



QEAM TM-21, TM-25, TM-30, and TM-34 Strap-drive Masts Operating Manual



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TP-4619601-C

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Safety Precautions and Warnings

WARNING

Mast Extension Hazard! Do not deploy the mast if power lines are less than 150 ft. (45m) from the center of the deployment site. Extending mast into obstructions could result in death or serious injury and could render the mast inoperable and partially extended. Before deploying the mast, be certain there is sufficient clearance above and to all sides of the expected location of the fully extended mast and payload. Keep all persons clear of mast and mast extension. Do not lean directly over the mast.

WARNING

Do not attempt to deploy the mast on soft or loose soil. The base plate and guy stakes could become unstable under wind loading and cause the mast to fall.

WARNING

Do not attempt to deploy or retrieve this mast during electrical storms or when winds exceed 25 mph (40 km/hr)

Helmets or hard hats, eye protection, gloves, and safety shoes or combat boots must be worn while working in the mast deployment area.

WARNING

Do not attempt to deploy the mast on ground that slopes more than 15 degrees (26.8%).

The mast must be vertical before deployment. Adjust guy lines as required until the bubble level indicates the mast is vertical.

CAUTION

Depending on the mast model, the mast weighs up to 275 lbs. (125 kg). Always observe weight lift limits.

CAUTION

Do not apply oil or grease to the mast. Lubricants will attract sand/dirt and may lead to premature wear and/or damage to the strap.

WARNING

Read all instructions before deploying this mast. Always follow guystake removal instructions to avoid injury and/or guystake damage.

WARNING

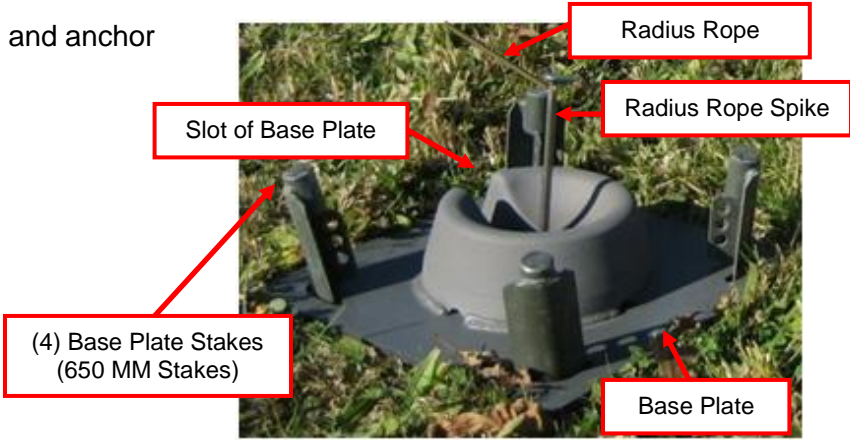
Safety Instruction - Trained Personnel Only! Death or serious injury could result if proper inspection, installation, operation and maintenance procedures are not observed. Installation, operation and maintenance to be performed by trained and authorized personnel only.

WARNING

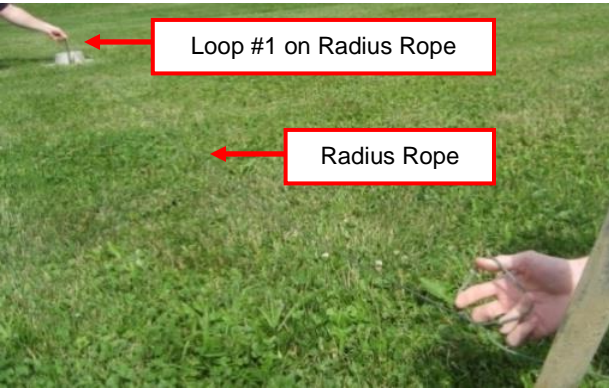
Safety Instruction - Read Manual! Failure to follow operating instructions could result in death or serious injury. Read and understand the operator's manual before using the mast.

**Section 1 Mast Deployment - Field Deployment With Optional Gin Pole and Winch
(3 man operation)**

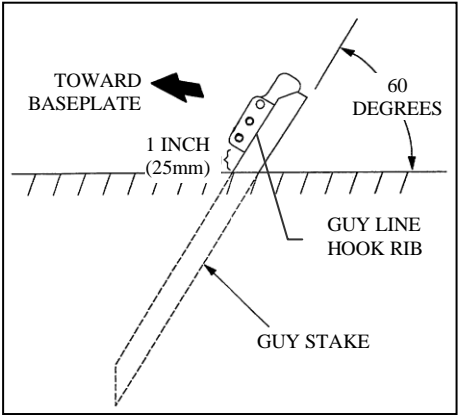
1. Select a site that has no more than a 15 degree (26.8%) slope, is suitable for deployment of guy stakes and guy lines and is at least 150 ft. (45 m) from overhead power lines.
2. Remove the accessories from the accessory bags. Refer to the accessory sheet (located at the end of the manual) for part identification and quantity.
3. Orient the base plate at the center of the site and anchor with four base plate stakes (650 mm stake).



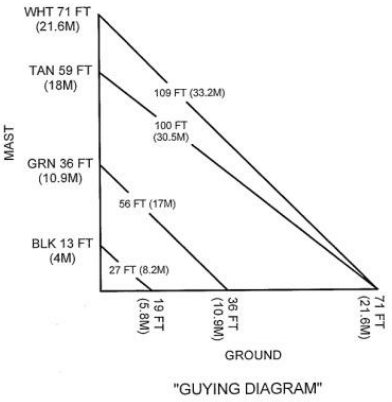
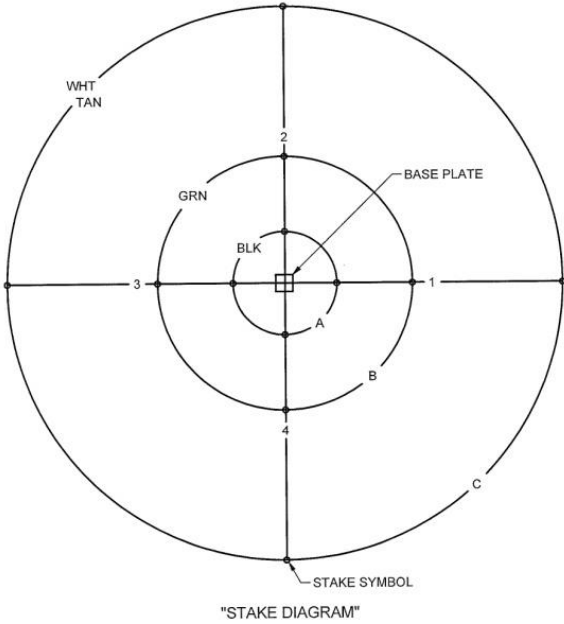
4. Place the radius rope spike through the center of the base plate and hook loop #1 of radius rope to it.
5. Unwind the radius rope in the direction of the slot-opening in the base plate.



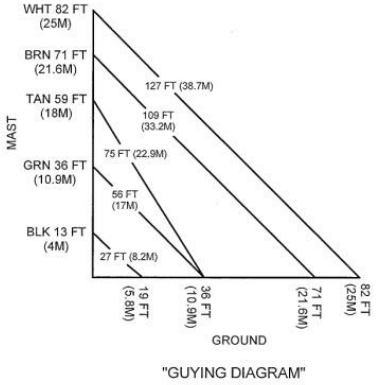
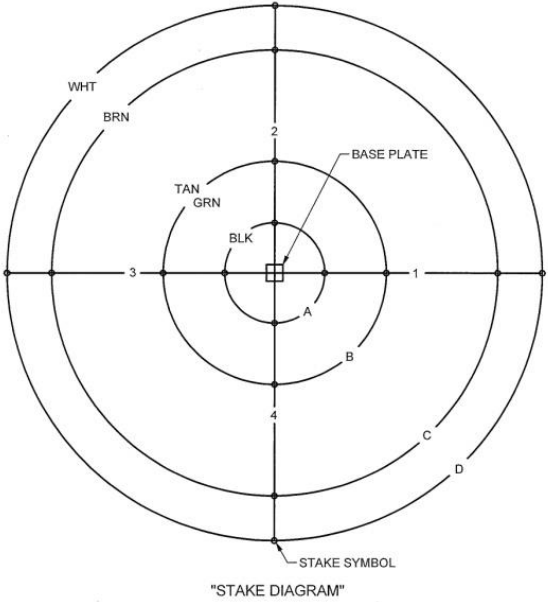
6. Hammer one (L850) guy stake at a 60 degree angle at each loop of the radius rope (total 3 for TM-21, total 4 for TM-25, TM-30, and TM-34).



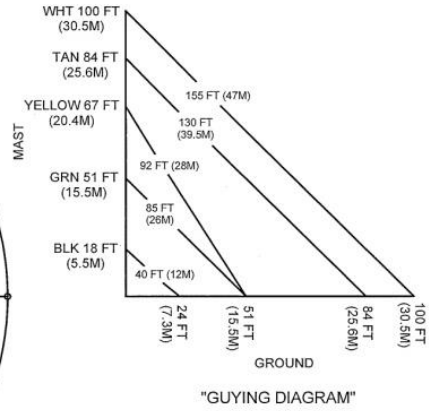
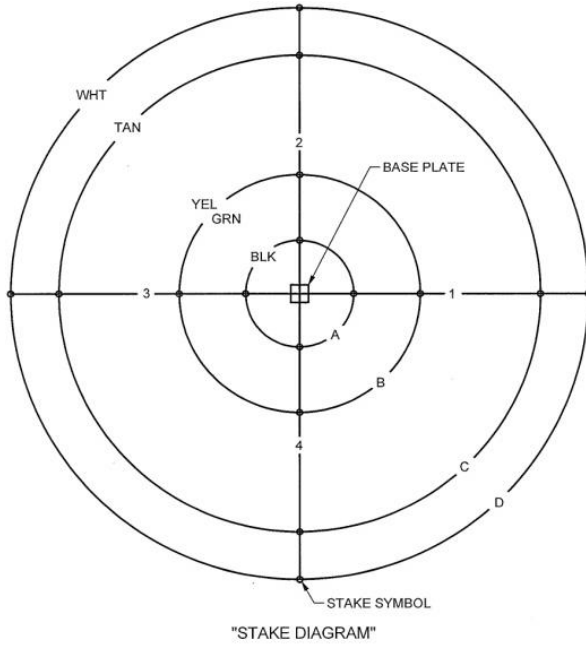
7. Repeat Step 6 at the 3 remaining positions (90 degrees apart).



