

Z VOLTAGE TESTER

	CONTENTS	PAGE
1.	GENERAL	101
2.	DESCRIPTION	101
3.	TESTING THE Z VOLTAGE TESTER	102
4.	MAINTENANCE	103
5.	USE	104
6.	CARE AND STORAGE	104

1. GENERAL

1.01 This section describes the Z Voltage Tester and its associated tools. It also provides information on its maintenance, use and care.

1.02 Detailed information on the testing procedures prior to climbing poles or performing certain work functions are covered in the appropriate Divisions. This section cancels section 620-105-960CA.

2. DESCRIPTION

2.01 The Z Voltage Tester is designed to detect the presence of voltages from 60 volts to 7200 volts. It consists of an indicator assembly which contains a small neon glow unit and reflector and a plastic insulated tube equipped with a replaceable probe assembly on one end for making contact with the conductor, conduit or street light fixture to be tested. Resistors inside the tube are included to limit the amount of current which can pass through the device. The tube, indicator assembly and an insulated clip are connected by insulated cord as illustrated in Fig. 1.

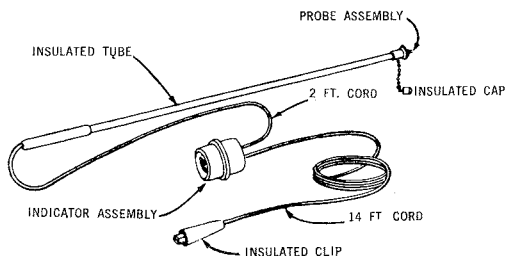


Fig. 1 — "Z" Voltage Tester

2.02 At 60 to 70 volts the indicator of the Z Voltage Tester glows dimly. Higher voltages will produce a brighter glow. Because the higher voltages can damage the tester if left connected (7200 volts will burn it out in approximately one minute) it should be touched to the facility being tested **only long enough to determine whether or not the indicator glows.**

2.03 A TCS871 Voltage Plug, as illustrated in Fig. 2 is available to provide a safe and convenient means for checking the operation of the Z Voltage Tester. When plugged into any standard 110- to 120-volt convenience outlet, it provides a source of voltage in series with a current limiting resistor. As illustrated, the resistor is connected to only one prong of the plug and this prong must be plugged into the "hot" side of the outlet.

150,000 OHM, 1/2 WATT RESISTOR

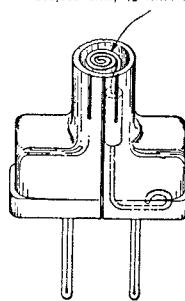


Fig. 2 — TCS871 Voltage Plug

2.04 The B Shunting Capacitor is required to prevent false operation of the tester under certain conditions when testing street light fixtures.

2.05 False operation of the tester generally is due to the capacitance coupling between the internal wiring of the fixture and the metal conduit. It is most likely to occur on series fed street light fixtures. If when testing light fixtures with the Z Voltage Tester only, there is an indication of energization it will be necessary to

determine the nature of the energization either by using the B Shunting Capacitor as described below or by referring the case to the electrical utilities for verification.

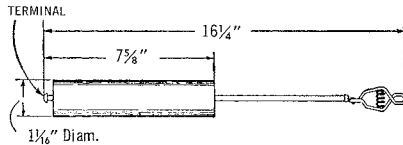


Fig. 3 — B Shunting Capacitor

2.06 The Z Temporary Bond Fig. 4 is an insulated stranded copper wire 5 feet long equipped with a battery clip on each end.

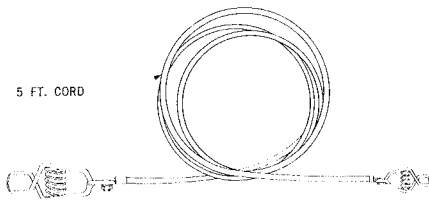


Fig. 4 — Z Temporary Bond

3. TESTING THE Z VOLTAGE TESTER

3.01 The Z Voltage Tester should be tested weekly to ensure that it is operating satisfactorily.

3.02 The method of testing the Z Voltage Tester is as follows:

- (a) Locate a standard 110- to 120-volt convenience outlet which is energized. This may be checked with an extension cord and lamp.
- (b) Insert the voltage plug, described in Para. 2.03, into the outlet; first choose the smaller of the two slots in the outlet to insert the prong connected to the resistor.
- (c) Attach the insulated clip of the voltage tester to a ground such as a water pipe, radiator, metallic power conduit, etc. If none of these are available, lay the Z Temporary Bond, uncoiled, on the floor and attach to one of its clips.
- (d) Grasp the grip of the voltage tester in the palm of the hand so that the end of the

