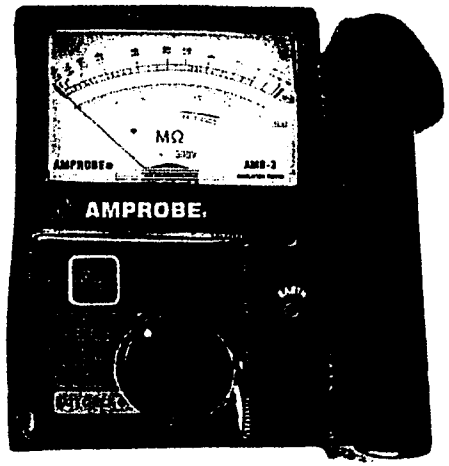
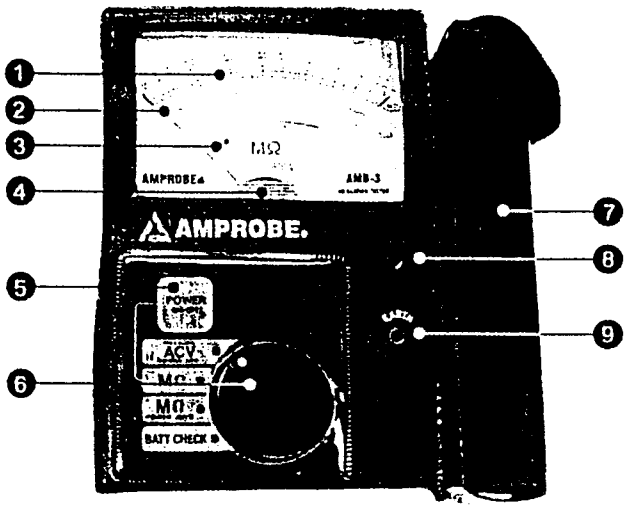
INSULATION RESISTANCE TESTER



Model AMB-3

AMPROBE.
A United Dominion Company

REFERENCE DESIGNATION



PARTS

1. Scales:
   a. MΩ scale
   b. ACV scale
   c. Battery check scale
2. Pointer
3. LED HV "ON" indicator
4. ∞ Position pointer adjustment
5. Insulation resistance test push button switch
6. Function selector switch
7. Test lead
8. L Terminal (Line side)
9. E Terminal (Earth side)

HOW TO USE YOUR AMB-3

1. **CONNECTION OF TEST LEADS**
   Connect the red test lead to the L terminal of the instrument and the black test lead to the E terminal of the instrument.

2. **ADJUSTMENT OF METER POINTER TO INFINITY (∞) SCALE**
   Confirm alignment of the pointer to the infinity line mark (left most marking of the MΩ scale). Turn the ∞ position screw head to align the pointer with the "Infinity line".

3. **MEASUREMENT OF INSULATION RESISTANCE**
   a. Connect the red and black test leads to the item under test. Note if test is referred to ground, connect the black test lead to ground and red test lead to circuit being tested.
   b. Rotate the function switch from POWER OFF position to MΩ position and push the POWER switch. The meter indicates the insulation resistance value.
   c. If the LED lamp is ON, the tester is working properly and the voltage is correctly impressed on the test point. If the LED lamp doesn't light, the batteries must be replaced.
   d. Set the rotary switch to MΩ POWER LOCK position for continuous measurements. POWER switch remains ON regardless of Push Button switch (The LED lamp stays ON).
   e. Return the control switch to POWER OFF position after measurement.

4. **CHECK BATTERIES**
   Rotate the control switch to BATT CHECK position with the E and L terminals NOT connected to anything. If the pointer swings to the BATT scale, the batteries are O.K. If the pointer points to the left side of the BATT scale, the batteries are low. Replace them with new batteries. For replacement of the batteries refer to page 8.

5. **ACV MEASUREMENT**
   a. Connect the test leads to the AMB-3.
   b. Rotate the function selector switch to the ACV (Power Off) position.
   c. Connect the leads to the circuit and read the voltage value in the red 0~600V scale.
   d. This ACV range can be used for general ACV measurements and as a preliminary check for whether or not ACV is present on the measured object, prior to insulation resistance measurement **(Note: If voltage is present DO NOT proceed with test. Remove voltage before proceeding).**

PRECAUTION - Be sure to return the function selector switch to the "Power Off" position after use. With the function selector switch in this position, current doesn't flow and the batteries will last longer.

SPECIFICATIONS

Model No.	Rated	Scale Range	ACV	Usage
AMB-3	500V 1000MΩ	0-1000MΩ	0-600V	Insulation tests for general equipment and electronic components

- **Power source:** Four 1.5V AA batteries
- **Accuracy:** Within ±5% of the value indicated in the primary effective scale range. Other: within ±2% of the scale length
- **ACV:** Within ±5% of full scale value
- **Size and Weight:** 5.85" x 9.9" x 1.8", .77lbs.
- **Accessories supplied:** 1 Test lead with probe, 1 Test lead with clip, carrying case.
- **Terminal to terminal voltage:**

±10% of rated voltage.....at ∞ (Open circuit)
About 90% of rated voltage.....at Center scale (approx. 20 Mohms)

NOTES