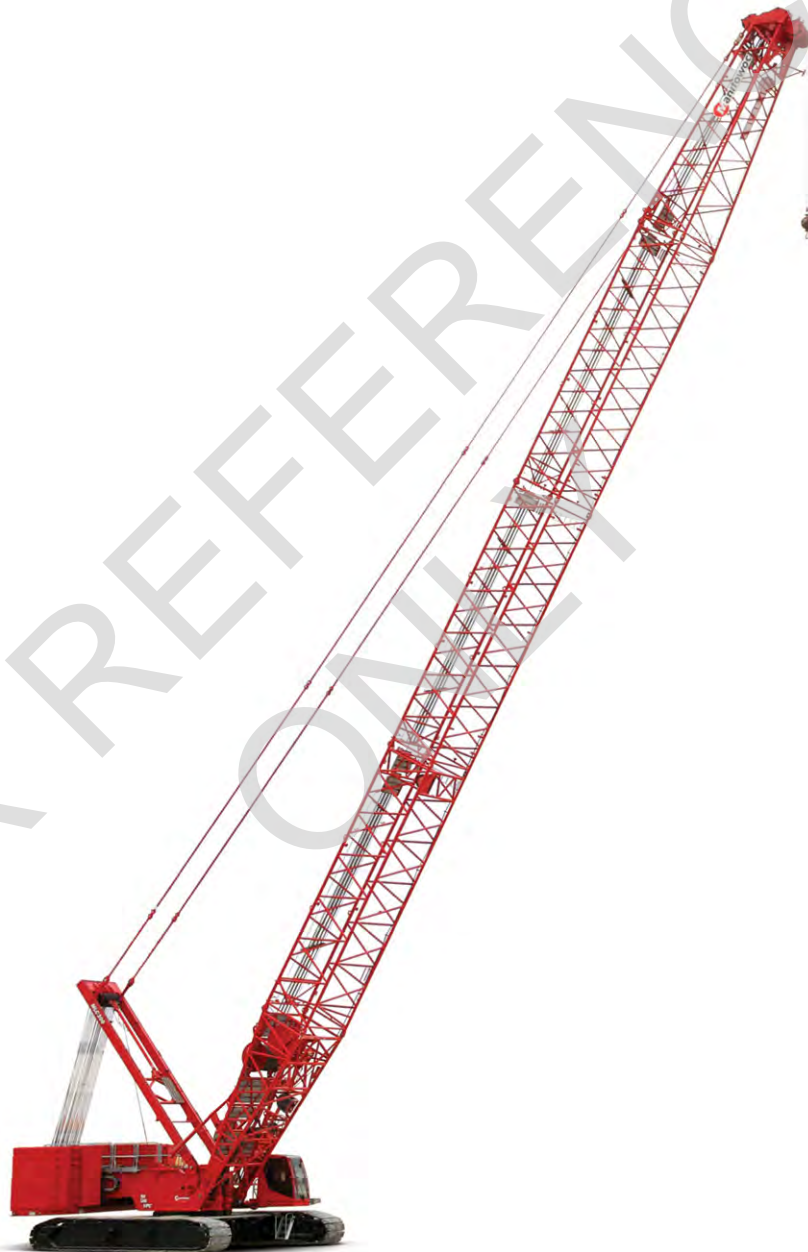


# Manitowoc MLC300

with Fixed Position Counterweight

## Operator Manual





# WARNING



## California Proposition 65

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Always start and operate the engine in a well-ventilated area.

If in an enclosed area, vent the exhaust to the outside.

Do not modify or tamper with the exhaust system.

Do not idle the engine except as necessary.

For more information, go to [www.P65warnings.ca.gov/diesel](http://www.P65warnings.ca.gov/diesel)

Batteries, battery posts, terminals, and related accessories can expose you to chemicals, including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling. For more information, go to [www.P65warnings.ca.gov](http://www.P65warnings.ca.gov)



## California Spark Arrestor

Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrestor may be required. The owner/ operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.



# OPERATOR MANUAL

This manual has been prepared for and is considered part of -

**MLC300**

**with Fixed Position Counterweight**

Crane Model Number

**XXXXXRef**

Crane Serial Number

This Manual is divided into the following sections:


<b>SECTION 1</b>	<b>INTRODUCTION</b>
<b>SECTION 2</b>	<b>SAFETY INFORMATION</b>
<b>SECTION 3</b>	<b>OPERATING CONTROLS AND PROCEDURES</b>
<b>SECTION 4</b>	<b>SETUP AND INSTALLATION</b>
<b>SECTION 5</b>	<b>LUBRICATION</b>
<b>SECTION 6</b>	<b>MAINTENANCE CHECKLIST</b>

## NOTICE

The serial number of the crane and applicable attachments (i.e. luffing jib) is the only method your Manitowoc dealer or the Manitowoc Crane Care Lattice Team has of providing you with correct parts and service information.

The serial number is located on a crane identification plate attached to the operator's cab and each attachment. Refer to the Nameplate and Decal Assembly Drawing in Section 2 of this manual for the exact location of the crane identification plate.

**Always furnish serial number of crane and its attachments** when ordering parts or discussing service problems with your Manitowoc dealer or the Manitowoc Crane Care Lattice Team.

	<b>⚠ WARNING</b>
	<p><b>To prevent death or serious injury:</b></p> <ul style="list-style-type: none"><li>• Avoid unsafe operation and maintenance. Crane and attachments must be operated and maintained by trained and experienced personnel. Manitowoc is not responsible for qualifying these personnel.</li><li>• Do not operate or work on crane or attachments without first reading and understanding instructions contained in Operator Information Manual and Service Manual supplied with crane and applicable attachments.</li><li>• Store Operator Information Manual and Service Manual in operator's cab.</li></ul> <p>If Operator Information Manual or Service Manual is missing from cab, contact your Manitowoc dealer for a new one.</p>

***THE ORIGINAL LANGUAGE OF THIS PUBLICATION IS ENGLISH.***



See end of this manual for Alphabetical Index

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FOR REFERENCE ONLY



# SECTION 1 INTRODUCTION

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## SECTION 1 INTRODUCTION

### CRANE DATA

See the end of this section for crane data specific to your crane:

- Basic Specifications
- EC Declaration (if applicable)

### CRANE WEIGHTS

See the end of this section for crane weights.

### OUTLINE DIMENSIONS

See the end of this section for outline dimensions.

### CHANGE OF OWNERSHIP REGISTRATION

If you are the new owner of a Manitowoc crane, please register it with Manitowoc Crane Care so we can contact you if the need arises.

1. Go to [www.manitowoc.com](http://www.manitowoc.com).
2. Go to Support > Services > Change of Ownership
3. Complete the form.

### MANITOWOC DEALER

For questions about this manual or the MLC300 crane, contact your Manitowoc dealer. If you do not know the contact information for your dealer, locate the Manitowoc dealer nearest you, as follows:

1. Go to [www.manitowoc.com](http://www.manitowoc.com)
2. Click on the red FIND A DEALER button.
3. Follow the on-screen prompts to locate your Manitowoc dealer.

### CRANE/ATTACHMENT IDENTIFICATION

An identification plate is attached to the outside of the operator cab (see [Figure 1-1](#)) and to the attachments (for example, luffing jib).

The crane or attachment model and serial number are provided on the plate.

For the exact location of the identification labels on your crane and attachments, refer to the Nameplates and Decals Drawing in Section 2 of this manual.

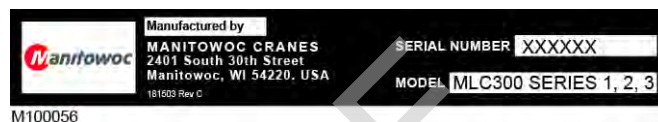
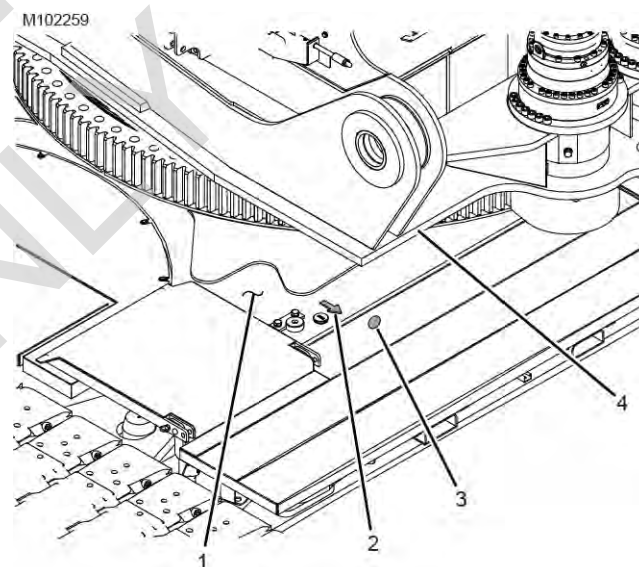


Figure 1-1. Identification Plate

### CRANE ORIENTATION

The terms RIGHT, LEFT, FRONT, REAR used in this manual refer to operator's right, left, front, and rear sides when seated in the operator cab looking forward.

- The swing drives are on the front of the rotating bed.
- The operator cab is on the left side of the rotating bed.
- A colored arrow (2) and dot (3) on the right top and right front sides of the carbody indicate the FRONT of the carbody (see [Figure 1-2](#)).



Item	Description
1	Carbody
2	Colored Arrow on Front of Carbody
3	Colored Dot on Front of Carbody
4	Front of Rotating Bed

Figure 1-2. Carbody Orientation Arrow

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FOR REFERENCE ONLY

IDENTIFICATION AND LOCATION OF COMPONENTS

Item	Description
0	Drum 0 (rigging winch)
1	Drum 1 (main hoist)
2	Drum 2 (aux hoist)
3	Drum 3 (aux hoist)
4	Drum 4 (boom hoist)
5	Boom Butt
6	Drum 6 (luffing or auxiliary hoist)
7	Drum 7 (tagline)
8	Upperworks
9	Lowerworks
10	Counterweight
11	Live Mast
12	Boom Stop (physical)
13	Boom Straps
14	Wire Rope Guide
15	Boom Insert (varying lengths)
16	Boom Top
17	Load Cell (1 each side of top)
18	Wire Rope Guide
19	Upper Boom Point
20	Lower Boom Point
21	Hook-and-Weight Ball
22	Load Block

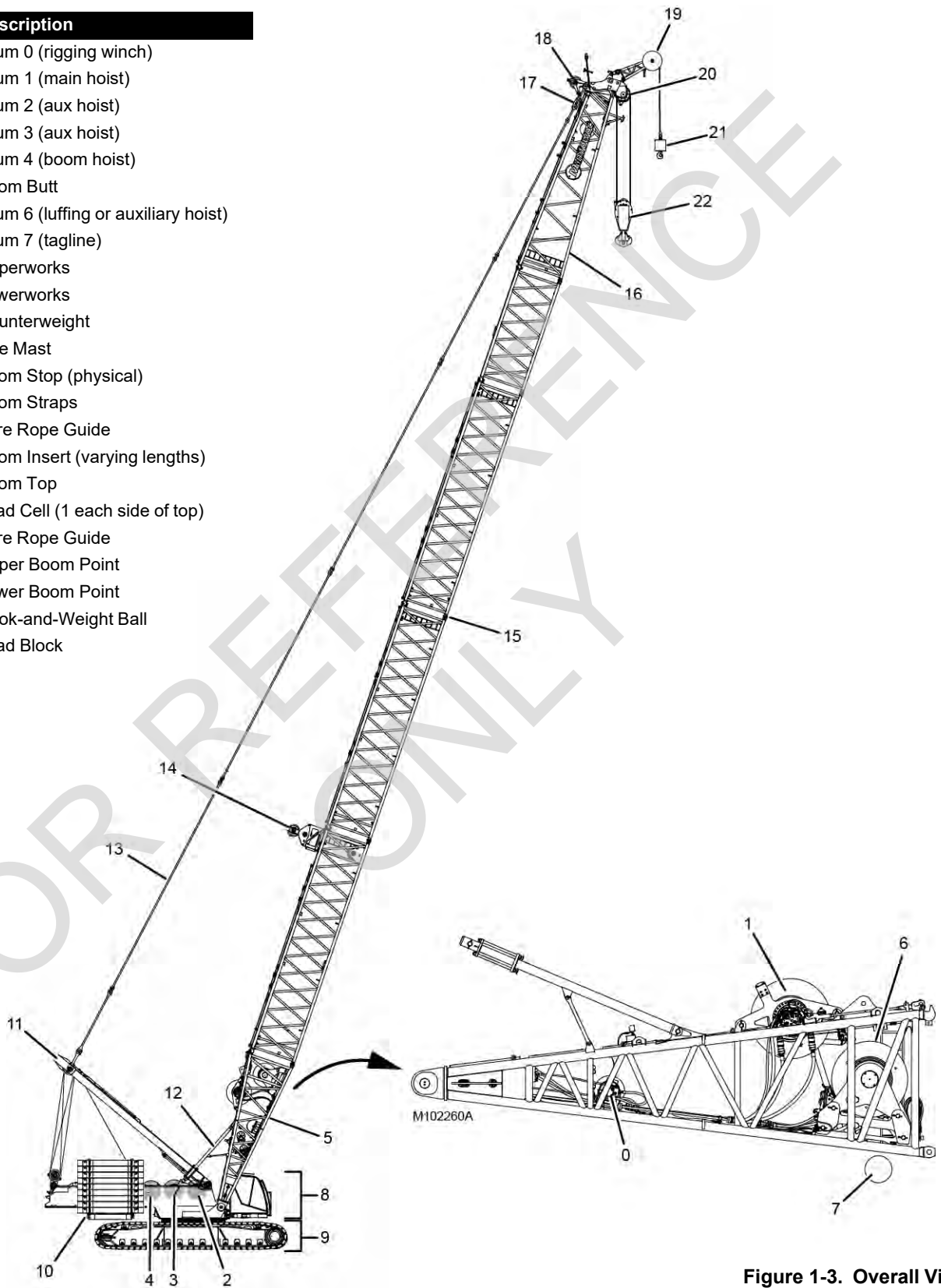


Figure 1-3. Overall View

Item	Description	Item	Description
1	Operator Cab	10	Counterweight Tray Retainer (2)
2	Swing Drive (1 is standard)	11	Batteries (inboard right side)
3	Crawler	12	Fuel Tank
4	Crawler Drive	13	Mast Equalizer
5	Intermediate Roller	14	Load Pin (right side only)
6	Turntable Bearing	15	Live Mast
7	Crawler Roller	16	Live Mast Sheaves
8	Counterweight Tray	17	Self-Erect Cylinder
9	Counterweight Box (quantity varies with Series 0, 1, 2, or 3)	18	Live Mast Straps

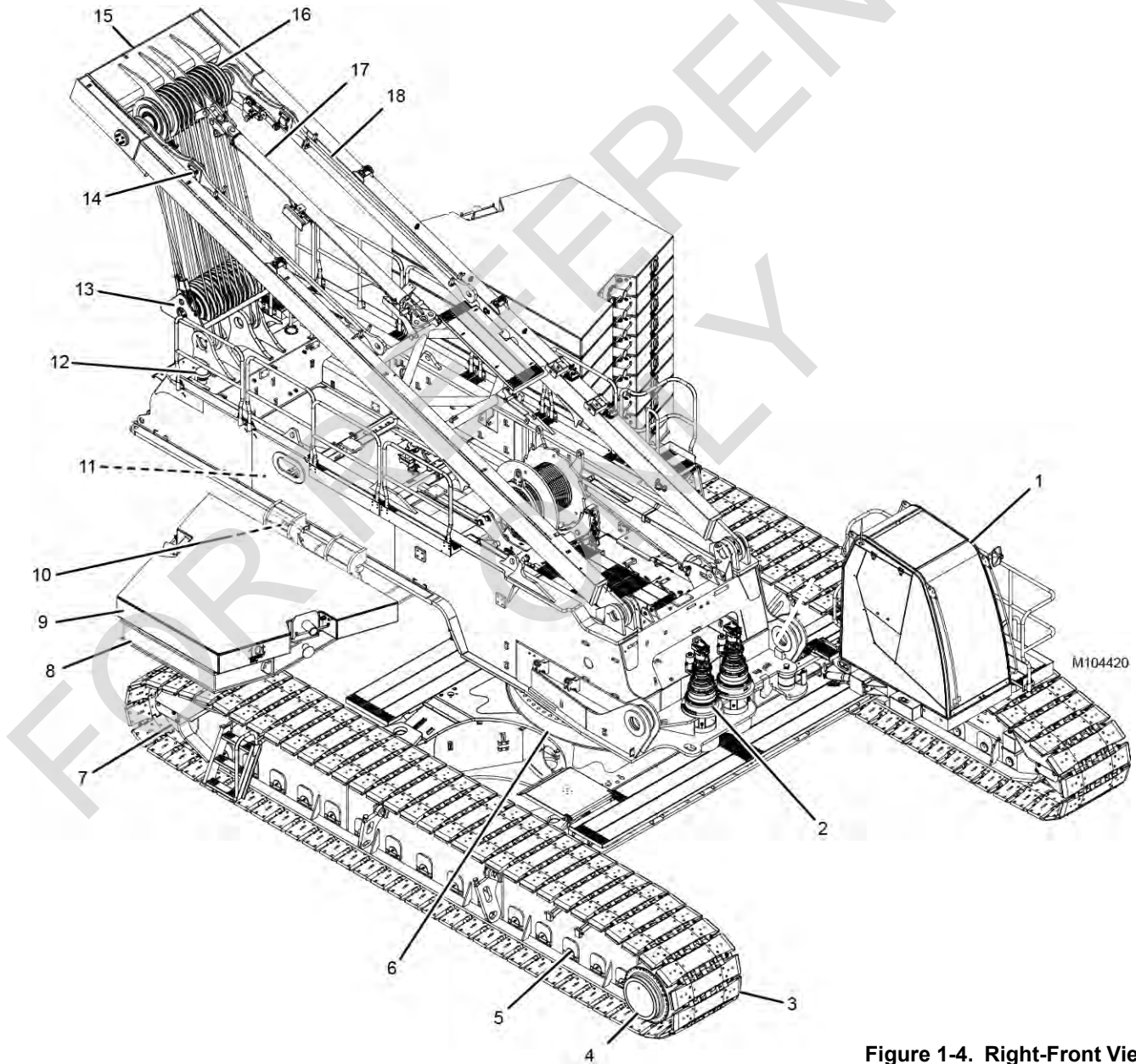


Figure 1-4. Right-Front View



Item	Description
19	Drum 2 (aux hoist)
20	Mast-Assist Arm and Cylinder (2)
21	Drum 3 (aux hoist)
22	Drum 4 (boom hoist)
23	Hydraulic Tank
24	Pump Drive with Pumps (under guards)
25	Cooler Assembly (under guards)
26	Engine (under guards)
27	Exhaust Aftertreatment Components (inboard left side)
28	DEF Tank (inboard left side)
29	Engine Air Cleaner (inboard left side)
30	Crawler Pin Puller (4)
31	Carbody Jack (4)
32	Jack Pad (4)

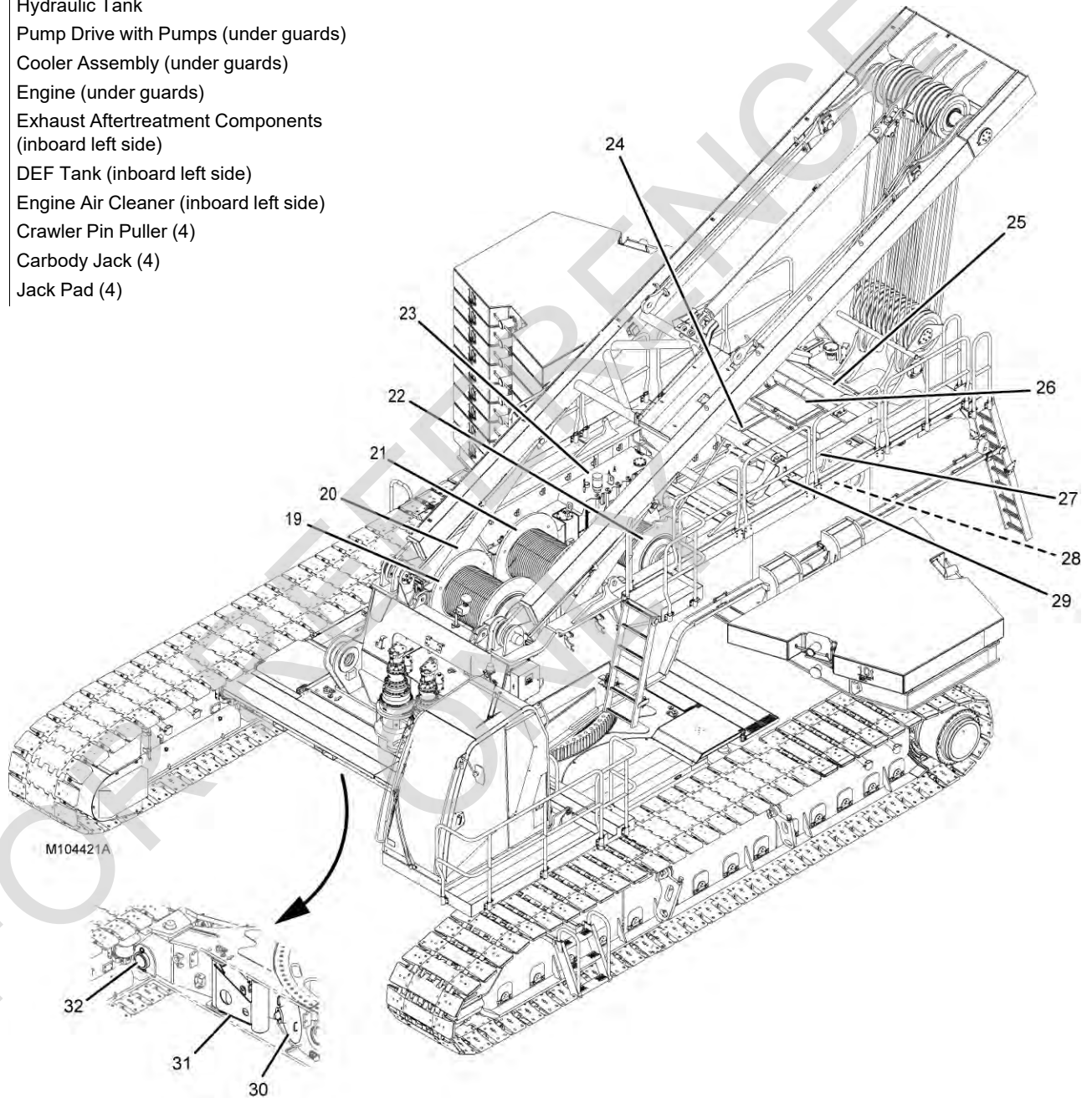


Figure 1-5. Left-Front View

## ENGLISH AND METRIC CONVERSIONS

## Inverse Conversion

## Direct Conversion

MULTIPLY (x) known value by conversion factor to obtain equivalent value in desired units. For example, 12 ft is converted to meters (m), as follows:

$$12 \text{ ft} \times 0.3048 = 3,6576 \text{ m}$$

DIVIDE (÷) known value by conversion factor to obtain equivalent value in desired units. For example, 3,6576 m is converted to feet, as follows:

$$3,6576 \text{ m} \div 0.3048 = 12$$

To Convert	Symbol	Application	To	Symbol	Multiply By
<b>AREA</b>					
Square Inch	in <sup>2</sup>	Filter Area Clutch Contact	Square Centimeter	cm <sup>2</sup>	6.4516
Square Foot	ft <sup>2</sup>	Ground Contact	Square Meter	m <sup>2</sup>	0.0929
<b>FORCE</b>					
Pound Force	lb	Pedal Effort	KiloNewton Newton	kN N	0.00445 4.4482
Pound Force	lb	Line Pull	KiloNewton	kN	0.00445
Pound Force Per Inch	lb/in.	Spring Force	Newton per millimeter	Nmm	0.1751
Pound Force Per Foot	lb/ft		Newton per meter	Nm	14.5939
<b>LENGTH</b>					
Inch	in.	Adjustments	Millimeter	mm	25.4000
Foot	ft	Outline Dimensions	Meter	m	0.3048
Mile	miles	Travel Distance	Kilometer	km	1.6093
<b>POWER</b>					
Horsepower	hp	Engine	Kilowatt	kW	0.7457
<b>PRESSURE</b>					
Pound/Sq. In.	psi	Hydraulic & Air	Bar		0.0689
<b>TEMPERATURE</b>					
Degrees Fahrenheit	°F	Oil, Air, Etc.	Degrees Centigrade	°C	°F - 32 ÷ 1.8
Degrees Centigrade	°C		Degrees Fahrenheit	°F	°C x 1.8 + 32
<b>TORQUE</b>					
Inch Pound	in lb	Bolt Torque	Newton Meter	Nm	0.1129
Foot Pound	ft lb		Newton Meter	Nm	1.3558
<b>VELOCITY</b>					
Miles Per Hour	mph	Vehicle Speed	Kilometers Per Hour	km/h	1.6093
Miles Per Hour	mph	Wind Speed	Meters Per Second	m/s	0.4470
Feet Per Minute	fpm	Line Speed	Meters Per Minute	m/min	0.3048
<b>VOLUME</b>					
Cubic Yard	yd <sup>3</sup>	Bucket Capacity	Cubic Meter	m <sup>3</sup>	0.7646
Cubic Foot	ft <sup>3</sup>		Cubic Meter	m <sup>3</sup>	0.0283
Cubic Inch	in <sup>3</sup>	Pump Displacement	Cubic Centimeter	cm <sup>3</sup>	16.3871

To Convert	Symbol	Application	To	Symbol	Multiply By
<b>VOLUME (LIQUID)</b>					
Ounce	oz	Fluid Capacities	Milliliter	mL	29.5735
Pint	pt		Liter	L	0.4732
Quart	qt		Liter	L	0.9464
Gallon	gal		Liter	L	3.7854
Gallon Per Minute	gpm	Pump Flow	Liters Per Minute	L/min	3.7854
<b>WEIGHT</b>					
Pound	lb	Unit/Component	Kilogram	kg	0.4536
Ton (2,000 lb.)	USt	Load Ratings	Metric Ton	t	0.9072
Ton (2,000 lb.)	USt		Kilogram	kg	907.1847

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## SECTION 2

### SAFETY INFORMATION

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FOR REFERENCE ONLY



## SECTION 2

### SAFETY INFORMATION



#### WARNING

##### California Proposition 65

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to [www.P65warnings.ca.gov/diesel](http://www.P65warnings.ca.gov/diesel).

Batteries, battery posts, terminals, and related accessories can expose you to chemicals, including lead and lead compounds, which are known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling. For more information go to [www.P65warnings.ca.gov](http://www.P65warnings.ca.gov).

##### California Spark Arrestor

Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrestor may be required. The owner/operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.

#### CONTINUOUS INNOVATION

Due to continuing product innovation, the information in this manual is subject to change without notice. If you are in doubt about any procedure, contact your Manitowoc dealer or Manitowoc Crane Care Lattice Team.

#### NAMEPLATES AND DECALS

See drawing at the end of this section.

#### SAFETY MESSAGES

##### General

The importance of safe operation and maintenance cannot be over emphasized. Carelessness or neglect on the part of operators, job supervisors and planners, rigging personnel,

and job site workers can result in their death or injury and costly damage to the crane and property.

To alert personnel to hazardous operating practices and maintenance procedures, safety messages are used throughout the manual. Each safety message contains a safety alert symbol and a signal word to identify the hazard's degree of seriousness.

#### Safety Alert Symbol



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. **Obey all safety messages that follow this symbol to avoid possible death or injury.**

#### Signal Words



#### DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



#### WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



#### CAUTION

Used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

#### CAUTION

Without the safety alert symbol, identifies potential hazards that could result in property damage.

**NOTE** Highlights operation or maintenance procedures.

#### Symbol Identification

Many of the symbols used in the safety and information signs and nameplates on this crane are identified in [Table 2-1 on page 2-2](#) and [Table 2-2 on page 2-3](#).

Table 2-1 Common Safety Symbols





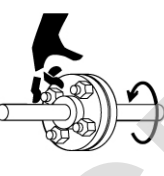













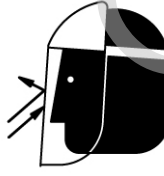







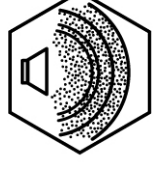

Cut or Crush Hazards					Cut Hazard
 M100090	 M100091	 M100066	 M100065	 M100069	 M100067
Crush Hazards					Fire Extinguisher
 M100070	 M100071	 M100072	 M100073	 M100074	 M100082
Fall Hazards			Falling Boom (Crush) Hazards		Explosion Hazard
 M100083	 M100084	 M100085	 M100068	 M100075	 M100080
Falling Load Hazards		Flying Objects Hazards		Overhead Obstruction Hazard	Pressure Release Hazard
 M100076	 M100077	 M100088	 M100088	 M100089	 M100081
Electrocution Hazards		Personal Fall Protection	Pressure Cleaning	Sound Power Level	Read Manual
 M100078	 M100079	 M100095	 M100087	 M100096	 M100093

Table 2-1 Common Safety Symbols








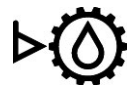

<b>Emergency Cab Exit</b>				
 M102486				

Table 2-2 Miscellaneous Symbols

Diesel Fuel	Engine Coolant	Engine Coolant Vent	Engine Oil Level	Hydraulic Filter	Hydraulic Oil
 M100271	 M100267	 M100268	 M100269	 M100272	 M100273
<b>Pump Drive Oil Level</b>	<b>Tire Pressure (if equipped)</b>				
 M100270	 M100266				

**SAFETY AND INFORMATION SIGNS**

**Maintaining Signs**

The crane owner/user shall make sure that all safety and information signs are legible and installed at the proper locations on the crane. If a sign has been defaced or removed, it must be replaced immediately. See the Nameplate and Decal Drawing at the end of this section for the installation locations of signs.

**Ordering Signs**

Order replacement safety and information signs from your Manitowoc dealer.

When ordering a sign, give the crane model number, the crane serial number, and the name and part number of the sign.

Item	Description
1	Operator Cab Platform with Handrails
2	Carbody Platform (both ends and sides)
3	Mast Platform
4	Engine Enclosure (non-skid)
5	Rotating Bed Handrails (both side)
6	Folding Ladder (left side only)
7	Rotating Bed Platform (both sides)
8	Counterweight Tray and Boxes (non-skid)
9	Ladder (left side only)
10	Ladder (both crawlers)
11	Catwalk (each boom section)
12	Ladder (each boom section)

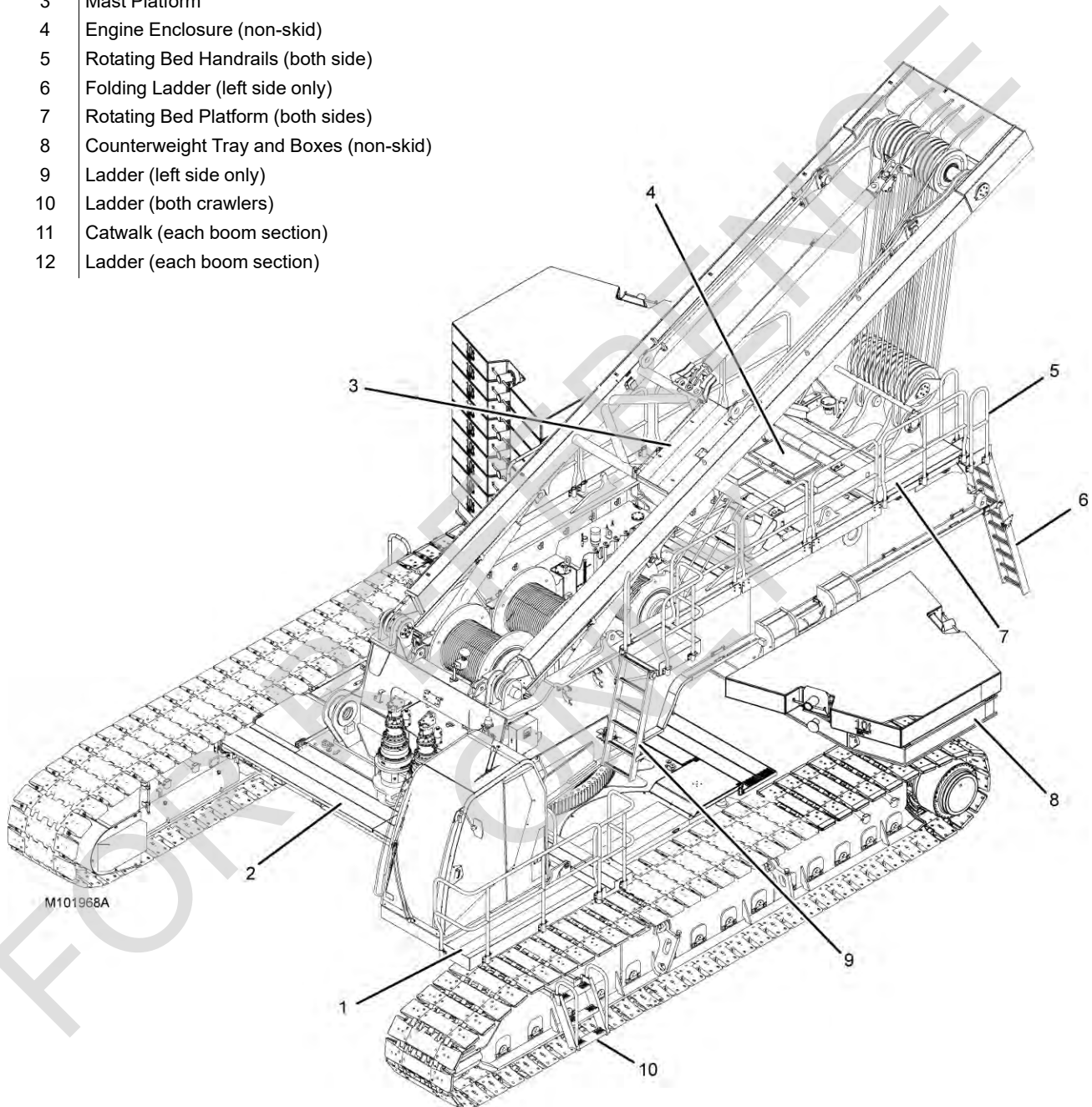


Figure 2-1. Crane Access Points

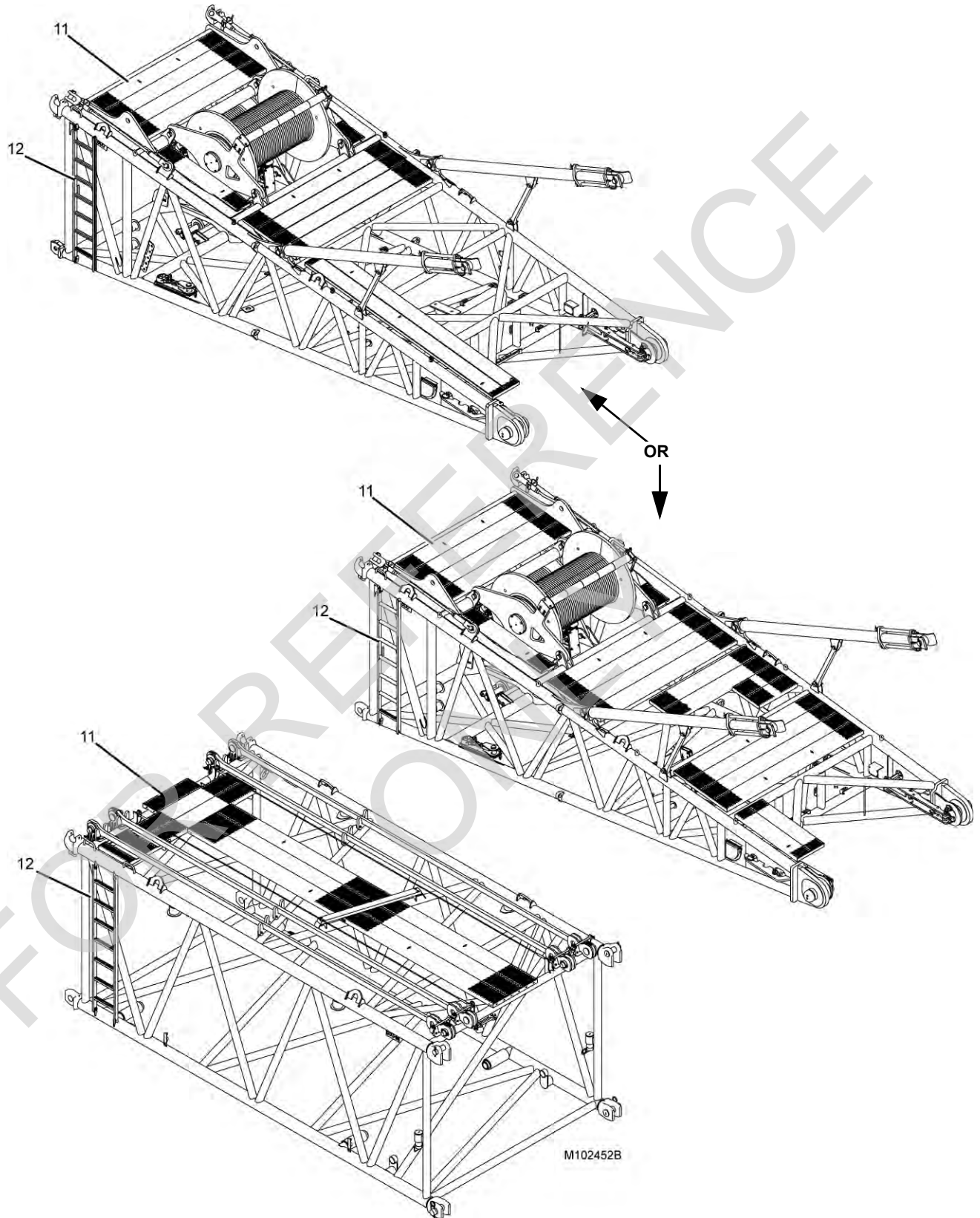


Figure 2-1 continued



## CRANE ACCESS POINTS



### WARNING

#### Crush Hazard!

The upperworks can swing into and crush personnel climbing on or off the crane.

Moving crawlers can crush personnel climbing on or off the crane.

