

# **DROP AND BLOCK WIRING**

## **PREVENTIVE MAINTENANCE**

<b>Contents</b>	<b>Page</b>
GENERAL .....	1
LIMITED INSPECTION PLAN .....	2
FULL INSPECTION PLAN .....	6
SELECTION OF PLAN .....	10

### **1. GENERAL**

1.01 The drop and block wire portion of the outside plant requires careful and continuous preventive maintenance treatment. Its fundamental characteristics and the manner in which it is affected by exposure to weather, building activity, proximity to electric light and power distributing circuits, abrasions and tree growths make it a vulnerable part of the plant from a service interruption viewpoint. Deteriorated insulation, trouble due to abrasion in trees and against building walls or roofs, etc., trouble at ties and at points of entrance to buildings are usually the more common faults.

1.02 A plan for periodic inspection of this plant supplemented by wet weather insulation tests and the prompt carrying out of repairs of defective conditions detected, has commonly been found the most effective and economical way of maintaining a satisfactory plant condition. Two plans for carrying out this work are herein designated as the "Limited Inspection Plan" and the "Full Inspection Plan."

## PREVENTIVE MAINTENANCE

1.03 In carrying out the inspection work required, good judgment must be exercised on the part of the inspector in determining what conditions are to be corrected. It should generally be the intent to carry out only that repair work necessary to insure continued satisfactory service from the plant and avoidance of hazards to the public or employees. Minor deviations from standard practices, old standards of construction and obsolete materials should not be changed except where they present a hazard or may be expected to cause trouble.

1.04 Wires in service whose appearance indicates deteriorated insulation should not generally be judged for replacement unless voltmeter tests made during wet weather indicate this to be the cause of line leakage.

1.05 Generally it will be found more economical to trim trees to avoid abrasion on existing drop or block wires than to reroute the wires to avoid trees.

1.06 The methods of making repairs of the more common defects found are given in Section G32.405.

## **2. LIMITED INSPECTION PLAN**

2.01 The basis on which this plan is built is that wet weather insulation tests of all subscriber lines will be made frequently enough to detect those lines with failing insulation sufficiently in advance of service interference to permit repairs before trouble occurs. In addition to these tests and the clearing of faults found, a periodic inspection as described in paragraph 2.06 should be carried out to locate conditions hazardous to the public or employees and inadequate clearances of wires from the plant of power or other wire using companies.

### **Wet Weather Tests and Associated Investigation—Limited Inspection Plan**

2.02 Voltmeter tests of all subscriber lines during very wet weather should be made at least annually. Until the condition of the plant is such that only a small proportion of the lines indicate insulation resistance of 50,000 ohms or less, it will probably be found desirable to make these tests on a

semi-annual basis preferably once during the Spring season and once during the Fall. Those lines showing insulation resistance of 50,000 ohms or less should be selected for field investigation and repair. The method of making wet weather insulation tests is described in Bell System Practices—Local Test Room Operation.

2.03 Following the determination of those lines with low insulation, a field investigation of each of these lines is usually required. Because it is often difficult to carry out this field investigation during wet weather when the low insulation is actually in evidence, much of this work must be done during dry weather, and the elimination of the faulty condition, therefore, largely depends upon the inspector's ability to locate the cause by inspection. The results of wet weather tests usually indicate only a limited number of lines requiring attention and for this reason, it is often possible by spreading this work over a period of several months, to have the investigation and repair work performed by the regular maintenance forces. The investigation of each line reported as having low insulation should cover such items as:

- (a) Check condition of cable terminal face plate to see that dirt or corrosion may not be a possible cause and observe that the wires are properly placed and terminated.
- (b) Observe condition of block or drop wires at attachments or ties to see that insulation is not broken or so badly deteriorated as to permit entrance of moisture.
- (c) Inspect the block or drop wire throughout its entire length to detect any defects due to abrasion, breaks in insulation due to kinks, splices or party line taps improperly taped, deterioration at entrance, etc. While making this inspection see that drop or block wire is properly separated from buildings, electrical wires or structures and has adequate clearances from streets and roadways.
- (d) If the inspection of the block or drop wire does not disclose the apparent cause of the low insulation, it may be advisable to inspect the station equipment. When so instructed inspect the protector, inside wire and other station equipment for possible insulation defects.

## PREVENTIVE MAINTENANCE

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- (e) After the completion of the investigation and repairs and before leaving the premises, have the line and station tested by the test desk to insure that they are in satisfactory working condition.

2.04 Following this investigation and the repair of any defects found, all lines on which low insulation had previously been found should be tested during wet weather to see that the faults have been cleared. On those lines still found to have insulation resistance below 50,000 ohms, make a second investigation during wet weather when the faults can be definitely located by opening the line at various points (See Section G32.205) and having its condition observed from the test desk.

2.05 All investigation and repair work should be thoroughly cleaned up prior to the time scheduled for making the next wet weather insulation test.

