

B-VOLTAGE TESTER

USE ON JOINT-USE POLES AND OTHER EQUIPMENT

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1. GENERAL

1.01 This section covers observations, safeguards, and testing for a potential electrical hazard before climbing or working on joint-use plant. It is imperative that employees recognize, test, and eliminate the possibility of an electrical shock before exposing themselves to a potential electrical hazard.

1.02 This section has been reissued to:

—Change the testing interval of the B-Voltage Tester from once a week to once a month.

—Provide identical information in Section 620-105-010 and cancels Section 460-300-109.

—Include information on the testing of other equipment which could carry a foreign potential, including closures used in joint buried plant.

—Require insulating gloves be tested and worn when conducting the monthly test of the B-Voltage Tester and related equipment.

—Delete reference to the KS-16990L1 Test Set (MD) as an alternate method to test the B-Voltage Tester.

—Introduce the "gunsight method" of positioning the indicator and probe when testing for a foreign potential.

—Include a monthly test of the B-Temporary Bond.

1.03 These instructions supplement those given in Sections 620-131-010, 620-132-010, and 620-133-010 which cover precautions involving hazards other than electrical.

2. DESCRIPTION OF B-VOLTAGE TESTER AND RELATED COMPONENTS

2.01 *B-Voltage Tester:* The B-Voltage Tester (Fig. 1) is designed to detect the presence of voltages from 60 to 7200 volts. It consists of an indicator assembly with a small neon globe unit and reflector, and a plastic-insulated probe. The probe is equipped with a toothed metal disk on one end for making contact to a conductor, conduit, street light fixture, or any other object to be tested. The probe is designed to limit the amount of current which can pass through the device.

2.02 At 60 to 70 volts, the indicator of the B-Voltage Tester glows dimly. Higher voltages will produce a brighter glow. Because higher voltages can damage the tester (7200 volts will burn it out in approximately one minute), employees must observe the indicator as the probe is touched to the facility being tested. A B-Voltage

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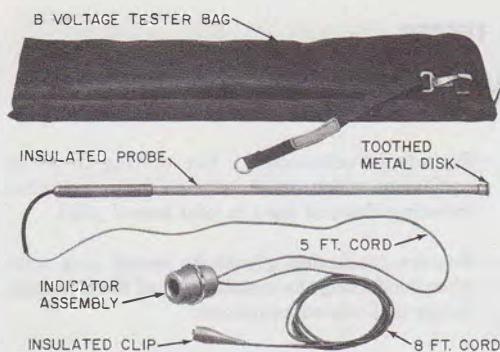


Fig. 1—B-Voltage Tester

Tester is not to be left connected after it has been determined that a facility is energized.

2.03 Canvas Bag: The canvas bag has been provided to carry and store the B-Voltage Tester, B-Temporary Bond (Fig. 2), B-Shunting Capacitor (Fig. 3), and a test date card.

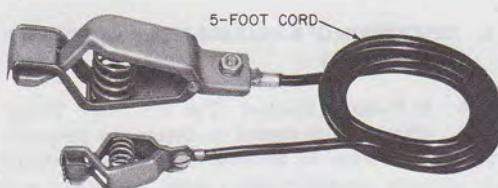


Fig. 2—B-Temporary Bond

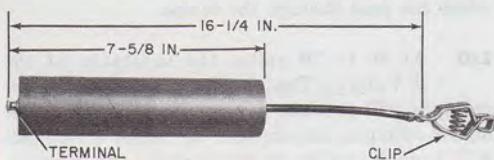


Fig. 3—B-Shunting Capacitor

2.04 Voltage Plug: A voltage plug is to be made up locally (Fig. 4) to provide a safe and convenient means to verify that the B-Voltage Tester is in good working order. When plugged into a standard 110-120 volt convenience outlet, it provides a voltage in series with a current-limiting resistor. As illustrated, the resistor is connected to only one prong of the plug which must be inserted into the hot side of the outlet. Normally, the hot side may be identified as being the smaller of the two parallel slots in the outlet.

2.05 Shunting Capacitor: The B-Shunting Capacitor (Fig. 3) is used to distinguish dangerously energized equipment from weakly energized equipment which is not dangerous. This is necessary in some localities to avoid unjustified investigations by the responsible electric utility.

2.06 Because the B-Voltage Tester is extremely sensitive and operates with very small currents, the indicator may glow when testing a street light fixture even though energized by leakage across damp cobwebs or induction between the fixture and its wiring.

2.07 The B-Shunting Capacitor will drain off harmless voltages such as those described in 2.06. It will not interfere with the operation of the B-Voltage Tester if the fixture is dangerously energized (as it would be if the wiring insulation in the fixture broke down).

