BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G31.115.1
Issue 1, June, 1946
AT&T Co Standard

OPEN WIRE TENSIONING

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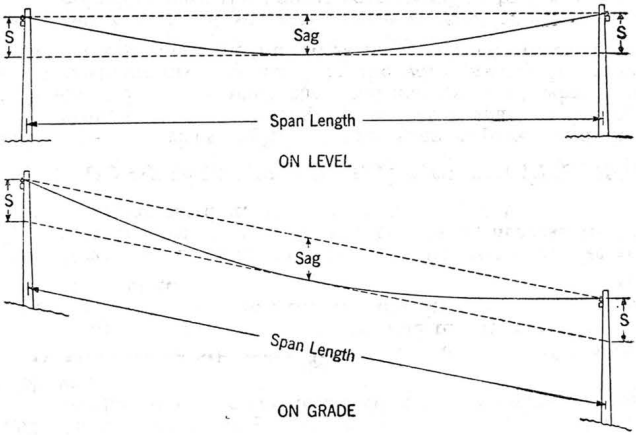
1. GENERAL

1.01 The tables of sags formerly given in Section G31.115, Issue 2, have been revised and now appear in G31.116.1, Issue 1. The remaining material in Issue 2 of G31.115 has been included in this section, and G31.115 is hereby cancelled.

1.02 The sag in a span of open wire is the distance measured as shown in the following diagrams:



1.03 In obtaining the proper sag by either the sighting or oscillation method as described in the following, proceed as follows:

(1) Measure or otherwise determine the length of the test span from the center of one pole to the center of the next pole and use the nearest value in the sag tables for the span length.

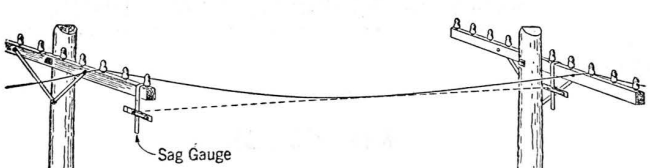
(2) Read the air temperatures on a thermometer. Use the temperature column in the sag table nearest to the thermometer reading.

2. METHOD OF MEASURING SAG—SIGHTING METHOD

2.01 Pull the wires slightly tighter than required and then slacken them back slightly. Select a span of average length about 10 spans from the dead-end or point where the wire is permanently connected to the wire previously pulled, and hang a sag gauge on the crossarm at each end of the span.

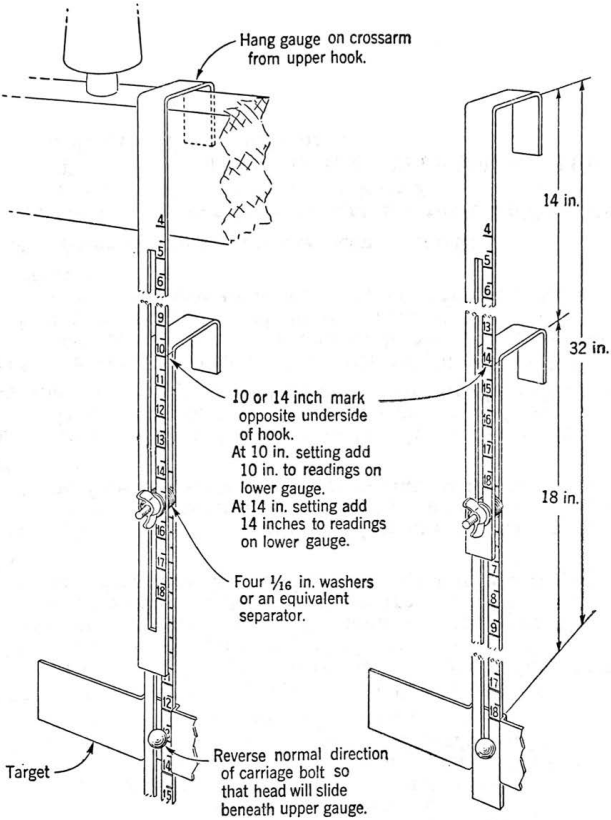
2.02 Set the target on each gauge so that the top of it coincides with the figures corresponding to the amount of sag specified for the particular length of span and temperature. The best results can be obtained by offsetting the targets on the crossarms. For example, in sighting on No. 3 wire, set one target against pin No. 1 and the other target against pin No. 5 at the opposite end of the span.

2.03 Sight across from the top of one target to the top of the other and with the wire resting on the top of the crossarms, adjust the sag in the wire by pulling up or slacking back, until the lowest point in the span is in line with the tops of the targets.



2.04 Select another span about ten spans nearer the pulling end of the run and adjust the sag in the same wire, as outlined above. In sections of line containing corners, more frequent sag measurements should be obtained in the spans beyond the corners.

