

## LASHED AERIAL CABLE PLACING STATIONARY REEL METHOD

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**1. GENERAL**

1.01 This practice provides information for placing lashed aerial metallic conductor cable and glass fiber (lightguide) cable by using the stationary reel method.

1.02 This practice is reissued to include lashing of lightguide cable to a strand already occupied by a metallic cable or another lightguide cable. Revision arrows are used to emphasize the more significant changes.

1.03 The stationary reel method of placing cable described in this practice is not applicable to CONECS-type cable (Practice 632-020-250).

1.04 To place lightguide cable, it is essential that a thorough route survey be made jointly by engineering and construction personnel. A placing plan giving close attention to the routine details of the route prior to construction is necessary. Aerial lightguide cable should occupy the uppermost communication space on the pole line.

**2. PRECAUTIONS**

2.01 Before placing the cable, observe the following precautions:

- (a) Protect the work location by placing warning signs, flags, or other warning devices at strategic points to alert vehicles and pedestrians to the presence of obstructions and technicians working in the area.
- (b) Inspect cable reels for flange protrusions, irregularities, or structural damage which may be a hazard to the cable sheath.
- (c) Inspect cable reels for obstructions that might interfere with the cable.
- (d) Use a B cable reel brake to control the rotation of the cable reel to prevent excessive free running of the reel. **Do not** use a plank or bar to block or brake the reel.
- (e) Inspect suspension strand for condition and proper size.

- (f) Avoid abrasion to cable sheath. Do not drag the cable over obstructions that will damage the sheath.
- (g) Avoid bending the cable sharply. The minimum bending radius for lightguide cable is 10 times the diameter of the cable when the cable is not under load and 20 times the diameter when the cable is under load.
- (h) Do not permit vehicular traffic to pass over cable.
- (i) Cable suspension clamps must be tightened at least one span ahead of cable-lashing operations. This is necessary to keep tension from building up in the strand as lashing progresses. When an aerial lift truck is being used, all clamps should be tightened before starting to place cable.

**A. Cutting**

**2.02 DANGER:** *An electrical shock can occur when plastic-sheath cable is cut. An electrical charge on the metallic shield of the cable can be produced by friction between the jacket and the cable guide or other equipment while the cable is being placed. An ac voltage may also be induced from parallel energized power wires. An electrical shock can occur if body contact is made between the metallic cable shield and the strand or other ground.* Since a voltage may exist, a ground shall be maintained during the cutting operation.

**2.03** Ground the cutting tools with lashing wire or test clips to a grounded strand or other suitable ground before cutting the cable. *Insulating gloves must be worn when cutting the cable.*

**3. MOUNTING, LOCATING, AND SETTING UP THE CABLE REELS**

**3.01** Before placing a cable reel on a cable reel trailer or cable reel jacks, check the size, gauge, type, and length of cable with the information given in the detail plans.

**3.02** Pull the cable from the top of the reel when the setup distance between the reel and the aerial cable guide on the strand is 20 feet or less. When it is necessary or advantageous to place the reel more than 20 feet from the guide, the cable should be pulled from the bottom of the reel.

**A. Locating the Reel**

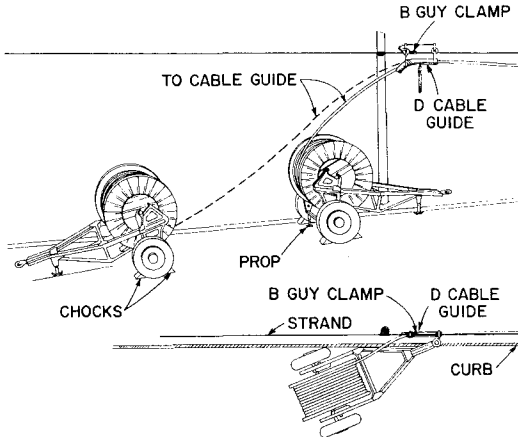
**3.03** Presurvey the job to determine the direction that the cable should be pulled for an efficient and safe cable-placing job. Some factors governing the selection of the cable reel locations are as follows:

- (a) Select cable reel locations that will permit pulling cable in both directions to minimize setting-up time.
- (b) To prevent damage to the cable, avoid pulling cable around tight corners wherever possible.
- (c) Select locations that will cause the least interference with traffic.
- (d) When power circuit exposures are encountered, take steps to maintain specified clearances.