2.08 The B-Shunting Capacitor is not to be used for any other purpose except as described in 8.02.

2.09 The B-Shunting Capacitor should not be dropped and is to be kept clean and dry. It does not require testing or any special maintenance.

2.10 B-Temporary Bond: The B-Temporary Bond (Fig. 2) is used to temporarily ground a light fixture, metallic conduit, power company hardware power ground wire, or other metallic objects in the telephone company work space which could become energized if a fault developed. The B-Temporary Bond is placed on such attachments only after the metallic object has first been tested with the B-Voltage Tester and found to be free of a voltage potential. When placed, the bond is first attached (small clamp) to a reliable ground source and then to the metallic object. When the

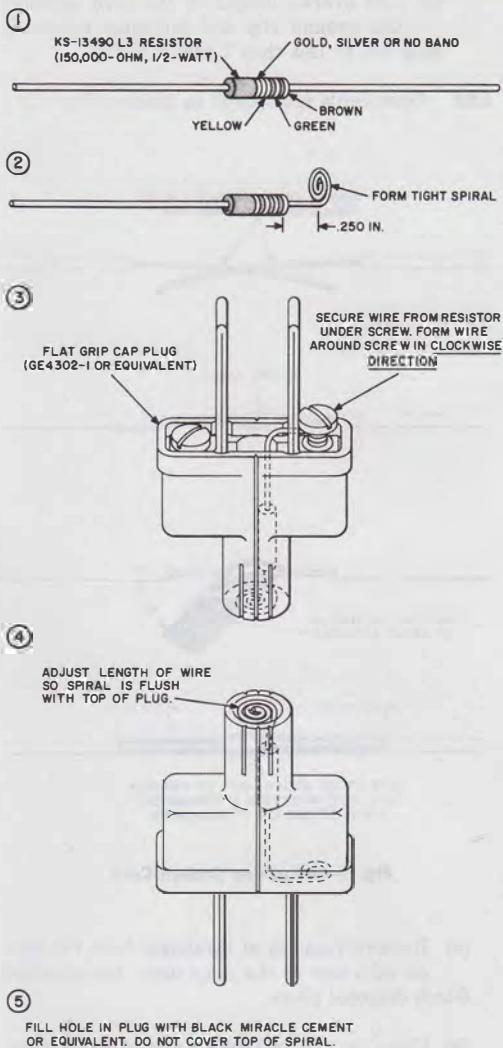


Fig. 4—Voltage Test Plug

work is completed, the bond is removed from the metallic object and then the ground source.

Should a fault develop when the B-Temporary Bond is in place, the insulation will overheat and smoke which should alert the employee to descend the pole immediately and avoid contact with the bond.

3. TESTING THE B-VOLTAGE TESTER AND B-TEMPORARY BOND

3.01 The reliability of the B-Voltage Tester and B-Temporary Bond are to be verified monthly to insure satisfactory operation. The insulating gloves are to be tested at least once each month and worn when using the B-Voltage Tester; also test and use insulating gloves when testing the B-Voltage Tester. The date on which these units are checked should be recorded on the test date card provided for that purpose.

3.02 Test the B-Voltage Tester in the following manner:

- (a) Locate an energized standard 110-120 volt convenience outlet.
- (b) Insert the voltage test plug into the outlet to energize the resistor.
- (c) Visually inspect the B-Voltage Tester for:
 - (1) Loose connections at each end of cord
 - (2) Loose ferrule
 - (3) Broken probe
 - (4) Defective clip
 - (5) Damaged cord.
- (d) Visually inspect the B-Temporary Bond for:
 - (1) Loose connection or broken wire at either clamp
 - (2) Damaged wire
 - (3) Defective clamp
 - (4) Evidence of cold solder joint.
- (e) Insulating gloves shall be worn while testing the B-Voltage Tester and B-Temporary Bond. (Insulating gloves are to be tested before and after each use.)
- (f) Attach the small clamp of the B-Temporary Bond to a suitable ground medium such as a water pipe, radiator, metallic power conduit, etc. Then attach the insulated clip of the

B-Voltage Tester to the large clamp of the B-Temporary Bond.

(g) Touch the toothed metal disk of the voltage tester probe to the metal spiral of the voltage plug. The indicator should glow; if it does not, see (j) below.

(h) Verify that an intermittent connection does not exist by placing a slight strain on the cord at the probe handle while touching the voltage plug. The indicator should continue to glow.

(i) With the indicator glowing, verify the continuity of the B-Temporary Bond by touching the large clamp of the B-Temporary Bond to the ground source. The brilliance of the indicator should *not* change. If the indicator glows brighter, the B-Temporary Bond is defective and must be replaced.