To prevent death or serious injury:

- Barricade all accessible areas to the crane so personnel cannot be struck or crushed when the upperworks is swung.
- Do not climb onto or off the crane while the upperworks is being swung or the crane is being traveled.
- Signal the operator for permission to climb onto/off the crane.
- Operator: do not swing or travel while personnel are climbing onto or off the crane. Stop the swing and travel motions. Apply the swing brake and turn on travel park.
- Operator: Always sound the horn to alert personnel before you swing or travel.
- Automatic alarms will sound to alert personnel when the crane is swung or traveled.

**NOTE** If the swing and travel alarms are not operating properly, they must be repaired as soon as possible. Until they are repaired, the operator shall alert personnel to crane movement using the horn on the control console.

## General

Take necessary precaution to prevent slipping and/or falling off the crane during assembly, disassembly, maintenance, or other work. **Falling from any height could result in serious injury or death.**

Manitowoc has provided ladders and platforms at the locations shown in [Figure 2-1](#).

The owner/user shall provide workers with approved ladders or aerial work platforms to access those areas of the crane, mast, and boom that cannot be reached from the ground or from steps, ladders, catwalks, and platforms provided by Maniowoc.

Adhere to local, state, and federal regulations for handling personnel and for personnel fall protection.

- Access points must be kept clear to prevent personal injury and unsafe operation of the crane. Store clothing and other personal belongings so they do not interfere with controls in operator cab or with operation of the crane.
- Do not allow ground personnel to store their personal belongings (clothing, lunch boxes, water coolers, and the like) on the crane.  
This practice will prevent ground personnel from being crushed or electrocuted when they attempt to access personal belongings stored on the crane.
- Tools, oil cans, spare parts, and other necessary equipment must be stored in tool boxes or other appropriate locations. Do not allow these items to lie around loose in operator cab or on steps, ladders, catwalks, and platforms.
- To reduce risk of slipping, non-skid material (sand in paint) has been applied to painted walkways and platforms.
- Walkways and platforms can be slippery when wet and when oil or is grease is spilled on them. **Keep walkways and platforms clean and dry to prevent slipping on them.** When non-skid material wears out, reapply it.
- Wear shoes with a highly slip-resistant sole material. Clean any mud or debris from shoes before entering the crane cab or climbing onto the cab. A shoe that is not clean might slip off a control pedal during operation.
- Do not make modifications or additions to the crane's access system that have not been evaluated and approved by Maniowoc.

## GETTING ON OR OFF CRANE

Personnel getting on and off the crane shall do so only at the ladders provided and only **while the crane is parked**.

Never climb onto or off a moving crane. **Climb onto and off the crane only when it is parked and only with the operator's permission.**

When personnel use ladders to get on or off the crane, their hands shall be free of any objects. Objects which cannot be carried in pockets or tool belts shall be lifted into place with a hand line or hoist.

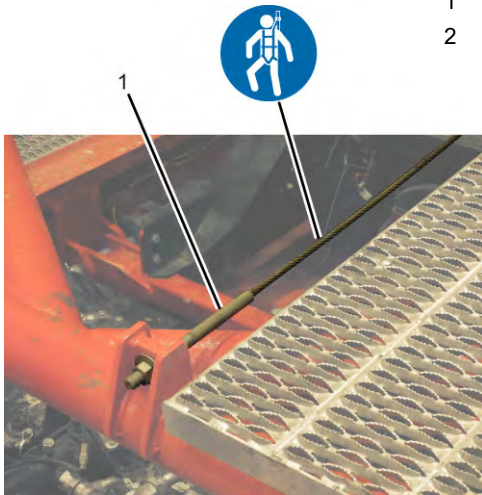
Always maintain a three-point contact with the ladder: two feet and one hand or two hands and one foot.



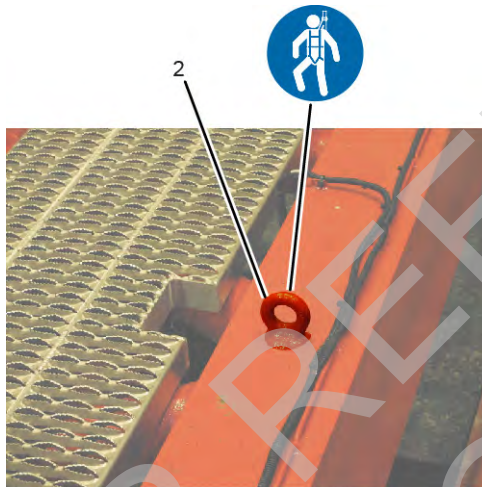
### PERSONAL FALL-PROTECTION

Manitowoc has provided lifelines and anchors throughout the crane and attachment (see [Figure 2-2.](#)) to which workers can attach their personal fall-protection equipment.

Item	Description
1	Lifeline
2	Anchor



M101966



M101967

Figure 2-2. Fall Protection Lifeline and Anchor

**! WARNING**  
**Fall Hazard!**

To prevent falling from any height during crane assembly and disassembly, personnel shall wear fall-protection equipment.

- Anchors and lifelines are designed to handle only one person at a time.
- Do not use anchors for lifting or pulling loads.

## OPERATOR MANUAL/CAPACITY CHART STORAGE

### General

Manitowoc provides the following manuals and other important literature with your crane and attachment (Luffing Jib, etc.):

- Operator Manual (Serial Numbered)  
Contains safety information, crane specifications, assembly/erection procedures, operating instructions, lubrication and maintenance checks.
- Parts Manual (Serial Numbered)  
Contains illustrations and part numbers of replaceable parts.
- Capacity Chart Manual (Serial Numbered)  
Contains lifting capacities and related information (wire rope specifications, drum and lagging information, etc.)
- Maintenance Checks and Lube Guide  
Contains lists of maintenance checks and lube services and their prescribed intervals.
- RCI/RCL Operation  
Contains rated capacity indicator and/or rated capacity limiter operation, limits, and calibration procedures.
- Service Manual (Serial Numbered)  
Contains theory of operation, maintenance procedures, crane and wire rope inspection procedures, troubleshooting information, and shop procedures.

The manuals which must be retained in the operator cab (Operator Manual, Capacity Charts, Maintenance Checks and Lube Guide, and RCL Operation) are supplied in an OPERATOR INFORMATION binder. A separate binder is provided for the crane and each applicable attachment.

The Operator Manuals and Capacity Charts are stamped with the serial number of the crane or attachment. The serial number on the manuals and capacity charts must match the serial number of the crane and attachment in use. **Using any other manual or capacity chart is prohibited.**

- The crane model and serial number is located on the Crane Identification Plate on the crane cab.
- The model and serial number of the attachment (other than standard boom) is located on the Crane Identification Plate on the attachment.

If the serial numbers of your manuals and capacity charts do not match the serial numbers of the crane or attachment, contact your Manitowoc dealer for the proper manual or capacity charts.

**Do not operate crane or attachment if proper Capacity Chart is not in cab.**

### Storing Manuals

Store the Operator Information Manuals for the crane and each applicable attachment on the bookshelf in the operator cab (Figure 2-3).

Attach the chain from the manual in use to the link behind the operator's seat.

Keep all other manuals provided with the crane in the crane owner's/user's office so they are readily available when needed.

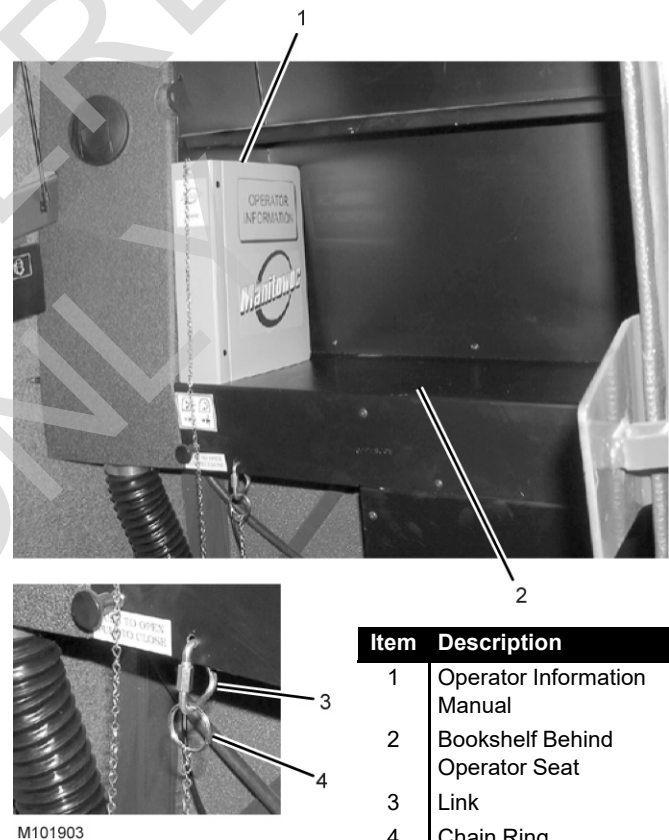


Figure 2-3. Bookshelf in Cab

## SAFE OPERATING PRACTICES

### General

The importance of safe operation cannot be over emphasized. Carelessness and neglect on the part of operators, supervisors and planners, rigging personnel and job site personnel can result in their death or injury and costly damage to the crane or property.

The safety information in this publication is intended only as a guide to assist qualified operators, supervisors and planners, rigging personnel, and job site personnel in safe operation. Manitowoc cannot foresee all hazards that will arise in the field; therefore, **safety remains responsibility of crane operators and owner.**

Local, state, and other governmental agencies may require stricter operating practices. When a conflict in practices exists, follow the strictest practice.

### Read Operator Manual

Safe and efficient assembly, disassembly, and operation of this crane requires that it be maintained in proper working order and that its operators and maintenance personnel be familiar with the crane's functions and capabilities.

The Operator Manual supplied with and considered part of your crane must be read and completely understood by each person responsible for assembly, disassembly, operation, and maintenance of the crane.

The Operator Manual must be read to personnel who cannot read or understand English or other language into which the manual is translated.

Because of a program of continuing improvement in product design, Manitowoc reserves the right to change the information and specifications contained in the Operator Manual at any time without notice. If you have any questions regarding the crane or its Operator Manual, please contact your Manitowoc dealer.

### Operator Qualifications

The crane must be operated only by the following **qualified** personnel:

1. Designated operators.
2. Trainees under direct supervision of a designated operator.
3. Supervisors, inspectors, and maintenance or test personnel when necessary in performance of their duties. Operation of the crane by these personnel shall be limited to the crane functions needed to perform the

inspection or to verify the crane's performance after maintenance procedures.

***No personnel shall be allowed to climb onto the crane or enter cab unless performance of their duties requires them to do so, and then only with knowledge of operator or other qualified person.***

**Qualified person** is defined as one who by reason of training and experience is thoroughly familiar with crane operations and the hazards involved. Such a person shall meet the operator qualifications specified in Occupational Safety and Health Administration (OSHA) Regulations (United States Federal Law), in ASME B30.5 American National Standard, or in any other applicable federal, state, or local laws.

**Operator training and qualification is crane owner's responsibility.**

**NOTE** The regulations and standards mentioned above and later in this section can be obtained from:

**US DOL/OSHA** Rules and Regulations are available by mail from the Superintendent of Documents, PO Box 371954, Pittsburgh, PA, 15250-7954 or by:

- Phone 202-512-1899
- Fax 202-512-2250
- Online at [www.osha.gov](http://www.osha.gov)

**ASME** (formerly ANSI) B30 Series American National Standards are available by mail from the ASME, 22 Law Drive, Fairfield, New Jersey, 07004-2900 or by:

- Phone US & Canada 800-843-2763
- Phone Mexico 95-800-843-2763
- Phone Universal 973-882-1167
- Fax 973-882-1717 or 973-882-5155
- E-mail [infocentral@asme.org](mailto:infocentral@asme.org)

### Operator Conduct

1. The operator shall not engage in any practice which diverts his/her attention while operating the crane.
2. The operator shall not operate the crane when he/she is physically or mentally unfit.
3. The operator shall be responsible for all operations under his/her direct control. When safety of an operation is in doubt, the operator shall stop the crane's functions in a controlled manner. Lift operations can resume only after safety concerns have been addressed or the continuation of crane operations is directed by the lift supervisor.

4. The operator shall be thoroughly familiar with operation of the crane and its proper care. If adjustments or repairs are necessary or if there are known defects that impair safe operation, the crane must not be operated until unsafe conditions have been corrected.
5. If there is a warning sign at the start controls, the operator shall not start the engine until the warning sign has been removed by the person who installed it.
6. Before starting the engine, the operator shall make sure that:
  - a. All daily inspection and maintenance services have been performed.
  - b. All controls are in the off position and all brakes and locking devices are applied or engaged.
  - c. All personnel are clear of the crane. Deploy a swing radius barrier.

**WARNING**

Safety devices and operational aids such as rated capacity indicator or limiter, boom and jib angle indicator or limiter, anti-two-block device, level indicator, swing limiter, proximity device, etc., may be installed on your crane. Such devices are to be used only as **AIDS TO ASSIST OPERATOR**; their presence on the crane in no way substitutes for or lessens requirement that operator knowledge, experience, and judgment are required to ensure safe operation of the crane.

**Crane must not be loaded beyond applicable static or dynamic ratings given in Capacity Chart for crane.**

- See Size of Load later in this section.
  - For a description of each safety device and operational aid, see Safety Devices and Operational Aids in this section and Section 3 .
7. The operator shall test all controls, limits, and communication systems at the start of each shift. Any defects found must be corrected before operation is begun.
  8. The operator shall not start crane movement if the load or designated signal person is not within his/her range of vision or communication.
  9. The operator shall understand and respond to signals from the person directing the lift or from the designated signal person. When a signal person or crane follower is not required, the operator is responsible for the lift. **Operator shall obey a stop signal at all times, no matter who gives it.**

10. The operator shall verify that the Capacity Chart being used is the correct one for the cranes configuration (boom length, load line reeving, counterweight, etc.).
11. The operator shall verify that:
  - a. All attachments are properly assembled and attached to the crane according to the rigging drawings called for in the Capacity Chart.
  - b. The counterweight — to include applicable auxiliary counterweight — is in place and of proper weight. **Maximum required counterweight must not be exceeded.**

**WARNING****Moving Load/Tipping Crane Hazard!**

Changing weather conditions including, but not limited to: wind, ice or snow accumulation, precipitation, flooding, lightning, etc. should be considered when determining the location and configuration of a crane when it will be left unattended.

12. The operator shall perform the following operations before leaving the operator cab for any reason:
  - a. Park the crane and position upperworks so the crane does not interfere with operation of other equipment.
  - b. Apply travel and swing brakes or locking devices.
  - c. Land any attached load.
  - d. Lower the boom onto blocking at ground level or onto a boom rest if possible.

If the boom cannot be lowered, as determined by a qualified designated person, it must be securely fastened from movement by wind or other outside forces (see Wind Conditions in Capacity Chart Manual).

- NOTE** The designated person shall be familiar with the job site limitations, the crane configuration, and the expected weather conditions.
- e. Move all controls to off.
  - f. Apply all drum brakes and pawls.
  - g. Disengage the master clutch, if equipped.
  - h. Stop the engine.

**NOTE** Also read Unattended Crane instructions in Section 3 of the Crane Operator Manual.

13. The operator shall perform the following operations if power or a control function fails during operation:



- a. Land all suspended loads, if possible, under brake or power control.
  - b. Apply all brakes and locking devices.
  - c. Move all controls to off.
14. If the crane will be operated at night, the operator shall make sure that there is sufficient lighting for safe operation. The load and landing area must be illuminated.
15. The operator shall not operate the crane during periods of bad weather if his/her ability to see the load or the signal person is impaired by darkness, fog, rain, snow, and the like.

Do not operate the crane with a snow or ice covered boom. The extra weight may cause overload, tipping, or structural damage.

Never operate the crane during an electrical thunderstorm.

When a local weather storm warning exists (including electrical thunderstorm), stop operation and secure the crane. See step 12 on page 2-10.

**NOTE** DO NOT depend on grounding. Grounding of a crane affords little or no protection from electrical hazards. The effectiveness of grounding is limited by the size of the conductor (wire) used, condition of the ground, the magnitude of voltage and current present, and numerous other factors.

16. Wind can cause the crane to tip or the boom and other attachments to collapse. The operator or qualified person directing the lift shall compensate for the effect of wind on the load and boom by reducing ratings, reducing operating speeds, or a combination of both.

Unless otherwise specified in the Capacity Chart, or Operator Manual, stop operation under the following wind conditions:

- a. If the wind causes the load to swing forward past the allowable operating radius or sideways past either boom hinge pin, land the load and apply the drum brakes.
- b. If the wind exceeds 16 m/s (35 mph), land all loads and apply the drum brakes, lower the boom onto blocking at ground level or otherwise restrain it, and apply the swing and travel brakes and/or locks.

**NOTE** *“Land load”* means to set it down on a firm uniformly supporting surface.

17. Booms, jibs, or masts which are being assembled or disassembled on the ground (with or without support of

boom rigging) must be securely blocked to prevent the boom, jib, or mast sections from dropping.

**Workers shall not go under boom, jib, or mast sections when removing connecting pins or bolts.**

18. Each outrigger must be visible to the operator or the signal person during extension and retraction.

## Handling Load

### Size of Load

1. The crane must not be loaded beyond the applicable static or dynamic ratings given in the Capacity Chart for the crane configuration.

**NOTE** Capacity charts for Manitowoc cranes show the total weight of freely suspended loads for various boom and jib lengths and operating radii.

*“Freely suspended load”* is a load that is hanging free with no direct external force applied except by the crane’s load-line reeving.

To determine the actual weight of the load which can be lifted at a given radius (working load), the operator shall deduct the weight of certain lifting equipment from the total weight given in the chart. See the specific Capacity Chart for your crane for a list of lifting equipment which must be deducted.

The operator’s judgment shall be used to further reduce total load to allow for the dynamic effects of swinging, hoisting, or lowering, and adverse weather conditions to include wind.

2. The operator or other designated person directing the lift shall verify that the weight of load is within the static or dynamic rating for radius at which load will be lifted.

**Verified weights and measured radii must take priority over RCI/RCL readings.**

### Attaching Load

1. Attach the hook to the load with slings, or other suitable rigging. Each hook must have a latch that is in proper working order. **Hook latches must not be wired open.**
  - a. Inspect each hook and latch before using.
  - b. Never use a hook or latch that is distorted or bent.
  - c. Make sure spring will force the latch against the tip of the hook.
  - d. Make sure the hook supports the load. The latch must never support the load. Latches are only intended to retain loose slings under slack conditions.

2. Only use slings and other rigging that are in safe operating condition and have a rating equal to or greater than the load to be lifted.
3. Do not wrap the load line around the load.
4. Use suitable protection between slings and any sharp edges on the load. When synthetic slings are used, the synthetic sling manufacturer's instructions, limitations, specifications, and recommendations must be followed.
5. Secure unused legs of a multi-leg sling before handling a load with one leg of sling.

### Lifting/Moving Load

1. Before lifting or moving a load, the operator or qualified person directing the lift shall make the following checks:
  - a. Crane has a firm, uniformly supporting foundation under all crawlers. Unless otherwise specified in the Capacity Chart, the foundation must be level to within 1% — 0,3 m (1ft) rise or fall in 30,5 m (100 ft) distance.  
  
When such a surface is not available, it must be provided with timbers, cribbing, or other structural members to distribute the load such that the allowable bearing capacity of the underlying member is not exceeded.
  - b. The load is secured and properly balanced in the slings or the lifting device before lifting the load more than 76 to 152 mm (3 to 6 in).
  - c. The lift and swing paths are clear of personnel and obstructions.
  - d. The load is free to be lifted.
  - e. The load line is not kinked or otherwise damaged.
  - f. Multiple part load lines are not twisted around each other in such a manner that the lines will not separate when the load is lifted.
  - g. The hook is brought over the load in a manner that will minimize twisting or swinging.
  - h. The load line and the boom hoist rope are properly spooled on the drums and seated in the sheaves.
  - i. The load drum brakes are in proper working order.  
  
The operator shall test the load drum brakes each time a load approaching the rated load is handled. Lift the load 76 to 152 mm (3 to 6 in) and fully apply the brakes — load must not lower through applied brakes.
  - j. Unused load drums are parked (working and parking brakes applied; if equipped, drum pawls engaged).
- k. All personnel are clear of the swing radius of the crane's counterweight.
2. While lifting or moving the load, the operator shall take the following precautions:
  - a. Accelerate and decelerate the load smoothly to avoid excessive stress on the boom and machinery.
  - b. Avoid sudden starts and stops while swinging. Keep the swing speed under control to prevent the load from swinging out beyond the radius at which the load can be handled and to minimize the pendulum action of the load.
  - c. Sound the signal horn before swinging and intermittently while swinging, especially when approaching personnel.  
  
If equipped, the automatic swing alarm will sound when the crane is swung.
  - d. Use taglines or other restraints to control the load when necessary.
  - e. Do not exceed any swing limitations (areas of operation) given in the Capacity Chart.
  - f. Do not allow the load, boom, or any other part of the crane to contact obstructions.
  - g. Do not use the crane to drag a load.
  - h. Do not hoist, lower, or swing the load while personnel are on the load or the hook. See Personnel Handling in this section.
  - i. Avoid carrying the load over personnel. Loads which are suspended must be blocked or cribbed before personnel are allowed to work under or between them.
  - j. Before lifting a load which requires the use of outriggers (or anytime outriggers are used), fully extend the outrigger beams and jacks so the truck tires do not bear any load.  
  
Securely fasten the outrigger jack pads or floats to jacks and set them on a flat, firm surface that will support the load placed on the pads or floats. Do not set the jack pads or floats in holes, on rocky ground, or on extremely soft ground.  
  
When dictated by ground conditions, install wood blocking or steel plates under the jack pads or floats to properly distribute the loading on the supporting surface.  
  
Wood blocking or steel plates used under the jack pads or floats must be:
    - Free of defects
    - Strong enough to prevent crushing, bending, or shear failure

- Of sufficient thickness, width, and length to completely support the jack pad or float, transmit the load to the supporting surface, and prevent shifting, toppling, or excessive settlement under load.

- k. Fully retract and lock the jacks and the outrigger beams so they cannot extend when not in use.
- l. Operate with extreme caution when using two or more cranes to lift the same load.

One designated person shall be responsible for operation when two or more cranes are used to lift the same load. The designated person shall analyze the lift and instruct all personnel involved in proper rigging and positioning of the load and all movements to be made. Decisions such as the necessity to reduce crane ratings, load position, boom position, ground support, and speed of movements must be in accordance with the designated person's decision.

- m. Do not lower the load or the boom to a point where less than three full wraps of wire rope remain on the respective drum (or as otherwise indicated in local, state, or federal regulations).
  - n. Engage the boom hoist pawl when operating with the boom at a fixed radius.
  - o. Engage the luffing hoist pawl when operating with the luffing jib at a fixed radius.
3. While traveling, the operator shall take the following precautions:
- a. Sound the signal horn before traveling and intermittently while traveling, especially when approaching personnel.  
If equipped, the automatic travel alarm will sound when the crane is traveled.
  - b. Carry the boom in-line with the lowerworks and facing the direction of travel.
  - c. Do not position the boom so high that it could bounce over backwards whether traveling with or without load.
  - d. Secure the rotating bed against rotation except when it is necessary to negotiate a turn, and then only when the operator is seated at controls or the boom is supported on a dolly.
  - e. Lash or otherwise restrain unused hooks so they cannot swing freely.
4. Before traveling with a load, the operator shall take the following additional precautions:

- a. A designated person shall be responsible for operation. Decisions such as the necessity to reduce crane ratings, load position, boom position, ground support, and speed of movements must be in accordance with the designated person's decision.
- b. Maintain specified tire pressures (truck cranes).
- c. Avoid sudden starts and stops. Use taglines or other restraints to control the position of the load.

### Multiple Load Line Operation



#### WARNING

#### Avoid Over Load and Side Load Damage to Crane

Manitowoc highly recommends that you contact your Manitowoc dealer for lift planning assistance and approval.

Multiple load line operation is becoming common practice for applications like panel tilt-up, pile tilt-up, pile driving, rolling fabricated sections, etc. The multiple lines may be on a common shaft (each with different parts of line) or on multiple shafts (lower boom point and upper point, boom point and fixed jib point, etc).

Manitowoc authorizes multiple load line operation for those applications requiring it, provided the following steps are performed:

1. The qualified lift planner and crane operator shall read and become thoroughly familiar with the appropriate Capacity Charts and Wire Rope Specification Charts.
2. The lift planner and the crane operator shall make sure the total load does not exceed the rated capacity given in the Capacity Chart and Wire Rope Specification Chart for given boom point or jib point, whichever is less.  
EXAMPLE: If one load line is lifting from the jib point, the proper jib chart applies.
3. The crane must be thoroughly inspected by a qualified person prior to setup.
4. The crane must be thoroughly inspected for load line interference caused by routing and reeving of multiple load lines. If interference is found, it must be eliminated.
5. For cranes produced before 2003, Rated Capacity Indicators/Limiters were not required by ASME B30.5 for non-personnel lifting.

To aid the operator in staying within the crane's Capacity Chart with the total applied load, Manitowoc recommends that its cranes be equipped with Rated

Capacity Indicators/Limiters to monitor the load on each load line.

***Operator is still responsible for knowing load and radius whether or not the crane is equipped with load indicator(s).***

6. Manitowoc recommends that each load line be equipped with an anti two-block device.
7. Manitowoc's Capacity Charts are based on freely suspended loads. To prevent side load damage to the boom, jib, and sheaves:
  - The load lines must hang as close to vertical as possible to minimize side and forward loads.
  - The distance between the load points and the hook points must be a minimum of three times the horizontal distance between the hook point on the load being lifted.
  - The load must remain centered on the boom and jib point shafts unless special lift approval is granted by Manitowoc.
  - The load lines should be located over the load's center of gravity as it is supported on a trailer, a barge, or the ground.
8. The crane operator shall be familiar with the operational characteristic of the crane as it relates to multiple drum operation (simultaneous operation, same or opposite direction, or individual operation).
9. When using tandem drums, the maximum operating layers may be limited depending on whether the crane was initially designed for tandem drum operation or not.
10. Load shift when lifting with two hooks may be more unpredictable than typical one hook lifting.

### ***Holding Load***

When a load is suspended, the operator shall take the following precautions:

1. Not leave his/her position at the controls
2. Not allow personnel to stand or pass under the load
3. Move all controls to off, apply all drum brakes, engage the boom hoist pawl, and apply the swing and travel brakes or locks.

## **SIGNALS**

1. Continuous communication must be maintained between the operator and the signal person during all crane movements. If communication is disrupted, ***operator shall stop all crane movements.***
2. Signals to the operator must be in accordance with the standard signals shown in Section 3, unless communications equipment (telephone, radio, etc.) is used.
3. All signals must be easily understood by the operator at all times. The operator shall not respond to any signal which is not clearly understood.
4. For operations not covered in the standard signals, or for special situations or emergencies, additional signals may be required. In those cases, the signals used must be agreed upon in advance by the operator and the signal person. The signals used must not conflict with or have potential to be confused with the standard signals.
5. When it is necessary to give instructions to the operator (other than those established by the signal system), all crane motions must be stopped.
6. The signal person shall:
  - a. Be tested by a designated person and show that he or she has a basic understanding of crane operations and limitations, to include boom deflection.
  - b. Be thoroughly familiar with the standard hand signals and voice signals if used.
  - c. Be positioned in clear view of the operator. The signal person's position should give him or her a clear view of the load, the crane, and the operating area.
  - d. Direct the load so it does not pass over personnel.
  - e. Keep unnecessary personnel out of the crane's operating area.
7. When moving the crane, the following audible signals must be used:
  - a. STOP - one short audible signal
  - b. GO AHEAD - two short audible signals
  - c. BACK UP - three short audible signals



## SAFETY DEVICES



### WARNING

Do not operate the crane unless all safety devices listed in this section are in proper working order.

- If a safety device stops working properly during operation, the operator shall safely stop operation.
- If any safety device listed in this section is not in proper working order, the safety device must be taken out of service and crane operation must not resume until the safety device is again working properly.
- Alternative measures are not permitted to be used for a faulty safety device.
- Always tag-out any faulty safety device and place a warning tag in the cab stating that the crane is out of service and must not be used.

Manitowoc provides the following safety devices on its cranes.

1. Horn activated by a switch on the control console in the operator cab  
If the horn is not working properly, it must be tagged-out or removed if possible.
2. Crane level indicator: either electronic (viewable in crane's electronic display) or mechanical (viewable from operator cab seat). If the crane level indicator is not working properly, it must be tagged-out or removed, if possible.
3. Cranes operating on a barge require: a trim indicator, a swing brake, and a wind direction indicator if the wind is a factor (supplied by crane owner or user).
4. Boom stops, both physical and automatic  
If a boom stop is damaged or not working properly, it must be tagged-out or removed if possible.
5. Jib stops, both physical and automatic (for fixed jib and luffing jib)  
If a jib stop is damaged or not working properly, it must be tagged-out or removed if possible.
6. Pedal locks for all foot-operated brakes (if applicable)  
If a pedal lock is damaged or not working properly, it must be tagged-out or removed if possible.
7. An integral holding device or check valve on each jacking cylinder.

## OPERATIONAL AIDS



### WARNING

Do not operate the crane unless all applicable operational aids listed in this section are in proper working order, except:

- Where an operational aid is being repaired
- The crane user implements a specified temporary alternative measure.

If an operational aid stops working properly during operation, the operator shall safely stop operation until the temporary alternative measures are implemented or the device is again working properly.

Manitowoc provides the following operational aids on its cranes, either as standard equipment or optional equipment. The operational aids are designated as Category 1 or Category 2:

### Category 1 Operational Aids

If a Category 1 operational aid is not working properly, it must be repaired no later than 7 calendar days after the deficiency occurs.

Exception: If the crane user documents that he/she has ordered the necessary parts within 7 calendar days of the occurrence of the deficiency, the repair must be completed within 7 calendar days of receiving the parts.

#### 1. Boom or Luffing Jib Angle Limiter (automatic boom or jib stop)

Temporary alternative measures if inoperative or malfunctioning:

The qualified person directing the lift shall make sure the maximum boom or jib angle/radius specified in the Capacity Chart for the load being handled is not exceeded. One or more of the following methods must be used:

- a. Measure radius using a tape measure.
- b. Measure the boom angle with a protractor-level on the centerline of boom.
- c. Clearly mark the boom or luffing hoist cable (so it can easily be seen by the operator) at a point that gives the operator sufficient time to stop the boom or jib within the minimum allowable radius.

In addition, install mirrors or remote video cameras and displays if necessary for the operator to see the mark.

- d. Clearly mark the boom or luffing hoist cable (so it can easily be seen by a designated signal person)

at a point that gives the signal person sufficient time to signal the operator and have the operator stop the boom or jib within the minimum allowable radius.

## 2. Anti-Two-Block Device

Temporary alternative measures if inoperative or malfunctioning:

The qualified person directing the lift shall establish procedures to furnish equivalent protection. One or more of the following methods must be used:

- a. Assign a signal person to signal the operator to stop hoisting when the load is a safe distance from the boom or jib point.
- b. Clearly mark the hoist cable (so it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the load a safe distance from the boom or jib point.

The temporary alternative measures for the anti-two-block device do not apply when lifting personnel in load line supported baskets. ***Personnel shall not be lifted in load line supported baskets when anti-two-block devices are not functioning properly.***

## Category 2 Operational Aids

If a Category 2 operational aid is not working properly, it must be repaired no later than 30 calendar days after the deficiency occurs.

Exception: If the employer documents that he/she has ordered the necessary parts within 7 calendar days of the occurrence of the deficiency, and the part is not received in time to complete the repair in 30 calendar days, the repair must be completed within 7 calendar days of receiving the parts.

### 1. Rated Capacity Indicator/Limiter

Temporary alternative measures if inoperative or malfunctioning:

The qualified person directing the lift shall establish procedures for determining load weights and shall make sure that the weight of the load does not exceed the crane's rating at the radius where the load is handled.

The weight of the load must be provided to the operator before the lift is made.

### 2. Boom Angle or Radius Indicator

Temporary alternative measures if inoperative or malfunctioning:

- a. Refer to the pendulum boom angle indicator on the boom butt (visible from operator cab).
- b. Measure the boom angle with a protractor-level on the centerline of boom.
- c. Measure radius using a tape measure.

### 3. Jib Angle or Radius Indicator

Temporary alternative measures if inoperative or malfunctioning. Use either or both:

- a. First, make sure you know the boom angle (see item 2 above).
- b. Then, measure radius using a tape measure.

### 4. Drum Rotation Indicator

Temporary alternative measures if inoperative or malfunctioning:

Mark the drum to indicate its rotation.

If the operator cannot see the drum, add mirrors or remote video cameras and displays so the operator can see the mark.

### 5. OPTIONAL Swing Limiter or Proximity Device

Temporary alternative measures if inoperative or malfunctioning:

The qualified person directing the lift shall establish procedures to furnish equivalent protection (for example, assign an additional signal person to observe the distance between the boom or load and job site obstructions to include power lines or to limit the swing sector specified in the Capacity Chart).

### 6. OPTIONAL Drum Spooling Limiter (maximum or minimum bail limit)

Temporary alternative measures if inoperative or malfunctioning:

The qualified person directing the lift, the operator, or a designated signal person shall watch the drum and signal the operator to stop it before it is over spooled (rope does not jump off drum) or before there are less than 3 full wraps of wire rope on the load drum or boom hoist.

### 7. OPTIONAL Closed-Circuit Television (CCTV)

Temporary alternative measures if inoperative or malfunctioning:

A designated signal person shall watch the load, the drums, and the counterweight and provide necessary hand or voice signals to the crane operator.

## ASSEMBLING, DISASSEMBLING, OR OPERATING CRANE NEAR ELECTRIC POWER AND TRANSMISSION LINES

### Electrocution Hazard

Thoroughly read, understand, and abide by all applicable federal, state, and local regulations regarding operation of cranes near electric power lines or equipment.

***United States federal law prohibits the use of cranes closer than 6 m (20 ft) to power sources up to 350 kV and greater distances for higher voltages unless the line's voltage is known [29CFR1910.180 and 29CFR1926.1400].***

***To avoid death or serious injury, Manitowoc recommends that all parts of the crane, boom, and load be kept at least 6 m (20 ft) away from all electrical power lines and equipment less than 350 kV.***

**NOTE** For detailed guidelines on operating near power lines, refer to the current edition of OSHA 29CFR1926.1400 and ASME B30.5 American National Standard.



### WARNING

#### Electrocution Hazard!

Manitowoc cranes are not equipped with all features required to operate within OSHA 29CFR1926.1408, Table A clearances when the power lines are energized.

1. Keep all personnel and their personal belongings (clothing, water coolers, lunch boxes, etc.) away from the crane if it is being operated near electrical power lines or equipment.
2. Before operating the crane in the vicinity of electrical power lines or equipment, notify the power utility company. Obtain positive and absolute assurance that the power has been turned off.

The crane is NOT INSULATED. Always consider all parts of the load and the crane as conductors, including the wire rope, pendants or straps, and taglines.

Most overhead power lines ARE NOT insulated. Treat all overhead power lines as being energized unless you have reliable information to the contrary from the utility company or owner.

The rules in this section must be followed at all times, even if the electrical power lines or equipment have been de-energized.

3. Crane operation is dangerous when close to an energized electrical power source. Exercise extreme caution and prudent judgment. Operate slowly and cautiously when in the vicinity of power lines.

4. If the load, wire rope, boom, or any portion of the crane contacts or comes too close to an electrical power source, everyone in, on, and around the crane can be seriously injured or killed.

The safest way to avoid electrocution is to stay away from electrical power lines and electrical power sources.

5. The operator is responsible for alerting all personnel to the dangers associated with electrical power lines and equipment. The crane is not insulated. Do not allow unnecessary personnel in the vicinity of the crane while operating. Permit no one to lean against or touch the crane. Permit no one, including riggers and load handlers, to hold the load, load lines, taglines, or rigging gear.

6. Even if the crane operator is not affected by an electrical contact, others in the area may become seriously injured or killed.

7. It is not always necessary to contact a power line or power source to become electrocuted. Electricity, depending on magnitude, can arc or jump to any part of the load, load line, or crane boom if it comes too close to an electrical power source. Low voltages can also be dangerous.

### Set-Up and Operation

1. During crane use, assume that every line is energized ("hot" or "live") and take necessary precautions.
2. Position the crane such that the load, boom, or any part of the crane and its attachments cannot be moved to within 6 m (20 ft) of electrical power lines or equipment. This includes the crane boom and all attachments. Overhead lines tend to blow in the wind, so allow for movement of the overhead lines when determining a safe operating distance.
3. Erect a suitable barricade to physically restrain the crane, all attachments, and the load from entering into an unsafe distance from electrical power lines or equipment.
4. Plan ahead and always plan a safe route before traveling under power lines. A wooden clearance frame should be constructed to ensure sufficient clearance is maintained between crane and power lines.
5. Appoint a reliable and qualified signal person, equipped with a loud signal whistle or horn and voice communication equipment, to warn the operator when any part of the crane or load moves near a power

source. This person should have no other duties while the crane is working.

6. Taglines should always be made of non-conductive materials. Any tagline that is wet or dirty can conduct electricity.
7. DO NOT store materials under power lines or close to electrical power sources.
8. When operating near transmitter/communication towers where an electrical charge can be induced into the crane or load:
  - The transmitter must be deenergized OR,
  - Tests must be made to determine if an electrical charge will be induced into the crane or load.
  - The crane must be provided an electrical ground.
  - If taglines are used, they must be non-conductive.
  - Every precaution must be taken to dissipate induced voltages. Consult with a qualified RF (radio frequency) Consultant. Also refer to local, state, and federal codes and regulations.