grip extends almost to the forefinger with the wire passing between the thumb and forefinger. (See Fig. 5.) With the thumb and forefinger bent, pinch the wire firmly. Hold the grip as firmly as possible with three fingers, and while keeping the wire firmly pinched, straighten the thumb and forefinger—thus putting tension on the wire. DO NOT USE BOTH HANDS AND PULL OR JERK ON THE WIRE SINCE EVEN A NORMAL CORD MAY BE DAMAGED OR BROKEN IF IT IS SUBJECTED TO VIOLENT PULLING.

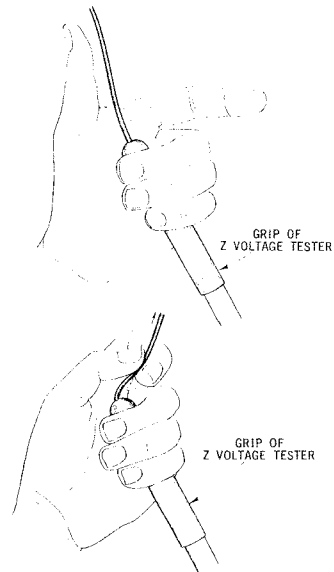


Fig. 5

- (e) Touch the toothed metal disk of the probe to the metal spiral of the voltage plug. The indicator should glow faintly. If the indicator does not glow, release the tension in the wire, but keep the probe in contact with the voltage plug. If the indicator glows after the tension has been released, the wire is broken under the insulation and the tester should be disposed of in accordance with the Company's established routine.
- (f) If the indicator does not glow, reverse the voltage plug in the outlet by removing it,

turning a half-turn and inserting again into the outlet, and repeat the test.

(g) If the indicator still does not glow, and it is known that the convenience outlet is not defective, then the voltage tester must be defective and shall be disposed of in accordance with the Company's established routine.

4. MAINTENANCE

4.01 Testers which cannot be repaired by using the methods described in this section should be disposed of in accordance with company's established routine.

Wire Insulation Breaks Near the Probe

4.02 Experience has shown that after extensive use under certain conditions, the insulation of the wire coming out of the probe handle or grip of the Z Voltage Tester, may crack and expose the bare wire. This is not dangerous, but because the wire will tend to bend much more sharply at the point where the wire is exposed, it will eventually break at this point. The following procedure is designed to prevent wire breakage at this point.

4.03 Clean the grip with a cloth (moistened if necessary with soap and water) to remove mud, grease and other foreign matter; dry it thoroughly before proceeding with repairs.

(a) Lay the wire snugly against the grip as shown in Fig. 6(1).

(b) Apply $\frac{3}{4}$ -inch (or 1-inch) D Vinyl Tape or friction tape along the grip and over the wire as shown in Fig. 6(2).

(c) Starting at the middle of the grip, wrap tape around the wire and grip lapping each turn about $\frac{1}{8}$ inch over the preceding turn. Continue the wrapping to the end of the grip and back to the other end of the grip, finally ending at the middle. This will result in a double layer of tape from one end of the grip to the other. The completed repair is shown in Fig. 6(4).

4.04 The preceding repair should not be made, however, if the wire between the probe and the indicator assembly has previously been field spliced, or is broken, as the wire will be too short.

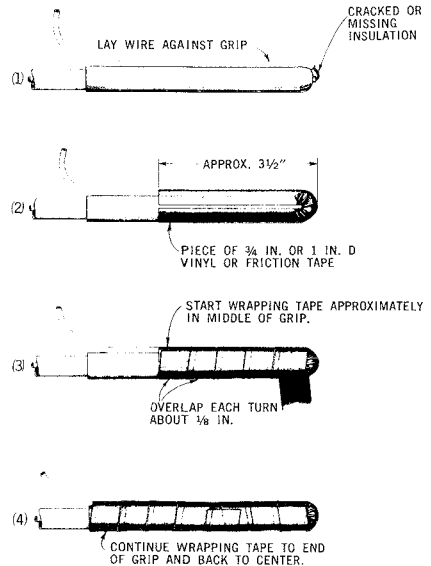


Fig. 6 — Taping Wire To Handle

Wire Splices

4.05 The wire or cord of the Z Voltage Tester may be spliced under the following conditions:

(a) Between the probe and the indicator assembly, a maximum of two splices are permitted unless it is also necessary to tape the wire to the grip in which case no splices are permitted in this piece of cord. Do not attempt to splice wire if the break is within 4 inches of either the indicator assembly or the grip of the probe.

