

## SUSPENSION STRAND

### BONDING AND GROUNDING METHODS

CONTENTS	PAGE
1. GENERAL . . . . .	1
2. PROTECTIVE GROUNDING . . . . .	1
3. ATTACHING GROUNDS . . . . .	2
4. GROUNDING STRAND DURING PLACING OPERATIONS—STATIONARY REEL METHOD . . . . .	2
5. GROUNDING STRAND DURING PLACING OPERATIONS—MOVING REEL METHOD . . . . .	3
6. STRAND CONTINUITY AND BONDING . . . . .	5

#### 1. GENERAL

1.01 This section outlines the methods to be used in bonding and grounding suspension strand.

#### 2. PROTECTIVE GROUNDING

2.01 The grounding of suspension strand on jointly used pole lines and at power crossings on nonjointly used lines is a necessary precaution to reduce the possibility of electric shock accidents in the event of an accidental contact with power wires.

2.02 The grounding of suspension strand shall be considered as *supplemental to*, and *not as a substitute for*, insulating gloves and other protective measures. The grounding of suspension strand will accomplish the following:

- (a) Limit the voltage on the strand in the event of an accidental contact with energized power conductors.
- (b) De-energize the power circuit in the event of an accidental contact by causing operation of power circuit breakers or fuses.
- (c) Drain off induced voltage on the strand.

2.03 Suspension strand must be connected to a low-impedance ground before effective protection is provided against accidental power contacts.

2.04 Satisfactory low-impedance ground connections include the following:

- (a) The vertical ground conductor of a multi-grounded neutral power system.

*Note:* If the work order does not indicate, or if it is not definitely known, that the power system is of the multigrounded neutral type, consult the supervisor or engineer responsible for the job.

- (b) An aerial cable sheath and supporting strand that is connected *without an insulating joint* to an underground or buried cable which is connected to a central office ground.

- (c) An aerial cable guy strand which is attached to the same bolt as a supporting strand meeting the requirements of 2.04(b) or is bonded to it and does not contain a strain insulator between the point of the protective ground connection and the suspension strand.

2.05 Anchor rods and guys and single or multiple telephone ground rod installations not connected to a low-impedance ground are *not* to be considered suitable protective grounds for grounding of suspension strand.

2.06 Strand being placed on jointly used pole lines shall be connected to a low-impedance ground during placing operations at approximately 1/4-mile intervals (if possible), or at intervals specified by the engineering forces.

2.07 Where power crossings are encountered on lines which are not jointly used, ground the strand as close as possible to the crossing span.

2.08 All temporary ground connections shall be maintained until the strand is tensioned and deadended.

3. ATTACHING GROUNDS

3.01 Permanent ground locations are dependent on local conditions and will be determined by the engineer. These permanent ground locations should be used, if possible, for temporarily grounding strand during placing operations.

3.02 A vertical ground conductor of a multi-grounded neutral power system *shall be tested with a B Voltage Tester* before a ground connection is made. The use of the B Voltage Tester is covered in Section 620-105-010.

3.03 *Do not make connections to vertical grounding conductors above the telephone space.* Such connections may be made in or below telephone space where authorized by agreement with the power company.

3.04 The connection to a vertical grounding conductor of a power system multi-grounded neutral is made in the telephone space on a pole by using an AT-7796X Connector as shown in Fig. 1.

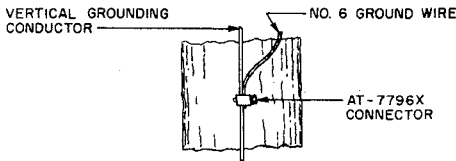


Fig. 1 — Ground Connection to Vertical Grounding Conductor

3.05 The connection to a grounded strand or guy, referred to in 2.03, is made by attaching the No. 6 ground wire as follows:

(a) For attachment to strand (except 25M), use a cable lashing clamp as shown in Fig. 2. Place the ground wire between the two washers.