(j) If the indicator does not glow, reverse the voltage plug and repeat the tests. If the indicator fails to glow after the plug is reversed and the tests are repeated, replace the B-Voltage Tester.

4. FIELD REPAIR OF B-VOLTAGE TESTER

4.01 Certain limited field repairs of a B-Voltage Tester are permitted. Testers which cannot be repaired, using the method described in this practice, should be disposed of in accordance with local instructions.

4.02 The cord of the B-Voltage Tester may be spliced under the following conditions:

(a) Between the probe and indicator assembly:

(1) A maximum of two splices permitted.

(2) No splice permitted if the open is within 4 inches of the indicator or grip of the probe.

(b) Between the indicator assembly and grounding clip:

(1) A maximum of three splices permitted.

(2) No splice permitted if the open is within four inches of the indicator assembly.

(3) The overall length of the cord between the ground clip and indicator assembly shall not be less than 7 feet, 6 inches.

4.03 Open cords are spliced as follows (Fig. 5):

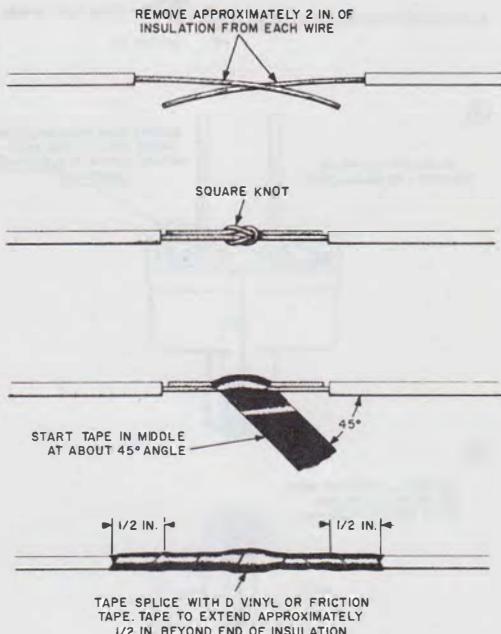


Fig. 5—Repairing Broken Cord

(a) Remove 2 inches of insulation from the wire on each side of the open using the standard 6-inch diagonal pliers.

(b) Clean the wire to insure a reliable connection.

(c) Tie a square knot in the middle of the exposed wire so the ends will lie parallel and extend approximately to the beginning on the insulation.

(d) Tape the splice with 3/4 inch D vinyl or friction tape. Apply the tape at a 45-degree angle, beginning at the knot and continue until about 1/2 inch of the rubber insulation has been covered. Apply two layers of tape.

5. PRECAUTIONS

- 5.01** Protective equipment (ie, insulating gloves, eye protection, hard hats when required, etc) must be worn when using the B-Voltage Tester or any of its related equipment.
- 5.02** When using the B-Voltage Tester, the employee is to grasp the probe at the handle.
- 5.03** When using the B-Shunting Capacitor, maintain at least one foot separation between the cord of the voltage tester and conductors associated with the capacitor.
- 5.04** An employee, testing for a foreign potential, is to observe the indicator as the probe touches the object being tested. This can be best accomplished by using the "gunsight method." Both the indicator and probe are held in the same hand and in the line of sight between the workman and the object being tested. Figures 10, 11, and 12 illustrate this technique.
- 5.05** The B-Voltage Tester should be touched to the facility being tested only long enough to determine whether or not the indicator glows.
- 5.06** Before ascending a pole, make a visual observation for potential hazards described in 6.01.

6. OBSERVATIONS TO BE MADE BEFORE CLIMBING

- 6.01** Examine the pole for potential electrical hazards (Fig. 6) such as a vertical power ground wire, vertical metallic power conduit, street light fixture, power company primary disconnect hardware, or other foreign metal objects. Also, observe the pole and adjacent spans for such hazards as improper clearance from power conductors or equipment, dangling power wires, inadequate clearance on pole-to-pole guys from power wires or energized attachments, etc. If none of these are present, the pole may be ascended providing no other hazard is evident.

