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the Lineman

RURAL ELECTRIFICATION ADMINISTRATION - U. S. DEPARTMENT OF AGRICULTURE



IT PAYS TO BE SAFE

How Wet Is A Rope

During August an electric shock accident occurred when a rope came in contact with a 7200-volt primary conductor. Russell E. Dew, New Mexico Safety and Job Training Instructor, sent the rope to the Bodendieck Tool Company electrical testing laboratory at Taylorville, Ill., for testing.

At the time of the accident the rope contained an undetermined amount of moisture. However, during the time required to ship the rope to the laboratory it had dried out. This is indicated by the test results obtained which are as follows:

Test Voltage	Duration	Observation
per foot	(minutes)	
10 KV	3	No effect
20 KV	3	No effect
37.5KV	3	No effect
50 KV	3.5	No effect
83 KV	3	Slight temperature raise

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Missouri Foremen Conferences

Two conferences for foremen were held recently at Chillicothe and Lebanon, attracting over 100 foremen in North and South Missouri. The conferences, sponsored jointly by the Missouri REA Association and the State Department of Education, included five sessions in two and one-half days. Foreman Responsibilities, REA Specifications, Hot Line Tool Demonstrations, Special Jobs, and a demonstration on Oil Circuit Reclosers, Fuse Circuit Coordination and Sectionalizers made up the five sessions of the conference.

J. C. Omer, Manager of the Howard Electric Cooperative and Secretary of the Safety and Job Training Committee, opened the conference with a welcome from the REA Association. Ernest Wood, Manager of the Farmers' Electric Cooperative at Chillicothe, and J. W. Haugh, Manager of the Laclede Electric Cooperative at Lebanon, helped with the arrangements for the conference in their cities and extended a word of welcome for those in attendance. Walter C. Brown, Supervisor of Industrial Education,

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MEMBERS OF CREW, TRAINED IN FIRST AID, APPLY ARTIFICIAL RESPIRATION IMMEDIATELY, BUT UNSUCCESSFULLY

A 4-man crew consisting of the assistant line foreman, a 1st class lineman (victim) and two groundmen, was assigned the job of replacing existing oil circuit breakers with some of a larger size. These men had been doing this type of work for the past two weeks.

The crew worked this job in the same manner as it had in the past, killing only the phase on which it worked so as to reduce outages to a minimum.

The foreman and 1st class lineman were up the pole, with the foreman working the top position. These men had completed the change-over on the right hand breaker and had energized it before beginning work on the other breaker. The second breaker had been replaced with the load side jumper installed and line side jumper hanging, so that the clamp could be grabbed with the hot stick for connecting.

The foreman then removed the protective ground while the lineman took a position well below the cross arm brace. These men then removed their rubber gloves, sending them down with the handline.

The foreman began descending the pole on the back side of the structure, remarking to the lineman, "As long as you are on that side you can 'heat it up' when they (groundmen) get the stick." The lineman answered, "O.K."

As the foreman climbed past the lineman on the way down, he noticed the pole position of the lineman. Later he said that the lineman could not possibly have reached anything that was hot from the position he was in at that time.

The foreman was about 10 feet from the ground when he heard an arc. He looked up and saw the arc just as the lineman began to fall. The lineman fell striking the foreman and knocking him from the pole. This caused the victim's body to turn sideways so that his safety belt began to bind the pole and eased him to the ground.

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Ralph A. C. Hill, Editor

Frank H. LeMaster, Associate Editor

Change In Specifications

At the Safety and Job Training Conference in Washington last fall the State Safety and Job Training instructors requested REA to change its specifications so that the eyebolt supporting the primary take-off of an A-5 addition to an A-1 or A-2 specification be lowered to a point 6 inches below the bottom of the pole top pin. This suggestion was made to provide more working clearance for the lineman boring the hole for the eye bolt. Several electric shock accidents had occurred in connection with the boring of this hole on energized lines.

