



WILL-BURT

Q★E★A★M

QUICK ERECTING ANTENNA MAST

H D T M

OPERATOR'S MANUAL



The Will-Burt Company
169 S. Main Street
Orrville, OH 44667

www.willburt.com

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Original Instructions

Warranty

Will-Burt warrants its QEAM HDTM masts to be free from defects in material and workmanship for a period of one (1) year, with such time period running from the date of shipment by Will-Burt. Will-Burt shall not be responsible for any damage resulting to or caused by its products by reason of failure to properly install, maintain or store the product; use of the product in a manner inconsistent with its design; unauthorized service, alteration of products, neglect, abuse, accident, or acts of God. This warranty does not extend to any component parts not manufactured by Will-Burt; provided, however, Will-Burt's warranty herein shall not limit any warranties by manufacturers of component parts which extend to the buyer.

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Document History

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Safety Summary

This section describes safety precautions for the Telescopic Composite Winch Drive Mast. These are recommended precautions that personnel must understand and apply throughout many phases of installation, operation, transportation, maintenance, storage, and troubleshooting. Be sure to read and understand the entire manual, and contact The Will-Burt Company with any questions, before performing any procedure outlined in this manual.

Signal Word Definitions

Per the ANSI Z535.4 standard, the following signal words and definitions are used to indicate hazardous situations:

DANGER

DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices.

General Safety Instructions

The following are general safety precautions that are not related to any specific procedures. These are recommended precautions that personnel must understand and apply throughout installation, operation, transportation, maintenance, storage, and troubleshooting. Additional precautions that apply to specific procedures and steps may be listed with the procedure or step to which they apply.

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.

WARNING

Trained Personnel Only! Only trained and authorized personnel should perform installation, operation, and maintenance procedures. Death or serious injury could result if proper procedures are not observed.

⚠ WARNING

Safety Equipment! Helmets or hard hats, eye protection, gloves, and safety shoes must be properly worn while working in the deployment area. Death or serious injury could result if proper safety equipment is not properly worn.

⚠ WARNING

Pinch Point Hazard! Moving parts can crush and cut resulting in death or serious injury. Keep clear of moving parts while operating mast.

⚠ WARNING

Crush Hazard – Mast Failure! Do not stand directly beneath the mast or its payload. Be certain the payload is properly installed and secured. Death or serious injury could result if mast fails suddenly.

⚠ CAUTION

Equipment Damage – Deviation! Deviation from standard operating conditions and procedures could cause system failure.

⚠ CAUTION

Lifting Hazard! Depending on the mast model, the mast weighs up to 91.5 lb. (41.5 kg). Always observe weight lift limits.

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Section 1 Introduction

Review this manual in its entirety. Contact The Will-Burt Company with any questions before performing any procedure outlined in this manual. The views depicted in this manual are provided for clarification and are subject to change without notice. Views are not to scale.

This manual describes installation, operation, and maintenance for the QEAM HDTM.

This manual is for the following QEAM HDTMs:

- 105-8 HDTM 2.0 (P/N: 713900850)
- 105-10 HDTM 2.3 (P/N: 713901050)
- 105-12 HDTM 2.7 (P/N: 713901250)
- 105-15 HDTM 3.2 (P/N: 713901550)
- 128-8 HDTM 2.0 (P/N: 713900851)
- 128-10 HDTM 2.3 (P/N: 713901051)
- 128-12 HDTM 2.7 (P/N: 713901251)
- 128-15 HDTM 3.2 (P/N: 713901551)
- 128-18 HDTM 3.7 (P/N: 713901850)

This manual is not for the following masts:

- Expedition Series
- Antenna Mast
- Hurry Up
- QEAM (Screw Drive Models)
- QEAM (Aluminum Strap Drive Models)

See www.willburt.com for information on these and other Will-Burt products.

The QEAM HDTM is designed to lift a specific payload for lighting, surveillance, or communication use only. Do not use mast to lift personnel. Contact The Will-Burt Company with any questions on the intended use.

1.1 Safety Precaution Notification

Refer to the Safety Summary for precautions to be observed while installing, operating, or maintaining this equipment.

1.2 Manual Organization

This manual is organized into the following sections:

Section 1 Introduction

Section 2 Operation

Section 3 Maintenance

1.3 Definitions of Terms

Throughout this manual, the following terms are used:

- “Mast” to refer to the mechanical telescoping mast
- “Mast System” to refer to the entire QEAM HDTM Mast System (Telescoping Mast, Ground Plate, Ground Plate Stakes, Azimuth Control Bar, Winch, Payload Tip, Guy Lines, Guy Line Stakes, Radius Rope, Hammer, Transit Bags)
- “Payload” to refer to the object or equipment being raised by the mast to an operational height

1.4 Specifications

This section describes specifications for the Mast System.

Table 1-1 Mast Specifications

Specifications		105-8	105-10	105-12	105-15
System Height	feet	26.25	32.8	39.37	49.21
	meters	8	10	12	15
Mast Height	feet	24.6	31.2	37.7	47.6
	meters	7.5	9.5	11.5	14.5
Retracted Length	feet	6.6	7.6	8.9	10.5
	meters	2.0	2.3	2.7	3.2
Base Tube Diameter	inch	4.13	4.13	4.13	4.13
	mm	105	105	105	105
Top Tube Diameter	inch	1.97	1.97	1.97	1.97
	mm	50	50	50	50
Payload Tip Length	inch	19.69	19.69	19.69	19.69
	mm	500	500	500	500
Maximum Vertical Top Load	lb.	55	55	55	55
	kg	25	25	25	25
Maximum Wind Area CxA	m ²	0.50	0.35	0.4	0.35
Maximum Horizontal Top Load	N	360	250	287	250
Maximum Operational Wind Speed	mph	74.5	74.5	74.5	74.5
	km/h	120	120	120	120
Maximum Survival Wind Speed	mph	99.4	99.4	99.4	99.4
	km/h	160	160	160	160
Guy Radius	feet	23	23	26 & 32.8	32.8 & 39.4
	meters	7	7	8 & 10	10 & 12
Number of Guys x Levels		4 x 2	4 x 2	4 x 3	4 x 3
Number of Sections		6	6	6	6
Mast Weight	lb.	45.2	47.4	50.7	55.1
	kg	20.5	21.5	23	25
Additional Components Weight	lb.	52.9	52.9	72.8	77.2
	kg	24.0	24.0	33	35
<p>* Note:</p> <ul style="list-style-type: none"> • Dimensions and specifications are provided for reference only and are not intended for vehicle design purposes. • Specifications may be subject to change without notice. • Maximum payload weight will impact other performance specifications. Consult The Will-Burt Company for additional information. 					

Table 1-2 Mast Specifications Continued

Specifications		128-8	128-10	128-12	128-15	128-18
System Height	feet	26.25	32.8	39.37	49.21	59
	meters	8	10	12	15	18
Mast Height	feet	24.6	31.2	37.7	47.6	57.4
	meters	7.5	9.5	11.5	14.5	17.5
Retracted Length	feet	6.6	7.5	8.9	10.5	12.1
	meters	2.0	2.3	2.7	3.2	3.7
Base Tube Diameter	inch	5.0	5.0	5.0	5.0	5.0
	mm	128	128	128	128	128
Top Tube Diameter	inch	2.8	2.8	2.8	2.8	2.8
	mm	71.5	71.5	71.5	71.5	71.5
Payload Tip Length	inch	19.7	19.7	19.7	19.7	19.7
	mm	500	500	500	500	500
Maximum Vertical Top Load	lb.	77	77	77		
	kg	35	35	35	30	30
Maximum Wind Area CxA	m ²	0.80	0.70	0.80	0.80	0.60
Maximum Horizontal Top Load	N	570	500	570	570	430
Maximum Operational Wind Speed	mph	74.5	74.5	74.5	74.5	74.5
	km/h	120	120	120	120	120
Maximum Survival Wind Speed	mph	99.4	99.4	99.4	99.4	99.4
	km/h	160	160	160	160	160
Guy Radius	feet	23	23	26 & 32.8	32.8 & 39.4	32.8 & 39.4
	meters	7	7	8 & 10	10 & 12	10 & 12
Number of Guys x Levels		4 x 2	4 x 2	4 x 3	4 x 3	4 x 3
Number of Sections		6	6	6	6	6
Mast Weight	lb.	54	58.4	63.9	77.2	91.5
	kg	24.5	26.5	29	35	41.5
Additional Components Weight	lb.	60.6	60.6	80.5	97	97
	kg	27.5	27.5	36.5	44	44
<p>* Note:</p> <ul style="list-style-type: none"> • Dimensions and specifications are provided for reference only and are not intended for vehicle design purposes. • Specifications may be subject to change without notice. • Maximum payload weight will impact other performance specifications. Consult The Will-Burt Company for additional information. 						