- 6.02** If a vertical power ground wire is present, make a voltage test in accordance with Part 7 before climbing or working on the pole

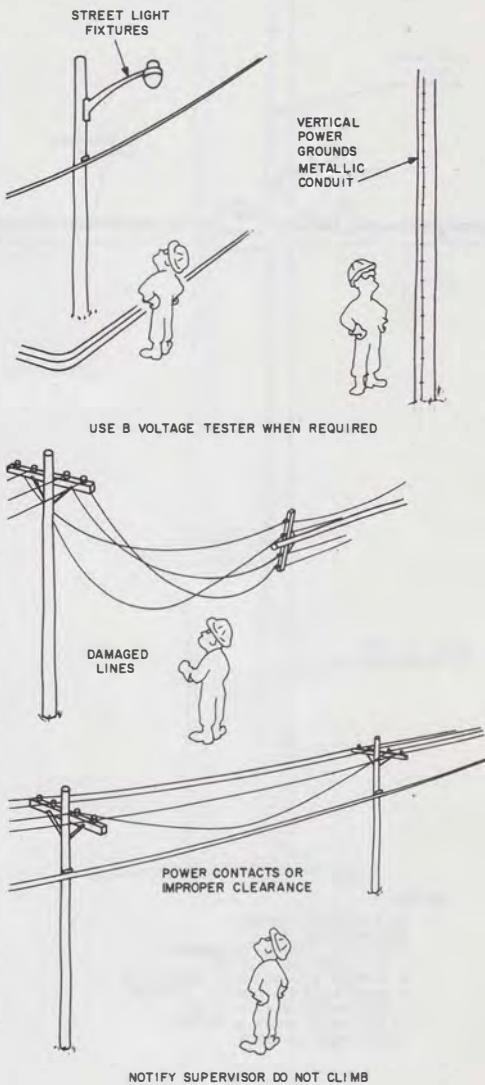


Fig. 6—Visual Inspection for Potential Electrical Hazards

unless it meets any one of the following conditions (Fig. 7):

- (a) The ground wire is securely bonded to a telephone cable strand.

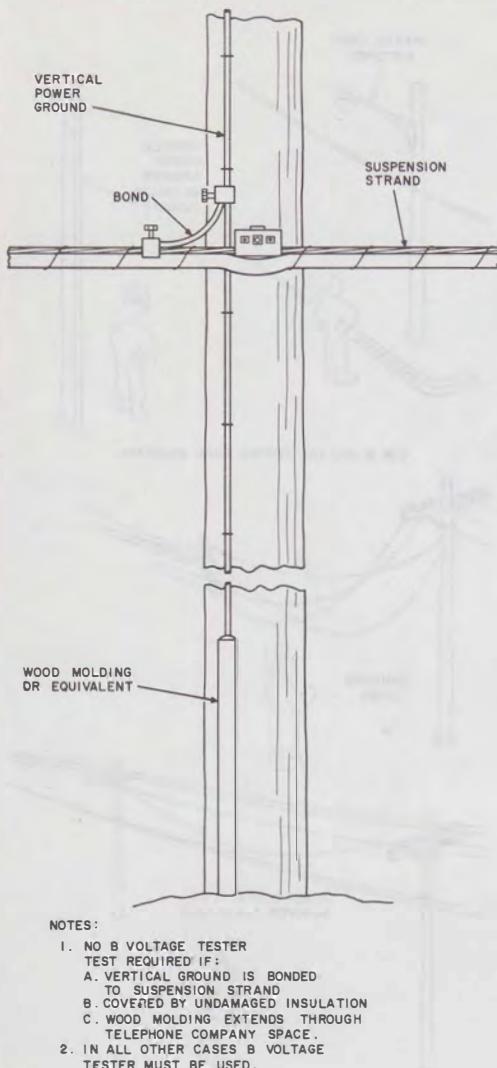


Fig. 7—Vertical Power Ground—Conditions Not Requiring Use of B-Voltage Tester

- (b) The ground wire is covered with wood moulding, or equivalent, up through the telephone space.
- (c) The ground wire is of the insulated type and the insulation is in good condition.

6.03 If a vertical metallic power conduit or other power company hardware extends to the base of the pole, make a voltage test in accordance with Part 7 before climbing or working on the pole unless it can be clearly seen that the conduit or hardware is bonded to telephone cable strand.

6.04 When a pole carries multiple line wire, telephone cable, or a bare vertical power ground wire and a street light fixture (Fig. 8), plan to make a voltage test in accordance with Part 8.

6.05 If a street light fixture is present in the telephone space on a pole not carrying a telephone cable or a bare vertical power ground wire, wear insulating gloves and avoid contact with it or its wiring since it is not possible to place a temporary bond to an effective ground.

6.06 Poles carrying street light fixtures may be worked on without making a voltage test under any one of the following conditions (Fig. 9):

- (a) The fixture is located in the power company's space.
- (b) The fixture is located above telephone attachments and it is clearly evident that it is securely bonded to the telephone cable strand.
- (c) The fixture is located below telephone cable and it can be clearly seen that it is securely bonded to the telephone cable strand. However, insulating gloves must be worn in climbing the pole unless the fixture wiring through and below the telephone space is 40 inches from the pole surface or otherwise made inaccessible.