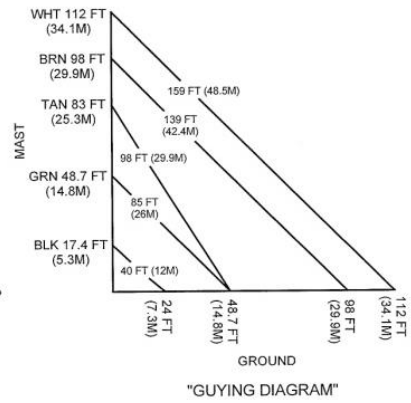
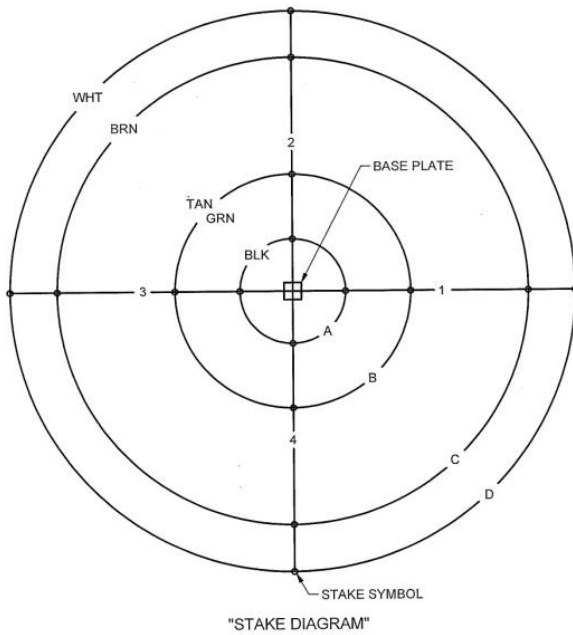
21M



25M



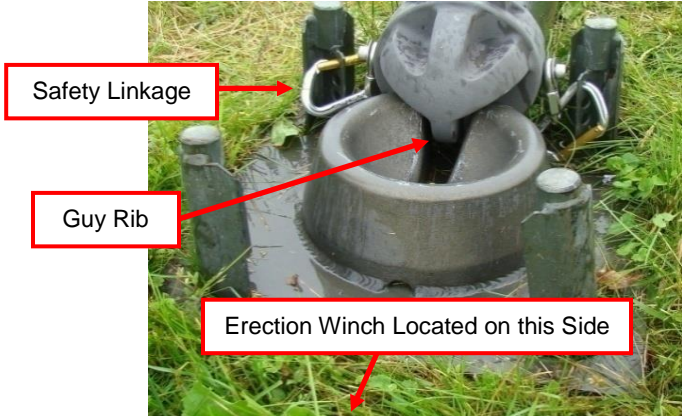
30M



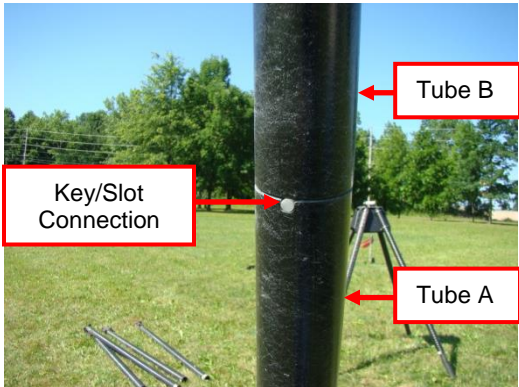
34M

Section 1.1 Optional Gin Pole/Winch Assembly (skip to step 17 if not used)

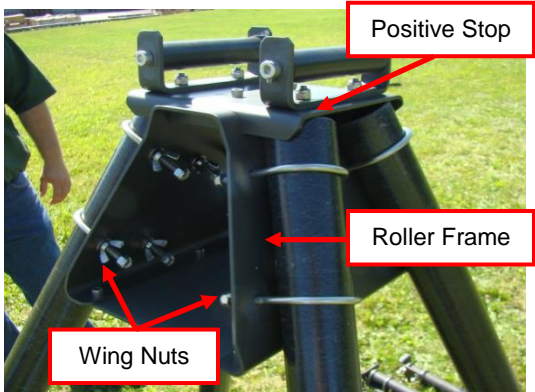
8. Steps 8 through 16 describe installing the optional Gin Pole/Winch assembly. If the optional Gin Pole/Winch assembly is not being installed, skip to step 17. Place the base of the mast on the base plate with the guide rib engaged in the slot and lay the top end of the mast on the ground (if oriented properly, the winch shackle will be facing upward). The guide rib can be identified as the rib that has the most angular separation from the other ribs. Connect the safety linkage (included with the optional gin pole kit) on each side of the base of the mast to the top holes of the base plate stakes. Be sure to attach the safety linkage to the two base plate stakes nearest the top of the mast.



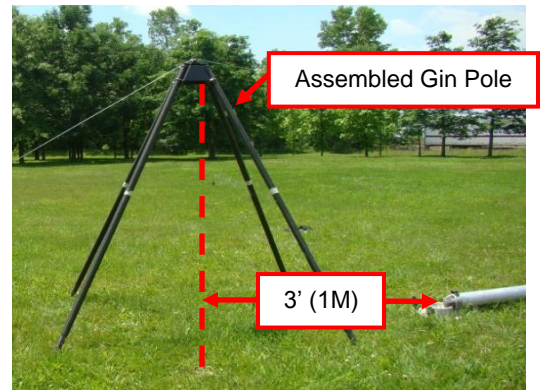
9. Remove the tube legs from the carry bag and insert Tube A (tube with foot) into Tube B (tube without foot). Be sure the key of Tube B inserts into the slot of Tube A. Repeat three times to have a complete set of 4 assembled legs.



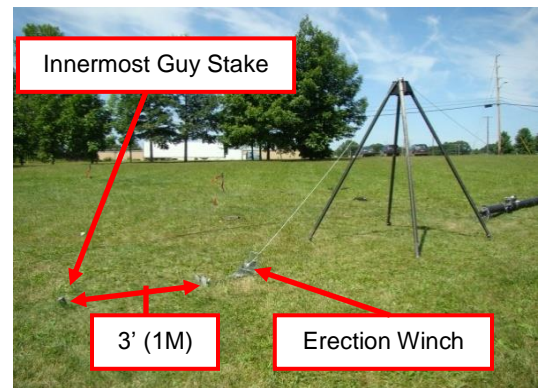
10. Slide each of the four assembled legs into the roller frame and ensure each tube contacts on the stop. Hand-tighten the wing-nuts inside the roller frame to fasten the legs to the frame.



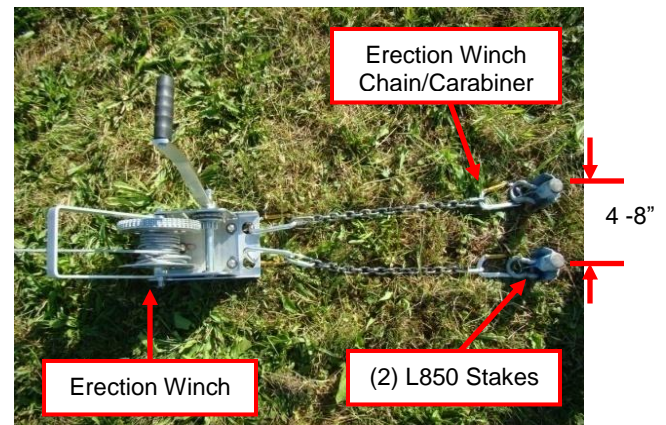
- Place the center of the assembled gin pole approximately 3 ft. (1 m) from the center of the base plate, opposite the top of the mast. Be sure the roller frame of the gin pole is in line with the mast and also in line with the 4 previously placed guy stakes opposite the mast.



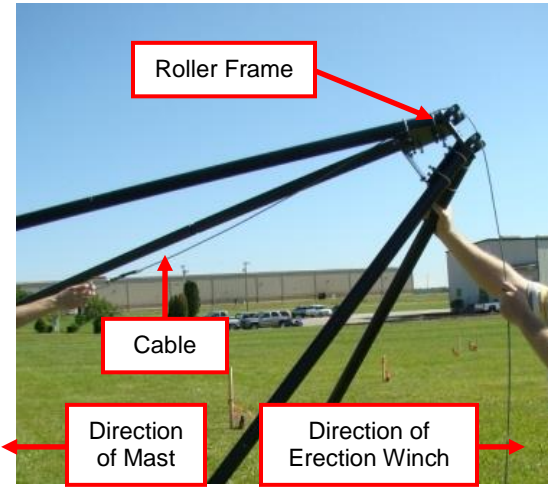
- Place the erection winch directly opposite the mast with the erection winch chains in a direction opposite the mast. The carabiner of these chains should be approximately 3 ft. (1 m) inside the first guy stake opposite the mast. Note the orientation of the erection winch with regard to the mast and gin pole.



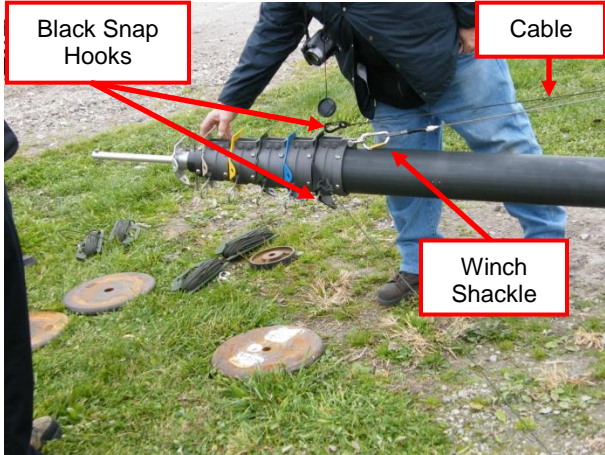
- Stake the erection winch bracket in place by placing two (L850) guy stakes in the area of the erection winch chain carabiner. Place these stakes only 4 to 8 inches apart; otherwise, the winch handles may hit the winch chains. These stakes should be hammered into the ground at a 60 degree angle as shown in Fig. 4. Once the stakes are securely in place, attach the two erection winch chain carabiners to the top hole of these stakes, making sure not to cross them.



14. Unwind enough cable from the erection winch to reach the base of the mast. The erection winch has a brake on it, preventing the cable from simply being pulled from it. To unwind cable from it, the crank handle must be rotated in a counterclockwise direction (when looking at the erection winch from the side of the handle). Tip the gin pole back towards the erection winch and place the cable in the middle of the roller frame. Stand the gin pole back up - the cable should now be in place over the top of the rollers of the erected gin pole.

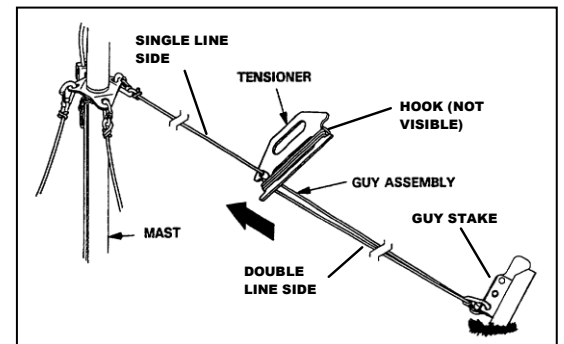
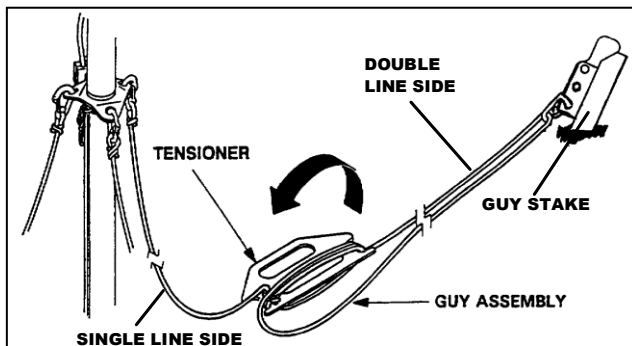
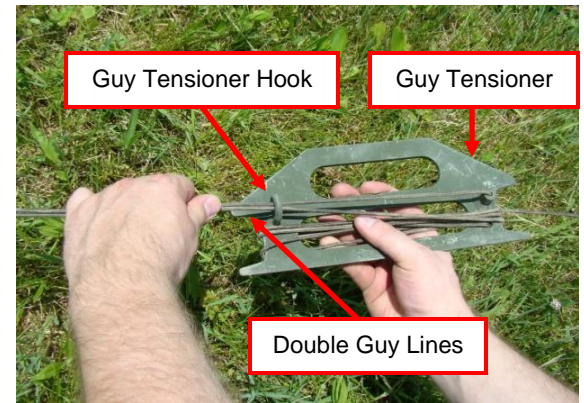


15. Unwind enough cable to reach the winch shackle on the base tube collar of the mast. Connect the cable from the erection winch to the winch shackle. Ensure that the opening end of the winch shackle (shown in yellow) is facing the mast to avoid denting the base tube.

