SUSPENSION STRAND TENSIONING—USE OF STRAND DYNAMOMETER

1. GENERAL

1.01 This section covers the use of the strand dynamometer in tensioning strand and in measuring the tension in existing strand. Information on the types of strand dynamometers and their maintenance is included in Section 081-410-101.

1.02 This section is reissued to update references, to include information on 1/4-inch (6.6M) extra high strength strand, and to include information previously contained in Section 627-240-010 which is canceled. Information on the 3-notch cam version of the strand dynamometer is deleted from this issue. Since this is a general revision, arrows denoting changes have been omitted.

1.03 Each dynamometer is furnished with a calibration chart and must be used with its own chart. ***Do not use a dynamometer on strand sizes for which it is not calibrated.***

1.04 Do not overload the dynamometer by using it for measuring tensions exceeding 10,000 pounds. Do not measure tension in 25M strand with cable in place as the resultant tensions usually exceed 10,000 pounds.

1.05 The B Strand Dynamometer, current model, (Fig. 1) utilizes a cam which is used to force the strand out of line. This produces a slight bending of the upper bar of the dynamometer. The amount of this bending is shown by the dial pointer and is an indication of the strand tension.

1.06 The cam has two notches, one for 6M, 6.6M or 10M, marked 6/10, and the other for 16M or 25M, marked 16/25, strand. The dynamometer may be used for 25M strand only if the calibration chart includes information for 25M strand and only where no cable is supported by this strand.

1.07 CR strand has been manufacture discontinued, therefore information on tensioning of CR strand has been omitted from this issue.

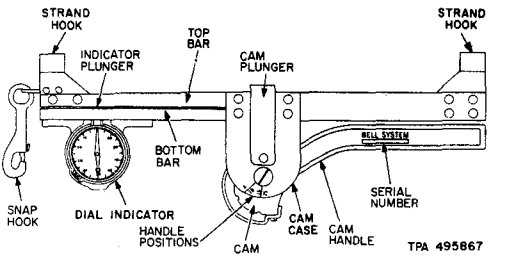

Fig. 1—B Strand Dynamometer

2. PRECAUTIONS

2.01 Strand should generally be tensioned in accordance with the tables in Sections 627-210-018 and 627-210-019 covering stringing tensions for copper conductor cables and aluminum conductor cables, respectively. In areas where the strand is exposed to crosswinds and it is known that cable will not be placed for a period of time, the strand should be left in a slack position (not exceeding 1000 pounds tension) with the suspension clamps loose. Leaving the strand at a tension of less than 1000 pounds will reduce the possibility of the individual wires failing because of fatigue.

2.02 When the strand has been placed in advance of the cable shipment the size and tension should be rechecked prior to placing the cable. This is especially important where there has been a substitution of the size or type of cable.

2.03 If the strand is smaller than required for the cable, the strand must be replaced.

2.04 If the strand is larger than normally required for the cable being placed, the tension should be checked and adjusted, if necessary, to the value prescribed for strand of proper size for the cable being placed. For example, if 10M strand was placed but because of a change in cable size or

**Reprinted to comply with modified final judgment.

Printed in U.S.A.

type, 6.6M is the proper size, the strand should be tensioned to that prescribed for 6.6M strand. It is particularly important to adjust the tension when aluminum conductor cable has been substituted for copper conductor cable or when the substitution is reversed.

2.05 Since the tension for strand placed to support aluminum conductor cable is less than for strand to support copper conductor cables a false deadend is required at a junction of these cables, even though the strand may be continuous.

2.06 At points where the strand would normally be reduced in size because of diminishing weight of the cable, it is sometimes advantageous to carry the larger size strand throughout the run. In these cases the strand beyond the false deadend should be placed at the tension prescribed for the smaller strand which would normally be placed.

3. OPERATION OF DYNAMOMETER

3.01 Check the temperature of the air once each morning and once each afternoon while strand is being tensioned using the thermometer furnished with the dynamometer. Place the thermometer in the sun or shade depending on the condition which exists along most of the strand being measured. Keep the thermometer away from sources of heat such as truck radiators and metal objects which may reflect heat. Allow time for the thermometer to adjust to the air temperature before reading.

3.02 Check the zero reading once each day the dynamometer is used in accordance with Section 081-410-101.

3.03 If cable is in place remove one ring or cable support or sufficient lashing wire to obtain about two feet of unobstructed strand. Place the dynamometer on the strand and move the cam handle so that the line on the cam handle is opposite the proper strand size marking on the cam case. The values of cable-in-place strand tensions are shown in Sections 627-210-018 and 627-210-019.

3.04 Take three readings 1/4 inch apart on the strand; discard the high and low values and use only the intermediate value as the correct dial reading.

4. CALIBRATION CHARTS

4.01 Each dynamometer is furnished with a calibration chart identified by the serial number of the dynamometer; ***no other chart should be used.*** If the chart is lost the dynamometer should be returned for recalibration.

4.02 Figure 2 illustrates a partially completed sample calibration chart of the most recent type. It can be identified by the columns designated 6.6M. All instruments returned for repair or recalibration will be provided with this chart.

