Part 4:

Insulator, Cross Arm, or Pole Change Procedures

Contents

Post Type Armless Construction 3 HPD 60 kV

DWG. 045707

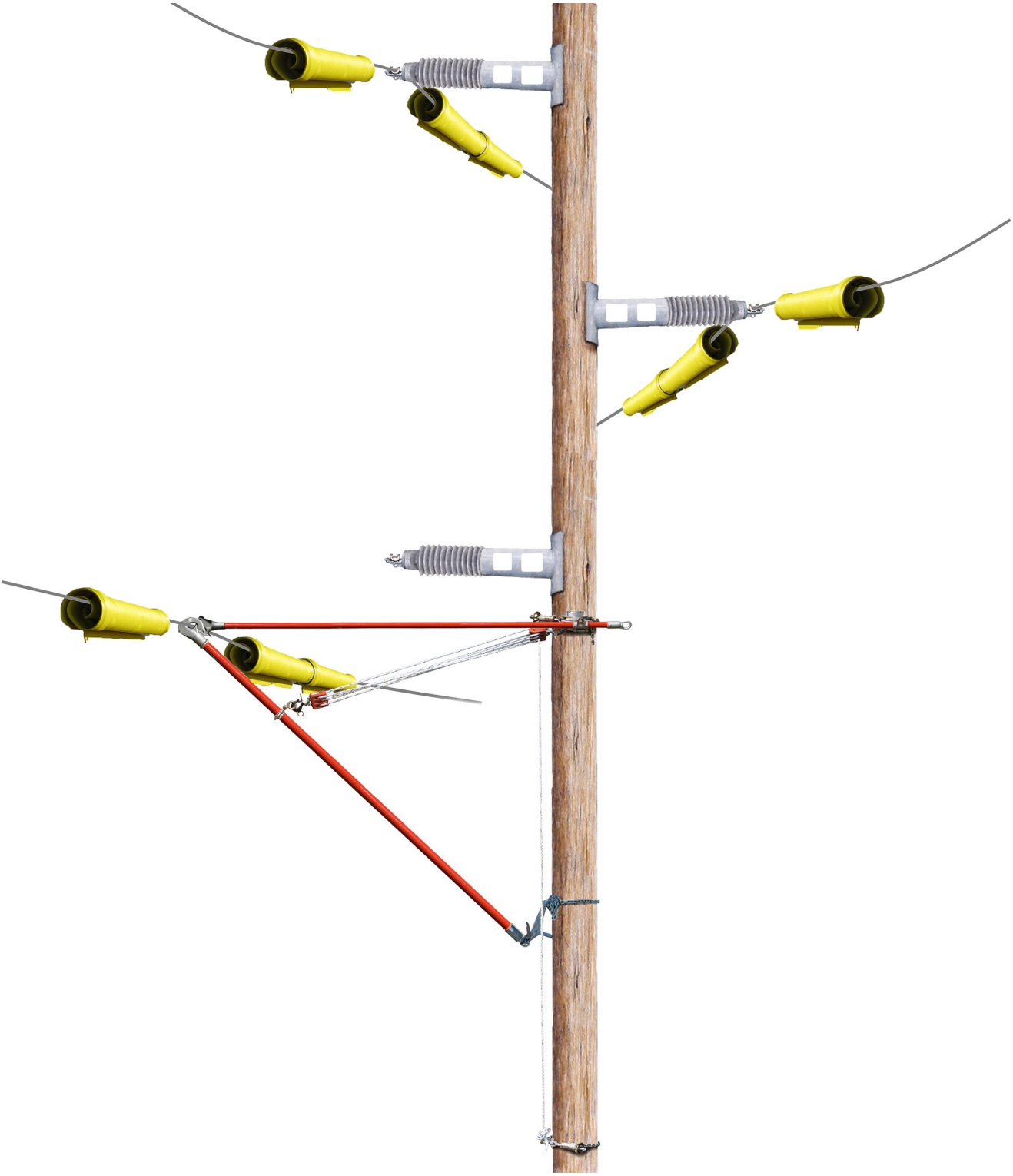
Insulator, Cross Arm or Pole Change Procedure

Before removing any conductors from an existing pole, the condition of the adjacent poles, conductors and attachments must be visually inspected and determined to be in good condition before starting this procedure.

The condition of all involved poles must be determined safe to rig on or climb, if required.

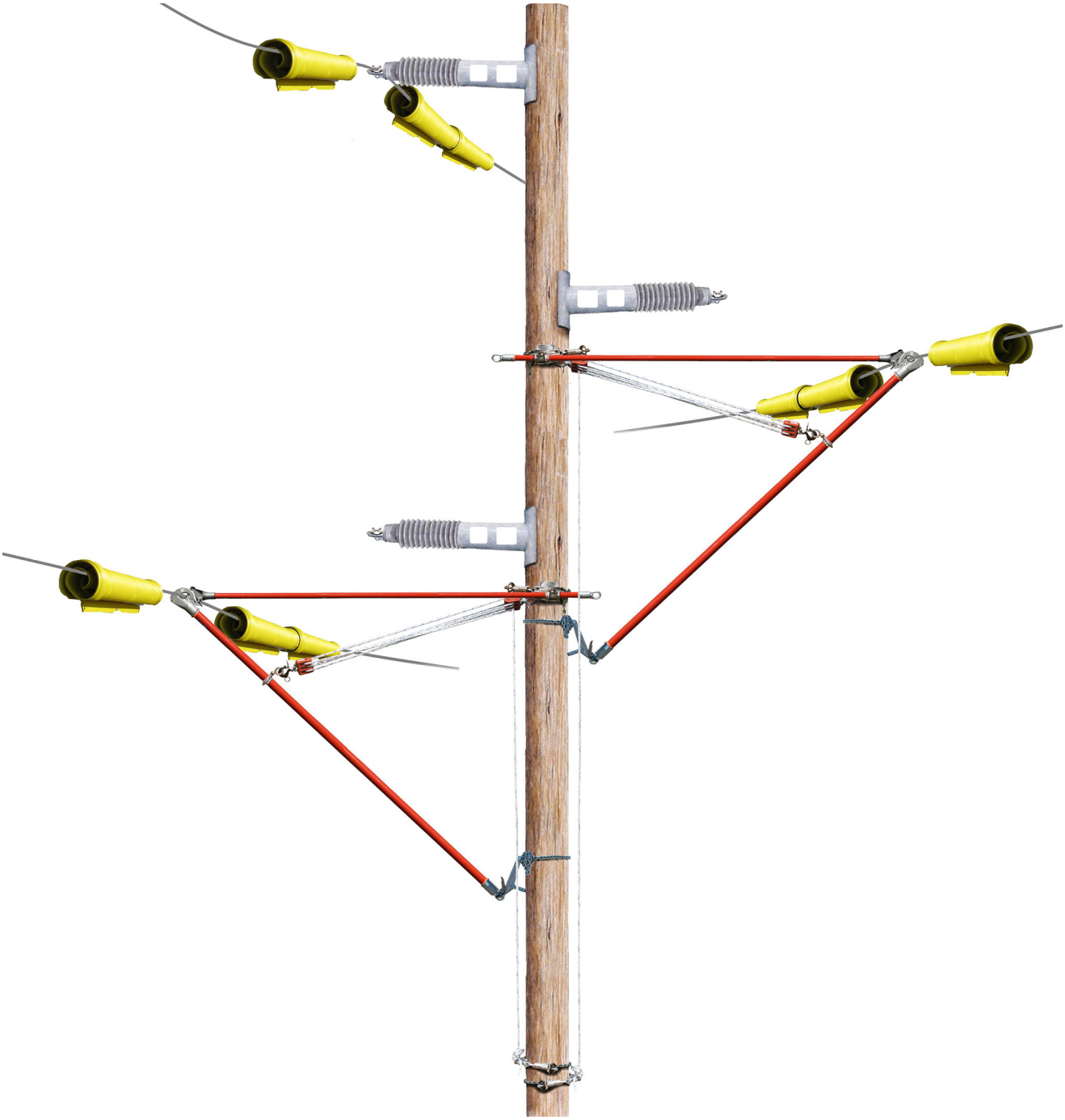
Procedure

1. If a distribution circuit or conductors are located on the pole, they must be covered and then relocated onto extension arms or completely removed from the existing cross arm. A clear working space must be created in order to install rigging, climb through, or make room to set a new pole. If a new pole is to be installed, plan to set it as close to the old pole as possible.
2. Attach wire tong bands to three 2-1/2" x 10' lifting tongs, 36 inches from the head of each tong.
3. Attach the head of a lifting tong to the conductor on the bottom transmission phase with the jaw opening facing the pole.
4. Attach a lever lift to the swivel ring on the wire tong. Swing the lever lift and lifting tong butt to the pole and attach to the pole in line with the conductor.
5. Attach a 1-1/2" wire tong saddle on the working side of the pole approximately 24 inches below the bottom of the insulator bracket.
6. Attach a 1-1/2" x 10' holding tong to the conductor alongside the lifting tong with the jaw opening facing down. Put the holding tong in the wire tong saddle clamp. Close the clamp, slide the holding tong out slightly and tighten the wire tong saddle clamp.



