

CHAPTER 11

AERIAL RF TRANSMISSION LINES

11.1 GENERAL

Coaxial cable may be installed by suspending the cable from pole-supported suspension strand by cable rings. The following paragraphs briefly describe the materials required and methods of installing the suspension strand and cable. (Normally such installation is a Public Works responsibility.)

11.2 SUSPENSION STRAND HARDWARE

11.2.1 Bolts and Clamps

Two types of suspension bolts are used to attach suspension strand clamps: the A-type bolt (square head on one end, threads on the other), and B-type (threads on both ends). Table 11-1 lists pertinent data covering these bolts.

11.2.2 Reinforcing Straps

Reinforcement of a through-bolt supported suspension clamp is sometimes required. The two reinforcing straps used for this purpose are the C- and S-type straps. Table 11-2 lists dimensions of these straps. The C-type strap is used at corner poles where a corner suspension clamp is required; the S-type is used in straight sections of suspension strand.

11.2.3 Reinforcing Links

Reinforcing links are used on poles where it is necessary to reinforce the cable suspension bolt, where a reinforcing strap cannot be used, and at corners where cable suspension screws are used. The dimensions of the two reinforcing links (S- and L-types) are given in table 11-3. The S-type reinforcing link is used where the pole circumference at the attachment point is 23 inches or less; the L-type link is used for circumferences greater than 23 inches. Reinforcing links should be installed after the strand has been installed, but before it is tensioned.

11.3 ATTACHMENT OF SUSPENSION STRAND AT CORNER POLES

The size of the thimble eyebolt, and the materials and methods used for supporting the guy end of the bolt at pole corners, depend upon the size of the guy strand and the ratio of the guy lead (distance from pole to guy anchor point) to the guy height (ground

to attachment point). The materials and methods used at the suspension clamp end of the bolt depend on the size of the suspension strand and whether the strand pulls away from or toward the pole.

11.3.1 Eyebolt Method (Pull Away From Pole)

A corner suspension clamp may be mounted on the threaded end of an eyebolt; the eye end is then used to support the guy. The sizes of the eyebolt and curved washer or guy strap are determined by the size and the lead-to-height ratio of the guy. Where the lead-to-height ratio of the guy is 1-1/4 or less, a bent thimble eyebolt and its associated hardware are required (see table 11-4). Where the lead-to-height ratio of the guy is more than 1-1/4, use a straight thimble eyebolt of the same size and with the same washer listed in the table (guy strap is not required). Figure 11-1 illustrates the typical construction of a suspension strand that pulls away from a corner pole.

11.3.2 Wrap Method (Pull Away From Pole)

Where a corner suspension clamp is required and the guy is attached by the wrap method, the clamp is mounted on the threaded end of a 3/4-inch cable suspension bolt. A curved washer (3-1/2- x 3-1/2- x 3/8-inch with 7/8-inch hole) is placed against the pole on each end of the bolt. Figure 11-2 shows examples of this type of construction.

NOTE

Do not use wrapped guys at pull-away corners when suspension strand is 16M or 25M.

11.3.3 Eyebolt Method (Pull Toward Pole)

A corner suspension clamp may be mounted on the threaded end of a 3/4-inch cable suspension bolt. A curved washer (3-1/2- x 3-1/2- x 3/8-inch with a 7/8-inch hole) is placed against the pole on each end of the bolt. The thimble eyebolt and hardware are the same as those listed in table 11-4, except that where the guy is 6M, a 5/8-inch thimble eyebolt and a curved washer (3-1/4- x 3-1/8- x 1/4-inch with a 3/4-inch hole) are used. Figure 11-3 shows the construction where the suspension strand pull is toward a pole.

11.3.4 Wrap Method (Pull Toward Pole)

The installation for a suspension strand that pulls toward a corner pole is similar to that for a strand that pulls away from a pole (see figure 11-4).

11.4 POLE STRAND CONNECTORS

A pole strand connector is used, together with two or more guy clamps, to join suspension strand ends at a pole. It should not be used at a pole where the strand is supported by cable suspension screws. A crossarm bolt or a 5/8-inch A-type

suspension bolt is usually used to mount the connector on the pole for 6M or 10M suspension strand; a 3/4-inch A-type suspension bolt is used for 16M and 25M strand. When using a 3/4-inch bolt, a curved washer (3-1/2- x 3-1/2- x 3/8-inch) is placed under the nut.