*Note:* If cable lashing clamps are not available, use a strand ground clamp as shown in Fig. 3.

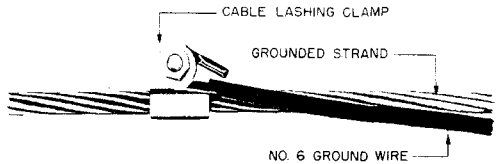


Fig. 2 — Ground Attachment to 6M, 10M, or 16M Strand

(b) For attachment to 25M strand, use a strand ground clamp as shown in Fig. 3.

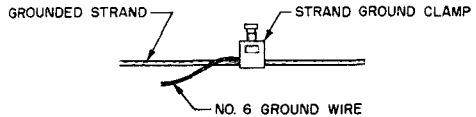


Fig. 3 — Ground Attachment to 25M Strand

4. GROUNDING STRAND DURING PLACING OPERATIONS — STATIONARY REEL METHOD

4.01 When strand is placed from a stationary reel, connection to a low-impedance ground may be made by using a B Grounding Roller as shown in Fig. 4. The description and use of the B Grounding Roller is covered in Section 081-410-106.

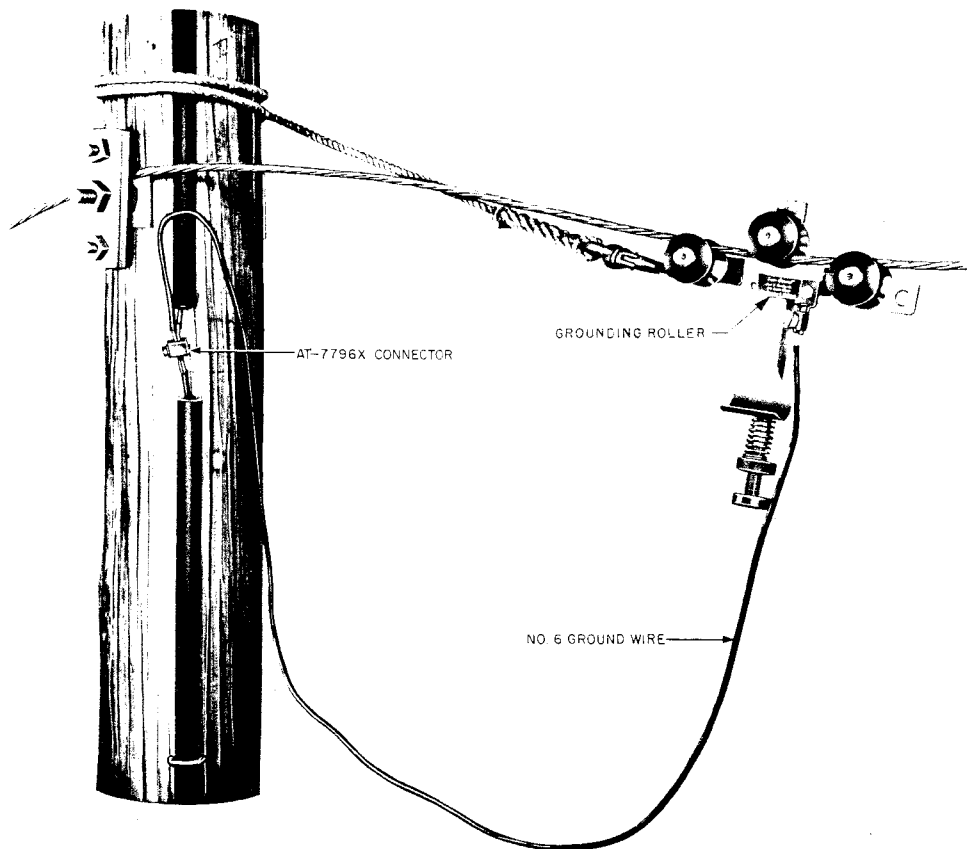


Fig. 4 — Strand Installed in Grounding Roller —  
Stationary Reel Method

**4.02** The requirements for ground attachments during placing operations are covered in 2.06, 2.07, and 2.08; however, the actual location where a grounding roller may be installed is determined by the availability of a satisfactory low-impedance ground as covered in 2.04.