Warning: Care must be exercised when securing oneself to the pole by avoiding contact with supply wires going to the fixture.

7. VOLTAGE TESTS AND SAFEGUARDS—AT GROUND LEVEL, AT BASE OF POLE, TESTING OTHER EQUIPMENT, AND TESTING DAMAGED JOINT CABLE CLOSURE

7.01 At Pole—Vertical Ground Wire, Metallic Conduit, or Other Hardware—When a voltage test is required in accordance with 6.02 or 6.03,

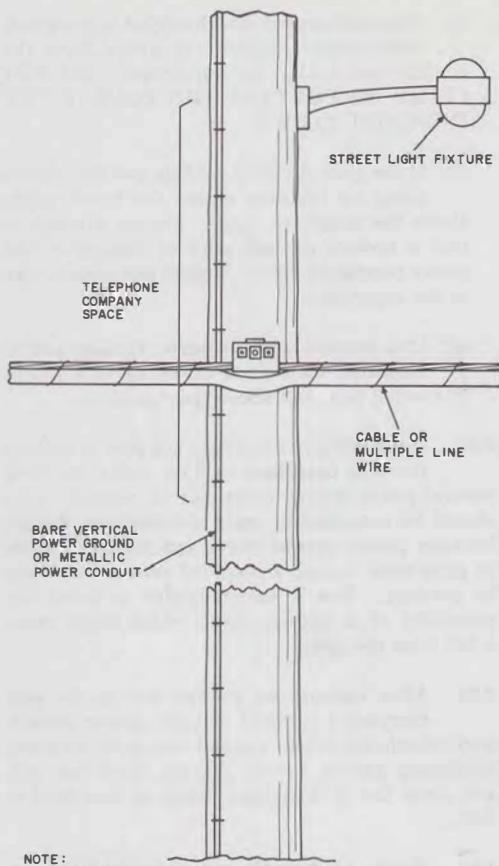


Fig. 8—Street Light Fixture—Conditions Requiring Use of B-Voltage Tester

proceed as follows before climbing or working on the pole:

- (a) Attach the insulated clip of the B-Voltage Tester (Fig. 10) to one of the following:

- (1) A 5-inch screwdriver blade pushed into the earth about 5 feet from the pole.

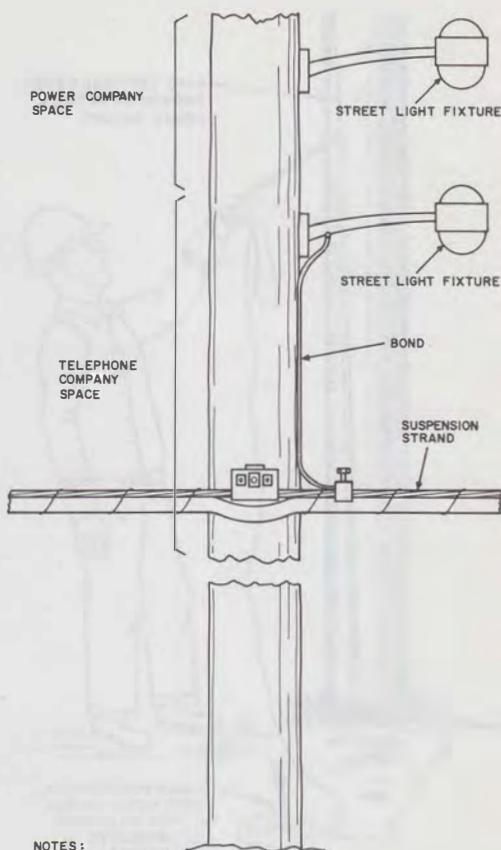


Fig. 9—Street Light Fixture—Conditions Not Requiring Use of B-Voltage Tester

- (2) A projection on a manhole cover or a metallic curb box.
- (3) A guy rod or a noninsulated anchor guy.
- (4) A substantial metal object such as a piece of lead sleeving, a metal crossarm brace, a lag wrench, or a 1/2 pound bar of D Seam