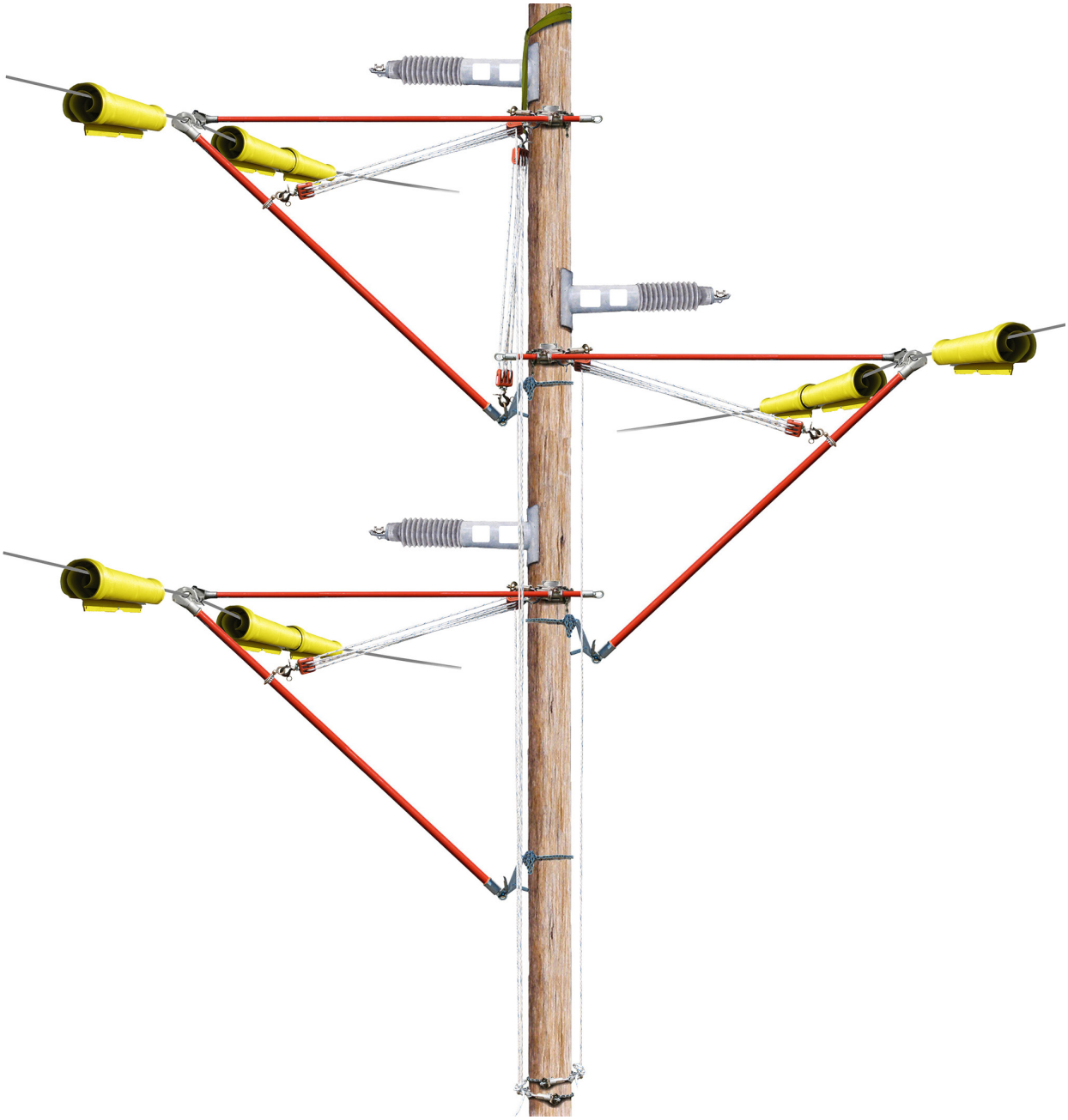
Post Type Armless Construction — 3 HPD 60KV

7. Install a nylon sling on the pole just below the saddle. Place a set of rope blocks in the sling and attach the other end in the clevis on the lever lift. Have the ground help install two rope snubbing brackets on the pole approximately 4 feet above the ground. Have the ground help remove the slack from the rope blocks fall line and secure the line in the rope snubbing bracket.
8. Install a second set of rope blocks between the holding tong saddle clevis and the wire tong band attached to the lifting tong. Have the ground help remove the slack from the fall line and secure the line in the rope snubbing bracket.
9. If setting a new pole, the conductor should be covered before removal from the insulator. The cover should be placed on the conductor on the side of the old pole where the new pole will be located.
10. While one lineman is using a universal stick mounted ratchet wrench with a deep well socket to loosen the nuts on the conductor clamp, the other lineman utilizing another stick can rotate the keeper piece and free the conductor.
11. When the conductor is free, loosen the wire tong saddle clamp on the holding tong and have the ground help pull the rope blocks fall line attached to the lever lift and raise the conductor approximately 12 inches.
12. While guiding the holding tong, slowly release the rope blocks attached to the band on the lifting tong and guide the conductor away from the pole until adequate working clearance is achieved. The holding tong can be pushed through the saddle until it can travel no further due to the butt ring casting. The holding wire tong clamp should then be securely tightened. Both sets of rope blocks can be slacked.
13. Moving up to the center conductor, on the working side of the pole, install a lifting tong and lever lift on this phase. Attach a 1-1/2" wire tong saddle on the working side of the pole approximately 24 inches below the bottom of the insulator bracket.
14. Attach a 1-1/2" x 10' holding tong to the conductor alongside the lifting tong with the jaw opening facing down. Put the holding tong in the wire tong saddle clamp. Close the clamp, slide the holding tong out slightly and tighten the wire tong saddle clamp.
15. Install a nylon sling on the pole just below the wire tong saddle. Place a set of rope blocks in the sling and attach the other end to the clevis on the lever lift. Have the ground help remove the slack from the rope blocks fall line and secure the line in a rope snubbing bracket.



16. Install a second set of rope blocks between the holding tong saddle clevis and the wire tong band mounted on the lifting tong. Have the ground help remove the slack from the fall line and secure the line in a rope snubbing bracket. If setting a new pole, the conductor should be covered before removal from the insulator. The cover should be placed on the conductor on the side of the old pole where the new pole will be located.

17. While one lineman is using a universal stick mounted ratchet wrench with a deep well socket to loosen the nuts on the conductor clamp, the other lineman utilizing another universal stick can rotate the keeper piece and free the conductor.
18. When the conductor is free, loosen the wire tong saddle clamp on the holding tong and have the ground help pull the rope blocks fall line attached to the lever lift and raise the conductor approximately 12 inches.
19. While guiding the holding tong, slowly release the rope blocks attached to the band on the lifting tong and guide the conductor away from the pole until adequate working clearance is achieved. The holding tong can be pushed through the saddle until it can travel no further due to the butt ring casting. The holding wire tong clamp should then be securely tightened. Both sets of rope blocks can be slacked.
20. On the top conductor, on the working side of the pole, install a lifting tong and lever lift on this phase. Attach a 1-1/2" wire tong saddle on the working side of the pole approximately 24 inches below the bottom of the insulator bracket.
21. Attach a 1-1/2" x 10' holding tong to the conductor alongside the lifting tong with the jaw opening facing down. Put the holding tong in the wire tong saddle clamp. Close the clamp, slide the holding tong out slightly and tighten.
22. Install a nylon sling on the pole just below the saddle. Place a set of rope blocks in the sling and attach the other end to the clevis on the lever lift. Have the ground help remove the slack from the blocks fall line and secure the line in a rope snubbing bracket.
23. Install a second set of rope blocks between the holding tong saddle clevis and the wire tong band mounted on the lifting tong. Have the ground help remove the slack from the fall line of the rope blocks and secure it in a rope snubbing bracket. Install at least one piece of cover on the conductor if a new pole will be set.
24. While one lineman is using a universal stick mounted ratchet wrench with a deep well socket to loosen the nuts on the conductor clamp, the other lineman utilizing another universal stick can rotate the keeper piece to free the conductor.
25. When the conductor is free, loosen the wire tong saddle clamp on the holding tong and have the ground help pull the rope blocks fall line attached to the lever lift and raise the conductor approximately 12 inches.
26. While guiding the holding tong, slowly release the rope blocks attached to the band on the lifting tong and guide the conductor away from the pole until adequate



working clearance is achieved. The holding tong can be pushed through the saddle until it can travel no further due to the butt ring casting. The holding wire tong saddle clamp should then be securely tightened. Both sets of blocks can be slacked.

27. With all three conductors removed from the pole and securely supported, the insulators and brackets can be removed safely. A new pole can now be installed if required.

28. When all replacement work is complete, move the conductors back into position or on to a new pole by reversing the above procedure.