1.5 Major Components

This section describes major components of the Mast System.

Major components of the Mast System include:

- Telescoping Mast
- Ground Plate
- Ground Plate Stakes
- Azimuth Control Bar
- Winch
- Payload Tip
- Guy Lines
- Guy Line Stakes
- Radius Rope
- Hammer
- Transit Bag

1.5.1 Telescoping Mast

The telescoping mast (Figure 1-1):

- Is the structure used to raise the payload to an operational height
- Consists of concentric, nesting mast tubes
- Is constructed with fiberglass tubes and collars to ensure low weight, low icing, and electric transparency
- Extends and retracts mechanically using a Winch
- Is self-locking
- Uses four vertical built-in keys to minimize mast and payload twist
- Is Guyed at the Base Tube to secure the mast for operation.

The mast has:

- Guying Plates with Guy Line Rings to attach the Guy Lines
- A Mast Lock Rope to secure the mast during transportation
- A Hoisting Belt which is used with the Winch to operate the mast
- A Winch Holder used to secure the Winch to the Mast
- A Bubble Level built-into the Winch Holder used to level the mast
- A Mast Foot and Mast Peg used to secure the mast to the Ground Plate
- A Mast Top Cover (not shown) which is pulled over the collars of a fully retracted mast to help protect the locking mechanism and interior of the mast from water, dust, debris, and other foreign material when the mast is not in use.

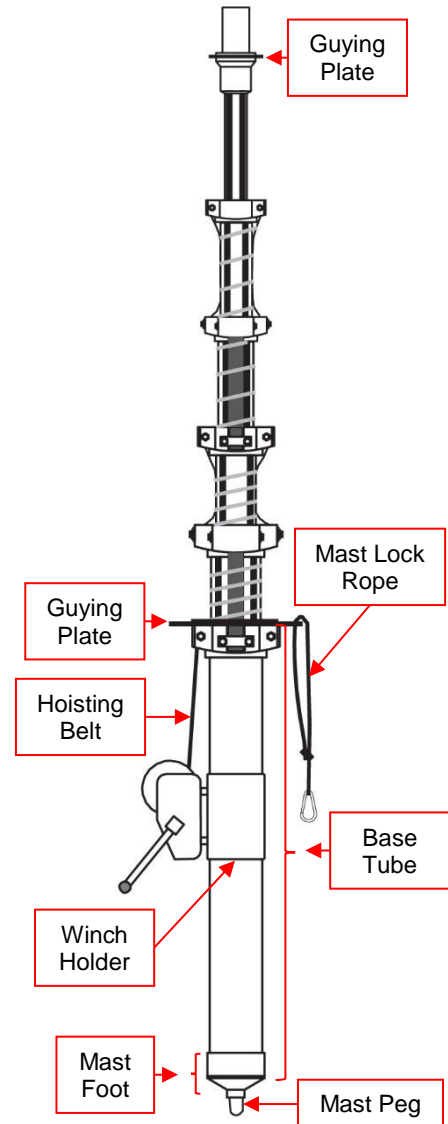


Figure 1-1 Telescoping Mast (Shown with Winch Attached)

1.5.2 Ground Plate

The Ground Plate (Figure 1-2):

- Is used to stabilize and secure the mast
- Is designed for field applications

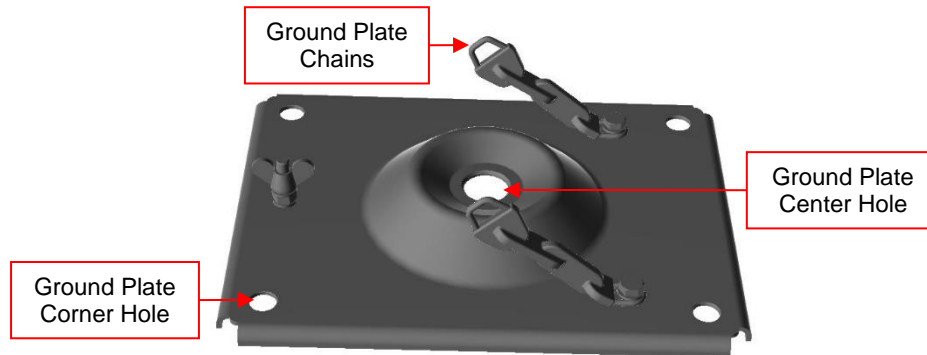


Figure 1-2 Ground Plate

The Ground Plate has:

- Ground Plate Chains used to secure the mast in position and prevent it from rotating
- Four Ground Plate Corner holes which are used with the Ground Plate Stakes (Section 1.5.3) to secure the Ground Plate in position
- A Ground Plate Center Hole where the Mast Peg fits

1.5.3 Ground Plate Stakes

The Mast System has three Ground Plate Stakes (Figure 1-3). Two are used to secure the Ground Plate in position. The third is used to assist in locating the Guy Line Stake positions and can work with the Azimuth Control Bar (Section 1.5.4) to secure a rotated Mast in position.



Figure 1-3 Ground Plate Stake

1.5.4 Azimuth Control Bar

The Azimuth Control Bar (Figure 1-4) is used to secure the mast in position on the Ground Plate. When the mast is not rotated, the Azimuth Control Bar fits through the Ground Plate Chains and the Mast Foot. When the mast is rotated, it fits through the Mast Foot and is secured in place with a Ground Plate Stake.



Figure 1-4 Azimuth Control Bar

1.5.5 Winch

The Winch (Figure 1-5):

- Is hand-operated
- Has an automatic safety brake
- Has a built-in automatic switch mechanism allowing it to be cranked to extend or retract the mast without needing to make any adjustments



Figure 1-5 Winch

Depending on the Mast System model, the Winch may be a Winch 501 or Winch 651.

1.5.6 Payload Tip

The Payload Tip (Figure 1-6):

- Attaches to the top of the mast
- Is used to secure and support the payload during the operation
- Includes a Grounding Screw on the side that allows for the attachment of a grounding wire



Figure 1-6 Payload Tip

1.5.7 Guy Lines

Guy Lines (Figure 1-7) are:

- Used with the Guy Line Stakes to further stabilize the mast by resisting environmental conditions that may cause tip-over and horizontal payload moment
- Made of Dyneema®
- Color-coded to match the Guy Plates on the mast where they attach. There will be:
 - (4) Guy Lines marked Red
 - (4) Guy Lines marked Blue

Taller models will also have (4) Guy Lines marked Yellow.



Figure 1-7 Guy Line

1.5.8 Guy Line Stakes

Guy Line Stakes (Figure 1-8) are used with the Guy Lines to further stabilize the mast by resisting environmental conditions that may cause tip-over and horizontal payload moment.

