

INSTRUCTION MANUAL 26J
FOR
CATALOG NO. 260563 RESISTANCE TESTER
(MK-IV Conductivity Test Set)

BIDDLE INSTRUMENTS
Blue Bell, PA 19422

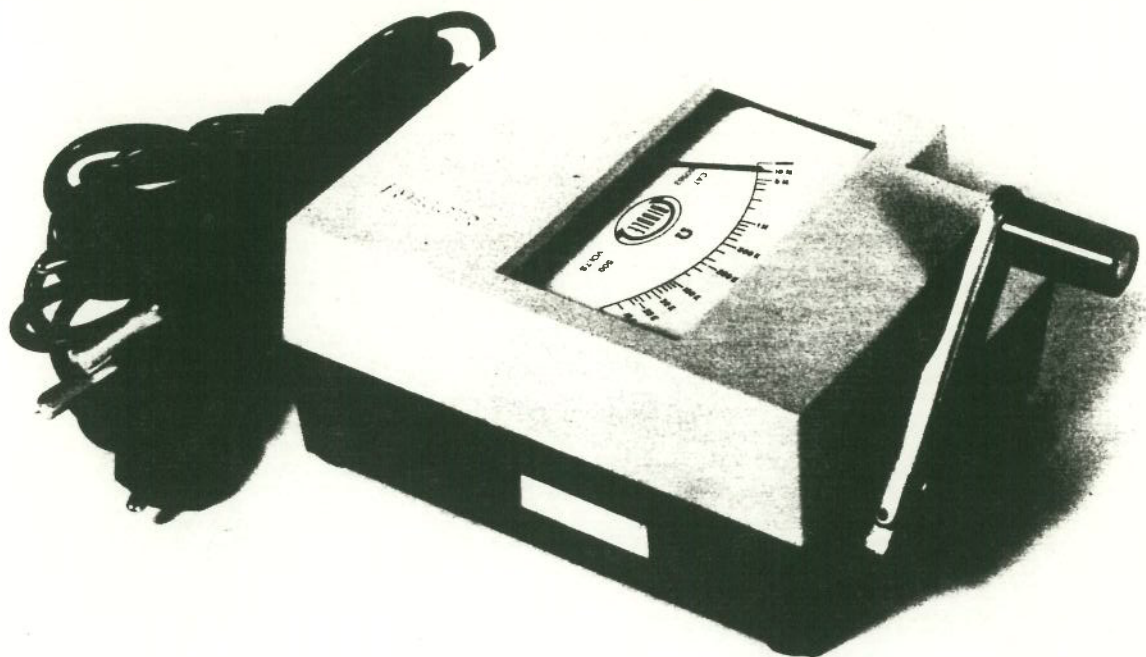


Figure A: The Catalog No. 260563 Instrument

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SECTION 1

GENERAL INFORMATION

1.1 EQUIPMENT ILLUSTRATION (See Figure -a-).

General.

The Insulation Tester described in this manual is composed of a hand-driven ac generator with voltage rectified to 500 volts dc; a cross-coil movement with a 0-10 M Ω scale, a carrying case and test leads. It has been designed to meet the specifications and requirements of NFPA-99.

Purpose.

The instrument measures the resistance, in megohms, to the flow of current through and/or over the surface of electrical equipment insulation. The test results are used to detect the presence of dirt, moisture, and insulation deterioration.

1.2 FUNCTIONAL DESCRIPTION

General

The instrument is portable. It is enclosed in a case which stands on four rubber feet.

The ohmmeter movement is mounted at one end of the instrument, next to the test jacks.

The crank for the hand-driven generator is mounted on the right side. A window is provided at the top to permit reading of the scale. The instrument is transported in a vinyl carrying case.

Ohmmeter.

The ohmmeter movement is of the permanent magnet cross-coil pointer type.

Scale length is approximately 2.50" (63.5 mm).

The instrument is calibrated to have an accuracy of ± 0.03 " (.76 mm) from any marked position.

The instrument is to be cranked at 160 RPM, minimum.

GENERAL INFORMATION (Continued)

1.3 QUICK REFERENCE DATA

Test Voltage, Open Circuit, at 160 RPM.

