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The Pacific Telephone and Telegraph Company
Southern California Area
BELL SYSTEM PRACTICES
Outside Plant
Construction and Maintenance

SECTION G10.903
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AVOIDING CONTACT WITH TELEPHONE PLANT WHICH HAS BECOME ENERGIZED BY FOREIGN POTENTIAL

Contents

1. GENERAL

1.01 This practice outlines the safety precautions to be followed and covers the reporting procedures to be employed for minimizing the possibility of telephone employees' receiving shocks from telephone plant that has become energized by contact with or induction from electric company facilities.

1.02 Precautions to be observed to prevent accidental electrical contacts while performing work operations in the vicinity of light and power or other foreign electrical wires and equipment are covered in the various sections of the Bell System Practices dealing with the work operations being performed.

2. UNGROUNDED AERIAL PLANT ELECTRICAL HAZARDS

2.01 The types of plant most subject to becoming electrically energized and which are potentially the most dangerous when energized are ungrounded aerial leads which are on joint poles with the Electric Company or which are overbuilt, crossed by, or exposed to possible contact with Electric Company wires or facilities.

2.02 Ungrounded aerial plant may consist of:

(a) Open wire
(b) Drop wire

(c) Ungrounded aerial cable
(d) Ungrounded cable suspension strand

These types of plant which are not grounded or which may have their connections to ground severed by electrical burns when contacted by electric wires can remain dangerously energized over their entire length until the contact is discovered and removed.

2.03 The probability of electrical contact is considerably increased during and following heavy wind and rain storms, electrical storms, earth quakes, floods, etc., due to broken or sagging wires, broken or leaning poles, trees falling into the lead, etc.

2.04 During fair weather, contacts can occur from such causes as improper clearances between aerial plant and electric wires, broken wires, broken insulators, broken poles from automobile collision, wire trash in leads, tree trimming operations, fires etc.

2.04 Ungrounded aerial leads located in areas which are subject to electrical storms can become dangerously charged by lightning or static electricity and can carry the charge for long distances, endangering the safety of employees who may be working in the lead.

2.06 Ungrounded aerial leads which are on the same poles with higher-voltage power circuits or are parallel to such lines at separations of 100 feet or less can become electrically charged by induction from the power wires particularly while the telephone wires are not connected to cable plant. Where power transmission lines supported on steel towers are involved, telephone wires may become charged by induction at separations of 200 feet or greater, depending on the length of exposure. While the electrical charge carried by the telephone wires under these conditions is not dangerous, the startling effect of the electrical shock which may be received unexpectedly by the workman may cause him to react in such a manner that a serious fall or other unforeseen injury may result.

3. GROUNDED AERIAL CABLE PLANT HAZARDS

3.01 In cases of electric contacts with grounded aerial cable plant, the low resistance to ground, via the grounded messenger and cable sheath, generally results in:

(a) burning off the power wires at the point of contact, (b) operation of the power circuit breakers or protective fuses, or (c) both of the foregoing.

3.02 As a result of the above, there is little likelihood of the grounded aerial cable plant remaining dangerously energized for any appreciable period of time after the contact has occurred. The messenger and sheath are, of course, energized for the duration of the contact; and, for this reason, where any swinging contacts are observed, or where electric wires are known to be in physical contact with the messenger or cable, the messenger and cable should be treated as energized and avoided until the contact is removed.

3.03 Any aerial cable plant, grounded or ungrounded, which has been contacted by light or power wires, must be carefully inspected in order to insure that the messenger has not been weakened to the point where it will no longer support the weight of a workman. The cable sheath must also be inspected for electrical burns as a protection for the service. It is therefore important that the reporting procedures outlined in these practices be followed in case of known or suspected contact between electric wires and any aerial cable plant.

4. CONTACT EVIDENCE

4.01 In the application of this practice, either "known" or "suspected" contacts shall be considered as contact evidence, as follows:

NOTE: As covered in the following, evidence of "above normal" voltage and currents at protectors would include: burned insulation on wiring, exploded fuses, severely burned or welded carbons, melted parts, burned or smoked areas on bases or mats, etc.