11.5 INSTALLING SUSPENSION STRAND

The sizes of strand to be used for supporting various weights of cables are given in table 11-5.

The following general practices apply to the installation of suspension strand:

- o Use a strand payout frame, strand reel jack, strand reel hanger, or cable reel jack for supporting strand reels during payout operation.
- o Tighten nuts of suspension clamps sufficiently to prevent strand from falling out of clamp groove when running strand through suspension clamps; do not tighten to point that causes binding.
- o Strand may be run over the nut placed on the suspension bolt between the pole and suspension clamp providing the strand is placed in the strand groove of the suspension clamp at every sixth pole in straight sections.
- o Run strand along ground only if ground is such that the galvanized finish on the strand will not be damaged.
- o Nails or spikes should not be used to support strand even temporarily as they may not provide sufficient strength.

11.6 SPLICING SUSPENSION STRAND

Splicing of suspension strand is performed in a manner similar to connecting sections of guy strand.

11.7 CUTTING SUSPENSION STRAND

Before cutting, bind 10M, 16M, and 25M strand with friction tape to prevent strand wires from spreading; cut with strand cutters, a hacksaw, or a three-cornered file.

11.8 PULLING UP SUSPENSION STRAND

Suspension strand may be pulled up by means of winch lines, blocks and tackle, or a chain hoist. Long sections of suspension strand should be pulled up by a truck. If two trucks are available, the winch line on one truck may be used to hold load at first pulling-up location until the winch from the second truck takes the entire load at the second pulling-up location.

11.9 DEAD-ENDING SUSPENSION STRAND

Either the eyebolt or wrap method may be used to dead-end suspension strand. In dead-ending the strand by either method, the number of guy clamps required is determined by the strand size (table 11-6).

11.9.1 Eyebolt Method

Straight thimble eyebolts and eyenuts are used where the lead-to-height ratio of the guy is larger than 1-1/4; bent thimble eyebolts and eyenuts are used for ratios less than 1-1/4 (see figure 11-5). A curved washer or guy strap is placed between the head of the bolt and the pole; a curved washer and nut are placed between the eyenut and the pole. The size of the eyebolt and associated hardware depends upon the size of the strand (see table 11-7).

11.9.2 Wrap Method

Figure 11-6 illustrates the wrap method of dead-ending suspension strand; refer to table 11-7 for the number of guy clamps required for various strand sizes.

11.10 ATTACHING COAXIAL CABLES TO SUSPENSION STRAND

Cable rings are attached to suspension strands to provide a support means for aerial cable. These rings shall be placed at 20-inch intervals along the suspension strand, as shown in A and B, figure 11-7. The method of placing cable rings for two cables is shown in C, figure 11-7.

11.11 AERIAL-CABLE SUPPORTS

Aerial-cable supports (A, figure 11-8) are used instead of cable rings at locations near poles. Cable supports are available in seven lengths, with dimensions as listed in table 11-8.

As shown in figure 11-9, two supports are installed on each side of a pole. Cable supports are also used to provide support for vertical cable runs; the cable support is attached to the suspension cable between the guy clamp and the eyenut as shown in figure 11-10.

11.12 DOWNLEAD CABLE SUPPORT

Downlead cables must be adequately supported. If only one cable is to be placed on a pole, the cable may be clamped directly to the surface of the pole with lag screws and formed clamps, or attached to the frame of a tower with bolts and form clamps.

When several downlead cables are to be installed, some means of supporting the cables and of maintaining definite space between the cables must be used.

11.13 CABLE IDENTIFICATION

Each interconnecting cable shall be permanently marked by placement of an approved type of cable tag near each cable termination. Cable tags shall be placed near the jack, plug, or terminal board to which the cable terminates, in a prominent manner such that associative identification is obvious.