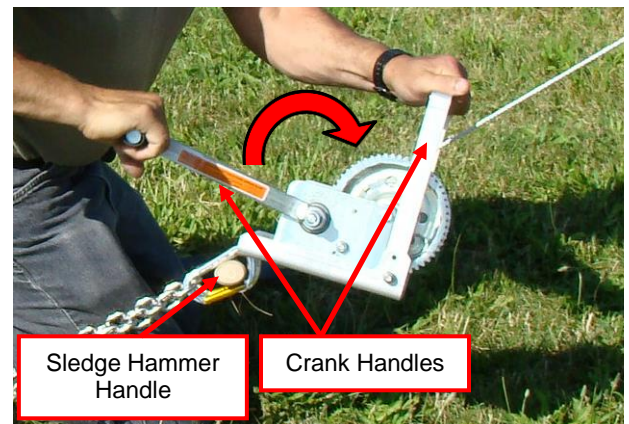


16. Unwrap two guy tensioners with black snap hooks and attach (a) the black snap hooks of these tensioners to the side position (90 degrees to each side of the winch shackle) of the lowest guy plate (black) on the mast and (b) the green snap hooks of these tensioners to the lowest hole on the innermost guy stakes. Be sure the snap hooks attached to the guy plates of the mast are inline (on the same side) with the snap hooks attached to the guy stakes to prevent tangling of the guy lines. Note that the snap hooks should be fastened from underneath the guy plates.

17. Tension the lines lightly by sliding the tensioner toward the mast and lock it by placing the guy tensioner hook over the double guy lines.



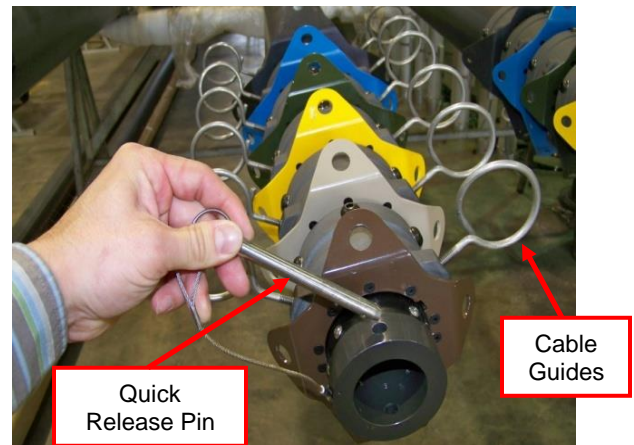
18. Lift the erection winch up by it's carry handle and rotate the crank handle in a clockwise direction (when looking at the erection winch from the crank handle side) to raise the top of the mast to a convenient working height for loading the payload and attaching the remaining guy lines (about 4 ft. (1.2 m)). To better steady the erection winch during this operation, slide the handle of the sledge hammer through the carabiners of the connecting chains and apply a slight downward force. At all times during the winching operation, verify that the winch cable remains taut and in the center of the gin pole roller frame, that the mast remains in the "dish" portion of the base plate, that the guide rib of the mast remains in the slot of the base plate, and that the winch stakes are stable and do not move more than 3 in. (75mm).



19. Unwind and attach all of the remaining guy lines to the matching color-coded guy plates. Note that some guy plates may not be used (optional guying levels). Note that the payload or the top of the mast must always be guyed. The guy lines can be attached directly to the payload or various options are available for top level guying, including a torque arm or a 50mm stub with a guy plate.



20. Install the manual positioner or top tube stub (if supplied) into the top of the mast and pin it in place using the integrated quick-release pin.



21. Install the payload onto the manual positioner/top tube stub and secure it.

22. Place the cable(s) through the cable guides and attach to the payload as required. If the optional gin pole/winch assembly is not being used to erect the mast, skip to step 25.

23. Begin raising the mast to a vertical position with the erection winch. Verify that the side guy lines are not binding and that the mast remains inline with the erection winch cable.



Mast Extension Hazard! Extending mast into obstructions could result in death or serious injury and could render the mast inoperable and partially extended. Before deploying the mast, be certain there is sufficient clearance above and to all sides of the expected location of the fully extended mast and payload. Keep all persons clear of mast and mast extension. Do not lean directly over the mast.

24. In order to prevent the mast from falling over (in the direction of the winch) as it reaches vertical, it is critical that the guy line opposite the erection winch be set to length. Follow the following steps in order to accomplish this task.
 - a. Connect the green snap hook of this black tensioner to either one of the side (90° from either side of the winch shackle) innermost guy stakes.
 - b. Tension the line lightly by sliding the tensioner toward the mast and lock it by placing the guy tensioner hook over the double guy lines.
 - c. Disconnect the green snap hook of this tensioner from the guy stake it is currently connected to and attach it to the innermost guy stake directly opposite the erection winch (inline with the guy ring of the guy plate).

This procedure sets the length of this guy line at the approximate length necessary to allow the mast to be raised to the vertical position. It is critical that personnel be stationed on this guy line during the raising of the mast (from horizontal to vertical) in order to make the necessary adjustments to it's length to (1) allow the mast to reach vertical and (2) prevent it from overtravelling the vertical position.

25. Raise the mast to vertical and verify that the mast is securely seated on the base plate.

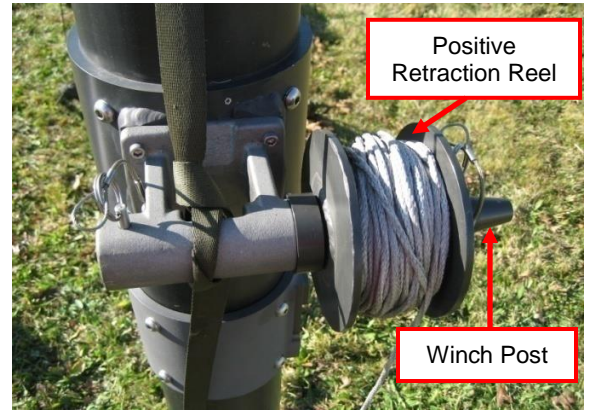


26. Using the integrated bubble level, adjust the four base guy lines using the black tensioners until all are tight and the mast is vertical. The bubble must be completely inside the inner circle of the bubble level before the mast is deployed.

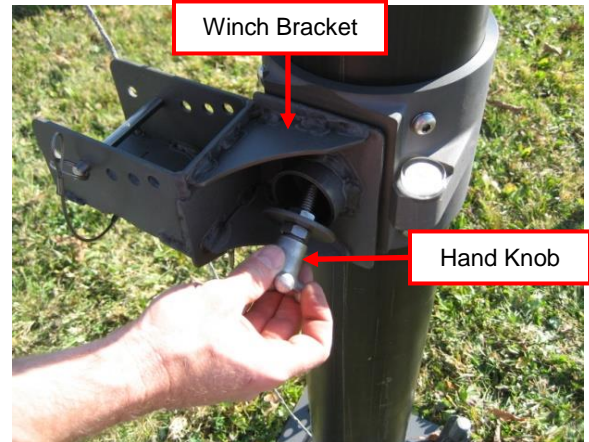


27. Using the rotator/tilter ropes (if supplied), position the payload as nearly as possible to its required position. Final adjustment will be made after the mast is extended.
28. Remove the gin pole from the area (move it outside of the furthest guy stake) to allow more room to properly and efficiently deploy the mast.

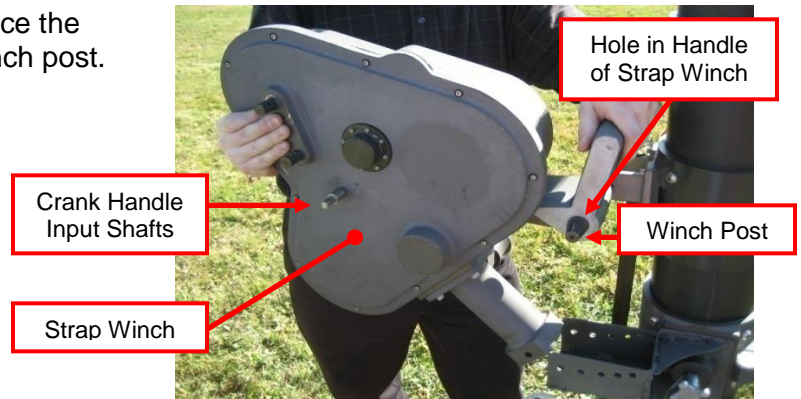
29. Detach the positive retraction reel from the winch post and set it beside the mast.



30. Install the winch bracket to the side of the mast using the attached hand knob.



31. Lift the strap winch to the position shown and place the hole in the handle of the strap winch over the winch post. Note: This is a 2-person lifting operation.



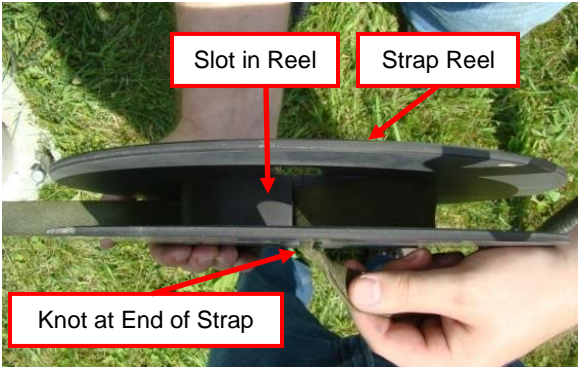
32. Adjust the strap winch (focusing mainly on the crank handle input shafts) to the desired height and using the pin attached to the winch bracket, fix the winch at that position.



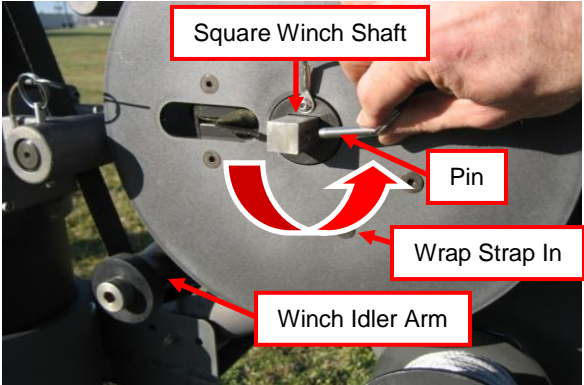
33. Attach the positive retraction reel to the strap winch. Spin it to remove any slack from the rope and then secure it to the strap winch using the attached pin.



