CHANCE SUPER TOP-TIE®

Multi-duty line tie does it all for conventional wood or Epoxirod® distribution construction.

Dependable conductor-to-insulator tying is vital to a sound, engineered system. Neglecting it or giving it only cursory attention can be quite costly under today's constant pressure from government and power consumers for service continuity.

Field-formed ties of annealed aluminum wire don't begin to compare with the performance of Super Top-Tie. This is borne out by Chance data for galloping and aeolian-vibration laboratory tests. Super Top-Tie is one of the best ways to design dependability into a system from conception.

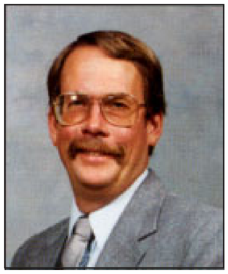
Available in 13 color-coded sizes related to conductor sizes, this single tie can serve every application on a system so designed. This one design replaces more than 250 other previously available factory-formed ties.

Utilized to its fullest potential, Super Top-Tie can help simplify standards for new utility operating divisions and can reduce costs in retrofitting uprated regions, not to mention the convenience it can add to new-system development.

By original design, 13 Super Top-Tie sizes accommodate conductor diameters from .184" to .977" in the top grooves of C-, F- and J-neck pins and posts plus many reclaimed or foreign insulators with 2 1/4" to 3 1/2" diameter necks. ■

SUPER TOP-TIE RANGES AND POPULAR CONDUCTOR SIZES

Cat. No.	Typical Bare Conductor	Diameter Range Min.	Diameter Range Max.	Color Code
STT-10	#6 (6x1); #6 7W AAC; #6 7W AAAC	.184	.220	None
STT-20	#4 (6x1); #4 (7x1); #4 7W AAC; #4 7W AAAC	.221	.257	Orange
STT-30	#3 (6x1); #3 7W AAC; #3 7W AAAC	.258	.289	Purple
STT-40	#2 (6x1); #2 (7x1); #2 7W AAC; #2 7W AAAC	.290	.325	Red
STT-50	#1 (6x1); #1 7W AAC; #1 7W AAAC	.326	.360	Grey
STT-60	1/0 (6x1); 1/0 AAC; 1/0 AAAC	.361	.409	Yellow
STT-70	2/0 (6x1); 2/0 AAC; 2/0 AAAC	.410	.460	Blue
STT-80	3/0 (6x1); 3/0 AAC; 3/0 AAAC	.461	.516	Black
STT-90	4/0 (6x1); 4/0 AAC; 4/0 AAAC	.517	.584	Pink
STT-100	266.8 (18x1); (26x7); 266.8 19W AAC; 266.9 AAAC	.585	.664	Green
STT-110	336.4 (18x1); (26x7); 336.4 19W AAC; 336.4 AAAC 397.5 (18x1);397.5 19W AAC	.665	.755	Brown
STT-120	397.5 (24X7), (26X7); 397.5 AAAC; 477 (18X1), (26X7); 477 19W AAC; 477 AAAC; 556.5 19W AAC	.756	.859	Violet
STT-130	556.5 (18X1), 26X7); 556.5 AAAC; 636 37W AAC; 636 (18X1), (24X7); 715.5 37W AAC	.860	.977	Gold



By Bob Keudell
Program Administrator
Transmission Maintenance
Pacific Power, a Division of PacifiCorp
Portland, Oregon

500 kV

Deadend insulator changeout

Hot Stick Training

As shutdown approvals for maintenance on our transmission grid become more difficult to obtain, hot-line work may well become the standard.

Learning how to maintain our 500 kV system with live-line procedures is a continuing process. We at PacifiCorp do not claim to foresee all future changes in the utility industry. But we are convinced that a skilled and trained workforce certainly will help us adapt as those changes occur.

As shutdown approvals for maintenance on our transmission grid become more difficult to obtain, hot-line work may well become the standard.

