

DESIGN OF AERIAL CABLE PLANT

Purpose: This addendum is issued to: (1) revise the graphs showing the final unloaded sags to be used in the design of Figure 8 cable plant to reflect the latest interpretation of the National Electrical Safety Code, (2) reflect the revision of PE-38, REA Specification for Figure 8 cable, by providing sag data for cable with a 3/16-inch, 7-wire strand EHS integral support messenger to replace the sag data provided previously for cable with a 0.148-inch solid integral support messenger. It replaces Addendum No. 1.

Additions:

1. GENERAL

1.04 Basically the same design requirements apply for non-joint Figure 8 cable as for non-joint lashed polyethylene-insulated (PIC) cable except for the additional information presented in this addendum.

1.05 The information included in this addendum pertains specifically to the following cables meeting REA Specification PE-38:

3/16-inch EHS Support Strand

Pair/Gauge

6/19
12/19
18/19
6/22
12/22
18/22
25/22
6/24
12/24
18/24
25/24
50/24

1/4-inch EHS Support Strand

Pair/Gauge

25/19
50/19
75/19
50/22
100/22
75/24
100/24
150/24
200/24

2. ECONOMIC AND SERVICE FACTORS

2.15 Figure 8 cable consists of individually insulated copper conductors twisted into pairs. The required number of twisted pairs are stranded into a cable core and enclosed in an aluminum shield. The shielded assembly is covered by an extruded polyethylene jacket with a parallel integral support strand. The integral messenger eliminates the need for lashing wire or rings.

2.16 Figure 8 cable to be used in projects of REA borrowers should meet the requirements of REA Specification PE-38. This specification provides for cables having 19, 22, or 24 gauge conductors, all conductors of each cable being of the same gauge. Composite cables (cables containing standard complements of 19 and 22 gauge pairs) can also be obtained under this specification. Two types of support messengers are available depending on the size cable desired. Either 3/16-inch EHS galvanized steel 7-wire stranded support messenger or a 1/4-inch EHS galvanized steel 7-wire stranded support messenger will be used.

4. SUSPENSION STRAND SELECTION

4.06 The support strand is an integral part of the Figure 8 cable and is supplied with the standard cable sizes specified in REA Specification PE-38.

4.07 Figure 8 cables are not suitable for supporting a man on either a cable car or a ladder. No supplementary cables should be lashed to a Figure 8 cable.

5. SPAN LENGTHS

5.09 The maximum span lengths to be used with Figure 8 cables of various sizes and gauges are given in sag charts 10a through 15a. These maximum span lengths are calculated on the basis of not exceeding 60% of the breaking strength of the support messenger under Fourth Edition NESC assumed storm loading. These charts indicate the pole height required for a 14-foot final unloaded ground clearance of 60°F. The pole class required is determined from REA TE & CM 611, "Design of Pole Lines," using the equivalent number of wires shown for the various sizes of Figure 8 cable.

5.10 Curves giving final unloaded sags at 60°F. are included in the following figures:

Figure	District	Support Messenger Size	NESC Assumed Loading*	
			Horizontal Wind Pressure (lbs/sq. ft.)	Radical Thickness of Ice (Inch)
10a	Heavy	3/16"	8	0.50
11a	Medium	3/16"	8	0.25
12a	Light	3/16"	12	0
13a	Heavy	1/4"	8	0.50
14a	Medium	1/4"	8	0.25
15a	Light	1/4"	12	0

*The Fourth Edition of the National Electrical Safety Code made relatively severe assumptions concerning transverse loading with the result that the pole strengths necessary were considerably out of line with designs using the same materials in other fields of engineering. Studies made since its issuance indicated that the wind pressures assumed for transverse loading seldom occur concurrently with the assumed ice conditions and then only in restricted areas. The Fifth and Sixth Editions of the Code reduced this assumed transverse wind loading. Therefore, constants were added to the resultant loading calculated in accordance with these editions to make the loading in the Fourth, Fifth and Sixth Editions effectively equivalent for round conductors.