After discussing the suggestion in Technical Standards Committee 'A', REA engineers felt that the suggestion had merit. It was unanimously agreed to accept the recommendation of the State safety instructors. To provide the maximum safety factor, it was decided to lower the eyebolt location to a point 33 inches below the top of the pole which materially increased the clearance requested.

During the past three years, there has been close cooperation between the State Safety and Job Training programs and the engineers who design the rural lines. This cooperation is producing safer construction specifications.

It will also be noted that a similar arrangement of tap and neutral position is approved for taps from V-phase and three-phase lines in preference to those now shown for such assemblies on drawings B21, B22, B23, B24, B27R, C21, C22, C23, C24, C25, C26, C27R, C28R, and C29.

MISSOURI FOREMEN (continued)

then explained that the purpose of the conference was to furnish key men in the cooperatives with latest information on safety practices, job techniques, job materials and tools. A. B. Blacklock, Safety and Job Training Instructor for North Missouri, served as Chairman of the conference sessions and introduced the following conference leaders: Ray J. Moreau, Operating Superintendent, Citizens Electric Cooperative, Ste. Genevieve; Leean Huff, REA Field Engineer; Buck Kinyon and A. Huey, Kearney Corporation, St. Louis; O. G. Anderson and Harry O. Donnohue, Chance Company, Centralia; Ivan K. Boggs, Safety and Job Training Instructor for South Missouri; N. K. Delaney and L. G. Wendegatz, Line Material

HOW WET (continued)

It is apparent that the rope which was a partial conductor at the time of the electrical shock accident regained its insulating properties at the time of the test.

To give some idea of the possible rapid change of moisture content of rope and its insulating values at various degrees of moisture content, the following tests were made. A piece of new 3/4 inch rope was taken from stock. It was tested dry at 85 KV per foot for five minutes to demonstrate that it was in good insulating condition. The only effect observed was a slight rise in temperature at the end of the five minute test.

This piece of rope was then soaked in tap water for one hour. Excess water was wiped lightly from the surface and the rope was placed on a table to dry. Tests of insulating properties were made at several intervals thereafter. Here are the results:

Test Data

Drying Time	KV Applied	Duration	Observations
1 hour	25		Instant Heating & Burning
26 hours	78	2 minutes	" " "
65 hours	75	5 minutes*	No effect

* At the end of five minutes the KV was stepped up to 80 and the test continued for an additional 4 minutes. The 80KV produced only slight warmth indicating that the rope was dry again and its insulating values high.

Discussion Points.

1. Why is it unsafe to depend on the insulating value of rope?
2. Who can tell from field observation how much moisture a rope may contain?
3. Isn't it the generally accepted practice to attach an insulated link stick when ropes are used to pull energized conductors?
4. Would rubber gloves guard against the unexpected situations which sometimes arise when ropes are used in the vicinity of energized conductors and parts?

Company; and L. B. Leaxh, Jess Pearee, R. W. Huller, Bill Satterfield, F. N. Wightman, Rex Dewey, J. K. Howell, and J. F. Krughoff, Westinghouse Electric Corporation.

A report of the conference is being prepared and will be sent to all those in attendance within the next few days.

Reprinted from 'The Safety News', June 1948, published by Missouri REA Safety and Job Training Committee.

As this was happening the groundmen were carrying the OCB back to the truck with the intention of bringing back the hot stick. They heard the arc, looked toward the pole and saw both men falling. As they ran to the pole the foreman got up while the lineman remained lying on the ground. They immediately removed the body belt and placed him in position to apply artificial respiration. He was still breathing and continued for some time thereafter. The foreman began to apply resuscitation and was spelled by one of the groundmen, who is very proficient. The foreman left for town to get the doctor and ambulance, and returned with them in about 15 minutes.