Against this "backdrop" our June 1994 training session became the starting point for performing energized maintenance on our 500 kV system as a routine matter. At the same time, we recognized needs for developing insulator change-out procedures for this system level. The reasons included the economic impracticalities of creating intentional outages and conditions that could preclude bringing in

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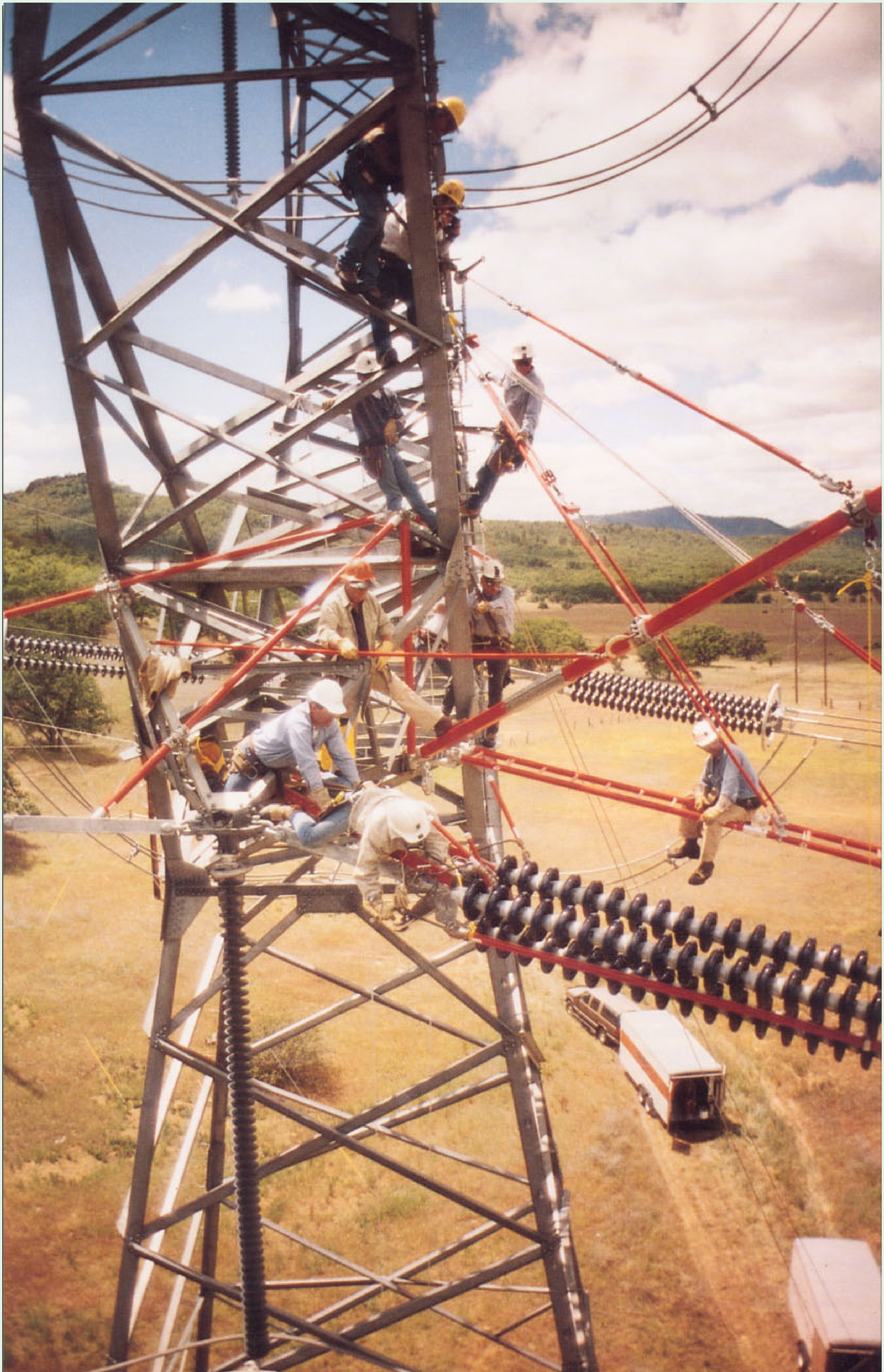
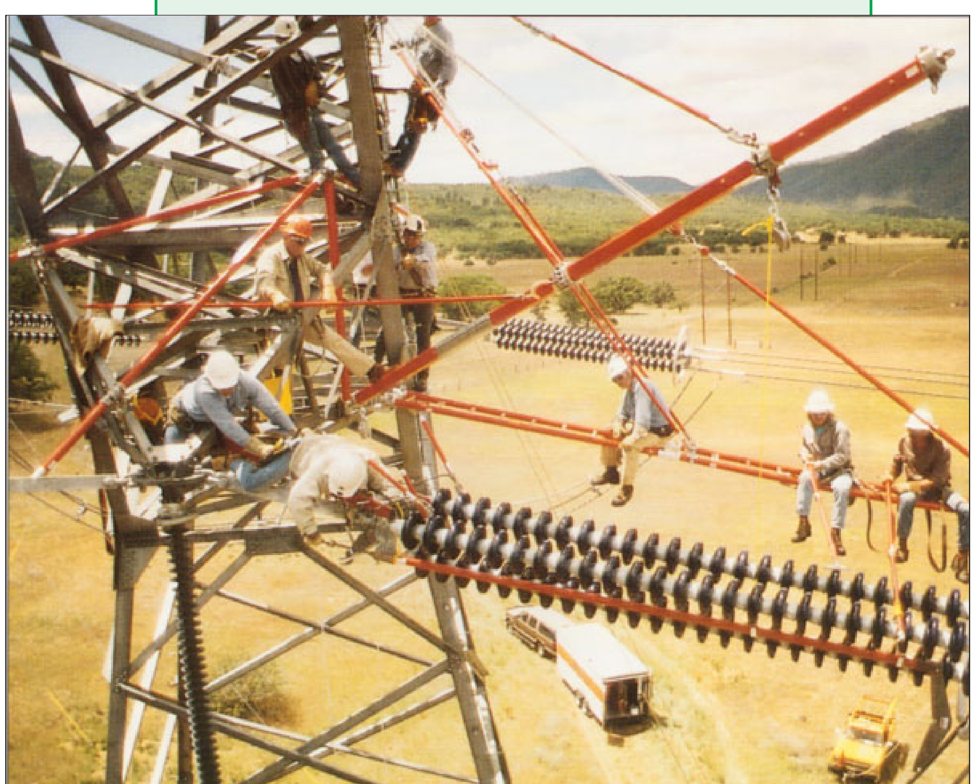