(b) Between the indicator assembly and the grounding clip, a maximum of three splices are permitted except that no attempt should be made to splice wire breaks within 4 inches of the indicator assembly, and no attempt should be made to splice wire breaks if the over-all length of the cord between the clip and the indicator assembly will be less than 7 feet 6 inches. Each splice will reduce the length of the cord about 2 inches.

4.06 Broken cords shall be spliced as illustrated in Fig. 7 and explained:

SECTION 106-220-925CA

- (a) Strip 2 inches of insulation from the wire on each side of the break using the wire stripping hole of the standard 6-inch diagonal pliers.
- (b) Clean the insulation of the wire adjacent to the break for a distance of at least an inch to remove mud, grease, etc.
- (c) Tie a square knot in the middle of the exposed wire so that the ends will lie parallel and extend approximately to the beginning of the insulation.
- (d) Tape the joint with $\frac{3}{4}$ -inch D Vinyl or friction tape. Start the tape at about a 45-degree angle beginning at the knot and continue until about $\frac{1}{2}$ inch of the rubber insulation has been covered. Continue taping until the splice has two layers, ending the tape in the middle of the splice.

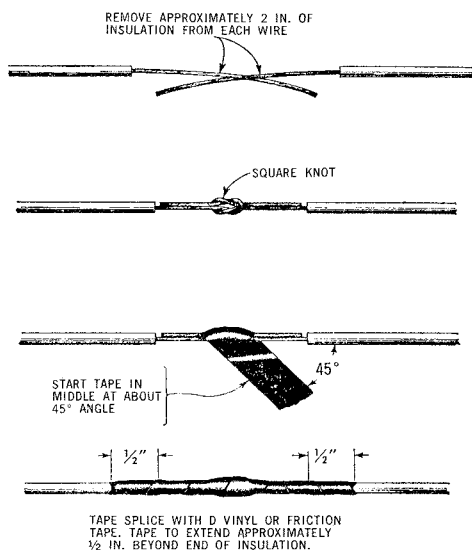


Fig. 7 — Splicing Wire

5. USE

- 5.01 The Z Voltage Tester is used to detect potential power hazards on:
- (a) Vertical power ground wire.

- (b) Vertical metallic power conduit.
- (c) Street light fixture.
- (d) Joint-use terminal.
- (e) Neutralizing transformer installations.
- (f) Any other occasion where foreign voltage is suspected.

6. CARE AND STORAGE

6.01 A canvas bag has been provided to carry and store the Z Voltage Tester, Z Temporary Bond and B Shunting Capacitor when not in use. A web strap with dee ring and snap hook is provided to attach the bag to the body belt. In placing the tester in the bag, place the toothed metal disk first. The capacitor and bond should be carried in lower pocket of bag. The test date card is carried in the plastic pocket provided for this purpose.

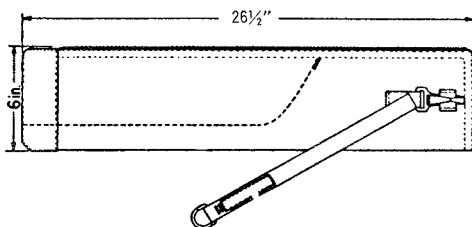


Fig. 8 — Z Voltage Tester Bag

- 6.02 The Z Voltage Tester should be handled and stored with reasonable care. 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.
- 6.03 Avoid exposing the instrument to excessive heat such as may be encountered near radiators, etc., as the plastic rod may deform under these temperatures.
- 6.04 The instrument should be CARRIED DOWN OR LOWERED from poles, NOT DROPPED, as the impact may short-circuit the elements in the neon glow unit of the indicator.