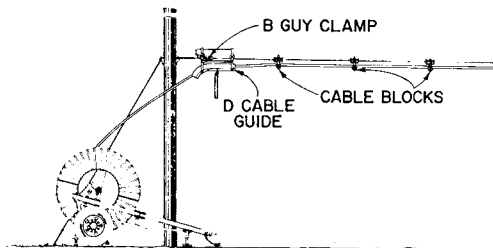
**B. Setting Up the Cable Reel**

**3.04** Movement of the reel should be carefully controlled. Do not let the reel tilt. Where uneven ground is encountered, the ground should either be leveled or a runway of planks should be provided to prevent tilting of the reel. Use a cable reel trailer for transporting the larger and heavier cable reels. If it is necessary to move heavy cable reels with a construction truck, use a cable reel sling.

**3.05** Position the cable reel in line with the strand wherever possible. A cable reel setup using a cable reel trailer is shown in Fig. 1 and 2.



**Fig. 1—Positioning Cable Reel Trailer**



**Fig. 2—Cable Reel Trailer in Position**

**3.06** Use a cable reel trailer equipped with a cable reel brake whenever possible. The brake provides control of cable reel rotation. Do not brake excessively. Avoid surges and jerks of the reel when placing lightguide cable.

**3.07** Cable reel jacks may be used for setting up a cable reel. However, since the jacks have no braking device, their use should be limited. When necessary to use cable reel jacks, do not allow the reel to tilt excessively. Place the cable reel jacks on a stable, level surface. Cable reel jacks are not recommended for use with lightguide cable reels.

#### **4. PREPARATIONS ALONG THE LINE**

##### **A. Placing Cable Blocks**

**4.01** Cable blocks are attached to the suspension strand and are used for supporting the pulling line and the cable during placing operations.

**4.02** The K cable block may be used for placing the first cable on a suspension strand or when lashing the second cable to an existing lashed cable and strand.

**4.03** The cable block frame and sheave are made of aluminum alloy. To minimize breakage of the block, avoid dropping, throwing, or handling it roughly. Cable blocks should always be lowered from a pole with a handline.

4.04 Use the D cable block lifter when placing K cable blocks. The cable block lifter is used with not more than two sections of the small tree pruner

handle or three sections of the large tree pruner handle (one tapered and two extension sections) to place the blocks on the strand (Fig. 3).