500V DC: +10%, -0%

Short Circuit Current

2.5 to 5 mA

Accuracy:

± 0.030 " (.76 mm) from any marked position when checked with standard resistor.

Voltage change at infinity between cranking speed of 160-240 RPM is $\pm 3\%$.

Operating Temperatures:

5° to 45°C (41° to 114°F).

Maximum Dimensions.

Length: 5 1/8 inches, (131 mm).
Width: 3 7/8 inches, (98.3 mm).
Height: 2 3/8 inches, (61 mm).
Weight: 2.1 lbs. (.95 kg)

1.4 SAFETY PRECAUTIONS

- SAFETY IS THE RESPONSIBILITY OF THE USER -
- LA SEGURIDAD ES EL CARGO DEL OPERADOR -

The Test Set and the sample to which it is connected are a source of high-voltage electrical energy and all persons making or assisting in the tests must use all practical safety precautions to prevent contact with energized parts of the test equipment and related circuits.

Persons actually engaged in the test must stand clear of all parts of the complete high-voltage circuit unless the set is de-energized and all parts of the test circuit are grounded.

Any persons not directly involved with the work must be kept away from test activities by suitable barriers, barricades or warnings.

1.5 RECEIVING INSTRUCTIONS

Your Megger instrument has been thoroughly tested and inspected to rigid inspection specifications before being shipped and is ready for use after it is set up as indicated in the Installation section. Check the equipment received against the packing list. Notify BIDDLE INSTRUMENTS, Blue Bell, PA 19422 of any shortage of materials. The Megger instrument should be examined for damage received in transit. If any damage is found, file a claim with the carrier at once and notify BIDDLE INSTRUMENTS or its nearest representative giving a detailed description of the damages observed.

1.6 WARRANTY

All products supplied by BIDDLE INSTRUMENTS are warranted against all defects in material and workmanship for a period of one year following shipment. Our liability is specifically limited to replacing or repairing, at our option, defective equipment. Equipment returned to the factory for repair will be shipped Prepaid and Insured. The warranty does not include batteries or lamps where the original manufacturer's warranty shall apply.

WE MAKE NO OTHER WARRANTY.

The warranty is void in the event of abuse or failure by the customer to perform specified maintenance as indicated in this manual.

1.7 REPAIR

BIDDLE INSTRUMENTS maintains a complete instrument repair service. Should this instrument ever require repairs, we recommend it be returned to the factory for repair by our instrument specialists. When returning instruments for repairs, either in or out of warranty, they should be shipped Prepaid and Insured, and marked for the attention of the Instrument Service Manager.

SECTION 2
INSTALLATION

2.1 UNPACKING AND HANDLING

To prepare the instrument for use, remove outer wrapping and lift out of the carrying case, along with the test leads.

2.2 INSTALLATION

The instrument is a portable unit used only for testing purposes and no permanent installation is necessary.

2.3 INSPECTION AND ADJUSTMENT

Use the instrument by positioning it on a firm and fairly level surface. Do not use near large masses of iron or within magnetic fields.

NOTE: THE INSTRUMENT IS NOT EQUIPPED WITH EXTERNAL POINTER ZEROING, BECAUSE THE MOVEMENT IS A TRUE OHMMETER, THE POINTER WILL REST ANYWHERE ON THE SCALE.

Check ∞ (INFINITY).

With no leads connected to the jacks, check infinity by energizing the instrument. This may be done by hand cranking at 160 RPM minimum. The pointer should read infinity within an accuracy of ± 0.030 ".

Check 0 (ZERO).

Short circuit red and black jacks. Energize the instrument. The pointer should read ZERO within an accuracy of ± 0.030 ".

Checking Test Leads.

With test leads connected to red and black jacks and with opposite ends separated, energize the instrument. If the pointer indicates more than .030" less than infinity there is a leak between the leads which must be removed before the instrument can be used. Touch the test ends of the leads together while energized and make a zero reading to be sure the leads are not open-circuited.

SECTION 3

OPERATOR'S SECTION

3.1 FUNCTIONAL OPERATION.

Use.