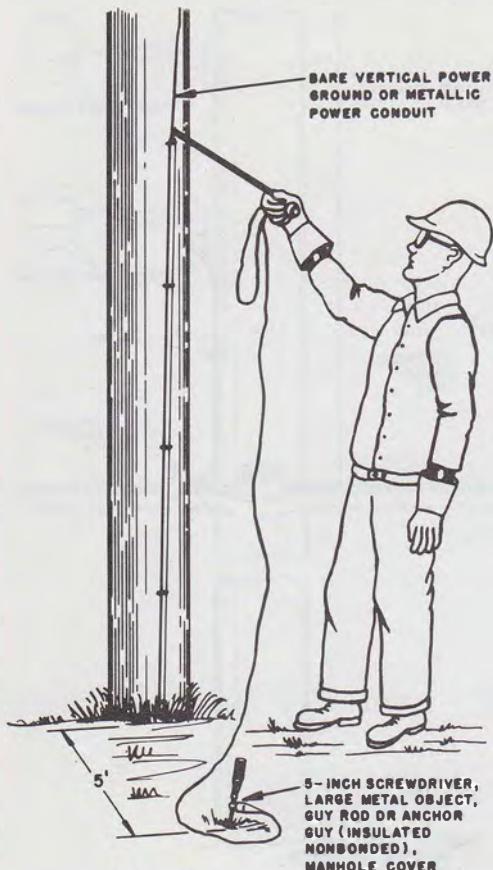


Fig. 10—Testing Vertical Power Ground

Solder, drop wire reel, etc; laid on the ground or pavement about 5 feet from the pole.

- (b) Standing about 3 feet from the pole, grasp the red handle of the insulated probe and indicator assembly with the same hand. Using the "gunsight method," observe the neon indicator while touching the toothed probe firmly against the metal object being tested.

Warning: *Insure that a reliable contact is made.*

(c) If the indicator glows, the object is energized. Immediately remove the probe from the contact and notify the supervisor. DO NOT CLIMB OR CONTACT THE POLE IF THE INDICATOR GLOWS.

(d) If the ground wire is broken, test the portion going up the pole unless the break exists above the telephone space. Do not attempt to test a broken ground wire or fixture in the power company's space. Report any broken wire to the supervisor.

(e) If a ground wire requires testing and is protected with wood moulding to a height of about 8 feet, test above the moulding.

7.02 If the voltage tester does not glow in making the test described in 7.01, poles carrying vertical power ground wires may be climbed. Care should be exercised to avoid simultaneous contact between power ground wires and telephone cable or guys since a small voltage (60 volts or less) may be present. This is recommended to avoid the possibility of a surprise shock which might cause a fall from the pole.

7.03 After making the voltage test on the pole carrying a vertical metallic power conduit and telephone cable, ascend the pole wearing insulating gloves, safety glasses, hard hat, etc, and place the B-Temporary Bond as described in 8.03.

7.04 Testing Other Equipment—Mobile homes, trailers, homes with metallic siding, exposed ends of temporary or abandoned electrical wiring in the immediate work area, joint-use pedestals, etc, could present a potential electrical hazard and are to be tested in accordance with 7.01. If a voltage is detected on this foreign equipment, the property owner is to be notified so corrective action can be taken. The employee is to notify his supervisor of the detected fault on the foreign equipment or on any joint-used pedestal found energized before making physical contact with the potential hazard.

7.05 Voltage Test—Cable Sheath: When sheath continuity is to be interrupted in joint buried plant for the purpose of locating plant, locating faults, or making splices, it is necessary to test the sheath prior to and after opening it with the B-Voltage Tester in accordance with 7.07.

7.06 Voltage Test—Damaged Cable Closure Used in Joint-Buried Plant: When a telephone or power pedestal closure (this applies to all closures used in joint-buried plant whether standing alone or mounted back to back with power) has been damaged or disturbed, eg, knocked over or driven into the earth by a motor vehicle or a trouble condition involving power is suspected, both telephone and power representatives shall be present before performing any type of maintenance work. Any power work shall be performed first.

7.07 After the power company has completed its work, the pedestal shall be tested with the B-Voltage Tester before any bodily contact is made with it. To guard against the possibility of serious injury, WEAR INSULATING GLOVES and EYE PROTECTION; then, using B-Voltage Tester, check the cable closure as follows:

(a) Attach the insulated clip of the voltage tester to a suitable ground, no closer than 5 feet to the closure being tested. A screwdriver with a 5-inch blade or longer driven into the earth can be used as a ground. Standing about 3 feet from the closure, grasp the handle of the insulated probe and indicator assembly with the same hand. Using the "gunsight method," observe the neon indicator while pushing the toothed metal disk against the closure. Push the toothed metal disk of the probe firmly against the closure while looking into the indicator assembly. If the indicator glows, the closure is energized. Immediately remove the probe from contact with the closure and report the conditions at once in accordance with local instruction. No attempt shall be made to correct the condition or proceed with any telephone work. It shall be the responsibility of the power company to clear its trouble. Telephone employees shall not work on the telephone plant until the power company has completed repairs.