Depending on the Mast System model:

- The Guy Line Stakes may be 850 mm or 650 mm
- There may be 4 or 8 Guy Line Stakes

Note: The pull-out strength of Guy Line Stakes is dependent on the soil type.



Figure 1-8 Guy Line Stake

1.5.9 Radius Rope

The Radius Rope (Figure 1-9) is used to assist in determining the Guy Line Stakes locations relative to the mast location. Depending on the Mast System Model, one of three different Radii Ropes will be used.



Figure 1-9 Radius Rope

1.5.10 Hammer

The Hammer (Figure 1-10):

- Is used to drive the Ground Plate Stakes and Guy Line Stakes into the ground
- Weights 6.6 lb. (3 kg)

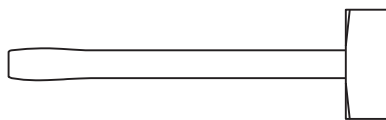


Figure 1-10 Hammer (3 kg)

1.5.11 Transit Bag

The Transit Bag (Figure 1-11) is used to carry components of the system. Depending on the Mast System model, there may be one or two Transit Bags. A list of components and quantities is included with the Transit Bag.

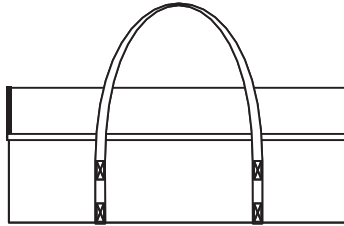


Figure 1-11 Transit Bag

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Section 2 Operation

This section describes operation of the Mast System. The exact operating procedures will vary based on the configuration of your Mast System. Follow the appropriate operation procedures for your Mast System. Use care to understand and follow all precautions while operating.

2.1 Pre-Operation Check

Before operating the system, ensure:

- All operators read and understand the entire operation procedure
- The Mast System is undamaged. If damage is apparent, do not use the Mast System, and have it serviced prior to use.
- All electric cables are undamaged and properly terminated.
- The area is free of power lines and other overhead obstructions.
- There are no underground utilities that may be damaged when installing Ground Plate Stakes and Guy Line Stakes.
- Any objects that might obstruct motion of the Mast System, cause binding, or hinder Mast System function are removed. Keep all persons clear of the mast and mast extension. Extending mast into obstructions could result in death or serious injury and could render the mast inoperable and partially extended.
- The operator has full view of the Mast System during use.
- Ensure the proper personnel are available to operate the mast. At least two people are necessary for deployment of the mast. Three people are recommended.
- Ensure the mast is only being operated in safe wind speeds.
- Ensure that the following precautions are understood and followed:

⚠ DANGER

Mast Deployment – Soil! Do not attempt to deploy the mast on soft or loose soil. The Ground Plate and Guy Stakes could become unstable under wind loading and cause the mast to fall.

⚠ DANGER

Mast Deployment – Wind! Do not attempt to deploy or retrieve this mast during electrical storms or when winds exceed 25 mph (40 km/h).

⚠ WARNING

Mast Deployment – Angle! Do not attempt to deploy the mast on ground that slopes more than 10 degrees. The mast must be vertical before deployment. Adjust Guy Lines as required until the bubble level indicates the mast is vertical.

⚠ WARNING

Buried Cables Hazard! Ensure there are no buried cables when hammering the Ground Plate Stakes and Guy Line into the ground.

⚠ WARNING

Mast Vertical! The mast must be vertical before deployment. Adjust the Guy Lines as required until the Bubble Level indicates the mast is vertical.

⚠ WARNING

Mast Deployment – Inspections! Visually inspect each component of the Mast System before each deployment. Check the stability of the Ground Plate Stakes and Guy Line Stakes periodically.

⚠ WARNING

Mast Extension Hazard! Do not deploy the mast if power lines are less than 150 ft. (45 m) from the center of the deployment site. 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. Extending mast into obstructions could result in death or serious injury and could render the mast inoperable and partially extended.

⚠ WARNING

Lifting Hazard – Intended Use! The mast is intended to lift a specific payload for lighting, surveillance or communication use only. Any other use without written consent is prohibited and could cause death or serious injury. Do not use mast to lift personnel. Do not exceed specified payload capacity. Large payload wind sail areas can reduce payload capacity. Consult Will-Burt engineering.

⚠ WARNING

Pinch Point Hazard! Moving parts can crush and cut resulting in death or serious injury. Keep clear of moving parts while operating mast.

⚠ WARNING

Extreme Conditions! For applications with heavy payloads or windy conditions, first deploy the non-loaded mast and then tighten all Guy Lines.

⚠ CAUTION

Safety Instruction – Guy Line Stakes! When using Guy Lines, the installer shall verify the Guy Line Stake point strength is adequate to support the Guy Line forces. Always follow Guy Stake removal instructions to avoid injury and/or Guy Stake damage.

⚠ CAUTION

Lifting Hazard! Depending on the mast model, the mast weighs up to 91.5 lb. (41.5 kg). Always observe weight lift limits.

2.2 Operation Equipment

Table 2-1 lists recommended equipment for operation.

Table 2-1 Equipment Recommended for Operation

Recommended Equipment*			
Personal Protective			
	Safety Glasses	Work Gloves	Nitrile or Vinyl Gloves
	Hearing Protection	Hard Hat or Helmet	Safety Shoes
* Depending on the local, regional, and national standards and codes of practice, and the environment, additional personal protective equipment may be necessary.			

2.3 Mast Operation: Quick Summary

The following is a quick summary of operation of the Mast System. Detailed steps follow the quick summary (Section 2.4).

To operate:

1. Select a Suitable Location (Section 2.4.1)
2. Prepare the Mast for Operation (Section 2.4.2)
3. Install the Payload (Section 2.4.3)
4. Extend the Mast (Section 2.4.4)
5. Rotate the Mast (Section 2.4.5)
6. Retract the Mast (Section 2.4.6)
7. Prepare the Mast for Transportation (Section 2.4.7)

2.4 Mast Operation: Detailed Instructions

The following are detailed steps of operation of the Mast System. The exact operation procedures may vary based on the operation environment.

2.4.1 Select a Suitable Location

To select a suitable mounting location, consider the following:

- The deployment area must have sufficient room to mount the Mast System. The area must be free of power lines or other overhead obstructions.
- The deployment area must be solid and capable of holding the forces required. Do not attempt to deploy the mast on soft or loose soil as the Ground Plate or Guy Stakes could become unstable under wind loading and cause the mast to fall. The installer shall verify the Guy Line Stake point strength is adequate to support all Guy Line forces.
- The Mast System should be on level terrain. The mast can be raised on a maximum slope of 10°. When raising the mast on an incline, ensure the long side of the Ground Plate lies in the direction of the tilt.
- The mast site and raising direction should be chosen with regard to the transmitting and/or receiving direction and antenna type.

2.4.2 Prepare the Mast for Operation

To prepare the components from the bags.

1. Place the Ground Plate at the center of site with the Ground Plate Chains pointing in the direction the mast will raise towards (Figure 2-1).

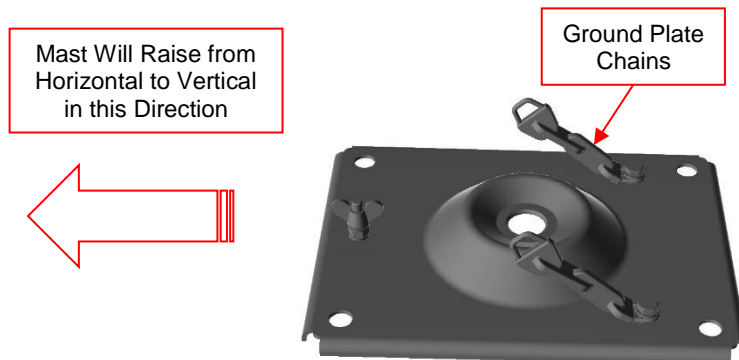


Figure 2-1 Ground Plate

2. Secure the Ground Plate in place with two of the Ground Plate Stakes. Use Ground Plate Corner Holes opposite of each on a diagonal. Only two of the four Ground Plate Corner Holes will be used.