The instrument is to be used primarily in checking the conductivity of floors, operating room accessories, shoes, furniture, etc. These tests are to be made for acceptance test of equipment and for maintenance checks.

Capabilities and Limitations.

The potential applied to the apparatus under test will vary from zero to maximum voltage depending on the resistance (conductivity) of the item being tested.

WARNING! DO NOT USE INSTRUMENT ON APPARATUS FOR WHICH THE MAXIMUM TEST VOLTAGE IS UNSAFE.

Ohmmeter Movement.

Is of the permanent magnet, moving cross coil and pointer type with a scale length of about 2.5 inches. It is calibrated to within ± 0.030 inch of any marked position.

Test Leads.

Test leads supplied with the instrument are 6 feet long, however, other lengths are available. DO NOT INTERCHANGE TEST LEADS with this instrument. Any substitution may cause errors in reading or be dangerous to the operator. Use spring clips for connecting the test leads to the equipment under test.

3.2 PREPARATION FOR USE.

Before using instrument, check zero and infinity and check test leads. Follow procedure outlined in paragraph 2.3.

3.3 PREPARING EQUIPMENT OR ARTICLES TO BE TESTED.

Follow the instructions in Chapter 3 of NFPA-99 for the particular item or instructions of the specification being followed.

3.4 PREPARING APPARATUS TO BE TESTED. (When used as conventional Megohmmeter).

Shut down apparatus.
Open switches.
Deenergize.

WARNING! WHEN TAKING APPARATUS OUT OF SERVICE, BLOCK OUT DISCONNECT SWITCHES, APPLY NEUTRAL OR PROTECTIVE (WORKMAN'S) GROUNDS.

Disconnect apparatus from other equipment and circuits. Avoid removing protective grounds by disconnecting the equipment from the exposed bus or line, leaving the latter grounded.

If neutral or other ground connections must be disconnected, ascertain that they are not carrying current at the time, and that when disconnected no other equipment will lack necessary protection.

Inspect conductors which lead away from the circuit being tested to be sure that they have been disconnected properly from any source of voltage.

Inspect apparatus to be tested in order to determine what equipment is connected and will be included in the test. The more equipment included in the test, the lower the reading will be, and the true insulation resistance of the equipment under test may be masked by the insulation resistance of the related equipment.

Capacitive effect on readings: on initial tests capacitive feedback will cause oscillation of the pointer until dissipated. If re-test is required the equipment under test should be discharged for 4 times the length of the initial test to ensure accurate readings, i.e., if test is for a period of one minute, discharge for 4 minutes.

When apparatus is shut down for the insulation resistance test, make sure that the readings are not affected by leakage over or through switches or fuse blocks, etc. Such leakage may cause inaccurate test results. Inconsistent readings can be caused by current leaking from an energized line into the apparatus particularly if the live line is direct current. Such leakage can be detected by watching the ohmmeter pointer at the moment the test leads are connected to the equipment to be tested.

SECTION 4

PRINCIPLES OF OPERATION

4.1 OVERALL FUNCTIONAL DESCRIPTION

The instrument consists of an indicator calibrated directly in ohms and megohms, an ac generator with gear train and with rectifying and resistance networks. A fold-away crank is provided for operating the generator.

4.2 FUNCTIONAL SECTIONS

Indicator.

The indicator is of the permanent magnet cross-coil type. When current and voltage are applied to the indicator, the pointer deflects. The amount of deflection is determined by the circuit components and the unknown resistance.

Generator.

The alternating-current generator consists of a single stator coil and a permanent magnet rotor. It is rectified to direct current through a voltage doubler rectifying circuit. The rotor operates in bearings which are permanently lubricated.

Gear Train.

The gear train is a simple spur gear drive. Proper lubrication of the gear train is made by the manufacturer and no additional lubrication is required.

Resistance Network.

Figure 6.2 shows schematic diagram of instrument.

4.3 CALIBRATION

Test Equipment. (See table 4.4).

Ohmmeter Scale.