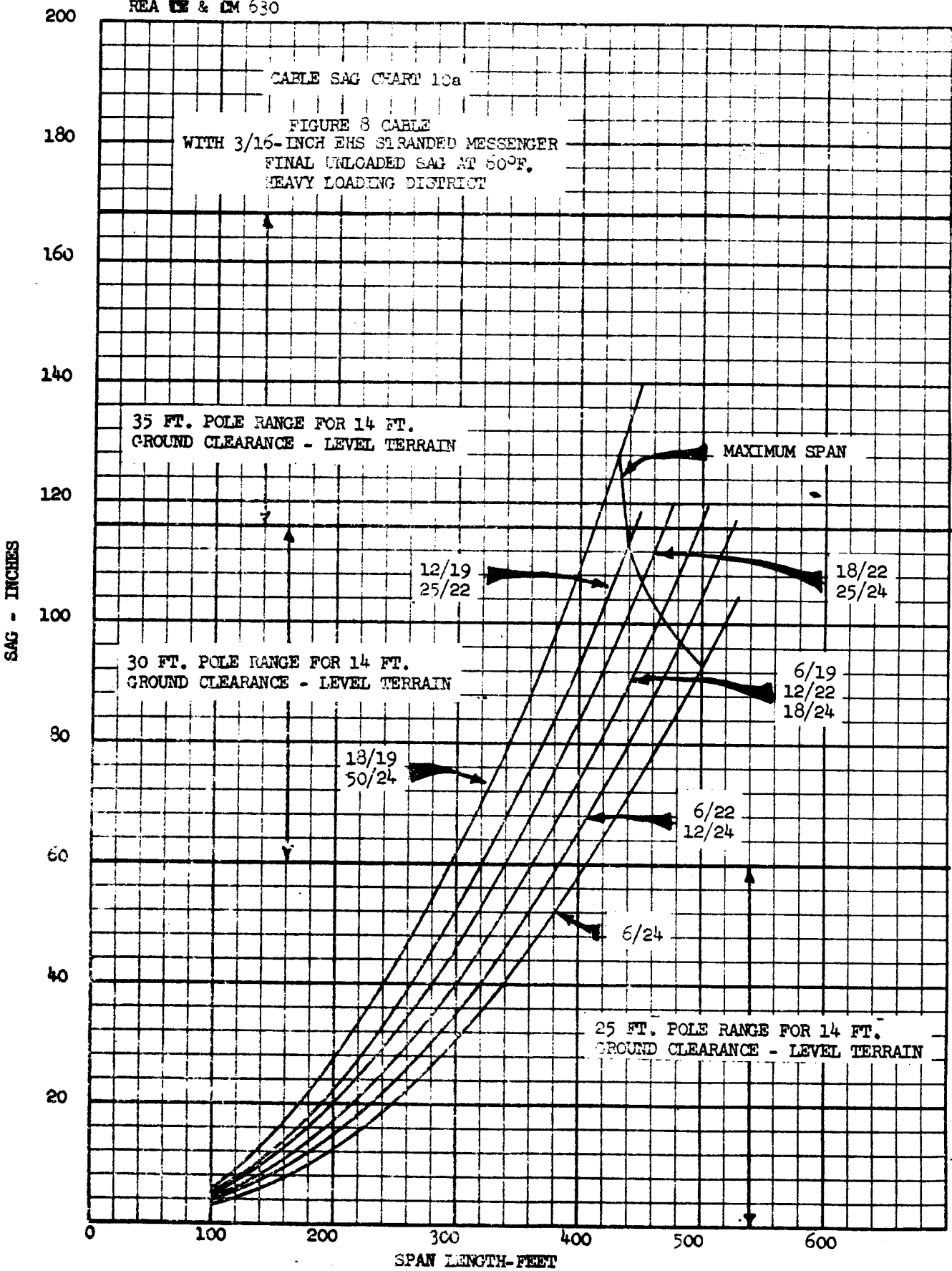
Figure 8 cable does not develop the same amount of loading as would be developed by a single round conductor. The Sixth Edition of the NESC requires that a "double constant" be added to the calculated resultant load. This addition represents a substantial over-design for Figure 8 cable. For sag and tension purposes, the NESC Committee on Interpretations has permitted Figure 8 facilities to have loads calculated in accordance with the Fourth Edition.

Transverse loads for pole strength are calculated according to the assumptions in the Sixth Edition.