Triangular Pin Type Construction TPA 60 kV

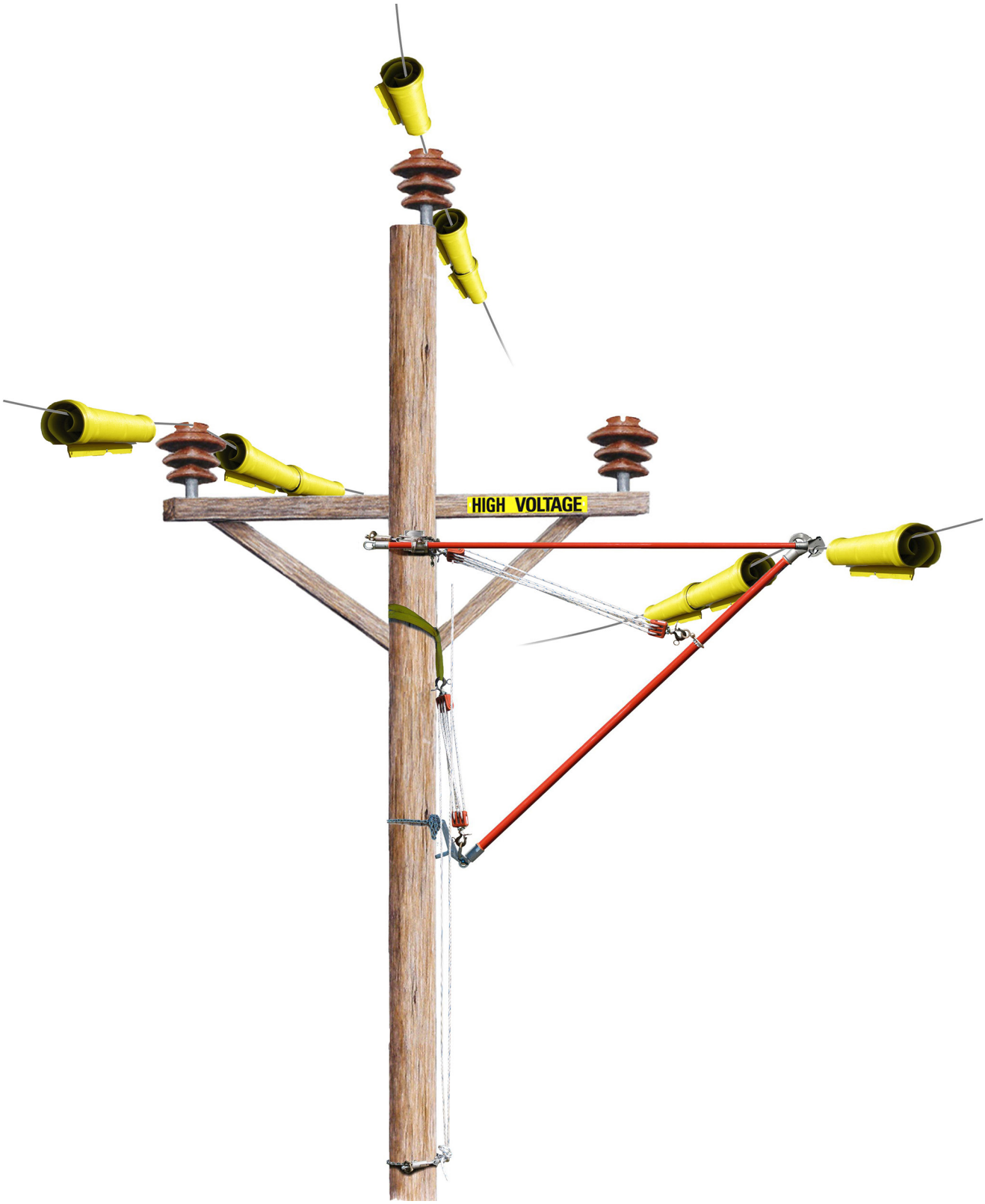
Insulator, Cross Arm or Pole Change Procedure

Before removing any conductors from an existing pole, the condition of the adjacent poles, conductors and tie wires must be visually inspected and determined to be in good condition before starting this procedure.

The condition of all involved poles must be determined safe to rig on or climb, if required.

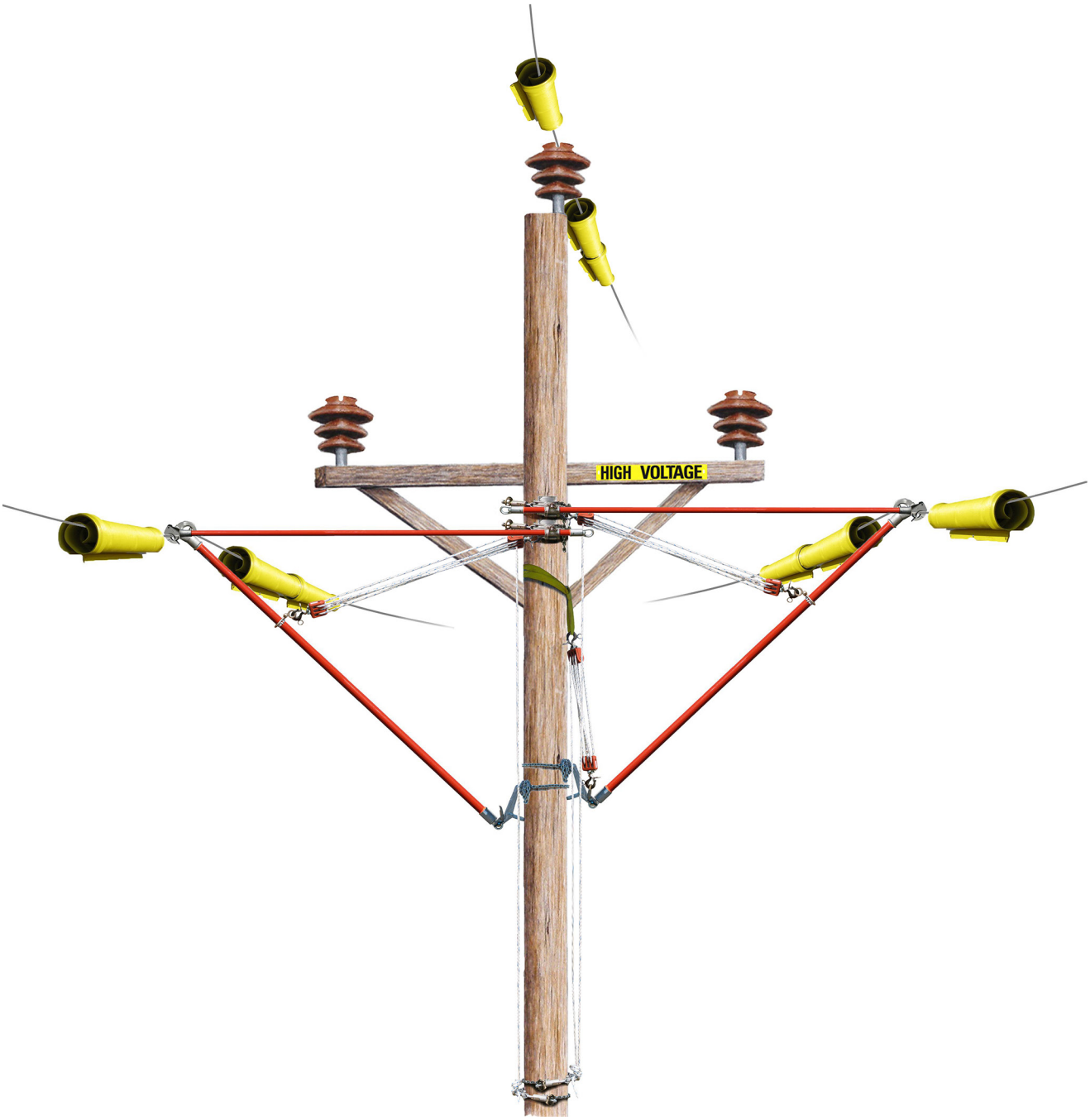
Procedure

1. If a distribution circuit or conductors are located on the pole, they must covered and then relocated onto extension arms or completely removed from the cross arm. A clear working space must be created in order to install rigging, climb through, or make room to set a new pole. If a new pole is to be installed, plan to set it as close to the old pole as possible.
2. On the working side of the pole, on the first outside transmission phase to be moved, untie the tie wire. If the tie wire is broken or damaged, the lifting tong and holding tong should be installed before untying the conductor. Protect the arm if necessary with insulated cover. While untying the conductor, any excess tie wire or preform should be cut off to prevent it from making contact with the cross arm, pole top, tools or equipment.
3. Attach a wire tong band to the 2-1/2" x 10' lifting tong 36 inches from the head of the tong.
4. Attach the head of the lifting tong to the conductor with the jaw opening facing the pole.
5. Attach a lever lift to the swivel ring on the wire tong. Swing the lever lift and lifting tong butt to the pole and attach to the pole in line with the conductor.
6. Attach a 1-1/2" wire tong saddle to the pole face opposite the cross arm just above where the arm braces are attached to the pole.



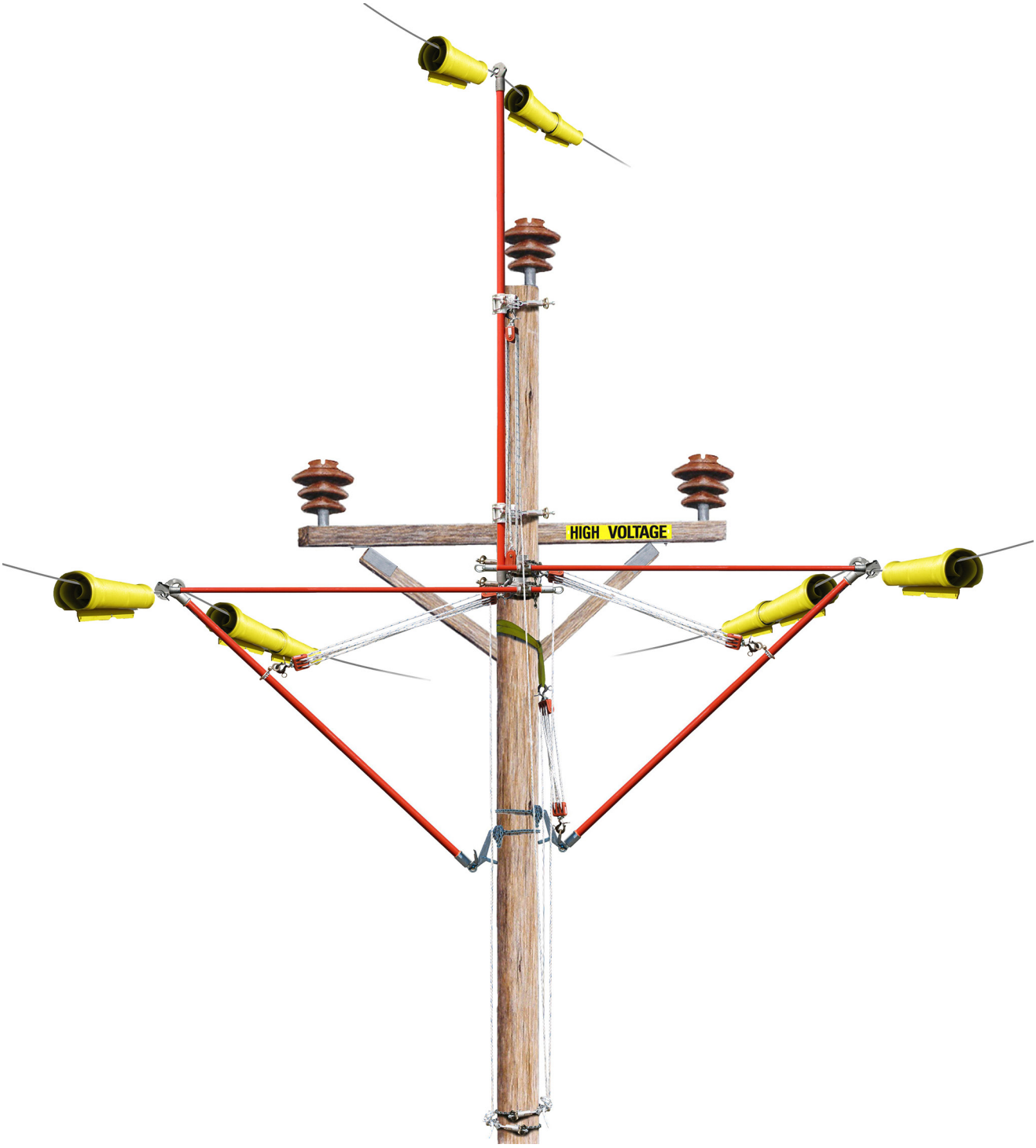
Triangular Pin Type Construction — TPA 60 kV