Table 11-2. Reinforcing Straps

TYPE	WIDTH	SIZE OF HOLES (inches)		CENTERLINE SPACING OF HOLES (inches)
		TOP	BOTTOM	
C	2	11/16	11/16	5-7/8
S	1-3/8	11/16	11/16	5-7/8

AIAG763

Table 11-3. Reinforcing Links

TYPE	LENGTH (inches)	DIAMETER OF EYES (inches)
S	5-3/4	9/16
L	8-3/4	9/16

AIAG764

Table 11-1. Suspension Bolts

BOLT	DIAMETER (inches)	LENGTH OVERALL (inches)	MINIMUM LENGTH OVERALL THREAD (inches)	NUMBER OF NUTS
A	5/8 and 3/4	10	4	2
		12	6	2
		14	6	2
		16	6	2
B	5/8 and 3/4	18	6	2
		10	3	4
		12	4	4
		14	6	4
		16	6	4
		18	6	4
		20	8	4

AIAG762

Table 11-4. Bent Thimble Eyebolt and Hardware for Attaching Suspension Strand to Corner Poles

GUY STRAND	BENT THIMBLE EYEBOLT (inches)	CURVED WASHER AT THREADED END OF BOLT (inches)	WASHER OR GUY STRAP AT EYE END OF BOLT (inches)
6M	3/4	3-1/2 x 3-1/2 x 3/8 (7/8-inch hole)	Curved washers: 3-1/2 x 3-1/2 x 3/8 (7/8-inch hole)
10M	3/4	3-1/2 x 3-1/2 x 3/8 (7/8-inch hole)	Guy straps: 7 x 2-1/2 x 5-1/16
16M	1	3-1/2 x 3-3/8 x 3/8 (1/16-inch hole)	Guy straps: 7 x 2-1/2 x 5/16
25M	1	3-1/2 x 3-3/8 x 3/8 (1/16-inch hole)	Guy straps: 7 x 4 x 5/16

AIAG765

Table 11-5. Size of Strand to Use With Specific Cable Weights

CABLE WEIGHT (lb per ft)	MAXIMUM SPAN (feet)			SIZE OF STRAND
	150	175	200	
1.99 and smaller	6M	6M	6M	10M
2.00 to 2.24	6M	10M	10M	16M
2.25 to 4.99	10M	10M	10M	16M
5.00 to 7.24	16M	16M	16M	25M
7.25 to 8.70	16M	16M	25M	25M
Larger	25M	25M	-	-

AIAG767

Table 11-6. Number of Guy Clamps Required for a Suspension Strand Dead End

STRAND SIZE	NUMBER OF CLAMPS
6M	1
10M	1
16M	2
25M	3

AIAG768

Table 11-8. Dimensions of Aerial Cable Supports

LENGTH OF STRAP (inches)	WIDTH OF STRAP (inches)	LENGTH OF WIRE HANGER (inches)	MAXIMUM CABLE DIA CAPACITY (inches)
10	3/4	5	3/4
16	3/4	5	1-3/16
22	3/4	5	2
28	3/4	5	2-5/8
34	3/4	5	3-1/4
50	3/4	5	5
64	3/4	5	6-7/16

AIAG770

Table 11-7. Eyebolts and Hardware for Dead-Ending Specific Guy Strands

STRAND SIZE	SIZE AND TYPE OF THIMBLE EYEBOLT (inches)	SIZE OF WASHER OR GUY STRAP REQUIRED UNDER BOLTHEAD (inches)	SIZE OF WASHER REQUIRED UNDER EYENUT (inches)
6M	5/8, straight	Curved washer: 3-1/4 x 3-1/8 x 1/4 (3/4-inch hole)	Curved washer: 3-1/4 x 3-1/8 x 1/4 (3/4-inch hole)
	5/8, bent	Curved washer: 3-1/4 x 3-1/8 x 1/4 (3/4-inch hole)	Curved washer: 3-1/4 x 3-1/8 x 1/4 (3/4-inch hole)
10M	3/4, straight	Curved washer: 3-1/2 x 3-1/2 x 3/8 (7/8-inch hole)	Curved washer: 3-1/2 x 3-1/2 x 3/8 (7/8-inch hole)
	5/8, bent	Guy strap: 7 x 2-1/2 x 5/16	Curved washer: 3-1/2 x 3-1/2 x 3/8 (7/8-inch hole)
16M	1, straight	Curved washer: 3-1/2 x 3-3/8 x 3/8 (1-1/16-inch hole)	Curved washer: 3-1/2 x 3-3/8 x 3/8 (1-1/16-inch hole)
	1, bent	Guy strap: 7 x 2-1/2 x 5/16	Curved washer: 3-1/2 x 3-3/8 x 3/8 (1-1/16-inch hole)
25M	1, straight	Curved washer: 3-1/2 x 3-3/8 x 3/8 (1-1/16-inch hole)	Curved washer: 3-1/2 x 3-3/8 x 3/8 (1-1/16-inch hole)
	1, bent	Guy strap: 7 x 4 x 5/16	Curved washer: 3-1/2 x 3-3/8 x 3/8 (1-1/16-inch hole)