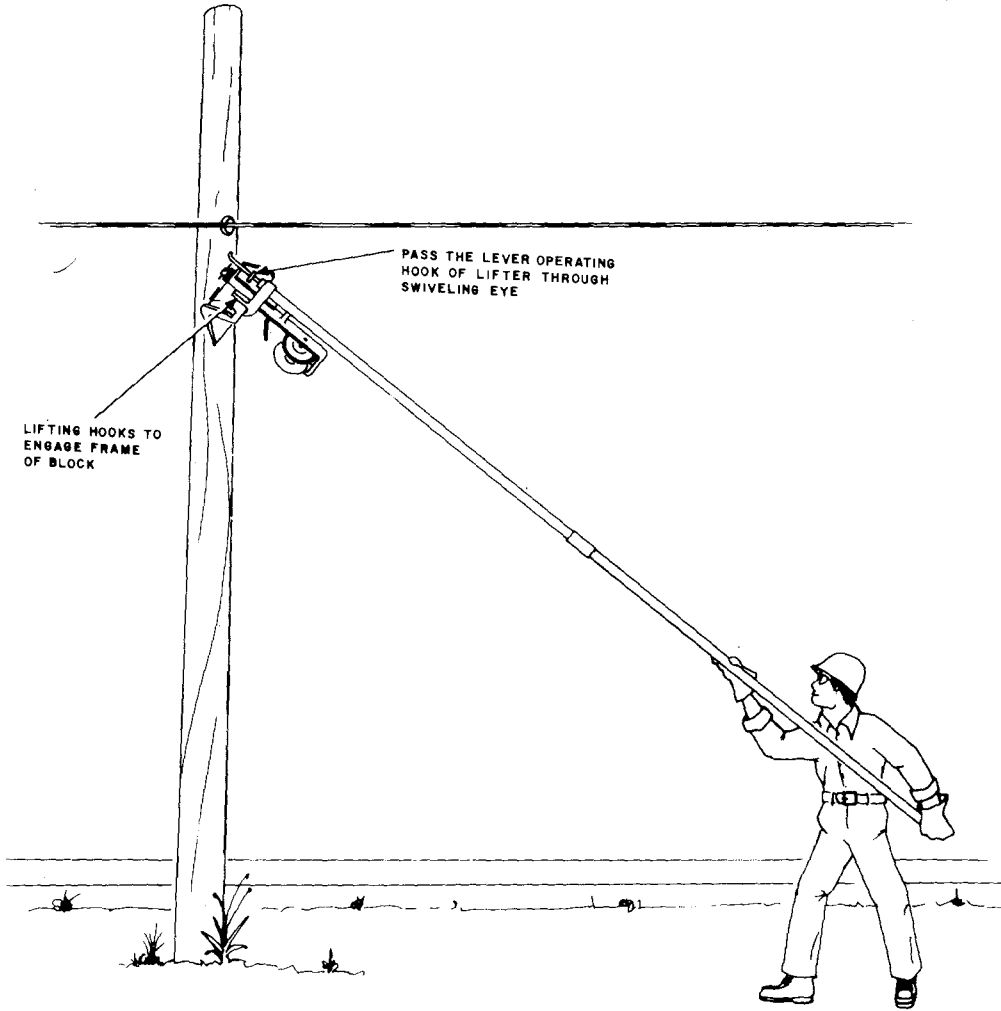
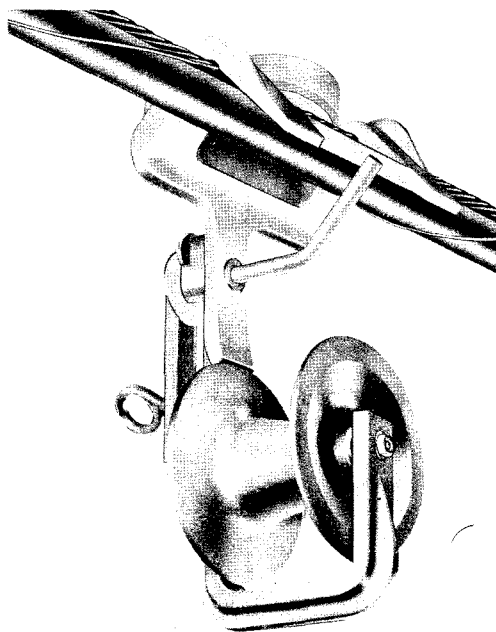


Fig. 3—Cable Block Mounted on Lifter

**4.05** The K cable block (Fig. 4) contains two spring-loaded rotating cams. When the cams are opened, the block can move freely in either direction along the strand. The cams are opened manually and placed in position to allow motion in the desired direction. They are held in this position by a release lever prior to placement on the strand. When the strand keeper is engaged by pulling the handle down, the release lever is disengaged and the spring tension forces the cams against the strand from each side.

**4.06** Extreme care must be exercised to ensure that the cable guides on the cable block are fully seated on the strand. Do not remove the lifter from the ring on the block handle until both cable guides are properly seated on the strand. To obtain a clear view while engaging the guides, stand a few feet away from the line rather than directly under the block.

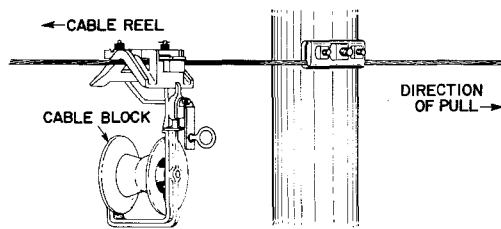
**4.07** Place a sufficient number of cable blocks on the strand to support the cable. Cable blocks should be distributed along the line at the required locations in advance of placing.