### Periodic Field Inspection—Limited Plan

2.06 In order to locate unsatisfactory conditions in the drop and block wire plant which can not be picked up by the wet weather test such as possible hazards to the public or to employees or hazards to service because of inadequate clearance from power wires or plant, a periodic field inspection of all drop or block wires for these conditions is necessary. The frequency of such an inspection depends largely upon local conditions, the relations with power or other wire using companies in obtaining proper plant construction, the extent of severe windstorms, sleet loads, etc. Usually this inspection will not be required more frequently than about once each two or three years. Sampling inspection of various parts of the drop or block wire plant will give an indication of the need for an inspection of the entire drop and block wire plant. This sampling inspection can often be advantageously combined with the inspection of aerial and block cable.

2.07 Because the wet weather tests are relied upon to detect those lines with insulation defects, it is not contemplated in the periodic inspection under the "Limited Plan" that condi-

tions likely to cause only minor abrasions or trouble after a considerable period of time—brought about by wires rubbing against trees, poles, buildings, etc.—will be repaired, unless the condition of the wires constitutes a hazard to the public or presents an obvious immediate hazard to service.

2.08 The periodic field inspection of each drop or block wire under the "Limited Plan" should cover such items as:

(a) HAZARDS TO PUBLIC OR EMPLOYEES

1. Observe that all wires (both working and disconnected) have sufficient clearance over streets, roadways, alleys, sidewalks, and private driveways.
2. Check clearances of all wires (both working and disconnected) at crossings over railways to be sure that they conform to requirements.
3. Note that wires (both working and disconnected) do not interfere with operation of building doors or shutters, fire escapes, outside stairways, movable clothes lines and the like.
4. Observe all wire supports to see that they are firmly in place, that none are missing and that supports and ties appear in satisfactory condition.
5. Note that no abnormal amount of slack is present between wire supports sufficient to cause poor appearance, a hazard to service or to the public.
6. Observe for disconnected wires broken down or with loose ends not properly taped.
7. See that proper climbing space on joint use poles has been maintained.

(b) HAZARDS FROM ELECTRIC LIGHT OR POWER PLANT

1. Observe all drop and block wires (both working and disconnected) throughout their entire length to see that they have such clearances from electric light or power wires or structures that trouble from direct crosses or "power arc follow up" will not be encountered. Typical illustration of such conditions and clearances required are given in Section G10.301.

(c) ABRASIONS

1. Observe only for those abrasion conditions on working wires of such a serious nature that trouble will obviously be caused in the near future. Conditions likely to cause only minor abrasions or trouble after a considerable period of time should not be judged as requiring repairs.

PREVENTIVE MAINTENANCE

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(d) MISCELLANEOUS

1. Report situations where the placing of additional cable or cable terminals would eliminate heavy wire runs.
2. All disconnected drop wires in unsatisfactory condition should be removed.

**Routine Work Requirements—Limited Plan**

2.09 Installers and construction crews should be required to leave all reused block or drop wires in satisfactory condition. That is, trees should be trimmed where required and wires rearranged or rerouted if necessary to avoid tree interference, abrasion hazards or insufficient power plant clearances. If the insulation on a drop or block wire being considered for reuse is obviously deteriorated to such an extent that interruption to service is probable, the wire should be replaced.

2.10 Repairmen should be required when visiting stations in connection with a reported trouble to inspect the drop or block wire for conditions hazardous to the public, clearances from power companies' plant, and conditions causing serious abrasion to the insulation of the drop or block wire. The items requiring attention should be repaired or reported in accordance with local instructions. Repairing or reporting conditions likely to cause only minor abrasion is not required because before the abrasion has progressed to a point where the service will be interrupted, it is expected that the condition will be detected through the wet weather tests and repaired. If, however, it is necessary to take down the drop, minor abrasions should be corrected.

2.11 Repairmen and installers should be required to brush off face plates of No. 14 type terminals whenever they visit a terminal of this type.

**3. FULL INSPECTION PLAN**

3.01 The basis upon which this plan is built is that hazardous conditions and potential troubles will be eliminated by thorough periodic inspection and repair of the entire drop and block wire plant. Dependence is placed on the ability of the

inspector to detect all conditions which are possible hazards to the public, employees or service. Wet weather tests under the Full Inspection Plan are made only for the purpose, in so far as the drop and block wire plant is concerned, of furnishing information to the inspector regarding the condition of drop or block wires which he may judge as requiring replacement due to their deteriorated or worn appearance.

3.02 This plan differs from the "Limited Inspection Plan" in that a specific individual investigation of each line found with low insulation on the wet weather test is not made, but in carrying out the inspection work ALL conditions judged as possible sources of trouble are cared for as well as some items at cable terminals and at bridging connectors.

#### **Wet Weather Tests—Full Plan**

3.03 Prior to the start of the full inspection, voltmeter tests, during very wet weather, should be made of all subscriber lines in accordance with the method described in Bell System Practices—Local Test Room Operation. Those lines on which the insulation resistance is found to be 50,000 ohms or less will have the results of the test recorded on the subscriber line card. This information will be used when considering replacement of abraded and deteriorated wires in connection with the periodic field inspection. Frequently the periodic inspection will be made as a continuous program and under such conditions it will probably be economical to have a wet weather test made on the entire plant yearly although only a portion of the lines will be inspected during the period between tests.