(a) KNOWN CONTACT

(1) Wires seen in actual contact, by employees of either the Telephone Company or Electric Company.

(2) Burns in bridle wire, drop wire, cable protectors, cable terminal lugs, etc., at cable-open wire or cable-drop wire junction poles. There may also be evidence of burns in the cable

at this point, such as exploded lead sheath in the cable stub, holes burned in the sheath, melted lead droppings, burns at the cable rings or clamps, etc.

(3) Fuses and carbon blocks operated at station protector, replaced fuses operated immediately. General appearance of protector and adjacent area may or may not indicate damage by "above normal" (see note) voltage and current.

(4) Central office heat coils or protector blocks operated. Replacing coils or blocks operated immediately.

(5) Deskman finds foreign potential on line under test.

(b) SUSPECTED CONTACT

(1) Protector blocks operated at cable-open wire junction, indicating "above normal" voltage and current (see note above).

(2) Fuses and blocks operated at station protector, indicating "above normal" voltage and current. Replaced fuses do not operate.

(3) A number of central office heat coils or protector blocks are found operated in the same cable, indicating above-normal voltage and current. Replaced coils do not operate; lines test open.

(4) Electric Company reports trouble on electric circuits where telephone plant is principally open wire.

(5) Police or Fire Department or subscribers report wire down, tree limbs on wires, electrical displays, etc.

(6) Subscribers report bells tingling or ringing in peculiar manner with no one on line.

(7) Electric burns are found in cable while investigating reported trouble.

(8) Deskman hears 50- or 60-cycle hum on line under test.

5. REPORTING EVIDENCE OF CONTACT

5.01 The test center is able to test for power, noise, and foreign potential on telephone lines and is in a position to correlate reports from other sources of known and suspected cases of contact between Telephone Company and Electric Company plant and to caution and direct employees whenever indications of energized plant exist. All information on known or suspected cases of contact originating outside of the Test Center, therefore, should be reported or relayed to this force without delay.

Note: The term "Test Center" in this practice shall include local test centers and toll testboards. One place shall be selected as the control center for each operating unit, such as central office area or district toll office area.

6. PROCEDURE - EVIDENCE OF CONTACT

6.01 Outside employees in the plant service forces, and line and cable-placing, splicing or maintenance forces who work in aerial wire or cable plant, should be constantly on the alert for any evidence of electrical contact as outlined in Part 4.

6.02 Upon finding or being notified of any evidence of contact, outside employees shall proceed as follows:

(a) Unless the report came from the test center, notify the test center immediately from the nearest available "safe telephone". Give details of contact evidence which has been found or reported and ask for further instructions.

Note: Standard installations of Subscriber's telephones, public telephones or toll stations are considered "safe" telephones. Test sets shall not be used for reporting to the test center, under these conditions.

(b) Warn other employees seen in the vicinity.

(c) Until the contact has been located and cleared, or until it has been determined that no contact exists, follow carefully all of the safety precautions outlined in Part 7 while working in the lead or when handling any service wires and associated equipment connected to the lead.

(d) If conditions hazardous to the public are found, take all precautions short of handling the energized plant to protect the public from it, by means of rope guards, warning signs or lights, personal guard duty, etc., appointing someone else to stand by if necessary while calling in reports.

(e) Do not handle or come in contact with any light or power wires, even though it appears that the circuits are dead. All such wires shall be considered alive and shall be avoided. They shall be handled only by Electric Company employees.

7. SAFETY PRECAUTIONS

7.01 Where evidence of contact exists or where the probability of contact is greatly increased due to hazardous storm conditions, the precautions listed below shall be followed by all employees while working in outside aerial plant. In cases of contact evidence, these precautions shall be observed until the contact has been located and cleared, or until it has been determined that no contact exists. During and after hazardous storm conditions, these precautions shall be followed for the duration of the emergency until notice is given by your Supervisor or test center that danger of contact is over.