**Fig. 4—K Cable Block Installed**

**4.08** Do not space blocks in any span greater than 35 feet. Place a block close to the pole on the side toward the cable reel (Fig. 5). Blocks shall be spaced as follows:

MAXIMUM CABLE WEIGHT POUNDS PER FOOT	MAXIMUM BLOCK SPACING (FEET)
1.0	35
1.5	33
2.0	25
2.5	20
3.0	16
3.5	14
4.0	12
5.0	10
6.0	8
7.0	7
8.0	6
8.5	5



**Fig. 5—Cable Block in Place**

4.09 Place additional blocks as follows:

- (a) One on each side of corners. At tight corners and with cables over 1-1/2 inches in diameter where there would be a possibility of the cable riding out of the block, use H cable blocks instead of the K cable blocks. (See Fig. 6.)

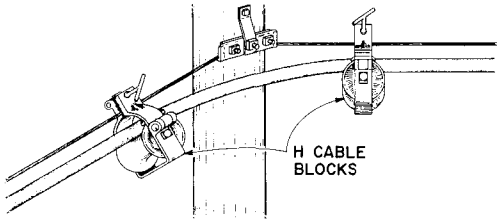


Fig. 6—H Cable Blocks in Place

- (b) Where definite vertical clearance must be maintained as at crossings over driveways, roads, streets, power wires, etc.
- (c) In the span where the cable guide is attached (for cables lighter than 2.5 pounds per foot), blocks should be placed not more than 20 feet apart to minimize oscillation of the cable and strand as the cable is pulled in.

B. Placing the D Cable Guide

4.10 Secure the D cable guide to the strand by placing a B guy clamp on the strand behind the first roller of the D cable guide as shown in Fig. 7. A cable guide shall be placed at the cable reel end for guiding the cable as it is pulled into position as follows:

- (a) When cable pulling is to start at a dead-end pole, place the guide about 24 inches from the pole as shown in Fig. 7.
- (b) Where the pull is started from a point in the span, place the cable guide as shown in Fig. 8.

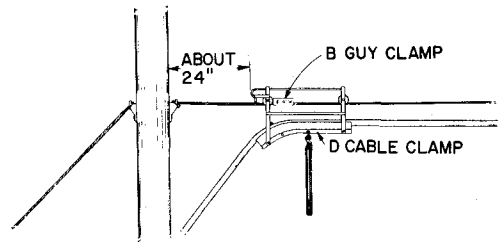


Fig. 7—Location at Dead-End Pole

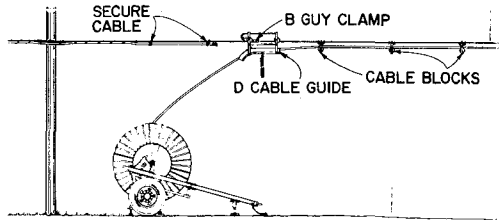


Fig. 8—Cable Guide Located in a Span

- (c) If the entire reel of cable is to be pulled, the guide should be located as shown in Fig. 9.

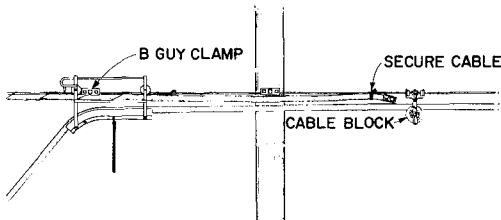


Fig. 9—Cable Guide Held With B Guy Clamp

### C. Pulling Line

- 4.11 The cable block lifter or a wire raising tool may be used to position the pulling line on the sheave of the cable block. (See Fig. 10.)

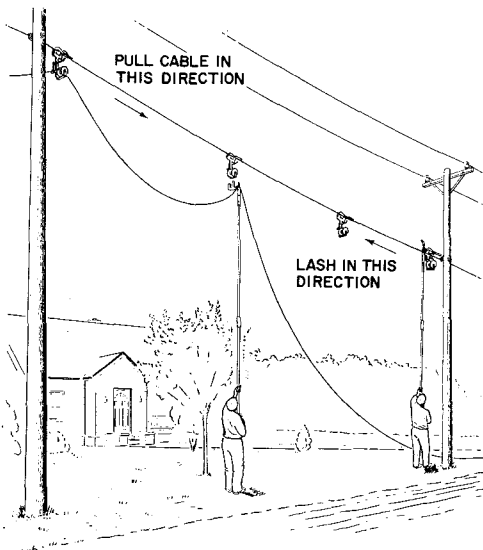


Fig. 10—Placing Pulling Line

- 4.12 The following are recommended for use as a pulling line for metallic conductor cables:

- (a) Manila rope (1/2-inch diameter or larger)
- (b) Polypropylene rope (7/8 inch or larger)
- (c) Wire rope (3/16 or 1/4 inch)
- (d) Winch line.

