BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G31.109.1
Issue 1, April, 1952
AT&T Co Standard

OPEN WIRE JOINTLY USED POLES AND POWER CROSSINGS—PREVENTION OF FLIP-UPS AT LOW POLES

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1. GENERAL

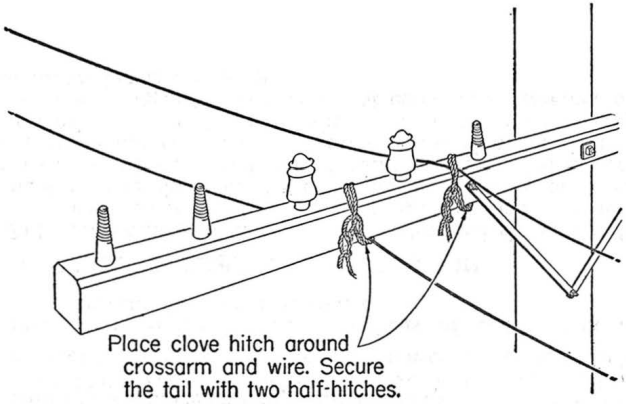
1.01 At upward changes of grade (low poles) a broken insulator, loose tie, loose pin or wood pole bracket may permit the telephone wire to rise suddenly to a higher level than normal. If this occurs at jointly used poles or at power crossings a contact between the telephone and power wires may result.

1.02 This section illustrates methods of construction to prevent these possible contacts.

2. LOCATIONS REQUIRING PROTECTION

2.01 At upward changes of grade (low poles) on jointly used poles or at power crossings the plant engineer should include data on the construction drawings or work prints showing where additional construction is needed to prevent accidental contacts with power wires. However, if this information is not shown on the work prints, the following procedure is suggested as a means of determining whether or not protection is necessary.

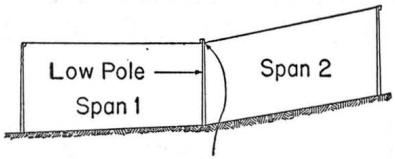
(1) Keep one wire under the crossarm at the low pole. Using a 3/8" hand line place a clove-hitch and two half-hitches around the wire and crossarm.



Note: If more than two wires are being strung at the same time, one wire (preferably the wire nearest the end of the crossarm) must be secured under the crossarm for this test. The remaining wires may be tied on top of the crossarm with a hand line. Do not remove the hand line holding the wires to the top of the crossarm until the test has been completed.

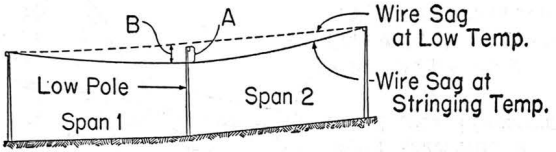
(2) Tension the line wires until the proper sag is obtained in a span adjacent to the double span which includes the low pole. After the wires have been properly tensioned, remove the hand line which holds the wire under the crossarm at the low pole.

(3) If the wire pulls up against the bottom of the crossarm, protection is required at that point. Replace the hand line until the special construction has been completed.



Wire pulling upward against bottom of Crossarm

(4) If the wire hangs free at the low point, i.e., below the crossarm, measure the vertical distance between the wire and the top of the crossarm in inches. This distance is called "A". Next add the lengths of the two spans adjacent to the low pole and divide this sum by two, to obtain the average span length. Using the proper sag table, determine the sag for this average span length at the existing stringing temperature and also at the lowest temperature given in the sag table. Subtract the low temperature sag from the existing temperature sag and multiply this difference by four. This distance is called "B". If "B" is greater than "A" protection is required, because under the low temperature condition, the line wire would be pulling up from the crossarm.



If B is greater than A protection is required.

(a) Average span length $= \frac{\text{Length of Span 1} + \text{Length of Span 2}}{2}$

(b) Vertical distance from top of crossarm to wire = "A".

(c) Sag at existing stringing temperature, less sag at lowest temperature, multiplied by four = "B".

(d) If "B" exceeds "A" protection is required.

(5) Example:

(a) Assume wire to be 109H in heavy loading area.
Assume measured distance "A" to be 16 inches.
Assume Span 1 to be 330 feet.
Assume Span 2 to be 310 feet.
Assume existing temperature to be 60° F.