All tools are placed on tool racks or on a tarp. The ladder is leaning on the tower and tarp. All Epoxiglas® tools are wiped with a silicone cloth prior to use. This removes the dust and surface contamination. The crew goes through a tailboard discussion on the procedures to be used. Once the job has started, no changes in the procedure are made unless each crew member understands the change.

The boom base, mast pole, brace poles and ladder base are mounted on the tower arm. Placement of the boom and ladder bases is critical to ensure that the changeout can be done easily and safely.

A back-up pole clamp is used on the boom brace poles for the heavier loads on transmission lines.

On this particular tower, there is a 5-ft. link between the insulators and the tower arm, so a ladder is layed flat to enable the lineman to reach the hardware plate and insulators. A static ground (shunt) is installed on all three insulator strings between the hardware plate and the cap of the second insulator. The cold-end yoke is installed. The first strain pole with hot-end yoke attached is maneuvered into place using the boom with a ¼" rope and padded hook. The linemen on the ladder are using universal poles with shepherd hooks to help on the hot end. The second strain pole is moved into place using the same method. After both strain poles and yokes are in place, tension is taken with ratchet wrenches to hold the tools securely.

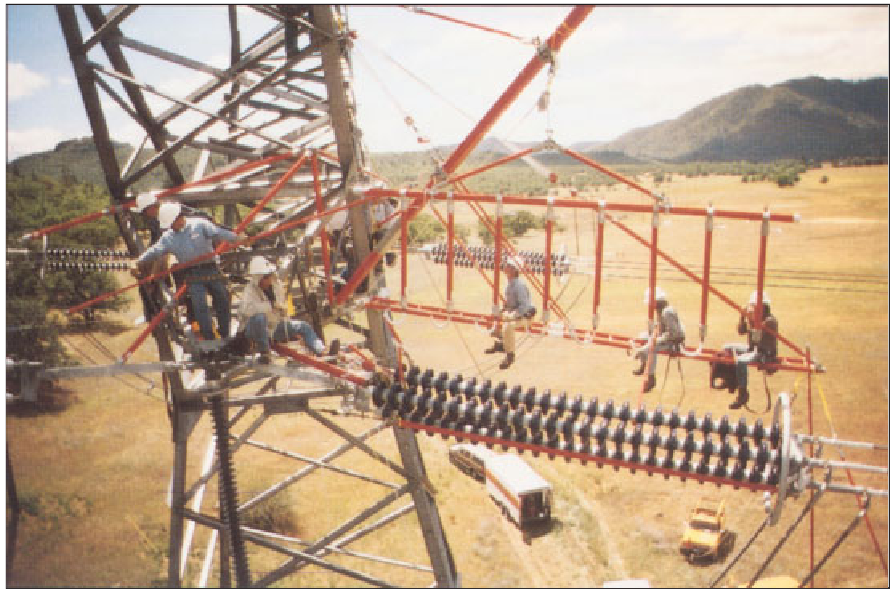


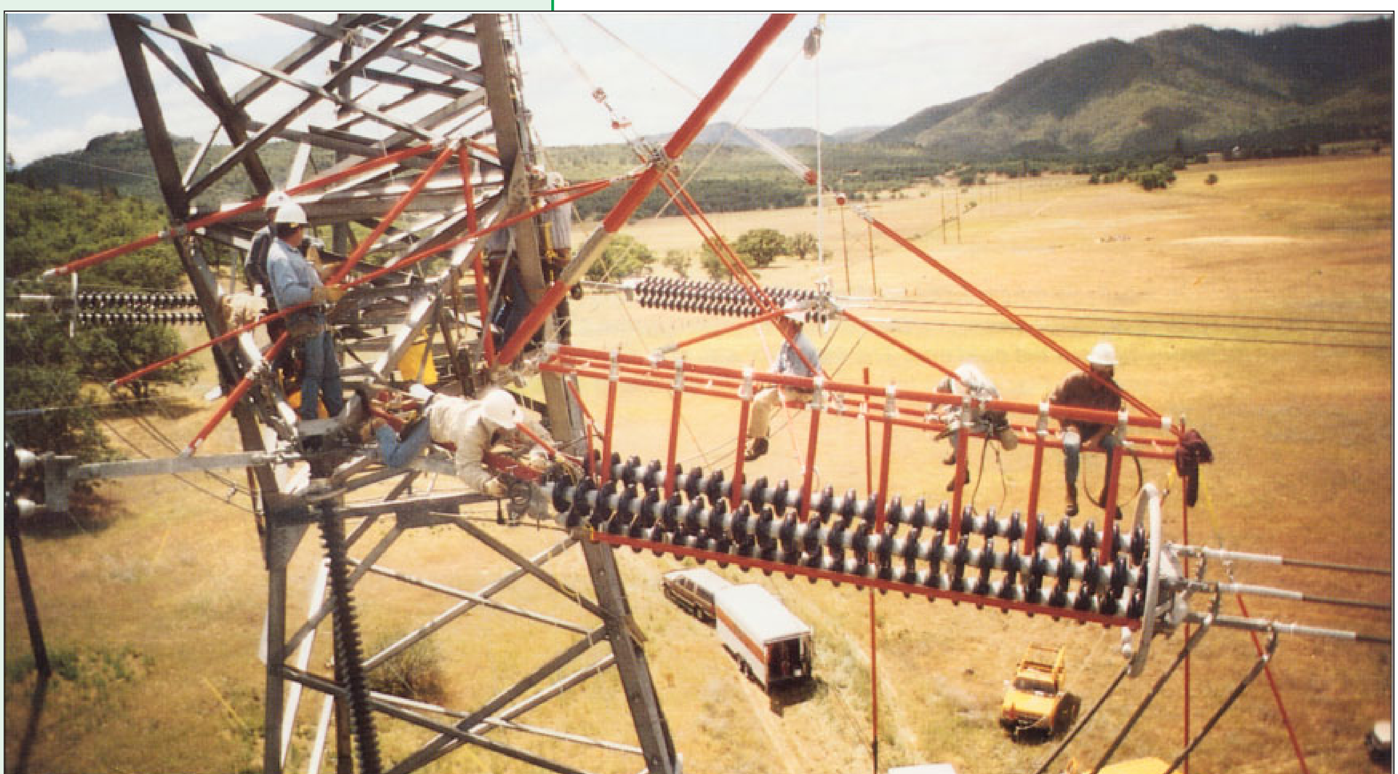
The hook assembly cradle is brought up the tower using the boom, bull line and capstan load handler.