## Electrocution Hazard Devices

1. The use of insulated links, insulated boom cages/guards, proximity warning devices, or mechanical limit stops does not ensure that electrical contact will not occur. Even if codes or regulations require the use of such devices, failure to follow the rules in this section may result in serious injury or death.
2. Be aware that such devices have limitations and you should follow the rules and precautions outlined in this section at all times even if the crane is equipped with these devices.
3. Insulating links installed into the load line afford limited protection from electrocution hazards. Links are limited in their lifting abilities, insulating properties, and other properties that affect their performance. Moisture, dust, dirt, oils, and other contaminants can cause a link to conduct electricity. Due to their capacity ratings, some links are not effective for large cranes and/or high voltages/currents.
4. The only protection that may be afforded by an insulated link is below the link (electrically downstream), provided the link has been kept clean, free of contamination, has not been scratched or damaged, and is periodically tested (just before use) for its dielectric integrity.
5. Boom cages and boom guards afford limited protection from electrocution hazards. They are designed to cover only the boom nose and a small portion of the boom. Performance of boom cages and boom guards is limited by their physical size, insulating characteristics, and operating environment (for example, dust, dirt, moisture, etc.). The insulating characteristics of these devices can be compromised if not kept clean, free of contamination, and undamaged.

6. Proximity sensing and warning devices are available in different types. Some use boom point (localized) sensors and others use full boom length sensors. No warning may be given for components, cables, loads, and other attachments located outside of the sensing area. Reliance is placed upon the operator in selecting and properly setting the sensitivity of these devices.
7. Never rely solely on a device to protect you and your fellow workers from danger.

Some variables you shall know and understand are:

- Proximity devices are advertised to detect the existence of electricity and not its distance, quantity, or magnitude.
  - Some proximity devices may detect only alternating current (AC) and not direct current (DC).
  - Some proximity devices detect radio frequency (RF) energy and others do not.
  - Most proximity devices simply provide a signal (audible, visual, or both) for the operator and this signal must not be ignored.
  - Sometimes the sensing portion of the proximity devices becomes confused by complex or differing arrays of power lines and power sources.
8. DO NOT depend on grounding. Grounding of a crane affords little or no protection from electrical hazards. The effectiveness of grounding is limited by the size of the (wire) conductor used, the condition of the ground, the magnitude of the voltage and current present, and numerous other factors.

## Electrical Contact

If the crane comes in contact with an energized power source, the operator shall:

1. Stay in the crane cab. DON'T PANIC.
2. Immediately warn PERSONNEL in the vicinity to STAY AWAY.
3. Attempt to move the crane away from the contacted power source using the crane's controls which are likely to remain functional.
4. Stay in the crane until the power company has been contacted and the power source has been de-energized. NO ONE shall attempt to come close to the crane or load until the power has been turned off.

Only as a last resort should an operator attempt to leave the crane upon contacting a power source. If it is absolutely necessary to leave the cab, JUMP

COMPLETELY CLEAR OF CRANE. DO NOT STEP OFF. Hop away with both feet together. DO NOT walk or run.

- Following any contact with an energized electrical source, your Manitowoc dealer shall be immediately advised of the incident and consulted on necessary inspections and repairs.

If the dealer is not immediately available, contact Manitowoc Crane Care Lattice Team. The crane must not be returned to service until it is thoroughly inspected for any evidence of damage and all damaged parts are repaired or replaced as authorized by Manitowoc or your Manitowoc dealer.

## REFUELING

- When using a portable container to refuel the crane, the container must be a safety-type can equipped with an automatic closing cap and a flame arrester.
- The engine must be **stopped** before refueling the crane.
- Smoking and open flames must be prohibited in refueling area.

## FIRE EXTINGUISHERS

- A portable fire extinguisher with a minimum rating of 10 BC must be installed in operator's or machinery cab of the crane.
- The operator and all maintenance personnel shall be thoroughly familiar with the location, use, and care of the fire extinguisher(s) provided.

## ACCIDENTS

If this crane becomes involved in a property damage and/or personal injury accident, immediately contact your Manitowoc dealer or the Product Safety and Reliability Department at the following address:

**Manitowoc Cranes**  
2401 So. 30th St.  
Manitowoc, WI 54220  
Phone: 920-684-6621

Provide a complete description of the accident, including the crane model and serial number.

The crane must not be returned to service until it is thoroughly inspected for any evidence of damage. All damaged parts must be repaired or replaced as authorized by Manitowoc.

## SAFE MAINTENANCE



### WARNING

Importance of safe maintenance cannot be over emphasized. Carelessness and neglect on part of maintenance personnel can result in their death or injury and costly damage to the crane or property.

Safety information in this publication is intended only as a guide to assist qualified maintenance personnel in safe maintenance. Manitowoc cannot foresee all hazards that will arise in field; therefore, **safety remains responsibility of maintenance personnel and crane owner.**

## Maintenance Instructions

To ensure safe and proper operation of Manitowoc cranes, they must be maintained according to the instructions contained in this manual and in the Service Manual provided with the crane.

Crane maintenance and repair must be performed by qualified personnel. These personnel shall **read Operator Manual and Service Manual before attempting any maintenance procedure.** If there is any question regarding maintenance procedures or specifications, contact your Manitowoc dealer for assistance.

**Qualified person** is defined as one who by reason of training and experience is thoroughly familiar with the crane's operation and required maintenance as well as the hazards involved in performing these tasks.

**Training and qualification of maintenance and repair personnel are crane owner's responsibility.**

## Safe Maintenance Practices

- Perform the following steps (as applicable) before starting a maintenance procedure:
  - Park the crane where it will not interfere with other equipment or operations.
  - Lower all loads to the ground or otherwise secure them against movement.
  - Lower the boom onto blocking at ground level, if possible, or otherwise secure the boom against dropping.
  - Move all controls to off and secure all functions against movement by applying or engaging all brakes, pawls, or other locking devices.
  - Stop the engine and render the starting means inoperative.

- f. Place a warning sign at the start controls alerting other personnel that the crane is being serviced and the engine must not be started. **Do not remove sign until it is safe to return the crane to service.**
2. Do not attempt to maintain or repair any part of the crane while the engine is running, unless absolutely necessary.  
If the engine must be run, keep your clothing and all parts of your body away from moving parts. **Maintain constant verbal communication between person at controls and person performing maintenance or repair procedure.**
  3. Wear clothing that is relatively tight and belted.
  4. Wear appropriate eye protection and approved hard hat.
  5. Never climb onto or off a moving crane. **Climb onto and off the crane only when it is parked and only with operator's permission.**  
Use both hands and handrails, steps and ladders provided to climb onto and off the crane.  
Lift tools and other equipment which cannot be carried in pockets or tool belts onto and off the crane with hand lines or hoists.
  6. The boom and gantry are not intended as ladders. Do not attempt to climb lattice work of the boom or gantry to get to maintenance points. If the boom or gantry is not equipped with an approved ladder, lower them before performing maintenance or repair procedures.
  7. Do not remove cylinders until the working unit has been securely restrained against movement.
  8. Pinch points are impossible to eliminate; watch for them closely.
  9. Pressurized air, coolant, and hydraulic oil can cause serious injury. Make sure all air, coolant, and hydraulic lines, fittings, and components are tight and serviceable.  
**Do not use your hands to check for air, coolant or hydraulic oil leaks:**
    - Use a soap and water solution to check for air leaks (apply to fittings and lines and watch for bubbles).
    - Use a piece of cardboard or wood to check for coolant and hydraulic oil leaks.
  10. Relieve pressure before disconnecting air, coolant, and hydraulic lines and fittings.
  11. Do not remove the radiator cap while the coolant is hot or under pressure. Stop the engine, wait until the pressure drops and the coolant cools, then slowly remove the cap.
  12. Avoid battery explosion: do not smoke while performing battery maintenance or short across battery terminals to check its charge.
  13. Read the safety information in the battery manufacturer's instructions before attempting to charge a battery.
  14. Avoid battery acid contact with skin and eyes. If contact occurs, flush the area with water and immediately consult a doctor.
  15. Stop the engine before refueling the crane.
  16. Do not smoke or allow open flames in refueling area.
  17. Use a safety-type can with an automatic closing cap and flame arrestor for refueling.
  18. Hydraulic oil can also be flammable. Do not smoke or allow open flames in the area when filling hydraulic tanks.
  19. Never handle wire rope with bare hands. Always wear heavy-duty gloves to prevent being cut by broken wires.
  20. Use extreme care when handling coiled pendants. Stored energy can cause the coiled pendants to uncoil quickly with considerable force.
  21. When inflating tires, use a tire cage, a clip-on inflater, and an extension hose which permits standing well away from the tire.
  22. Only use cleaning solvents which are non-volatile and non-flammable.
  23. Do not attempt to lift heavy components by hand. Use a hoist, jacks, or blocking to lift components.
  24. Use care while welding or burning on the crane. Cover all hoses and components with non-flammable shields or blankets to prevent a fire or other damage.
  25. To prevent damage to crane parts (bearings, cylinders, swivels, slewing ring, computers, etc.), perform the following steps **before welding on the crane:**
    - Disconnect all cables from batteries.
    - Disconnect output cables at engine junction box.
    - Attach the ground cable from the welder directly to the part being welded and as close to the weld as possible.

Do not weld on the engine or engine mounted parts (per engine manufacturer).
  26. Disconnect and lock the power supply switch before attempting to service high voltage electrical components and before entering tight areas (such as carbody openings) containing high voltage components.
  27. When assembling and disassembling booms, jibs, or masts on the ground (with or without support of boom

rigging pendants or straps), securely block each section to provide adequate support and alignment.

**Do not go under boom, jib, or mast sections while connecting bolts or pins are being removed.**

28. Unless authorized in writing by Manitowoc, do not alter the crane in any way that affects the crane's performance (including welding, cutting, or burning of structural members or changing pressures and flows of air/hydraulic components). Doing so will invalidate all warranties and Capacity Charts and make the crane owner/user liable for any resultant accidents.
29. **Keep crane clean.** Accumulations of dirt, grease, oil, rags, paper, and other waste will not only interfere with safe operation and maintenance but also create a fire hazard.
30. Store tools, oil cans, spare parts, and other necessary equipment in tool boxes. Do not allow these items to lie around loose in the operator cab or on walkways and stairs.
31. Do not store flammable materials on the crane.
32. Do not return the crane to service at completion of maintenance or repair procedures until all guards and covers have been reinstalled, trapped air has been bled from hydraulic systems, safety devices have been

reactivated, and all maintenance equipment has been removed.

33. Perform a function check to ensure proper operation at the completion of maintenance or repair.

## ENVIRONMENTAL PROTECTION

**Dispose of waste properly!** Improperly disposing of waste can threaten the environment.

Potentially harmful waste used in Manitowoc cranes includes — but is not limited to — oil, fuel, grease, coolant, air conditioning refrigerant, filters, batteries, and cloths which have come into contact with these environmentally harmful substances.

Handle and dispose of waste according to local, state, and federal environmental regulations.

When filling and draining crane components: do not pour waste fluids onto the ground, down any drain, or into any source of water.

- Always drain waste fluids into leak proof containers that are clearly marked with what they contain.
- Always fill or add fluids with a funnel or a filling pump.
- Immediately wipe up any spills.



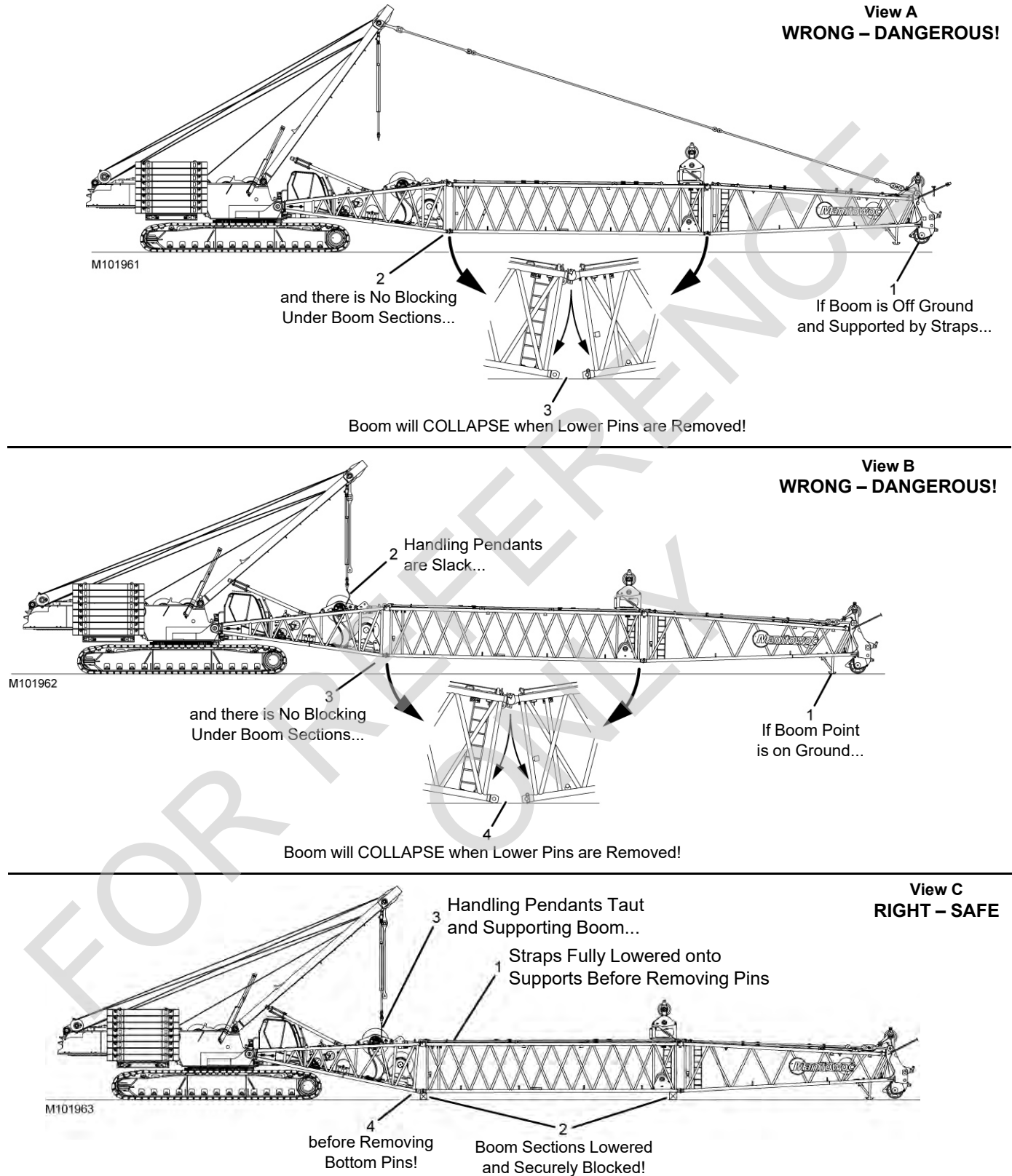


Figure 2-4. Boom Disassembly



## BOOM DISASSEMBLY SAFETY

**NOTE** The term “boom” used in the following instructions applies to all lattice attachments (fixed jib, luffing jib, mast, etc.).



### DANGER!

#### Collapsing Boom Hazard!

Prevent death or serious injury when disassembling boom sections — read and adhere to the following instructions.

Safe handling of lattice booms during disassembly is a primary concern for preventing serious or fatal injuries. A boom can collapse during disassembly if workers fail to observe safe working practices.

Accidents during boom disassembly usually result from one of three primary causes:

- Workers are not familiar with equipment or are not properly trained.
- Disassembly area is not suitable.
- Safe procedures are overlooked because not enough time is allocated for the task.

### General

Safety decals ([Figure 2-5](#)) are placed near the connectors on the boom sections as shown on the Boom Disassembly Decal Drawing at the end of this section.

Workers involved with boom disassembly shall be trained and experienced in the operation and disassembly of construction cranes. Everyone shall read and understand these instructions, the information in the Boom Assembly Drawing, and the instructions in Section 4 before beginning disassembly. **Anyone who has a question should ask for an explanation. *One worker who does not fully understand or fails to follow correct procedures can endanger other workers.***

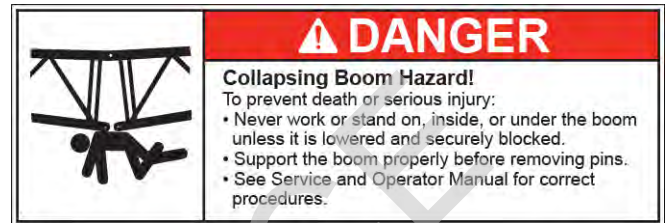
### Location

Select a suitable location for boom disassembly. It must be firm, level, and free of obstructions. It should have enough open space to accommodate the crane, the length of boom, and – if required – movement of an assist crane or other equipment. If possible, secure the area to keep unauthorized personnel and vehicles away.

### Pin Removal

When removing pins from boom sections, stand clear of pins being removed. Even though the boom is resting on

blocking, individual pin connections may still be under load. Pins can be ejected forcefully if the boom has any pressure on it or if the boom is not supported properly.



M101904

Figure 2-5. Safety Decal

## Disassembly Precaution

Always block boom sections so they are securely supported and cannot shift or move suddenly when pins are removed. If there is any doubt about a boom disassembly procedure, ***block tightly under boom sections before removing any pin.***



### DANGER

#### Collapsing Boom Hazard!

Boom can collapse or jerk when pins are removed. To avoid death or serious injury:

- Do not remove bottom connecting pins from any boom section when boom is supported by straps as shown in [Figure 2-4](#), View A.
- Do not remove strap connecting pins until straps are fully lowered into supports as shown in [Figure 2-4](#), View C.
- Do not remove bottom connecting pins from any boom section when boom point is resting on ground and handling pendants are slack as shown in [Figure 2-4](#), View B.
- Never work or stand inside boom unless it is lowered and securely blocked as shown in [Figure 2-4](#), View C.
- Do not stand or walk on top of the boom unless it has walkways.



### DANGER

#### Falling Boom Hazard!

Crane can tip or the boom can collapse if excess boom is cantilevered. Never cantilever more boom than allowed in rigging drawings or capacity charts.

## PERSONNEL HANDLING POLICY

In 1998, the American Society of Mechanical Engineers issued a new American National Standard entitled, Personnel Lifting Systems, ASME B30.23-1998. This standard provides, ***“lifting and lowering of personnel using ASME B30 Standard hoisting equipment shall be undertaken only in circumstances when it is not possible to accomplish the task by less hazardous means. Unless all of the applicable requirements of this volume are met, the lifting or lowering of personnel using ASME B30 Standard equipment is prohibited.”***

The ASME Standards recognize that mobile and locomotive cranes are primarily designed and intended for handling materials and not personnel. The ASME Standards have a retrofit statement that applies to existing cranes after the standards go into effect. It is not the intent of the standards to require retrofitting of existing equipment. If an item is being modified, the performance requirement must be reviewed relative to the current standard.

This new standard is consistent with the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) regulations for Construction that state, in 29CFR1926.1431(a): ***The use of a crane or derrick to hoist employees on a personnel platform is prohibited, except when the erection, use, and dismantling of conventional means of reaching the work site, such as a personnel hoist, ladder, aerial lift, elevating work platform or scaffold, would be more hazardous or is not possible because of structural design or work site conditions.***

Use of a Manitowoc crane to handle personnel is acceptable provided:

- The crane user shall comply with the manufacturer's specifications and limitations for lifting accessories (hooks, slings, personnel platforms, etc.).
- The requirements of the applicable national, state and local regulations and safety codes are met.
- A determination has been made that use of a crane to handle personnel is the least hazardous means to perform the work.
- The crane operator shall be qualified to operate the specific type of hoisting equipment used in the personnel lift.
- The crane operator shall remain in the crane cab at all times when personnel are off the ground.
- The crane operator and occupants have been instructed in the recognized hazards of personnel platform lifts.
- The crane is in proper working order.
- Load and boom hoist drum brakes, swing brakes, and locking devices such as pawls and dogs must be

engaged when the occupied personnel platform is in a stationary position.

- The crane must be equipped with a boom angle indicator that is visible to the crane operator.
- The crane must be equipped with boom hoist limiting device.
- If the luffing jib is used for hoisting personnel, the crane must be equipped with a luffing jib angle indicator that is visible to the crane operator.
- If the luffing jib is used for hoisting personnel, the crane must be equipped with a luffing hoist limiting device.
- The crane is equipped with a positive acting device which prevents contact between the load block or overhaul ball and the boom tip (anti-two-block device).

For friction cranes, this implies the addition of spring applied brakes activated by the anti-two-block device. The load line hoist drum must have a system or device on the power train, other than the load hoist brake, which regulates the lowering rate of speed of the hoist mechanism (controlled load lowering).

### ***Free fall of the hoist line is prohibited.***

- The Operator Manual is in the cab, readily accessible to the operator.
  - The crane's load Capacity Chart is affixed inside the crane cab, readily accessible to the operator. The total weight of the loaded personnel platform and related rigging must not exceed 50 percent of the rated capacity for the radius and configuration of the crane.
  - The crane is uniformly level within one percent of level grade and located on a firm footing. Some Capacity Charts require more stringent levelness criteria.
- Cranes with outriggers or stabilizers must have them all extended and locked. All outriggers or stabilizers must be extended equally in accordance with the Capacity Charts and operating procedures.
- Handling personnel from a platform suspended by wire rope from a luffing jib is acceptable, but only when it is not possible to accomplish the task using a less hazardous means. The crane user and operator shall take into account hazards that may be present when using a luffing jib.
  - Direct attachment of a personnel platform to a luffing jib is prohibited.
  - The platform meets the requirements as prescribed by applicable standards and regulations.
  - Applicable personal protection equipment is provided (for example, personal fall-protection system).

- For wire rope suspended platforms, the crane is equipped with a hook latch that can be closed and locked, eliminating the throat opening.
- The platform is properly attached and secure.
- Personnel platforms must not be used in winds exceeding 20 mph (9 m/s) at the hoisted platform height or in electric storms, snow, ice, sleet, or other adverse weather conditions which could affect the safety of personnel.
- Hoisting personnel within 6 m (20 ft) of a power line that is up to 350 kV or within 15 m (50 ft) of a power line that is over 350 kV is PROHIBITED, except for work covered in OSHA 29CFR1926 subpart V.

For operation outside the United States, the requirements of the applicable national, state and local regulations and safety codes must be met. This may include, in addition to the above:

- Automatic brakes such that when the equipment operating controls are released, the motions are brought to rest.
- A holding device (such as a load hold check valve) must be provided in the hydraulic or pneumatic systems to prevent uncontrolled movement of the hoisting equipment in the case of a system failure.

Manitowoc offers upgrade packages for friction controlled models to install anti-two-block, dead man control, and automatic hoist system control requirements to satisfy other codes and standards.

Manitowoc recommends that cranes be properly maintained, regularly inspected, and repaired as necessary. All safety signs must be in place and legible. We also urge Manitowoc crane owners to upgrade their cranes with rated capacity indicator/limiter systems for all lifting operations.

If you have any questions about this subject or other product safety matters relating to the operation and use of a Manitowoc crane, please contact your Manitowoc dealer or the Product Safety and Reliability Department at the following address:

#### Manitowoc Cranes

2401 So. 30th St.  
Manitowoc, WI 54220

Phone: 920-684-6621

## PEDESTAL/BARGE MOUNTED CRANES



### WARNING

#### Overload Hazard!

A pedestal mounted crane will not tip to indicate to the operator that the crane's capacity has been exceeded. When the capacity of a pedestal mounted crane is exceeded, the hook rollers or other structural components may break, before the load lines fail, causing the crane to separate from the pedestal.

For this reason, great care must be taken to operate a pedestal mounted crane within its rated capacity.

Careful planning is required before a crane can be operated on a barge. The crane user shall verify that the barge is capable of limiting crane list and/or dynamics to the maximum allowable specified in the Capacity Charts. If the specified crane list and/or dynamic conditions are exceeded, the crane's capacity may be exceeded; the hook rollers or other structural components may break, causing the crane to separate from the pedestal.



### WARNING

The crane owner/user shall verify that the method used to fasten or restrain the crane to the foundation, the barge, the ship or the floating platform is strong enough, under all operating conditions, to prevent the crane from breaking off the foundation or moving on the barge.

Manitowoc does not permit use of a truck crane on a barge, a ship or a floating platform.

### Pedestal Mounted Crane

Also see ASME publication B30.8-2004, Floating Cranes and Derricks.

#### Definition

A pedestal mounted crane is a crane which is securely fastened to a foundation, barge, ship, or floating platform so the crane is restrained from tipping.

#### Examples

1. Crane rotating bed mounted on a turret (pedestal) which is securely fastened to the foundation (Figure 2-6).

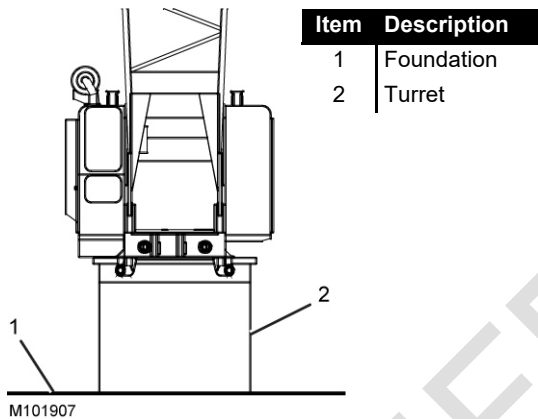


Figure 2-6. Turret-Mounted Crane

2. Crane rotating bed mounted on a carbody (crawlers removed) which is securely fastened to the foundation (Figure 2-7).

**NOTE** If the carbody will be bolted to the foundation, contact your Manitowoc dealer for the recommended bolt pattern and for the type and quantity of bolts to be used.

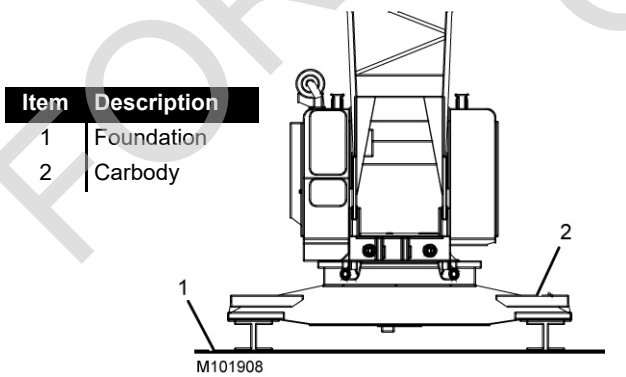


Figure 2-7. Carbody-Mounted Crane

### Barge Mounted Crane

#### Definition

A barge mounted crane is a crane that is anchored or restrained in a work area of the barge, ship, or floating platform and is subjected to tipping forces.

#### Examples

**NOTE** The foundation is the deck of the barge, ship, or floating platform.

1. Crawler-mounted crane with the carbody anchored with tie-downs to the foundation (Figure 2-8).

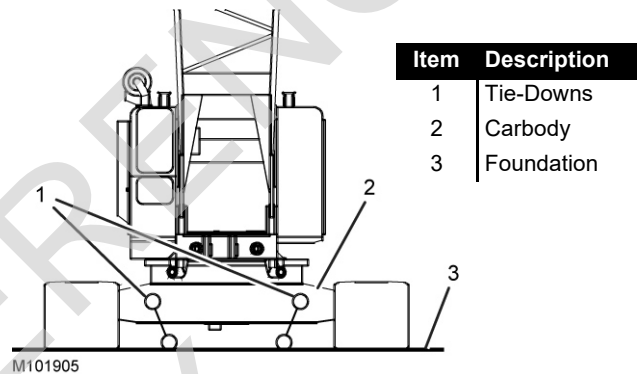


Figure 2-8. Crawler-Mounted Crane

2. Crawler-mounted crane working on a timbered area of the barge, ship, or floating platform with the crawlers restrained by curbing and end stops (Figure 2-9). When not working, the crane carbody is anchored with tie-downs to the foundation. **Traveling with load is not permitted.**

**NOTE** Manitowoc does not permit traveling on a barge deck with load.

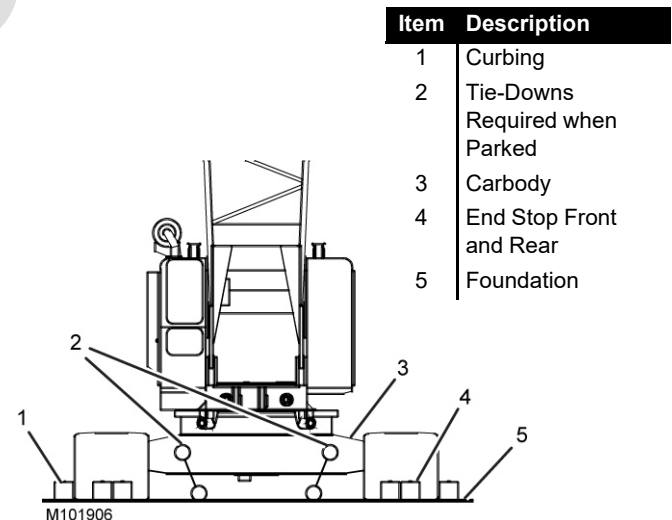


Figure 2-9. Crawler-Mounted Crane

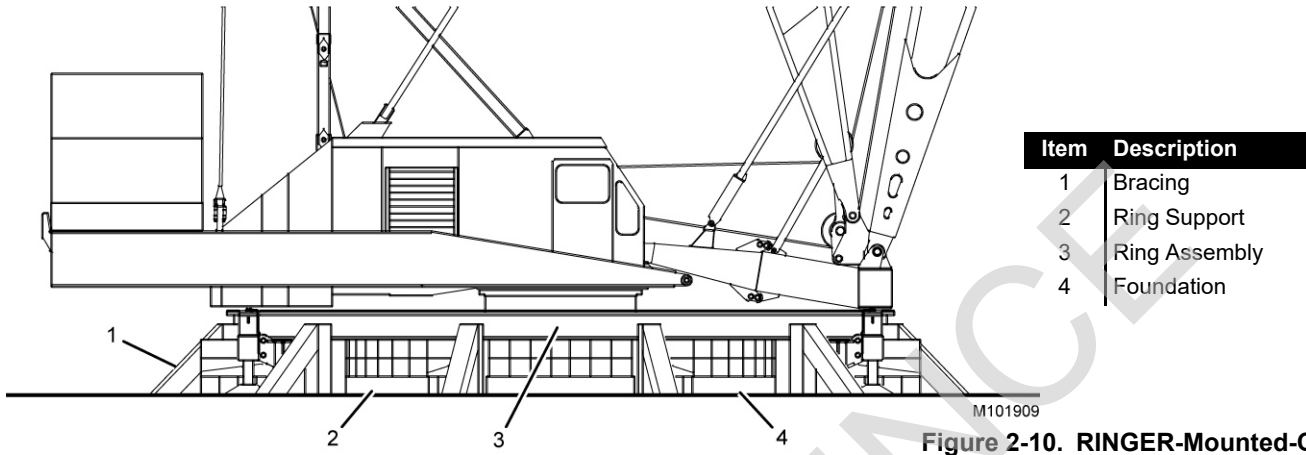
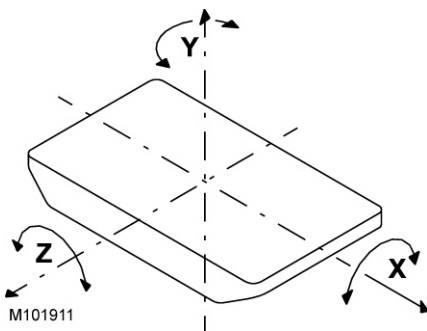


Figure 2-10. RINGER-Mounted-Crane



AXIS		TRANSITIONAL		ROTATIONAL	
SYMBOL	NAME	STATIC	DYNAMIC	STATIC	DYNAMIC
X	Longitudinal		Surge	Heel List	Roll
Y	Vertical		Heave		Yaw
Z	Lateral		Sway	Trim	Pitch

Figure 2-11. Barge Dynamics

3. RINGER® (crawler mounted, carbody mounted) supported on blocking, screw jacks, or steel pedestals which are braced and fastened to the foundation in such a manner as to prevent movement (Figure 2-10).

**NOTE** RINGERS must be equipped with hook rollers on the boom carrier and the counterweight carrier.

4. RINGER (platform mounted) which has the ring braced and fastened directly to the foundation in such a manner as to prevent movement.

### Capacity Charts for Barge Mounted Crane

Manitowoc provides two types of Capacity Charts for a crane mounted on a barge or other supporting structure under static conditions.

1. A Capacity Chart based on tipping when the crane is anchored only to prevent shifting.
2. A Capacity Chart based on structural competence when the crane is securely fastened for use as a pedestal mounted crane.

**NOTE** Unless otherwise specified in a machine list Capacity Chart, a 0 degree machine list Capacity Chart rating applies to machine list **not to exceed 1/2 degree**. All other machine list ratings – 1°, 2°, and 3° – must NOT be exceeded.

### Shock Loading Caused by Barge Dynamics

Shock loads to the crane can be experienced when the barge is subjected to up and down movement of wave action (referred to as DYNAMICS). Figure 2-11 illustrates the dynamic conditions of the barge which influence crane capacity.

### CAUTION

#### Structural Damage Hazard!

If the crane's boom or structure is shock loaded during operation, or there is any indication of shock loading, all structural components of the crane must be inspected to detect cracks and other damage. Nondestructive test equipment, such as magnetic particle or ultrasonic procedures, is recommended for this inspection.

**NOTE** Manitowoc does not recommend crane operation under dynamic conditions.

### Operation on Barge

Machine list and/or dynamics will be experienced when a crane is operated on a barge, ship, or floating platform. Both of these conditions reduce the crane's capacity and each must be taken into account for safe operation on a barge, ship, or floating platform.



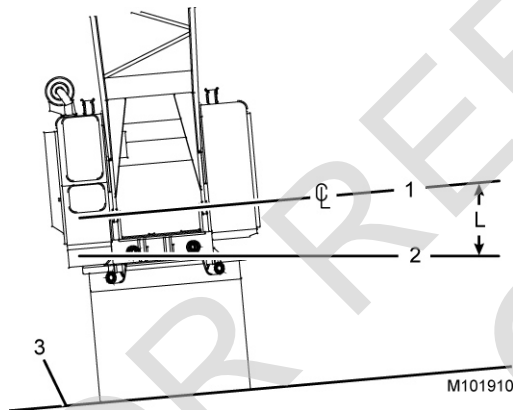
**WARNING****Tipping Crane Hazard!**

Tie-downs which only prevent the crane from shifting as in barge, ship or floating platform mounting, may not provide adequate support when using a Capacity Chart for pedestal mounting. Before operating a crane on a barge, a ship or a floating platform, the crane user shall verify that correct the Capacity Chart is being used — pedestal mounted, barge mounted, 0°, 1°, 2° or 3° list or dynamic Capacity Chart.

Failing to use the correct Capacity Chart can result in an accident.

**Barge Mount Definitions**

1. Machine List, as defined by Manitowoc, is the crane's out-of-level condition — from side-to-side — as measured by the angle between horizontal and a line drawn through the centerline of the crane's boom hinge pins (Figure 2-12). This out-of-level condition creates side load and affects the crane's lifting capacity.



Item	Description
1	Centerline through Boom Hinge Pins
2	Horizontal
3	Barge Deck
L	Degrees of Machine List (Maximum allowable is specified in Capacity Chart)

**Figure 2-12. Machine List**

2. Barge List (also referred to as heel or trim) causes swing out of the load and may produce side load. When Manitowoc provides a Capacity Chart showing capacities for a 2 degree machine list for example, we

are referring to the maximum allowable lifting capacity for the crane when experiencing an out-of-level condition (side-to-side) of 2 degrees as measured by angle between horizontal and a line drawn through centerline of the crane's boom hinge pins.

Unless otherwise specified in the Capacity Chart, barge list (heel or trim) must not exceed the machine list degrees given in the Capacity Chart.

3. Barge List and Machine List are not the same. As the crane rotates on a barge, barge list (as defined above) will change. The worst machine list condition generally occurs when the crane swings over the corner of the barge, producing maximum side load.

**Inspection of Barge-Mounted Crane**

To aid in preventing harmful and damaging failure as previously indicated, regular inspection for signs of overloading in the following load bearing components is required. Correct each defect found before placing the crane into service.

- Boom
- Counterweight
- Backhitch
- Rotating Bed
- Wire Rope
- Pendants and Straps
- Hook and House Rollers

When equipped with hook rollers, it is recommended that each hook roller assembly be inspected daily for any sign of overloading, to include:

- Deformation of roller path
- Proper hook roller adjustment
- Deformation or cracks in hook roller hanger
- Bent hook roller shaft
- Damaged bearings

**Transporting Crane on Barge**

If it is necessary to transport the crane on a barge, ship, or floating platform when dynamic conditions will be experienced, the boom must be lowered onto a cradle (or other support) and the crane's boom, rotating bed, and lowerworks must be secured against movement. If the crane is equipped with a mast, the mast must be securely tied down with guylines. Failing to take these steps can result in shock load or side load damage to the boom and mast.