5.11 The following three examples are offered to illustrate the proper use of cable sag charts 10a through 15a.

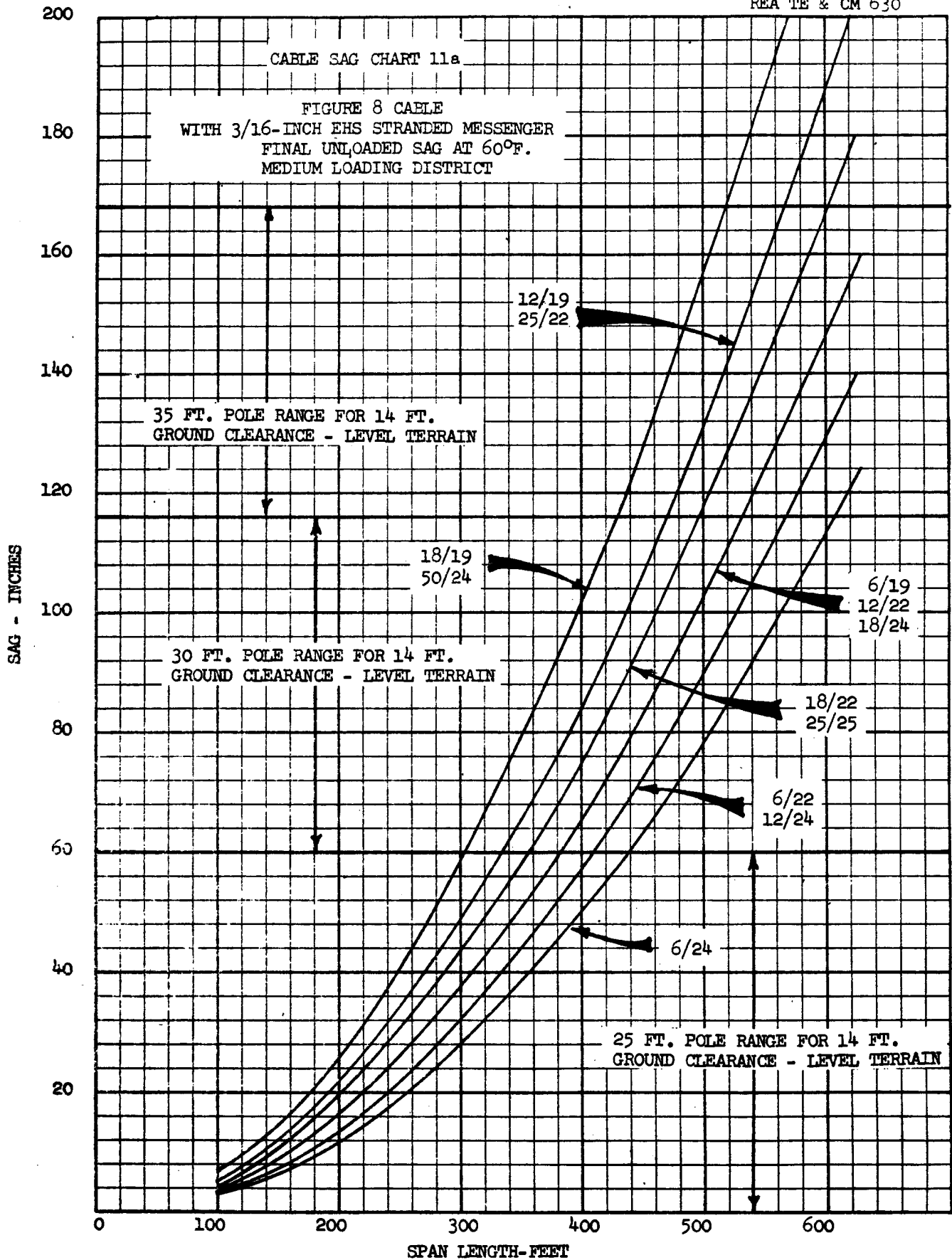
Example 1: Assume a 50 pair, 19 gauge Figure 8 cable is to be used in the light loading district. A 14-foot final unloaded ground clearance is required and the terrain is level. What is the maximum span length allowable if 25-foot poles are used: From Cable Sag Chart 15a, the maximum span allowable is 275 feet.

Example 2: A 75 pair, 22 gauge cable is to be used in the medium loading district for a road crossing requiring 18.5 feet of final unloaded sag. The span length is 300 feet. What size poles are required? From Cable Sag Chart 14a, a 25-foot pole would be required for a 14-foot ground clearance. However, since we need 54 more inches, the equivalent sag for the 75/22 Figure 8 cable would be 60" + 54" = 114". The 114" places the pole length between 25' and 30'. Select two 30-foot poles to assure a ground clearance of 18.5 feet at midspan. From REA TE & CM 611, we would find that class 7 poles would be required.