34. Feed the strap from the mast around (under) the winch idler arm and onto the strap reel in the direction shown. The strap must slide into the slot in reel and the knot must be set in the hole at the base of the slot (if the strap does not have a knot, tie one approximately 2" (50mm) from the end).



35. Place the strap reel on the square winch shaft so that the strap is centered between the walls of the reel and install the pin to prevent accidental removal.



36. Attach the crank handles to the strap winch at the desired reduction shafts (“high speed” in most cases) and 180 degrees apart. Secure the crank handles using the attached pins. Crank the handles in the indicated direction (per the label on the strap winch) to raise the mast. When cranking the handles, be sure to visually inspect the condition of the strap as it spools around the reel to ensure it is in good working condition. Refer to the STRAP VISUAL INSPECTION CRITERIA section of this manual (located at the end of the manual) to verify the strap is in good working condition.



37. When using a cordless drill to extend the mast, do not install the crank handles. An 18 volt or larger cordless drill can be chucked directly to the drill input (a 3/8 inch hex). The clutch on the drill should be set to the lowest torque that will operate the mast to avoid breaking the shear pin in the hex input. If the shear pin does break, there are replacement pins in the tool kit.



38. Under windy conditions, more torque will be required to extend the mast, especially when a section is nearing full extension. If available, deploy two personnel to the appropriate upper guy lines to pull the mast into the wind and straighten it. This will reduce the torque required for deployment. Do not attempt to deploy the mast if winds exceed 25 mph (40 km/hr).

39. When a section with guy lines attached reaches full extension, the vertical deployment of the mast must stop in order to secure the guy lines. There are a few key indicators that help determine when a section has reached full extension:

- a. An increase in torque required to raise the mast.
- b. A distinct noise indicating the engagement/deployment of the next section of the mast.
- c. Visually observing the next section of the mast starting to deploy.

40. The guy lines must be secured to the appropriate guy stakes and tensioned before the mast is extended any further. Stand at the base of the mast and site the mast for vertical as the guy lines are tensioned.

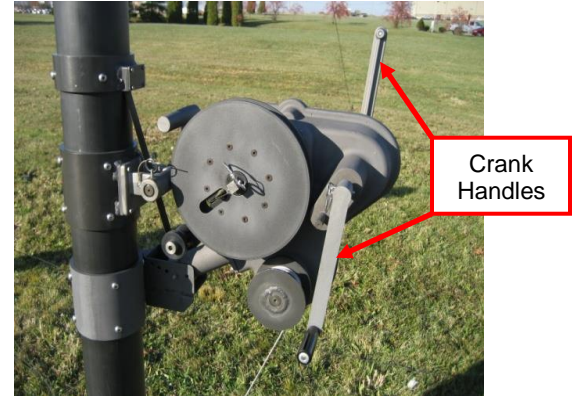


41. The mast has built-in stops, but can be extended to any intermediate height. Always deploy the guy lines on the extended sections and the payload (or top adapter) before leaving the mast, even when the mast is only partially extended. The full height of the mast is realized when:
- All sections of the mast are observed to be extended.
 - The crank handles of the strap winch become very difficult to crank.
42. Once the mast has reached the desired height, stop cranking to automatically engage the strap winch lock. The crank handles can be removed at this time if desired.
43. Visually check that the mast is straight in all directions and adjust the guy tensioners as required to straighten the mast.
44. The rotator/tilter ropes (if supplied) may now be used to reposition the payload. The ropes should be tied off to the mast when they are not in use.

Section 2 Mast Retrieval - Field Retrieval (3 man operation)

1. Verify that winds do not exceed 25 mph (40 km/hr). Do not attempt to retrieve the mast in winds exceeding 25 mph (40 km/hr).

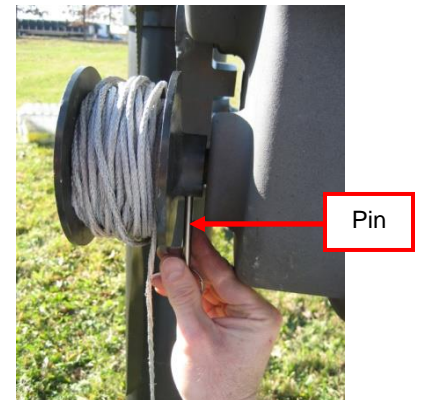
2. Attach the crank handles to the crank handle input shafts on the winch and crank the handles in the indicated direction to retract the mast. The positive retraction mechanism will automatically engage as required to help retract the mast. The handles may become more difficult to crank for brief periods, this is normal. The additional torque required is an indication that the mast positive retraction is engaged. Some noise and vibration may also be evident. This is normal operation of the positive retraction clutching mechanism.



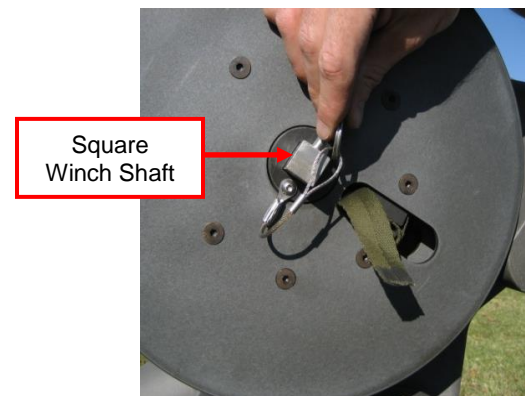
3. When a mast section being retracted is approaching a guyed mast section (within 3 ft. (1 m)), it is beneficial to relieve the tension of all 4 guy lines of the guyed section. This helps the section above nest into the guyed section without binding.

4. Under windy conditions it is helpful to deploy two people to the appropriate upper guy lines to pull the mast into the wind and straighten it. This will reduce the torque required for retraction.

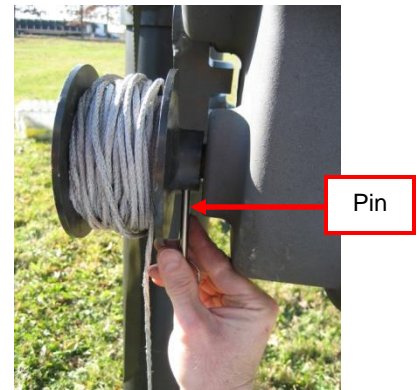
5. Continue cranking the winch in the retraction direction, being sure to release the tension on the guy lines of the guyed sections as the sections above are within 3 ft (1 m). When the mast is near fully nested (final section approximately half way retracted), remove the pin attaching the positive retraction reel to the strap winch. This will prevent the positive retraction cable from binding as the mast is fully nested. The positive retraction reel can remain on the winch at this time.



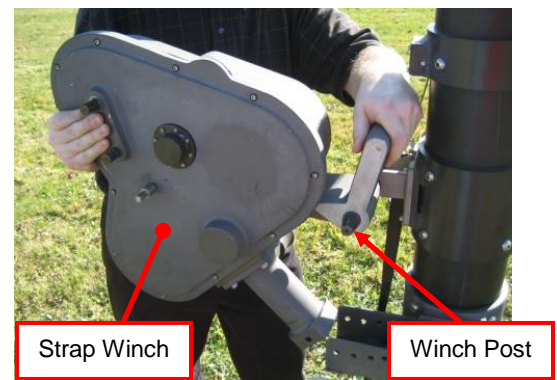
6. Continue cranking the mast in the retraction direction until there is slack in the strap. Remove the pin from the square winch shaft. Then remove the strap reel from the square winch shaft.



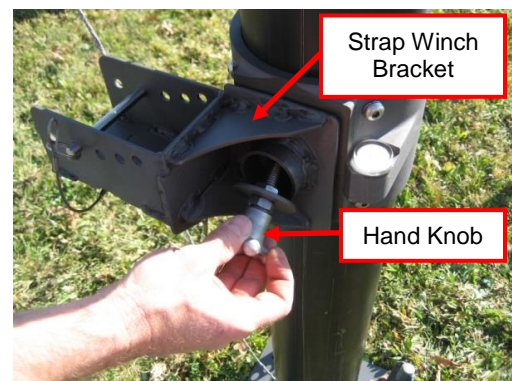
7. Remove the positive retraction reel from the strap winch at this time and place it on the ground near the base of the mast.



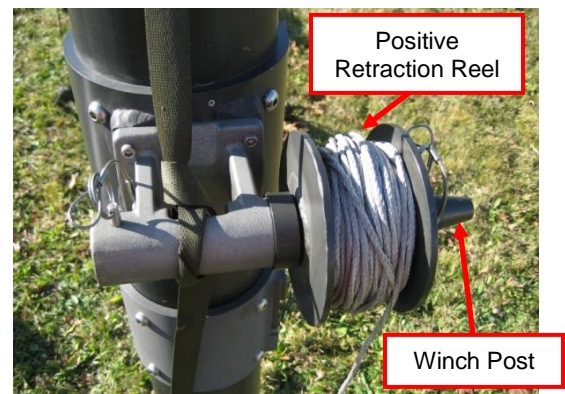
8. Remove the pin connecting the strap winch to the strap winch bracket, tilt the strap winch upward to clear the winch bracket, and remove the strap winch from the winch post of the mast. Note: This is a 2-person lifting operation.



9. Remove the strap winch bracket from the mast by first removing the hand knob that secures it to the mast. The strap winch bracket may need to be jostled to remove it from the mast.



10. Add the positive retraction strap on the now empty winch post for storage and pin into place.



Section 2.1 Optional Quad-Pod/Winch Retrieval (skip to step 13 below if not used)

11. Confirm that the winch bracket is securely staked to the ground and the winch cable has less than 1'(0.3m) of slack. Position the gin pole in place, with its center 3 ft. (1 m) from the base of the mast.



⚠ WARNING

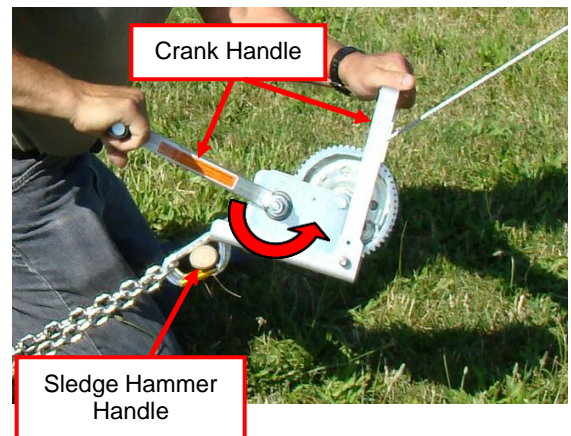
Safety Instruction - Trained Personnel Only! Death or serious injury could result if proper inspection, installation, operation and maintenance procedures are not observed. Installation, operation and maintenance to be performed by trained and authorized personnel only.

⚠ WARNING

Safety Instruction - Read Manual! Failure to follow operating instructions could result in death or serious injury. Read and understand the operator's manual before using the mast.

12. Release the one base guy line (black snap hook/black base plate) on the winch side of the mast and push the mast away from the winch to remove the slack in the cable. Loosen the side guy lines slightly. This will help the mast to pivot over freely.

