

**OPEN WIRE REMOVAL**

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**1. GENERAL**

1.01 This section sets forth methods and safety precautions to be followed in the removal of open wire. It has been reissued to provide instructions for classifying and removing copper line wire in such a manner as to preserve the condition of the wire that is suitable for reuse. Addendum G31.505, Issue 1 is canceled.

**2. PRECAUTIONS**

2.01 Before climbing or working on poles which are not definitely known to be strong enough to withstand additional loads to which they may be subjected, precautions should be taken as set forth in Section 620-131-010 and related sections.

2.02 Safety precautions as described in paragraph 3.04 must be taken when removing open wire crossing over electric light, power or trolley wires, railroads, streets and heavily traveled highways. To further minimize the possibility of electrical hazard it is advisable to avoid contact with any light, power, or trolley attachments which are normally free from dangerous voltages but which may become energized; as, for example, guys which are improperly insulated, transformer cases, light fixtures, trolley fixtures, span supports, extension braces, etc.

2.03 When circuits are working on the lead involved it is essential that work be executed so as to minimize service interruptions resulting from "shorts" and "crosses." To this end it is necessary to keep in close touch with the test board and to prevent contact between wire being removed and that on which service is being maintained. Tools, tie wires, etc., carried in the body belt are frequent causes of service interruptions.

**3. REMOVAL OF WIRE**

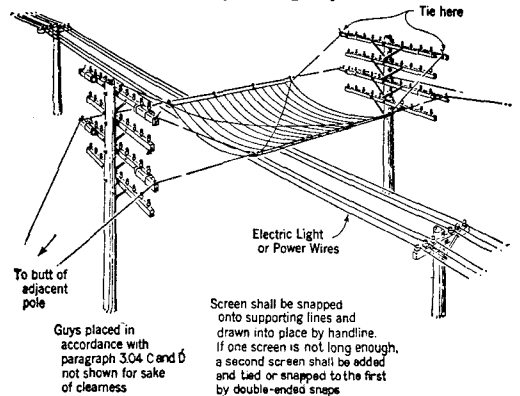
3.01 Wires or guys should not be cut in such a manner as will introduce unbalanced loads because of the possibility of breaking crossarms or poles. For example, a crossarm or pole may break under the unbalanced load caused by cutting wires along one face without releasing the tension in the opposite direction. Where unbalanced loads cannot be avoided, compensating temporary guys shall be placed.

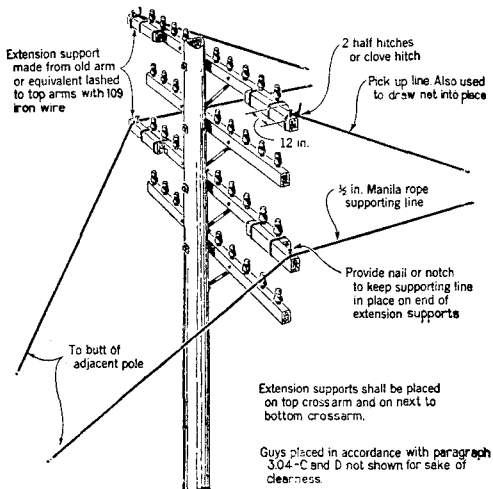
3.02 No wire should be untied or removed within one-half mile of a crossing over light or power wires, trolley wires, a railway, or a heavily traveled highway prior to removing the wire from the crossing span, and the work should be planned accordingly. This is to preclude accidents which may result from slack running ahead of the removal job.

3.03 After wire has been removed from the crossing span, removal work may proceed in the usual manner.

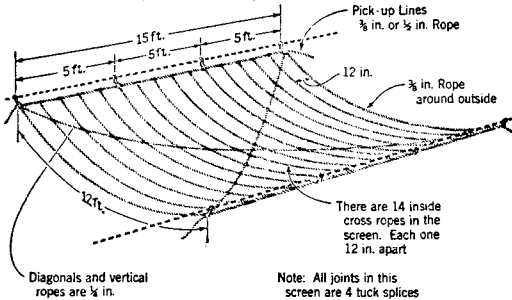
3.04 The successive steps to be followed in the removal of wire crossing over power wires, railways, and heavily traveled highways and special precautions to be taken during the course of such work are set forth below:

- (a) If practicable arrange with power company operating the power wires to shut off current during the removal work and for power company's linemen to open circuits or place "short" or "ground" straps within sight of the crossing.
- (b) Manila rope, dry and free from metallic strands, shall be the only type of rope used for removing wire at crossings involving power wires.
- (c) Head guy each crossing pole away from the crossing span by means of 3/4 inch rope or larger. Attach these guys near the top of each crossing pole and near the ground line of the adjacent poles or to other satisfactory anchorage.
- (d) Tie the crossing poles together by means of a manila rope, 3/4 inch or larger. This rope should be attached to crossing poles near point of attachment of head guys placed in accordance with paragraph 3.04 (c).
- (e) Place a manila rope, 1/2 inch or larger, from the cross-arm of each of the crossing poles to the butts of the adjacent line poles. These ropes are used for withdrawing the wires from the span and should be attached to the crossarms on the crossing poles in a temporary manner and so that when untied the ends will extend approximately 18 inches into the crossing span. There should be an eye, spliced or tied, in each end of the lines attached to the crossarms for attachment of the crossing wires. See illustrations under paragraphs 3.04 (i) and (j).
- (f) If the power has not been shut off or if there is any doubt as to whether this has been done and the voltage on the power conductors exceeds 220 volts a screen of manila rope or an approved equivalent should be placed between telephone and power conductors at the point of crossing. The screen is to be employed in addition to other precautions mentioned but is not required if but one or two wires are involved in the removal, nor is it required at crossings over steam railways or highways.

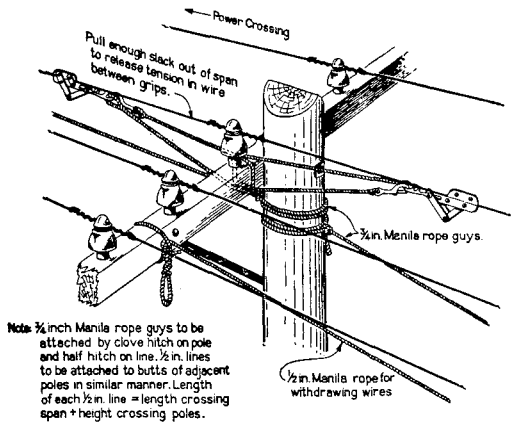




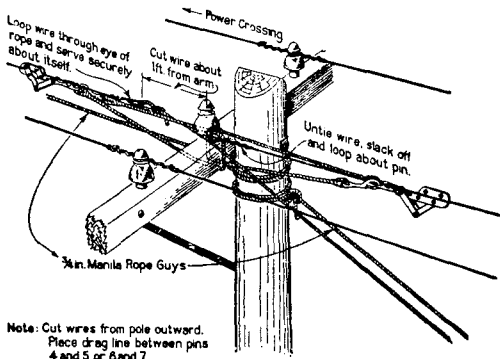
The following illustration gives details of the screen.



- (g) Operations (i), (j), (k) and (l) shall be completed on one crossing pole before the same operations are performed on the other pole and men shall not be on both crossing poles simultaneously while the wire is being handled.
- (h) Rubber gloves shall be worn at all times while cutting and withdrawing wires from crossings at which there is an electrical hazard.
- (i) Place pair of wire grips or slack blocks over arm and attach to wire on each side of arm so that wire between grips will be slack.



- (j) Cut line wire about one foot from crossarm on crossing side. Untie 1/2 inch manila rope line from arm and loop end of wire over crossing through the eye of this line and serve the wire about itself securely. This wire should be drawn tightly enough so that excess sag will not develop when grips are removed.



Note: Cut wires from pole outward. Piece drag line between pins 4 and 5 or 6 and 7.

- (k) Loop other end of wire about pin. This end of wire should be slacked off so that the full load of the dead-end will not be carried by the arm on the crossing pole. Because of this release in tension a temporary guy is not required unless the arm is badly deteriorated.
- (l) Operations should be completed on one wire before starting to work on the adjacent wire and should proceed from the pole outward. It is generally undesirable to pull out more than five wires at a time. After the wires to be removed at one pull have been cut and attached to the 1/2 inch manila line on one crossing pole, the corresponding operations should be repeated on the same wires on the other crossing pole.
- (m) The wires should be withdrawn from the crossing by drawing on one of the 1/2 inch manila lines and permitting the other to slide over the crossarm into the crossing span. This work should be performed by men standing on the ground and sufficient tension should be maintained on the ropes during the entire operation to prevent the wires or ropes falling into the rope basket or contacting the power conductors.