7. Attach a 1-1/2" x 10' holding tong to the conductor alongside the lifting tong with the jaw opening facing down. Put the holding tong in the wire tong saddle clamp. Close the clamp, slide the holding tong out slightly and tighten the wire tong saddle clamp.
8. Install a nylon sling on the pole about 3 feet below the saddle. Place a set of rope blocks in the sling and attach the other end of the rope blocks to the clevis on the lever lift. Have the ground help install a rope snubbing bracket on the pole approximately 4' above the ground. Have the ground help remove the slack from the rope blocks fall line and secure the line in the rope snubbing bracket.
9. Install a second set of rope blocks between the holding tong saddle clevis and the wire tong band attached to the lifting tong. Have the ground help remove the slack from the fall line and secure the line in the rope snubbing bracket.
10. If setting a new pole, the conductor should be covered before removal from the insulator. The cover should be placed on the conductor on the side of the old pole where the new pole will be located.
11. While one lineman is using a universal stick to put downward pressure on the conductor to hold it in the insulator groove, another lineman can finish untying the conductor from the insulator. Any excess tie wire or preform should be cut off to prevent it from making contact with the cross arm, tools or equipment.
12. When the conductor is completely untied, loosen the wire tong saddle clamp on the holding tong and have the ground help pull the rope blocks fall line attached to the lever lift and raise the conductor approximately 12 inches.
13. While guiding the holding tong, slowly release the rope blocks attached to the band on the lifting tong and guide the conductor away from the pole until adequate working clearance is achieved. The holding tong can be pushed through the saddle until it can travel no further due to the butt ring casting. The holding wire tong saddle clamp should then be securely tightened. Both sets of rope blocks can be slacked.
14. On the opposite outside conductor, untie and remove the tie wire or preform tie on the working side of the pole. Install a lifting tong and lever lift on this phase. Remove the rope blocks from the opposite phase sling. Rotate the sling for use on the conductor being moved and attach the rope blocks to the sling and to the newly installed lever lift clevis.



15. Install a second 1-1/2" wire tong saddle with 4-inch extension either just above or just below the saddle on the pole face. Attach a holding tong to the conductor and place it in the wire tong saddle clamp. Close the clamp and slide the holding tong out slightly and tighten the wire tong saddle clamp. Install a set of rope blocks between the new saddle and the new lifting tong band. Install a conductor cover if needed and completely untie the conductor from the insulator and move the phase out to a safe working location. Securely tighten the saddle clamp and slack both sets of blocks.

16. Install a pole cover on the top of the pole. On the center phase, untie and cut the tie wire or preform tie from the conductor on the working side of the pole. Remove excess tie material.
17. Attach a 2-1/2" wire tong saddle with a 4-inch clamp extension on the working side of the pole just above the cross arm. Attach a 2-1/2" x 16' lifting tong to the center conductor and then slide the lifting tong into the wire tong saddle clamp. Tighten the wire tong clamp.
18. Take a second 2-1/2" wire tong saddle with 4-inch extension clamp and clamp it loosely on the lifting tong at least 6 feet below the first saddle. Now attach the wire tong saddle to the pole face so that the wire tong is plumb and parallel with the pole. Tighten the wire tong clamp.
19. Install a set of rope blocks between the wire tong saddle clamp clevis on the top saddle and the swivel ring on the bottom of the wire tong. Have the ground help remove all slack from the fall line of the rope blocks and secure it in a rope snubbing bracket. While the ground help is holding the strain on the fall line, both saddle clamps can be loosened just enough to allow the lifting tong to slide through them. Install at least one piece of cover on the conductor if a new pole will be set.
20. While one lineman is using a universal stick to put downward pressure on the conductor to hold it in the insulator groove, another lineman can untie the conductor from the insulator. While untying the conductor, any excess tie wire or preform tie should be cut off to prevent it from making contact with the mounting bracket or pole top.
21. The conductor can now be lifted free of the insulator from the ground by pulling on the fall line of the rope blocks. Have the ground help raise conductor off the insulator until adequate working clearance is achieved. Have the ground help secure the rope blocks fall line to the rope snubbing bracket and tighten the two wire tong saddle clamps securely.
22. With all three conductors removed from the pole and securely supported, the insulators, pole top bracket and cross arm can be removed safely. A new pole can now be installed if required.
23. When all replacement work is complete, move the conductors back into position or on to a new pole by reversing the above procedure.


HIGH VOLTAGE

Flat Pin Type Construction TPAF 60 kV

Insulator, Cross Arm or Pole Change Procedure

Before removing any conductors from an existing pole, the condition of the adjacent poles, conductors and tie wires must be visually inspected and determined to be in good condition before starting this procedure.

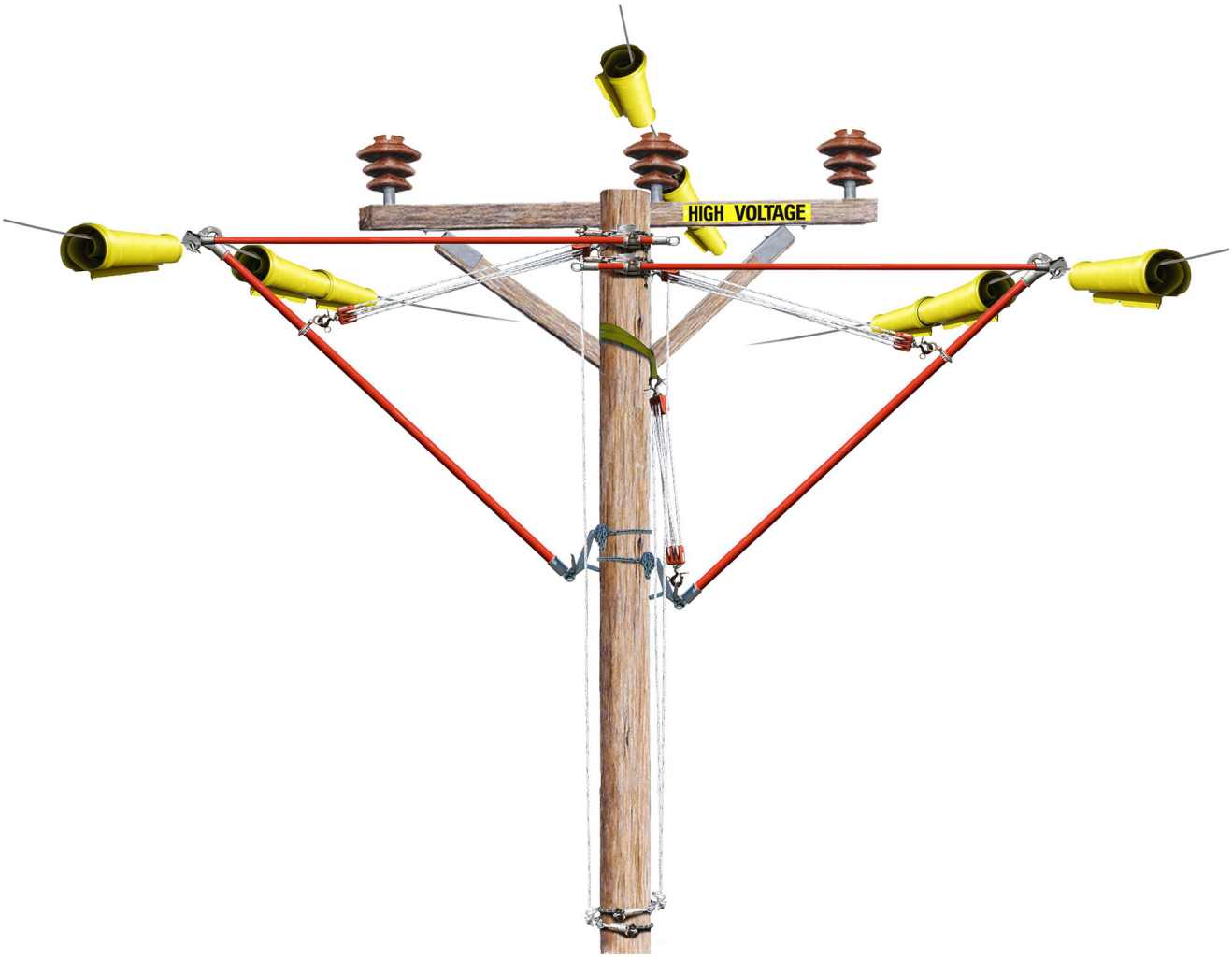
The condition of all involved poles must be determined safe to rig on or climb, if required.