- 4.13 **Do not use line wire or its equivalent as a pulling line.** Line wire may bind in the cable block resulting in breakage and/or a flip-up or the cable falling out of the blocks.

- 4.14 When lightguide cables or small metallic conductor cables are placed with few corners in the route or where light pulls are anticipated, a continuous length of fish line, SAMSON\* rope, or manila rope that is 1/4 inch or larger in diameter may be used to pull the cable.

- 4.15 For large cables and where heavy pulls may be encountered, wire rope or winch line shall be used to pull cable. Use the B grounding roller when wire rope or winch line is used on joint-use poles and at power crossings. The roller must be located as close as practical to the pulling end of the operation. Place the wire rope in the cable blocks as they are placed, or pull it through the blocks with a previously placed manila rope. Where interference is encountered, such as trees or power crossings, keep the spacing of the blocks short to reduce the possibility of surging and flip-ups.

\* Registered trademark of Samson Ocean Systems, Inc.

4.16 An H cable block or a wire rope snatch block shall be placed at or on the pole where the cable section ends to guide the pulling line, as shown in Fig. 11 and 12. Use a 1-sheave cable block where the cable is to be pulled through the block. A snatch block lashed to the pole may be used where the cable is not pulled through the block.

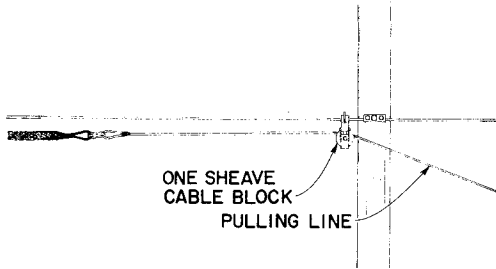


Fig. 11—Pulling Line in 1-Sheave Block

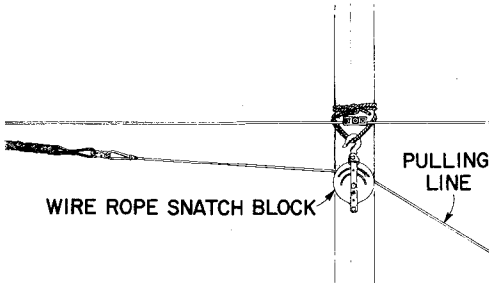


Fig. 12—Pulling Line in Wire Rope Snatch Block

◆**Note:** The flexible pulling eye of connectorized lightguide cable must not be pulled over any sheave. If a flexible pulling eye must pass a cable block, the necessary pull will have to be applied to the cable jacket behind the pulling eye using a suitable grip. Do not remove the epoxy plug on unconnectorized ribbon and stranded lightguide cable when installing the cable grip. The cable block must have a radius at least equal to the minimum permissible for the cable under load (20 times the cable diameter).◆

4.17 After all blocks are in place, thread the pulling line through the cable guide and attach to the cable end.

**D. Attaching Pulling Line to Cable**

4.18 Unfasten the end of the cable from the reel. Pull about 6 feet of cable off the reel and straighten it. If the cable end is equipped with a pulling eye (Fig. 13), attach the pulling line to the cable ◆ using a connecting link (for metallic cables) or a Pengo-Miller A-13L swivel or equivalent (for lightguide cables).◆