CABLE SAG CHART 11a

FIGURE 8 CABLE
WITH 3/16-INCH EHS STRANDED MESSENGER
FINAL UNLOADED SAG AT 60°F.
MEDIUM LOADING DISTRICT



CABLE SAG CHART 12a

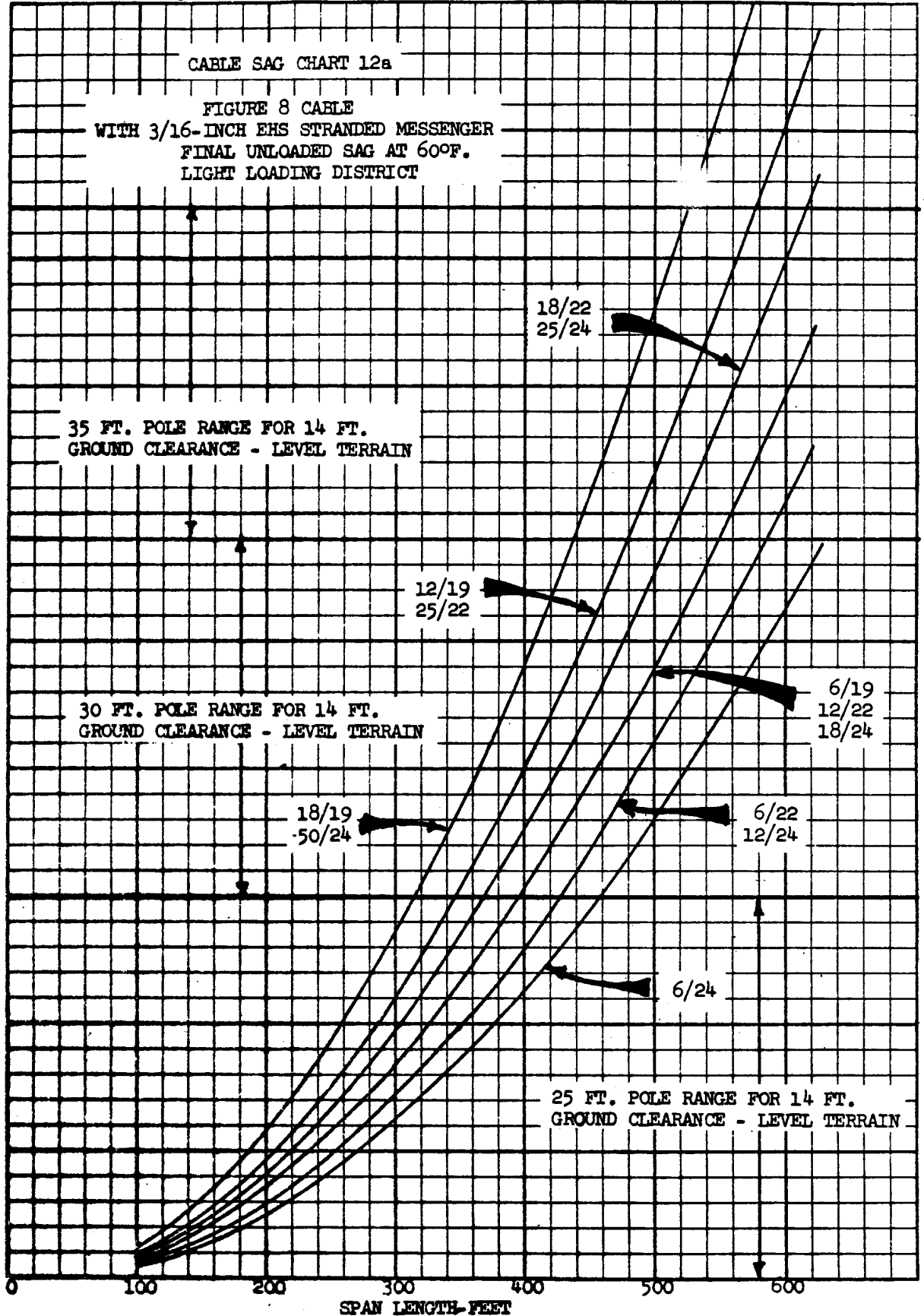
FIGURE 8 CABLE
WITH 3/16-INCH EHS STRANDED MESSENGER
FINAL UNLOADED SAG AT 60°F.
LIGHT LOADING DISTRICT