**4.03** Do not remove the grounding roller until after the strand is tensioned, deadended, and permanent grounds are attached.

## 5. GROUNDING STRAND DURING PLACING OPERATIONS — MOVING REEL METHOD

**5.01** If suspension strand is to be placed using the moving reel method, start the placing operations from a point where the strand can be grounded. For example, start from a pole carrying grounded strand and cable. Deadend and ground the new strand before moving the reel.

.02 Additional ground attachments along the line may be made by using the grounding roller (see Part 4), or as indicated in Fig. 5.

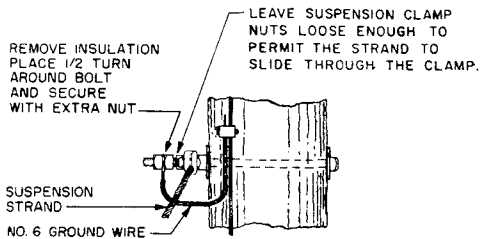


Fig. 5 — Ground Connection to Suspension Bolt

5.03 When the grounding roller is used to ground strand being placed from a moving reel, proceed as follows at the pole where the ground is to be attached:

- (a) Pull excess slack from the strand and hold the strand with a strand puller.

*Caution: Do not place an excessive unbalanced load on the pole. A temporary guy shall be used if necessary.*

- (b) Attach grounding roller as shown in Fig. 6 on the side of the pole opposite the strand puller.

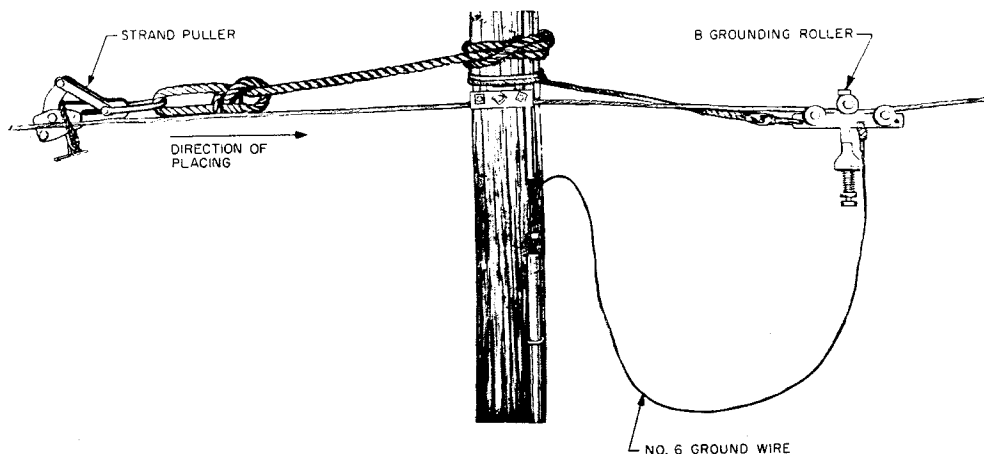


Fig. 6 — Grounding Roller Attached to Strand — Moving Reel Method

5.04 When the strand has been tensioned, connect the ground wire permanently to the strand as follows:

- (a) Tighten the suspension clamp.
- (b) Attach No. 6 Ground Wire to the low-impedance ground and to the strand as shown in Fig. 7.