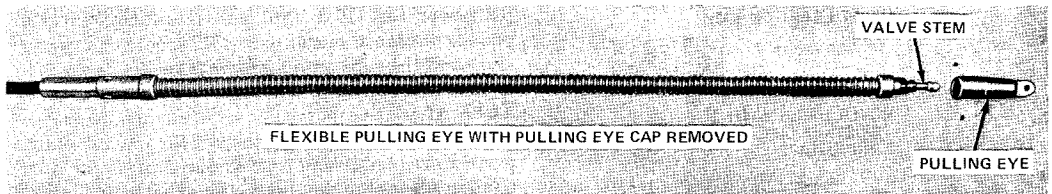
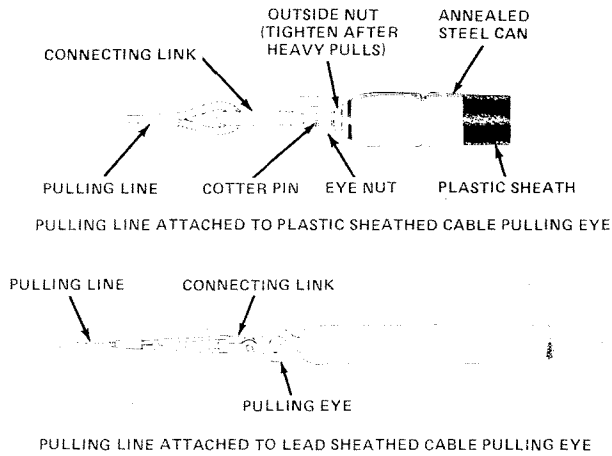


Fig. 13—Attaching Pulling Line to Cable

4.19 When metallic conductor cables not equipped with pulling eyes are to be placed, use a core hitch if any of the following conditions exist (Fig. 14).

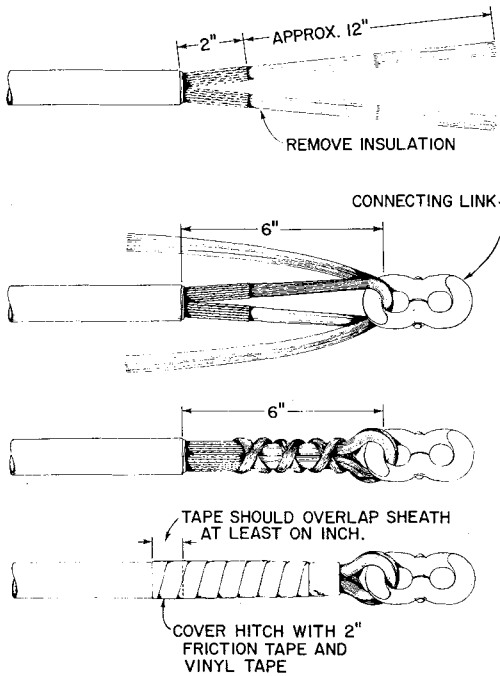


Fig. 14—Preparing a Core Hitch (Metallic Cable)

- (a) Length of pull exceeds 2000 feet.
- (b) Length of pull exceeds 1000 feet and there is either a reverse corner in the line or the pull on any pole exceeds 20 feet.
- (c) There is any indication of obstructions or obstacles which may result in high pulling loads.

4.20 A cable grip of the proper size may be used for pulling lead-sheathed cable not equipped with pulling eyes. A cable grip may also be used for plastic-sheathed cable and lightguide cable if none of the conditions outlined in paragraph 4.19 exist. The proper size grip is listed in Practice 081-410-102. Attach the pulling line as shown in Fig. 15.

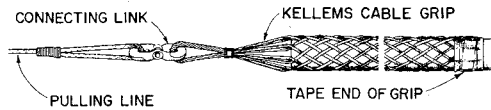


Fig. 15—Attaching Pulling Line to Cable Grip

5. PULLING CABLE

5.01 When using a manila rope pulling line, make the cable pull with a CR collapsible power reel or an RS power reel. For pulling lightguide, a "B" capstan winch or a winch with adjustable tension control, a "C" capstan winch, or some other winch with a suitable upper limit on tension may also be used.

5.02 When using a wire rope pulling line to pull copper cable, make the cable pull with the winch drum, RS power reel, or a CR collapsible power reel.

5.03 When using synthetic rope as a pulling line to pull copper cable, make the cable pull with an RS power reel. If a hard pull is anticipated (300 pounds tension or more), use an RS spool as a capstan and wind the rope onto a separate reel.

5.04 After the cable reel is set up and all necessary apparatus is placed, inspect the reel carefully, particularly the inside edge of the flanges for protruding edges or other obstructions that would interfere with turning the reel or unwinding the cable properly.