AIAG769

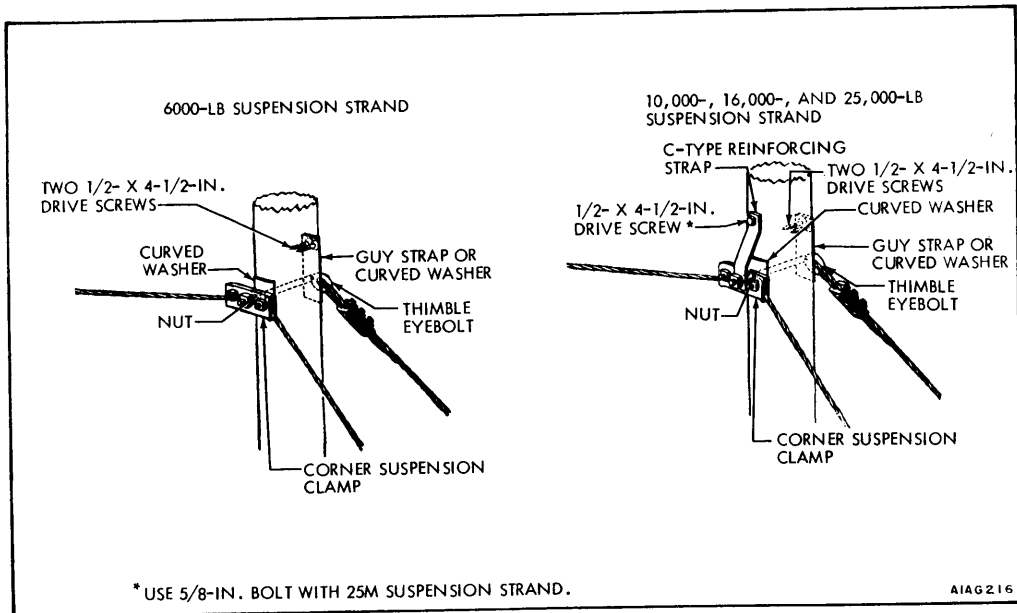


Figure 11-1. Eyebolt Suspension Strand Installation
(Strand-Pull Away From Corner Pole)

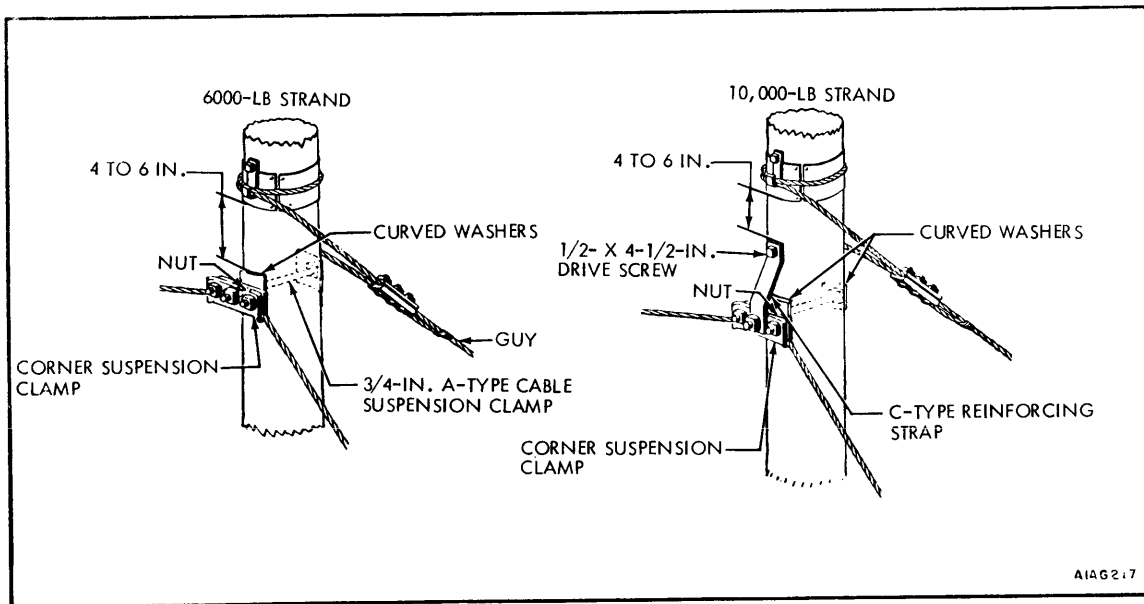


Figure 11-2. Wrap Suspension Strand Installation
(Strand-Pull Away From Corner Pole)