## SECTION 3

### OPERATING CONTROLS AND PROCEDURES

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FOR REFERENCE ONLY



**SECTION 3  
OPERATING CONTROLS AND PROCEDURES**



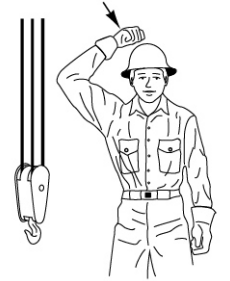
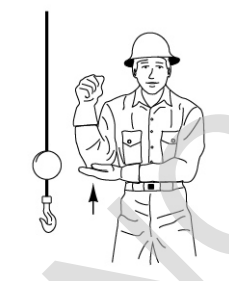
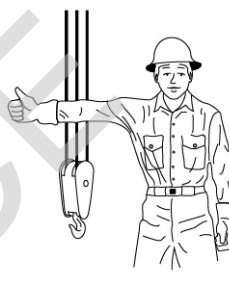

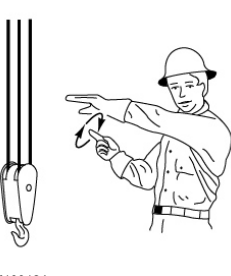
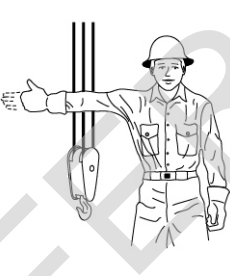
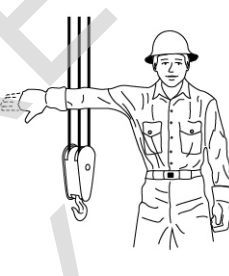

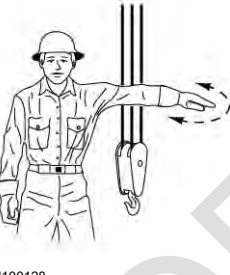
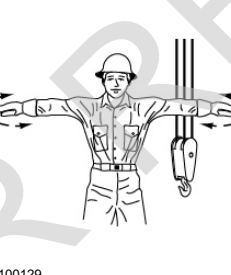
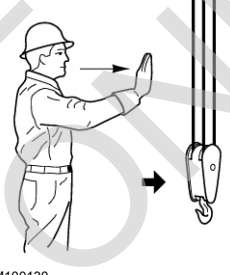
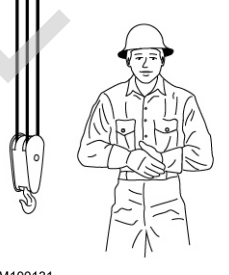
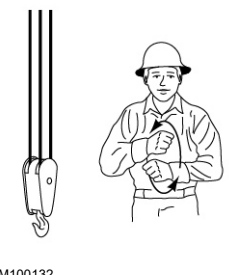
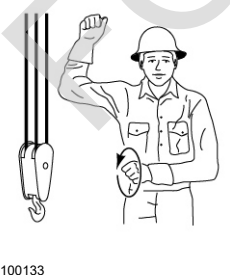
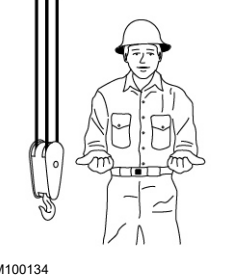
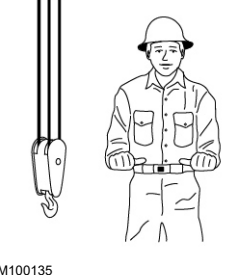
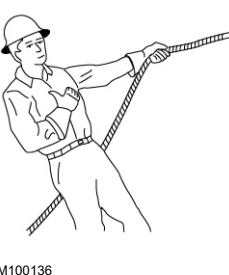

*FOR REFERENCE ONLY*

*THIS SECTION STARTS ON THE NEXT PAGE*

### STANDARD HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS

The following standard hand signals comply with ASME B30.5-2014.

**Table 3-1. Standard Hand Signals for Controlling Crane Operations**

1	2	3	4	5
 <p>M100118</p>	 <p>M100119</p>	 <p>M100120</p>	 <p>M100121</p>	 <p>M100122</p>
6	7	8	9	10
 <p>M100123</p>	 <p>M100124</p>	 <p>M100125</p>	 <p>M100126</p>	 <p>M100127</p>
11	12	13	14	15
 <p>M100128</p>	 <p>M100129</p>	 <p>M100130</p>	 <p>M100131</p>	 <p>M100132</p>
16	17	18	19	20
 <p>M100133</p>	 <p>M100134</p>	 <p>M100135</p>	 <p>M100136</p>	 <p>M100137</p>

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Table 3-1. Standard Hand Signals for Controlling Crane Operations

Item	Description
1	<b>HOIST</b> —With forearm vertical, forefinger pointing up, move hand in small horizontal circles.
2	<b>LOWER</b> —With arm extended downward, forefinger pointing down, move hand in small horizontal circles.
3	<b>USE MAIN HOIST</b> —Tap fist on head. Then use regular signals.
4	<b>USE WHIPLINE (Auxiliary Hoist)</b> —Tap elbow with one hand. Then use regular signals.
5	<b>RAISE BOOM</b> —Arm extended, fingers closed, thumb pointing upward.
6	<b>LOWER BOOM</b> —Arm extended, fingers closed, thumb pointing downward.
7	<b>MOVE SLOWLY</b> —Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal (hoist slowly shown as an example).
8	<b>RAISE BOOM &amp; LOWER LOAD</b> —With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.
9	<b>LOWER BOOM &amp; RAISE LOAD</b> —With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.
10	<b>SWING</b> —Arm extended, point with finger in direction of swing of boom.
11	<b>STOP</b> —Arm extended, palm down, move arm back and forth horizontally.
12	<b>EMERGENCY STOP</b> —Both arms extended, palms down, move arms back and forth horizontally.
13	<b>TRAVEL</b> —Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.
14	<b>DOG EVERYTHING</b> —Clasp hands in front of body.
15	<b>TRAVEL (Both Tracks)</b> —Use both fists in front of body, making a circular motion about each other, indicating direction of travel forward or backward. (For Land Cranes Only).
16	<b>TRAVEL (One Track)</b> —Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For Land Cranes Only).
17	<b>EXTEND BOOM (Telescoping Booms)</b> —Both fists in front of body with thumbs pointing outward.
18	<b>RETRACT BOOM (Telescoping Boom)</b> —Both fists in front of body with thumbs pointing toward each other.
19	<b>EXTEND BOOM (Telescoping Boom)</b> —One Hand Signal. One fist in front of chest with thumb tapping chest.
20	<b>RETRACT BOOM (Telescoping Boom)</b> —One hand signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.

### SYMBOLS USED ON CONTROL CONSOLES

The following symbols are used on the control consoles to identify the operating controls and their operation.

**Table 3-2. Symbol Identification — Control Consoles**


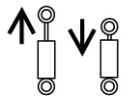









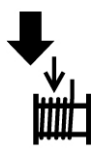

 <p>12V</p>	<p>Battery, 12 Volt Supply</p>	 <p>M100144</p>	<p>Cylinders, Mast Assist Arms, Extend and Retract</p>
 <p>M100168</p>	<p>Bypass, Crane Limits</p>	 <p>M100148</p>	<p>Drum</p>
 <p>M101690</p>	<p>Cab Tilt Down</p>	 <p>M100149</p>	<p>Drum, Free Fall</p>
 <p>M101689</p>	<p>Cab Tilt Up</p>	 <p>M100150</p>	<p>Drum, Lower</p>
 <p>M101960</p>	<p>Camera</p>	 <p>M100151</p>	<p>Drum Number (location of number varies)</p>
 <p>M100191a</p>	<p>Crawlers</p>	 <p>M100152</p>	<p>Drum, Raise</p>
		 <p>M100155</p>	<p>Engine or Auxiliary Engine</p>

Table 3-2. Symbol Identification — Control Consoles

























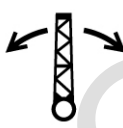
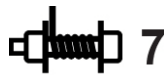


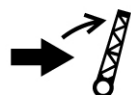

	Engine Run		Light, Consoles
M100160		M100165	
	Engine Start		Light, Position
M100160		M100291	
	Engine Stop		Light, Work (and camera)
M100161		M100166	
	Fan		Lighter
M100142		M100167	
	Heater		Lock and Unlock
M100163		M100162a	
	Horn		Off
M100164		M100170	
	Light, Dome		On
M103338		M100171	

Table 3-2. Symbol Identification — Control Consoles

 M101959	Park Off	 M100192	Travel Forward—Left Crawler
 M100172	Park On	 M100193	Travel Forward—Right Crawler
 M100183	Speed, Fast	 M100194	Travel Reverse—Left Crawler
 M100184	Speed, Slow	 M100195	Travel Reverse—Right Crawler
 M100185	Stop, Emergency	 M100196a	Travel Speed
 M100186	Swing	 M100197	Winch, Tagline (Drum 7)
 M100189	Swing Left	 M101957	Windshield Washer, Front
 M100190	Swing Right	 M101958	Windshield Washer, Overhead

### SYMBOLS USED ON REMOTE CONTROL

The following symbols are used on the remote control to identify the operating controls and their operation.

Table 3-3. Symbol Identification — Remote Control






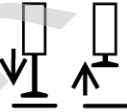
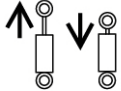


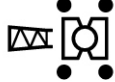

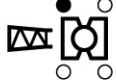

 M100141	Alert	 M100160	Engine
 M101677	Battery	 M100160	Horn
 M100143a	Cab Tilt	 M100145	Jack (Extend/Retract)
 M100144	Cylinder, Mast Assist (Extend/Retract)	 M102430	Jack, Carbody (individual)
 M100146	Data, Confirm	 M102429	Jack, Carbody (all)
 M100146a	Data, Select	 M102442	Jack, Carbody Right Front
 M100154	Energize		

Table 3-3. Symbol Identification — Remote Control

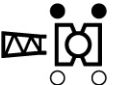

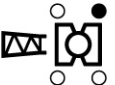

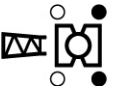

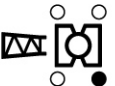

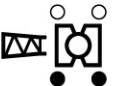






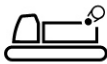





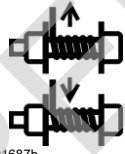
 <p>M102446</p>	<p>Jack, Carbody Right Front and Right Rear</p>	 <p>M100170</p>	<p>Off</p>
 <p>M102447</p>	<p>Jack, Carbody Right Rear</p>	 <p>M100171</p>	<p>On</p>
 <p>M102448</p>	<p>Jack, Carbody Right Rear and Left Rear</p>	 <p>M100177</p>	<p>Pin (Disengage)</p>
 <p>M102449</p>	<p>Jack, Carbody Left Rear</p>	 <p>M100178</p>	<p>Pin (Engage)</p>
 <p>M102445</p>	<p>Jack, Carbody Left Rear and Left Front</p>	 <p>M102440</p>	<p>Pins, Boom Hinge</p>
 <p>M102444</p>	<p>Jack, Carbody Left Front</p>	 <p>M102437</p>	<p>Pins, Crawler Left</p>
 <p>M102443</p>	<p>Jack, Carbody Left Front and Right Front</p>	 <p>M102436</p>	<p>Pins, Crawler Right</p>
 <p>M102435</p>	<p>Mast, Live</p>	 <p>M102451</p>	<p>Pins, Equalizer</p>



Table 3-3. Symbol Identification — Remote Control

 M102450	Pins, Live Mast Hinge	 M100184	Speed, Slow
 M102441	Signal, Transmission	 M101687	Winch, Rigging
 M100183	Speed, Fast	 M101687b	Winch, Rigging (Pay Out/Haul In)

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OPERATING CONTROLS

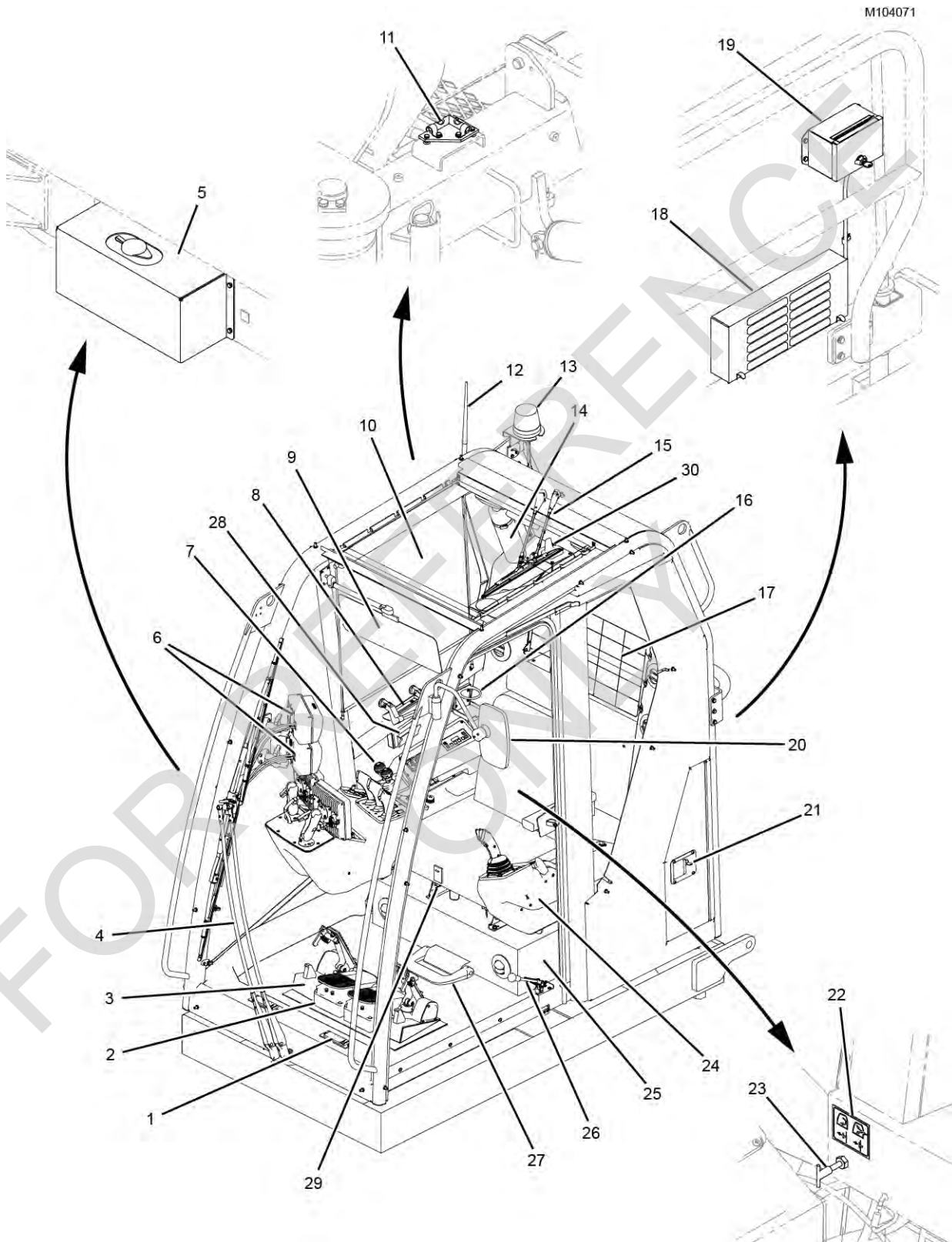


Figure 3-1. Cab Controls and Indicators

Table 3-4. Cab Controls and Indicators

Item	Name	Description
1	Louvers	Vents to circulate air in the operator cab.
2	Travel Foot Pedals	See <a href="#">page 3-28</a> for more information.
3	Free Fall Brake Pedals	See <a href="#">page 3-29</a> for more information.
4	Front Windshield Wiper	See <a href="#">page 3-23</a> for more information.
5	Windshield Washer Fluid Reservoir	Container for washer fluid.
6	Camera Monitors	The camera screen displays camera options and items for selecting and operating. Camera options include up to eight different cameras to monitor drum spooling and area behind the crane. See <a href="#">page 3-35</a> for more information.
7	Right Console	See <a href="#">page 3-18</a> for more information.
8	Right Window Latch	Right window latch is used to open the window for ventilation and as an emergency exit. See <a href="#">page 3-56</a> for more information.
9	Sun Visor	A visor is provided for the front window. Position the visor as desired to shade the sunlight.
10	Sun Shade	Shades are provided for the roof and side windows. Position the shades as desired to shade the sunlight.
11	Upperworks Level	See <a href="#">page 3-32</a> for more information.
12	Radio Antenna	See the radio manufacturer's instructions.
13	Rated Capacity Limiter (RCL) Light	The beacon rotates and the alarm sounds whenever the crane's capacity is near an overload condition (when RCL system is ON). See <a href="#">page 3-32</a> .
14	Fire Extinguisher	Used to extinguish class A, B, and C fires. Standard extinguisher is in the cab. An optional extinguisher is mounted on the left side of the rotating bed to the rear of the cab.
15	Upper Windshield Wiper	See <a href="#">page 3-23</a> for more information.
16	Cup Holder	Provided for operator convenience.
17	Cargo Net	Provided for storage.
18	HVAC Outdoor Air Ventilation	Air terminal supplies outdoor air.
19	RCL Override Assembly Switch	On cranes meeting CE requirements, an RCL/RCI override switch is provided outside the cab in a lockable box. The override switch allows emergency operation of the crane functions in case of RCL/RCI component failures: boom angle sensor, luffing jib angle sensor, and load sensing sheaves (load pins). <ul style="list-style-type: none"> <li>When the external override is on, the speed of the crane functions is limited to 15% of their maximum speed for load increasing actions.</li> <li>Actuation of the external override and all relevant data is recorded in a data recorder.</li> </ul>

20	Rear View Mirror	Adjustable rear-view mirror. Standard mirror is mounted on the cab. An optional mirror is mounted on the right-front side of rotating bed.
21	Storage Compartment	Store the setup remote control in this compartment. The door latch can be locked with the provided key.
22	Decal - Outside Air Ventilation	Displays the positions of the air control handle.
23	Outside Air Control Handle	Pull out to close the vents and push to open the vents.
24	Left Console	See <a href="#">page 3-16</a> for more information.
25	HVAC Housing	Houses the main components for the operator cab heating and cooling system (fan, heating and cooling coils, valves).
26	Cab Door Brake	Manual handle for locking the cab door in any position. Push the handle down to apply and pull up to release.
27	Engine Foot Throttle	See <a href="#">page 3-28</a> for more information.
28	Ash Tray	Provided for operator convenience.
29	Door Latch	Self-acting latch that secures the door closed. The door latch can be locked with the provided key.
30	GPS/GSM Antenna	Contact your Manitowoc dealer for CraneSTAR information.

31

Battery Disconnect Switch

Turn the knob **CLOCKWISE** to **CONNECT** the battery circuit.  
 Turn the knob **COUNTERCLOCKWISE** to **DISCONNECT** the battery circuit for the following reasons:

- When servicing the crane’s electrical control system.
- If desired, to prevent batteries from discharging when the crane is stored for extended periods of time.
- If desired, to prevent the crane from being started by unauthorized personnel.

The handle can be padlocked to prevent unauthorized use.

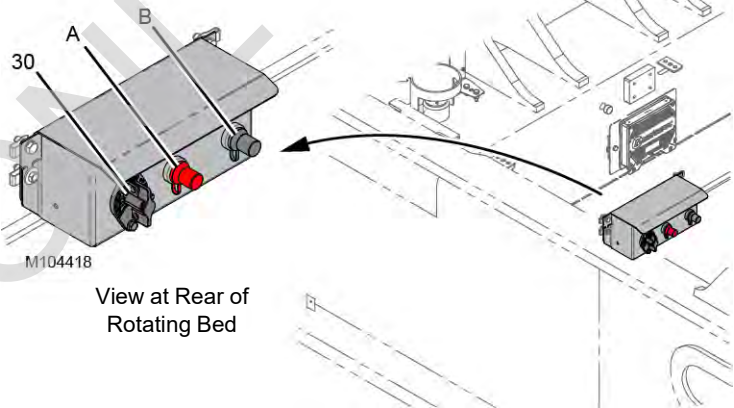
**CAUTION**

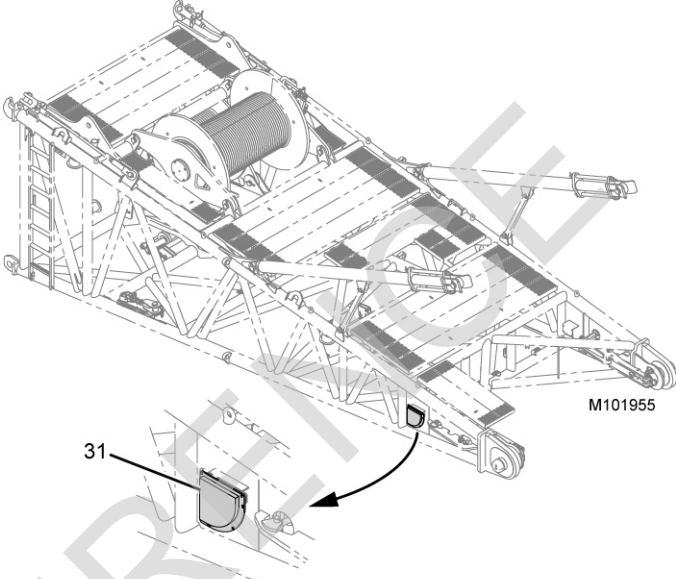
**Engine Damage!**

To avoid possible engine fault codes and undesirable operation, make sure the engine ignition switch has been off five minutes before disconnecting the batteries.

Do not rely on this switch to protect the crane’s electronic systems when welding. Disconnect the cables at the batteries before welding.

Item	Description
A	Positive – Remote Battery Terminal
B	Negative – Remote Battery Terminal



<p>32</p>	<p>Boom Angle Indicator</p>	<p>See <a href="#">page 3-32</a> for more information.</p> 
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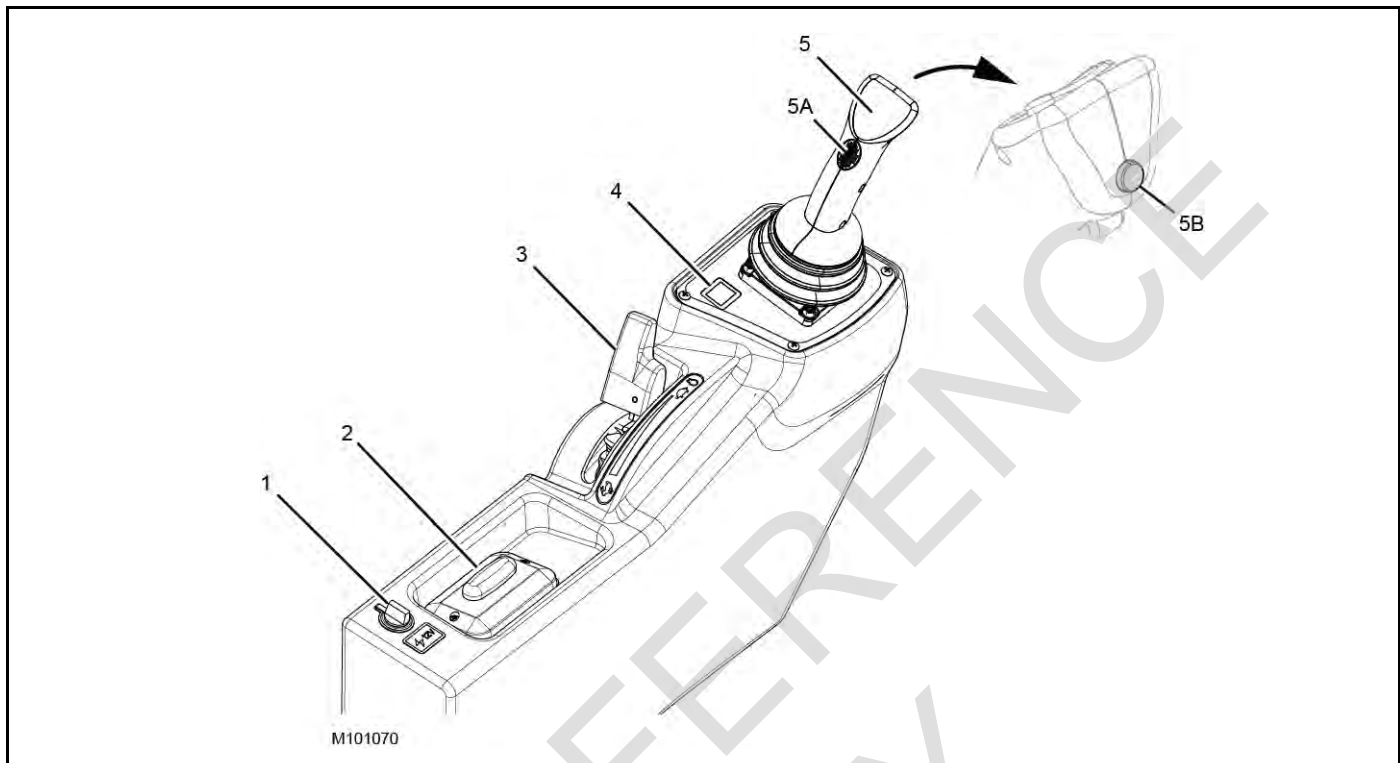
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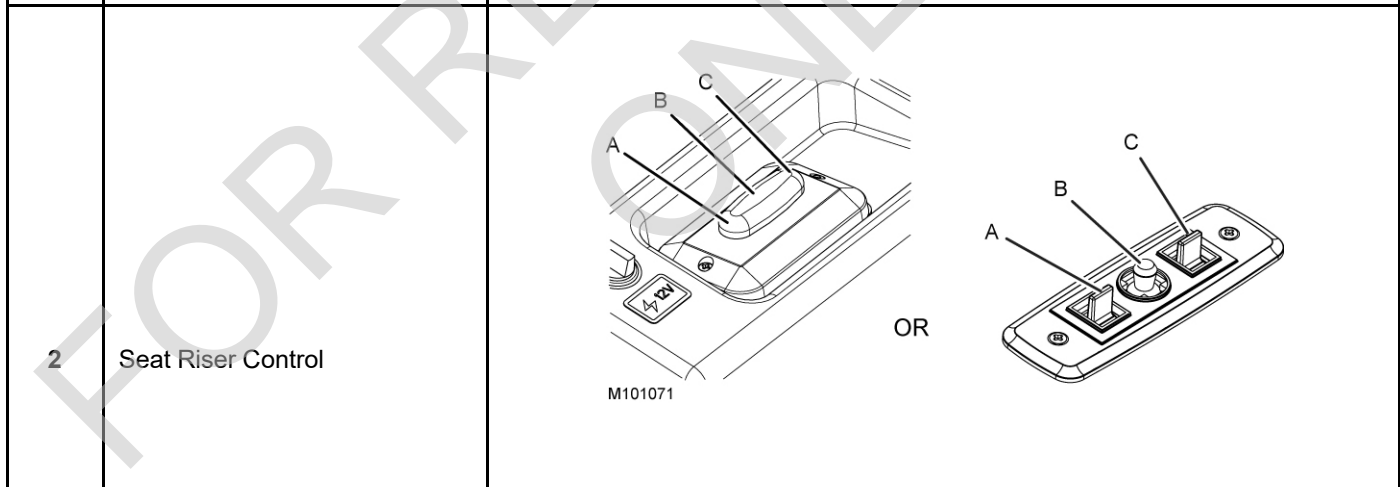


**Left Console**

Table 3-5. Left Console




Item	Name	Description
1	12VDC Power Source	Maximum current draw is 10A. For fuse location, see Section 3 of the Service Manual.



Item	Description
A	Engage switch to raise or lower the rear riser.
B	Engage switch to raise and lower the seat and to move the seat forward or backward.
C	Engage switch to raise or lower the front riser.

Table 3-5. Left Console

3	Hand Throttle	<ul style="list-style-type: none"> <li>• Move the handle FORWARD to DECREASE the engine speed.</li> <li>• Move the handle BACK to INCREASE the engine speed.</li> </ul> <p>Engine speed must be fast enough to provide sufficient power for the work being done. <b>The engine can stall under the load if the engine speed is too slow.</b></p>						
4	Drum Identifier	<p>Displays the drum number controlled by the corresponding control handle. The location of the boom control handle can vary depending on crane configuration. See <a href="#">Drum and Control Handle Identification on page 3-55</a>.</p> <div style="text-align: right;">  </div>						
5	Boom and Swing Control Handle	<p><b>Boom Control Handle:</b> See <a href="#">Boom Hoist Operation on page 3-64</a>.</p> <p>The location of the boom control handle can vary depending on crane configuration. See <a href="#">Drum and Control Handle Identification on page 3-55</a>.</p> <ul style="list-style-type: none"> <li>• Move the control handle BACK to RAISE the boom. The boom hoist brake releases and speed changes in relation to control handle movement.</li> <li>• Release the control handle to CENTER to STOP the boom. Speed decreases to off and the boom hoist brake applies to hold the boom in position.</li> <li>• Move the control handle FORWARD to LOWER the boom. The boom hoist brake releases and speed changes in relation to the control handle movement.</li> </ul> <p><b>Swing Control Handle:</b> See <a href="#">Swing Operation on page 3-66</a>.</p> <ul style="list-style-type: none"> <li>• Move the control handle to the LEFT to SWING LEFT.</li> <li>• Release the control handle to CENTER to STOP swinging. Swing speed decreases and the rotating bed slows to a stop. Move the control handle in the opposite direction to stop the swing motion faster.</li> <li>• Move the control handle to the RIGHT to SWING RIGHT.</li> </ul> <p>The swing and travel alarm beeps to warn personnel when the crane is swung.</p> <table border="1" data-bbox="634 1318 1507 1640"> <thead> <tr> <th data-bbox="634 1318 732 1356">Item</th> <th data-bbox="732 1318 1507 1356">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="634 1356 732 1455">A</td> <td data-bbox="732 1356 1507 1455">Drum rotation indicator—a pin-type actuator in the control handle moves up and down to signal the operator by feel that the drum is turning.</td> </tr> <tr> <td data-bbox="634 1455 732 1640">B</td> <td data-bbox="732 1455 1507 1640">Swing holding brake switch—holds the rotating bed in position for short periods of time. The swing control handle is not operable while the swing holding brake switch is pressed.                             <ul style="list-style-type: none"> <li>• PRESS the switch to APPLY the swing holding brake.</li> <li>• RELEASE the switch to RELEASE the swing holding brake.</li> </ul> </td> </tr> </tbody> </table>	Item	Description	A	Drum rotation indicator—a pin-type actuator in the control handle moves up and down to signal the operator by feel that the drum is turning.	B	Swing holding brake switch—holds the rotating bed in position for short periods of time. The swing control handle is not operable while the swing holding brake switch is pressed. <ul style="list-style-type: none"> <li>• PRESS the switch to APPLY the swing holding brake.</li> <li>• RELEASE the switch to RELEASE the swing holding brake.</li> </ul>
Item	Description							
A	Drum rotation indicator—a pin-type actuator in the control handle moves up and down to signal the operator by feel that the drum is turning.							
B	Swing holding brake switch—holds the rotating bed in position for short periods of time. The swing control handle is not operable while the swing holding brake switch is pressed. <ul style="list-style-type: none"> <li>• PRESS the switch to APPLY the swing holding brake.</li> <li>• RELEASE the switch to RELEASE the swing holding brake.</li> </ul>							

### Right Console

Table 3-6. Right Console

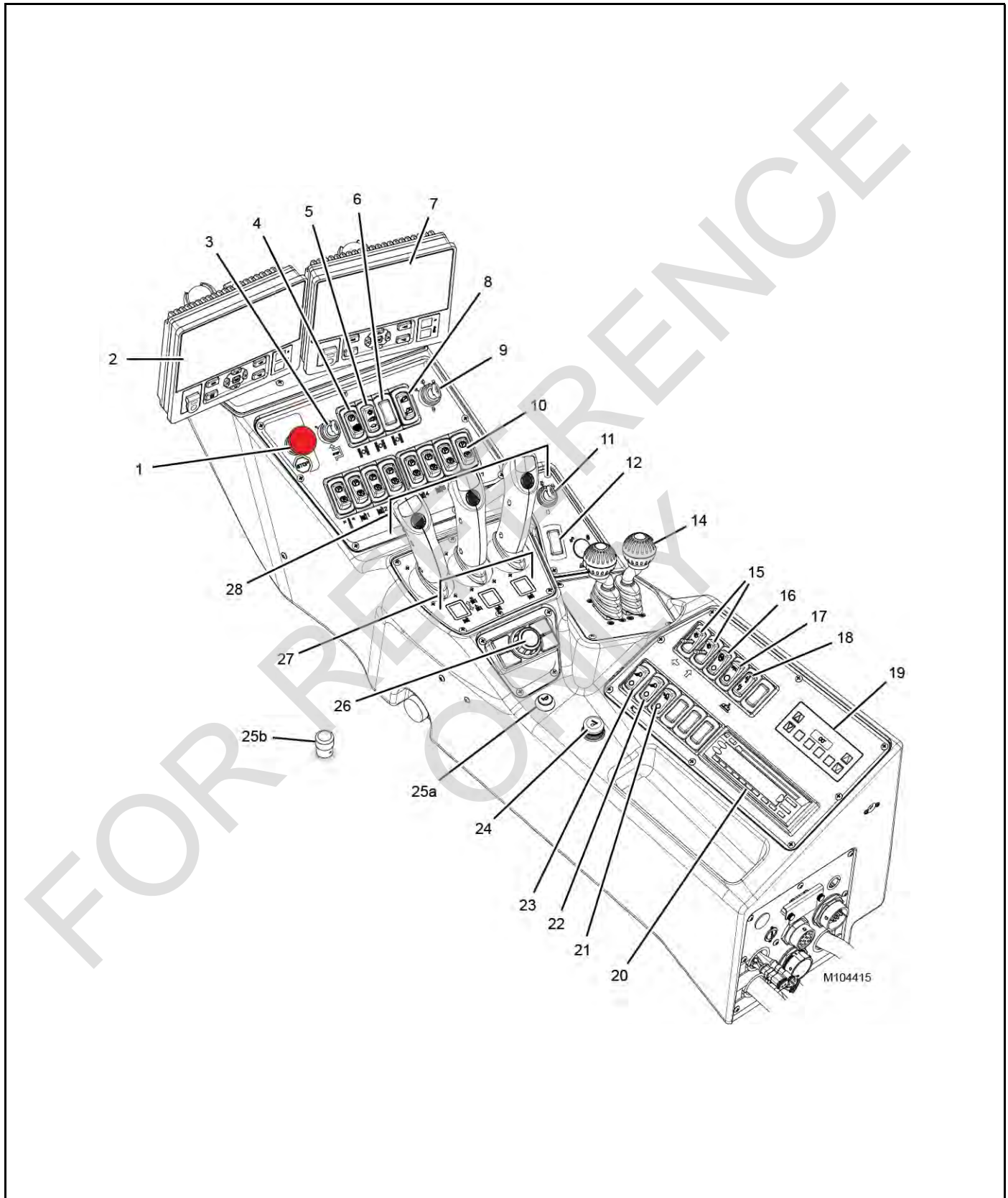


Table 3-6. Right Console

Item	Name	Description
1	Emergency Stop Button	<p>When this button is depressed, the crane engine shuts off, the motor brakes apply, and the currently operated functions come to a complete stop.</p> <p>For normal engine shut down, use the engine ignition switch.</p> <p><b>NOTE</b> The button must be pulled up before the engine can be restarted.</p> <p>If the emergency stop switch has been activated while functions were being operated, test the corresponding disk brakes for proper operation before putting the crane back into service.</p>
2	Rated Capacity Limiter (RCL) and Rated Capacity Indicator (RCI) Display	Displays load lifting information and alerts the operator to overload conditions. See the RCL/RCI Operation Manual for detailed information.
3	Limit Bypass Key Switch	<p>This key bypasses the limits described in <a href="#">Operating Limits Identification and Operation on page 3-47</a>:</p> <ul style="list-style-type: none"> <li>To BYPASS an operating limit, turn the key to I and hold the key in this position.</li> <li>To ENABLE operating limits, release the key to O. This position allows a limit to stop a crane function in the normal matter. <b>The key must be in this position for all normal operation. Otherwise, structural damage can occur.</b></li> </ul> <p>Remove the key to prevent unauthorized operation.</p>
4	Travel Park Switch	<ul style="list-style-type: none"> <li>Press the TOP of the rocker to PARK travel. With park on, the travel control handles are inoperable and the travel brakes are applied.</li> <li>Press the bottom of the rocker UN-PARK travel. With park off, the travel control handles are operable and the travel brakes are applied and released in conjunction with control handle movement.</li> </ul>
5	Travel Speed Switch	<ul style="list-style-type: none"> <li>Press the TOP of the rocker to operate the travel motors in HIGH speed. High speed operation provides maximum available travel speed for traveling long distances.</li> <li>Press the BOTTOM of the rocker to operate the travel motors in LOW speed. Low speed operation provides smooth starts and stops and allows more precise control of the travel motors than high speed.</li> </ul>
6	Not Used	
7	Main Display	Displays operating conditions, faults, and diagnostic information. See the MLC300 Main Display Operation Manual for detailed information.