- (n) Repeat operations (e), (i), (j), (k), (l), and (m) for the remaining wires on the crossarm and in turn for such other wires as are to be removed.

3.05 In pulling out wires crossing under light, power, or trolley circuits, keep the wires taut by means of a hand-line to avoid the possibility of the ends flipping up and making contact with the foreign circuits. When there is an up pull at the point of the crossing, the wires to be removed should be held down by a loop around the crossarm to prevent such contact.

3.06 Wire in sections not involved in crossing spans should be cut into convenient lengths and dropped to the ground for recovery provided right-of-way conditions permit and provided there is no likelihood of introducing service interruptions. Otherwise, it should be drawn out over the crossarms after having been untied from the insulators and cut into convenient section lengths.

3.07 The intervals at which wires are cut will depend upon local conditions such as location of corner poles, crossings over electric light or power wires, railroads, highways, tree interference, etc. Favorable cutting points are:

- (a) Guyed poles, because each guy in place and intact may serve as the equivalent of a temporary guy in the same direction or a push brace in the opposite direction.
- (b) The poles at the ends of a section of tree interference.

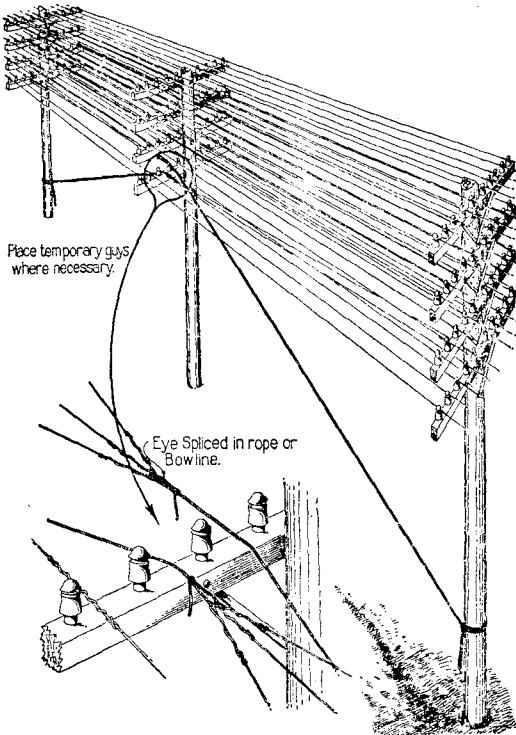
Generally, it will be desirable to limit the length of the sections into which the wire is cut so that the weight of the wire removed from each will not exceed 200 pounds. As a rule, it will be more advantageous to handle short lengths of a relatively large number of wires rather than a long length of a lesser number of wires because of the difference in time involved in coiling. The lengths of wires of various gauges weighing approximately 200 pounds are tabulated below:

APPROXIMATE NUMBER OF SPANS OF WIRE WEIGHING 200 POUNDS

Size	Feet of Wire	COPPER WIRE		
		Span Length (ft.)		
		100	130	163
080	10300	104	80	67
104	6100	61	47	37
128	4030	40	31	24
165	2430	25	19	15
		IRON WIRE		
Size	Feet of Wire	Span Length (ft.)		
		100	130	163
083	10690	110	82	65
109	6220	67	48	38

3.08 The successive steps involved in the method in which wires are drawn out over the tops of crossarms are as follows:

- (a) Place two 1/2 inch manila rope lines over the crossarm at which wires are to be cut and secure to butts of the adjacent poles. Each line shall be about 300 feet in length and should have an eye spliced or tied into the end attached to the crossarms to permit of fastening the wires to the rope as they are cut. One line should be placed so that the eye extends about two feet beyond the crossarm and the other should be placed so that the eye just reaches the crossarm.
- (b) At the pole at which the ropes meet, cut one wire at a time about one foot from the crossarm on the side on which there is the greater distance between the arm and the rope eye. Loop the ends of the wires through the rope eyes and serve the wires upon themselves securely enough so that they will not become detached while pulling them out. Cut as many wires as can conveniently be removed in a single pull and bunch them so as not to retard pulling operations. Wires to be removed from the top crossarm may be bunched in any convenient position, either on the top arm or on an adjacent arm. Wires on other arms should be bunched either on the same arm from which they were untied or on an adjacent arm and on the same side of the lead as the pins from which they were removed. The set-up is illustrated below:



- (c) Cut or untie the tie wires on all wires to be removed throughout the length of the particular section. Bunch the wires as described in the preceding paragraph. Remove or straighten and turn back all ties to prevent them from catching on pins or crossarms.
- (d) Repeat operations described in paragraphs 3.08 (a) and (b) at opposite end of section from pulling line. The wires may then be withdrawn by means of a power driven wire take up reel or by hand, the drag line being used to prevent the accumulation of excessive sag and to control the ends of the wires.

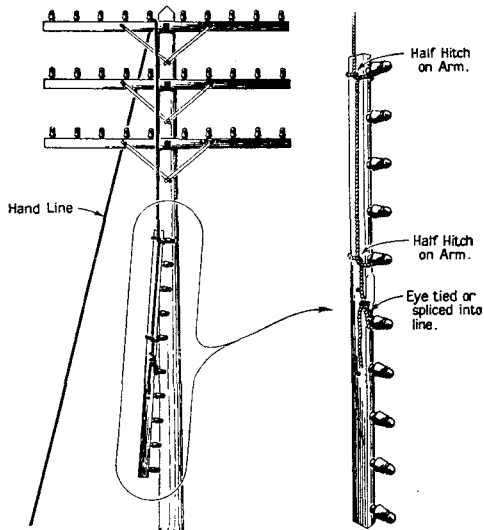
3.09 Copper wire has a high salvage value and should be neatly coiled with ties placed at least three points on the coil. The wire should then be returned to the storeroom for weighing or disposed of in accordance with other instructions or routines. Copper ties and pieces of copper wire should also be salvaged.

3.10 Iron wire has no salvage value but should be gathered up and disposed of to the best advantage consistent with safety and good public relations.

#### 4. REMOVAL OF CROSSARMS AND OTHER EQUIPMENT

4.01 If because of right of way conditions, public relations, or other reasons it is desirable to remove crossarms from poles while still in the air, proceed as follows:

- (a) Pass handline over upper crossarm or attach the line to the arm by means of a block and lower the arm to be removed as shown below:



The handline should be passed through a rope lashing placed near the top of the pole for removal of top arm.

- (b) Remove drive screw holding crossarm braces by means of a lineman's wrench or a bit brace socket wrench.
- (c) Remove crossarm bolt by turning nut so that there is not quite a nut full of the bolt remaining in the nut. Drive bolt out as far as nut will permit and after removing nut lift off arm and lower it to the ground with a handline. The removal of the bolt from the pole can be completed by using a one-half inch bolt or similar article as a drift pin. Keep head back from bolt as far as practicable to prevent any particles of spelter flying into the eyes. Do not permit the bolt to fall to the ground.

(d) Crossarm equipment, such as braces, insulators, transposition brackets, etc., should generally be removed from crossarms after the arms have been lowered to the ground.

- 4.02 In removing insulators care should be taken to avoid injury from cracked or chipped glass.

## 5. SORTING AND DISPOSING OF WIRE, CROSSARMS AND OTHER EQUIPMENT

5.01 Crossarms and other equipment should be sorted at a convenient point and divided as between junk and good material. In some cases, crossarms which are not suitable for reuse as such, may be cut and reused as guard arms.

5.02 Insulators should be sorted according to type and returned to the storeroom or disposed of in accordance with other instructions. Broken insulators or insulators having no reuse value should be buried at convenient points or disposed of otherwise.

5.03 Crossarm braces, if in good condition, may be reused.

5.04 Crossarm bolts, if in satisfactory condition, may be reused.

5.05 Transposition brackets may be reused if in good condition, otherwise they should be disposed of as junk.

5.06 As a general rule it is inadvisable to reuse hardware which is ungalvanized or on which the galvanizing is chipped or deteriorated to any marked degree.