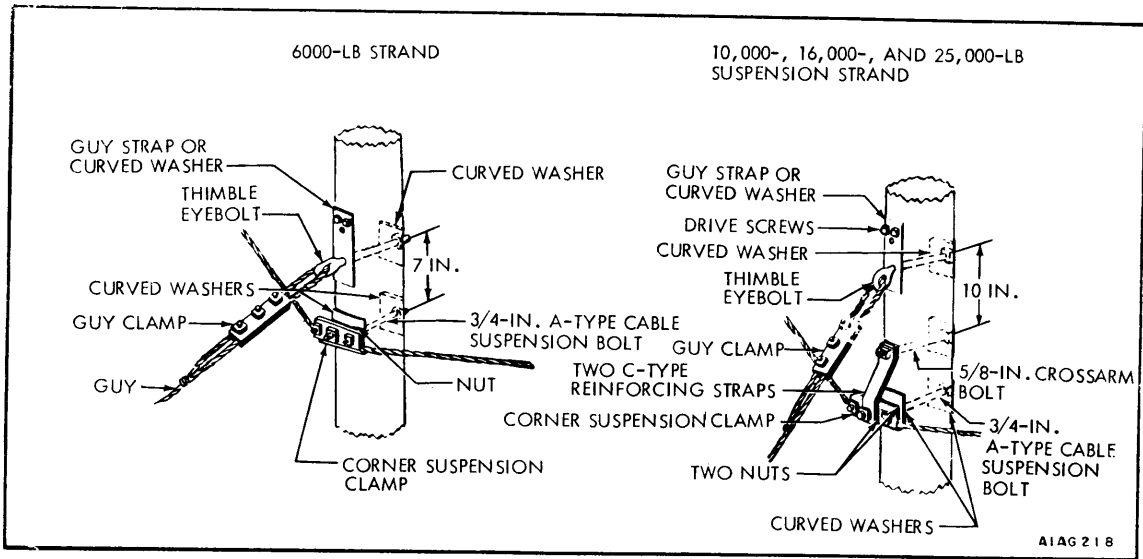


Figure 11-3. Eyebolt Suspension Strand Installation
(Strand-Pull Toward Corner Pole)

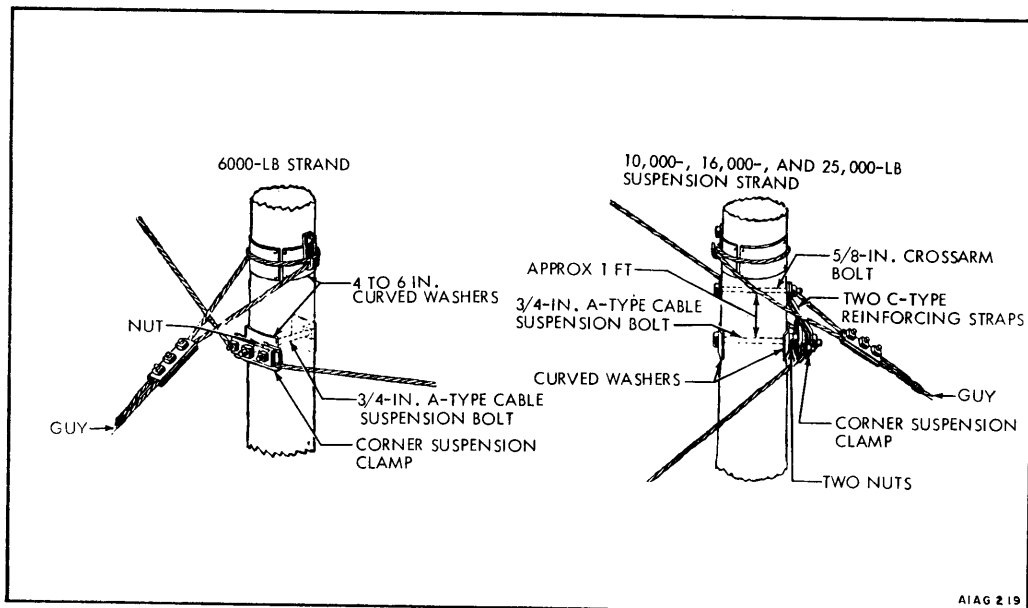


Figure 11-4. Wrap Suspension Strand Installation
(Strand-Pull Toward Corner Pole)