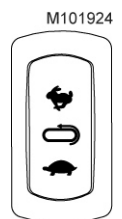
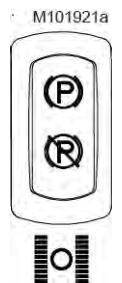
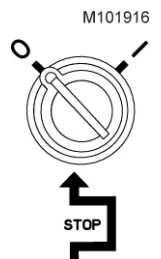


Table 3-6. Right Console

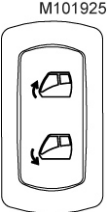
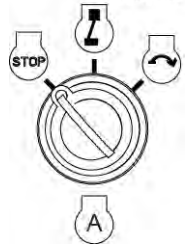
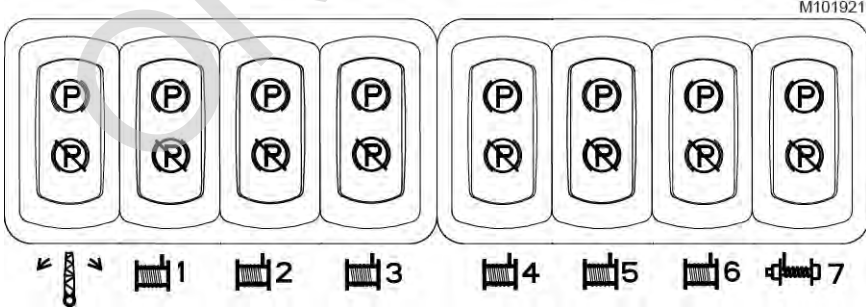
<p>8</p>	<p>Cab Tilt</p>	<ul style="list-style-type: none"> <li>• Press and hold the TOP of the rocker to tilt the front of the cab UP to a maximum of 21° above horizontal.</li> <li>• Release the rocker CENTER to LOCK the cab in the desired position.</li> <li>• Press and hold the BOTTOM of the rocker to tilt the front of the cab DOWN to a minimum of horizontal.</li> </ul>  <p style="text-align: center;"><b>CAUTION</b> <b>Avoid Operator Cab Damage!</b></p> <p>Do not lower the operator cab below horizontal during operation. The cab will hit the crawlers when swung. Make sure the stop pins are in the working position (see <a href="#">Figure 3-9 on page 3-56</a>).</p>
<p>9</p>	<p>APU Ignition Switch Auxiliary Power Unit</p>	<p>This switch is used for starting and stopping the optional APU. The APU powers the cab accessories (lights, heater, A/C) when the crane engine is off.</p> <p>Refer to the APU manufacturers manual for detailed operation and maintenance instructions.</p> <p>The APU ignition switch has the following positions:</p> <ul style="list-style-type: none"> <li>• Stop (A)</li> <li>• Run (B)</li> <li>• Start (C)</li> </ul>  <p><b>NOTE</b> The APU will not start from the cab or from the APU if the APU doors are removed.</p> <p>See <a href="#">AC Operation on page 3-83</a> for APU installation and starting instructions.</p>
<p>10</p>	<p>Park Switches</p>	<p>A separate switch is provided for each crane function: swing, drums, and crawlers.</p>  <ul style="list-style-type: none"> <li>• Press the TOP of the rocker to PARK the corresponding crane function. With drum park on, the corresponding control handle is inoperable, the brake is applied, and (if equipped) the pawl is engaged.</li> <li>• Press the bottom of the rocker to UN-PARK the corresponding crane function. With park off, the corresponding control handle is operable, the brake is applied and released in conjunction with control handle movement, and (if equipped) the pawl is disengaged.</li> </ul> <p><b>Continued on next page.</b></p>

Table 3-6. Right Console



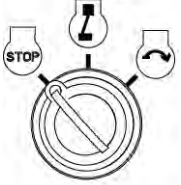
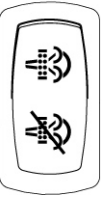
<p>10</p>	<p>Park Switches (continued)</p>	<p>Alternatively, each of the crane functions can be parked in the Main Display Speed and Torque Settings Screen. See the Main Display Operation Manual for instructions.</p> <p>If the operator moves a control handle for a function that is parked, the corresponding fault icon will appear in the Alerts Bar of the Main Display Working Screen and the function will be inoperable until un-parked.</p> <p> if the function was parked with a park switch.</p> <p> If the function was parked in the speed and torque settings screen.</p>
<p>11</p>	<p>Engine Ignition Switch</p>	<p>The engine ignition switch has the following positions:</p> <ul style="list-style-type: none"> <li>• Stop (A)</li> <li>• Run (B)</li> <li>• Start (C)</li> </ul>  <p style="text-align: right;">M101922</p>
<p>12</p>	<p>Engine Regeneration/Inhibit Switch</p>	<p>The regeneration/inhibit switch is a three-position rocker switch. The top position is momentary. The center and bottom positions are maintained. For more information on this switch, see Section 7 of the MLC300 Service Manual.</p> <p><b>Active Position</b></p> <p>The active center position is for normal engine operation. The position does not require operator assistance under normal conditions. This position allows the exhaust system to actively (automatically) regenerate.</p> <p><b>Manual Regeneration</b></p> <p>If the Engine Information Screen in the Main Display indicates the exhaust system requires a manual regeneration, press and release the top of the rocker. The engine ECM will control a regeneration cycle.</p> <p>The top of the rocker switch is momentary and the switch will return to the active position after the top of the switch is pressed.</p> <p>A manual regeneration will begin only if the engine is at low idle.</p> <p><b>NOTE</b> The top end of the switch has a guard that prevents accidental manual regeneration.</p> <p>The High Exhaust System Temperature (HEST) lamp may come on during regeneration and remain on for a short time after regeneration.</p>  <p style="text-align: right;">M101927</p>



Table 3-6. Right Console

12	Engine Regeneration/Inhibit Switch (continued)	<p><b>Regeneration Inhibit</b></p> <p>To prevent the exhaust system active (automatic) regeneration, press the bottom of the rocker. The switch will remain depressed. The amber LED in the rocker will glow. To re-enable active regeneration, manually return the switch to the active position.</p> <p>Do not use the Inhibit switch unless specifically instructed by a Manitowoc or Cummins technical advisor.</p> <p>The exhaust system regen inhibited icon indicates the aftertreatment system active (automatic) regeneration is prevented because the inhibit switch is in the inhibit position.</p> <p>For information on exhaust system-related faults, see the MLC300 Main Display Operation Manual.</p> <p>See engine manufacturer's operation and maintenance manual for information on the after-treatment system and engine faults.</p>
13	Not Used	



Table 3-6. Right Console

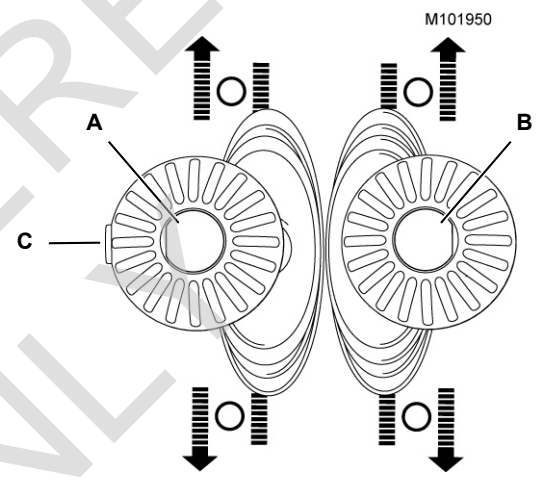
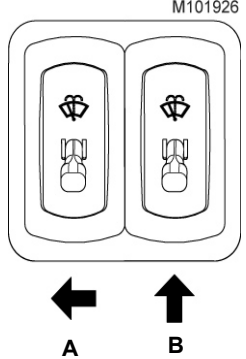
<p>14</p>	<p>Crawler Handles</p>	<p>See <a href="#">Travel Operation on page 3-76</a>.</p> <p>The following directions of travel are with the <b>front of the rotating bed and the front of carbody facing the same direction</b>.</p> <p>The swing and travel alarm beeps to warn personnel when the crane is traveled.</p> <p><b>A</b> = left crawler handle, <b>B</b> = right crawler handle, and <b>C</b> = cruise control switch.</p> <ul style="list-style-type: none"> <li>• Pull the control handle <b>BACK</b> to travel the corresponding crawler in <b>REVERSE</b>. The travel brake releases and speed increases in relation to control handle movement.</li> <li>• Release the control handle to <b>CENTER</b> to <b>STOP</b> the crawler. Speed decreases to off and the travel brake applies to stop and hold the crawler in position.</li> <li>• Push the control handle <b>FORWARD</b> to travel the corresponding crawler <b>FORWARD</b>. The travel brake releases and speed increases in relation to control handle movement.</li> </ul>  <p>The diagram shows two circular crawler handles, A on the left and B on the right. Handle A has a central button labeled C. Four arrows indicate movement directions: up and down from the top and bottom of handle A, and up and down from the top and bottom of handle B. A label M101950 is positioned above the right handle.</p> <ul style="list-style-type: none"> <li>• To turn travel <b>CRUISE ON</b>, press and release the button (C) while traveling in the desired direction and speed. The crane will continue to travel in the selected direction and speed when the operator release the crawler handles.</li> <li>• To turn travel <b>CRUISE OFF</b>, push either crawler control handle in the opposite direction or press and release the button again. Travel cruise will also turn off if an operating limit that prevents operation is reached (for example, seat switch or park switch).</li> </ul>
<p>15</p>	<p>Windshield Wiper Switches</p>	<p><b>A</b> = front windshield and <b>B</b> = upper windshield wiper.</p> <ul style="list-style-type: none"> <li>• Toggle fully down = <b>OFF</b>.</li> <li>• Toggle up = <b>INTERMITTENT</b> depending on how far up the toggle is moved.</li> <li>• Toggle fully up = <b>HIGH</b> speed.</li> <li>• Press the <b>TOP END</b> of the switch to <b>SPRAY WASHER FLUID</b> onto the windows.</li> </ul> <p>During cold weather, fill the windshield washer tank with a non-freezing cleaning fluid.</p>  <p>The diagram shows two rectangular wiper switches, A on the left and B on the right. Each has a vertical toggle and a top button. Arrows labeled A and B point to the respective switches. A label M101926 is positioned above the right switch.</p>

Table 3-6. Right Console

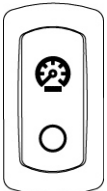
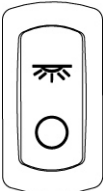
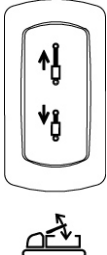
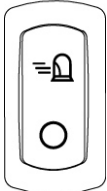
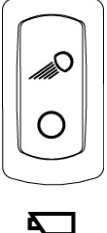
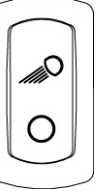
16	Panel Lights	<ul style="list-style-type: none"> <li>Press the TOP of rocker to TURN ON the panel switch back lights.</li> <li>Press the BOTTOM of rocker to TURN OFF the panel switch back lights.</li> </ul>	<p>M101918</p> 
17	Dome Lights	<ul style="list-style-type: none"> <li>Press the TOP of rocker to TURN ON the dome light.</li> <li>Press the BOTTOM of rocker to TURN OFF the dome light.</li> </ul>	<p>M101919</p> 
18	Mast Assist Arms Switch	<p>The setup mode must be on (live mast configuration selected) to operate the mast assist arms. See Section 4 of the MLC300 Operator Manual for instructions.</p> <ul style="list-style-type: none"> <li>Press and hold the TOP of the rocker to EXTEND the mast arm cylinders.</li> <li>Release the rocker to CENTER to STOP the cylinders. The valves on the cylinders lock them in position.</li> <li>Press and hold the BOTTOM of the rocker to RETRACT the mast arm cylinders.</li> </ul>	<p>M101933</p> 
19	Climate Control Keypad	See <a href="#">page 3-31</a> for more information.	
20	AM/FM Radio	See the radio manufacturer's instructions.	
21	Boom and Jib Position Light	<ul style="list-style-type: none"> <li>Press the TOP of the rocker to TURN ON the flashing red position light at the top of the boom or the jib.</li> <li>Press the BOTTOM of the rocker to TURN OFF the position light at the top of the boom or the jib.</li> </ul>	<p>M101932</p> 
22	Camera Lights	<ul style="list-style-type: none"> <li>Press the TOP of the rocker to TURN ON the camera lights.</li> <li>Press the BOTTOM of the rocker to TURN OFF the camera lights.</li> </ul>	<p>M101930</p> 
23	Crane Work Lights Switch	<ul style="list-style-type: none"> <li>Press the TOP of the rocker to TURN ON the work lights.</li> <li>Press the BOTTOM of the rocker to TURN OFF the work lights.</li> </ul>	<p>M101931</p> 

Table 3-6. Right Console

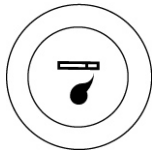

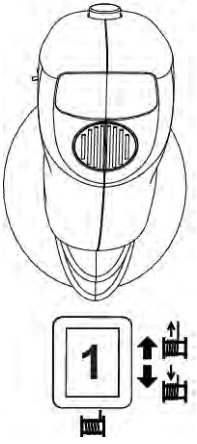
<p><b>24</b></p>	<p>Cigarette Lighter</p>	<ul style="list-style-type: none"> <li>• Push IN to TURN ON lighter.</li> <li>• The lighter will pop out when the coil is hot.</li> </ul> <p>This receptacle can be used to power other 12VDC devices. Maximum current draw is 10A.</p>  <p style="text-align: right;">M101923</p>
<p><b>25A</b></p>	<p>Horn Switch (on console)</p>	<ul style="list-style-type: none"> <li>• Press and hold the TOP of the rocker to TURN ON the horn.</li> <li>• RELEASE the rocker to TURN OFF the horn.</li> </ul> <p>Before swinging or traveling, sound the horn to alert nearby personnel.</p> 
<p><b>25B</b></p>	<p>Horn Switch (on floor)</p>	<ul style="list-style-type: none"> <li>• PRESS and hold with your foot to TURN ON the horn.</li> <li>• RELEASE to TURN OFF the horn.</li> </ul> <p>Before swinging or traveling, sound the horn to alert nearby personnel.</p>
<p><b>26</b></p>	<p>Jogdial</p>	<p>Used in conjunction with the Crane Control System (CCS). See the MLC300 Main Display Operation Manual and the RCL/RCI Operation Manual for more information.</p>
<p><b>27</b></p>	<p>Drum Identifier</p>	<p>Displays the drum number controlled by the corresponding control handle. See <a href="#">Drum and Control Handle Identification on page 3-55</a>.</p>  <p style="text-align: right;">M101928</p>

Table 3-6. Right Console

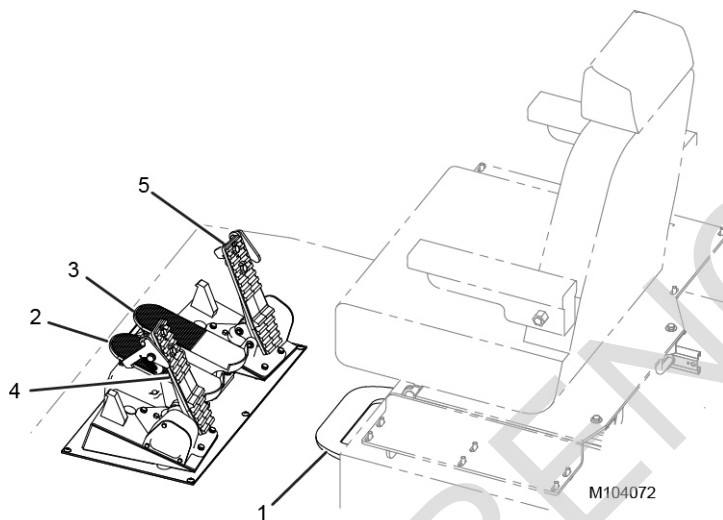
28	Drum Control Handles	<p>Each load drum has a spring-applied, hydraulically-released, disc-type drum brake on the motor end of the drum.</p> <p>Additionally, if the front or rear drum has free fall, a spring-applied, hydraulically-released disc-type brake is provided on the left end of the drum.</p> <p>For <b>normal operation</b> (free fall off or without free fall):</p> <ul style="list-style-type: none"> <li>• If equipped, the free fall brake (on left end of drum) is applied at all times.</li> <li>• The corresponding drum brake is released automatically when the drum control handle is moved in either direction from off.</li> <li>• The corresponding drum brake is applied automatically when the drum control handle is moved to off.</li> <li>• For non-free fall load drums, see <a href="#">Load Drum Operation (without free fall or with free fall disabled) on page 3-69</a>.</li> </ul> <p>For <b>free fall operation</b>:</p> <ul style="list-style-type: none"> <li>• The drum brake (on motor end of drum) is applied when the drum control handle is in neutral and when the load is free falling. If the handle is not in neutral, the free fall brake is applied proportionally to the handle.</li> <li>• Once the load stops free falling, the drum brake releases. If the handle is returned to neutral and the free fall pedal is not down, the drum brake is applied and the free fall brake releases proportionally to the pedal.</li> <li>• <b>Use the free fall brake pedal to control lowering speed and to stop and hold the load in position.</b></li> <li>• For free fall load drums, see <a href="#">Load Drum Operation (with free fall enabled) on page 3-71</a>.</li> </ul> <p><b>NOTE</b> The drum brakes are applied automatically when the engine is stopped (or power is lost for any reason), when applicable operating limits are reached, when applicable system faults occur, and when the drum park switches are moved to the park position.</p> <p>The position of the drum control handles can vary depending on crane configuration. See <a href="#">Drum and Control Handle Identification on page 3-55</a>.</p> <p>The following description is for normal operation (free fall off). If free fall is on, <b>the corresponding free fall brake pedal must be applied to stop the load when the drum control handle is released to off.</b></p> <ul style="list-style-type: none"> <li>• Pull the control handle BACK to RAISE the load. The drum brake releases and speed increases in relation to control handle movement.</li> <li>• Release the control handle to CENTER to STOP the load. Speed decreases to off and the drum brake applies to stop and hold the drum in position.</li> <li>• Push the control handle FORWARD to LOWER the load. The drum brake releases and speed increases in relation to control handle movement.</li> </ul> <p><b>NOTE</b> Drums 1 and 3 cannot be operated at the same time. If you attempt to operate both drums at the same time, the Function Diverted fault will come on in the Main Display. Park the drum not in use.</p>
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FOR REFERENCE ONLY

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### Foot Pedals

Table 3-7. Foot Pedals



Item	Name	Description
1	Engine Foot Throttle	<ul style="list-style-type: none"> <li>• Press <b>DOWN</b> on the foot throttle to <b>INCREASE</b> engine speed <i>above</i> the hand throttle setting.</li> <li>• <b>RELEASE</b> the foot throttle to <b>DECREASE</b> engine speed to idle or to the hand throttle setting.</li> </ul>
2 3	Left Travel Foot Pedal Right Travel Foot Pedal	<p>The following directions of travel are with the <b>front of the rotating bed and the front of carbody facing the same direction.</b></p> <p>The swing and travel alarm beeps to warn personnel when the crane is traveled.</p> <ul style="list-style-type: none"> <li>• Depress the <b>FRONT</b> of pedal to travel the corresponding crawler <b>FORWARD</b>. The corresponding crawler brake release and speed increases in relation to pedal movement.</li> <li>• Release the pedal to <b>CENTER</b> to <b>STOP</b> the corresponding crawler. Speed decreases to off and the crawler brake applies to hold the crawler in position.</li> <li>• Depress the <b>REAR</b> of pedal to travel the corresponding crawler in <b>REVERSE</b>. The corresponding crawler brake releases and speed increases in relation to pedal movement.</li> </ul>

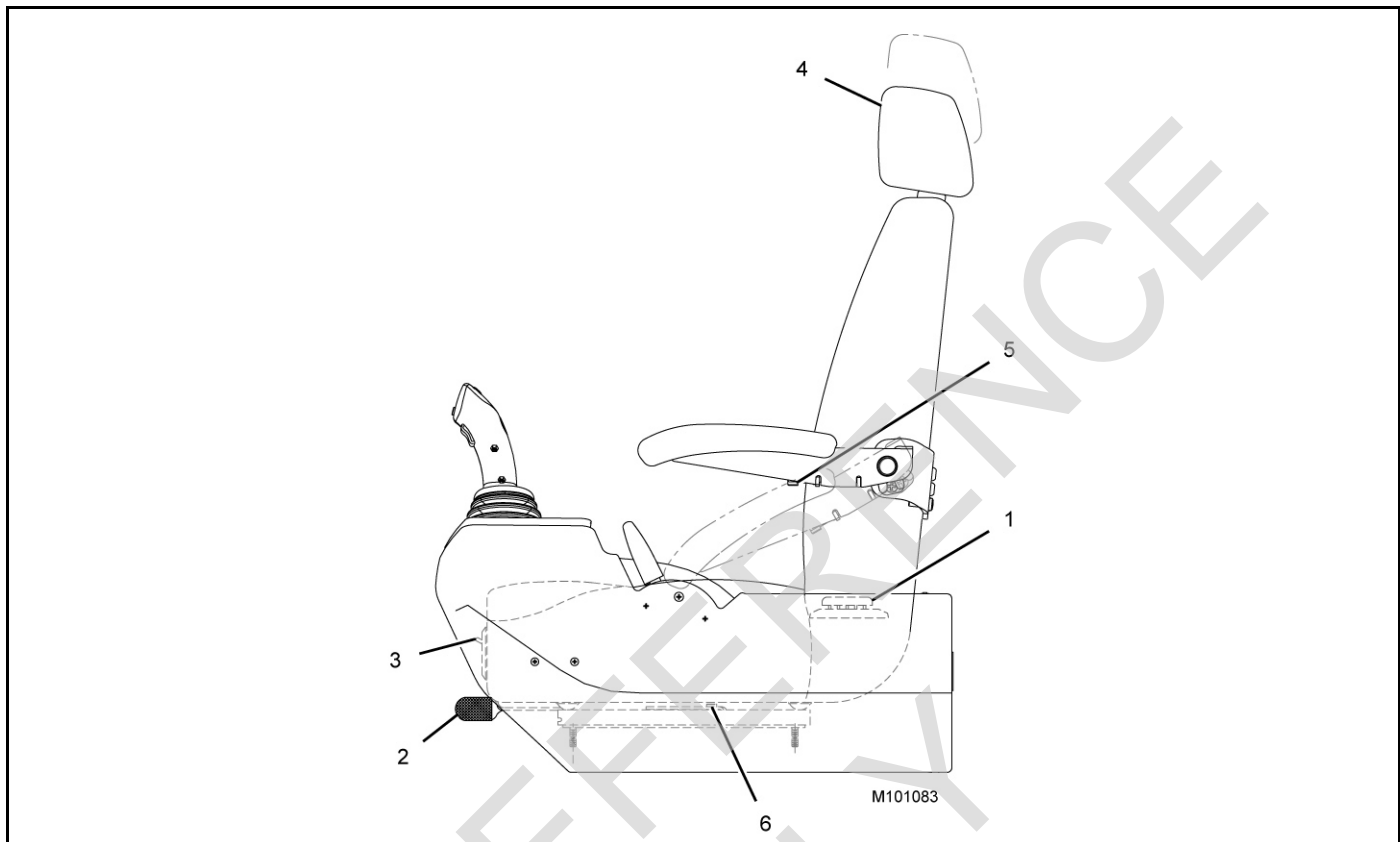
Table 3-7. Foot Pedals

<p>4 5</p>	<p>Drum 2 Free Fall Brake Pedal Drum 3 Free Fall Brake Pedal</p>	<p>The crane can be equipped with 1 or 2 optional free fall brake pedals. The left pedal is for the front hoist (Drum 2) and the right pedal is for the rear hoist (Drum 3).</p> <p>Each free fall equipped drum has a spring-applied, hydraulically-released brake that is controlled by the corresponding free fall brake pedal.</p> <p><b>When free falling a load, the corresponding brake pedal must be used to slow down and stop the load.</b></p> <p>The free fall brake pedals have no function and are inoperable when the free fall mode is off.</p> <p>To use free fall, see <a href="#">Load Drum Operation (with free fall enabled) on page 3-71</a>.</p> <p>Pedal Operation:</p> <ul style="list-style-type: none"> <li>• Depress pedal (3) to apply the brake in relation to pedal movement. Fully depress and latch the pedal to fully apply the brake (2).</li> <li>• Depress the heel of the latch (4) to unlatch the pedal (3) and then ease up on the pedal to release the brake (1) gradually as the pedal rises.</li> </ul> <div data-bbox="850 787 1295 1276" style="text-align: center;"> <p>M104075</p> </div> <table border="1" data-bbox="932 1312 1222 1493" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Item</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Brake released</td> </tr> <tr> <td>2</td> <td>Brake applied</td> </tr> <tr> <td>3</td> <td>Pedal</td> </tr> <tr> <td>4</td> <td>Latch</td> </tr> </tbody> </table>	Item	Description	1	Brake released	2	Brake applied	3	Pedal	4	Latch
Item	Description											
1	Brake released											
2	Brake applied											
3	Pedal											
4	Latch											



### Seat Controls

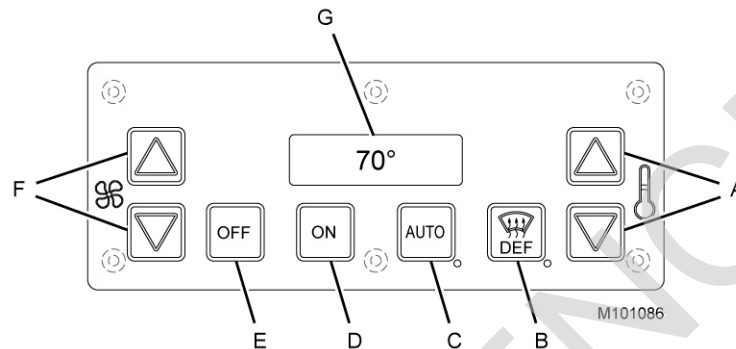
Table 3-8. Seat Controls



Item	Name	Description
1	Seat Riser on Left Console	See <a href="#">page 3-16</a> for operating instructions.
2	Fore-Aft Control	<ul style="list-style-type: none"> <li>• Push the lever to the LEFT to UNLOCK the seat.</li> <li>• Use body weight to slide the seat to the desired position.</li> <li>• RELEASE lever and ensure that it is latched to LOCK the seat in position.</li> </ul>
3	Reclining Backrest Adjustment	<ul style="list-style-type: none"> <li>• Move the switch UP to RELEASE the backrest.</li> <li>• Use body weight to adjust the backrest to the desired position.</li> <li>• RELEASE the switch to lock position of the backrest.</li> </ul>
4	Adjustable Headrest	From the default position, the headrest may be raised up 65 mm (2.5 in)
5	Armrest Adjustment Knob	<p>The knob located on the underside of armrest.</p> <ul style="list-style-type: none"> <li>• Turn the knob CLOCKWISE to RAISE armrest.</li> <li>• Turn the knob COUNTERCLOCKWISE to LOWER armrest.</li> </ul>
6	Seat Switch	<p>Prevents the crane from being operated until the operator is seated.</p> <p>When the operator is not seated, all control handles are inoperable, all brakes are applied, free fall is turned off, and travel cruise is turned off.</p>

## Climate Control Keypad

Table 3-9. Climate Control Keypad



Item	Name	Description
A	Temperature Set Switches	Increments the set point temperature UP or DOWN.
B	Windshield Defrost	Turns the fan on and opens the fresh air door to bring in air from outside the cab.
C	Automatic Fan Control Switch	Places the system in a fully automatic temperature control mode including fan speed. The system will adjust the fan speed to the lowest setting necessary to maintain the cab temperature at the displayed set point temperature.
D	Power ON Switch	Turns the control panel ON.
E	Power OFF Switch	Turns the control panel OFF.
F	Fan Speed Set Switches	Overrides the automatic fan speed control feature. Increments the fan speed UP or DOWN in 11 steps. The fan speed set is maintained until it is changed or AUTO is pressed.
G	Current Temperature Display	To change from Fahrenheit to Celsius, press the temperature UP and DOWN switches at the same time.

**NOTE** If equipped with the optional Auxiliary Power Unit Heater and Air Conditioner assembly, the climate control system can be operated when the crane engine is off. See [AC Operation on page 3-83](#) for instructions.

## Other Operator Aids

### Boom Angle Indicator

The boom angle indicator ([Figure 3-2](#)), located on the boom butt, shows the angle of the boom in degrees above horizontal.

**NOTE** The boom, luffing jib, and mast angles can be viewed in the RCL/RCI Display or in the Main Display.

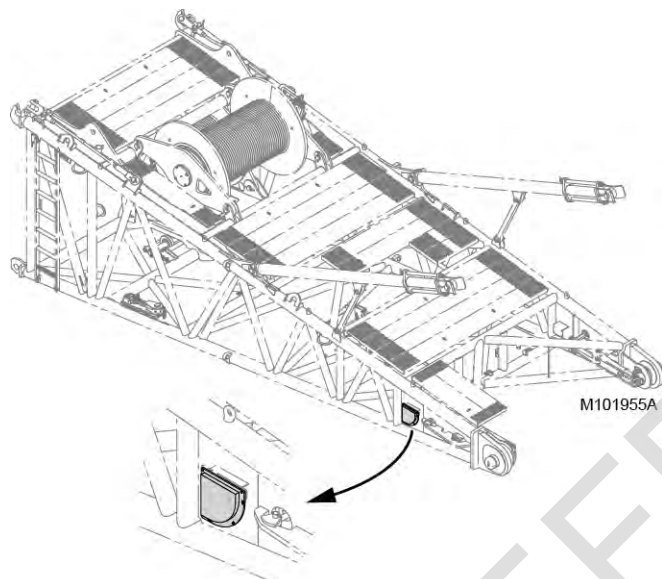


Figure 3-2. Boom Angle Indicator

### **WARNING** Overload Hazard

Use the boom angle indicator only as a guide to position the boom near the angle corresponding to the radius for a given load.

In all cases, the radius shall govern the capacity. Exceeding the radius given in the capacity chart can result in tipping or structural damage.

### Crane Capacity Beacons (Optional)

The purpose of the crane capacity beacons is to alert personnel in the vicinity of the crane of the degree to which the crane is operating within its rated capacity:

- Green Beacon ON = Crane's rated capacity is at a safe level.

- Amber Beacon ON = Crane's rated capacity is approaching the maximum level.
- Red Beacon ON = Crane's rated capacity has been exceeded.

The signal beacons correspond to the color shown in the rated capacity bar or triangle in the RCL/RCI Display in the crane cab.

### Upperworks Level

#### **WARNING**

##### Crane Tipping Hazard

Unless otherwise specified on the capacity chart, perform all crane operations with the crane level to within one percent of grade in all directions— 0,3 m in 30 m (1 ft in 100 ft); otherwise, the crane could tip.

Either a 2-way level or a circular level is located on the cab support. Both levels indicated crane levelness from front-to-rear and from side-to-side.

A level is also provided on the front of the carbody for use during crane setup.

The 2-way level ([Figure 3-3](#)) indicates crane levelness from front-to-rear (2) and from side-to-side (3).

- The crane is level when the bubbles (1) are centered in the glass.
- The crane is approximately one percent of grade out of level in the corresponding direction when half of a bubble (1) is off center.

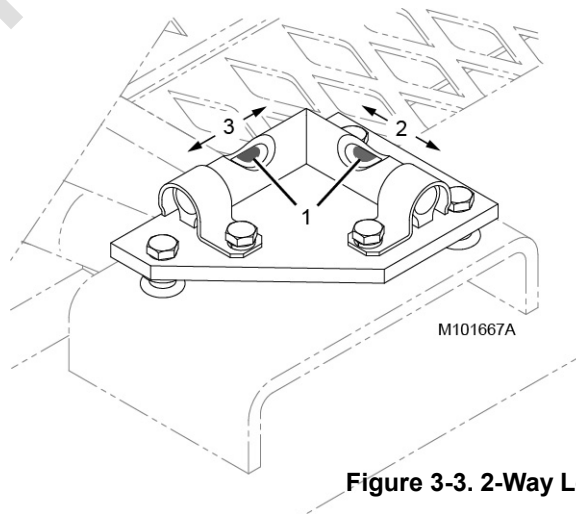


Figure 3-3. 2-Way Level

The circular level (Figure 3-4) indicates crane levelness from front-to-rear and from side-to-side using four concentric rings (2).

- The crane is level when the bubble (1) is centered in the 0° ring of the glass.
- The crane is 1°, 3°, or 5° out of level in the corresponding direction when the bubble is centered in the corresponding ring of the glass.

**NOTE** Crane pitch and roll can be monitored in the Crane Position Bar of the Main Display Working Screen. See Main Display Operation Manual for instructions.

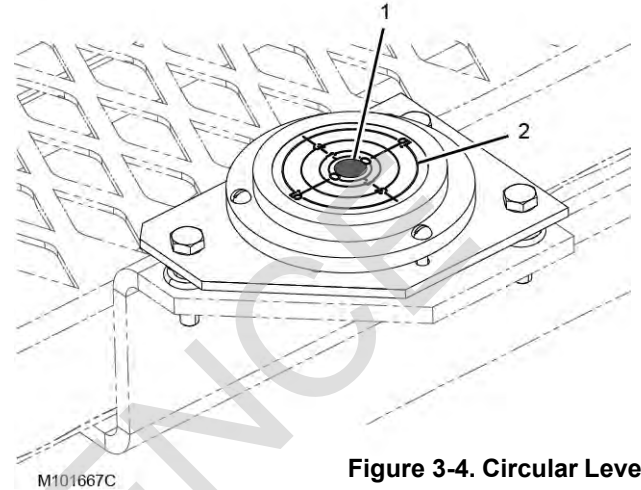
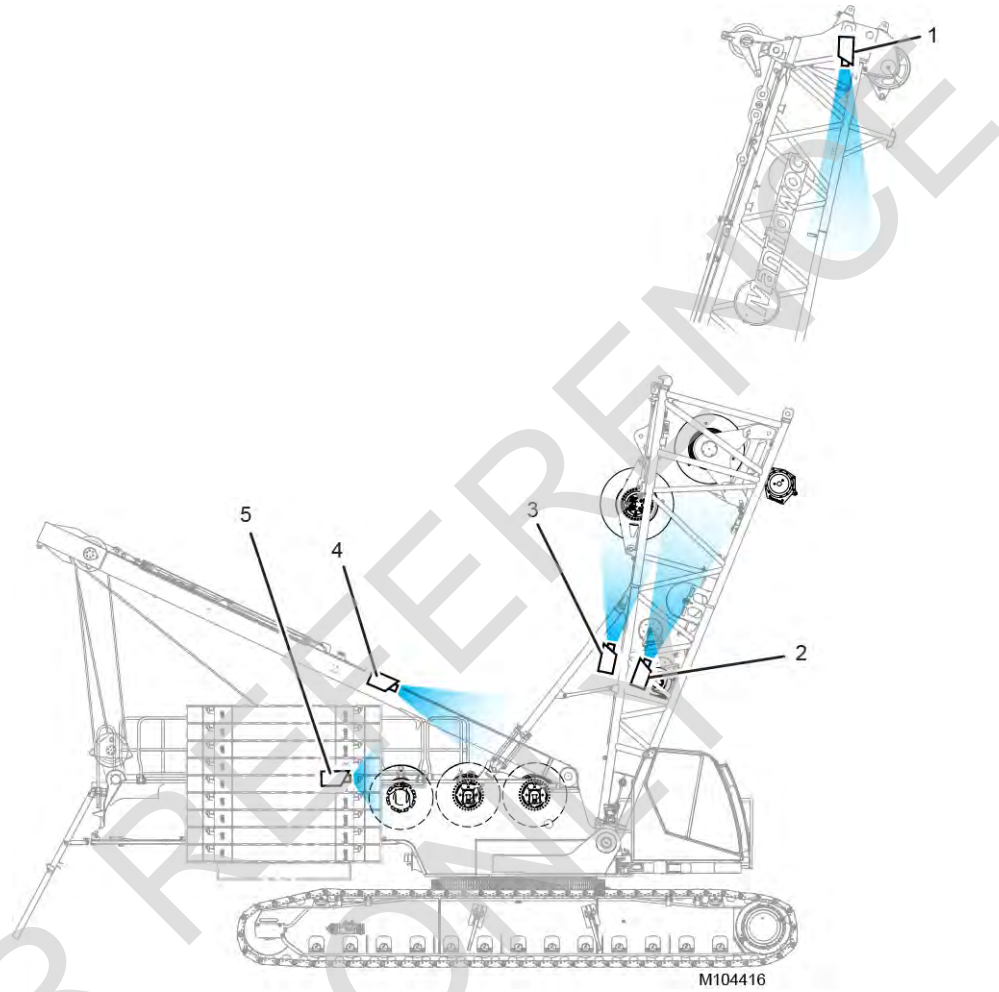


Figure 3-4. Circular Level

**Crane Cameras**

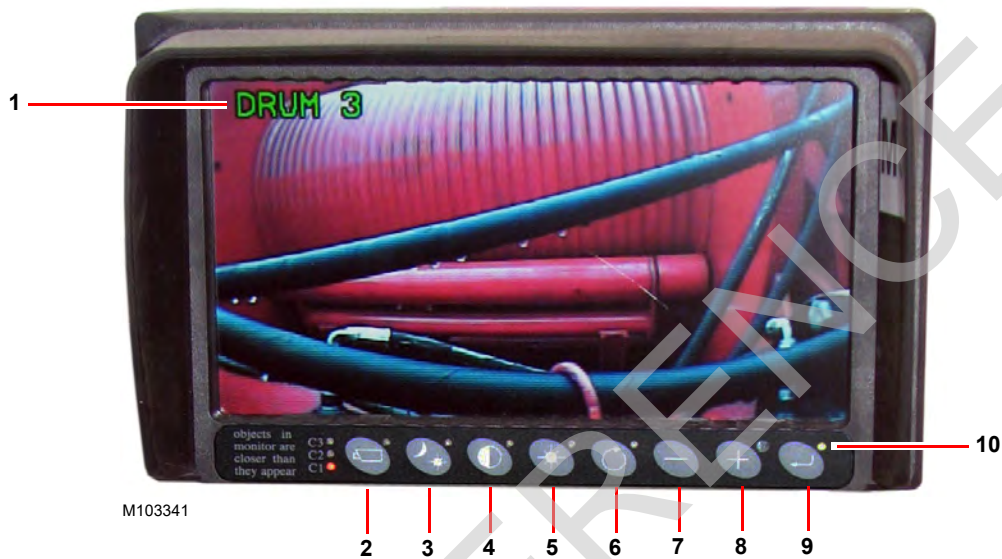
**Table 3-10. Crane Camera Locations**



Item	Name
1	Camera Points at LOAD from boom point or from luffing jib point
2	Camera Points at DRUM 6
3	Camera Points at DRUM 1
4	Camera Points at DRUM 2/3
5	Camera Points at DRUM 4

**Crane Camera Monitor**

**Table 3-11. Camera Monitor Operating Controls**



**NOTE** For detailed information about the camera monitors, refer to the camera manual that is supplied with the crane.

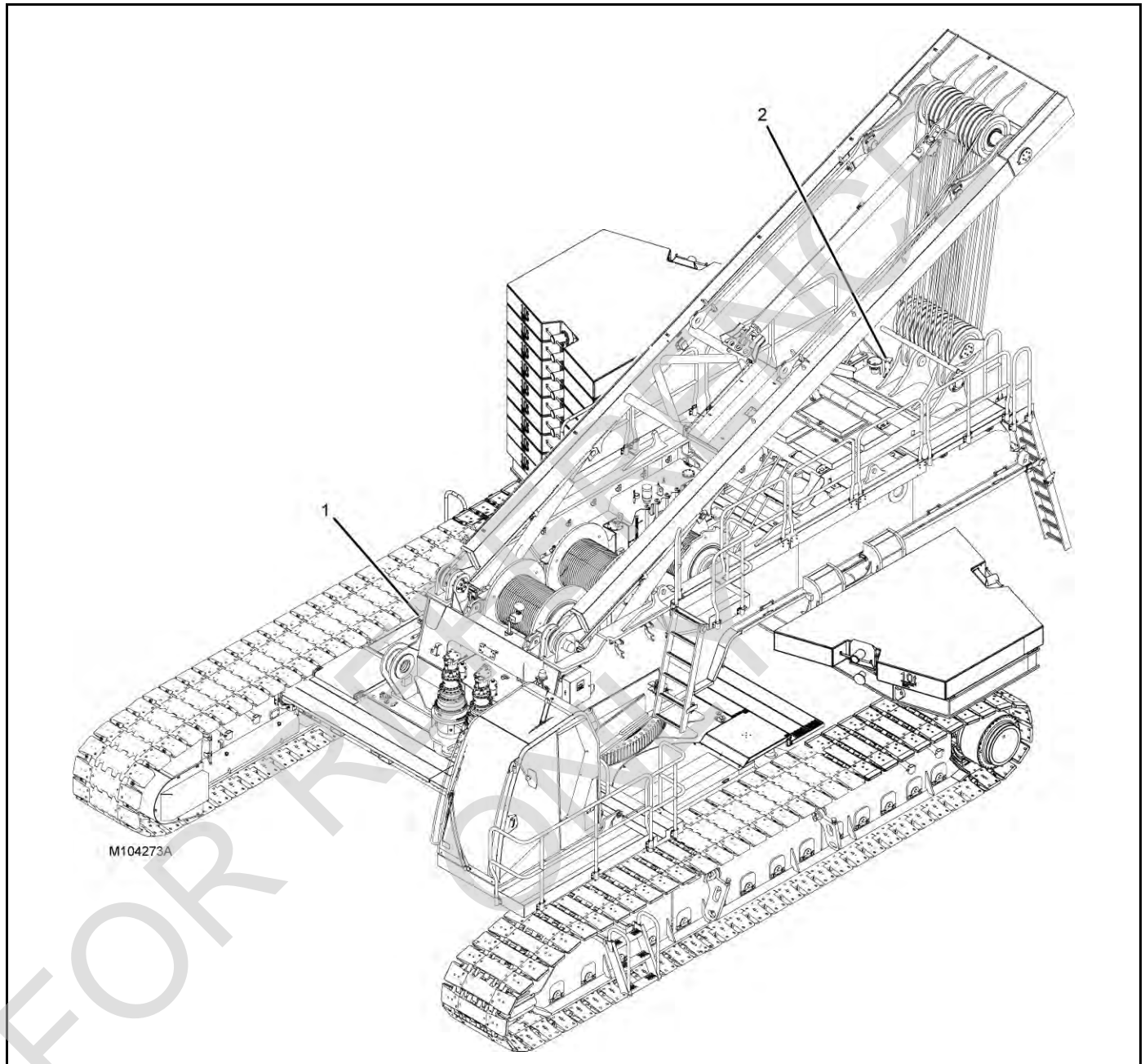
Item	Name	Description
1	Camera label	To change the label (“DRUM 3” in this case), refer to the vendor manual.
2	CAMERA button	After pressing CAMERA, use PLUS or MINUS to select the desired camera.
3	AUTOMATIC BRIGHTNESS button	Press AUTOMATIC BRIGHTNESS. The monitor brightness will adjust automatically to changing light conditions.
4	CONTRAST button	After pressing CONTRAST, use PLUS and MINUS to adjust the monitor contrast.
5	BRIGHTNESS button	After pressing BRIGHTNESS, use PLUS and MINUS to adjust the monitor brightness.
6	OPTION button	Used to go to a previous menu item. Press button for 3 seconds to exit menu screens.
7	MINUS button	After pressing BRIGHTNESS, <i>decreases</i> the monitor brightness. After pressing CONTRAST, <i>decreases</i> the monitor contrast. In the Operator Menu, go to the <i>previous</i> menu option.
8	PLUS button	After pressing BRIGHTNESS, <i>increases</i> the monitor brightness. After pressing CONTRAST, <i>increases</i> the monitor contrast. In the Operator Menu, go to the <i>next</i> menu option.
9	ENTER button	Press once to enter the monitor Operator Menu.
10	Power LED	Glows green when the monitor is powered.