(b) Substitute values of span lengths in formula. Then average span length $=$

$$\frac{330 \text{ feet} + 310 \text{ feet}}{2} = \frac{640 \text{ feet}}{2} = 320 \text{ feet}$$

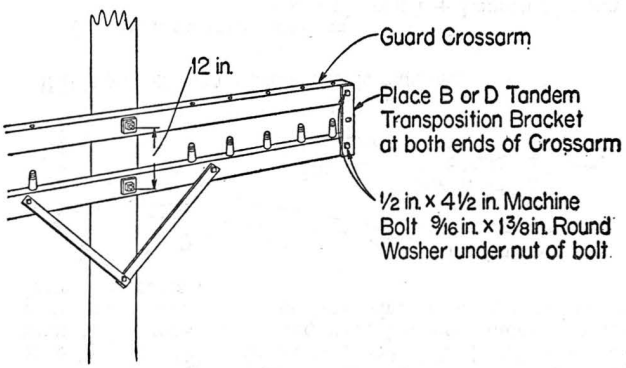
(c) From tables, the stringing sag for 109H in heavy loading area for 320 foot span at 60° F. = 27 inches.

(d) From tables, the stringing sag for 109H in heavy loading area for 320 foot span at —10° F. is 18.5 inches.

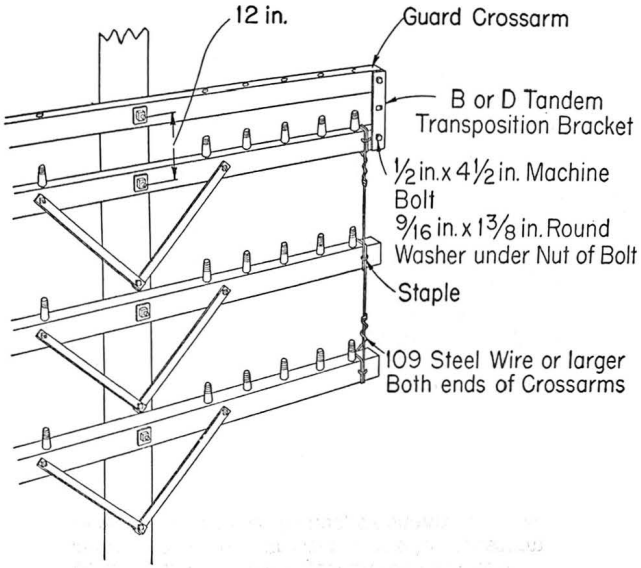
(e) Subtracting 18.5 inches from 27 inches leaves 8.5 inches. Multiplying this by four, gives 34 inches which is greater than 16 inches measured for "A". This means that at the lower temperature the wire would be pulling up from the crossarm, so special construction for prevention against flip-ups is required at the low pole.

3. CROSSARM CONSTRUCTION

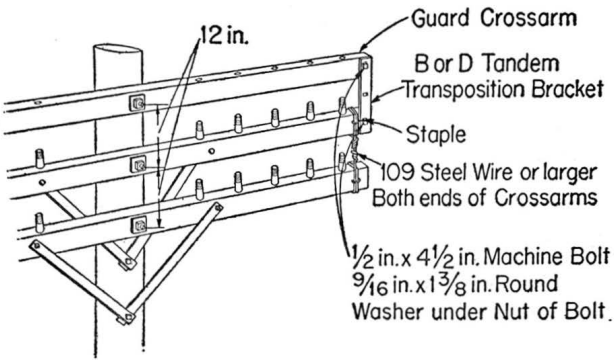
3.01 The following illustrations indicate the methods of preventing flip-ups at low poles when crossarm construction is used. The construction shall be applied at both ends of the crossarm.



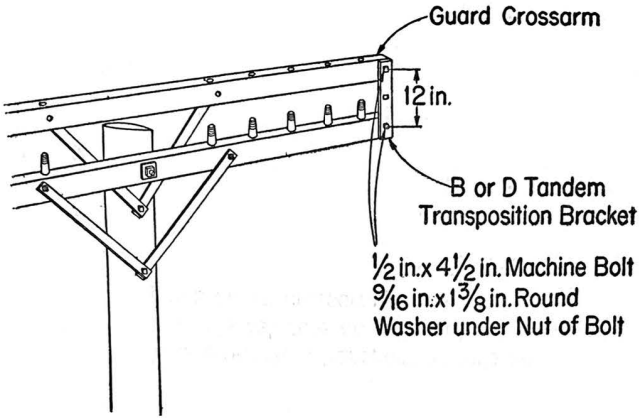
Where sufficient pole space is available the guard crossarm may be located as shown.