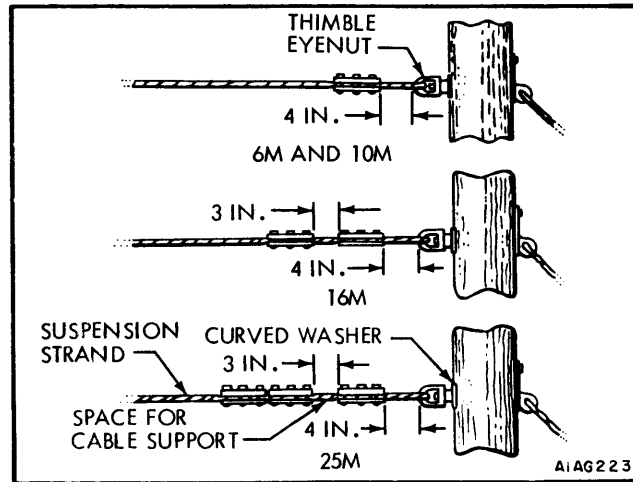


Figure 11-5. Eyebolt Method of Dead-Ending Suspension Strand

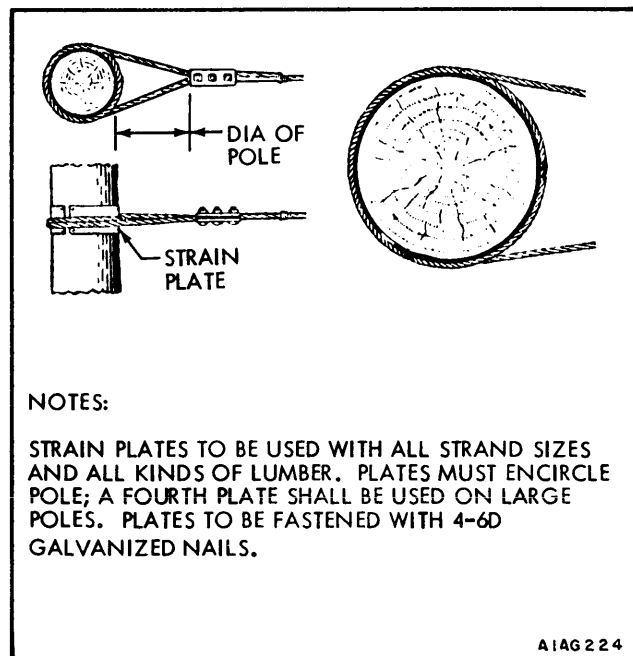


Figure 11-6. Wrap Method of Dead-Ending Suspension Strand