5.05 To avoid sheath damage, precautions should be taken to prevent the cable from dragging over the ground. Where this cannot be avoided, protect the cable by means of planks or logs placed on the ground directly under the cable.

5.06 Use a cable reel brake mounted on standard cable reel trailers to control the turning of the reel and prevent overrunning. Lightguide cable may be payed off the reel by hand during the pull.

5.07 Maintain communications with the winch operator at all times while the cable is being pulled so the operation may be stopped instantly if necessary. The cable reel should be attended while the cable is being pulled to prevent overrunning and to slow the pull near the end of the reel.

- 5.08** Make a final check of all preparations before starting the pulling operation.
- 5.09** Pull the cable at such a speed that swinging and surging of the cable and strand is minimized and complete control of the cable reel can be maintained.
- 5.10** When the cable approaches the end of the pull, reduce the pulling speed until the cable has reached its final position, including the overlap required for splicing. At this point, stop the pull.
- 5.11** Fasten a handline to the cable just before the end comes off the reel in order to hold it from gliding through the cable blocks.
- 5.12** After the cable is pulled in and the pulling end anchored, block or brake the cable reel so there is sufficient tension in the cable to prevent excessive sag in the unlashd portion. If there is not enough cable to leave the end on the reel, secure the cable end to a pole or other support by using a length of line similar to the pulling line.
- 5.13** If the cable must be cut, seal the open end as soon as possible to prevent moisture from entering the cable. Temporary cable end seals can be made with B cable caps of the appropriate size (Practice 081-852-128). When a length of cable is left at the last pole for use as a future extension of the route, permanently seal the cable end and secure the cable along the guy or strand extension with lashed cable supports and spacers, or run the cable down the pole and clamp it. Permanent cable end seals can be made with E plastic caps and B encapsulant and installed as described in Practice 633-505-211.

## 6. LASHING AERIAL CABLE

- 6.01** ♦Tighten cable suspension clamps at least one span ahead of cable-lashing operations. This is necessary to keep tension from building up in the strand as lashing progresses. When an aerial lift truck is being used, all clamps should be tightened before the start of cable placing. ♦Strand movement will cause unequal loading of poles due to different strand tension in adjacent spans.
- 6.02** ♦When lightguide cable is payed off the reel, avoid jerks and excessive tension. Lightguide cable must be double lashed to the strand. Do not build slack into the cable at splice locations. A splice alignment bar should be used at splices to ensure a smooth transition of the cable from its lashed position to the splice case. The splice alignment bar also establishes the correct relative position of ribbon cable for splicing. Do not use the splice alignment bar with stranded lightguide cable. ♦
- 6.03** Pull the cable lasher toward the cable reel end to release the cam lock on the blocks.
- 6.04** A minimum of 3 feet of cable overlap must be allowed at cable splice locations for metallic cable. ♦For ribbon-type lightguide cable, the correct overlap is determined by the splice alignment bar. The back end (cable end) of the sheath termination hardware rests against the shoulder in one of the two grooves, and the flexible pulling eyes overlap each other and part of each cable sheath. For stranded lightguide cable, the amount of overlap depends on the type of splice and whether it is on the ground or in the air. Generally, the overlap is twice the amount of ribbon cable. ♦
- 6.05** The C cable block pusher or D cable guide (used when lashing to an existing cable in K cable blocks) is placed on the strand ahead of the cable lasher. For cable weighing more than 2-1/2 pounds per foot, it may be advantageous to use two pushers.
- 6.06** Slack in the unlashd spans resulting from the progress of the lashing machine should be taken up at the reel.
- 6.07** After the blocks are pushed to the pole, remove and lower them to the ground with a handline.
- 6.08** Transfer the pusher or D cable guide to the next span and pull the lasher to the pole.
- 6.09** Temporarily secure the lashing wire to the strand with a lashing wire grip and transfer the lasher to the next span.
- 6.10** Secure the lashing wire to the strand, where it is interrupted, and continue the lashing operation.
- 6.11** For information on lashing cable past a pole and omitting supports and spacers, see Practice 627-320-011.