3. Fix the third Ground Plate Stake in the Ground Plate Center Hole (Figure 2-2). This Ground Plate Stake should be secure and vertical, but does not need to be all the way into the ground. This Ground Plate Stake will be used with the Radius Rope to find the Guy Line Stake locations.

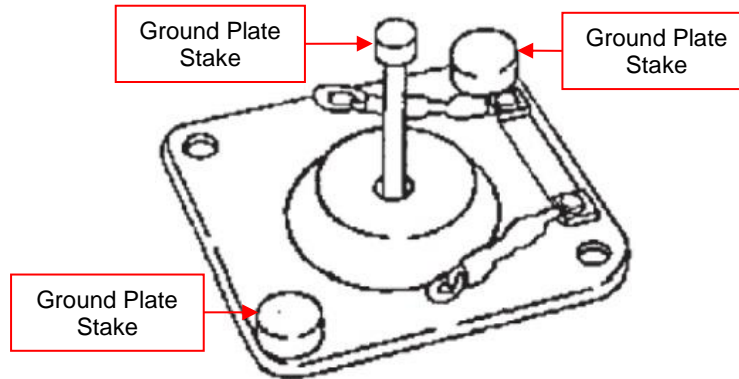


Figure 2-2 Ground Plate Secured with Ground Plate Stake in Middle

4. Unwind the Radius Rope and secure it to the Ground Plate Stake in the center of the Ground Plate (Figure 2-3).

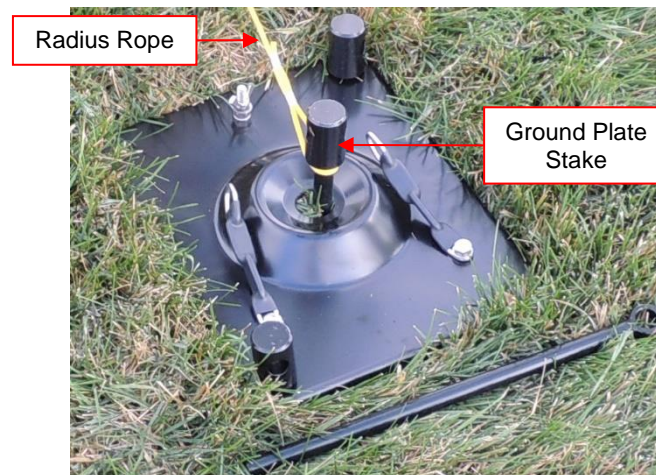


Figure 2-3 Radius Rope Attached to Ground Plate Stake

5. Stretch the Radius Rope out towards the direction the mast will raise (Figure 2-4).



Figure 2-4 Radius Rope Stretched Out

6. Secure the Guy Line Stake in the ground at the location of the loop on the Radius Rope. The Guy Line Stake should be at a 60° angle from the ground (Figure 2-5). Depending on the mast model, there will be either one or two loops. For models with two loops, secure a Guy Line Stake at each loop.

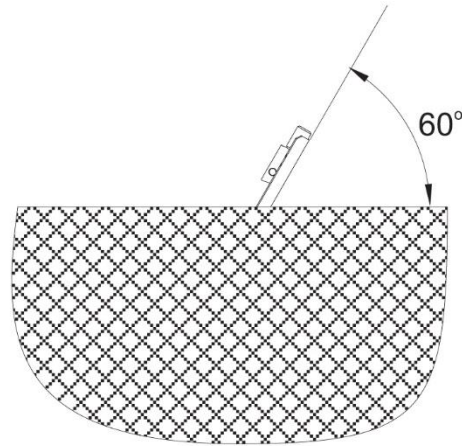


Figure 2-5 Guy Line Stake Angle

7. Secure the loop at the end of the Radius Rope to the Guy Line Stake and stretch out the Radius Rope so that the Radius Rope, Guy Line Stake and Ground Plate Stake form a “V” (Figure 2-6). The Guy Line Stake loops on the Radius Rope should be as far as possible from the Ground Plate.

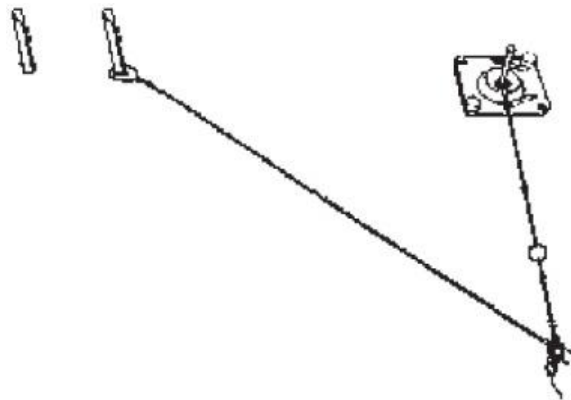


Figure 2-6 Radius Rope Attached to Guy Line Stake and Ground Plate Stake

8. At the middle loop on the Radius Rope, secure a Guy Line Stake. For models with two loops, secure a Guy Line Stake at each loop.
9. Repeat Steps 7 and 8 for the remaining Guy Line Stakes.
10. Rewind the Radius Rope on the reel and return it to the bag.
11. Remove the Ground Plate Stake from the center of the Ground Plate and return it to the bag. Leave the other Ground Plate Stakes in place.

12. Position the mast so that the Mast Foot is next to the Ground Plate. The Mast Foot should point in the direction the mast will rise (Figure 2-7).

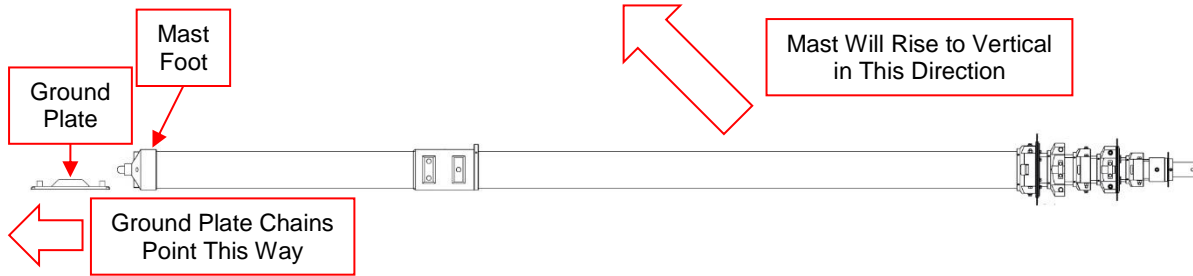


Figure 2-7 Mast Direction

13. Insert the Azimuth Control Bar through the Ground Plate Chains and the side holes on the Mast Foot (Figure 2-8).

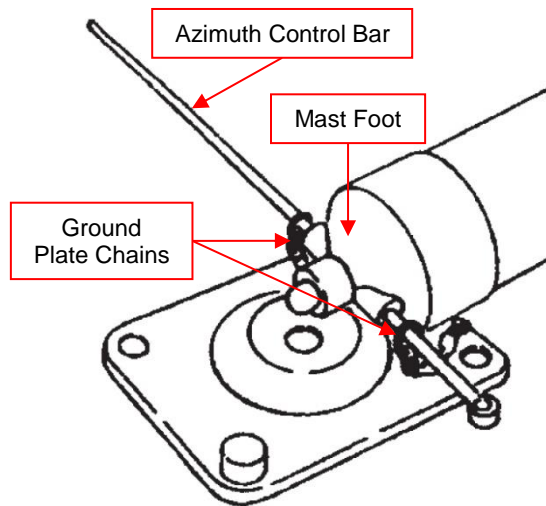


Figure 2-8 Azimuth Control Bar Through Ground Plate Chains and Mast Foot

14. Remove the Mast Top Cover.

15. Release the Mast Lock Rope.



Figure 2-9 Release the Mast Lock Rope

16. Unwind the Hoisting Belt.

17. The Guy Line Rings and the Guy Lines are color-coordinated. Secure the appropriate Guy Lines to the Guy Line Rings on the Base Tube.
18. Unwind these Guy Lines.
19. Secure the side Guy Line to the bottom holes on the side Guy Line Stakes.
20. Secure the back Guy Line to the bottom hole on the back Guy Line Stake.
21. Lay the front Guy Line in the direction the mast will raise.
22. Attach the rest of the Guy Lines to the Guy Line Rings as appropriate.
23. Unwind the Guy Lines and lay them out in the direction the mast will raise (Figure 2-10). Ensure the Guy Lines do not tangle.