While the foreman was away, the groundmen continued to work on the victim. It was during this time that he stopped breathing and began to change color. White splotches appeared on the skin. A doctor examined the victim and administered adrenalin intravenously but detected no response. The injured was then placed in the ambulance and moved to the hospital. The crew continued artificial resuscitation enroute to the hospital until the victim was placed in the iron lung.

At the hospital, adrenalin was again administered directly into the heart muscle. But, as before, no reaction was obtained.

The lineman was pronounced dead several hours later.

Burns on the hands indicated the path of current through his body was into his right hand and out the left. He was holding onto the cross arm brace with his left hand and had grabbed the energized jumper coming from the bottom of the breaker, with his right hand. To do this, he had to step up from the position he was in when last seen by the foreman..

Members of this crew always had the reputation of analyzing their jobs thoroughly and stressing the necessity for caution.

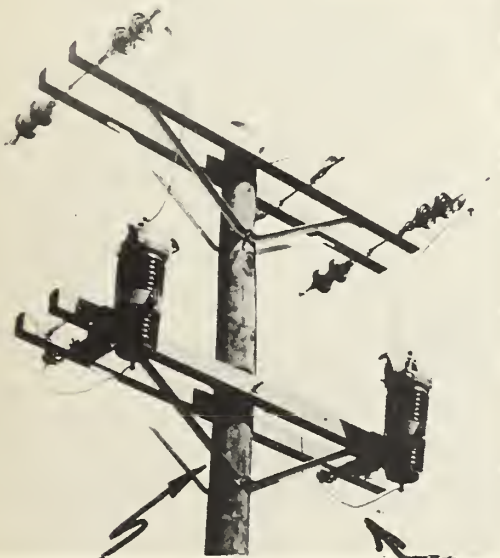
The deceased had spent 12 years in line work, of which the last 1 1/2 years were spent in this cooperative.

Discussion Points

1. Did 'position' have anything to do with this accident?
2. Should a lineman ever put himself in a position from which it is possible to grab or fall into an energized conductor or part?
3. Do you attribute this accident to failure to wear rubber gloves or improper work position?
4. Should rubber gloves be worn on every energized pole even though the workman does not intend to place himself in a position from which it is possible to reach, fall into, or inadvertently contact anything 'hot'?
5. Would you be proud to work with a crew trained to render first aid, as this crew did, to give you the only possible chance to remain alive under these circumstances?



The gloves victim was wearing at the time of the accident. Burns on hand correspond to holes burned in gloves.