The boom is moved over the insulator strings to allow the cradle to be lowered between the top two insulator strings. The cradle is lowered enough to allow the hooks to be turned. The cradle is then raised up until it supports the bottom insulator string.

The cotter key can now be pulled on the hot end between insulator and ball clevis.

Take enough tension with ratchet wrenches to allow the insulator string to be disconnected on both ends.





After the insulators are disconnected, the cradle is raised with the bull line. Care must be taken not to break any insulators in the top two strings while the damaged insulators are raised in the clear. After the insulators are in the clear, the static ground can be removed from the cold end. The insulator string is moved toward the ladder until it has sufficient clearance to be lowered to the ground. Placing the insulators back in the line is done by reversing these procedures.

(Text continued from page 2)

heavy equipment to perform the maintenance by conventional construction methods.

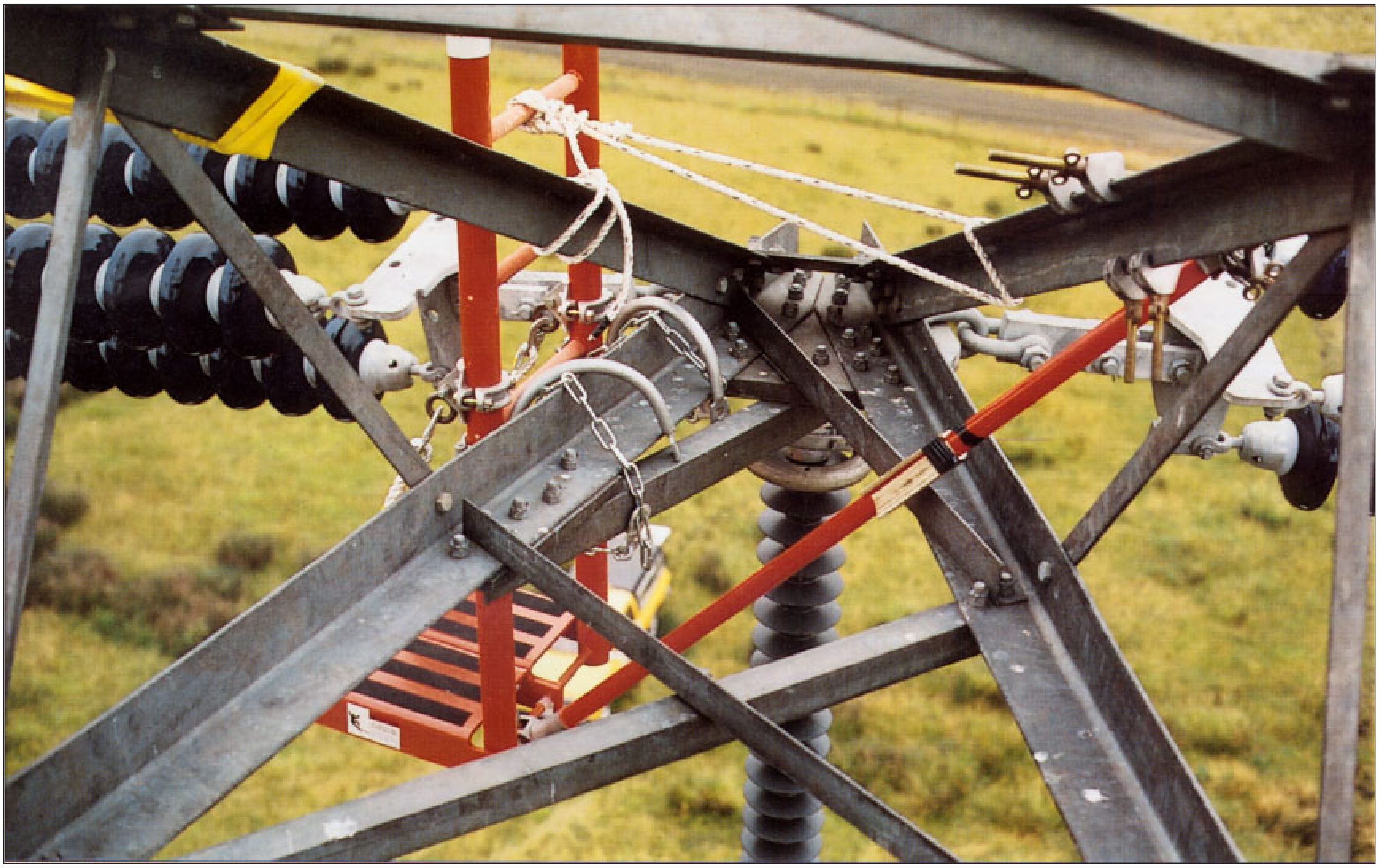
For the insulator change-out procedure, we basically modified our live-line work practices from our lower-voltage systems. Adapting them to this system level took teamwork, time and “talent.” Many of our lineworkers assigned to this particular line had not been exposed to this type of work. All our previous 500 kV live-line training had been directed towards crews in areas charged with responsibility for such maintenance prior to construction of this line.

We believe we conducted this training session at the most opportune time for devoting our crews to the establishment of procedures for responding to potential future needs. For consultation throughout the session, Chance Hot Line Tool Demonstrator Ray Keplar was on site.