4.03 The upper table of the calibration chart indicates the dial reading of the dynamometer when it is placed on a strand of the size indicated at the top of the column and at the tension listed in the column headed "Tension Lbs." For example, to find the dial reading which indicates 1100-pound tension for 6M strand, look in the column headed ***6M*** and on the line opposite ***1100.*** For the dynamometer calibrated on the sample chart illustrated, the dial reading would be ***12.4.***

4.04 The lower table combines the calibration data with the stringing tensions for copper conductor cables specified in Section 627-210-018 and gives the dial reading desired for each length of span and at various temperatures. For example, spans to 250 feet should be placed at 1100 pounds tension at 60°F. The lower table of the chart illustrated in Fig. 2 shows that ***6M*** strand, in span lengths to ***250 feet,*** when placed at ***60° F*** will give a dial indicator reading of ***12.4*** which corresponds to 1100 pounds on the upper chart.

5. TENSIONING STRAND

5.01 Strand tension readings may be taken at any convenient point in the span. At false deadends, measure the tension beyond the deadend. The tension should be read at one or more locations in the section as indicated below. When tension is to be read at more than one location measure first at the location most distant from the pulling end of the strand. Readings should be taken at the following points:

(a) Sections free from corners or changes in grade:

(1) Less than 10 spans: One reading; near center of section.

→CALIBRATION CHART FOR STRAND DYNAMOMETER NO. _____ Date Of Calibration _____

DO NOT USE THIS CHART FOR ANY OTHER DYNAMOMETER

Strand Size	6.6M	6M	10M	16M	25M	Tension Lbs.	6M	10M	16M	25M	Tension Lbs.	16M	25M
Handle Position	6/10	6/10	6/10	16/25	16/25		6/10	6/10	16/25	16/25		16/25	16/25
Tension Lbs.	Dial Readings						Dial Readings					Dial Readings	
400						2500					6200		
500						2600					6400		
600						2700					6600		
700						2800					6800		
800						2900					7000		
900						3000					7200		
1000			11.3			3200					7400		
1100			12.4			3400					7600		
1200			13.4			3600					7800		
1300						3800					8000		
1400						4000					8200		
1500						4200					8400		
1600						4400					8600		
1700						4600					8800		
1800						4800					9000		
1900						5000					9200		
2000						5200					9400		
2100						5400					9600		
2200						5600					9800		
2300						5800					10000		
2400						6000							

DIAL READINGS OF STRAND STRINGING TENSIONS FOR COPPER CONDUCTOR CABLES

Strand Size		6.6M	6M	6.6M	6M	6.6M	6M	10M	10M	16M	25M
Handle Position		6/10		6/10		6/10		6/10	6/10	16/25	16/25
Span Length		to 250'		250'–450'		over 450'		to 400'	over 400'	All	All
Temperature Degrees Fahrenheit	0										
	20										
	40		13.8								
	60		12.4		12.4		12.4				
	80										
	100										

TPA 564295

Fig. 2—Sample Calibration Chart for Strand Dynamometer

(2) 10 to 20 spans: Two readings; two-thirds and one third the section length, measured from pulling end.

(3) Over 20 spans: Three readings; three-fourths, one-half, and one-fourth the section length, measured from pulling end.

(b) Sections including corners or changes in grade:

(1) The first reading, on the far side of the corner or change in grade most distant from the pulling end, then in a similar manner at each corner or change in grade working toward the pulling end.

Tighten bolts of the suspension clamps as the desired tension is obtained in each portion of the strand.

5.02 ***Tensioning Galvanized Strand:***

(a) Use this method with copper-conductor cable at normal stringing tensions and with calibration chart illustrated in Fig. 2.

(1) In the lower table of the calibration chart in the column under the proper strand size and span length and on the line opposite the latest air temperature reading, determine the dial indicator reading for the dynamometer.

(2) Place the dynamometer on the strand at the proper location, and operate the lever to the proper position.

(3) Adjust the tension of the strand until the dial indicator reads within two small divisions of the proper reading.

(b) Use the following method under any conditions. It does not require that the desired strand stringing tensions be known.

(1) To determine the tension at which the strand should be placed at the existing

temperature refer to Section 627-210-018, Section 627-210-019, or from other instructions.

(2) From the upper table of the calibration chart find the dial indicator reading opposite that tension and under the proper strand size.

(3) Place the dynamometer and adjust the strand tension to give the proper dial reading.

6. MEASURING TENSION

6.01 ***Tension may be measured in an existing galvanized strand as follows:***

(1) Take three readings 1/4 inch apart. Use the intermediate reading.

(2) In the upper table of the calibration chart, in the proper column for the size of the strand being measured, locate the dial indicator reading nearest the observed reading.

(3) Opposite this reading locate the tension of the strand in the tension column to the left.

6.02 ***Tension may be measured in existing CR strand as follows:*** If available, use calibration charts for CR strand and proceed as for galvanized strand. If this chart is not available proceed as follows:

(1) Determine size of strand

(2) Place dynamometer on strand with cam in the 6/10 notch.

(3) Take three readings 1/4-inch apart, using the proper cam notch. Use intermediate reading.

(4) Find the dial indicator reading nearest the observed reading in the proper column for the size of the CR strand being measured.

Note: 16M CR strand uses 10M column.

(5) Opposite the reading just located find the tension listed in the Tension Column. For 6M CR and 10M CR multiply this tension by 1.2; for 16M CR strand use the listed tension. This is the tension of the measured strand.

7. MEASURING GUY TENSIONS

7.01 Guy tensions are measured in the same way as those of suspension strand. Use care to prevent the dynamometer from slipping along the strand.