(b) If the indicator assembly of the voltage tester does not glow in making the test described in (a) above, remove the cover from the closure and visually inspect the cable sheath ground. If the cable sheath ground is not intact or is loose, test the cable sheath with the voltage tester as described in (a) above before performing maintenance work.

(c) If for any reason it becomes necessary to open the bonds between telephone facilities

and power or across cable sheath openings, a temporary bond strap must be placed before the bond is opened. If due to physical conditions the temporary bond cannot be placed, consult with the power company representative. It may be necessary to deenergize the power briefly for repair operations. When temporary or permanent bonds are placed or removed, **insulating gloves and eye protection must be worn.**

Warning: Electrical continuity of all bonds, including cable shield bonds in closures or at splice locations, must be preserved during the repair process. Until the permanent bond is installed, maintain continuity using a temporary bond strap.

8. VOLTAGE TESTS AND SAFEGUARDS ALOFT

8.01 Street light fixtures, pole-to-pole guys extending near power company facilities, and power company hardware in the Telephone Company workspace must be tested for a foreign potential as follows:

- (a) Attach B-Voltage Tester bag to the body belt.
- (b) Put on protective equipment including a hard hat, eye protection, and insulating gloves, etc, and climb to a convenient height to make the voltage test. Do not contact the suspected hardware, light fixture, or its wiring.
- (c) Attach the insulated clip of the B-Voltage Tester to the cable suspension strand, support bracket of multiple line wire, or a bare (tested) vertical power ground wire. Using the "gunsight method," touch the toothed metal disk of the voltage tester probe firmly against the fixture while observing the open end of the indicator assembly (Fig. 11).
- (d) If the indicator glows, immediately remove the probe from contact with the fixture, then remove the insulated clip from its attachment. If a B-Shunting Capacitor is not available, descend the pole and notify the supervisor. Avoid contact with the fixture or its wiring. If a B-Shunting Capacitor is available, make a second test as specified in 8.02.
- (e) If the indicator does not glow, contact the fixture with the probe again to be sure that

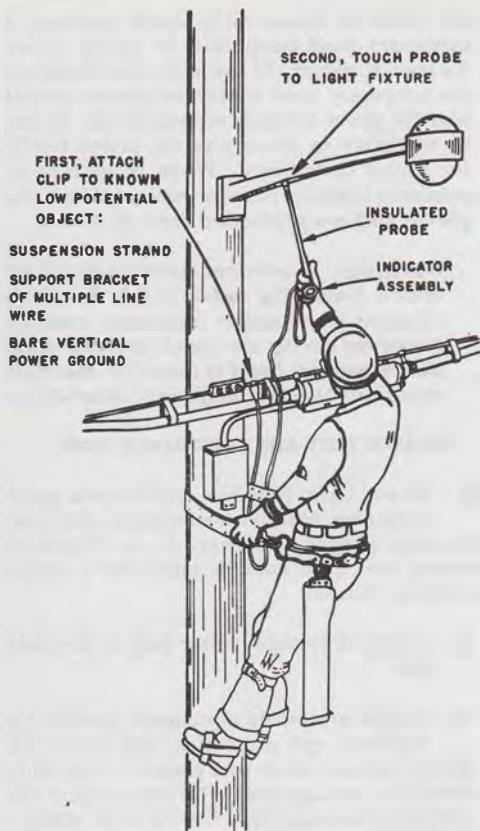


Fig. 11—Testing Street Light Fixture

good contact has been made. If the indicator still does not glow, place a temporary bond as specified in 8.03.

8.02 Use of B-Shunting Capacitor—If a foreign voltage is detected when performing the test described in 8.01, make a second test wearing insulating gloves with the aid of a B-Shunting Capacitor as follows (Fig. 12):

- Attach the clip of the voltage tester and the clip of the shunting capacitor to the cable suspension strand.
- Attach the small clip of the temporary bond to the metal terminal of the capacitor and