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### MOTION WARNING ALARMS

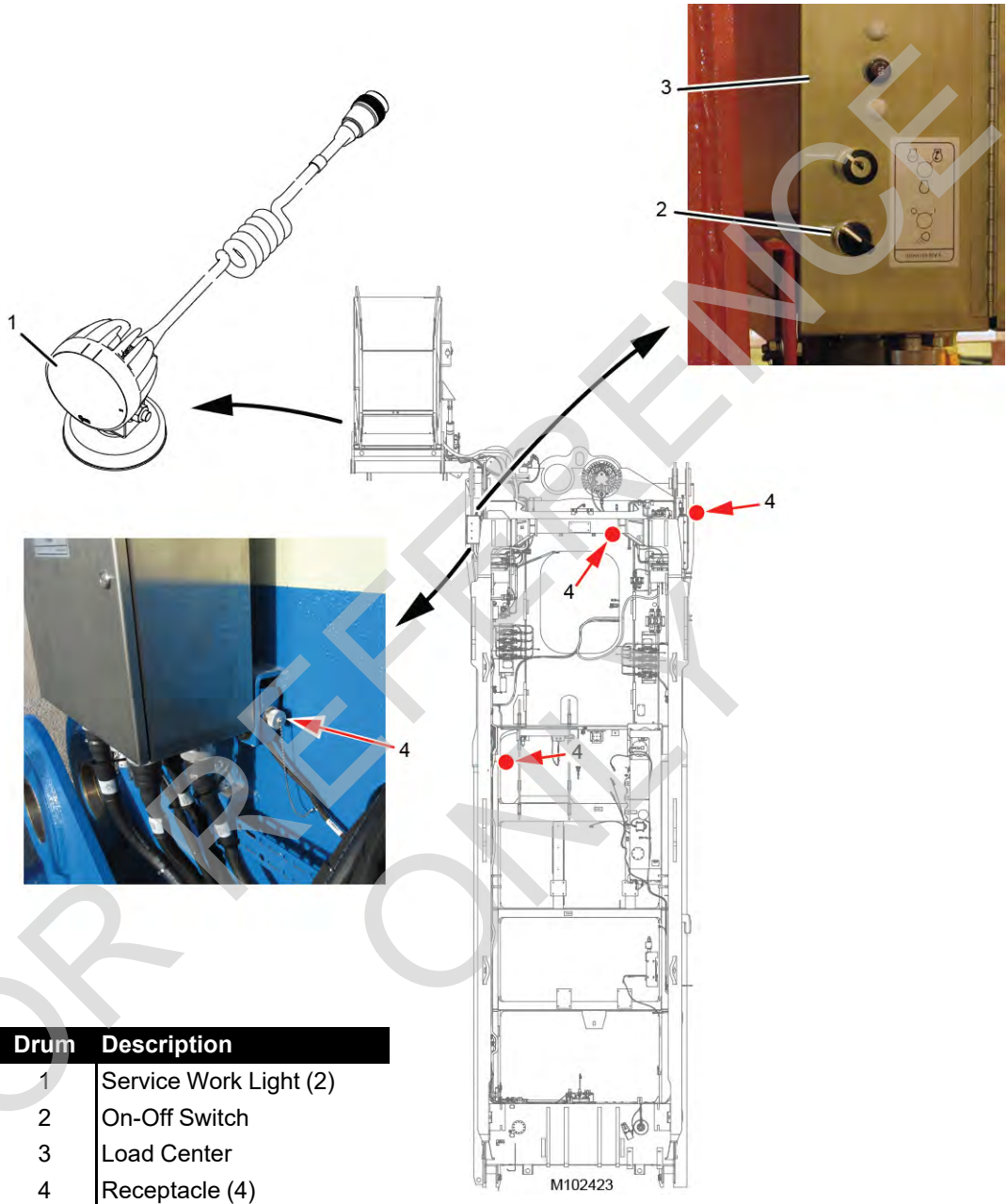
Table 3-12. Motion Warning and Alarms



Item	Name	Description
1	Swing and Travel Alarm, Front	Dual-tone, interrupted alarms that sound when the swing or either travel control handle is moved in either direction from off. The alarms turn off when the control handles are moved to off.
2	Swing and Travel Alarm, Rear	

## SERVICE LIGHTS

Table 3-13. Service Light Components



Drum	Description
1	Service Work Light (2)
2	On-Off Switch
3	Load Center
4	Receptacle (4)

M102423

Table 3-13. Service Light Components

Item	Name	Description
1	Portable Service Light	This crane is equipped with two portable service lights (1) stored on the rear shelf in the operator cab. Each light has an extension cord and magnetic base that allows the light to be mounted and pointed in the desired direction.
2	On-Off Switch	The on-off switch is located on the load center (3) on the left-front side of the rotating bed. Turn the knob CLOCKWISE to TURN ON the service lights. Turn the knob COUNTERCLOCKWISE to TURN OFF the service lights. When not in use, turn off the service lights and store them. The crane's batteries could die if the lights are left on when the engine is off.
3	DC Load Center	The DC load center contains fuses and relays for the cranes electric system. It is mounted on the left front corner of the rotating bed.
4	Receptacle	Four receptacles are provided.

## REMOTE CONTROL ACTIVATION

Table 3-14. Remote Control Components

Item	Description
1	Remote Control
2	Electric Cable: 20 m (66 ft)
3	Transceiver
4	Receptacle (2)
5	Battery Charger
6	External Engine Switch
7	DC Load Center

Table 3-14. Remote Control Components

Item	Name	Description
1	Remote Control	See <a href="#">Remote Control Operation on page 3-42</a> . The remote control (1) and the electric cable (2) are stored in the compartment on the left side of the operator cab. The remote control is powered by a 3.6V, 1.2AH NIMH battery. Two batteries are supplied.
2	Electric Cable	The remote control can be operated without the electric cable (2) (wireless) if job site conditions allow a wireless signal. If you are unable to get a wireless signal, connect the electric cable (2) between the receptacle (4) on the remote control (1) and the receptacle (4) on the transceiver (3).
3	Transceiver	The transceiver transmits and receives signals from the remote control. It is mounted on the front of the rotating bed.
4	Electric Cable	For use if you cannot get a wireless signal.
5	Battery Charger	The battery charger is mounted on the wall in the operator cab. It charges the batteries supplied with the remote control. The engine must be running to charge the battery.
6	External Engine Switch	This switch turns on cab power and activates the remote control.
7	DC Load Center	The DC load center contains fuses and relays for the cranes electric system. It is mounted on the left front corner of the rotating bed.

**To turn on the remote control:**

- Using the key provided, turn the external engine switch (6, [page 3-40](#)) to the RUN position.
- Turn the remote control power switch (1, [page 3-43](#)) CLOCKWISE to the ON (I) position. The communication light (27, [page 3-44](#)) will flash green.
- Press the remote control communication switch (2, [page 3-43](#)) for approximately one second and release it. The remote control function light (9, [page 3-43](#)) for the last function used will glow green.

The remote control will remain on until the external engine switch (6, [page 3-40](#)) is turned COUNTERCLOCKWISE to the STOP position or the remote control is turned off in the Remote Control Selection Screen in the Main Display (see MLC300 Main Display Operation Manual).

The remote control will also turn off (go to sleep) after 10 minutes of non-use. If this happens, press the remote control communication switch (2, [page 3-43](#)) for approximately one second and release it to re-establish communication.

**NOTE** The remote control can also be turned on in the Remote Control Selection Screen in the Main Display (see MLC300 Main Display Operation Manual).

**To start the engine using the remote control:**

- Turn on the remote control as instructed above.
- Read [Startup Procedures on page 3-61](#).
- Rotate the remote control power switch (1, [page 3-43](#)) CLOCKWISE to the START position to start the engine.
- Release the power switch (1, [page 3-43](#)) to the ON (I) position as soon as the engine starts.



### REMOTE CONTROL OPERATION

Table 3-15. Identification and Operation of Remote Controls

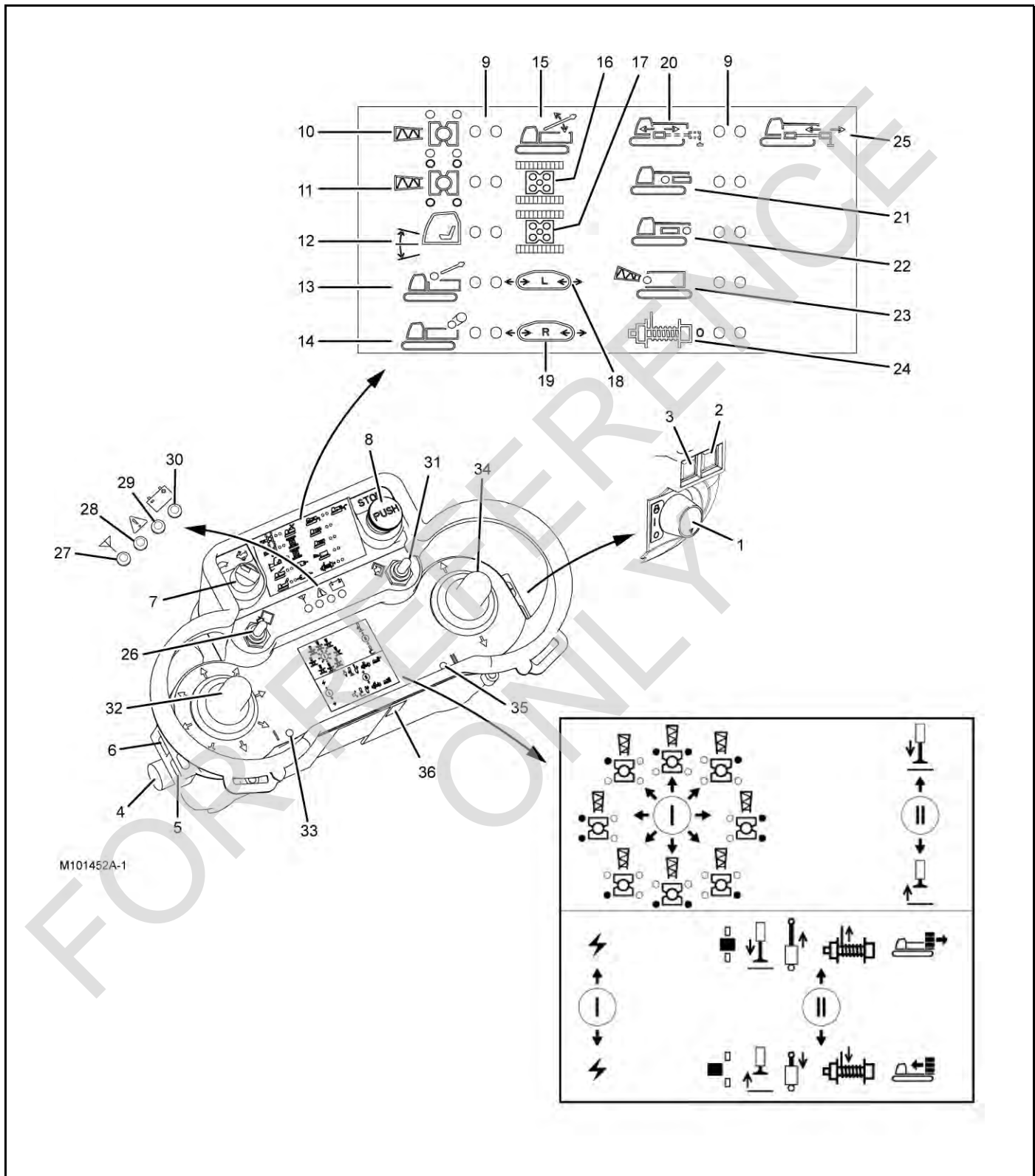


Table 3-15. Identification and Operation of Remote Controls

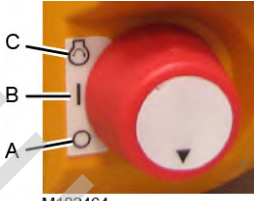
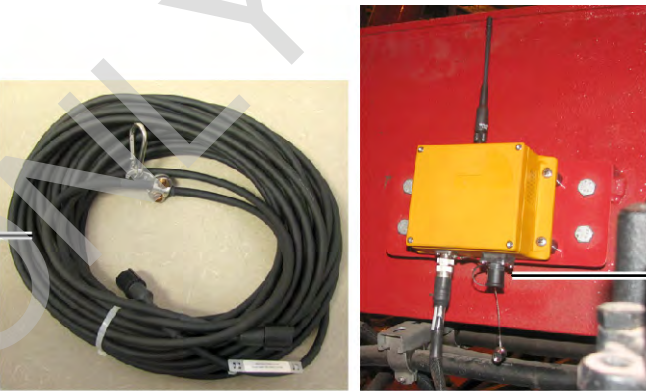
Item	Name	Description
1	Power Switch	<p>The power switch has the following positions:</p> <ul style="list-style-type: none"> <li>• OFF (<b>A</b>): maintained position that turns off the remote control's internal power circuit.</li> <li>• ON (<b>B</b>): maintained position that turns on the remote control's internal power circuit.</li> <li>• Start (<b>C</b>): momentary position that starts the engine. When released, the switch spring returns to the ON (B) position.</li> </ul> <p>See <a href="#">Startup Procedures on page 3-61</a> for engine start precautions.</p> 
2	Communication Switch	<p>Press and release the button to TURN ON communication between the remote control and the transceiver. The communication light (27) will flash green.</p> <p>Press and release the button again to TURN OFF communication between the remote control and the transceiver. The communication light (27) will turn off.</p>
3	Horn Switch	<p>PRESS and hold to TURN ON the crane's horn.</p> <p>RELEASE to TURN OFF the crane's horn.</p>
4	Receptacle	<p>The remote control can be operated without an electric cable (wireless) if job site conditions allow transmission of a wireless signal.</p> <p>If you are unable to get a wireless signal, the electric cable (A) supplied by Manitowoc can be connected between the remote control receptacle (4) and the transceiver receptacle (B).</p> 
5-6	Not Used	
7	Speed Switch	<p>Rotate CLOCKWISE to INCREASE engine speed (high).</p> <p>Rotate COUNTERCLOCKWISE to DECREASE engine speed (low).</p>
8	Emergency Stop Switch	<p>When this button is depressed, the engine shuts off and all functions come to a complete stop and are inoperable.</p> <p>For normal engine shut down, use the external engine switch (6, <a href="#">page 3-40</a>).</p> <p><b>NOTE</b> The button must be pulled up before the engine can be restarted.</p>
9	Function Light	<p>Glows GREEN to indicate which setup function (10 through 25) has been selected.</p>



Table 3-15. Identification and Operation of Remote Controls

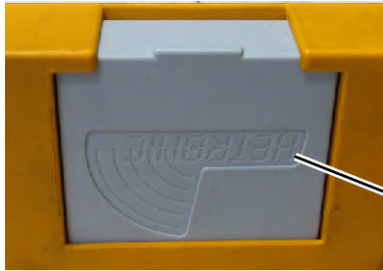



10	Carbody Jacks, ALL jacks operated at the same time.	The function light (9) glows GREEN next to the icon for the setup function that has been selected.
11	Carbody Jack – An individual jack can be operated.	
12	Cab Tilt	
13	Live Mast Hinge Pins	
14	Equalizer Hinge Pins	
15	Live Mast Assist Arms	
16	Crawler Pins, Left	
17	Crawler Pins, Right	
18	No Function	
19	No Function	
20	No Function	
21	No Function	
22	No Function	
23	Boom Hinge Pins	
24	Rigging Winch	
25	No Function	
26	Selector Switch	Move this switch UP or DOWN to scroll through the set up functions (10 through 25) until the green light appears next to the desired function.
27	Communication Light	Flashes GREEN to indicate that there is a good signal between the transceiver and the remote control. If the signal is lost, troubleshoot the system (dead battery or connection, faulty electric cable, faulty electric cable connection).
28	Fault Light	Glow RED to indicate that an operating limit has been exceeded. See MLC300 Main Display Operation Manual.
29	Fault Light	Glow AMBER to indicate that a system fault exists. See MLC300 Main Display Operation Manual.
30	Battery Light	<p>Glow RED when the remote control battery (A) is dead. Replace the battery.</p>  <p>M102463</p> <p>Push in and lift out to remove the battery. Reverse the step to install a new battery.</p>
31	Confirm Switch	Move this switch UP (momentarily) and release it to CONFIRM the selected function.
32	I Control Handle	Controls the functions identified by this icon  on the decals next to the control handle.

Table 3-15. Identification and Operation of Remote Controls

33	Handle Indicator Light	Glows BLUE when the control handle (32) is operated.
34	II Control Handle	Controls the functions identified by this icon  on the decals next to the handle.
35	Handle Indicator Light	Glows BLUE when the control handle (34) is operated.
36	Identification Number	<p>Each remote control has a unique identification number (A) on the side of the unit. This number must be entered in the Main Display when turning on the remote control in the Remote Control Selection Screen. See MLC300 Main Display Operation Manual for instructions.</p>  <p>M102462</p>
<b>Setup Function Operation</b>		
Individual Carbody Jack		<ul style="list-style-type: none"> <li>• Select and confirm item 10.</li> <li>• Move the control handle I in the required direction to select the desired jack.</li> <li>• Move the control handle II FORWARD to EXTEND the jack or move the control handle II REARWARD to RETRACT the jack.</li> </ul>
All Carbody Jacks (at same time)		<ul style="list-style-type: none"> <li>• Select and confirm item 11.</li> <li>• Move the control handle I either in direction to energize the function.</li> <li>• Move the control handle II FORWARD to EXTEND all of the jacks or move the control handle II REARWARD to RETRACT all of the jacks.</li> </ul>
Cab Tilt		<ul style="list-style-type: none"> <li>• Select and confirm item 12.</li> <li>• Move the control handle I in either direction to energize the function.</li> <li>• Move the control handle II FORWARD to EXTEND the cab tilt cylinder or move the control handle II REARWARD to RETRACT the cab tilt cylinder.</li> </ul>
Live Mast Hinge Pins		<ul style="list-style-type: none"> <li>• Select and confirm item 13.</li> <li>• Move the control handle I in either direction to energize the function.</li> <li>• Move the control handle II FORWARD to ENGAGE the live mast hinge pins or move the control handle II REARWARD to DISENGAGE the live mast hinge pins.</li> </ul>
Equalizer Hinge Pins		<ul style="list-style-type: none"> <li>• Select and confirm item 14.</li> <li>• Move the control handle I in either direction to energize the function.</li> <li>• Move the control handle II FORWARD to ENGAGE the equalizer hinge pins or move the control handle II REARWARD to DISENGAGE the equalizer hinge pins.</li> </ul>

**Table 3-15. Identification and Operation of Remote Controls**

Live Mast Assist Arms	<ul style="list-style-type: none"> <li>• Select and confirm item 15.</li> <li>• Move the control handle <b>I</b> in either direction to energize the function.</li> <li>• Move the control handle <b>II</b> FORWARD to EXTEND the mast assist arms and cylinders or move the control handle <b>II</b> REARWARD to RETRACT the mast assist arms and cylinders.</li> </ul>
Crawler Pins, Left	<ul style="list-style-type: none"> <li>• Select and confirm item 16.</li> <li>• Move the control handle <b>I</b> in either direction to energize the function.</li> <li>• Move the control handle <b>II</b> FORWARD to ENGAGE the left crawler pins or move the control handle <b>II</b> REAWARD to DISENGAGE the left crawler pins.</li> </ul>
Crawler Pins, Right	<ul style="list-style-type: none"> <li>• Select and confirm item 17.</li> <li>• Move the control handle <b>I</b> in either direction to energize the function.</li> <li>• Move the control handle <b>II</b> FORWARD to ENGAGE the right crawler pins or move the control handle <b>II</b> REAWARD to DISENGAGE the right crawler pins.</li> </ul>
Boom Hinge Pins	<ul style="list-style-type: none"> <li>• Select and confirm item 23.</li> <li>• Move the control handle <b>I</b> in either direction to energize the function.</li> <li>• Move the control handle <b>II</b> FORWARD to ENGAGE the boom hinge pins or move the control handle <b>II</b> REARWARD to DISENGAGE the boom hinge pins.</li> </ul>
Rigging Winch (Drum 0)	<ul style="list-style-type: none"> <li>• Select and confirm item 24.</li> <li>• Move the control handle <b>I</b> in either direction to energize the function.</li> <li>• Move the control handle <b>II</b> FORWARD to PAY OUT the rigging line or move the control handle <b>II</b> REARWARD to HAUL IN the rigging line.</li> </ul>

## OPERATING LIMITS IDENTIFICATION AND OPERATION

The following table lists the operating limits this crane is equipped with and identifies which of those limits are bypassable. When a limit is reached, the operating limit fault is activated and the corresponding fault icon appears in the fault bar of the Main Display Working Screen (see [Table 3-17. Operating Limits Description on page 3-48](#)).

**Table 3-16. Operating Limits Identification**

Limit	Bypassable		Bypassable in Luffing Jib Setup Mode On <sup>1</sup>		Bypassable with External Override Switch <sup>2</sup>
	See <a href="#">Limit Bypass Key Switch on page 3-19</a>				
	Non-CE <sup>3</sup>	CE <sup>3</sup>	Non-CE <sup>3</sup>	CE <sup>3</sup>	CE <sup>3</sup>
Bail, Minimum (each drum)	No	No	No	No	No
Block Up (each drum)	Yes	Yes <sup>4</sup>	Yes	Yes	No
Boom Max Up	No	No	No	No	No
Function Diverted	No	No	No	No	No
Function Parked	No	No	No	No	No
Inactive Control Station (CE only)	No	No	No	No	No
Luffing Jib Maximum Down 1	Yes	No	Yes	Yes	No
Luffing Jib Maximum Down 2	No	No	No	No	No
Luffing Jib Maximum Up 1	Yes	No	Yes	Yes	No
Luffing Jib Maximum Up 2	Yes <sup>5</sup>	No	Yes <sup>5</sup>	Yes <sup>5</sup>	No
Luffing Jib Stop Latch	Yes	Yes	Yes <sup>5</sup>	Yes <sup>5</sup>	No
Mast (live) Accessory Fault	No	No	No	No	No
Mast Arms Down	Yes	Yes	No	No	No
Mast Arms Up	Yes	Yes	No	No	No
Mast Too Far Back	Yes	Yes	No	No	No
Mast Too Far Forward	Yes	Yes	No	No	No
Operator Out of Seat	No	No	No	No	No
Pawl Engaged	No	No	No	No	No
Rated Capacity Indicator/Limiter	Yes	Yes <sup>4</sup>	Yes	Yes <sup>4</sup>	Yes <sup>6</sup>
Transducer Fault	No	No	No	No	No

<sup>1</sup> Use only for rigging. See [Bypassing Limits in Luffing Jib Setup Mode on page 3-52](#).

<sup>2</sup> Cranes meeting European requirements (CE) are equipped with an RCI/RCL External Override Switch located outside the operator cab. See MLC300 Rated Capacity Indicator/Limiter Operation Manual.

<sup>3</sup> CE = Cranes that comply with 2010 European requirements.







<sup>4</sup> Only if boom or luffing jib is below allowable angle given in capacity chart (while raising or lowering boom and luffing jib from or to ground level).







<sup>5</sup> Only when boom is below 50°.






<sup>6</sup> The speed of the crane functions is limited to 15% of their maximum speed for movements that increase load.

The following table describes the operating limits this crane is equipped with. When a limit is reached, the operating limit fault is activated and the corresponding fault icon appears in the fault bar of the Main Display Working Screen.









**Table 3-17. Operating Limits Description**



Operating Limit	Icon
<p><b>Bail, Minimum</b></p> <p>This limit stops the corresponding drum from lowering when there are three to four wraps of wire rope remaining on the drum.</p> <ul style="list-style-type: none"> <li>• The load can be raised after the limit is contacted.</li> <li>• This limit can only be bypassed by disconnecting the electric cable from the limit switch and connecting the shorting plug.</li> </ul> <p style="text-align: center;"> <b>WARNING</b> <b>Falling Load Hazard!</b></p> <p>When lowering a load below the minimum bail limit, do so slowly with extreme caution. Do not lower the load to the point where less than three full wraps of wire rope are on the drum. The wire rope could be pulled out of the drum allowing the load to fall.</p>	 M102775
<p><b>Block Up</b></p> <p>In the non-setup mode, this limit stops the boom or luffing jib from lowering and the load drum from hoisting when the load contacts a block-up limit switch.</p> <ul style="list-style-type: none"> <li>• The load on the corresponding drum can be lowered and the boom or luffing jib can be raised after a block-up limit switch is contacted.</li> <li>• The limit bypass switch must be turned to the bypass position before a load can be hoisted above the limit.</li> </ul> <p style="text-align: center;"> <b>WARNING</b> <b>Two-Blocking Hazard!</b></p> <p>If it is necessary to hoist a load above the block-up limit, do so slowly with extreme caution to prevent two-blocking.</p> <p>Do not hoist the load above the minimum block clearance given in the Reeving Diagrams (see Section 4 of the MLC300 Operator Manual).</p> <p>Do not use the limit bypass switch to lower the boom or the luffing jib after the block-up limit is contacted, or two-blocking could occur. The load could fall.</p>	 M102773
<p><b>Boom Max Up</b></p> <p>This limit stops the boom when the boom is raised to one of the following maximum angles:</p> <p>85° for boom only 86° for boom with luffing jib</p> <p>The boom can be lowered after this limit is reached.</p> <p>The boom max up limit angle must be readjusted each time the luffing jib is installed or removed. See Section 4 of the Crane Service Manual or Section 6 Luffing Jib Operator Manual for the adjustment procedure.</p>	 M102777
<p><b>Function Diverted</b></p> <p>This limit prevents Drums 1 and 3 from being operated at the same time. Drum 3 must be parked to operate Drum 1. Drum 1 must be parked to operate Drum 3.</p>	 M102779

Operating Limit	Icon
<p><b>Function Parked</b></p> <p>This limit prevents the selected crane function from being operated until the park switch is turned off (un-parked).</p>	 <p>M102772</p>  <p>M104949</p>
<p><b>Free Fall Lowering Over Speed</b></p> <p>This limit does not stop operation. It alerts the operator if the load on either Drum 2 or 3 is being lowered faster than 225 rpm, which can result in accelerated wear and shortened service life of the free fall brake.</p>	 <p>M104600</p>
<p><b>Inactive Control Station</b></p> <p>This limit applies only to cranes meeting CE requirements.</p> <p>This limit prevents the cab controls from being operated when the remote control is being operated. The remote control has priority. Therefore, if the cab controls are being operated and the remote control becomes active, the cab controls will be disabled.</p>	 <p>M102791</p>
<p><b>Luffing Jib Maximum Down 1 (minimum working angle)</b></p> <p>This programmed limit stops the luffing jib when the boom-to-luffing jib angle is 70°.</p> <ul style="list-style-type: none"> <li>• The luffing jib can be raised after this limit is reached.</li> <li>• The limit bypass switch must be turned to the bypass position to lower the jib to the Luffing Jib Maximum Down 2 limit.</li> </ul>	 <p>M102792</p>
<p><b>Luffing Jib Maximum Down 2 (minimum angle)</b></p> <p>A limit switch stops the luffing jib before the boom-to-luffing jib angle is 68.5°.</p> <ul style="list-style-type: none"> <li>• This limit cannot be bypassed.</li> <li>• If this limit is contacted on cranes meeting CE requirements, the luffing jib cannot be raised until the limit is reset. See <a href="#">Resetting Luffing Jib Limits on page 3-53</a>.</li> </ul> <p style="text-align: center;"><b>! WARNING</b> <b>Falling Boom/Jib Hazard!</b></p> <p>Do not lower the luffing jib below the minimum angle given in the Luffing Jib Raising (and lowering) Procedure chart. Structural damage could result, possibly causing the boom and luffing jib to collapse.</p>	 <p>M102781</p>

Operating Limit	Icon
<p><b>Luffing Jib Maximum Up 1 (maximum working angle)</b></p> <p>This programmed limit stops the luffing jib when the boom-to-luffing jib angle is 169°.</p> <ul style="list-style-type: none"> <li>The luffing jib can be lowered after this limit is reached.</li> <li>The limit bypass switch must be turned to the bypass position to raise the jib an additional 1.5° to the Luffing Jib Maximum Up 2 limit.</li> </ul> <p style="text-align: center;"><b>! WARNING</b> <b>Falling Boom/Jib Hazard!</b></p> <p>Proceed slowly when operating the luffing jib above the Luffing Jib Maximum Up 1 limit.</p> <p>Do not raise the luffing jib above the Luffing Jib Maximum Up 2 limit. Structural damage will occur, possibly causing the boom and luffing jib to be pulled over backwards.</p>	 <p>M102782</p>
<p><b>Luffing Jib Maximum Up 2 (maximum angle)</b></p> <p>A limit switch stops the luffing jib before the boom-to-luffing jib angle is 170.5°.</p> <ul style="list-style-type: none"> <li>This limit cannot be bypassed.</li> <li>If this limit is contacted on cranes meeting CE requirements, the luffing jib cannot be raised until the limit is reset. See <a href="#">Resetting Luffing Jib Limits on page 3-53</a>.</li> </ul>	 <p>M102783</p>
<p><b>Luffing Jib Stop Latch</b></p> <p>See the Luffing Jib Operator Manual for a complete description of the luffing jib physical jib stop latch.</p> <p>This limit stops the corresponding hoist if:</p> <ul style="list-style-type: none"> <li>You try to luff up when either jib stop latch is LOCKED (proximity sensor electrically open) and the boom-to-luffing jib angle is greater than 145°. This limit can be bypassed only in the luffing jib setup mode if the boom angle is less than 50°.</li> <li>You try to boom down or you try to luff up when either latch is UNLOCKED (proximity sensor electrically closed) and the boom angle is less than 30°. This limit can be bypassed.</li> </ul>	 <p>M103337</p>
<p><b>Mast (live) Accessory Fault</b></p> <p>If the crane is configured with a live mast only, this limit stops the mast hoist from operating in either direction. Check the pressure transducers for the live mast hoist and the accessory system.</p>	 <p>M103769</p>
<p><b>Mast Assist Arms Down</b></p> <p>With the Setup Mode ON, this limit stops the boom hoist if you attempt to raise the live mast when the mast assist arms are down.</p> <p style="text-align: center;"><b>! WARNING</b> <b>Falling Mast/Boom Hazard!</b></p> <p>Prevent the mast from falling over backwards:</p> <ul style="list-style-type: none"> <li>Fully raise the mast assist arms before raising the live mast to vertical. The mast can fall over backwards if this precaution is not taken.</li> </ul>	 <p>M102799</p>

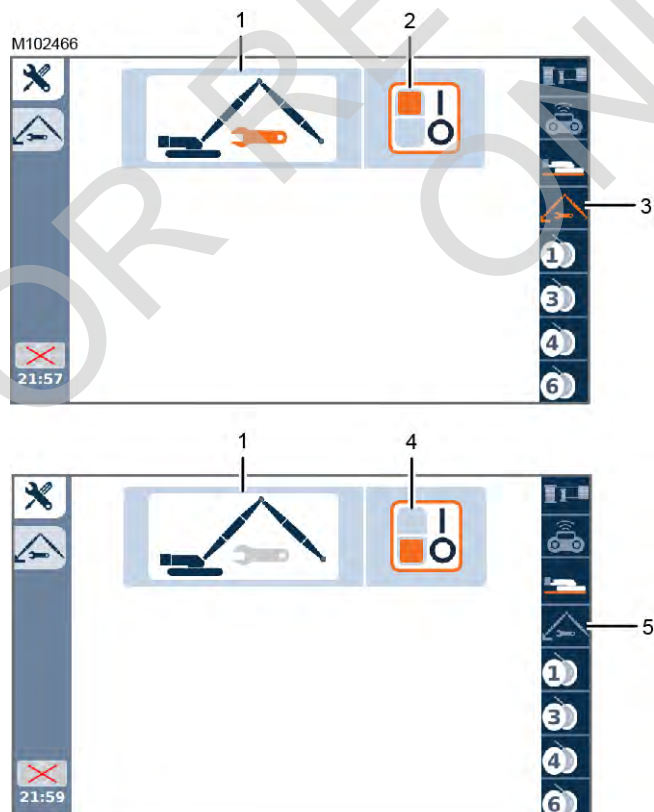


Operating Limit	Icon
<p><b>Mast Assist Arms Up</b></p> <p>With the Setup Mode OFF (any boom or jib configuration selected in RCL/RCI), this limit stops the boom hoist if you attempt to raise the boom when the mast assist arms are up.</p> <p style="text-align: center;"> <b>WARNING</b> <b>Falling Mast/Boom Hazard!</b></p> <p>Prevent the mast and the boom from falling:</p> <ul style="list-style-type: none"> <li>Fully lower the mast assist arms before raising the boom. The mast can buckle and collapse if it contacts the mast-assist arms with a fully rigged boom.</li> </ul>	 M102798
<p><b>Mast too Far Back</b></p> <p>This limit stops the boom hoist when the live mast is lowered rearward to 2°. Finish lowering the mast to the transport position (0°) manually with the switch on the remote control or on the right console in the cab.</p>	 M102784
<p><b>Mast too Far Forward</b></p> <p>The fault alarm for this limit is activated when the live mast is lowered forward to 158° during crane assembly and disassembly.</p> <p style="text-align: center;"> <b>WARNING</b> <b>Falling Mast Hazard!</b></p> <p>Do not lower the mast below the specified angle. Raise the live mast when this fault is activated. Further lowering is not approved - <b>the mast could fall.</b></p>	 M102785
<p><b>Operator Out of Seat</b></p> <p>This limit prevents the crane functions from being operated when the operator is out of the seat. Sit down in the seat to operate the crane functions.</p>	 M102790
<p><b>Pawl Engaged</b></p> <p>This limit prevents the drum from lowering until the pawl is disengaged from the ratchet. It may be necessary to hoist slightly to fully disengage the pawl.</p>	 M102794
<p><b>Rated Capacity Limiter</b></p> <p>This fault is activated for the following conditions. Take immediate corrective action.</p> <ul style="list-style-type: none"> <li>Overload</li> <li>Sensor fault</li> <li>Out of the capacity chart (a condition that is not covered by the current capacity chart)</li> <li>Unconfirmed or invalid RCL/RCI configuration.</li> </ul>	 M102787

Operating Limit	Icon
<p><b>Speed Sensor Fault</b></p> <p>Does not stop operation. Alerts the operator if a drum speed sensor is not detecting drum rotation. Diagnose speed sensor failure. Replace sensor or harness as needed</p>	 <p>M104965</p>
<p><b>Transducer Fault</b></p> <p>In the setup mode, this limit stops operation if there is a transducer fault. Troubleshoot the hydraulic system using the screens in the Main Display to determine the faulty transducer. Take corrective action to correct the fault.</p>	 <p>M102793</p>

**BYPASSING LIMITS IN LUFFING JIB SETUP MODE**

- Go to the Luffing Jib Setup Screen (1) in the Main Display (Figure 3-5).  
See the MLC300 Main Display Operation Manual for detailed instructions.
- Turn the luffing jib setup mode ON (2).  
The luffing jib setup icon (3) in the Status Bar of the Main Display will turn orange.
- Rotate the limit bypass key CLOCKWISE and release it. The limits will remain bypassed for 10 seconds.
- Move the desired control handle (luffing hoist, boom hoist, load drum) in the required direction. The limits will remain bypassed for as long as the control handle is moved in either direction.
- The limits will remain bypassed for 10 seconds after the control handle(s) is returned to off.
- Turn the luffing jib setup mode OFF (4) for normal operation when the boom and luffing jib are within the applicable capacity chart.  
The luffing jib setup icon (5) in the Status Bar of the Main Display will turn light blue.