13. Begin cranking the erection winch handle in a counter-clockwise direction (when looking at the erection winch from the crank handle side). Confirm that the mast is gradually tilting over and that there is no slack in the cable. To better steady the erection winch during this operation, (1) place your non-cranking hand on the carrying handle, (2) slide the handle of the sledge hammer through the carabiners of the connecting chains and apply a slight downward force on this handle. At all times during the winching operation, verify that the winch cable remains taut and in the center of the gin pole roller frame, that the mast remains in the "dish" portion of the base plate, that the guide rib of the mast remains in the slot of the base plate, and that the winch stakes are stable and do not move more than 3 in. (75 mm). Do not stand under the mast while it is being lowered.



14. If the side guy lines become tight, it may be necessary to loosen them further.

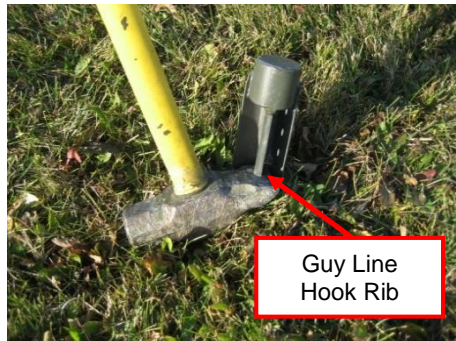
15. When the mast has reached a convenient working height, remove the payload, the rotator/tilter (if supplied), and all of the guy lines except the two side guy lines on the base tube (same guy lines that were installed first on the mast). Coil the rotator/tilter ropes (if supplied) for storage. Do not attempt to remove them from the rotator/tilter.



16. Lower the mast to the ground. Remove the remaining two black guy lines from the mast.

17. Unhook all of the guy tensioners from the guy stakes, wind them up on the guy line tensioners and place them in the transport bags.

18. Hit each guy stake on each edge (not on the inside or outside curved surfaces) then use the hammer to pry under the guy line hook rib. Hit the stake out by rapidly sliding the hammer from the ground up to the hook rib.



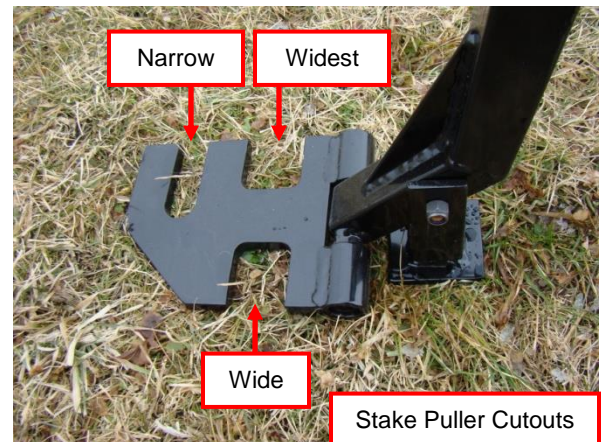
19. Stow all the accessories in the accessory bags. Refer to the accessory sheet for part identification and quantity verification.

Section 2.2 Optional Stake Puller

1. The optional stake puller is used to remove stakes. It can be used on different sizes of stakes including the 650mm and 850mm stakes. The stake puller top handle is shipped separate from the bottom base. To connect the handle, press the blue button then insert the pin.



2. There are three cutouts in the stake puller. Different cutouts are used for different types of stakes. Use the cutout that best fits your stake and the depth of your stake. Typically, the wider cutouts are used to pull stakes when they are all the way in the ground. The narrow cutout is used to remove stakes once the stake has been raised about a few inches out of the ground.



3. When the stake is driven all the way in the ground, place the wide or widest cutout over the stake.



4. Push down on the stake puller handle. This will pull the stake a few inches out of the ground.



5. Now that the stake is a few inches out of the ground, place the narrow cutout over the stake.



6. Push down on the stake puller handle. This will pull the stake out a few more inches.



7. Lift up on the stake puller handle and allow the cutout to rest back on the ground. Repeat step 6 and 7 until the stake is removed.



Section 3 Preventative Maintenance

Perform the following checks in this section before and after each deployment. Do not attempt to deploy the mast if it does not pass all of the following checks.

1. Visually inspect the guy tensioners for frayed or broken rope, cracks or other damage. It is highly recommended that guy tensioners be replaced every 5 years, regardless of usage.
2. Verify that the bubble level is attached to the mast and is operational.
3. Visually inspect the crank handles for damage.
4. Visually inspect the guy plates for cracks or elongated holes.
5. Visually inspect the guy stakes for cracks or severe damage.
6. Visually inspect the exterior of the mast for dents or other damage.
7. Visually inspect the mast for loose, broken, or missing hardware.
8. Visually inspect the strap winch and the optional erection winch for damage.
9. Visually inspect the erection winch cable for fraying or other damage.
10. Verify that the strap winch automatic lock is operational while deploying the first section of the mast by letting go of the crank handles.
11. Keep the mast clean. Do not use oil or grease on the mast because they will attract dirt and lead to high operating forces and premature wear.
12. Keep the erection winch cable and gearing clean. Periodically lubricate the erection winch with silicone spray or light machine oil.
13. The mast strap winch is fully sealed and lifetime lubricated. It is not necessary to lubricate the strap winch.

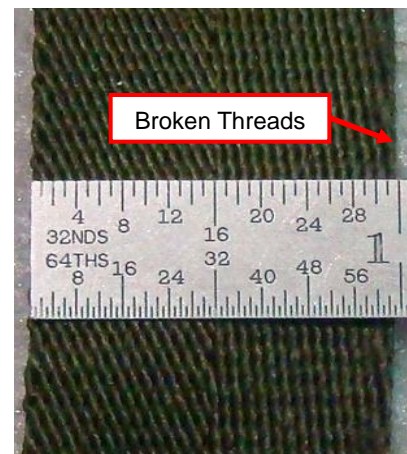
Section 3.1 Strap Visual Inspection Criteria

14. Visually inspect the mast strap as the mast is deployed and retracted. If the strap is excessively frayed at any point along its length, do not deploy the mast.

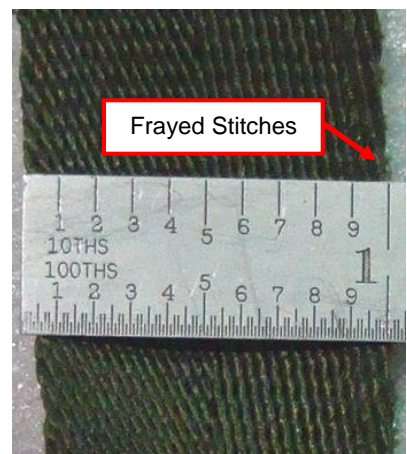
- a. New strap, no fraying, urethane coating evident (strap is stiff and shiny)



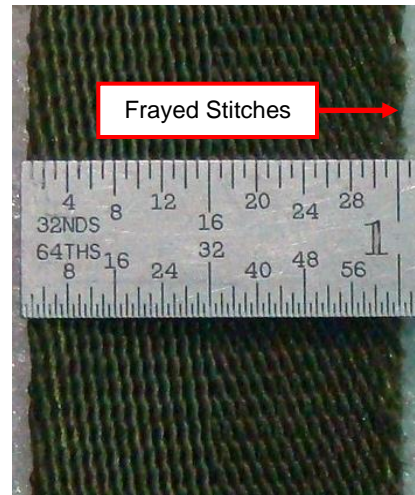
- b. Light-normal strap wear, slight fraying evident (on right side in this picture), edge stitches still intact, strap still holds its shape well, strap ok for continued use.



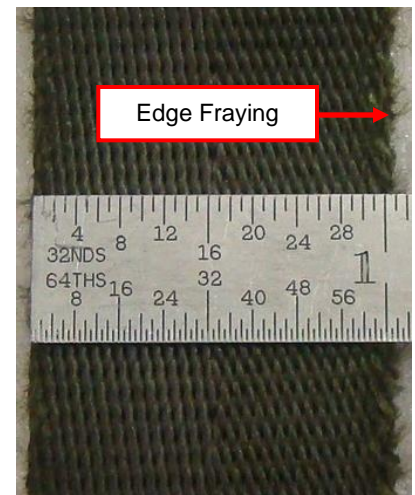
- c. Light-normal strap wear, slight fraying evident, edge stitches wearing but still intact, strap still holds its shape well, strap ok for continued use.



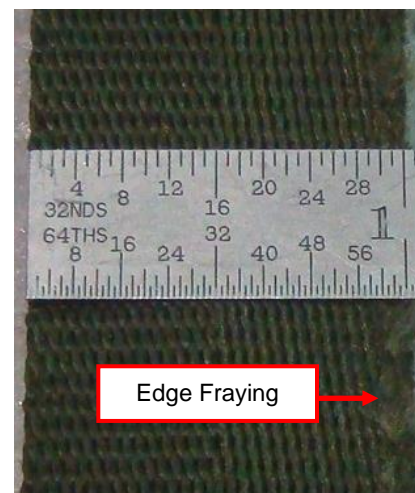
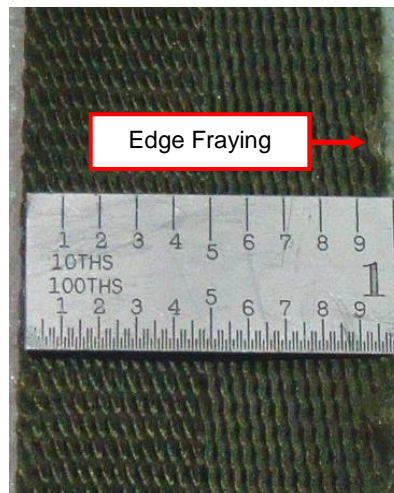
- d. Medium-normal strap wear, edge stitches have more broken strands on right side in this picture, strap still holds its shape, strap ok for continued use.



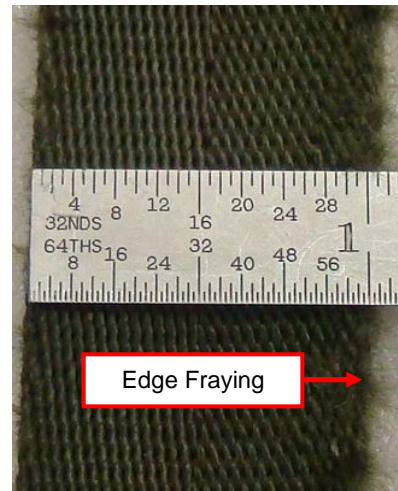
- e. Medium-normal strap wear, edge is noticeably different on right side in this picture, strap ok for continued use but should be replaced within the next year, within the next 100 deployments, or if its condition worsens noticeably.



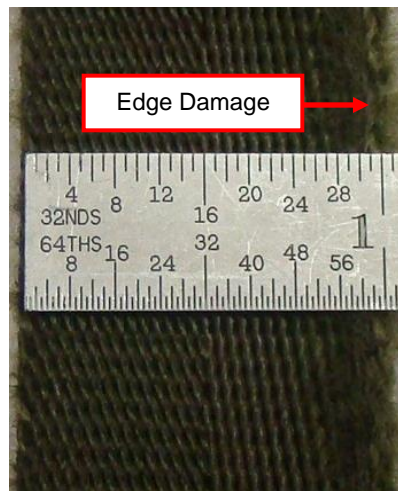
- f. Medium-normal strap wear, edge stitches are still visible but are less defined, strap ok for continued use but should be replaced within the next year, within the next 100 deployments, or if its condition worsens noticeably.