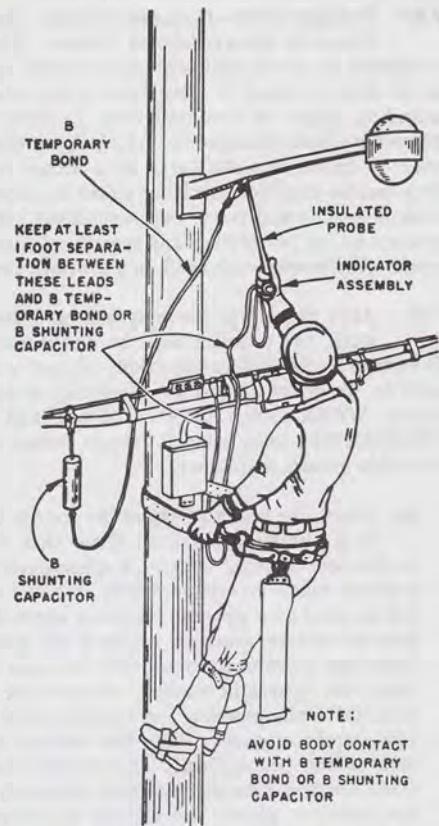


Fig. 12—Use of B-Shunting Capacitor

the large clip to the metal cap behind the toothed metal disk of the insulated probe of the voltage tester. If the metal cap or ferrule of the probe has been tape reinforced, attach the small clip of the temporary bond to the toothed metal disk of the voltage tester and the large clip to the capacitor terminal.

- Make attachments so that at least one foot of separation is maintained between the leads of the voltage tester and the temporary bond or shunting capacitor.
- While observing the open end of the indicator assembly, touch the toothed metal disk to

the fixture being tested. Avoid bodily contact with temporary bond or capacitor during test.

(e) If the indicator glows, the fixture is energized.

Immediately remove the probe from contact with the fixture, replace testing equipment in the carrying case, descend the pole, and notify the supervisor. Avoid contact with the fixture or its wiring.

(f) If the indicator does not glow, contact the fixture with the probe again to be sure that good contact has been made. If the indicator still does not glow, place a temporary bond as described in 8.03.

8.03 Use of the B-Temporary Bond—A

B-Temporary Bond is used to temporarily ground a fixture, conduit, or bare vertical ground wire (Fig. 13) which has been tested for and found to be free from a voltage potential while working aloft. Should a fault develop, the B-Temporary Bond will provide a direct path to ground for the foreign potential. The insulation on the bond will overheat and smoke which should alert the employee to descend the pole. Using insulating gloves, attach the bond in the following manner:

Attach the small clip of the B-Temporary Bond to the cable suspension strand in such a manner that it will not be in the way of work operations; then attach the large clip of the bond wire to the fixture, conduit, or bare vertical ground wire. Do not bond to a support bracket of multiple line wire or the suspension strand of isolated cable. Never attach to any street light wires or terminals to which they are attached or to a fixture which causes the indicator to glow.

8.04 The insulating gloves may be removed only after the temporary bond is in place, and then only if other protection requirements permit. Leave the B-Temporary Bond in place until all work operations have been completed at this pole for the day. If the bond starts smoking, put on insulating gloves and descend the pole immediately. Avoid contact with the bond, the fixture, or its wiring. Notify your supervisor.

8.05 Upon completion of work operations on a pole, remove the B-Temporary Bond as follows:

(a) Put on insulating gloves.

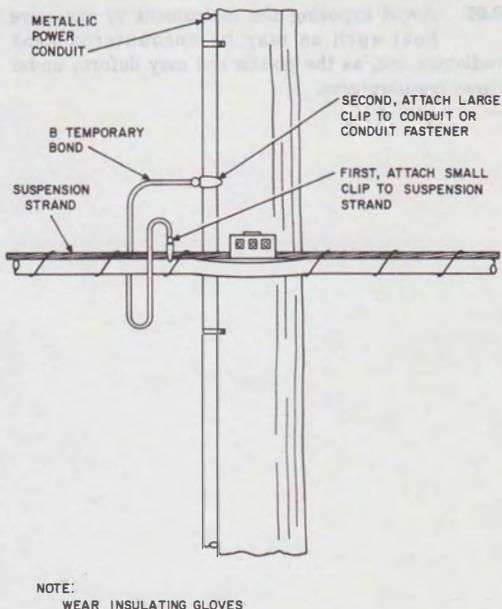


Fig. 13—B-Temporary Bond Attachment to Metallic Power Conduit

(b) First remove the clip from the fixture, metallic conduit, or bare vertical ground wire.

(c) Remove the other clip which was attached to the strand. If a spark is detected when removing the bond, descend the pole immediately and notify the supervisor.

9. CARE AND STORAGE

9.01 The B-Voltage Tester should be handled and stored with reasonable care. Store the bag and its contents so the instrument will not be subjected to any pressure from other tools or material.

9.02 Remove any dampness or dirt with a clean cloth before using or storing. Keep the instrument free of grease or oil to prevent deterioration of insulation.

9.03 Avoid exposing the instrument to excessive heat such as may be encountered near radiators, etc, as the plastic rod may deform under these temperatures.

9.04 The instrument is to be carried down or lowered from poles, not dropped, as the impact may short circuit the element in the neon glow unit of the indicator.