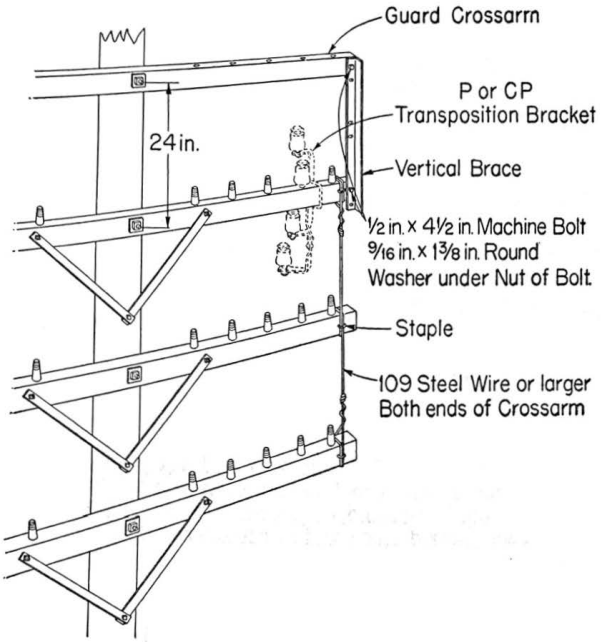
Lower Crossarms may be protected as shown



Where separation or clearance requirements do not permit placing guard crossarm 12 inches above top crossarm, the top crossarm may be lowered 12 inches, as shown.



Where clearance requirements prevent lowering the wire supporting crossarms, the guard crossarm may be placed above the top of the pole as shown.

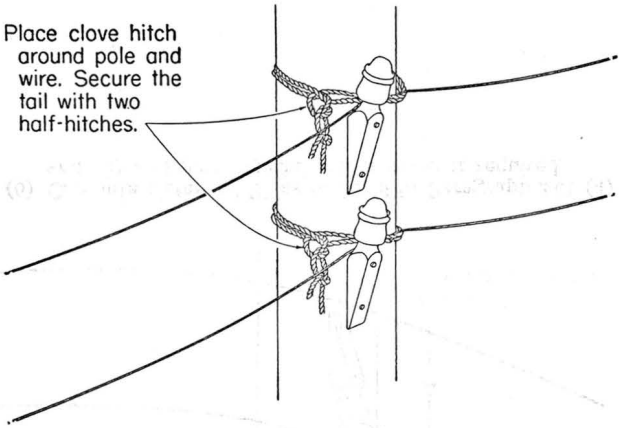


Where phantom transposition falls on low pole, relocate on adjacent pole or place guard crossarm as shown.

4. BRACKET CONSTRUCTION

4.01 The following procedure is suggested to determine whether protection is required at low poles when bracket construction is used.

(1) Using a 3/8″ hand line place a clove-hitch and two half-hitches around the pole and wire. Keep the wire in the notch between the bracket and pole. Tie the lower wire at the lower bracket. Make this hitch tight so that wire will not slide up the pole.

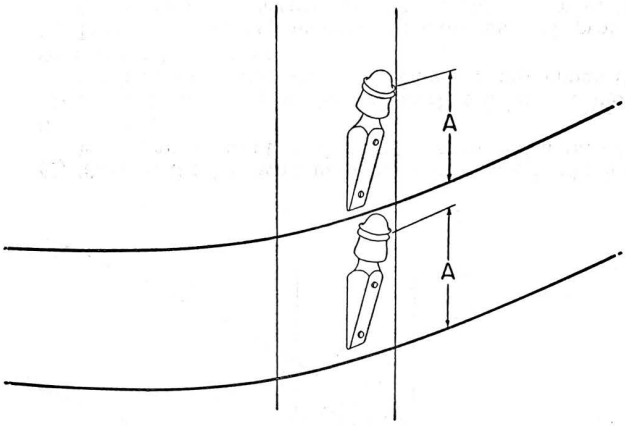


(2) Tension the line wire until the proper sag is obtained in a span adjacent to the double span which includes the low pole.

(3) After the line wire has been properly tensioned, remove the hand line taking care that if there is any uppull the wire will not get away.

(4) If the wire has any tendency to move upward, protection is required. Secure the wire to the pole with the hand line until the special construction is completed.

(5) If there is no noticeable uppull, lift the wire from the notch and let it hang down free of the bracket. Measure the vertical distance from the wire to the wire groove of the insulator. This is distance "A".



(6) Compute distance "B" as outlined in Paragraph 2.01 (4) and (5) and place special construction if required.

4.02 The following illustration indicates the method of preventing flip-ups at low poles when bracket construction is used.