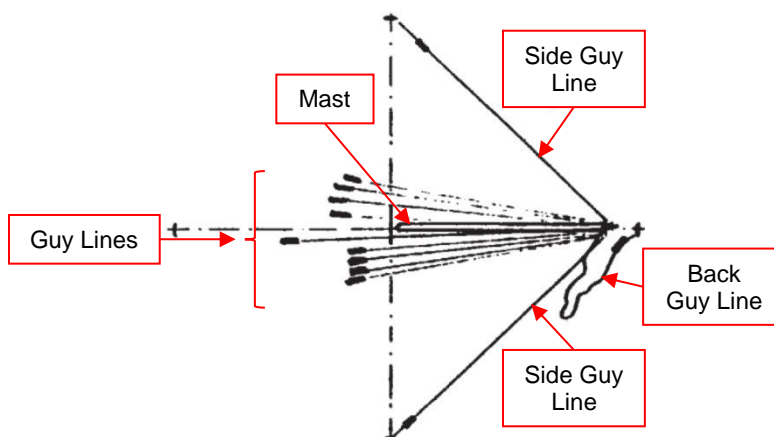


Figure 2-10 Guy Lines Laid Out

24. To raise the mast to vertical, one person should lift the mast and then push it forward while another pulls on the Guy Line directly opposite (Figure 2-11). The person lifting the mast should use care to ensure the mast does not tip to the side or forward as the mast nears vertical. When vertical, the Mast Peg will slide into the Ground Plate Center Hole.

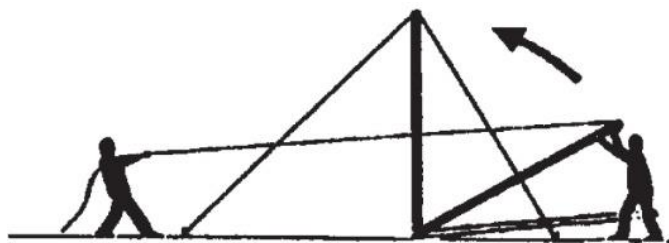


Figure 2-11 Raising the Mast to Vertical

25. With one person supporting the mast, the other(s) tension(s) the Base Tube Guy Lines. Observe the Bubble Level on the Base Tube to ensure the mast standard vertically.

26. With the latch pointed upwards, secure the Winch to the Winch Holder on the mast. The Winch will snap into place.

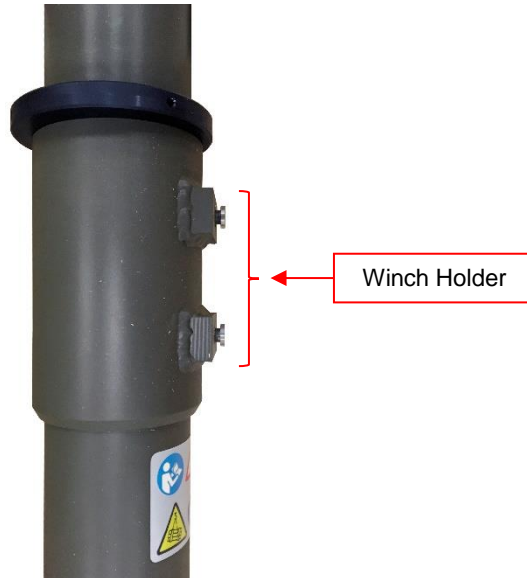


Figure 2-12 Winch Holder

27. Insert the Hoisting Belt into the Winch Drum.

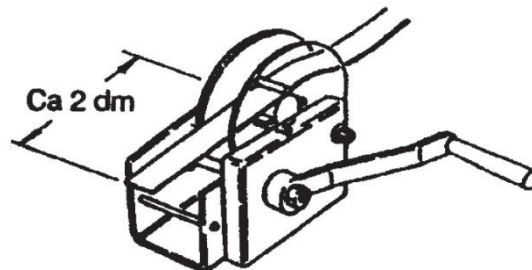


Figure 2-13 Winch

28. Wind the Winch enough that the mast extends approximately 4 inches (10 cm).

2.4.3 Install the Payload

To install the payload:

1. Loosen the front Guy Line to allow the mast to lower from vertical towards the ground at an angle. Lower the mast until the top of the mast can be safely reached.
2. Attach the Payload Tip to the top of the mast (Figure 2-14).

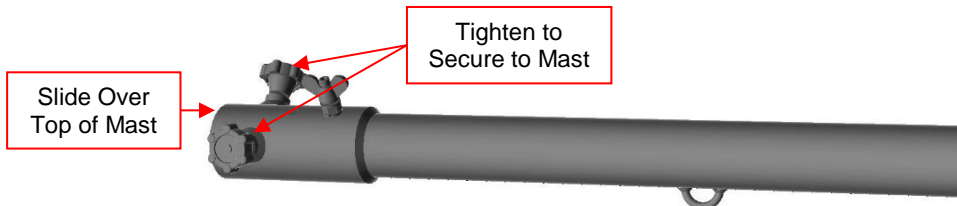


Figure 2-14 Payload Tip

3. Properly secure the payload to the Payload Tip. The mounting hardware must include proper means to resist vibration loosening such as thread-locking compound or locking hardware. Torque all hardware as appropriate for its size and grade. Be sure not to overtighten to the Payload Tip, or damage to the Payload Tip could occur.

Note: The Grounding Screw on the side of the Payload Tip allows for the attachment of a grounding wire (Figure 2-15).

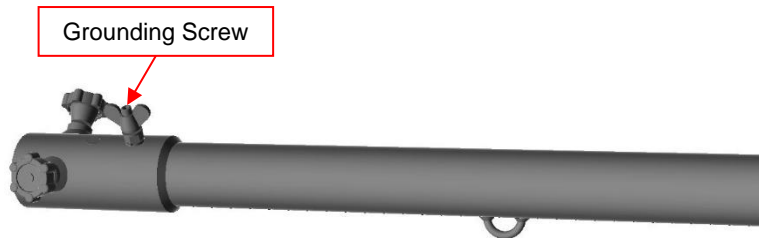


Figure 2-15 Payload Tip Grounding Screw

4. Return the mast to the vertical position. Tension the Base Tube Guy Lines. Observe the Bubble Level to ensure the mast stands vertically.

2.4.4 Extend the Mast

⚠ WARNING

Mast Overextension! Do not attempt to overextend the mast. Attempting to overextend the mast may cause Winch Brake failure or malfunction.

To extend the mast:

1. Crank the Winch clockwise. To fully extend the mast, crank the winch until the colored label appears on the Hoisting Belt. Do not try to force the mast any higher. A mechanical stop prevents the tubes from going further.

Note: When extending the mast, a “clicking” sound must be heard from the Winch. If a clicking sound is not heard, stop cranking the mast and repair the Winch (Section 3.6.2).