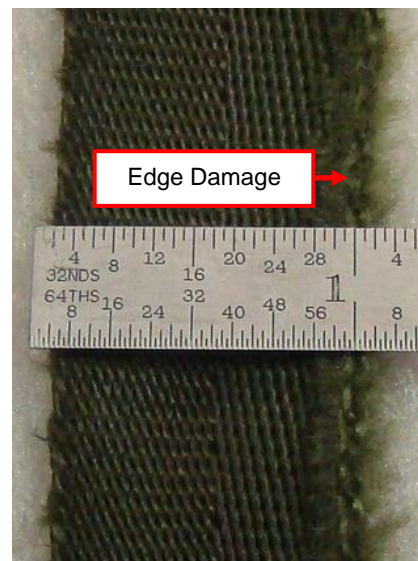
- g. Medium-heavy wear, right edge is frayed significantly, edge stitches are difficult to distinguish, strap is becoming "limp", strap must be replaced within the next 2 months or 25 mast deployments.



- h. Medium-heavy wear, right edge is frayed significantly, edge stitches are difficult to distinguish, strap is becoming "limp", strap must be replaced within the next month or 10 mast deployments.



- i. Heavy wear, right edge stitch is no longer present along the strap length, heavy fraying presents danger of strap fibers becoming tangled within mast, strap must be replaced before next mast deployment.



- j. Localized cut or pinch damage, strap must be replaced before next mast deployment.



- k. Localized pinch damage, strap must be replaced before next mast deployment.



- l. Result of continued use of a strap with heavy wear or localized damage, longitudinal fibers became entangled in strap rollers – new strap could not be “pulled through” the mast, a complete mast teardown was required.



Section 3.2 Strap Replacement Procedure

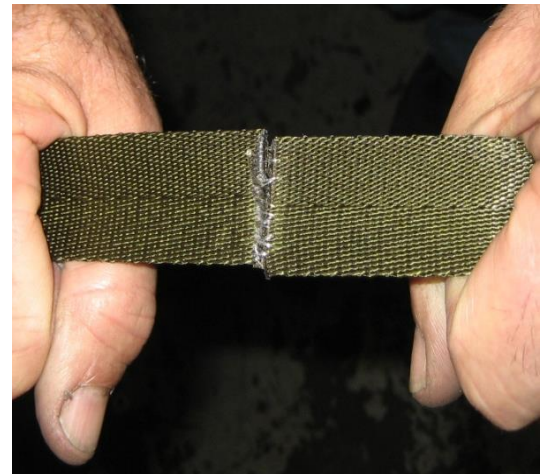
1. The new strap will be joined to the free end of the old strap near the winch attachment point. If necessary, cut the old strap to provide a clean, square edge.



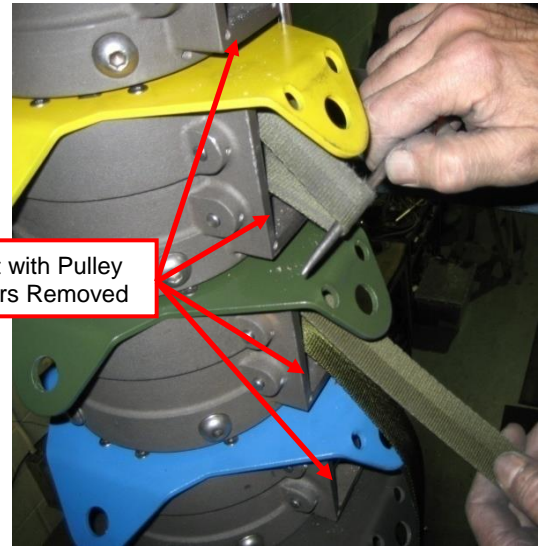
2. Using the fishing line and needle provided in the tool kit, create a butt splice between the old and new strap with standard loop stitches.



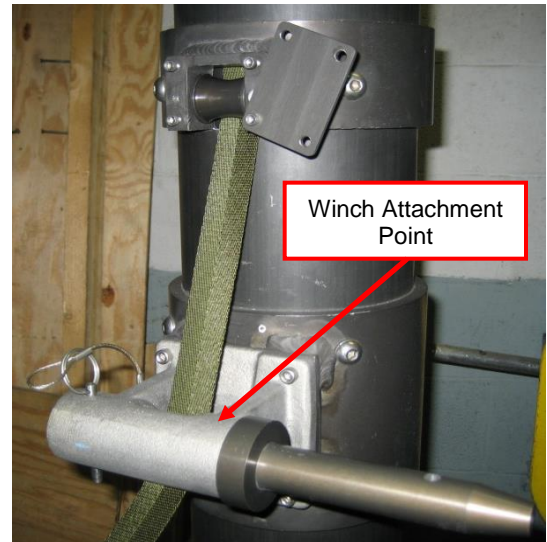
3. Test the splice by pulling on the two straps. Watch for loose stitches or stitches pulling through the edges of the strap.



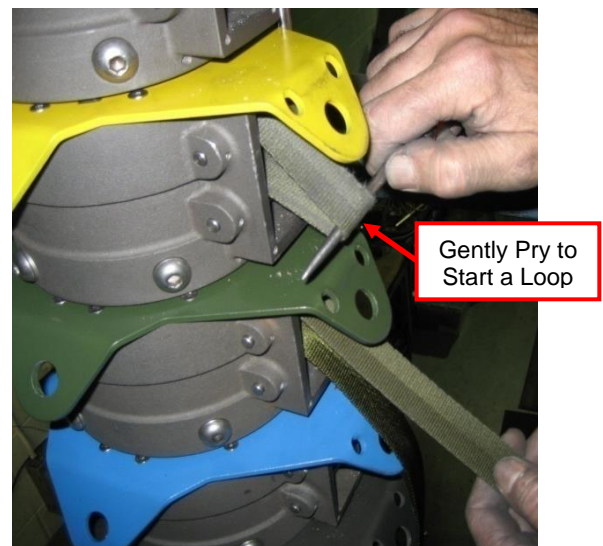
4. Remove all of the pulley covers on the collars by removing the (4) screws.



5. It is critical that the new strap is fed into the mast without twisting or folding, one person must control the new strap as it feeds into the mast and maintain a light tension on it.



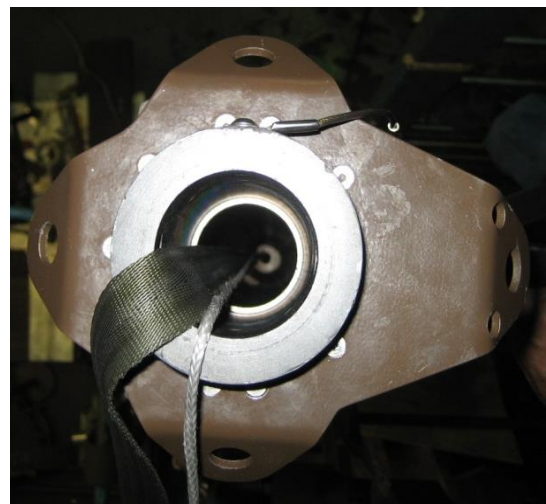
6. At the same time, the second person moves to the largest collar (nearest the winch attachment point) and begins pulling a loop of the strap out of the collar. It may be necessary to gently pry it out with a screwdriver or allen wrench to start a loop. Once the loop can be grasped, begin pulling it such that the new strap feeds into the mast.



7. Pull a loop approximately 6' (2 m) long out of the collar and check to make sure that it is not twisted or folded.
8. Move to the next largest collar and repeat the procedure, watching the previous loop for twists or folds as it feeds into the mast. It is helpful to leave a small loop of strap outside the previous collar because this process will be repeated multiple times as the entire new strap is pulled into the mast.
9. Repeat this procedure to the top of the mast.
10. Confirm that the pull-down rope has approximately 3' (1m) of slack.
11. Using long needle-nose pliers, a long screwdriver or other device reach into the top of the mast and pull out the top stub cap. It is not attached to the top of the mast and should pull out freely if there is slack in the strap and pull-down rope and if it is pulled straight out. If it jams, try pushing it back in to square it up and then pull it straight out.



12. Once the top stub cap is out of the mast, note the strap routing through the top stub cap, around the strap pin and back through the top stub cap. Remove the two socket head cap screws holding the strap pin to the top stub cap, remove the strap pin and pull the strap out of the top stub cap.
13. Set the top stub cap (still attached to the pull-down rope) to the side of the mast and begin pulling the strap out the top of the mast.



14. Move back to the largest collar and repeat the process until the butt splice is pulled out the top of the mast. Always leaving a small loop of strap at each collar.

15. Cut the butt splice and discard the old strap.
16. Fold about 6" (15 cm) of the new strap over at the top of the mast and push the fold through the lower side of the top stub cap (the side opposite the knot in the rope) just enough to allow the strap pin to pass through the resulting loop.
17. Insert the strap pin through the strap, grasp both sides of the strap and pull the loop tight on the strap pin.
18. Secure the strap pin in place with the two socket head cap screws.



19. Insert the top stub cap back into the top of the mast and pull it into place by pulling the loop of strap at the nearest collar.
20. Working from the top of the mast down, pull the strap tight at each collar and at the bottom of the mast near the winch attachment point.
21. Wind the pull-down rope tight on the drum and secure the drum in its stowed position.

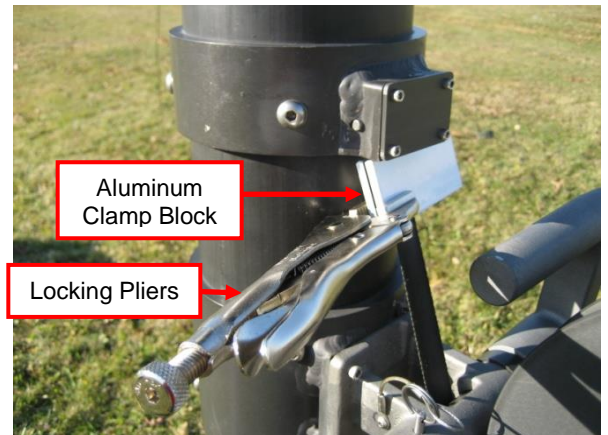
Section 4 Mast Recovery Procedures

⚠ WARNING

When a mast is not functioning per standard operating procedures, it is often an indication of damage. Use extreme caution at all times when attempting these recovery procedures, the mast may move suddenly and forcefully at any time. Serious injury or death can occur if personnel are in the area of motion.

Section 4.1 Removing the Winch from an Extended Mast - Winch Issues

1. Tightly clamp the aluminum clamp block in place over the strap near the mast using the provided locking pliers.



2. Carefully crank the winch in the reverse direction (“LOWER”) to transfer the load from the winch to the clamp block. Transfer of the load is accomplished when the strap between the winch and the aluminum clamp block hangs freely.



3. Once the load has been fully transferred to the clamp block, the winch can be removed from the mast per the normal “Mast Retrieval” procedures in this manual.



4. Repair or replace the winch as soon as possible. The clamp block is not intended to support the mast for extended periods.