To check ohmmeter scale, proceed as follows, (proper cranking speed 160 RPM minimum):

**CAUTION! INSTRUMENT MUST BE DE-ENERGIZED
WHEN CHANGING SAMPLES.**

1. Connect 25 k Ω resistor between red and black jacks.
2. Energize the instrument.
3. Read scale. Pointer should indicate 25K Ω \pm 0.030".
4. De-energize instrument (stop cranking).
5. Repeat above with resistor at 250 K Ω , 500K Ω , 1M Ω and 5 M Ω .

Voltage.

1. Connect electrostatic voltmeter between red and black jacks.

CAUTION! If a voltmeter other than an electrostatic type is used, an incorrect reading may be obtained. The internal resistance of the voltmeter must be higher than the highest graduation on the scale or a low voltage reading will be obtained, i.e., if the voltmeter has an internal resistance of 10M Ω the Megger tester will read 10M Ω and the voltmeter will read the output voltage of the Megger tester with a 10M Ω load. An electrostatic voltmeter has infinite internal resistance and the Megger tester will read infinity and the voltmeter will indicate the open circuit voltage of the Megger Instrument.

2. Energize the instrument.
3. Read voltmeter, it should indicate 500V to 550V dc.

Short Circuit Current.

1. Connect milliammeter between red and black jacks.
2. Set range so that 5 mA can be read.
3. Energize instrument.
4. Current should be between 2.5 and 5 mA.

TABLE 4.4

CALIBRATION EQUIPMENT REQUIRED

Nomenclature	Application	Range/Values	Accuracy
Wire Wound Resistor	Supplies known resistance.	25 K Ω 250 K Ω 500 K Ω 1 M Ω 5 M Ω	All within 0.1%
Milliammeter	For checking instruments's short circuit current.	10 mA	1%
Electrostatic	For checking voltage at instrument's terminals.	0 - 1000V	2%

SECTION 5

TROUBLESHOOTING AND MAINTENANCE

5.1 TROUBLESHOOTING

5.2 TABLE - TROUBLESHOOTING CHART

TROUBLESHOOTING CHART

TROUBLE	PROBABLE CAUSE	REMEDY
Pointer does not move to infinity when voltage is applied during infinity check.	Defective moving element.	Replace defective moving element assembly. (See paragraph 5.3.)
	Defective components.	Remove and replace defective PC Board. (See paragraph 5.4.)
	Defective generator assembly.	Remove and replace defective generator assembly. (See paragraph 5.4.)
Pointer indicates less than infinity when test leads are connected at terminals, with opposite ends separated, and crank is turned at normal speed (160 RPM minimum).	Leakage between test leads.	Correct leakage or replace test leads.
Pointer does not move promptly to zero.	Defective moving element.	Replace defective moving element assembly. (See paragraph 5.4.)
Pointer does not indicate zero when test lead ends are touched together while ohmmeter is being cranked.	Test leads open circuited.	Correct open circuit or replace test leads.

TROUBLESHOOTING CHART (continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Pointer indicator does not move readily.	Metallic particles collected on moving system magnet.	Collect particles. Exercise extreme care as the moving system can be damaged in the process.
Ohmmeter does not calibrate.	Resistance changes, partial short of resistors, and moving system.	Check resistors and moving system. Replace if defective. (See paragraph 5.4.)
No generator voltage at red and black jacks although crank turns easily.	Defective generator.	Check generator assembly. Remove and replace if defective. (See paragraph 5.4.)
No generator voltage at red and black jacks (crank does not turn easily).	Shorted capacitor C1.	Replace PC Board. (See paragraph 5.4.)
	Shorted resistor R1.	Remove PC Board. (See paragraph 5.4.)

5.3 REMOVAL OF PARTS AND SUB-ASSEMBLIES

Removal of Case Cover.

Remove four stick-on feet. Remove four screws attaching cover to case, lift off cover.

Removal and Disassembly of Moving Element Assembly with Scale.

1. Unsolder three connections at PC Board.

CAUTION: USE EXTREME CARE NOT TO DAMAGE THE COIL OR THE POINTER!

2. Remove two screws with lockwashers attaching moving element. Carefully lift moving element assembly out of case.

Removal of Generator

Perform operations in paragraph 5.3 before attempting to remove generator.

1. Disconnect two leads at PC Board.
2. Remove scale from moving system.
3. Remove three screws and lockwashers and lift generator assembly from case.