Item	Identification
1	Luffing Jib Setup Screen
2	ON
3	Luffing Jib Setup Icon ON
4	OFF
5	Luffing Jib Setup Icon OFF

FIGURE 3-5

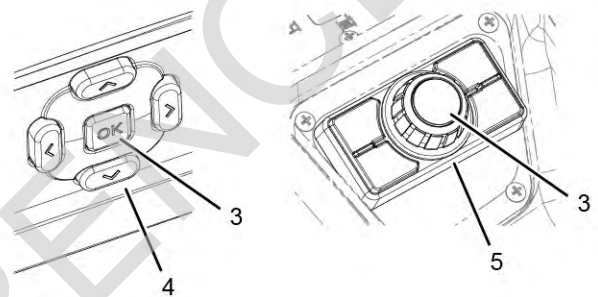
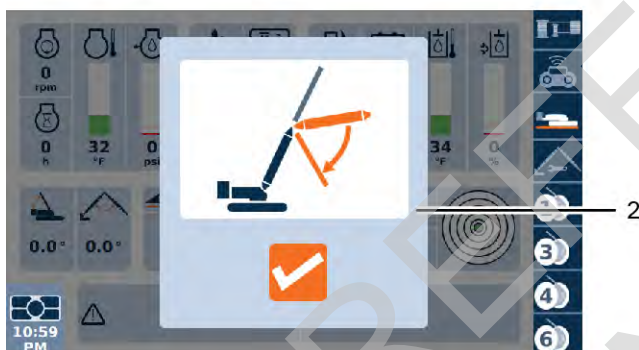
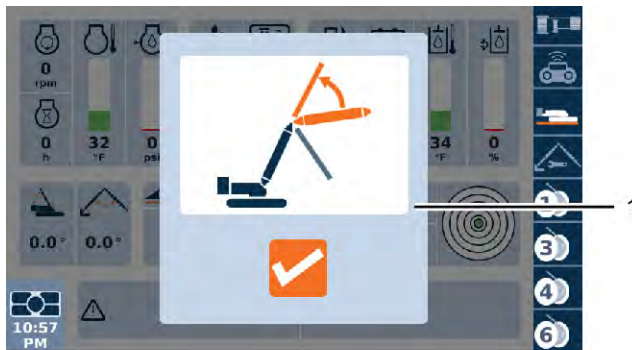
## RESETTING LUFFING JIB LIMITS

This procedure applies only to cranes meeting CE requirements. See [Figure 3-6](#).

When the Luffing Jib Maximum Up 2 limit or the Luffing Jib Maximum Down 2 limit is contacted, operation will stop and the jib up prompt (1) or the jib down prompt (2) will appear in the Main Display.

When either prompt appears:

1. Release the control handle to off.
2. Press either select button (3) to reset the limit.
3. The prompt will go off and you will be able to operate the luffing jib in the opposite direction of the limit, down or up.

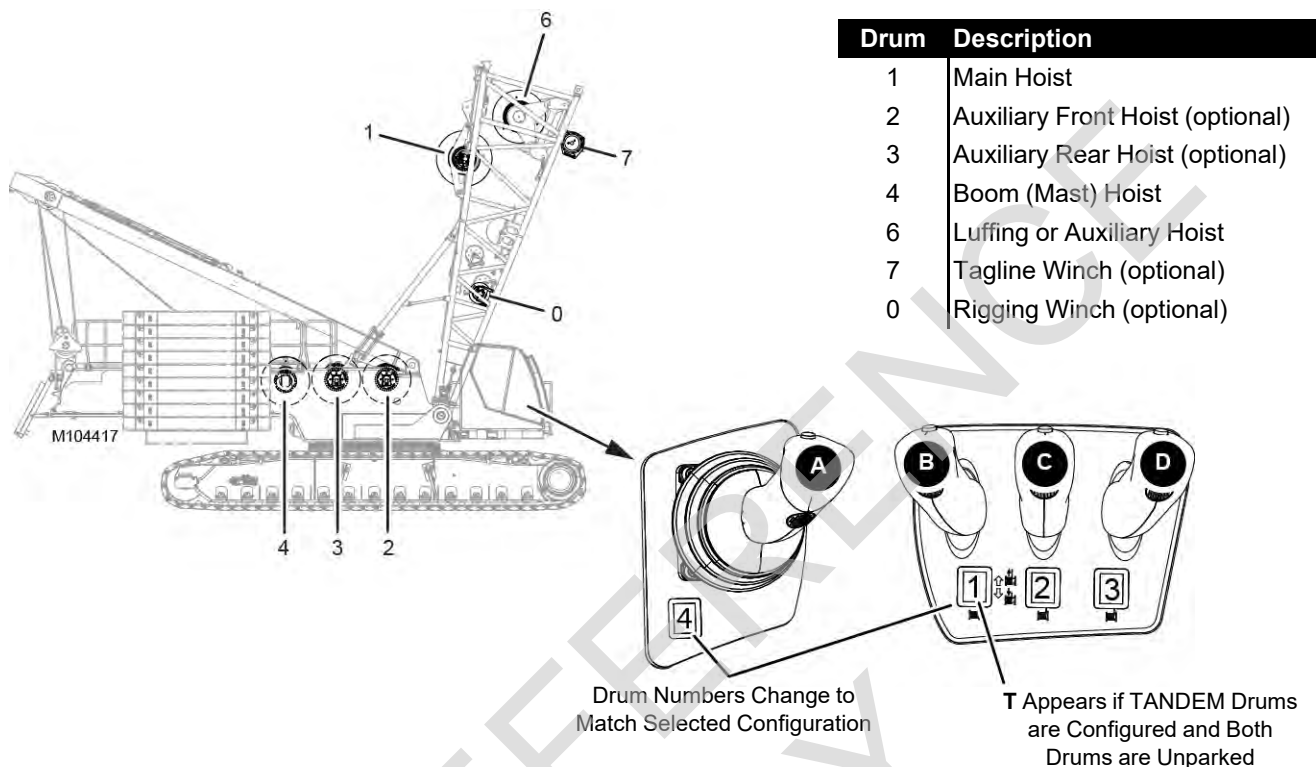


Drum	Description
1	Jib Up Prompt
2	Jib Down Prompt
3	Select Button
4	Main Display
5	Jog Dial on Right Console

Figure 3-6. Resetting Luffing Jib Limits

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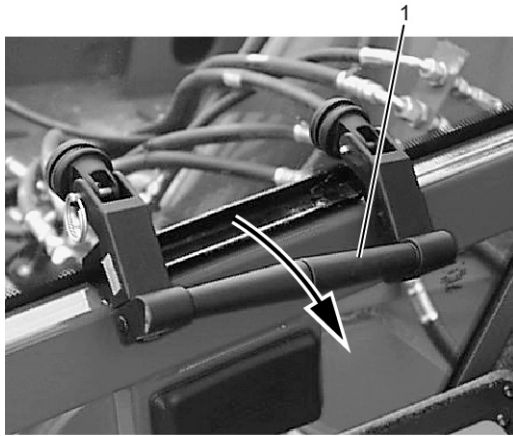
### DRUM AND CONTROL HANDLE IDENTIFICATION



Configuration	HANDLE A Controls Drum	HANDLE B <sup>4</sup> Controls Drum	HANDLE C Controls Drum	HANDLE D Controls Drum
Live Mast Handling (crane assembly) <sup>1</sup>	4	1	AC <sup>2</sup> or 2 or 3 <sup>3</sup>	6 or 5 <sup>3</sup>
Boom only	4	1	2 or 3 <sup>3</sup>	3 or 6 <sup>3</sup>
Boom with Luffing Jib	6	1	2 or 3 <sup>3</sup>	3 or 4 <sup>3</sup>
Boom with Fixed Jib	4	1	2 or 3 <sup>3</sup>	3 or 6 <sup>3</sup>
Boom with Luffing Jib and Fixed Jib Attached	6	1	2 or 3 <sup>3</sup>	3 or 4 <sup>3</sup>

- <sup>1</sup> Live Mast Configuration selected in RCL/RCI display.
- <sup>2</sup> AC: Handle C provides proportional control of the self-erect cylinder (assembly cylinder). The self-erect cylinder must be turned ON in the Mode Selection Group of the main display.
- <sup>3</sup> Combination of parked and un-parked drums determines which drum is operable.
- <sup>4</sup> When TANDEM drums are configured in the RCL/RCI, Handle B controls both drums simultaneously when both drums are unparked. To control the drums independently when TANDEM drums are configured, see the Tandem Drum NOTE on [page 69](#).

Figure 3-7. Drum Identification



M101948A

View A

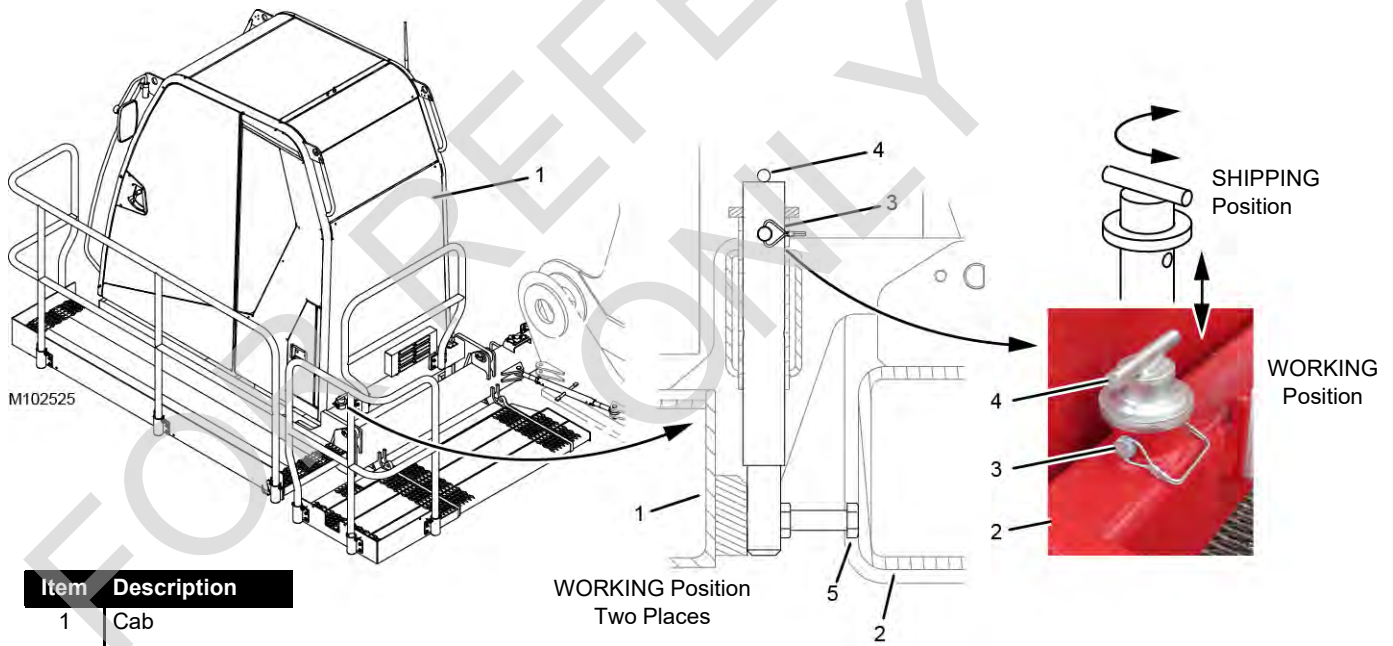


M101947A

View B

Item	Description
1	Window Latch Handle

Figure 3-8. Right-Side Cab Window



M102525

WORKING Position  
Two Places

Item	Description
1	Cab
2	Cab Support
3	Safety Pin (2)
4	Stop Pin (2)
5	Stop Bolt

Figure 3-9. Cab Tilt Stop Pin



## RIGHT CAB WINDOW OPERATION

See [Figure 3-8](#) for the following procedure.

### Closing Window

Rotate the window latch handle DOWN to the position shown in View A.

### Opening Window For Ventilation

Rotate the window latch handle UP to the position shown in View B. The window can be swung open approximately 76 mm (3 in) for ventilation.

## OPERATOR CAB EMERGENCY EXIT



M102486

Using the life hammer provided, smash the front window to exit the operator cab in an emergency. The hammer is stored on the left wall inside the operator cab.

## CAB DOOR ADJUSTMENT

Refer to F2297 at the end of this section for Vision Cab Door Adjustment procedures (for example: door brake and door damper).

## CAB TILT STOP PINS INSTALLATION

The cab tilt stop pins (1, [Figure 3-9](#)) on the rear of the cab support (3) must be in the working position for crane operation. The cab will hit the crawlers and be damaged when the crane is swung if the cab is tilted down below horizontal.

Item	Description
1	Flow Control Valve
2	Set Screw
3	Adjusting Knob
4	Color Bands

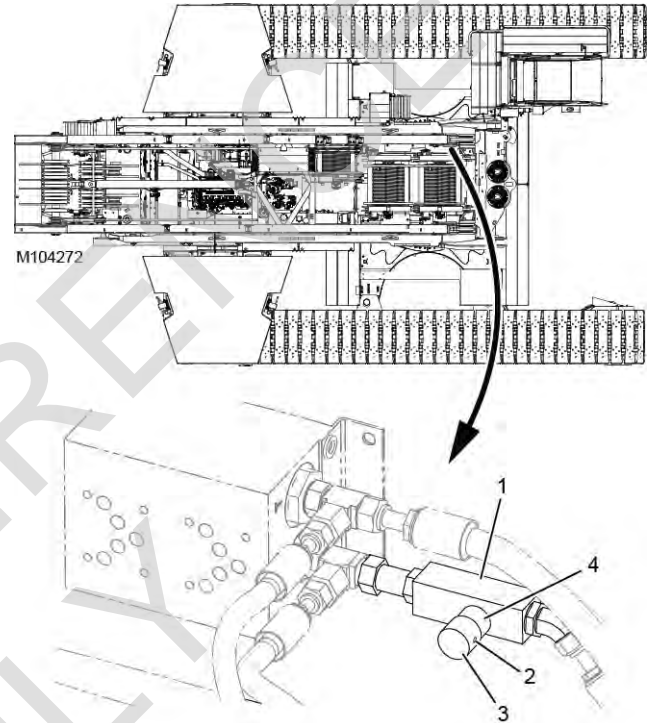


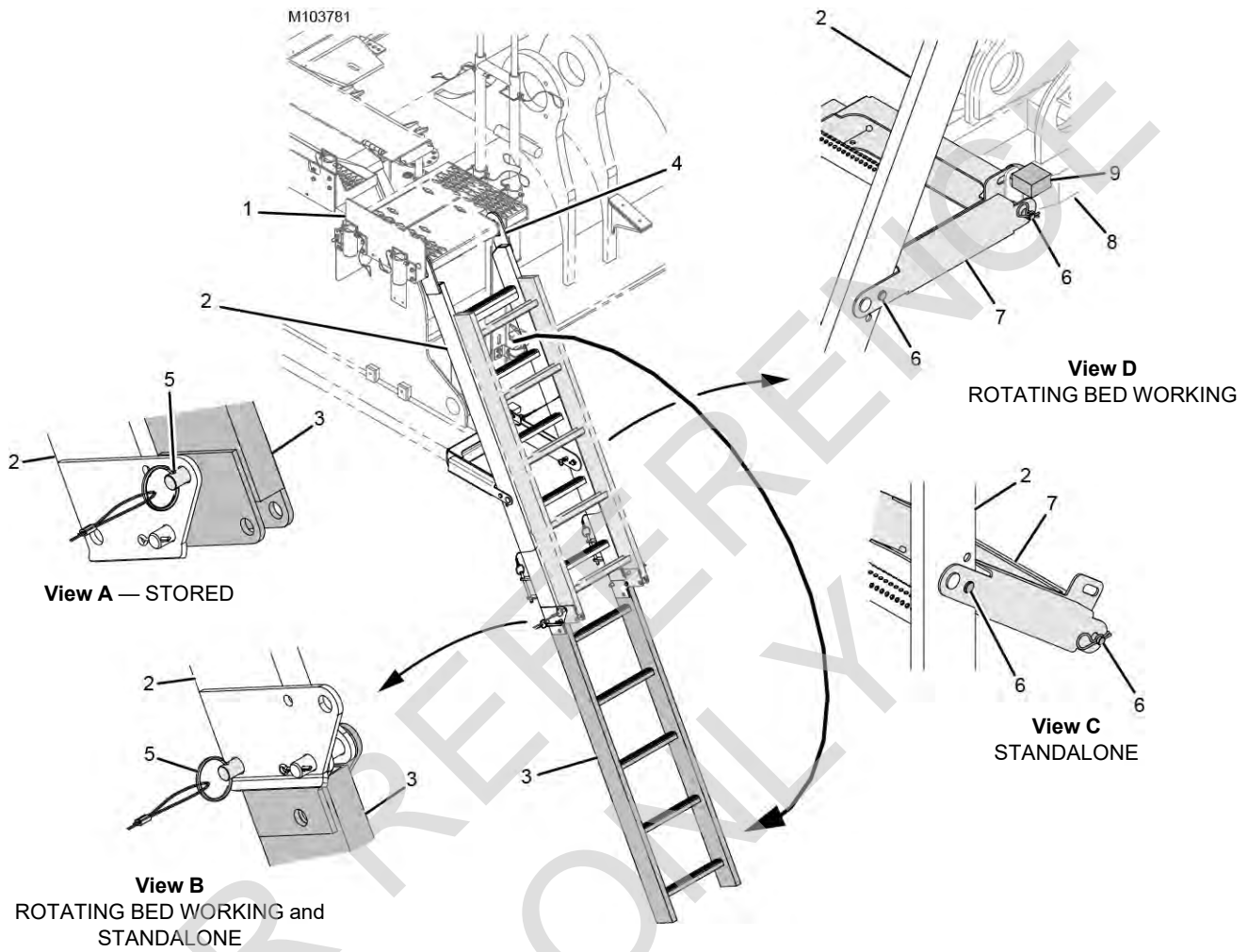
Figure 3-10. Cab Tilt Flow Control Valve

## CAB TILT SPEED ADJUSTMENT

The cab tilt speed can be adjusted at the flow control valve (1, [Figure 3-10](#)). The valve is located on the left-front inside wall of the rotating bed.

- Loosen the set screw (2).
- Turn the adjusting knob (3) fully clockwise (in) so that no color bands (4) appear.
- Adjust the flow control valve to the desired setting by turning the adjusting knob (3) counterclockwise (out).  
The recommended initial setting is to turn the adjusting knob out until only the first green color band is showing.
- Test the operation of the cab tilt using the switch in the cab.
- If necessary, turn the adjusting knob out or in to obtain the desired speed.
- Securely tighten the set screw (2).





Item	Description
1	Left-Rear Platform
2	Top Ladder
3	Bottom Ladder
4	Ladder Hook (2)
5	Pin with Hair-Pin Cotter (2)
6	Pin with Hair-Pin Cotter (3)
7	Ladder Support Bracket
8	Rotating Bed Lug
9	Padlock

Figure 3-11. Ladder (current)

## LADDER INSTALLATION

The folding ladder provides access to the rotating bed for servicing the crane.

The ladder weights 18 kg (40 lb).



### WARNING

#### Fall Hazard

Do not use the ladder when operating the crane. Only use the ladder when servicing the crane.

- When using the ladder to service the crane, the quick-release pins (5, View B) must be installed or the ladder could fold when you are climbing it.
- When operating the crane, the ladder must be either stored or removed.
- Do not exceed the ladders capacity of 227 kg (500 lb).

The ladder has been provided only for accessing and servicing the Manitowoc MLC300. Any other use is neither intended nor approved.

See [Figure 3-11](#) for following procedures.

### Installing Ladder

If the ladder has been removed, install it as follows:

1. Lower the bottom ladder (3, View B) to the working position and install the pins (5).
2. Hook the ladder to the pins in the left-rear platform (1) with the hooks (4) on the end of the ladder.
3. Remove the three pins (6, View C).
4. Raise the ladder support bracket (7, View D) and pin it to the upper holes in the top ladder (2) with two pins (6).

5. Pin the ladder support bracket (7, View D) to the rotating bed lug (8) with the remaining pin (6).

6. Install the padlock (9, View D).

### Storing Ladder

The ladder must be stored (or removed) before operating the crane or damage will occur.

1. Remove the pins (5, View B) and rotate the bottom ladder (3) up.
2. Pin the bottom ladder (3, View A) to the top ladder (2) with the pins (5).

### Using Ladder (Working Position)

1. If the ladder has been removed, install it as instructed earlier.
2. If the ladder is stored, remove the pins (5, View A) and rotate the bottom ladder (3) down.
3. Install the pins (5, View B).

### Removing Ladder

1. Lower the bottom ladder (3) to the working/standalone position as shown in View B and install the pins (5).
2. Remove the padlock (9, View D).
3. Unpin the ladder support bracket (7, View D) from the rotating bed lug (8) by removing one pin (6).
4. Remove the other two pins (6, View D).
5. Lower the ladder support bracket (7, View C) and install three pins (6).
6. Attach the padlock (9, View D) to the rotating bed lug (8).
7. Unhook the ladder hooks (4) from the pins in the left-rear platform (1) and lift the ladder away from the rotating bed.

## OPERATING IN WIND

Wind adversely affects lifting capacity and stability. The result could be loss of control over the load and crane, even if the load is within the crane's capacity.

Do not raise boom for the purpose of measuring the wind speed with the crane's anemometer.

### **WARNING** Tipping Crane Hazard

The judgment and experience of qualified operators, job planners, and supervisors shall be used to compensate for the affect of wind on the lifted load and the boom by reducing ratings or operating speeds, or a combination of both.

Failing to observe this precaution can cause the crane to tip or the boom and/or jib to collapse. Death or serious injury to personnel can result.

Wind speed (to include wind gusts) must be monitored by job planners and supervisors.

The wind speed at the boom or jib point can be greater than the wind speed at ground level. Also be aware that the larger the sail area of the load, the greater the wind's affect on the load.

As a general rule, ratings and operating speeds must be reduced when the **wind causes load to swing forward past allowable operating radius or sideways past either boom hinge pin.**

For wind conditions specific to this crane, see the Wind Conditions chart at the end of this section or, if applicable, see the wind conditions in the capacity charts provided with the crane and attachment.

## CRAWLER BLOCKING

### **DANGER** Tipping Hazard!

Do not attempt to raise or lower the boom or the boom and jib from or to ground level until the crawlers are blocked, if required. Otherwise, the crane will tip.

To prevent the crane from tipping, some boom and jib lengths require blocked crawlers. See the appropriate Liftcrane Boom or Jib Capacities chart for blocked crawler requirements.

For crawler blocking dimensions and instructions, see the Crawler Blocking topic in the Capacity Chart Information folio located in the Capacity Chart Manual supplied with the crane.

## PREPARING CRANE FOR OPERATION

### **WARNING** Read Capacity Charts

Do not attempt to operate the crane without first reading and understanding the capacity charts located in the Capacity Chart Manual provided with the crane.

The crane must be rigged and operated according to the instructions given in the capacity charts, in Section 4 of the MLC300 Operator Manual, and in Section 4 of the MLC300 Luffing Jib Manual.

Unless otherwise specified in the capacity charts, all crane operations must be performed with the crane level to within one 1% of grade in all directions — 0,3 m in 30 m (1 ft in 100 ft); otherwise, crane could tip.

Do not operate the crane—including raising the boom from ground level—if the wind speed exceeds the limits given in the capacity charts. Contact your local weather station for the wind velocity in your area.

Failing to comply with the requirements of the capacity charts can result in tipping or structural failure of the boom or luffing jib.

### **Equipment Failure Hazard**

At low ambient temperatures, dynamic loads (impact and shock) can affect the steels used in Manitowoc cranes when operating in cold weather. Read and comply with [Cold Weather Operation on page 3-78](#) before operating the crane.

### **Moving Load Hazard**

The operator shall select the proper crane capacity chart in the RCL/RCI Display before operating.

Unexpected drum motion or improper limit responses can result if the wrong capacity chart is selected.

The limit bypass switch shall be in the enable position (on) and all the limits with which the crane is equipped shall be operational before operating the crane.

### **Avoid Injuring Personnel in Operating Area**

Sound the horn to alert personnel that operation is about to begin.

**CAUTION****Machinery Damage Hazard**

Before operating the crane at the start of each shift:

- Perform the preventative maintenance checks and lubrication requirements listed in Sections 5 and 6 of the MLC300 Operator Manual.
- Adjust the operator's seat. See [Seat Riser Control on page 3-16](#) and [Seat Controls on page 3-30](#).
- Adjust the cab door if needed. See [Cab Door Adjustment on page 3-57](#).
- Store the folding ladder. See [Ladder Installation on page 3-59](#).
- Make sure cab tilt stop pins are lowered and pinned in working position. See [Cab Tilt Stop Pins Installation on page 3-57](#).

**STARTUP PROCEDURES****WARNING****Moving Machinery Hazard**

To avoid injuring personnel or damaging the crane and property:

- Do not start the engine if an out-of-order sign or do not operate tag is present at the start controls.
- Check that all controls are off so the crane and load do not move when the engine is started.
- Check that all personnel are clear of the crane before starting the engine. **Sound horn to alert personnel.**

**Engine Explosion Hazard**

Do not use starting fluids with this crane's engine. The engine is equipped with an air intake heater. Use of starting fluid can cause an explosion, fire, personal injury, severe damage to the engine and damage to property.

Read and understand the starting instructions in the engine manufacturer's operation and maintenance manual provided with this crane.

1. If used, unplug or turn off the engine block heater, engine oil pan heater, hydraulic tank heaters, and any other crane heaters.

**NOTE** Manitowoc recommends the use of the Cold Weather Package to aid startup when the ambient temperature will be 0°C (32°F) and below.

2. Make sure the battery disconnect switch is in the CONNECT position (see [Battery Disconnect Switch on page 3-13](#)). The engine will not start if the batteries are disconnected.

**CAUTION****Engine Damage!**

To avoid possible engine fault codes and undesirable operation, make sure the engine ignition switch has been off five minutes before disconnecting the batteries.

Do not rely on this switch to protect the crane's electronic systems when welding. Disconnect the cables at the batteries before welding

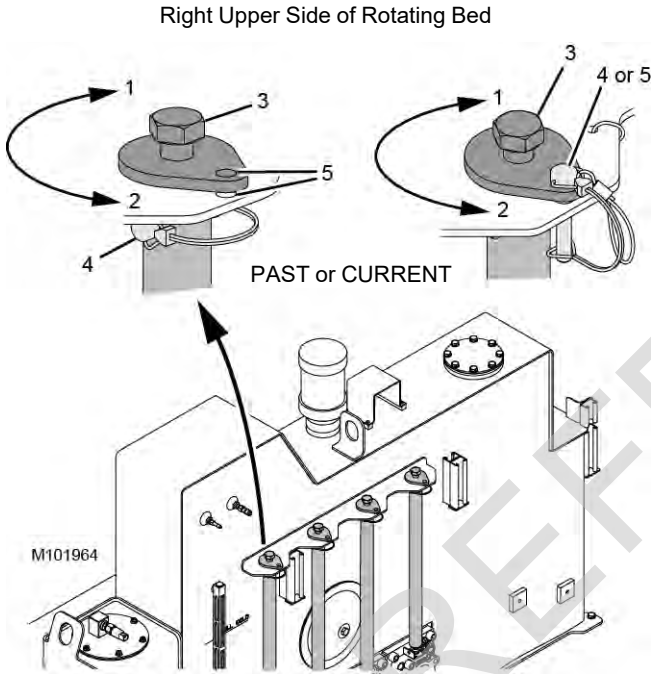
3. Make sure the emergency stop button is UP. The engine will not start if the button is depressed (see [Emergency Stop Button on page 3-19](#)).

4. Make sure the hydraulic tank shutoff valves are open as shown in [Figure 3-12](#).

**CAUTION**

**Pump Damage**

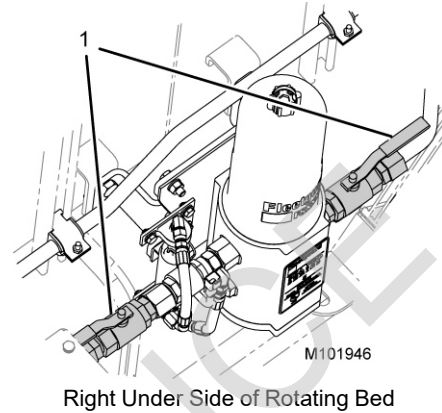
Do not start the engine until the hydraulic tank shutoff valve is open. Otherwise, the pumps could cavitate and be damaged.



Item	Description
1	CLOSE Shut-Off Valve (must remove safety pin)
2	OPEN Shut-Off Valve
3	Valve Operator (M16 hex)
4	Safety Pin
5	Padlock Holes (for owner furnished padlock)

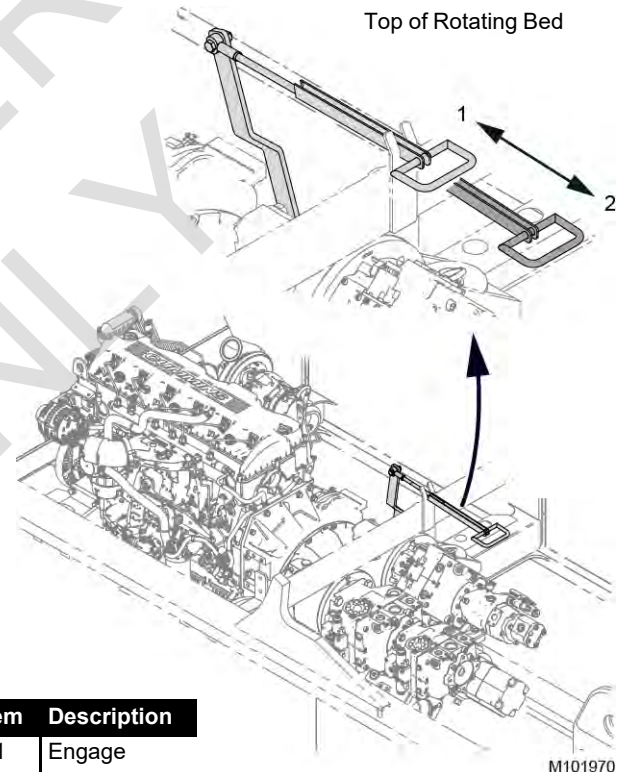
**Figure 3-12. Hydraulic Tank Shut-Off Valves**

5. For Cummins engine only, make sure the fuel system shut-off valves (1, [Figure 3-13](#)) are open as shown



Item	Description
1	Fuel System Shut-Off Valve (2) Shown Opened

**Figure 3-13. Fuel System Shut-Off Valves**



Item	Description
1	Engage
2	Disengage

**Figure 3-14. Engine Clutch Lever**

6. If necessary in cold weather, disengage the engine clutch as shown in [Figure 3-14](#). This step will disconnect the pumps from the engine and aid in cold weather startup.



**CAUTION****Avoid Engine Clutch Damage!**

Observe the following precautions for engine clutch:

- **Decrease engine speed to idle** before engaging or disengaging clutch.
- Do not run engine longer than twenty minutes with clutch disengaged.
- Disengage and engage clutch several times monthly with engine running.

7. Turn the ignition switch to the RUN position.

- All indicator lights, the operating limit buzzer, and the system fault beeper should come on for 2 to 3 seconds when the ignition switch is in RUN position; if not, correct the fault as soon as possible.
- For a Cummins engine only, the **WAIT TO START** icon will appear in the Main Display indicating that the pre-heater is warming the engine's air intake.



The length of time the wait to start icon remains on depends on ambient temperature. The lower the ambient temperature, the longer the icon will stay on.

8. When the **WAIT TO START** icon turns off, turn the ignition switch to the START position.

**CAUTION****Avoid Starter Damage**

If the engine does not start after 30 seconds of cranking, wait a few minutes before starting again so the starter motor cools.

9. Once the engine starts, increase engine speed as necessary to keep the engine running.
10. If the engine clutch is disengaged, decrease engine speed to low idle and engage the clutch within 20 minutes after starting the engine.
11. After the engine is started, the Working Screen shown in [Figure 3-15](#) will appear in the Main Display.

See the Main Display Operation Manual for detailed instructions on what is displayed in the Working Screen.

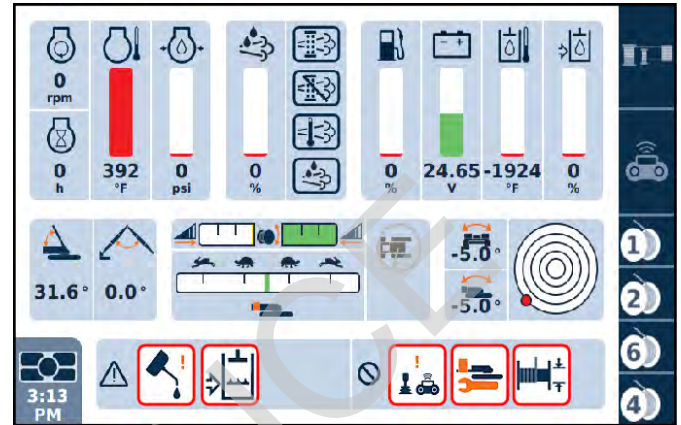


Figure 3-15. Working Screen

When the engine is started, it is normal for faults to appear in the alerts bar of the Main Display Working Screen. The faults should go away as soon as the engine oil pressure and hydraulic oil temperature rise to normal.

**NOTE** For fault identification, see the MLC300 Main Display Operation Manual.

**CAUTION****Machinery Damage**

Do not operate the crane when faults exist. If the faults do not go away soon after the engine is started, or if any come on during operation, immediately proceed as follows:

- Determine the fault in the Main Display Working Screen.
- Land the loads, if possible, and park all functions.
- Move all the control handles to off.
- Stop the engine.
- Correct cause of the fault.

**NOTE** You will not be able to increase engine speed until the hydraulic oil temperature is warmed to at least 17°C (63°F).

The hydraulic oil temperature fault will remain on until the hydraulic oil temperature is 17°C (63°F). **There will be no throttle response until this fault is cleared.**



12. Configure the crane and select the appropriate capacity chart in the RCL/RCI Display. See the RCL/RCI Operation Manual.

**NOTE** The last capacity chart used will be the current capacity chart.

## OPERATING PROCEDURES

### Boom Hoist Operation

The location of the boom control handle varies depending on the crane's configuration. Refer to [Drum and Control Handle Identification on page 3-55](#).

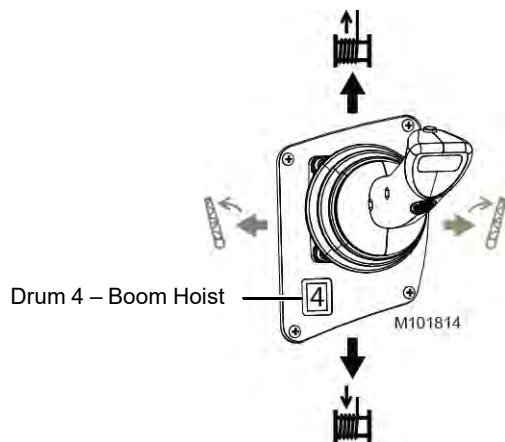


Figure 3-16. Boom and Swing Control Handle

### CAUTION

#### Avoid Rigging Damage

Check that the boom hoist wire rope is reeved through all sheaves and spooled properly onto the drum before raising the boom from the ground.

- For wire rope and reeving specifications, see the Boom Assembly Drawing in Section 4 of the MLC300 Operator Manual.
- For instructions on attaching the wire rope to boom hoist drum, see the Wire Rope Installation topic in Section 4 of the MLC300 Operator Manual.

1. Select the correct capacity chart and crane configuration using the RCL/RCI Display. For detailed instructions, see the RCL/RCI Operation Manual.
2. Boom hoist speed can be adjusted between 25% and 100% to meet operator needs. See the Speed and Limits Screen topic in the Main Display Operation Manual for detailed instructions.
3. Make sure the automatic boom stop is set at the proper angle. For detailed instructions, see the Automatic Boom Stop Adjustment topic in Section 4 of the MLC300 Service Manual.
4. If not previously done, perform the crane Startup Procedure on [page 3-61](#).

5. Turn off the boom hoist park switch. It may be necessary to raise the boom slightly to disengage the boom hoist pawl.

### CAUTION

#### Avoid Boom or Luffing Jib Damage

Do not turn on the drum park switch while raising or lowering the boom. The brake will bring the boom to an abrupt stop. This action could cause shock load damage to the boom and the jib. Bring the boom to a smooth stop with the control handle and then turn on the drum park switch.

6. Increase the engine speed to the desired RPM with the hand throttle. Press the foot throttle to momentarily increase the engine speed when more power is required.
7. Pull the boom control handle BACK from off to RAISE the boom.
8. Push the boom control handle FORWARD from off to LOWER the boom.



### WARNING

#### Avoid Two-Blocking Hazard

Pay out the load lines while lowering the boom. The load may contact the boom point sheaves or the jib point sheaves if this step is not taken. The wire rope or other parts could break, allowing the load to fall.

9. As the boom nears the desired angle, slowly move the boom control handle toward off to decrease speed. Then, move the control handle to off to stop the boom when it reaches the desired angle. The boom hoist brake will apply to hold the boom in position.

**NOTE** Besides the boom maximum up limit, a physical boom stop is provided. The physical boom stop cushions boom raising between approximately 75° and the maximum boom angle. The boom stop also provides a physical stop at 89°.

10. To hold the boom in position for long periods, turn on the boom park switch. The boom hoist pawl will engage.

### Luffing Hoist Operation

The location of the boom and luffing jib control handles varies depending on the crane's configuration. Refer to [Drum and Control Handle Identification on page 3-55](#).



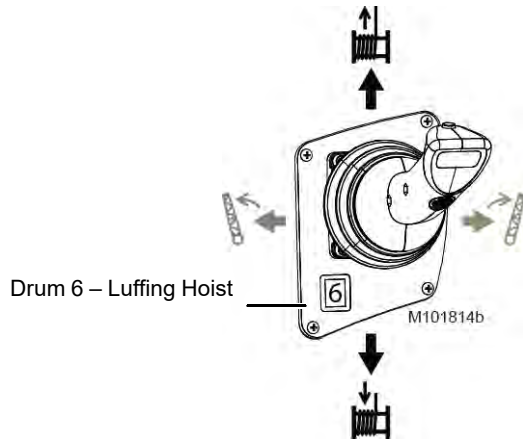


Figure 3-17. Luffing Jib Control Handle

**WARNING****Avoid Death or Serious Injury**

Read and understand the instructions in the Luffing Jib Operator Manual and the Luffing Jib Raising Procedure chart in the Luffing Jib Capacity Chart Manual before attempting to raise or lower the luffing jib from or to the ground.