Section 4.2 Mast Jammed in Extended Position - Standard Procedures

1. Visually check for obstructions (guylines, positioner ropes, cabling, etc.) that may be keeping the uppermost tube from nesting. Extend the mast and remove the obstruction as required.
2. Try raising and lowering the mast several times at various speeds (slow and fast). Sometimes a minor internal jam can be cleared with this process.
3. Confirm recent conditions. If icing is a possible cause for the jam, is it possible to wait for the mast to thaw? Alternately, the positive retraction base roller cover can be removed and warm air (must be less than 150 degrees F (65 degrees C) can be blown into the base of the mast.
4. Lower the mast to the point of the jam and pull on the upper guylines: gently side to side, then straight down with a gradually increasing load up to 100 pounds (445 N) total. Alternate these two loads several times as required.
5. If the above does not work, pull straight down on the upper guylines with quick, short movements being careful not to apply more than 100 pounds of force (445 N).

Section 4.3 Mast Jammed in Extended Position – Emergency Procedure I

⚠ WARNING

The following procedure may damage the mast, and can cause serious injury if not performed carefully. Use these methods only when absolutely necessary.

1. Raise the mast approximately 1.5'(0.5 m) above the point of the jam with the strap winch.
2. Place the aluminum clamp block in place per the winch removal procedure above.
3. Carefully crank the winch in the reverse direction (“LOWER”) to transfer the load from the winch to the clamp block. Transfer of the load is accomplished when the strap between the winch and the aluminum clamp block hangs freely.



4. Continue cranking in the reverse direction until approximately 3'(1 m) of "slack" is hanging between the winch drum and the clamp block.

⚠ WARNING

Note that the mast may drop very rapidly until all of the slack in the strap is taken up. This procedure can be dangerous and can cause high impact loads to the mast and winch. Use it only when absolutely necessary and always inspect the mast and winch thoroughly afterward for bent or broken components.

5. Release the locking pliers from the clamping block quickly and carefully from a position at the side of the mast.
6. This procedure can be repeated more than once if necessary. Never allow more than 3' (1 m) of slack in the strap as this may lead to twists in the strap feeding into the mast and/or high impact loads breaking the loaded components of the winch.

Section 4.4 Mast Jammed in Extended Position – Emergency Procedure II

⚠ WARNING

The following procedure may damage the mast, and can cause serious injury if not performed carefully. Use these methods only when absolutely necessary. Do not attempt to perform this procedure in winds exceeding 10 mph (16 km/hr). Do not attempt to perform this procedure without a crew chief or commanding officer and 9 support personnel present.

⚠ WARNING

In this procedure, the lowest moving section of the mast will be released and lowered. This procedure can be extremely dangerous because it lowers the entire mast and releases the tension in all of the guy lines simultaneously. The mast will fall over if the guy lines are not sufficiently held in tension. The mast may also fall over if the guy lines are pulled excessively in any one direction.

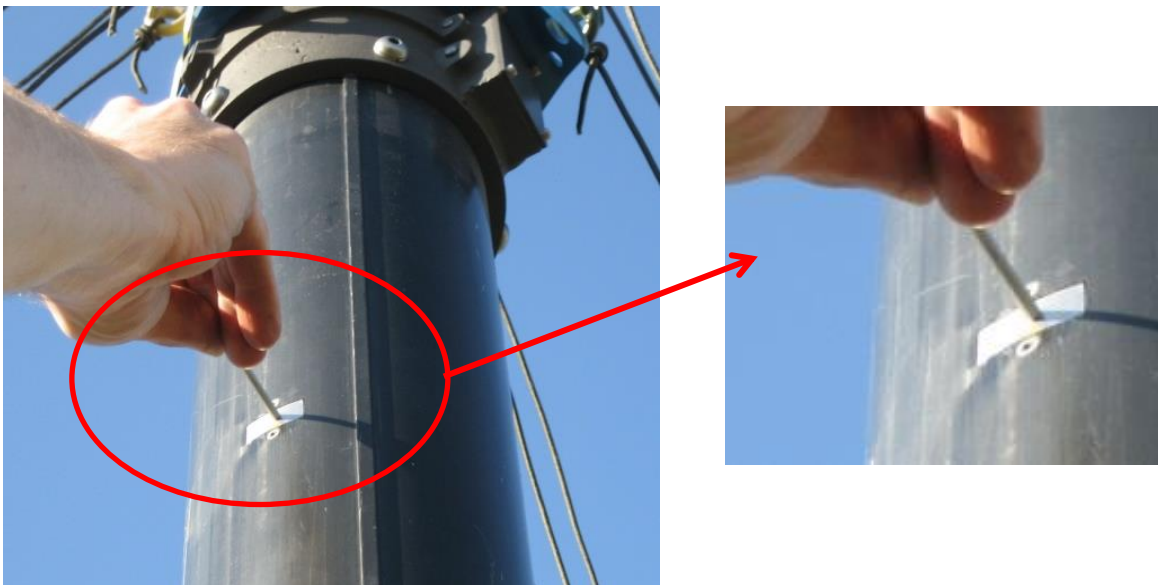
1. Extend the mast per normal deployment procedures until the top section is within 1.5' (0.5 m) of full extension. This will minimize the distance that the 5.5" tube (the tube directly above the base tube) will free-fall when it is released.
2. Deploy personnel to the outer two guy lines in each of the four guying directions (8 people total).
3. Deploy one person to the base of the mast to operate the winch and continuously sight the mast for vertical after it has been released.
4. The crew chief or commanding officer should take a central position near the mast to help sight the mast and give orders to the personnel at the guy lines to keep the mast as vertical as possible.

5. Use a ladder or scaffold to perform the remainder of the steps. Latch plates are located near the top of the base tube.

⚠ WARNING

In the next step, the 5.5" section of the mast may drop partially or completely at a very high speed. Keep hands, arms and body away from the mast as much as possible when releasing the latches.

6. With the outer two guylines pulled snug at each location by the (8) outer personnel, the person at the base of the mast should put the 1/8" allen wrench (included in the emergency tool kit) into each access hole and with a quick, open-palmed impact to the handle, release each of the four latches.



7. Once the 5.5" section has been released, the person at the base of the mast can crank the winch in the "LOWER" direction. The 5.5" section will normally lower completely and then the uppermost extended section of the mast will begin to lower.
8. If necessary, before completely lowering the 5.5" section, the 5.0" section (the next section above the 5.5") can be released by following this same procedure starting at Step #5.

Section 5 Accessory Bags

This section describes the contents of the accessory bags for the different QEAM masts (TM-21, TM-25, TM-30, and TM-34). Each mast has four to six accessory bags. The bags are referenced as “Accessory Bag S/A #1” through “Accessory Bag S/A #6”.

Mast	Accessory Bag S/A #1	Accessory Bag S/A #2	Accessory Bag S/A #3	Accessory Bag S/A #4	Accessory Bag S/A #5	Accessory Bag S/A #6
TM-21	4287801	4287802	4287803	4287804		4285306
TM-25	4293501		4293503	4293504	4293505	4285306
TM-30	4305001		4305003	4305004	4305005	4285306
TM-34	4285301	4285302	4285303	4285304	4285305	4285306

Figures 1 through 6 show the parts in the accessory bags. For each mast, the parts may differ slightly because of the height of the mast. For example, the Accessory Bag S/A #3 for the TM-21 contains a 56' green and 100' tan tensioner. The Accessory Bag S/A #3 for the TM-25 contains a 56' green and a 75' tan tensioner.