Procedure

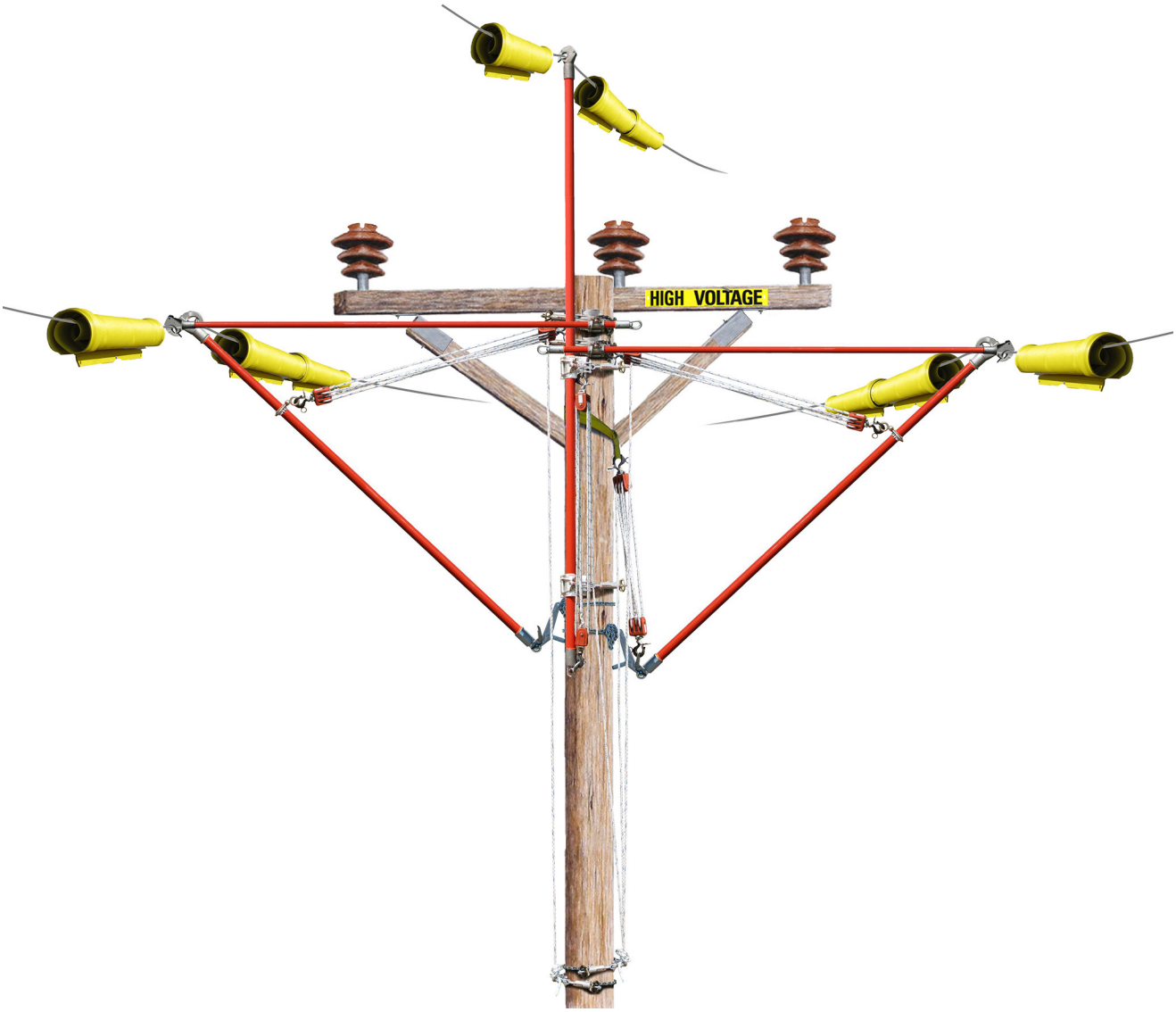
1. If a distribution circuit or conductors are located on the pole, they must covered and then relocated onto extension arms or completely removed from the cross arm. A clear working space must be created in order to install rigging, climb through, or make room to set a new pole. If a new pole is to be installed, plan to set it as close to the old pole as possible.
2. On the working side of the pole, on the first outside transmission phase to be moved, untie the tie wire. If the tie wire is broken or damaged, the lifting tong and holding tong should be installed before untying the conductor. Protect the arm if necessary with insulated cover. While untying the conductor, any excess tie wire or preform tie should be cut off to prevent it from making contact with the cross arm, pole top, tools or equipment.
3. Attach a wire tong band to a 2-1/2" x 10' lifting tong, 36 inches from the head of the tong.
4. Attach the head of the lifting tong to the conductor with the jaw opening facing the pole.
5. Attach a lever lift to the swivel ring on the lifting tong. Swing the lever lift and lifting tong butt to the pole and attach to the pole in line with the conductor.

Flat Pin Type Construction — TPAF 60 kV

6. Attach a 1-1/2" wire tong saddle to the pole face opposite the cross arm just below where the arm braces are attached to the pole.
7. Attach a 1-1/2" x 10' holding tong to the conductor alongside the lifting tong with the jaw opening facing down. Put the holding tong in the wire tong saddle clamp. Close the clamp, slide the holding tong out slightly and tighten the wire tong saddle clamp.
8. Install a nylon sling on the pole just above the wire tong saddle. Place a set of rope blocks in the sling and attach the other end of the rope blocks to the clevis on the lever lift. Have the ground help install a rope snubbing bracket on the pole approximately 4 feet above the ground. Have the ground help remove the slack from the rope blocks fall line and secure the line in the rope snubbing bracket.
9. Install a second set of rope blocks between the holding tong saddle clevis and the wire tong band attached to the lifting tong. Have the ground help remove the slack from the fall line and secure the line in the rope snubbing bracket.
10. If setting a new pole, the conductor should be covered before removal from the insulator. The cover should be placed on the conductor on the side of the pole where the new pole will be located.
11. While one lineman is using a universal stick to put downward pressure on the conductor to hold it in the insulator groove, another lineman can finish untying the conductor from the insulator. Any excess tie wire or preform should be cut off to prevent it from making contact with the cross arm, tools or equipment.
12. When the conductor is completely untied, loosen the saddle clamp on the holding tong and have the ground help pull the rope blocks fall line attached to the lever lift and raise the conductor approximately 12 inches.
13. While guiding the holding tong, slowly release the rope blocks attached to the band on the lifting tong and guide the conductor away from the pole until adequate working clearance is achieved. The holding tong can be pushed through the wire tong saddle until it can travel no further due to the butt ring casting. The holding wire tong clamp should then be securely tightened. Both sets of rope blocks can then be slacked.
14. On the opposite outside conductor, untie and remove the tie wire or preform tie on the working side of the pole. Install a lifting tong and lever lift on this phase. Remove the rope blocks from the opposite phase sling. Rotate the sling for use on the conductor being moved and attach the rope blocks to the sling and to the newly installed lever lift clevis.


HIGH VOLTAGE

15. Install a second 1-1/2" wire tong saddle just below the first wire tong saddle on the pole. Attach the holding tong to the conductor and install a set of rope blocks between the new saddle and the lifting tong band. Install a conductor cover if needed and completely untie the conductor from the insulator and move the phase out to a safe working location. Securely tighten the saddle clamp and slack both sets of blocks.
16. On the center phase, untie and cut the tie wire or preform tie from the conductor on the working side of the pole. Remove excess tie material.
17. Attach a 2-1/2" wire tong saddle with 4-inch extension on the working side of the pole approximately 2 feet above the lever lifts. Attach a 2-1/2" x 10' lifting tong to the center conductor and then put the lifting tong in the wire tong saddle clamp. Pull down on the lifting tong slightly to hold the conductor in the insulator groove. Tighten the wire tong clamp.
18. Install a 1-1/2" wire tong saddle with 4-inch extension on the pole below the other two saddles. Install the holding tong on the conductor alongside the lifting tong head. Put the holding tong pole in the saddle clamp and tighten.
19. Hang a set of rope blocks between the 1-1/2" saddle clamp and the lifting tong swivel ring. Attach a second set of rope blocks between the lifting tong saddle and the swivel ring on the butt of the lifting tong.
20. Install a conductor cover on the center phase. Install a pole top cover on the pole. Install arm protection if needed.
21. Have the ground help put slight tension on the rope blocks fall line in preparation for moving the conductor.
22. While one lineman is using a universal stick to put downward pressure on the conductor to hold it in the insulator groove, another lineman can untie the conductor from the insulator. While untying the conductor, any excess tie wire or preform should be cut off to prevent it from making contact with the pole top, cross arm, tools or equipment.
23. The conductor can now be lifted free of the insulator by pulling on the fall line of the rope blocks. Working both sets of blocks, the conductor can be moved up and out away from the pole until adequate working clearance is achieved.



24. With all three conductors removed from the pole and securely supported, the insulators, cross arm or pole can be replaced.