#### **Periodic Field Inspection—Full Plan**

3.04 The frequency with which this inspection is carried out depends upon the quality of work performed by telephone workmen, the relations with power or other wire using companies in obtaining proper plant construction and local weather conditions such as prevalence of severe windstorms, sleet loads, etc. Usually, inspections carried out at a frequency of once each two or three years will be adequate for average

## PREVENTIVE MAINTENANCE

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conditions. Sampling inspections of typical parts of the drop or block wire plant will indicate the need for an inspection of the entire drop and block wire plant. The principal items which should be considered in carrying out the inspection and repair work are:

### (a) HAZARDS TO PUBLIC OR EMPLOYEES

1. Observe that all wires (both working and disconnected) have sufficient clearance over streets, roadways, alleys, sidewalks and private driveways.
2. Check clearances of all wires at crossings over railways and railroads to be sure that they conform to requirements.
3. Note that wires (both working and disconnected) do not interfere with operation of building doors or shutters, fire escapes, outside stairways, movable clothes lines and the like.
4. Observe for disconnected wires broken down or with loose ends not properly taped.
5. See that proper climbing space on joint use poles has been maintained.
6. Observe all wire supports to see that they are firmly in place, that none are missing and that attachments and ties appear in satisfactory condition. See that drop wire clamps properly support spans to which they are attached.
7. Note that no abnormal amount of slack is present between wire supports sufficient to cause poor appearance, a hazard to service or to the public.

### (b) HAZARDS FROM ELECTRIC LIGHT OR POWER PLANT

1. Observe all wires (both working and disconnected) to see that they have such clearances from electric light or power wires or structures that trouble from direct crosses or "power arc follow up" conditions will not be encountered. Typical illustrations of such conditions and clearances required are given in Section G10.301.

### (c) ABRASIONS AND DETERIORATED WIRE

1. Inspect all working wires throughout their entire length to see that abrasion defects do not exist and that wires are clear or are protected from trees, poles, buildings or other objects which may cause damage to the insulation.

2. Observe all wires for condition of braid. Where braid appears either weather worn or ragged to such an extent as to indicate a possible need for replacement, call test desk and inquire if line to which drop is connected was found to have low insulation resistance on last wet weather test. Drop or block wires having insulation resistance of more than 50,000 ohms should not be judged as requiring replacement because of apparent deteriorated conditions.

(d) **TERMINALS**

1. Remove from terminals any disconnected wires found and dress back in manner outlined in Section G32.175.
2. Dress up wire run from last wire support to terminal if necessary.
3. See that insulation on wires is such that crosses or grounds will not occur.
4. Check binding posts to see that connections are tight and that top nuts on unused binding posts are turned down finger tight. Seal vacant wire entrance holes with corks in accordance with Section G32.175. Clean face plates of No. 14 type terminals in accordance with local instructions.

(e) **MISCELLANEOUS**

1. See that bridging connectors between insulated wires are properly taped. If necessary to remove tape, inspect connectors for tightness and condition.
2. See that bridging connectors between open wire and drop wires are of proper type, are tight and that crotch of parallel drop wire is properly taped.
3. Report situations where the placing of additional cable or cable terminals would eliminate heavy wire runs.
4. All disconnected drop wires in unsatisfactory condition should be removed.

**Routine Work Requirements—Full Plan**

3.05 Installers and construction crews should be required to leave all reused drop or block wires in excellent condition, rerouting them if necessary to avoid tree interference or other sources of abrasion or hazards due to insufficient power plant clearances. If the insulation on a drop or block wire

## PREVENTIVE MAINTENANCE

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being considered for reuse is obviously deteriorated to such an extent that interruption to service is probable, the wire should be replaced.

3.06 Repairmen should be required when visiting stations in connection with a reported trouble to inspect at least the first two spans of wire from the station premises for conditions hazardous to employees or the public, clearances from power companies' plant and other conditions likely to cause abrasion to the insulation. The items requiring attention should be repaired or reported in accordance with local instructions.

### 4. SELECTION OF PLAN

4.01 The selection of the plan to be applied in any given area will depend upon climatic conditions, the general condition of the plant, the rapidity with which it is planned to bring about the maintenance condition desired, and the availability of forces to carry out the work.

4.02 The "Limited Inspection Plan" concentrates work on that portion of the wire plant known to require prompt repairs and for that reason is effective in bringing about immediate improvement in trouble results. It expends a minimum of effort on those wires which may later be abandoned through disconnection and reconcentration and as a result will usually be the more economical in application. In magneto areas or other areas having a large portion of the station ringers connected directly to ground, the determining of insulation conditions by wet weather tests may be so difficult that the results will be unsatisfactory.

4.03 The "Full Inspection Plan" when carefully carried out provides a more thorough preventive maintenance job than the Limited Plan. It brings the plant up to a high standard and under average conditions generally results in slightly less interruption to service than does the application of the Limited Plan.