**7. LASHING TWO OR MORE CABLES**

**7.01** General information on lashing two or more cables to one suspension strand is covered in Practice 627-320-011 and shall be referred to before starting operations. Do not place lightguide cable on the same strand with another lightguide cable or with conventional (metallic-conductor) cable unless the strand is at least one size larger than the minimum permissible size for the span and storm-loading region as given in Table A (for ribbon lightguide cable) or Table B (for stranded lightguide cable).

TABLE A					
MAXIMUM PERMISSIBLE SPAN LENGTHS RIBBON-TYPE LIGHTGUIDE CABLE (SPAN LENGTHS IN FEET)					
STORM-LOADING REGION	STRAND SIZE				
	6.6M	6M	10M	16M	25M
Heavy	150	250	350	500	900
Medium	300	500	700	1000	1600
Light	300	500	700	1100	1900

TABLE B					
MAXIMUM PERMISSIBLE SPAN LENGTHS STRANDED LIGHTGUIDE CABLE (SPAN LENGTHS IN FEET)					
STORM-LOADING REGION	STRAND SIZE				
	6.6M	6M	10M	16M	25M
Heavy	200	300	400	600	1000
Medium	400	650	800	1200	1900
Light	350	600	800	1200	2500

**A. Placing New Cable (With an Existing Lashed Cable and Strand)**

**7.02** When placing a new cable with an existing lashed cable and strand, the existing lashing wire does not have to be removed. Using the stationary reel method, the following equipment is required:

- (a) K cable blocks
- (b) D cable guide
- (c) J cable lasher (model 2).

**7.03** The D cable guide is designed so it can be used as a block pusher for pushing K cable blocks ahead of the cable lasher, and may also be used as a cable guide to feed cable from a cable reel to the suspension strand.

**7.04** Place a cable guide on the strand at the cable reel end, keeping in mind that a D cable guide is required in the lashing operation as a cable block pusher.

**7.05** Place the pulling line and proceed with the other preparatory operations. Pull in the new cable. Apply slight tension to the end of the cable before lashing.

**7.06** At the location where the cable lashing is to begin, place the D cable guide on the strand with the curved shoe end facing in the direction of lashing. In this position, the block pusher will engage the cable block and cause it to release on contact. Attach a pulling line to the tow rope of the guide.

**7.07** Place the J cable lasher on the strand, position the cables, and adjust the rear vertical cable roller and cable lifter as described in Practice 627-310-205. Lash the cables and strand together.

**7.08** After lashing, terminating, and supporting operations have been completed, any detached drop wires shall be reattached.

**B. Placing New Cable (Removing Existing Cable Rings or Lashing Wire)**

**7.09** Before placing the new cable, remove rings, grade clamps, cable supports, wire ties, lashing wire, etc., from the existing cable and strand. Use cable blocks to support the existing cable temporarily. The cable blocks are also used for placing the new cable.

**7.10** Place the pulling line so it does not pass around the existing cable and rests in the proper position with respect to the existing cable, cable terminals, and poles. Secure terminal stubs branch cables, etc., to the existing strand with lashed cable supports or ties to reduce the strain on the joints. Sheath-mounted terminals which are to remain in plant should be secured temporarily to the existing cable.

**7.11** If there is still slack in the existing cable assembly after the new cable is pulled in, it may be desirable to start lashing at some intermediate location (preferably at a terminal splice) so the slack can be worked to corners or dead ends where it may be disposed of without cutting out slack.

**7.12** Pull the new cable in and secure the end to the strand where the lashing is to start. If lashing is to start from some intermediate point, both ends of the cable should be secured to the strand until each end section is tensioned preparatory to lashing.

**7.13** Tensioning locations for the existing cables should be selected so a branch cable splice or a splice for a pole-mounted terminal will not be included within the section of cable being tensioned.

Separate sets of tensioning devices should be used. Apply only slight tension to PIC cables.

**7.14** If the cables are in their proper relative positions, lash them in the regular manner. If, during the lashing operation, slack in the existing cable is being pushed ahead to an extent that might cause damage to a pole-mounted terminal stub, detach the terminal from the pole and support it temporarily from the strand. Drop wires should be handled in the same manner if there is any possibility that movement of the terminal away from the pole might result in service interruptions.