AVOIDING CONTACT WITH TELEPHONE PLANT WHICH HAS BECOME ENERGIZED BY FOREIGN POTENTIAL

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1. GENERAL

1.01 This section outlines safety precautions and reporting procedures to reduce the possibility of injury to telephone personnel resulting from contact with telephone plant energized by accidental contact with or induced voltages from power circuits.

1.02 It is revised to consolidate information previously contained in two sections and to specify the use of the "B" Voltage tester (620-105-010) before contacting telephone plant which shows evidence of contact with or which is suspected to be energized by power.

1.03 Precautions which should be followed while working in the vicinity of power circuits and equipment are contained in the Bell System Practices covering the work operation 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

2.03 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.

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

2.05 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.

2.06 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.

2.07 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 from greater distances, 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 above.

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. 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 this practice be followed in case of known or suspected contact between electric wires and **any aerial cable plant.**

4. CONTACT EVIDENCE

4.01 As covered in the following evidence of a power contact, evidence of "above normal" voltage and currents at protectors would include: burned insulation on wiring, exploded fuses, burned or welded carbons, melted parts, burned or smoked telephone sets, etc.

(a) Known contact:

(1) Wires seen in actual contact, by telephone co. employees, electric company employees, local residents or others.

(2) Burns in bridle wire, block 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 cable rings grade clamps, bond 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" voltage and current.**

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

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

(6) Use of "B" Voltage tester indicates energized plant.

(b) Suspected contact:

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

(2) 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.

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

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

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

(6) Power burns found in cable while investigating reported trouble.

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

5. REPORTING EVIDENCE OF CONTACT

5.01 The District Manager-Plant Engineering shall arrange with the various power companies in his district to have all power failures, which involve contact with telephone plant, reported to the District Manager-Installation and Repair, or his representative. This is done in order that telephone personnel in the vicinity may be promptly notified. Similar notification should be given by the power companies when trouble has been cleared.

5.02 The test center is able to test for power, noise, and foreign potential on telephone lines. It is in a position to correlate reports from other sources of known and suspected cases of contact between telephone and electrical facilities and to caution and direct employees when indications of energized plant exist. All information on known or suspected cases of contact originating outside 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 in order to protect the public from it. Use rope guards, warning signs or lights, personal guard duty, etc., appointing someone 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 by power company employees only.

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 joint with power or which is overbuilt, crossed by, or in close proximity with power 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. **Insulating gloves shall be worn when touching or handling 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 insulating 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.

(d) **Test all plant for hazardous voltages with the B Voltage Tester. Insulating Gloves must be worn when making this test.**

Inspection of Station Protectors

7.03 In addition to the precautions covered in 7.02, make a careful visual inspection of the station protector of the line involved before handling or coming 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 worker. 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 insulating 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 workers 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," ie, subscriber sets, public telephones, or toll stations. **Do not use test sets.**

7.06 Sections of aerial wire leads which are separated from the region of the electrical storm by repeater stations, or sections of grounded cable, 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 from greater distances, 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 623-100-010 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, workers shall wear insulating gloves, and be secured to the pole by a 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 power 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 power or telephone plant that may permit contact, ie, broken insulators or tie wires, improper fasteners, etc.

(c) Plant in joint use, or at crossings, damaged by motor vehicle collision, etc., causing contact between telephone and power facilities.

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

(e) Fires near joint-use plant.

(f) Loose wire or scraps which could cause contact in joint-use leads.

(g) Improperly-placed or missing strain insulators in permitting contacts via guy wires between power and telephone plant.

8.03 A thorough understanding of the clearance requirements outlined in Section 620-200-900PT is 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 aerial plant on poles joint with power or in proximity to power wires or facilities, the following precautions shall be taken to guard against electrical shock.

(a) Before climbing pole:

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

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

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

(4) While climbing and working on poles, follow safety precautions, avoiding contact with 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) In addition to the foregoing, especially during wet weather, guard against falls and other injuries which may be caused by current leakage on joint use poles. Safeguard against these hazards by the use of insulating gloves and blankets. Place the safety strap around poles before touching aerial plant. Use ladder or tower trucks when conditions permit. When current leaks are encountered notify the power company for immediate correction

(b) Before riding suspension strand: Observe that path is clear of all possible contact between body of worker and power wires, equipment or other foreign wires. **Do not ride strand until unsafe conditions have been safeguarded or corrected.**

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