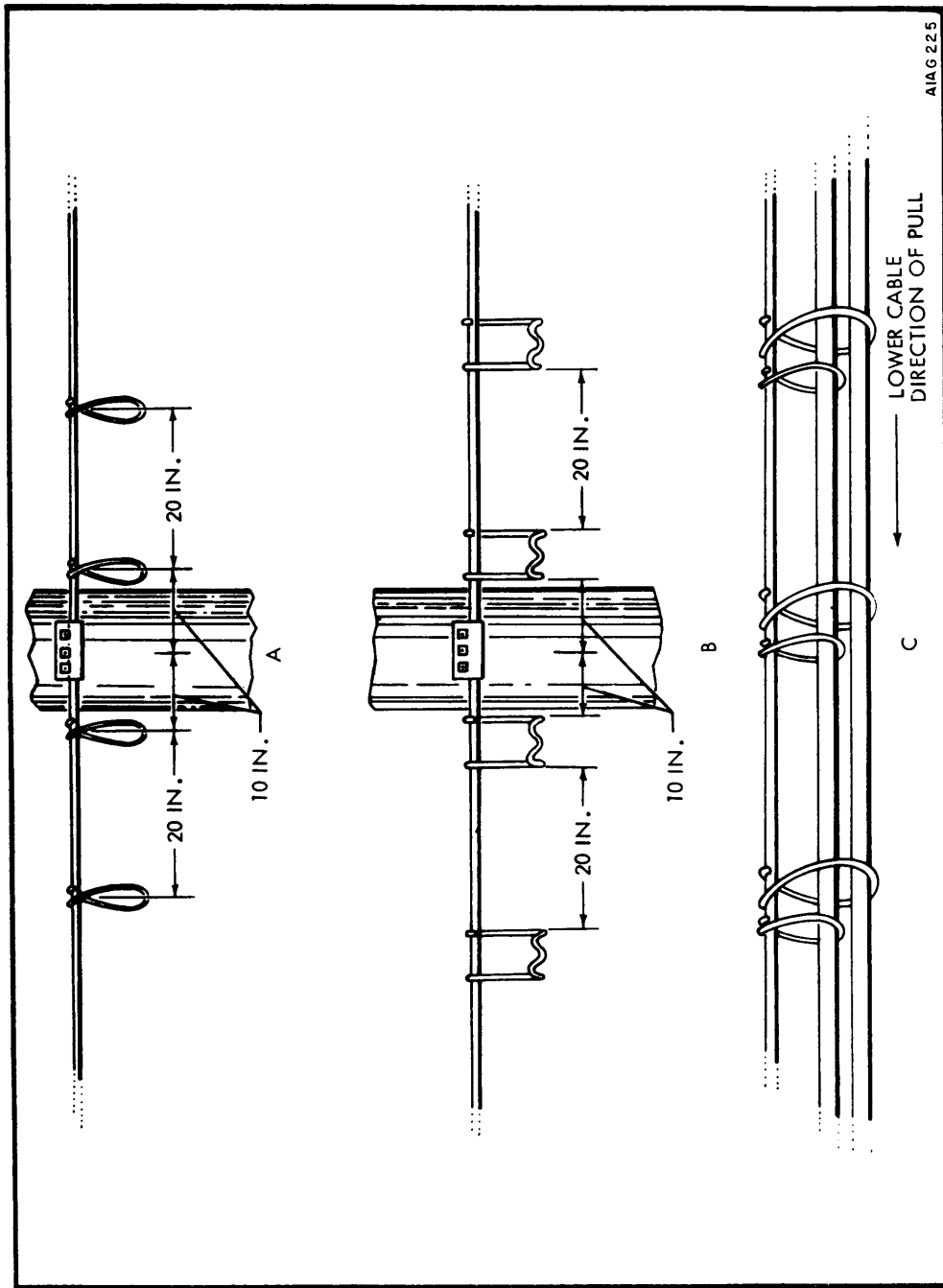


Figure 11-7. Installation of Cable Rings

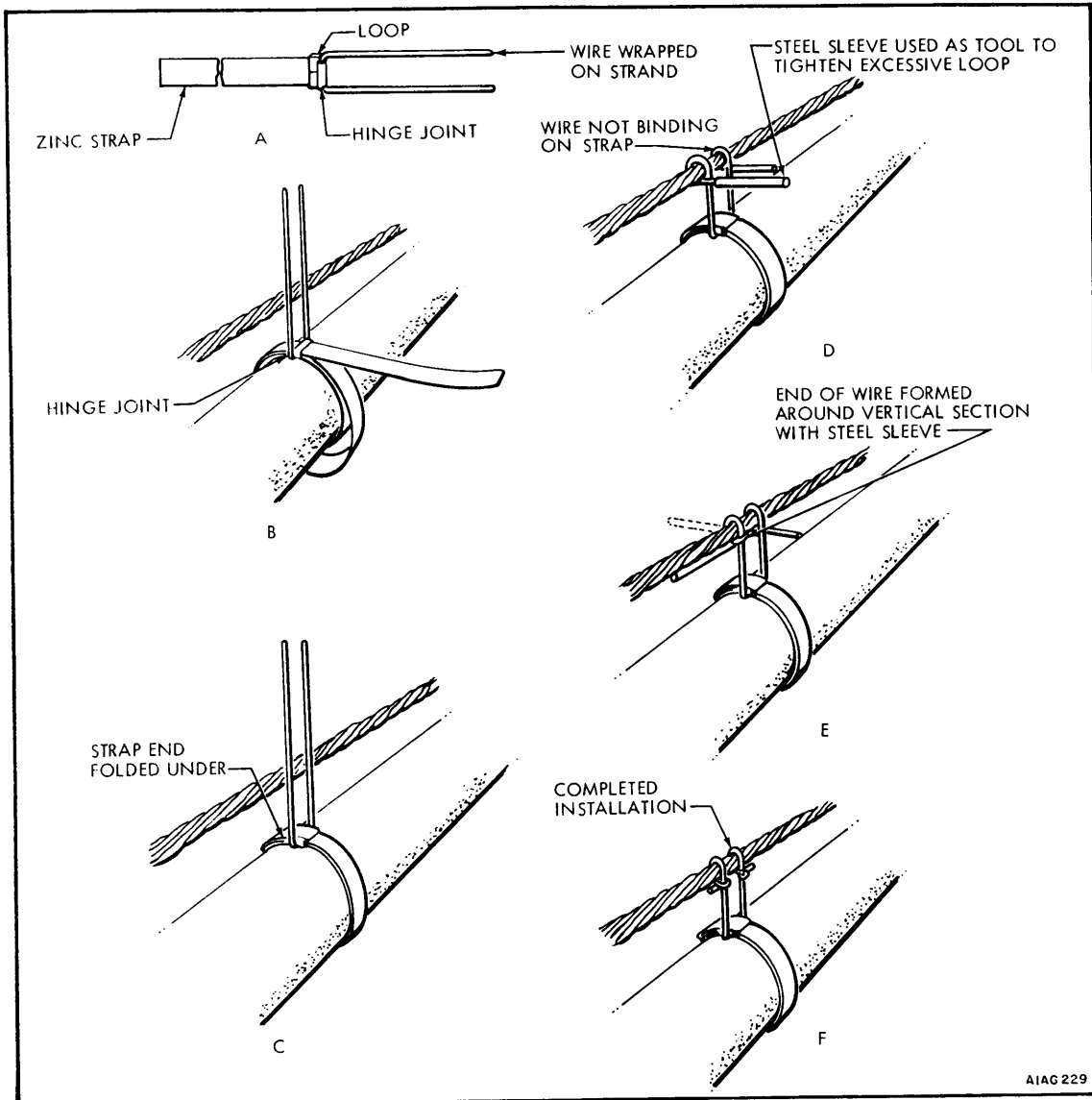


Figure 11-8. Installation of Aerial Cable Supports