2. As necessary, adjust the length of the Guy Lines by winding on or off one or more turns from the Guy Reel.
3. Properly secure and tension all Guy Lines to the proper stakes immediately after extending the mast. To tension the Guy Lines, pull the reel up to tighten the Guy Line (Figure 2-16). The reel will lock automatically. To release tension on the Guy Lines, lift the top Guy Line upwards and push the reel towards the stake.

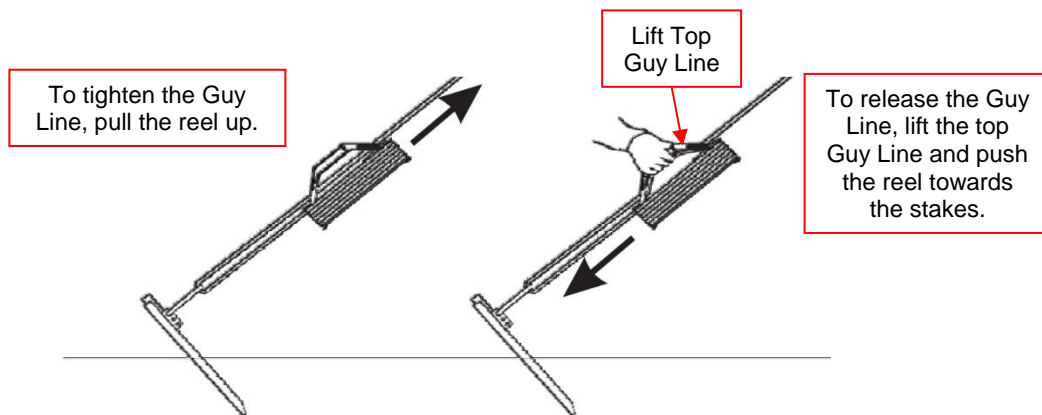
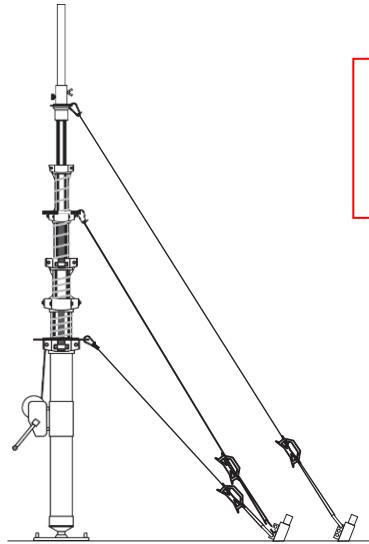


Figure 2-16 Tensioning and Releasing the Guy Line

All Guy Lines should be equally tensioned (Figure 2-17). Beginning at two locations opposite each other, gradually tension each Guy Line. Vertical alignment of the mast is accomplished by observing the Bubble Level on the Base Tube. Adjust the appropriate Guy Line(s) as necessary to keep the mast plumb vertically.



Note: Guy Lines only shown in one direction for clarity. In the field, Guy Lines would go out in four directions 90° apart and be either to two or three levels.

Figure 2-17 Guy the Mast (Three Level Guying Shown)

4. Check the mast one day after initial installation. Check the tension periodically afterwards. In bad conditions, such as loose sand, the Guy Line Stakes must be inspected and, if necessary, driven down. This must be done more frequently in hard wind. To reduce the strain on the Guy Line Stakes, they can be moved outward to use the full length of the Guy Line.

2.4.5 Rotate the Mast

To rotate the mast:

1. Remove the Azimuth Control Bar from the Mast Foot and the Ground Plate Chains.
2. Reinsert the Azimuth Control Bar through the Mast Foot, but not through the Ground Plate Chains.
3. Rotate the mast as required. It is not necessary to loosen the tension on the Guy Lines to rotate the mast.
4. Insert the third Ground Plate Stake through the eyehole on the Azimuth Control Bar and drive it into the ground to secure the mast.

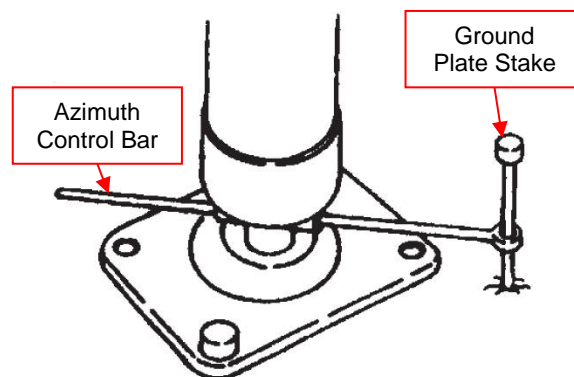


Figure 2-18 Rotated Mast Secured

2.4.6 Retract the Mast

⚠ WARNING

Secure Mast Before Retracting! Ensure the Azimuth Control Bar is through both of the Ground Plate Chains and the Mast Foot before retracting the mast.

To retract the mast:

1. If the mast was rotated:
 - a. Remove the Ground Plate Stake from the eyehole on the Azimuth Control Bar.
 - b. Rotate the mast back to the original position.
 - c. Remove the Azimuth Control Bar from the Mast Foot.
 - d. Reinsert the Azimuth Control Bar through the Mast Foot and Ground Plate Chains.
2. Decrease the tension on any Guy Lines attached above the Base Tube. When decreasing tension on Guy Lines, gradually decrease tension on each Guy Line while observing to ensure the mast is not bending too far towards on side.
3. Crank the Winch counter-clockwise to lower the mast.

2.4.7 Prepare the Mast for Transportation

⚠ WARNING

Transporting! Always attach the Mast Lock Rope to the Top Guying Plate to secure the mast when transporting.

To prepare the mast for transportation:

1. Loosen the front Guy Line to allow the mast to lower from vertical towards the ground at an angle. Lower the mast until the top of the mast can be safely reached.
2. Remove the payload from the Payload Tip.
3. Remove the Payload Tip from the mast.
4. Remove the Hoisting Belt from the Winch and disconnect the Winch.
5. Carefully lower the mast the rest of the way to the ground.
6. Disconnect the Guy Lines from the mast and Guy Line Stakes and neatly wind up the Guy Lines.
7. Remove the Azimuth Control Bar from the Ground Plate Chains and Mast Foot.
8. Attach the Mast Lock Rope to the Top Guying Plate to secure the mast (Figure 2-19).

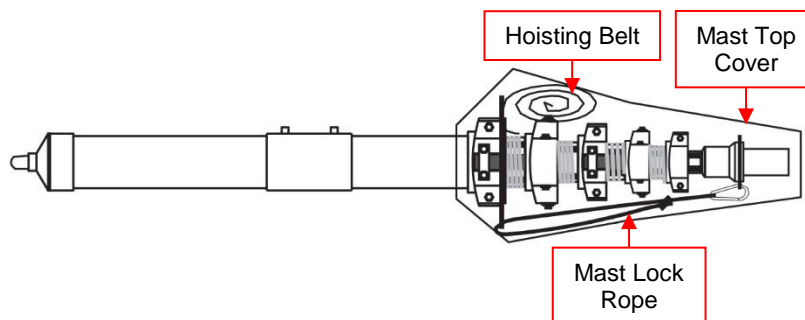


Figure 2-19 Mast in Transport Mode

9. Cover the top of the mast with the Mast Top Cover (Figure 2-19).
10. Remove the mast from the Ground Plate.
11. Remove the Ground Plate Stakes.
12. Remove the Guy Line Stakes.
13. Inspect and clean all components.
14. Ensuring all components are accounted for, neatly pack up all components into the Transit Bags.

Section 3 Maintenance

This section describes maintenance procedures required to keep the system operational. Use care to understand and follow all precautions while performing these procedures. Contact the factory with any questions before performing maintenance and repair procedures. The Will-Burt Company also offers maintenance and repair services.