Inspection of Ungrounded Aerial Leads

7.02 Before doing any work in open wire, drop wire, or ungrounded aerial cable leads, which requires climbing poles and coming in contact with any wires, cables, messengers, connecting blocks or protectors in the lead, or which requires handling from the ground any wires or drops connected to the lead, the following inspections shall be made:

(a) If the lead is short, inspect the entire portion which is on joint poles with the Electric Company or which is overbuilt, crossed by, or in close proximity with Electric Company wires or facilities. Look for broken or sagging wires, fallen trees, branches or wire trash in the lead, broken or leaning poles, etc., causing Electric Company wires or facilities to be in actual contact with telephone plant or in close enough proximity to cause swinging contacts.

(b) If the lead is too long to inspect completely, inspect the terminal open wire junction pole for evidence of contact. Look for burned or

melted jumpers or slack span wires at the terminal and for burned, melted, or exploded lead sheath on the cable and terminal stub near the pole. If line wire protectors are provided, look for similar evidence of contact on associated wiring and parts. If the pole is climbed to make this inspection, climb only far enough to permit close visual inspection. Wear rubber gloves while touching or handling any terminals, protectors, or associated wiring. Do not touch them if it is apparent, from a visual inspection, that they have been damaged by electrical contact; and do not do any work in the lead which requires coming in contact with any of the wires, cables, or messengers until the contact has been located and determined to be clear.

(c) During and following hazardous storm conditions on long leads described above which have not been inspected in their entirety, wear rubber gloves while handling any of the line wires, drop wiring, and protector wiring even when no evidence of contact has been found or reported until notice is given by your supervisor or test center that danger of contact is over.

Inspection of Station Protectors

7.03 In addition the precautions covered in Paragraph 7.02 make a careful visual inspection of the station protector of the line involved before handling or coming in contact with the drop wire and before climbing to work in the lead. This inspection must be made in both ungrounded and grounded aerial leads in order to insure the safety of the workman. Look for burned or exploded fuses or protector parts, burned or melted protector wiring or insulation, evidence of arcing between protector parts and protector box, severely-burned or welded carbons, etc. Until it is determined by inspection that no contact evidence exists, wear rubber gloves while handling or coming in contact with any protector equipment and associated wiring. If it is evident from appearances that contact has occurred, do not touch any protector parts or wiring until the contact has been located and determined to be clear.

Electrical Storm Precautions

7.04 During electrical storms in the vicinity, or when warned that electrical storms are affecting the section of the lead in which work is being performed, all workmen shall stay clear of ungrounded aerial leads.

7.05 Toll repairmen line crews and others dispatched on trouble or working in such leads during electrical storms shall make all calls from "safe telephones", i.e., subscriber sets, public telephones, or toll stations. No attempt should be made to tap test set in on any line wires of the lead.

7.06 Sections of aerial wire lead which are separated from the region of the electrical storm by repeater stations, or sections of grounded cable, etc., where cable protectors are used, may be considered free from the electrical hazards of the storm, and the precautions outlined above need not be taken.

Induced Voltage From Power Wires

7.07 When working on open wire lines or ungrounded messenger or cable leads which are on the same pole with higher voltage power circuits (over 2900 Volts to ground, or over 5000 Volts between wires) or are parallel to such lines at separations of 100 feet or less, the telephone lines may become charged with voltages induced from the power wires particularly while the telephone wires are not connected to cable plant. Where power transmission lines supported on steel towers are involved, telephone wires may become charged by induction at separations of 200 feet or greater, depending on the length of exposure.

7.08 To prevent injuries from the startling effect of electrical shocks which may be received under these conditions, the precautions outlined in Section G31.141.2 should be followed during construction work operations. This practice describes the methods to be used for grounding wires to drain off voltage charges. Similar means of grounding should also be employed when placing messenger and when working in ungrounded leads on repair visits, etc. In addition to these precautions, the workman may provide additional protection by wearing rubber gloves, and by making himself secure on the pole with safety strap before touching any of the conductors.