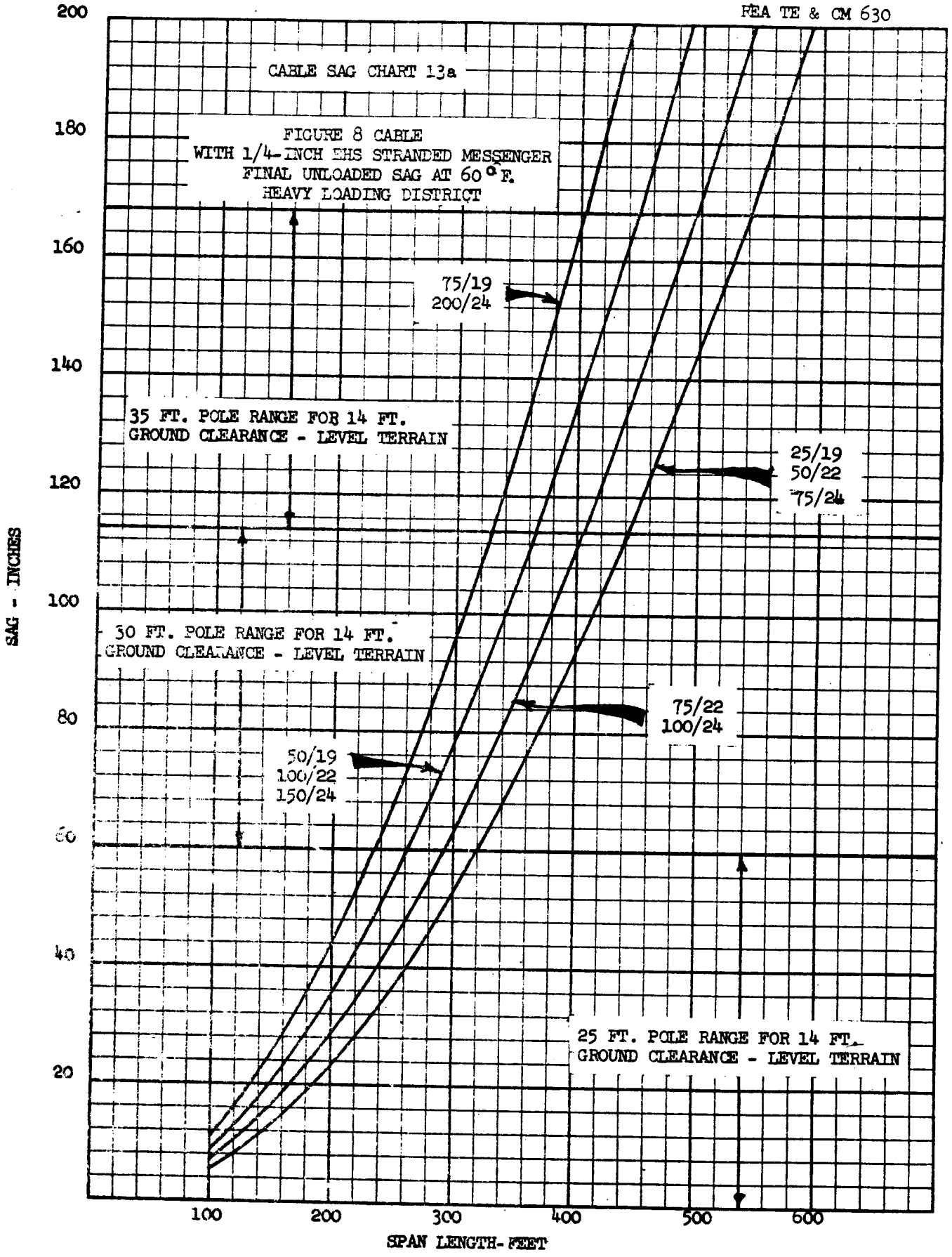
SAG - INCHES

35 FT. POLE RANGE FOR 14 FT.
GROUND CLEARANCE - LEVEL TERRAIN

30 FT. POLE RANGE FOR 14 FT.
GROUND CLEARANCE - LEVEL TERRAIN

25 FT. POLE RANGE FOR 14 FT.
GROUND CLEARANCE - LEVEL TERRAIN





CABLE SAG CHART 14a

FIGURE 8 CABLE
WITH 1/4-INCH EHS STRANDED MESSENGER
FINAL UNLOADED SAG AT 60° E
MEDIUM LOADING DISTRICT

S. INCHES

180

160

140

120

100

80

60

40

20

0

0 100 200 300 400 500 600

SPAN LENGTH- FEET

75/19
200/24

35 FT. POLE RANGE FOR 14 FT.
GROUND CLEARANCE - LEVEL TERRAIN

25/19
50/22
75/24

30 FT. POLE RANGE FOR 14 FT,
GROUND CLEARANCE - LEVEL TERRAIN

75/22
100/24

50/19
100/22
150/24

25 FT. POLE RANGE FOR 14 FT.
GROUND CLEARANCE - LEVEL TERRAIN