**4. CLASSIFYING COPPER LINE WIRE BEFORE REMOVAL**

6.01 Copper line wire, after being removed, will generally be utilized in one of the following ways:

(a) Reused as line wire after minor reconditioning in the field: Only wire which is known to be in very good condition will be utilized in this way, for example, wire on which few, if any, repairs are required other than removal of a limited number of twisted sleeve joints.

(b) Reused as line wire or buried shield wire after being returned to the shop for reconditioning. This would include, for example:

(1) Wire which is in good condition except for appreciable wear at many of the tie points, wire which contains more twisted sleeve joints than can economically be cut out in the field at the time of removal, etc.

(2) Wire such as described in (a) above which is to be sent to the storeroom rather than being reused immediately as line wire.

(c) Turned in as junk because it is known to be unsuited for reuse as line wire or buried shield wire. For example, wire which has been damaged repeatedly by storms; wire containing many closely spaced sleeves such as is often the case where wires have been retransposed several times; wire, which according to trouble records, has broken with excessive frequency; and wire which has been subject to excessive corrosion, such as wire at crossings over main lines of steam railroads, or wire in the vicinity of certain industrial plants.

6.02 It is necessary to decide, before starting removal operations, what disposition is to be made of the wire, as this will govern the practices followed during removal. Decisions as to whether the wire is suited for reuse as line wire or buried shield wire, or whether it should be turned in for junk, might be based on information gathered from the following sources:

- (a) discussions with employees familiar with the history of the wire,
- (b) review of the trouble records, and
- (c) inspection of the wire to determine whether it contains an excessive number of sleeves and to check the condition of the wire at tie points.

6.03 A tag should be securely attached to each coil of wire removed, indicating clearly the intended disposition. The marking should be in accordance with the following:

- (a) Wire which is to be reused as line wire without reconditioning, other than that done during its removal (See 6.01 (a)), should be marked "Reuse."
- (b) Wire which is to be reconditioned in the shop before being reused as line wire or buried shield wire (See 6.01 (b)) should be marked "Repair."
- (c) Other wire (See 6.01 (c)) should be marked "Junk."

It will generally be desirable to record on tags attached to coils of wire intended for "Reuse" or "Repair," the size and weight of the wire in each coil.

**7. REMOVING WIRE WHICH IS TO BE REUSED OR REPAIRED**

7.01 At the time the wire is being untied, remove all tie wires, bridging connectors and bridle wires.

7.02 Care should be exercised in handling wire which is to be reused or repaired to avoid damaging it unnecessarily. The same precautions should be taken as are exercised in handling new wire; these include:

- (a) Avoid stepping on the wire or running over it with vehicles.
- (b) Avoid kinking the wire or bending it too sharply.
- (c) Avoid dropping heavy or sharp objects onto the wire which might nick or flatten it.
- (d) Avoid dropping coils of the wire onto sharp edged objects, for example, rocks and tools, which might nick it.

(e) Do not drag the wire over rocky terrain.

(f) Do not pull the wire around transposition brackets or steel pins at corner poles; move the bracket or wire so that it will pull against a wooden pin or place a piece of burlap or canvas so as to protect the wire.

(g) Do not pull the wire over point transposition brackets; to provide a means of separating the wires, drive a 30d nail into the top of the crossarm between the bracket and the adjacent pin.

(h) Avoid damage from tools or other equipment during transit.

7.03 All wire intended for reuse or repair should be wound into coils (maximum weight 185 lbs.) containing but a single wire (two or more wires shall not be wound into the same coil).

7.04 Wires may be coiled up by one of two methods, namely,

(a) By pulling the wires over the crossarms onto a take-up reel.

(b) By dropping them to the ground and then winding onto a take-up reel. Use of this method is necessarily limited to cases where dropping the wires to the ground will not interfere with traffic or pedestrians, and where the ground surface is not so rocky as to damage the wires when they are being wound up.

7.05 When the wires are to be withdrawn by pulling them over the crossarms, some of the things which should be done and taken into consideration include:

(a) After untying the wires spread them out over the crossarm so that there is a pin or pole separating each wire from the one adjacent to it. See 7.02 (g).