2.05 The sag gauge may be conveniently used in checking sags up to 18 inches. If required to measure sag in excess of the readings on the sag gauges, two of the sag gauges can be spliced together as shown in the following:



3. METHOD OF MEASURING SAG — OSCILLATION METHOD

3.01 This method has been developed for determining when wire has been pulled to the proper sag and can be used as a means of checking the tensions in the wires. The oscillation method consists of determining the actual sag by oscillating the wire vertically or horizontally and counting the oscillations during a 15-second period. The number of oscillations in this period is an indication of the sag.

3.02 It is necessary to make the oscillation test on only one wire on each crossarm. If the wires are pulled up with pulling blocks, strain equalizing blocks and tackle, all the wires should have the same sag and the same number of oscillations. If strain equalizing blocks and tackle are not used, the sag of the other wires may be obtained by sighting relative to the tested wire.

3.03 The test span preferably shall be one of average length, with the crossarms on about the same level. The wire should be free to oscillate without contact with tree limbs or other objects.

3.04 In order that the sag may be adjusted in all sections, it is desirable to select the spans for testing, starting from the dead-end point and advancing toward the pulling end.

3.05 In straight sections, for each pull, it will probably be satisfactory to have a test made once every ten spans, the first test being made about ten spans from the dead end. In sections of line containing corners, more frequent tests may be necessary.

3.06 After the test span has been selected:

(1) Obtain the sag measurement for the conditions from the sag tables indicated in Part 2.

The number of oscillations for 15 seconds should be in accordance with the following:

Sag Inches	No. of Oscillations 15 Seconds	Sag Inches	No. of Oscillations 15 Seconds
2	37-1/2	12 to 12-1/2	15
2-1/2	33	13 to 14	14-1/2
3	30	14-1/2	14
3-1/2	28	15 to 15-1/2	13-1/2
4	26	16 to 17	13
4-1/2	24-1/2	17-1/2 to 18-1/2	12-1/2
5	23	19 to 20	12
5-1/2	22	20-1/2 to 21-1/2	11-1/2
6	21	22 to 23-1/2	11
6-1/2	20-1/2	24 to 26-1/2	10-1/2
7	20	27 to 29-1/2	10
7-1/2	19	30 to 33	9-1/2
8	18-1/2	33-1/2 to 38	9
8-1/2	18	38-1/2 to 42-1/2	8-1/2
9	17-1/2	43 to 46	8
9-1/2	17	47 to 52-1/2	7-1/2
10	16-1/2	53 to 60	7
10-1/2	16	60-1/2 to 67-1/2	6-1/2
11	15-1/2	68 to 70	6

(2) In preparing to oscillate the wire the workman on the pole or the foreman shall signal for pulling the wires. The wires shall be pulled, until in his judgment they are slightly tighter than required and then slacked back slightly, as better results are obtained by testing the wire in that manner.

3.07 The wire should be made to oscillate by a man on the pole striking the wire with his hand at the crossarm.

3.08 If the number of oscillations is small, the wire should be made to oscillate sidewise. If the number of oscillations is large the wire should be made to oscillate up and down.

Note: By oscillation is meant the complete motion of the wire either from one side to the other and back, or vertically from the highest position to the lowest position and back again at the particular point at which the observation is made.

The oscillation can also be measured by the wave along the wire from a point at one end of the span to the other end and back to the starting point.

3.09 The number of oscillations shall be counted by the man on the pole, holding the wire on the insulator with one hand and holding a finger of the other hand near the wire at the crossarm and counting the number of times in 15 seconds that the wire hits the finger. This is the number of oscillations of the wire which should correspond to that selected from the table. If the number of oscillations is less than required, the wire shall be pulled up. If the number is more, slack off the wire. The count shall always be checked by repeating the test at least once.

4. SAG OF WIRES STRUNG ON AN EXISTING CROSSARM

4.01 When stringing wires on an existing crossarm which carries no wires, string them in accordance with the sag tables.

4.02 When stringing wires that are not point transposed on a crossarm which carries wires that are too slack, string them at the same sag as the existing wires on the crossarms, if the difference from the proper sag does not exceed 6 inches. The sag shall be obtained by sighting relative to the existing wires.

4.03 When stringing wires on a crossarm which carries wires that are not point transposed but are too tight, string the new wires in accordance with the sag table.

Note: If point transposed circuits are involved string the wires in accordance with the instructions covering Construction of Carrier Open Wire Circuits.

4.04 Before readjusting sag in old wires check guying, etc., to determine whether improper sag in existing wires is due to anchors giving, etc. Correct or report such conditions, when found, before stringing new wires.