⚠ WARNING

Trained Personnel Only! Only trained and qualified personnel should perform maintenance and servicing procedures. Death or serious injury could result if proper maintenance procedures and inspections are not observed.

⚠ WARNING

Tip Over Hazard! Before performing maintenance or repair, ensure the Mast System is level and secure. Injury to personnel or equipment damage could occur if the Mast System tips over.

⚠ CAUTION

Equipment Damage – Lubricants! Do not apply oil or grease to the mast. Lubricants will attract dust and contaminants from the air, and may lead to premature wear and/or damage to the strap.

In general:

- Examination and maintenance is required after approximately 300 mast extensions (or as necessary)
- Two people are necessary to replace mast tubes and lifting belts
- Before starting maintenance, the mast must be secured on a suitable work table in a horizontal position

Maintenance of the Mast System is describes as follows:

- Maintenance Equipment (Section 3.1)
- Inspections (Section 3.2)
- Clean the Mast System (Section 3.3)
- Replace Mast Tubes and Lifting Belts (Section 3.5)
- Winch Maintenance and Repair (Section 3.6)

3.1 Maintenance Equipment

Table 3-1 lists recommended equipment for maintenance.

Table 3-1 Equipment Recommended for Maintenance

Recommended Equipment*		
Personal Protective		
Safety Glasses	Work Gloves	Nitrile or Vinyl Gloves
Hearing Protection	Hard Hat or Helmet	Safety Shoes
Equipment		
Wrenches	Screwdrivers	Rubber Mallet
A suitable working table with support for the mast		
* Note:		
<ul style="list-style-type: none"> Depending on the local, regional, and national standards and codes of practice, and the environment, additional personal protective equipment may be necessary. When disposing of any disposables or components, do so according to any applicable local, regional, and national standards and codes of practice. 		

3.2 Inspections

Before performing maintenance operations, perform the following inspections:

- Examine the mast tubes to ensure they are not damaged and glide smoothly without stopping. Listen for unusual sounds.
- Examine the lifting belts for damage, especially on the edges or in places between individual sections.
- Examine that all running wheels operate smoothly and that there are no visual damages.
- Check all fasteners for loosening.
- Ensure the Guying Plates rotate smoothly and are not damaged.
- Check all Guy Lines, reels, carbine hooks, and tie-knots for damage and ensure all function properly.
- Check the Winch and ensure the Winch and brake system function properly.
- Check the Ground Plate, Ground Plate Stakes, Guy Line Stakes, and Bags.
- Ensure all components are included with the Transit Bags.
- Create a report for damage and lost parts.

3.3 Clean the Mast System

Clean the:

- Mast using a soft cloth, mild detergent, and warm water. It is not recommended to use pressurized water. After cleaning, dry all wet parts with a clean, dry cloth.
- Ground Plate, Ground Plate Stakes, Azimuth Control Bar, Payload Tip, Guy Line Stakes, and Hammer with a brush, soft cloth, and warm water.
- Winch with warm water, cloth, and mild detergent. After cleaning, the Winch may be lubricated with standard machine lubricants.

Note: Never lubricate the Hoisting Belt, Running Wheels, or Mast Tubes.

3.4 Guy Line Maintenance

This section describes Guy Line Maintenance.

3.4.1 Temporary Repair of Damaged Guy Line

To temporarily repair a damaged Guy Line, cut out the damaged section and tie the Guy Line together as shown in Figure 3-1.

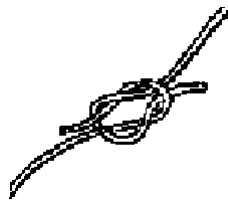


Figure 3-1 Tie Guy Line

3.4.2 Replace a Guy Line

To replace a Guy Line:

1. Remove the old Guy Line.
2. Replace the old Guy Line with a new Guy Line that is the same length as the old one.
3. Attach the carbine hook as shown in Figure 3-2.

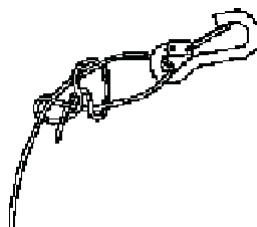


Figure 3-2 Attach Carbine Hook

3.5 Replace Mast Tubes and Lifting Belts

This section describes the procedures used to replace mast tubes and lifting belts.

Refer to Figure 3-3 for information pertaining to identification of the mast tubes and lifting belts.

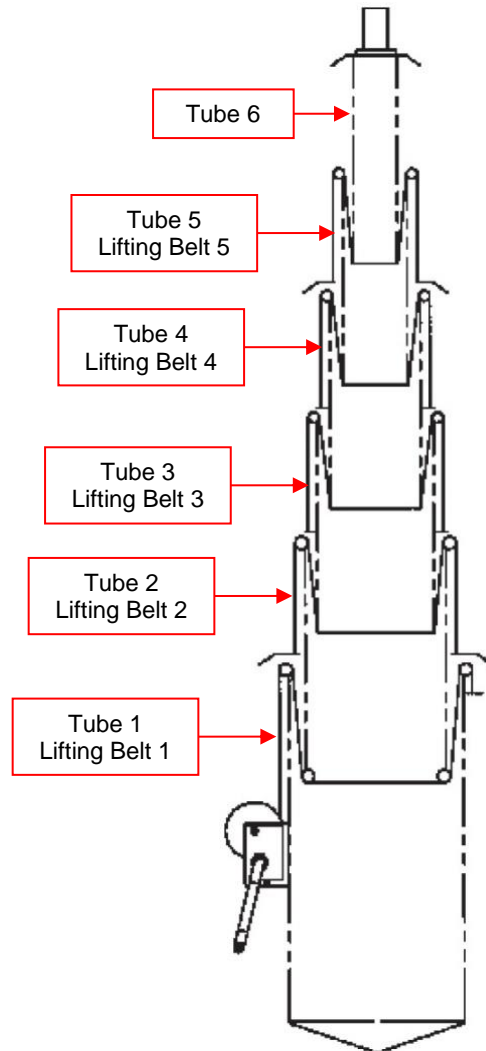


Figure 3-3 Mast Tubes and Lifting Belts

3.5.1 Replace Tube 6

To replace tube 6:

1. Pull out tube 6 (Figure 3-4).



Figure 3-4 Remove Tube 6

2. Remove the lifting belt from the notch on the lower glider (Figure 3-5).



Figure 3-5 Remove Lifting Belt

3. Insert the lifting belt into the notch of the new tube and install the new tube into the mast.

3.5.2 Replace Tube 5

To replace tube 5:

1. Remove tube 6.
2. Remove the lifting belt from the notch on the lower glider.
3. Pull tube 5 out approximately 15.75 inches (40 cm).

4. Remove the elastic rope by unloosening the upper knot on the elastic rope (Figure 3-6). Memorize the number of turns applied around the tube.



Figure 3-6 Remove Elastic Rope

5. On tube 4, remove the four screws on both plates on the glider which holds lifting belt 5 (Figure 3-7). Remove the pins from the belt bends.



Figure 3-7 Remove the Screws

6. Pull tube 5 out the rest of the way and remove the lifting belt from the notch on the lower glider of tube 5.
7. Insert the lifting belt into the notch on the lower glider on the new tube 5.
8. Insert the new tube 5 into tube 4. During this procedure, ensure lifting belt 5 is not twisted.
9. Replace the elastic rope ensuring it has the same number of turns as it had before (reference Step 4).

3.5.3 Replace Tubes 4 and 3

Replace tubes 4 and 3 using the same general procedures used to replace tube 5 (Section 3.5.2).

3.5.4 Replace Tube 2

To replace tube 2:

1. Remove the elastic rope from tube 3 by unloosening the upper knot on the elastic rope (Figure 3-6). Memorize the number of turns applied around the tube.