Removal of Component Board Assembly

Perform operations in paragraphs 5.3a and 5.3c before attempting to remove component board with attached parts.

1. Unsolder remaining leads from board.
2. Remove label in side recess.
3. Remove screws holding component board to case. Remove complete board assembly.

5.4 REASSEMBLY OF PARTS AND SUBASSEMBLY

Replacement of Component Board Assembly:

1. Position component board to case with screws.
2. Replace blank label.
3. Reconnect leads to proper positions.

Replacement of Generator

1. Position generator in case and secure with screws.
2. Attach leads to PC Board.

Reassembly and Replacement of Moving Element Assembly with Scale.

1. Position moving element assembly carefully in case housing and secure assembly to chassis with two screws and lockwashers.
2. Resolder three connection.

Replacement of Case Cover.

1. Position cover on case and secure with four screws.
2. Replace feet.

SECTION 6
REPLACEMENT PARTS

Case Assembly	10382-14
Cover Assembly	10382-15
Generator	10350-9
Moving System with Scale	10399-11
PC Board	25813
Feet	5599
Side Label	10860

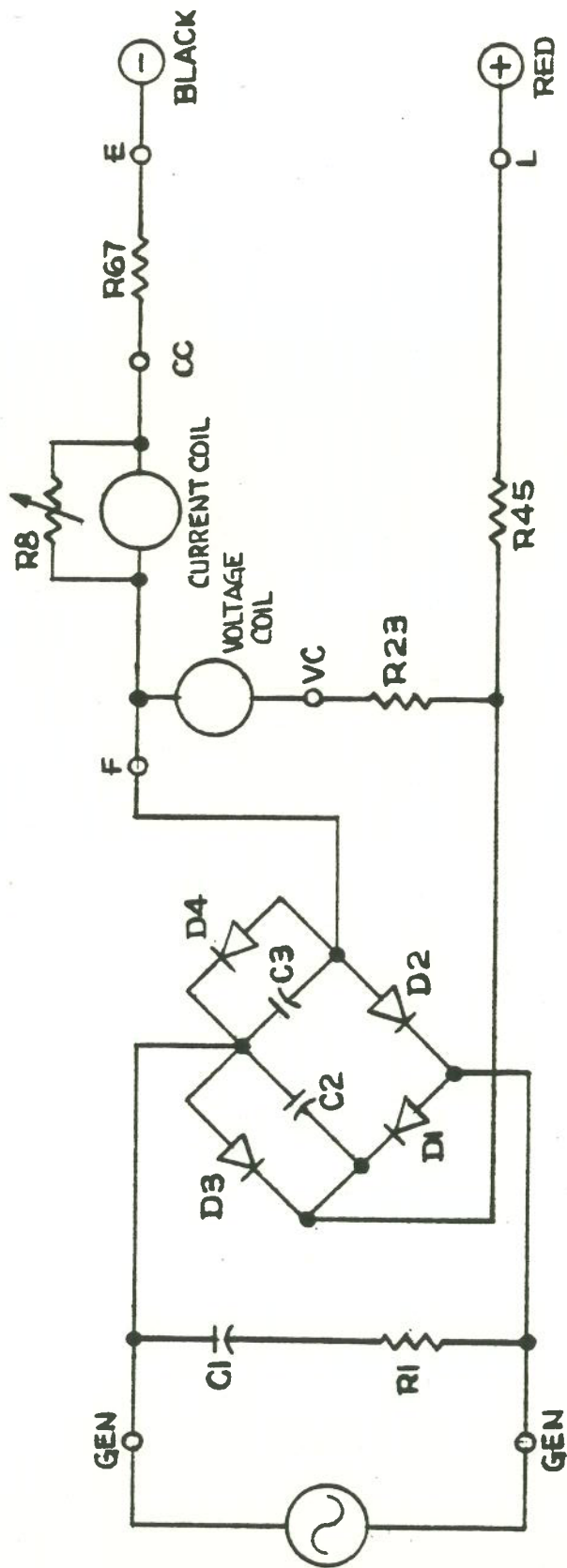


Figure 6.2: Schematic Diagram of the Cat. No. 260563 Instrument