Maintenance essential to this important line

Built in two sections completed in 1992 and 1993, this 138-mile line had not yet required much live-line work. The line is lattice-steel construction for most of its length with a short section of single-pole structures at one end due to right-of-way constraints. Conductor is three-bundle Pheasant (1272 kcm) in a delta configuration. It links a substation near Eugene, Oregon to another substation near Medford, Oregon.

Part of the Third AC Intertie, linking the Pacific Northwest with the Southwest, this line is owned jointly by Bonneville Power Administration and PacifiCorp, with PacifiCorp responsible for maintenance. PacifiCorp’s only other 500 kV line runs from Midpoint, Idaho to the substation near Medford, Oregon, the southern termination of this line. ■



An alternate method for the cold end when an 18" link is used between the tower arm and hardware plate is to use a 5-ft. platform ladder for the man to stand on. Care must be taken so that the distance between the platform ladder and the jumper string is not less than the hot stick clearance.

About the Author

Bob Keudell, as an Apprentice Lineman in 1973, received a B.S. degree in Business Administration. The next year he started as a lineman for Pacific Power & Light, later was promoted to foreman, and in 1990, took an administrative position. His career includes experience ranging from replacing streetlights to working energized 500 kV. His current duties include: Planning training, scheduling aerial patrols, and developing new standards and specifications for the Pacific Power transmission grid.

TiPS & NEWS
view from
Vol. 1, No. 2 April 1995

Bulletin 15-9503WB