Figure 3-8 Remove Elastic Rope

2. Pull out tubes, 6, 5, 4, and 3 together and remove the lifting belt from the notch on the lower glider of tube 3.
3. Remove the elastic rope from tube 2 by unloosening the upper knot on the elastic rope.
4. Remove the screws on both plates on the upper glider on tube 1 which holds lifting belt 5 (Figure 3-7). Remove the pins from the belt bends.
5. Unscrew all eight screws from the upper glider on tube 1 (Figure 3-9). Pull all plates up along tube 2. Memorize the position of the screw which holds the elastic rope.



Figure 3-9 Unscrew the Upper Glider

6. Unscrew the four screws on both limiters and remove them (Figure 3-10).



Figure 3-10 Remove the Limiters

7. Pull out tube 2 and remove lifting belt 1 from the notch.
8. Insert a new tube 2. Reattach all removed elements in the reverse order.

3.5.5 Replace Tube 1

To replace tube 1, follow the procedure to replace tube 2 (Section 3.5.4). During this procedure, replace tube 1 if necessary.

3.5.6 Replace Lifting Belts 5, 4, 3, and 2

To replace lifting belts 5, 4, 3, and 2:

1. Remove the elastic rope from the tube by unloosening the upper knot on the elastic rope (Figure 3-11).



Figure 3-11 Remove Elastic Rope

2. Unscrew all screws from the upper glider on the mast tube immediately below the mast tube which the lifting belt is being replaced on (Figure 3-12). Remove the pins from the belt bends.



Figure 3-12 Remove the Screws

3. Pull out the mast tube and remove the lifting belt from the notch in the lower glider (Figure 3-13).



Figure 3-13 Remove Tube 6

4. Insert the pins to the new lifting belt and install the lifting belt on the glider as before. Ensure the lifting belt is not twisted.
5. Stretch the lifting belt and insert it into the lower glider of the mast tube.
6. Push the mast tube with the new lifting belt into the next lower mast tube.
7. Reattach the elastic rope to the mast tube.

3.5.7 Replace Lifting Belt 1

To replace lifting belt 1:

1. Remove the elastic rope from tube 2 by unloosening the upper knot on the elastic rope (Figure 3-11).



Figure 3-14 Remove Elastic Rope

2. On the upper glider on tube 1 (which holds lifting belt 2), unscrew all screws from both plates (Figure 3-14). Remove the pins from the belt bends.



Figure 3-15 Remove the Screws

3. Pull out tube 2 using the same procedure described in Section 3.5.4. Remove the lifting belt from the notch in the lower glider (Figure 3-16).



Figure 3-16 Remove Lifting Belt

4. Remove the screws from the plate holding lifting belt 1 (Figure 3-17) and remove the pins from the belt bends. Remove the old lifting belt 1.



Figure 3-17 Remove the Screws

5. Insert the new lifting belt 1 and install the remaining tubes back into tube 1 in the reverse order.
6. Reinstall the elastic rope on tube 2.

3.5.8 Replace a Running Wheel

To replace a running wheel:

1. Lift all tubes above the running wheel which will be replaced approximately 8 to 12 inches (20 to 30 cm).
2. Pull out the lifting belt a little so that it makes a small bow.
3. Unscrew the running wheel axis (Figure 3-18) and pull it out. If necessary, use a rubber mallet to help remove the running wheel.



Figure 3-18 Unscrew Running Wheel Axis

4. Use a screwdriver to remove the running wheel (Figure 3-19).



Figure 3-19 Remove the Running Wheel

5. Insert the new running wheel.
6. Reinstall the running wheel axis. Tighten the screw and nut only so much that the next tube will run smoothly. If the new running wheel does not turn smoothly, then loosen the nut slightly.

3.6 Winch Maintenance and Repair

This section describes maintenance and repair of the Winch.

3.6.1 Winch Maintenance

To perform maintenance on the Winch:

1. Remove the Winch handle.
2. Unscrew both lids on the Winch.
3. Remove the lids.
4. Examine the cogwheels (Figure 3-20). If any damage is observed, then the Winch Should be replaced.



Figure 3-20 Winch Cogwheels

5. Attach the handle and turn it in both directions. Ensure the main drum and all cogwheels are running smoothly.
6. If necessary, clean the interior of the Winch with appropriate oil-cleaning solvent and wipe it with a soft, clean cloth.
7. Use standard machine lubricant on the cogwheel.
8. Reassemble the Winch.

3.6.2 Winch Repair

In rare conditions, it is possible that the Winch Brake is blocked. This could happen when the operator accidentally tries to overextend the mast. When blocked, the Winch Brake does not automatically stop the mast tubes. One way to recognize that the Winch Brake is blocked is that there is no “clicking” sound when lifting the mast.

To unblock the Winch Brake:

1. Place the Winch on a flat surface such as a work bench (Figure 3-21).



Figure 3-21 Place Winch on Flat Surface

2. Attach the hand crank to the Winch Axis.
3. Insert a large screw driver into the Winch Drum.
4. Move the hand crank counter-clockwise until the screwdriver stops movement (Figure 3-22).



Figure 3-22 Move Crank Counter-Clockwise

5. In this position, re-arrange the position of hand-crank to be horizontal and strongly push it counter-clockwise to release the blocked brake.

6. After the Winch Brake is released, there must be a small gap between the Winch Square Axis and the safety nut (Figure 3-23).

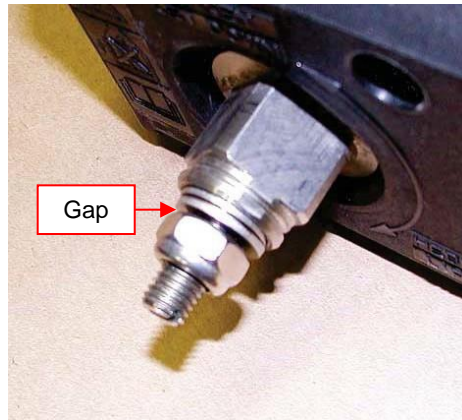


Figure 3-23 Small Gap

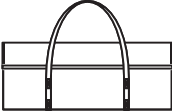



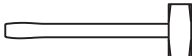
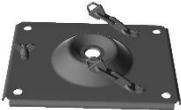




If the gap is not present:

- a. Ensure the screwdriver is still inside the drum.
- b. Use a wrench to turn the safety nut $\frac{1}{2}$ to 1 turn counter-clockwise (Figure 3-24).



Figure 3-24 Use Wrench to Turn Safety Nut

3.7 Accessories (List of Content)

		MAST TYPE/Qty.									
		8 105	10 105	12 105	15 105	8 128	10 128	12 128	15 128	18 128	
	BAG	1	1	2	2	1	1	2	2	2	
	GUY LINE STAKES 650	4	4	8	8	4	4	8	-	-	
	GUY LINE STAKES 850	-	-	-	-	-	-	-	8	8	
	AZIMUTH CONTROL BAR	1	1	1	1	1	1	1	1	1	
	GROUND PLATE STAKE	3	3	3	3	3	3	3	3	3	
	HAMMER 3 KG	1	1	1	1	1	1	1	1	1	
	GROUND PLATE	1	1	1	1	1	1	1	1	1	
	WINCH 501	1	1	1	-	-	-	-	-	-	
	WINCH 651	-	-	-	1	1	1	1	1	1	
	GUY LINE										
	RED	4	4	4	4	4	4	4	4	4	
	BLUE	4	4	4	4	4	4	4	4	4	
	YELLOW	-	-	4	4	-	-	4	4	4	
	RADIUS ROPE										
	MR-7	1	1	-	-	1	1	-	-	-	
	MR-8-10	-	-	1	-	-	-	1	-	-	
	MR-10-12	-	-	-	1	-	-	-	1	1	
	PAYLOAD TIP	1	1	1	1	1	1	1	1	1	