25. When all replacement work is complete, move the conductors back into position by reversing the above procedure.

Tri Post & Suspension Construction TPSR 44-70 kV

(Light Loading) DWG. 053804

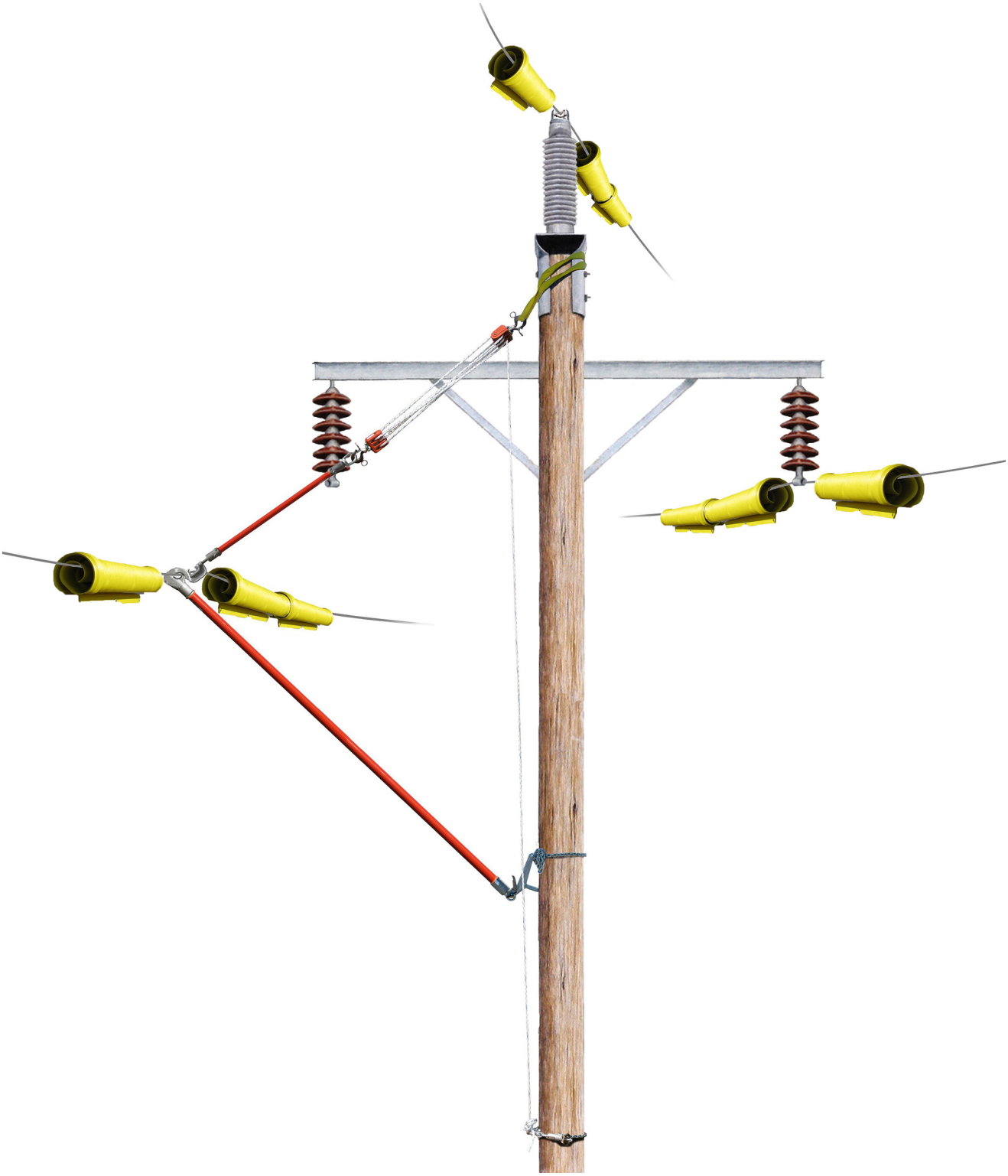
Insulator, Cross Arm or Pole Change Procedure

Before removing any conductors from an existing pole, the condition of the adjacent poles, conductors and attachments must be visually inspected and determined to be in good condition before starting this procedure.

The condition of all involved poles must be determined safe to rig on or climb, if required.

Procedure

1. If a distribution circuit or conductors are located on the pole, they must be covered and then relocated onto extension arms or completely removed from the existing cross arm. A clear working space must be created in order to install rigging, climb through, or make room to set a new pole. If a new pole is to be installed, plan to set it as close to the old pole as possible.
2. On the working side of the pole, on the first lower transmission phase to be moved, attach the head of a 2" x 12' lifting tong to the conductor with the jaw opening facing the pole.
3. Attach a lever lift to the swivel ring on the wire tong. Swing the lever lift and lifting tong butt to the pole and attach to the pole in line with the conductor.
4. Attach a second lifting tong and lever lift to the opposite bottom phase conductor and attach to the pole just above or just below the first lever lift.
5. Attach a 1-1/2" wire tong saddle on the pole face with the cross arm at the conductor level.



Tri Post & Suspension Construction — TPSR 44-70 kV

6. Attach a 1-1/2" x 10' holding tong to the conductor alongside the lifting tong with the jaw facing down on the first conductor to be moved. Put the holding tong in the wire tong saddle clamp. Close the clamp, slide the holding tong out slightly and tighten the wire tong saddle clamp.

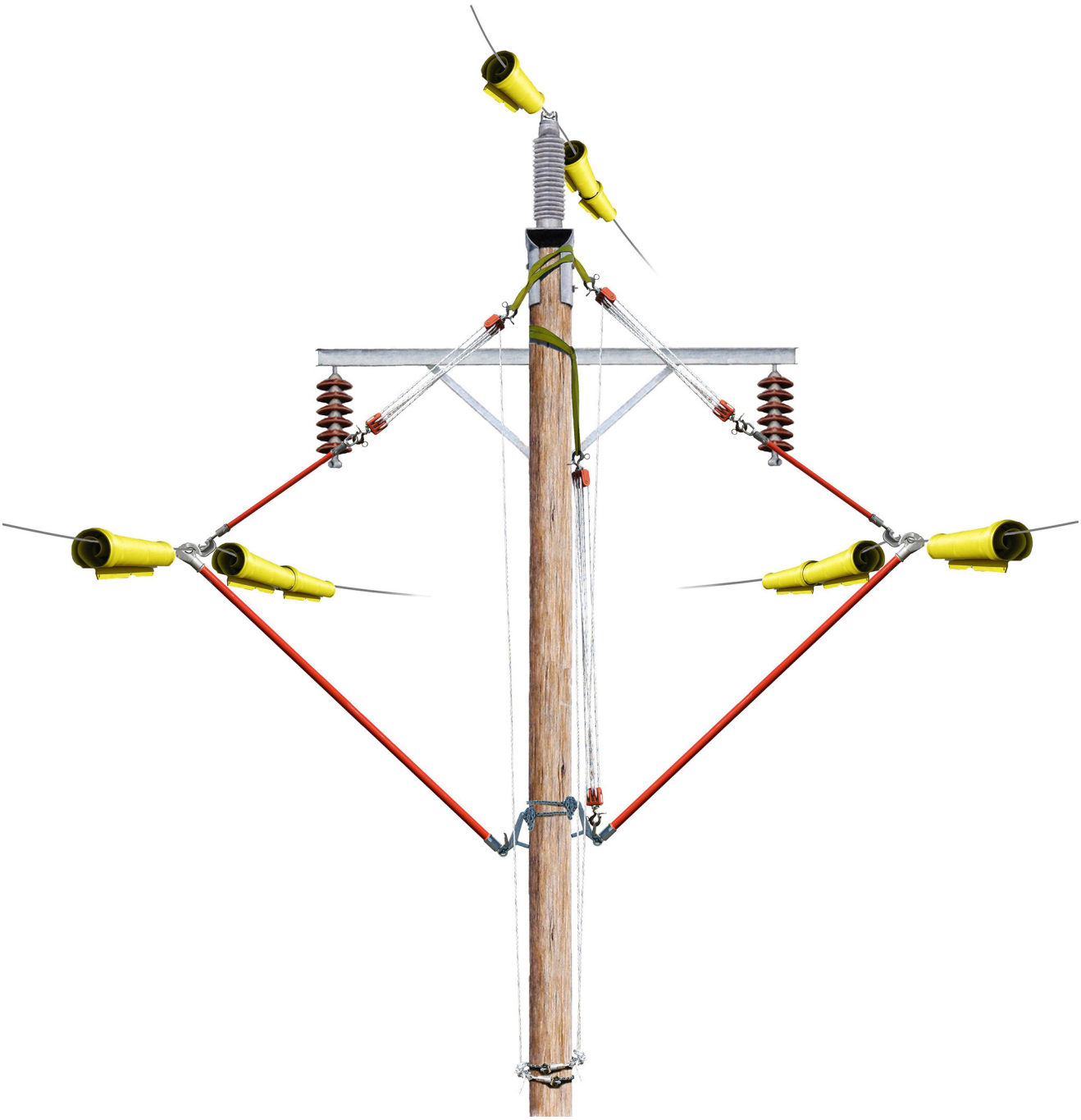
7. Install a nylon sling on the pole just below the cross arm brace attachment point. Place a set of rope blocks in the sling and attach the other end of the rope blocks to the clevis on the lever lift. Have the ground help install two rope snubbing brackets on the pole approximately 4 feet above the ground. Have the ground help remove the slack from the rope blocks fall line and secure the line in a rope snubbing bracket.

8. Install a second nylon sling and set of rope blocks above the cross arm. Attach the rope blocks to the butt ring of a 1-1/2" x 4' strain link stick. Attach the strain link stick to the conductor alongside the wire tongs. Again ask the ground help to remove the slack from the rope blocks fall line and secure the line in the rope snubbing bracket. If setting a new pole or removing and replacing the cross arm, the conductor should be covered before removal from the insulator string. The cover should be placed on the conductor on the side of the old pole where the new pole will be located, or both sides if removing and replacing an arm.

9. One lineman utilizing a universal stick with a cotter key puller attached can release the cotter key from the conductor clamp. The first lineman can now clamp the bottom insulator just above the bell with an adjustable insulator fork attached to the other end of the universal pole. Have the ground help raise the conductor slightly by pulling on the rope blocks fall line attached to the lever lift. The second lineman utilizing a ball and socket adjuster mounted on a universal pole can disengage the ball-socket joint.

10. When the conductor is free, loosen the wire tong saddle clamp on the holding tong and slide the holding tong out while the ground help is slowly releasing the tension on the strain link stick rope blocks. Working together, move the conductor out away from the pole until adequate working clearance is achieved. The holding tong can be pushed through the saddle until it can travel no further due to the butt ring casting. The holding wire tong clamp should then be securely tightened. Both sets of rope blocks can be slacked.