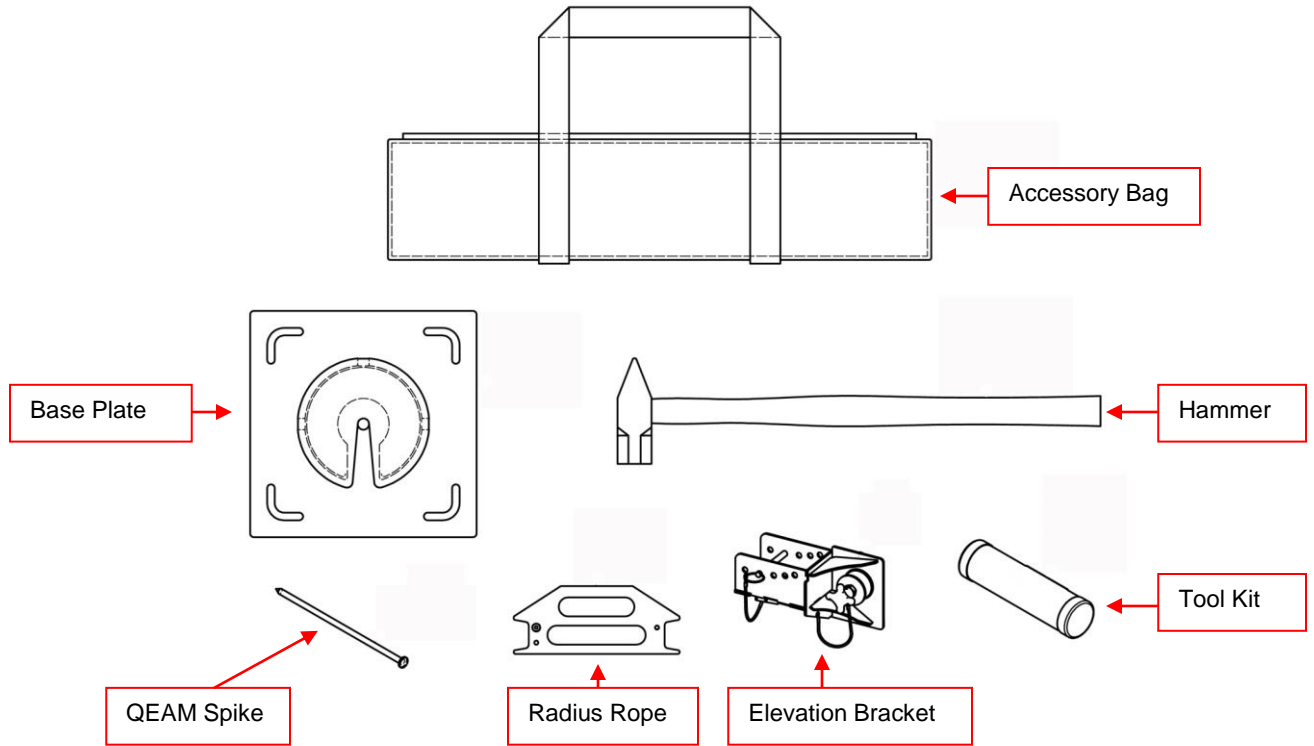


Figure 1 Accessory Bag S/A #1 Contents

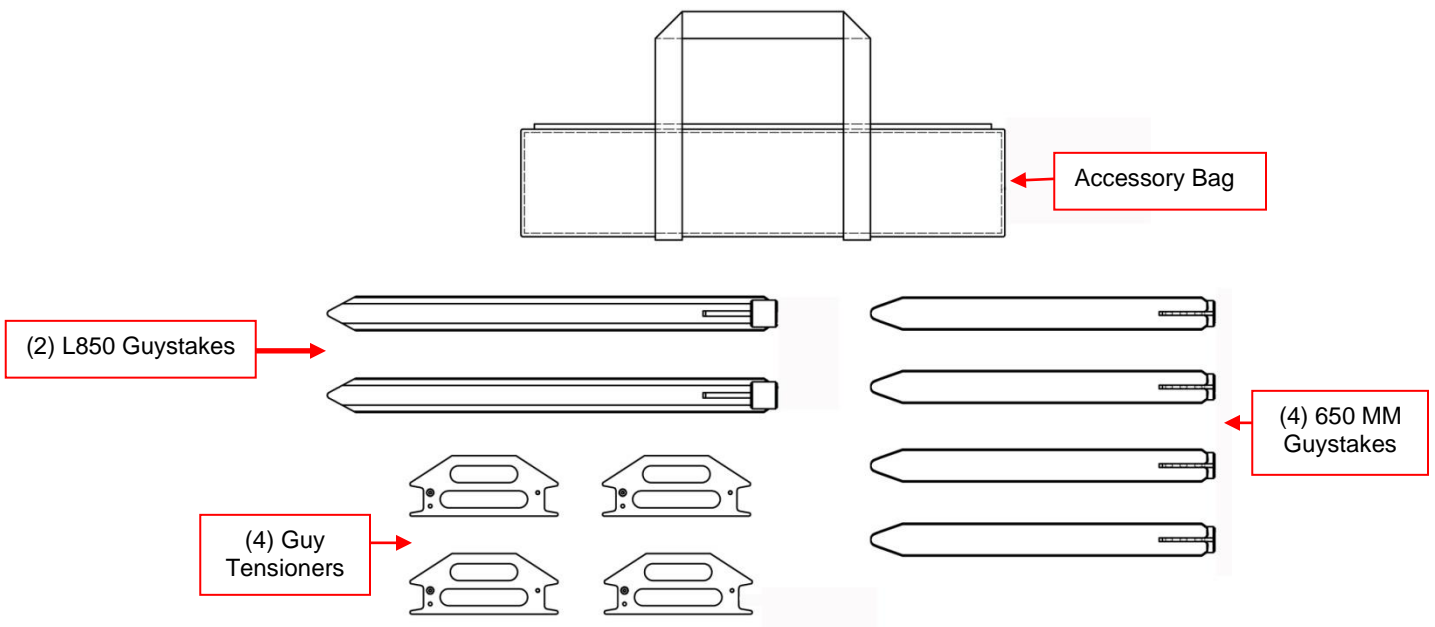


Figure 2 Accessory Bag S/A #2 Contents

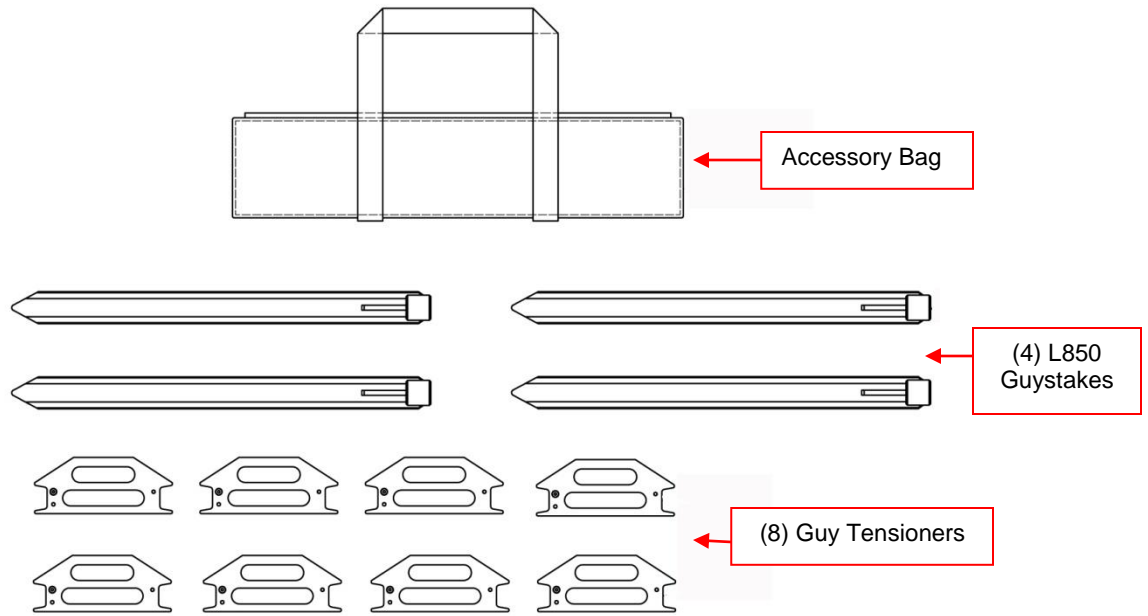


Figure 3 Accessory Bag S/A #3 Contents

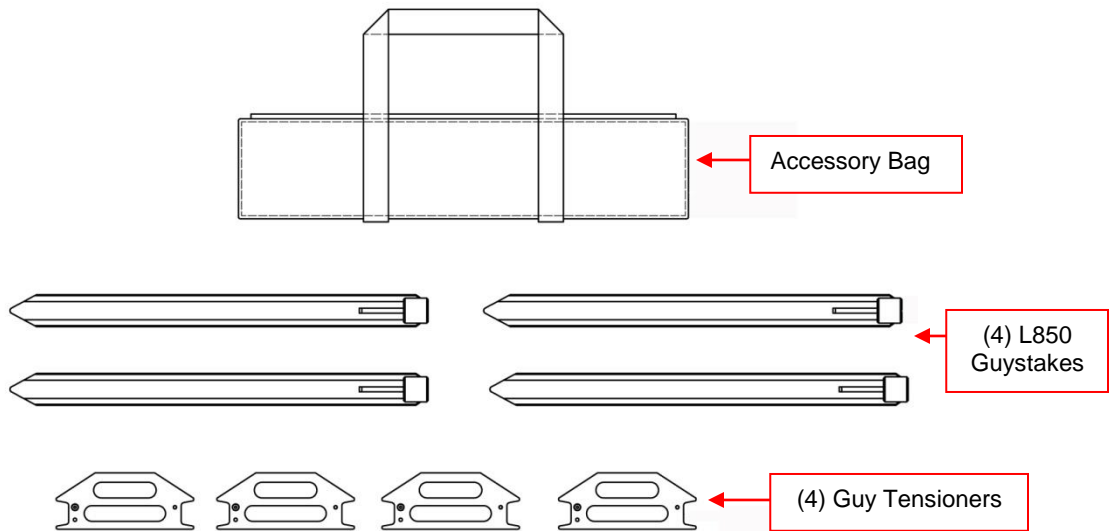


Figure 4 Accessory Bag S/A #4 Contents

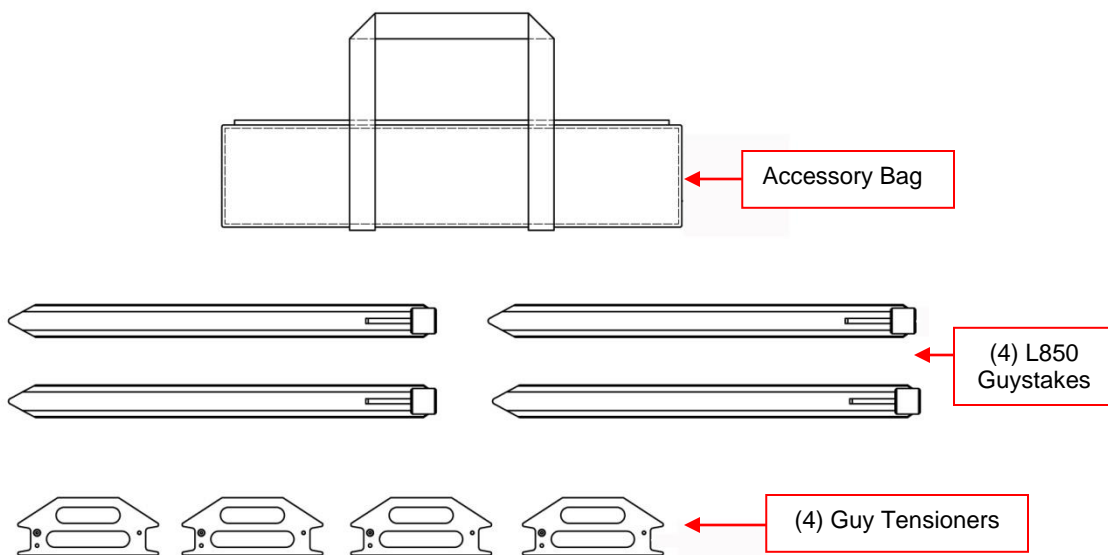


Figure 5 Accessory Bag S/A #5 Contents

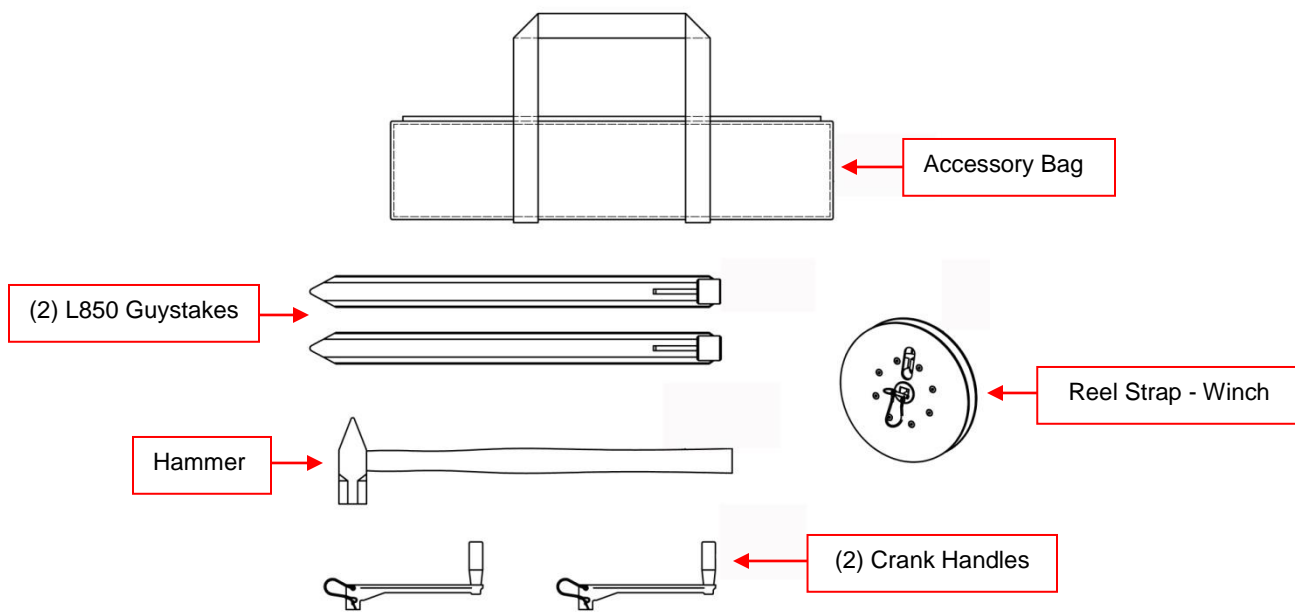


Figure 6 Accessory Bag S/A #6 Contents