8. CLEARANCE SITUATIONS

8.01 In addition to the hazards which result from contacts between power wires and open wire or aerial cable plant during the storm conditions outlined in the preceding text, other electrical hazards are introduced from time to time as a result of improper or inadequate clearance between the power wires and the telephone plant. Since electrical hazards from these sources may come unexpectedly and without

warning in any kind of weather, it is important that all outside employees who work in aerial plant recognize the clearance situations which bring the hazards about and take proper steps to avoid and correct the unsatisfactory conditions.

8.02 Typical clearance situations which can be hazardous to the safety of employees and which must be constantly watched for and corrected are:

(a) Inadequate clearance between telephone plant and Electric Company wires or facilities due to improper installation, sagging or broken wires, guys or cables, unbalanced loads on poles, etc.

(b) Improperly-supported conductors or fixtures of either Electric Company or Telephone Company that may permit contact between Electric and Telephone Company plant, i.e., broken insulators or tie wires, improper fasteners, etc.

(c) Damaged plant in joint use, or at crossings, from motor vehicle collision, etc., causing or permitting contact between Telephone and Electric Company wires or facilities.

(d) Tree trimming by Electric Company or outside parties on pole lines in joint use.

(e) Fires near joint-use plant.

(f) Wire trash which would cause contact in leads on joint-use plant.

(g) Improperly-placed or missing guy insulators permitting contacts via guy wires between Electric and Telephone Company plant.

8.03 A thorough understanding of the clearance requirements outlined in Section G10.301-S, together with close adherance to the inspection and reporting procedure covered in Section G10.901 will be necessary to comply with the above instructions.

8.04 Cases of known or suspected electrical contact which result from clearance situations shall be handled by the same reporting procedures and precautions outlined above for the handling of other contact evidence.

Climbing and Working Clearances - Aerial Plant

8.05 When doing work in any aerial plant on poles jointly used by the Electric Company or in the proximity of any electrical wires or facilities, the following precautions shall be taken to guard against electrical shock.

(a) Before climbing pole:

(1) Make a careful survey of electrical wires and equipment attached to the pole which may be encountered and observe that clearance and climbing space is adequate to permit climbing and working on pole without coming in contact with the electrical facilities.

(2) Observe that guy wires which pass through vicinity of electrical wires are properly equipped with insulators to electrically isolate sections within reach of workmen in telephone plant.

(3) Observe that non-conductive protective mouldings are in place and in good repair on any electrical wiring or conduit runs on poles which are within reach of workmen in telephone plant.

(4) While climbing and working on pole, follow safety precautions outlined in Section 010.205, avoiding contact with any part of electrical equipment or wiring.

(5) Where standard clearances or climbing space from power circuits or equipment, are not provided, or where protective insulators, mouldings, etc., are missing, damaged or located in such a manner that danger of contact exists, no work shall be done on the pole until proper safeguards have been made or until the conditions have been corrected.

(6) During wet weather, in addition to the precautions above, be on the alert and take precautions to guard against serious falls or other injuries from the surprise effect of electrical shocks, from leakage currents on poles supporting electric company wires and associated equipment, transformer vertical conduit and ground wire runs, etc. Means of safeguarding against these hazards should include: use of rubber gloves, rubber boots, rubber overcoats;

use of safety belt around pole while climbing and descending; use of ladders, tower trucks, etc., depending on the conditions encountered.

(b) Before riding suspension strand:

Observe that riding path is clear of possible contact between body of workman and any electric company wires or equipment or other foreign wires; do not ride strand until any unsafe conditions have been safeguarded or corrected.

(c) Night work:

Before climbing and working in aerial plant at night time, adequate lighting shall be obtained to inspect plant for proper climbing and working clearances as outlined in (a) above.