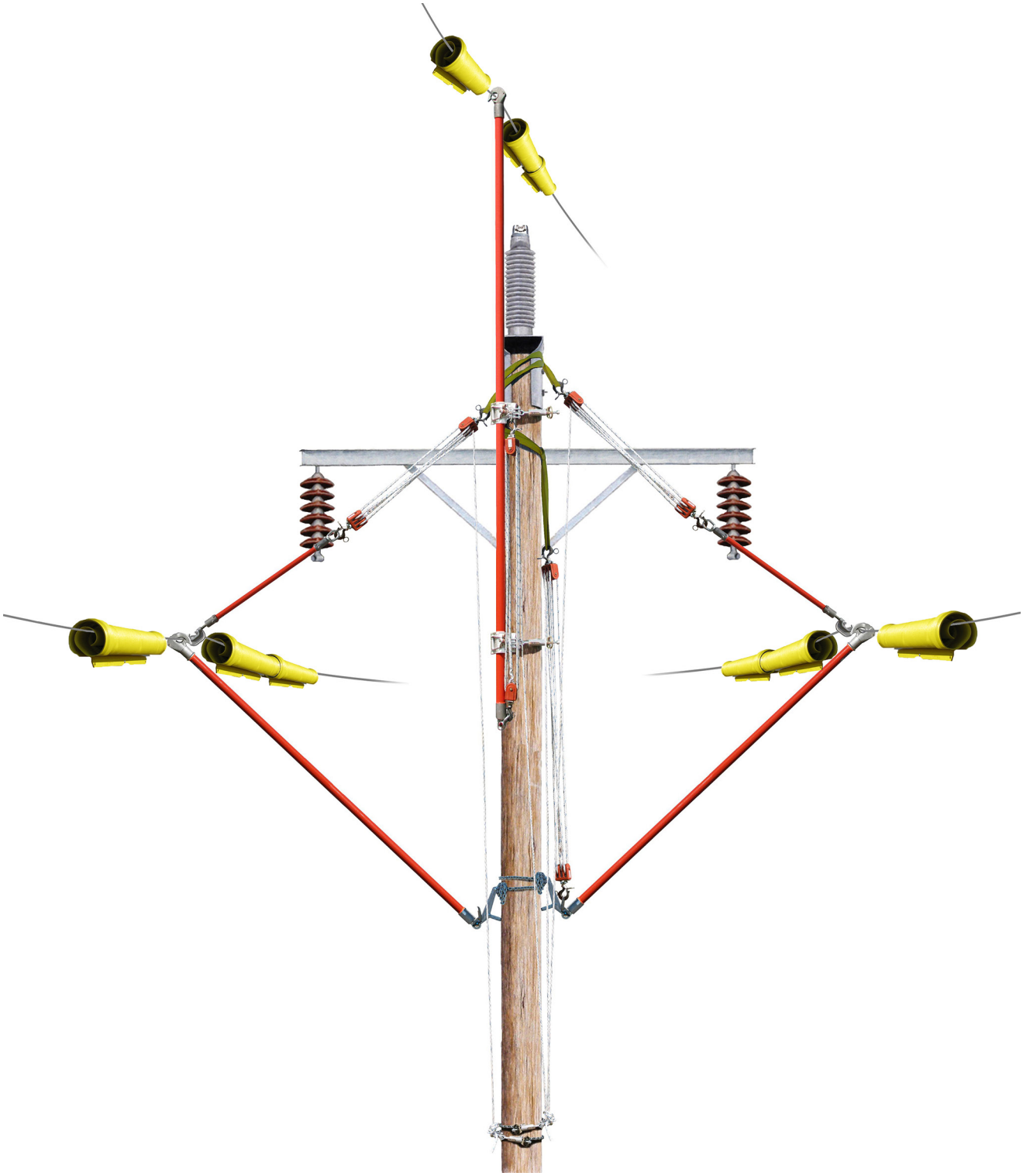
11. Remove the strain link stick from the conductor and attach it to the opposite phase. Rotate the nylon sling so that the eye is in line with the link stick on the conductor. Have the ground help remove the slack from the rope blocks fall line and secure the line in a rope snubbing bracket.



12. Remove the rope blocks from the remaining nylon sling and the lever lift clevis. Rotate the sling around to the other side of the pole and reattach the rope blocks to the sling and the other lever lift clevis.

13. Install a second 1-1/2" wire tong saddle with 4-inch extension just below the first saddle on the pole face. Attach a 1-1/2" x 10' holding tong to the conductor alongside the lifting tong. Put the holding tong in the saddle clamp. Close the clamp, slide the holding tong out slightly and tighten.

14. Release the cotter key. Ask the ground help to raise the conductor slightly, and then disengage the ball-socket joint.
15. If conductor cover is required, install it now. Loosen the saddle clamp on the holding tong and while working with the ground help, slowly move the conductor out away from the pole until adequate clearance is achieved. Securely tighten the wire tong saddle clamp. Slack and remove the rope blocks from the lever lift and pole sling.
16. Attach a 2-1/2" wire tong saddle on the opposite side of the pole just above the cross arm.
17. Install a 24-inch pole cover on the top of the pole. On the center phase install a 2-1/2" x 16' wire tong on the conductor and slide it into the wire tong saddle clamp. Tighten the wire tong clamp.
18. Install a second 2-1/2" wire tong saddle loosely on the lifting tong at least 5 feet below the first saddle. Now attach the wire tong saddle to the pole face so that the wire tong is plumb and parallel with the pole. Tighten the wire tong clamp.
19. Install a set of rope blocks between the wire tong saddle clamp clevis on the top saddle and the swivel ring on the bottom of the wire tong. Have the ground help remove all slack from the fall line of the rope blocks and secure it in a rope snubbing bracket. While the ground help is holding the strain on the fall line, both saddle clamps can be loosened just enough to allow the lifting tong to slide through them. Install at least one piece of cover on the conductor if a new pole will be set.
20. Utilizing a universal stick mounted ratchet wrench loosen the nuts on the conductor clamp and rotate the keeper piece to free the conductor.
21. The conductor can now be lifted free of the insulator from the ground by pulling on the fall line of the rope blocks. Have the ground help raise the conductor off the insulator until adequate working clearance is achieved. Have the ground help to secure the rope blocks fall line to the rope snubbing bracket and tighten the two tong saddle clamps securely.
22. With all three conductors removed from the pole and securely supported, the insulators and cross arm can be removed safely. A new pole can now be installed if required.
23. When all replacement work is complete, move the conductors back into position or on to a new pole by reversing the above procedure.



Insulator Replacement Vertical Dead-End 60 kV

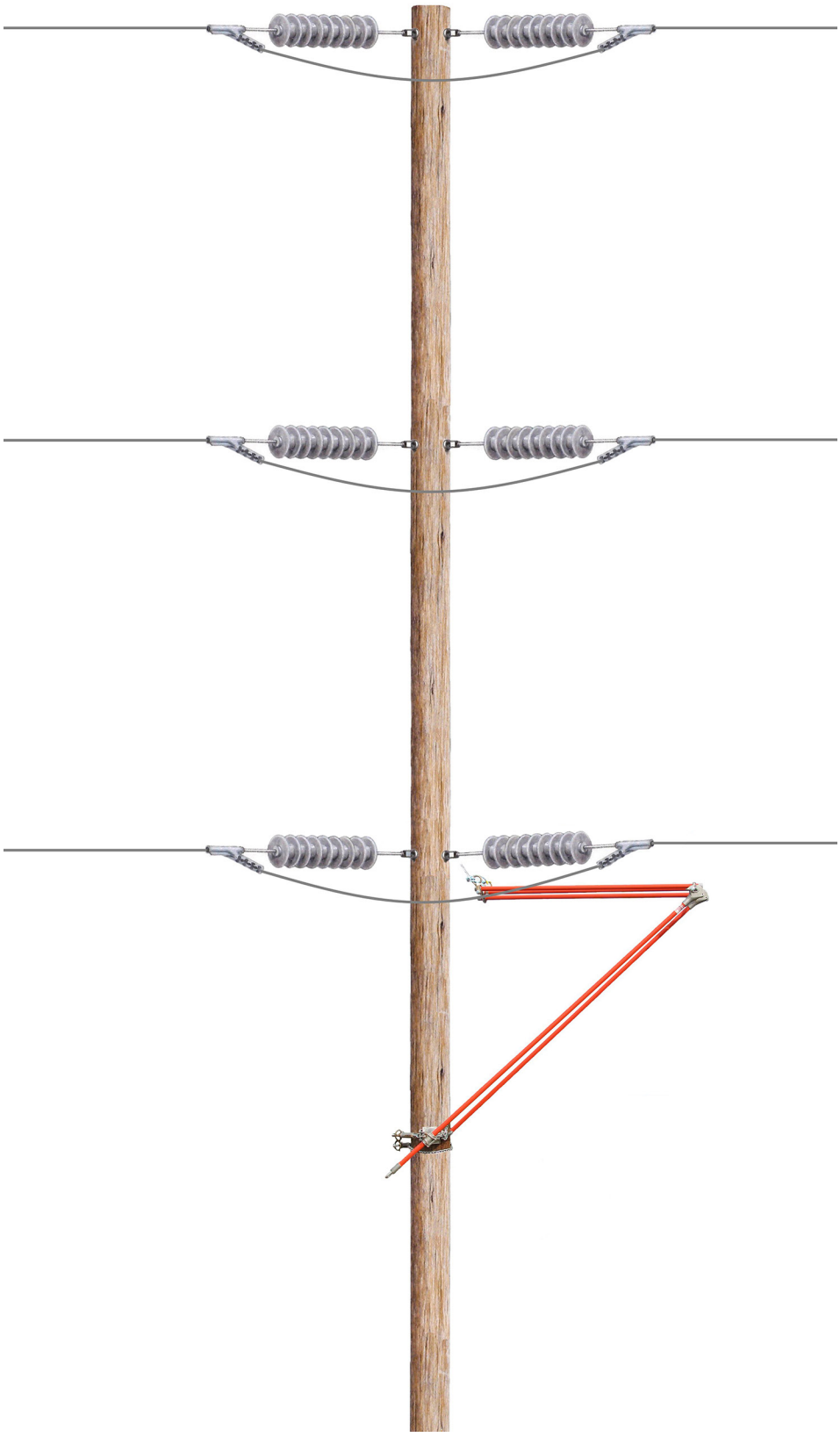
Insulator Replacement Procedure

Before removing any conductors from an existing pole, the condition of the adjacent poles, conductors and tie wires must be visually inspected and determined to be in good condition before starting this procedure.