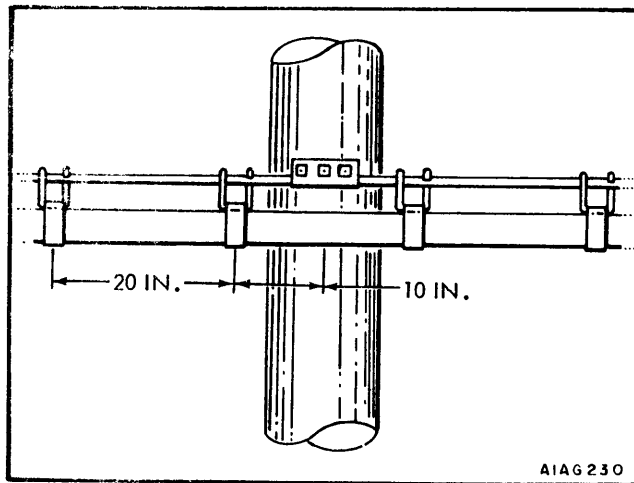


Figure 11-9. Use of Aerial Cable Supports

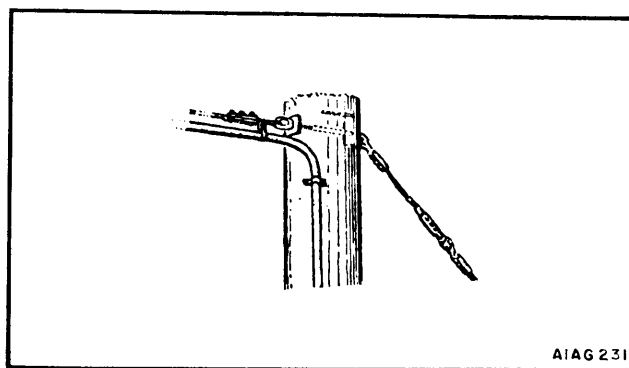


Figure 11-10. Aerial Cable Supports Used to Support Vertical Cable Runs