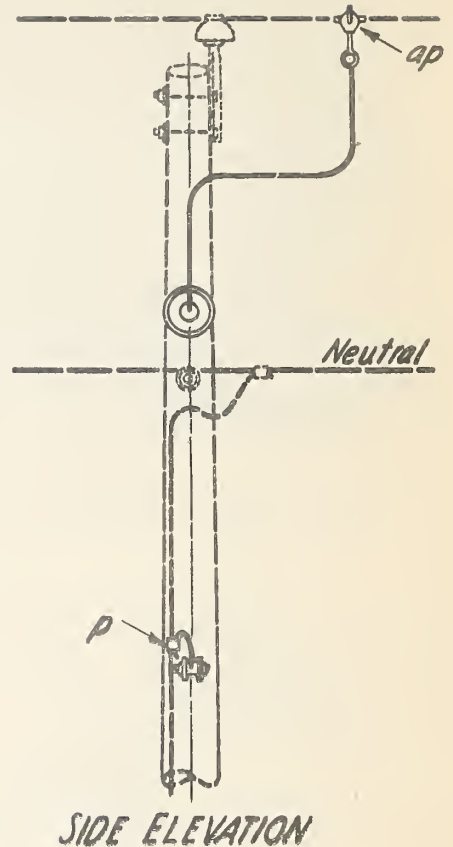
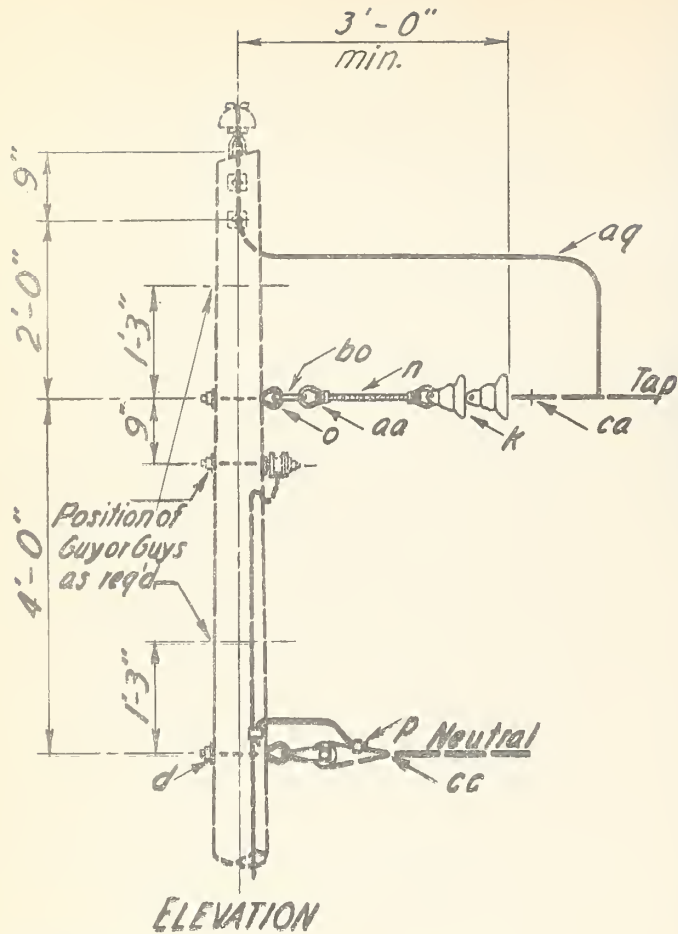
Smudged spot on brace indicates position of left hand.

Point at which victim grabbed jumper with right hand.

Recent Accidents

A lineman climbed a 50-foot pole. He apparently forgot to fasten his safety strap. He leaned back and fell 50 feet to the ground. He received several broken ribs and a broken back. It is believed that the broken back severed the spinal cord. Lost time - probably the rest of his life.

A lineman trainee was working on a junction pole. As he fastened his safety belt his left elbow contacted a 3-shot fuse. The electrical shock knocked him from the pole. He received electrical burns on his left elbow and right side. Lost time - two weeks.



NOTES:

If an additional tap is required in the opposite direction the material items therefor will be the same, except that two eye nuts are substituted for the two eye bolts.

A similar arrangement of tap and neutral position should be used for taps from two and three phase lines in preference to those now shown for such assemblies on drawings B21, B22, B23, B24, B27R, C21, C22, C23, C24, C25, C26, C27R, C28R, C29.

ITEM	NO. REQ'D	MATERIAL	ITEM	NO. REQ'D	MATERIAL
k	2	Insulator, suspension	aq		Jumpers
n	1	Bolt, double arming, 1/2" x req'd length	d	2	Washer, 2 1/4" x 2 1/4" x 1/8", 3/4" hole
o	2	Bolt, eye, 1/2" x req'd length	bo	1	Shackle, anchor
P		Connectors, as req'd.	ca	1	Deadend assembly, primary
aa	2	Nut, eye, 1/2"	cc	1	Deadend assembly, secondary
ap	1	Clamp, hot line, tap assembly			

SEE STORY "CHANGE IN SPECIFICATIONS" ON PAGE TWO

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V. PRIMARY, 1-PHASE 2-WIRE NEUTRAL GROUND
VERTICAL CONSTRUCTION - TAP AT 0 TO 30° ANGLE

Scale: 1/2" = 1'-0"

Date: July 15, 1946

No. REVISION DATE:

A2-2