The condition of all involved poles must be determined safe to rig on or climb, if required.

Procedure

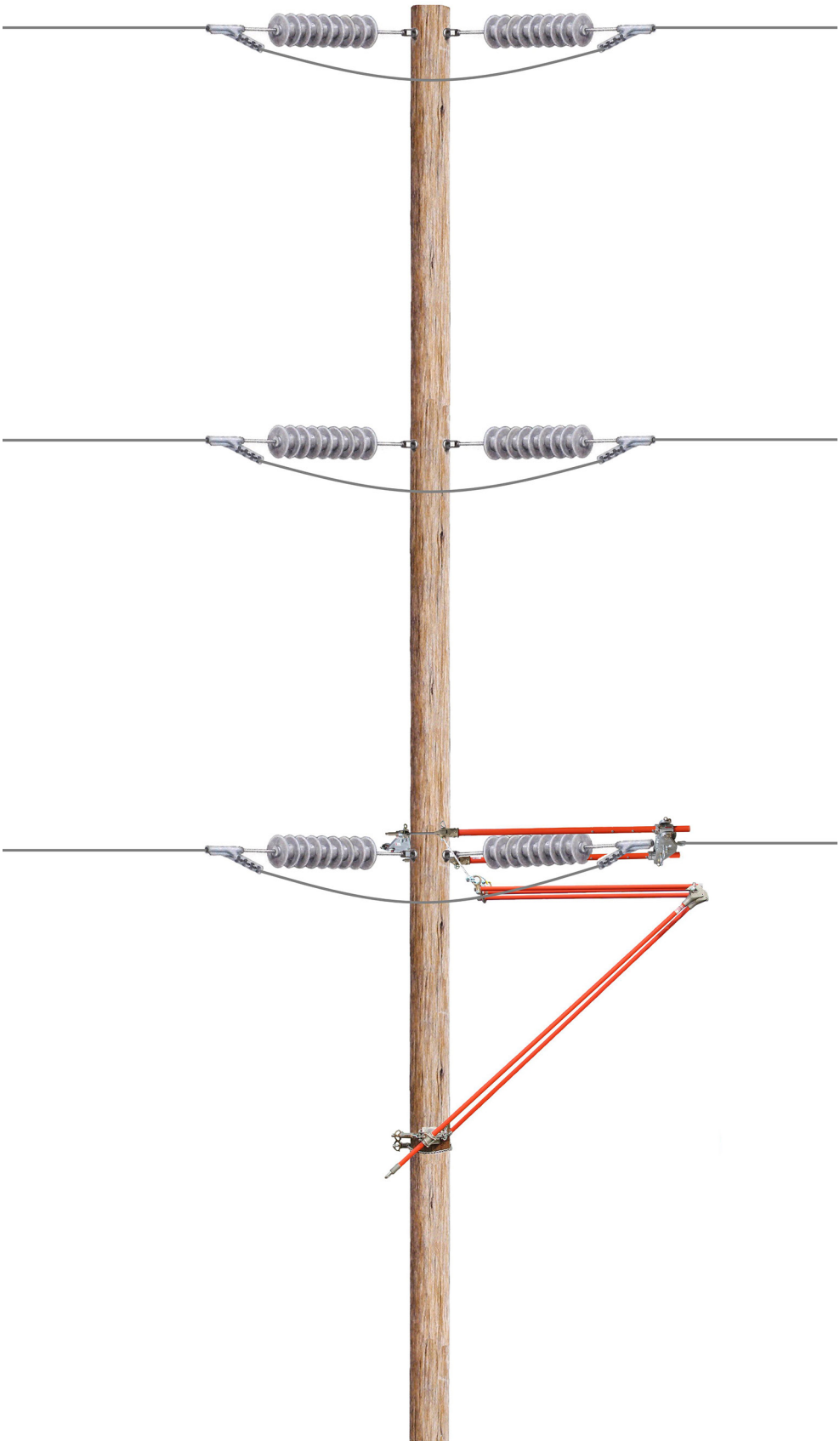
1. If a distribution circuit or conductors are located on the pole, they must covered or relocated in order to make a clear working space on the pole to install rigging, climb through or send tools up and down a hand line.
2. Assemble a two pole strain carrier and an insulator cradle on a tarp. Place the assembled strain carrier on two hot line tool racks.
3. Attach the cold end yoke to the pole behind the insulator string to be removed. Usually, the cold end yoke is attached to the back of the pole opposite the insulator string and secured to the pole with the pole strap. If hardware or space does not permit this, the cold yoke can also be attached to the front of the pole with a chain.
4. Utilizing a universal pole, one lineman can install a wire grip on the conductor approximately where the hot yoke can hook onto it.
5. Remove one strain pole from the hot yoke of the two pole strain carrier. Attach the hot yoke with the other strain pole engaged to it to a 4-foot link stick on the end of a split hand line. Have the ground help raise the assembly on the hand line and hold the weight of the assembly while one lineman guides the hot yoke into place on the conductor by grasping the cold end of the strain pole. Straddle the conductor with the yoke until the hot yoke hooks the wire grip. Rotate the hot yoke until it is in a horizontal position and install the threaded strain jack at the rear end of the strain



Insulator Change, Vertical Dead-End — 60 kV

pole into the slot on the cold yoke on the same side of the pole. Remove the link stick and hand line from the strain carrier assembly with a universal pole.

6. Again utilizing the strain link stick on the split hand line to raise and position the remaining strain pole, place the pole clamp of the remaining strain pole in the slot of the hot yoke and make certain that it is secure. Install the threaded strain jack into the remaining slot on the cold end yoke. Utilizing a universal pole, push the wire grip out on the conductor until it is in tension with the hot end yoke hook. Hand tighten both trunnion nuts until the strain poles are even.
7. Install the insulator cradle on the pole by tying it to the pole just below the insulator string. Attach two 1-1/2" wire tong pole saddles to opposite sides of the pole in a position that will allow two 1-1/2" x 10' wire tongs to support the insulator cradle.
8. Clamp the 1-1/2" wire tongs to the lugs on each side of the insulator cradle bracket at the hot end of the cradle. Place the wire tongs into the saddle clamps on each side of the pole and loosely tighten. Slide the wire tongs through the saddle clamps, lifting the insulator cradle until it is in position against the insulator string, then tighten the saddle clamps securely. The insulator cradle can also be supported by the hot yoke with eye bolts if there is limited space between phase attachments.
9. Install the ratchet wrenches on the trunnion nuts and begin to turn the nuts until the strain is relieved from the insulator string. The two nuts should be tightened alternately, keeping the strain pole assembly in proper alignment and equalizing the strain on both poles of the strain carrier.
10. When the strain has been relieved from the insulator string, release the cotter key on the ball socket joint at the dead-end clamp. Utilizing a cotter key puller or pusher installed on a universal pole. Continue relieving the strain on the insulator string until the ball socket joint is loose.
11. Separate the ball socket joint with a ball-socket adjuster mounted on a universal pole. A second lineman with a second universal pole can assist with the separation of the ball socket joint.
12. When the ball socket joint is separated, grasp both 1-1/2" wire tongs, loosen the saddle clamps, and lower the insulator cradle until the hand line can be tied on to the cold end of the string. Continue lowering the string until adequate clearance has been achieved to change a bad insulator in the string or remove the insulator string from the pole. The insulator string can be lowered to the ground for replacement.



Insulator Change, Vertical Dead-End — 60 kV continued

13. When insulator replacement is complete, place the insulator string in the cradle and attach the insulator string to the pole. Raise the insulator cradle with the wire tongs and tighten the saddle clamps securely.
14. Two linemen, each utilizing a universal pole, one with a ball socket adjuster attached, can now reconnect the ball socket joint. When the hot end of the insulator string is attached to the dead-end clamp, begin to slowly release the strain carrier by reversing the trunnion nuts. When the insulator string is supporting part of the weight of the conductor, tap the cotter key back into position with a ball-socket adjuster mounted on a universal pole.
15. Lower the insulator cradle to a vertical position and remove the holding wire tongs from the saddle clamps. Send the wire tongs and 1-1/2" wire tong pole saddles to the ground. Untie the cold end of the insulator cradle from the pole and send the cradle to the ground.
16. Continue to loosen the trunnion nuts on the strain carrier until the weight of the conductor is carried by the insulator string. Use a universal pole to attach the split hand line with link stick attached to the first strain pole to be removed.
17. While holding one pole of the strain carrier, disengage the pole supported by the hand line from first the cold end and then the hot end of the strain carrier. A second lineman should assist with a universal pole. Send the free pole to the ground.
18. Controlling the hot end yoke with the cold end of the remaining strain pole, rotate the hot end yoke so that it is straddling the conductor. Utilizing a universal pole, remove the wire grip from the conductor and send it to the ground.
19. Utilizing a universal pole, attach the link stick on the hand line to the hot yoke. Have the ground help support the weight of the strain pole assembly and guide it free of the conductor with a universal pole, being careful not to nick the insulator string. Send the assembly to the ground.
20. The cold end yoke can be removed from the pole and sent to the ground.
21. Remove the hand line from the pole.