(b) It will generally be found desirable to employ some means to prevent twisted sleeve joints from catching on crossarms; three methods commonly used include:

(1) Placing a tape wrapping around the ends (the ends toward the take-up reel) of sleeves that can be reached from the crossarms.

(2) Placing a tie of marline or binding twine around the line wire ahead of each joint, that is, between the joint and the first crossarm that it will be pulled over.

(3) Replacing twisted sleeve joints by rolled sleeve joints before beginning to pull out the wire. Where there are two twisted sleeve joints within 50 feet, it will generally be desirable to replace the two joints by a single rolled sleeve joint by cutting out the short intervening section of wire.

(4) Placing a U Cable Guard over the leading edge of the crossarm. Each end of the guard should be tied to the crossarm with a strap made of webbing material or a piece of rope or marline. For 5 wires or less, located on the same side of the pole, use one 5-ft. guard on each pole; for 6-10 wires place a 5-ft. guard on each side of the pole.

(c) The number of wires that may be wound up simultaneously ranges from one to ten, depending upon the type of equipment available.

(d) The length of section pulled out at one time should, of course, be as long as practicable, say, at least one-half mile where favorable conditions prevail. Some of the factors to be taken into consideration in determining the length of section include:

(1) The size and number of wires.

(2) Location and number of corners and amount of pull on each corner.

(3) Number and abruptness of changes in grade.

(4) Accessibility to motor vehicle equipment.

(5) Likelihood of hindering traffic.

(6) Location of obstructions such as main highways, railroads, and power crossings where it is generally necessary, for safety reasons, to remove the wire in short sections and to employ special precautions and equipment.

(e) Attach a drag line of 3/8-in. or 1/2-in. manila rope, about 100 feet in length, to each wire at the opposite end from the take-up reel. Tape the junction of the drag line and wire to keep it from catching on crossarms and transposition brackets; to prevent this junction from catching at insulators it may be desirable to unscrew each insulator about one turn. Except when wires are being removed from the top crossarm, it will generally be desirable to stiffen the last four or five feet of the free end of the drag line by wrapping it with tape to keep it from hitching onto crossarms or transposition brackets.

(f) Generally it is not desirable to wind up the wire at a speed in excess of 150 feet per minute.

7.06 When wires are to be wound onto coils after being dropped to the ground, points to be taken into consideration include:

(a) As a rule, wires from one crossarm only should be dropped to the ground at one time. If wires are to be removed from more than one arm, wires from the upper arm (or arms) may be untied and moved into a position between the two outer pins; these wires may be lowered to the ground with a Wire Raising Tool after the wires dropped to the ground initially have been wound onto the take-up reel.

(b) If practicable, reel up simultaneously all wires which have been dropped to the ground on the same side of the pole. If this cannot be done the ends (those farthest removed from the take-up reel) of wires which are to remain on the ground while others are being reeled up should be snubbed to a pole or some other convenient anchorage.

(c) Wind up the wires attached to the take-up reels initially. If the ends of these wires are reached before the coil has attained the desired weight, splice them to the ends of wires remaining on the ground with rolled sleeves. Remove the snub from the other ends of these wires and proceed as before.

7.07 All coils should be carefully tagged as directed in Paragraph 6.03. Coils should be securely bound in at least four places with twine or copper wire. (Do not bind coils of copper wire with steel wire.)

#### REPAIRING LINE WIRE IN THE FIELD

8.01 Following are practices to be observed when wire, such as described in 6.01 (a), is being reconditioned in the field:

(a) Examine carefully the first three or four spans of wire removed for nicks, cracks and wear at tie points. If this examination indicates that the wire is not in good enough condition to be reused, without major reconditioning, its classification should, of course, be reconsidered. Make such examinations often enough to be sure that there is no appreciable change in the condition of the wire being removed.

(b) Cut out all twisted sleeve joints and replace them by rolled sleeve joints. When cutting out twisted sleeve joints, cut the line wire about 8 inches beyond the joint.

(c) Cut out and avoid including any section of wire which is less than 50 feet between splices.

(d) Wind the wire into coils having an eye 19-20 inches; in order to prevent distortion of the coils it will generally be desirable to bind them before removing them from the take-up reels.

(e) Cut out all bends having a radius of less than 3/4 inch.