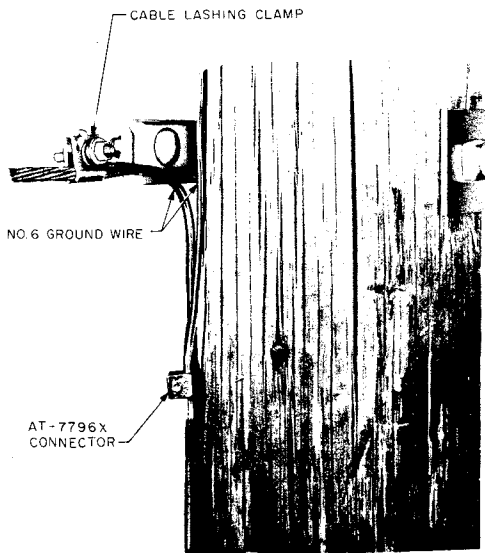
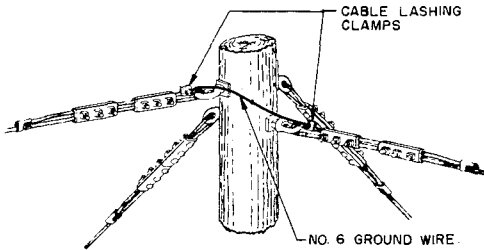


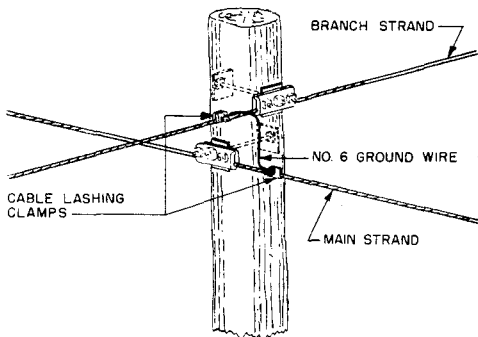
Fig. 7 — Ground Attachment to Strand

## 6. STRAND CONTINUITY AND BONDING

**6.01** The continuity of suspension strand must be maintained. Any break in the strand continuity shall be bridged with a permanent bond of No. 6 Ground Wire as shown in Fig. 8 and 9.



**Fig. 8 — Strand Bond at Deadends**



**Fig. 9 — Strand Bond — Branch Strand**

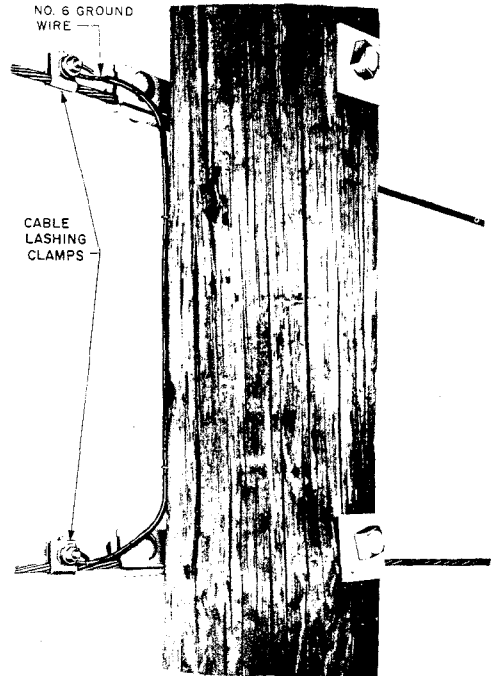
**6.02** The continuity of strand for grounding and bonding purposes is maintained under the following conditions:

- (a) When two strands are attached to the same bolt.
- (b) When two strands are attached to hardware supported by the same bolt, such as two guy hooks or two cable suspension clamps on opposite sides of a pole, etc.

**6.03** When two or more suspension strands are attached to the same pole and are supported on separate suspension bolts, the strands shall be bonded together at the following locations:

- (a) At the first and last poles.
- (b) At intervals of 1500 feet along the lead.

**6.04** The method of bonding strands being supported on separate suspension bolts is shown in Fig. 10.



**Fig. 10 — Bonding Strands Supported on Separate Suspension Bolts**

**6.05** Where a bond is placed between the power neutral and a suspension strand, all other suspension strands on the same pole shall be electrically connected to this bond.