Use extreme care when operating the luffing hoist and the boom hoist at the same time. The maximum or minimum operating radius will be reached quickly when operating both hoists at the same time.

**CAUTION****Avoid Rigging Damage**

Check that the luffing hoist wire rope is reeved through all sheaves and spooled properly onto the luffing hoist drum before raising the boom and luffing jib from the ground.

- For wire rope and reeving specifications, see the Luffing Jib Assembly Drawing in the MLC300 Luffing Jib Operator Manual.
- For instructions on attaching wire rope to the luffing hoist drum, see the Wire Rope Installation topic in Section 4 of MLC300 Operator Manual.

1. Select the correct capacity chart and crane configuration using the RCL/RCI Display. For detailed instructions, see the RCL/RCI Operation Manual.
2. Luffing hoist speed can be adjusted between 25% and 100% to meet operator needs. See the Speed and Limits Screen topic in the Main Display Operation Manual for detailed instructions.
3. Make sure the automatic boom stop is set at the proper angle. For detailed instructions, see the Automatic

Boom Stop Adjustment topic in Section 4 of MLC300 Service Manual.

4. Make sure the automatic jib stops are set at the proper angles. For detailed instructions, see the Automatic Jib Stop Adjustment topic in the MLC300 Luffing Jib Operator Manual.
5. If not previously done, perform the crane Startup Procedure on [page 3-61](#).
6. Turn off the luffing hoist park switch. It may be necessary to raise the luffing jib slightly to disengage the luffing hoist pawl.

**CAUTION****Avoid Boom or Luffing Jib Damage**

Do not turn on the luffing hoist park switch while raising or lowering the luffing jib. The brake will bring the luffing jib to an abrupt stop. This action could cause shock load damage to the boom and jib. Bring the luffing jib to a smooth stop with the control handle and then turn on the park switch.

7. Increase the engine speed to the desired RPM with the hand throttle. Press the foot throttle to momentarily increase the engine speed when more power is required.
8. Pull the luffing jib control handle BACK from off to RAISE the luffing jib.  
Push the luffing jib control handle FORWARD from off to LOWER the luffing jib.

**WARNING****Avoid Two-Blocking Hazard**

Pay out the load lines while lowering the boom. The load may contact the boom point or the jib point sheaves if this step is not taken. The wire rope or other parts could break allowing load to fall.

9. As the luffing jib nears the desired angle, slowly move the luffing jib control handle toward off to decrease speed.

Then, move the control handle to off to stop the luffing jib when it reaches the desired angle. The luffing hoist brake will apply to hold the boom in position.

**NOTE** Besides the automatic luffing jib stops, a physical luffing jib stop starts to cushion luffing jib raising at 149° boom-to-luffing jib angle and provides a physical stop at 172° boom-to-luffing jib angle.

10. To hold the luffing jib in position for long periods, turn on the luffing jib park switch. The luffing hoist pawl will engage.

## Swing Operation

### WARNING

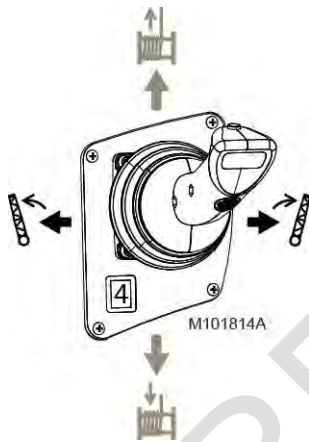
#### Tipping Hazard

To prevent the crane from tipping, adhere to any swing limitations given in the capacity chart.

### DANGER

#### Moving Crane Hazard

The counterweights can strike personnel in the area of the swing path! Warn personnel to stay clear of the swing path. Sound the horn prior to swinging.



**Figure 3-18. Swing Control Handle**

1. Select the correct capacity chart and crane configuration using the RCL/RCI Display. For detailed instructions, see the RCL/RCI Operation Manual.
2. Swing speed and torque can be adjusted between 25% and 100% to meet operator needs. See the Speed and Limits Screen topic in the Main Display Operation Manual for detailed instructions.
3. The swing angle can be adjusted between 0° and 100° to meet job site restrictions. See the Swing Angle

Screen topic in the Main Display Operation Manual for detailed instructions.

4. If not previously done, perform the crane Startup Procedure. See [page 3-61](#).
5. Turn off the swing park switch.

### CAUTION

#### Avoid Boom/Swing Drive Damage

Do not apply the swing holding brake or turn on the swing park switch while swinging. The brake will bring the rotating bed to an abrupt stop. This action could cause damage to the boom and the luffing jib from side loading or damage to the swing drive from shock loading. Bring the rotating bed to a smooth stop with the swing control handle and then apply the swing holding brake or turn on the swing park switch.

6. Increase the engine speed to the desired RPM with the hand throttle. Press the foot throttle to momentarily increase the engine speed when more power is required.
7. Move the swing control handle to the LEFT from off to SWING LEFT.  
Move the swing control handle to the RIGHT from off to SWING RIGHT.
8. Start the swing motion with a smooth acceleration. Continue control handle motion to swing at the desired speed.
9. Stop swinging by releasing the swing control handle to OFF. Swing speed will decrease to off and the rotating bed will coast to a stop.  
If a faster stop is desired, move the swing control handle past OFF to the opposite swing direction.
10. Once the rotating bed stops, depress the button on the control handle to apply the swing holding brake and hold the rotating bed in position for short periods during the operating cycle.
11. To hold the rotating bed in position for long periods, turn on the swing park switch.

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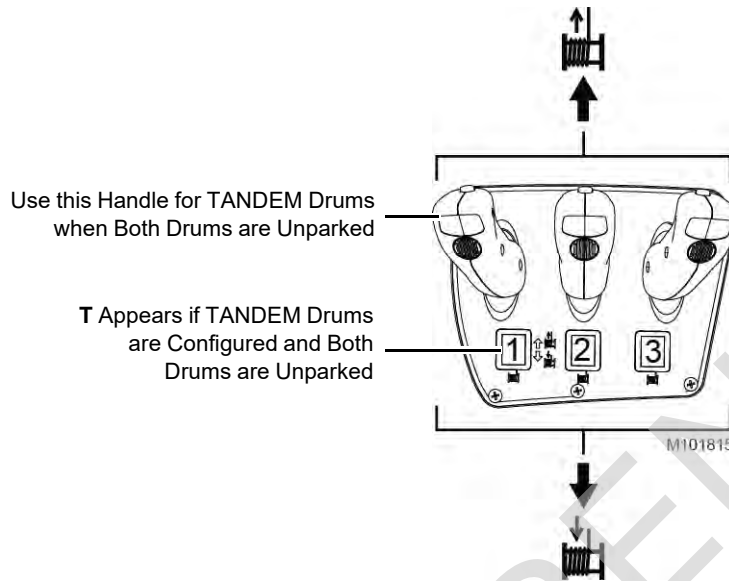


Figure 3-19. Load Drum Control Handles

Item	Description
1	Lower Boom Point Sheaves
2	Load Block Sheaves
3	To Drum Configured for Left Side Boom Point Sheaves
4	Left Side Boom Point Sheaves
5	To Drum Configured for Right Side Boom Point Sheaves
6	Right Side Boom Point Sheaves

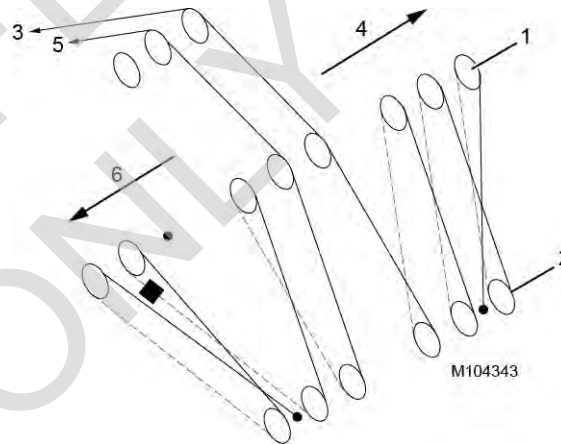


Figure 3-20. Example of Boom Point Reeving for Tandem Drums

## Load Drum Operation (without free fall or with free fall disabled)

The location of the load drum handles varies depending on the crane's configuration. Refer to [Drum and Control Handle Identification on page 3-55](#).



### WARNING

#### Falling Load Hazard

Prevent load on unused drums from falling. Turn on drum park switch for drums not in use.

1. Select the correct capacity chart and crane configuration using the RCL/RCI Display. For detailed instructions, see the RCL/RCI Operation Manual.
2. Load drum speed can be adjusted between 25% and 100% to meet operator needs. See the Speed and Limits Screen topic in the Main Display Operation Manual for detailed instructions.
3. If not previously done, perform the crane Startup Procedure. See [page 3-61](#).
4. Turn off the drum park switch for the drum to be operated.

For TANDEM drum operation turn off the drum park switch for both drums.

### CAUTION

#### Avoid Boom or Luffing Jib Damage

Do not turn on the drum park switch while raising or lowering the load; the brake will bring load to an abrupt stop. This action could cause shock load damage to boom, luffing jib, and load line. Bring the load to a smooth stop with the drum control handle and then turn on the drum park switch.

**NOTE** In the TANDEM drum configuration:

- With both tandem drums unparked, the left handle on the right console ([Figure 3-19](#)) controls both drums simultaneously and automatically adjusts speed to keep the load block level. A **T** appears in the drum identifier.
  - With both tandem drums unparked, the middle handle on the right console controls the drum that is configured for the right side boom point sheaves ([Figure 3-20](#)) independently if needed. Doing this will activate a fast beeping signal in the cab. The drum identifier will indicate the number of the drum that is configured for the right side boom point sheaves.
  - If the drum that is configured for the right side boom point sheaves is parked, the left handle on the right console controls the drum for the left side boom point sheaves ([Figure 3-20](#)) independently if needed. The drum identifier will indicate the number of the drum that is configured for the left side boom point sheaves.
5. Increase the engine speed to the desired RPM with the hand throttle. Press the foot throttle to momentarily increase the engine speed when more power is required.
  6. If equipped with free fall brake pedals, the pedals can be latched down.
  7. Pull the drum control handle BACK from OFF to RAISE the load.  
Push the drum control handle FORWARD from OFF to LOWER the load.
  8. As the load nears the desired position, slowly move the drum control handle toward OFF to slow down the load.
  9. Then release the control handle to OFF to stop the load when it reaches the desired position. The drum brake will apply to hold the load in position.
  10. To hold the load in position for long periods, turn on the drum park switches.

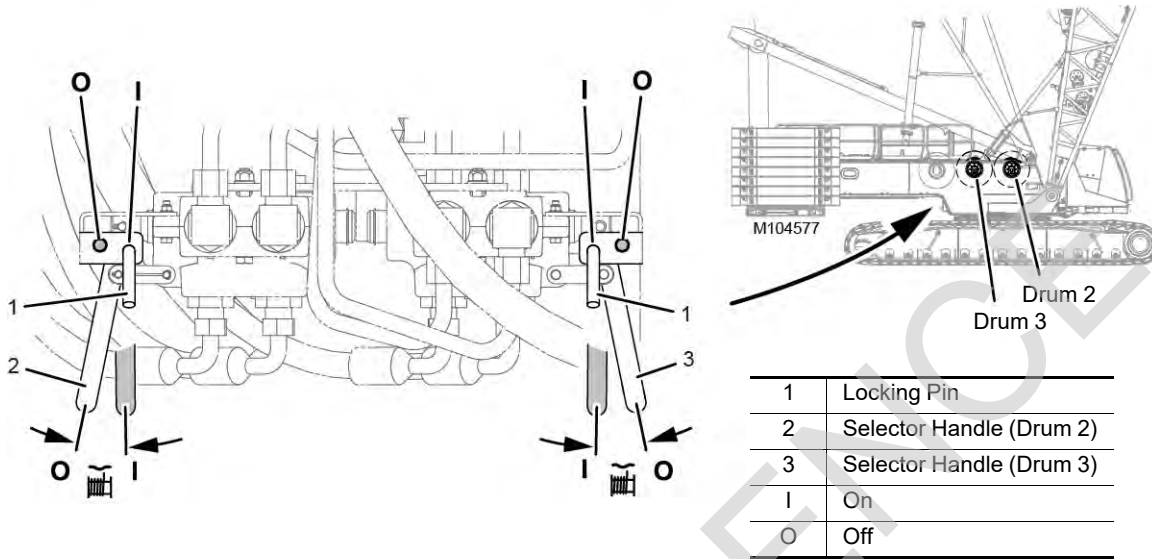
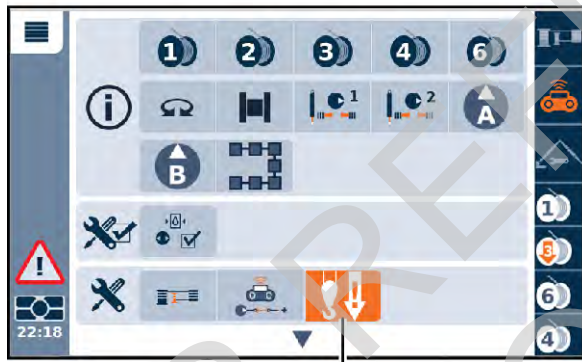


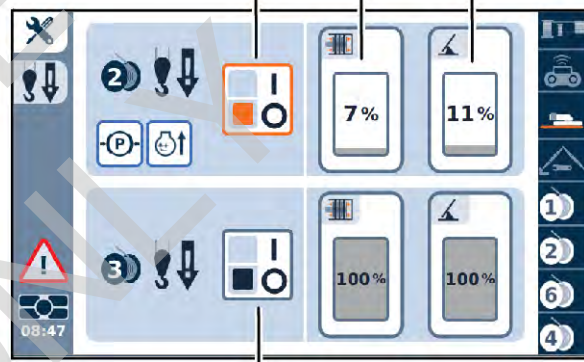
Figure 3-21. Free Fall Selector Valves

Menu Screen



M104578A

Free Fall Selection Screen



Free Fall Icon Identification

	Free Fall		Engine Off: engine must be running to enable free fall.
	Free Fall Enabled for Corresponding Drum		Operator Out of Seat: operator must remain seated to enable free fall. Drum will park if operator gets out of seat.
	Corresponding Drum Paying Out Load Line (load is free falling)		Latch Pedal: corresponding free fall pedal must be latched to enable free fall.
	Invalid Configuration		Operating Limit Active: correct all active operating limits.
	Function Parked: corresponding drum must be unparked to turn on free fall.		

1	Free Fall Mode
2	Drum 2 I/O Selection Box
3	Drum 3 I/O Selection Box
4	Free Fall Drum Slip Selection Box
5	Free Fall Pedal Response Selection Box

Figure 3-22. Free Fall Selection Screen



## Load Drum Operation (with free fall enabled)

The location of the load drum control handles varies depending on the crane's configuration. Refer to [Drum and Control Handle Identification on page 3-55](#).



### WARNING

#### Falling Load Hazard

Prevent the load on an unused drum from falling. Turn on the drum park switch for a drum not in use.

1. If not already done, perform the crane Startup Procedure. See [page 3-61](#).
2. Select the correct capacity chart and crane configuration using the RCL/RCI Display. For detailed instructions, see the RCL/RCI Operation Manual.



### WARNING

#### Falling Load Hazard

To prevent the load from falling when free fall is turned on for either drum, follow the steps in the sequence given below.

3. To **TURN ON FREE FALL** for either Drum 2 or 3:

**NOTE** Both Drums 2 and 3 can be operated in free fall at the same time.

- a. Latch down the corresponding free fall brake pedal.
- b. Turn off the drum park switch for the drum to be operated.

For TANDEM drum operation turn off the drum park switch for both drums.

**NOTE** If equipped with TANDEM drum configuration, see the NOTE on [page 3-69](#).

### CAUTION

#### Avoid Boom or Luffing Jib Damage

Do not turn on the drum park switch while raising or lowering the load. The brake will bring the load to an abrupt stop.

This action could cause shock load damage to the boom, the jib, and the load line. Bring the load to a smooth stop with the drum control handle and the free fall brake pedal. Then turn on the drum park switch.

- c. For the desired drum, remove the locking pin (1, [Figure 3-21](#)), rotate the selector handle (2 or 3) OUT to the "I" (ON) position and reinstall the locking pin (1) in the "I" holes.

**NOTE** The remaining steps assume you already know how to navigate in the main display.

- d. In the mode selection line of the main display menu screen, scroll to the free fall selector icon and click OK. The Free Fall Selection Screen ([Figure 3-22](#)) will appear.
- e. In the Free Fall Selection Screen ([Figure 3-22](#)), proceed as follows:
  - Highlight the "I/O" selection box (2 or 3) for the desired Drum 2 or 3. This allows you to toggle between the ON ("I") and OFF ("O") boxes with the OK key.
  - With the selection box highlighted, click OK to highlight the "I" box and turn ON free fall.
  - Scroll to the free fall drum slip selection box (4) for the desired Drum 2 or 3. Increase or decrease drum slip as required and click OK.

For most applications, 100% slip should be selected so the load line pays out freely when a load is lowered with the free fall brake pedal.

For applications like pile driving, adjust slip so the hammer follows the pile at the desired rate of speed.

The corresponding free fall brake pedal can be applied to stop the load drum regardless of the slip adjustment. Likewise, the corresponding control handle can be pulled back or pushed forward to hoist or lower the load with full power.

- Scroll to the free fall pedal response selection box (5) for the desired Drum 2 or 3. Increase or decrease pedal response as desired and click OK.
- Pedal response can be adjusted between 0% and 100% to suit operator needs. A high setting increases the pedal movement required to control a small load and decreases the pedal movement required to control a heavy load.

4. To **RAISE LOAD** using full power:

- a. Increase engine speed to the desired RPM with the hand throttle. Press the foot throttle to momentarily increase the engine speed when more power is required.

**NOTE** Load drum speed can be adjusted between 25% and 100% to meet operator needs. See the Speed and Limits Screen topic in the Main Display Operation Manual for detailed instructions.

- b. Leave the free fall brake pedal latched down.
- c. Pull the drum control handle BACK from OFF to RAISE the load. The drum brake will release.



- d. As the load nears the desired position, slowly move the drum control handle toward off to slow down the load.
- e. To stop the load, release the control handle to off. The drum brake will apply hold the load in position.
- f. To hold the load in position for long periods, turn on the drum park switch.

**WARNING****Falling Load Hazard**

Free fall operation is limited to 8 300 kg (18,300 lb) per part of line when lowering a load with the free fall brake pedal. Hydraulic power shall be used for full line pull. Permanent brake damage could occur, allowing the load to lower uncontrolled.

- g. To LOWER LOAD using full power:
  - a. Increase engine speed to the desired RPM with the hand throttle. Press the foot throttle to momentarily increase the engine speed when more power is required.

**NOTE** Load drum speed can be adjusted between 25% and 100% to meet operator needs. See the Speed and Limits Screen topic in the Main Display Operation Manual for detailed instructions.

- b. Leave the free fall brake pedal latched down.
- c. Push the drum control handle FORWARD from OFF to LOWER the load. The drum brake will release.
- d. As the load nears the desired position, slowly move the drum control handle toward off to slow down the load.
- e. To stop the load, release the control handle to off. The drum brake will apply hold the load in position.
- f. To hold the load in position for long periods, turn on the drum park switch.

**WARNING****Falling Load Hazard**

When operating either drum in free fall, do not exceed 225 rpm free fall lowering speed ([Figure 3-23](#)).

Exceeding this limit is not recommended and can result in accelerated wear and reduced free fall brake life. The brake could slip allowing the load to lower uncontrolled.

- 5. To LOWER LOAD using free fall brake pedal:

- a. Leave the drum control handle in off and release the free fall brake with the brake pedal to lower the load at the desired speed.

As the load nears the desired position, gradually depress the brake pedal to apply the free fall brake and slow down the load. **Then fully apply the free fall brake with the brake pedal to stop the load and hold it in position.**

- b. If the load will be suspended for any length of time, latch the free fall brake pedal down and turn on the drum park switch.

**WARNING****Falling Load Hazard**

When operating in free fall, the load will lower uncontrolled if the free fall brake is not applied when the drum control handle is released to off.

Be ready to apply the free fall brake with the brake pedal so the lowering speed can be controlled and the load can be stopped immediately when necessary.

- 6. To switch load handling from the free fall brake pedal to the corresponding drum control handle:

- a. While the load is being lowered with the free fall brake pedal, slowly move the drum control handle in the desired direction from off. The following will occur:

- The free fall brake will gradually apply in proportion to drum control handle movement.
- The free fall brake will fully apply momentarily to stop the load.
- The drum brake will release and the load will either lower or rise depending on which way the drum control handle was moved in step [6a](#).

- b. When the drum control handle is moved to off, the load will stop if the free fall brake is already latched down.

- c. If the free fall brake pedal is not already latched down, be prepared to apply it when the drum control handle is moved to off. Otherwise, the load will free fall.

- 7. To **TURN OFF FREE FALL** for either Drum 2 or 3:

- a. Latch down the corresponding free fall brake pedal.

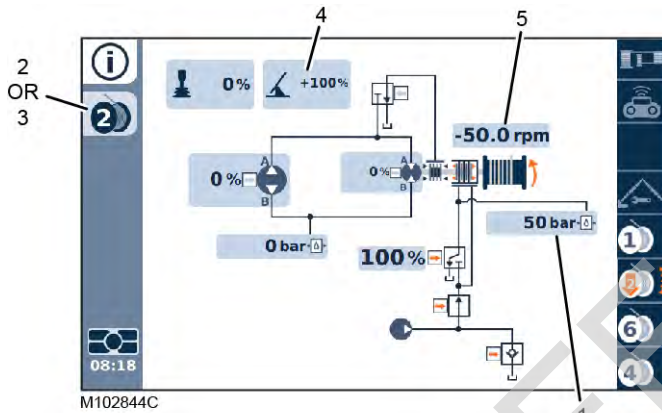
- b. In the Free Fall Selection Screen ([Figure 3-22](#)):

- Highlight the "I/O" selection box (2 or 3) for the desired Drum 2 or 3. This will allow you to

toggle between the ON (I) and OFF (O) boxes with the OK key.

- With the selection box highlighted, click OK to highlight to the “O” box and turn OFF free fall.
- c. For the desired drum, remove the locking pin (1, [Figure 3-21](#)), rotate the selector handle (2 or 3) IN to the “O” (OFF) position, and reinstall the locking pin (1) in the “O” holes.

**Free Fall Brake Pedal Hydraulic Pressure Test**



1	Drum 2 or 3 Free Fall Brake Pressure
2	Drum 2 Icon
3	Drum 3 Icon
4	Drum 2 or 3 Free Fall Brake Pedal Command
5	Drum 2 or 3 Speed

Figure 3-23. Drum 2 or 3 Control Information Screen

Test the free fall brake pedals daily prior to initial use.

1. Land the load on the drum of the pedal being tested.
2. Turn off the drum park switch for the corresponding drum.
3. For the corresponding drum:
  - a. Lock the selector handle in the “O” (off) position. See step 7. This will prevent the drum from lowering during the remaining steps.
  - b. Turn ON free fall. See step 3e.
  - c. Monitor brake pressure in the corresponding Drum 2 or 3 Control Information Screen of the main display ([Figure 3-23](#)). With drum slip at 100%, pressure should be approximately:
    - 30 bar (430 psi) with 11% pedal command
    - 0-5 bar (0-70 psi) with 100% pedal command (pedal up fully)
  - d. Determine and correct the cause of the problem if the brake pressure is not within the specified range.

**WARNING**  
Falling Load Hazard

Do not operate a drum in free fall if the corresponding brake pressure is not within the specified range. The brake could slip allowing the load to lower uncontrolled.

**Free Fall Brake Operational Test**

A free fall operational test must be performed weekly as instructed in Section 2 of your MLC300 Service Manual.

## Clamshell Operation

For clamshell operation, the crane must be equipped with Drums 2 and 3:

- Drum 2 is the closing line
- Drums 3 is the holding line

### Preparing For Clamshell Operation:

1. Select the desired Clamshell/Duty Cycle Capacity Chart in RCL/RCI display.
2. Enable the clamshell mode in the Main Display. This step can only be performed after the capacity chart is selected in [step 1](#).
3. Turn off the drum park for both drums.
4. Set engine speed at the desired rpm.
5. Clam closing pressure is set automatically.

### Clamshell Operation In Full-Power

Perform Preparing for Clam Operation steps. Then proceed as follows:

#### CLOSING BUCKET (Digging)

1. Lower the bucket into the digging area.
2. Pull back the closing line handle to close the bucket. The holding line will pay out automatically allowing the bucket to dig in as it closes.
3. Release the closing line handle to off when the bucket is closed fully.

**NOTE** Use care when digging in a blind area. The bucket is closed when the holding line starts to slacken.

#### RAISING BUCKET

1. Pull the holding line handle back to raise the bucket at the desired speed.
2. Swing to the dumping area as the bucket rises.
3. Release the holding line handle to off when the bucket is at the desired height.

#### DUMPING BUCKET

1. Push the closing line handle forward to dump bucket at the desired speed.
2. Release the closing line handle to off as soon as bucket is empty and fully open.

Use care not to slacken the closing line while dumping. Any slack in the closing line will have to be taken out while digging. This action will slow down the clam cycle.

#### LOWERING BUCKET

1. Push the holding line handle forward to lower the bucket at the desired speed.
2. Control the lowering speed by slowly moving the holding line handle toward off.

**NOTE** Lowering speed is controlled by handle movement. It is not necessary to apply the working brakes to slow down the bucket during full-power clamshell operation.

3. Swing back to the digging area as the bucket lowers.
4. Stop swinging when the bucket lands in the digging area.
5. The bucket will stop lowering automatically when it contacts ground.
6. Release the holding line handle to off.
7. Repeat the clam cycle.

**NOTE** Clamshell operation can also be performed with free fall enabled for both drums.

With clamshell enabled, the free fall brakes will release only when the closing line handle is pushed forward. The free fall brakes for both drums are released at this time. Full power dumping of the bucket is not possible with free fall enabled.

If the holding line is operated in free fall, the closing line must also be operated in free fall; otherwise, the closing line will not keep up with the holding line and the bucket will close while lowering.

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## Travel Operation



### WARNING

#### Tipping Hazard

The travel surface must be firm and uniformly supporting. Refer to the Maximum Allowable Travel Specifications chart in the Capacity Chart Manual for:

- Travel specifications with load
- Travel specifications without load

Failure to comply with the Maximum Allowable Travel Specifications can result in tipping.

#### Moving Crane Hazard

Know the position of the rotating bed with relation to the front of the carbody before traveling. An accident can result if the crane travels opposite of the intended direction.

- The boom is at the front of the upperworks.
- A yellow arrow and dot on the right top and right front sides of the carbody indicate the FRONT of the carbody.

#### Flying Object Hazard

Excessive dirt build-up at the tumbler and the front roller ends of crawlers can result in excessive tension in tread connectors. The tread connectors can break if over tensioned, causing the treads to fly apart unexpectedly with dangerous force.

### CAUTION

#### Boom Damage

Abrupt travel operation could result in shock loading the boom and rigging. To avoid this, perform all travel functions—starting, turning, stopping—slowly and smoothly.

### CAUTION

#### Accelerated Crawler Wear

To reduce the wear and tear of the crawler components (treads, rollers, frames), try not to allow dirt to pile up at the tumbler and the front roller ends of the crawlers.

Dirt can pile up when turning on soft surfaces. To avoid this:

- Bring crawlers to a complete stop before changing direction of travel.
- Turn a few degrees. Then slowly travel forward or reverse so dirt falls away from the crawlers. Continue this procedure until the desired turn has been made.
- Avoid sharp turns if possible.
- Make gradual turns or counter-rotate whenever possible so both crawlers are always powered.
- Clean the crawlers often.

Keep the crawler treads properly adjusted.

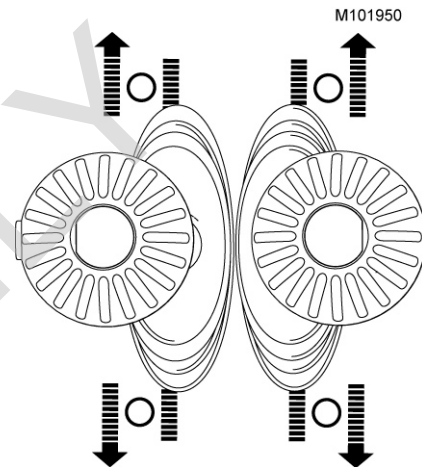


Figure 3-24. Crawler Handles

#### 1. Before traveling:

- Check for travel restrictions. See the Maximum Allowable Travel Specifications chart in the Capacity Chart Manual.
- Plan the travel route. It must be firm, level, and free of obstructions. Do not exceed the grades specified in the Maximum Allowable Travel Specifications chart.
- Check the crawlers for proper adjustment.
- Warn personnel to stand clear of the travel area. **Do not travel without a signal person.** Turn off the travel park switch.

- When **traveling with load**, position the boom at or above the boom angle given in the Maximum Allowable Travel Specifications chart.

When **traveling with load**, carry the load as close to the ground as possible. Stabilize the load with taglines.

For **traveling without load**, carry the load block and weight ball low enough that they cannot swing into the boom or jib. If desired, tie off the load block at front of rotating bed. Position the boom as specified in the Maximum Allowable Travel Specifications chart.

- Increase the engine speed to the desired RPM with the hand throttle. When more power is needed, depress the foot throttle to momentarily increase the engine speed.
- Travel speed can be adjusted between 25% and 100% to meet operator needs. See the Speed and Limits Screen topic in the Main Display Operation Manual for detailed instructions.
- Select the desired travel speed—low or high.

**NOTE** The following directions of travel are with the front of the rotating bed and the front of carbody facing the same direction.

If the front of the rotating bed and the front of the carbody face in opposite directions, the crane will travel in the direction opposite of control handle movement.

Travel cruise can be turned on once the crane is being traveled in the desired direction (see [Crawler Handles on page 3-23](#)).

- To TRAVEL STRAIGHT ([Figure 3-25](#)), move both of the crawler handles the same amount in the desired direction from the neutral position.

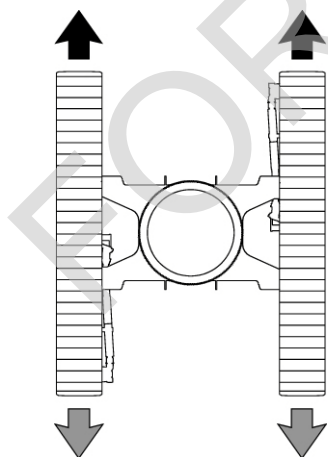


Figure 3-25. Travel Straight

- To make a SHARP LEFT TURN ([Figure 3-26](#)), move the right crawler control handle forward from the neutral position and leave the left crawler control handle in the neutral position. The crane will pivot about the left crawler.

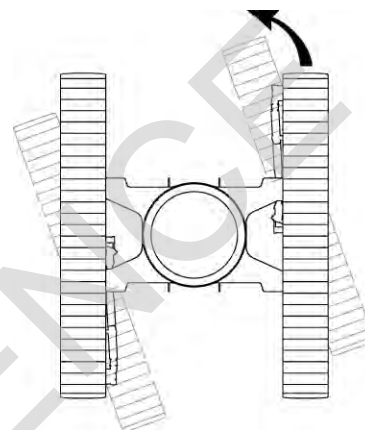


Figure 3-26. Travel Left (sharp turn)

- To make a SHARP RIGHT TURN, reverse step 7.
- To make a GRADUAL LEFT TURN ([Figure 3-27](#)), move both crawler handles to front from the neutral position. Move the right crawler control handle farther to the front than the left crawler handle. The right crawler will turn faster than left crawler.

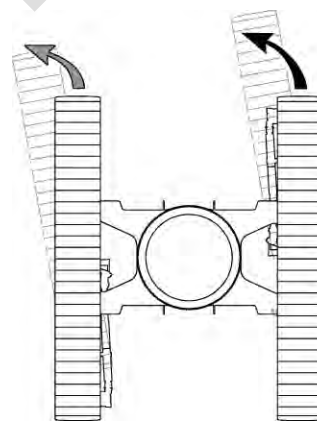


Figure 3-27. Travel Left (gradual turn)

- To make a GRADUAL RIGHT TURN, reverse step 9.



11. To COUNTER-ROTATE LEFT (Figure 3-28), move the right crawler control handle forward from the neutral position and move left crawler control handle back from the neutral position.

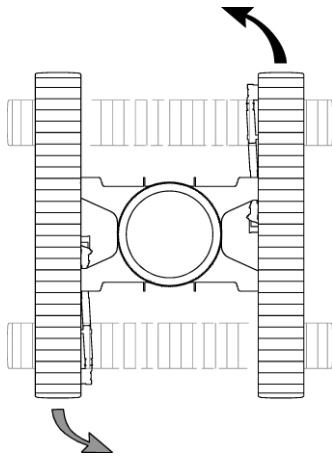


Figure 3-28. Counter-rotate Left

12. To COUNTER-ROTATE RIGHT, reverse step 11.  
 13. Slowly move both crawler handles to the neutral position to stop traveling and to hold the crane in position.  
 14. When finished traveling, turn on the travel park switch.

## SHUTDOWN PROCEDURE OR LEAVING THE CRANE UNATTENDED



### WARNING

#### Moving Load/Tipping Crane Hazard

The operator shall not leave the operator cab until the crane, loads, and boom have been secured against movement.

Changing weather conditions including but not limited to: wind, ice or snow accumulation, precipitation, flooding, lightning, etc. should be considered when determining the location and configuration of a crane when it will be left unattended.

1. Travel the crane onto a level surface. **Do not leave the crane unattended on a grade.**
2. Turn on the travel park switch.
3. Swing the rotating bed to the desired position. Then turn on the swing park switch.
4. Lower all loads to the ground.
5. Turn on the drum park switch for each load drum.
6. If possible, lower the boom (and luffing jib, if equipped) onto blocking at ground level.

If the boom and luffing jib cannot be lowered, as determined by a qualified designated person, they must be securely fastened from movement by the wind or other outside forces.

Refer to the wind conditions in the Wind Conditions chart for operating restrictions under various wind conditions.

**NOTE** The qualified designated person must be familiar with the job site limitations, the crane configuration, and the expected weather conditions.

7. Check that all the control handles are in the center position.
8. Decrease engine speed to idle. Allow the engine to idle for three to five minutes so it cools evenly.
9. Stop the engine.
10. Remove all keys from the cab to prevent unauthorized operation.
11. Lock the operator cab windows and door to prevent unauthorized entry.

## COLD WEATHER OPERATION

Also see [Cold Weather Heater Package on page 3-81](#).

### Crane Limitations

The static load-carrying limitations of the steels used in Manitowoc cranes are not affected by cold weather. Manitowoc's capacity charts are acceptable for use in cold weather.

However, dynamic loads (impact and shock) can affect the steels used in Manitowoc cranes when operating in cold weather. Dynamic loads are created by traveling, sudden application and release of load, and duty-cycle operations.



**DANGER****Injury and Equipment Failure Hazard**

At low ambient temperatures, dynamic loads (impact and shock) can result in structural failure leading to serious injury or death.

**When operating in ambient temperatures of:****-20 to -30°C (-5 to -22°F):**

- Avoid impact or shock-loading of the crane and any attachment.
- Conduct operations with regard to potential failure of hydraulic components.

**-31 to -40°C (-23 to -40°F):**

- De-rate crane by 40% for all lift operations. Halting all lifts should be considered.
- Duty-cycle operation is prohibited.

**below -40°C (-40°F):**

- All operation (lift and duty-cycle) is prohibited except in extreme emergencies, and then only with approval from a competent engineer who has de-rated crane accordingly.

**CAUTION****Avoid Hydraulic Component Damage**

Heat the hydraulic oil to at least 0°C (32°F) prior to start-up. Tank heaters are available from Manitowoc.

Before operating any hydraulic components, always allow the hydraulic system to warm up to 16°C (60°F).

Do not activate any lower accessory functions until the hydraulic system has obtained the minimum operating temperature of 16°C (60°F).

**Wire Rope**

Wire rope manufacturers state that wire rope will not become brittle in temperatures down to -34°C (-30°F). However, lubrication may be a problem during extremely cold weather because normal wire rope lubricants may harden and chip off, leaving rope without lubrication.

Consult your wire rope supplier for recommended cold-weather lubricants.

**Cold Weather Starting Aid**

The engine has a heater ("grid heater") in the air intake that comes on during crane start-up.

**WARNING****Engine Explosion Hazard**

An explosion and serious burns may result if ether is sprayed into the engine air intake.

Do not spray any combustible starting aid (ether) into the air intake. The grid heater will ignite the ether.

***To prevent overheating, the oil pan and coolant heaters must be unplugged when the engine is running or when the ambient temperature is above -1°C (30°F).***

**Cooling System**

The cooling system must be kept full and be protected from freezing at the lowest expected ambient temperature. See engine manual for antifreeze recommendations.

A mixture of 40% antifreeze and 60% water provides freeze protection to -37°C (-35°F). A mixture of 60% antifreeze and 40% water provides freeze protection to approximately -51°C (-60°F). 100% antifreeze will freeze at -23°C (-10°F).

**Batteries**

To provide maximum cranking power and to prevent the batteries from freezing, they must be kept fully charged (resting voltage 12.4V–13.2V) and warm when crane is idle during cold weather.

It is recommended that batteries be stored indoors or heated with a battery heater when crane is idle. Be aware that:

- A battery with a 50% charge freezes at -27°C (-16°F). A battery with a 100% charge freezes at -57°C (-70°F).
- A battery with a 100% charge retains only 40% of its cranking power at -18°C (-0°F). At -29°C (-20°F), the same battery retains only 18% of its cranking power.

**Engine Oil, Gear Oil, and Hydraulic Oil**

For extreme cold, refer to Approved Lubricants for Operation in Arctic Climate in the MLC300 Lubrication Guide.

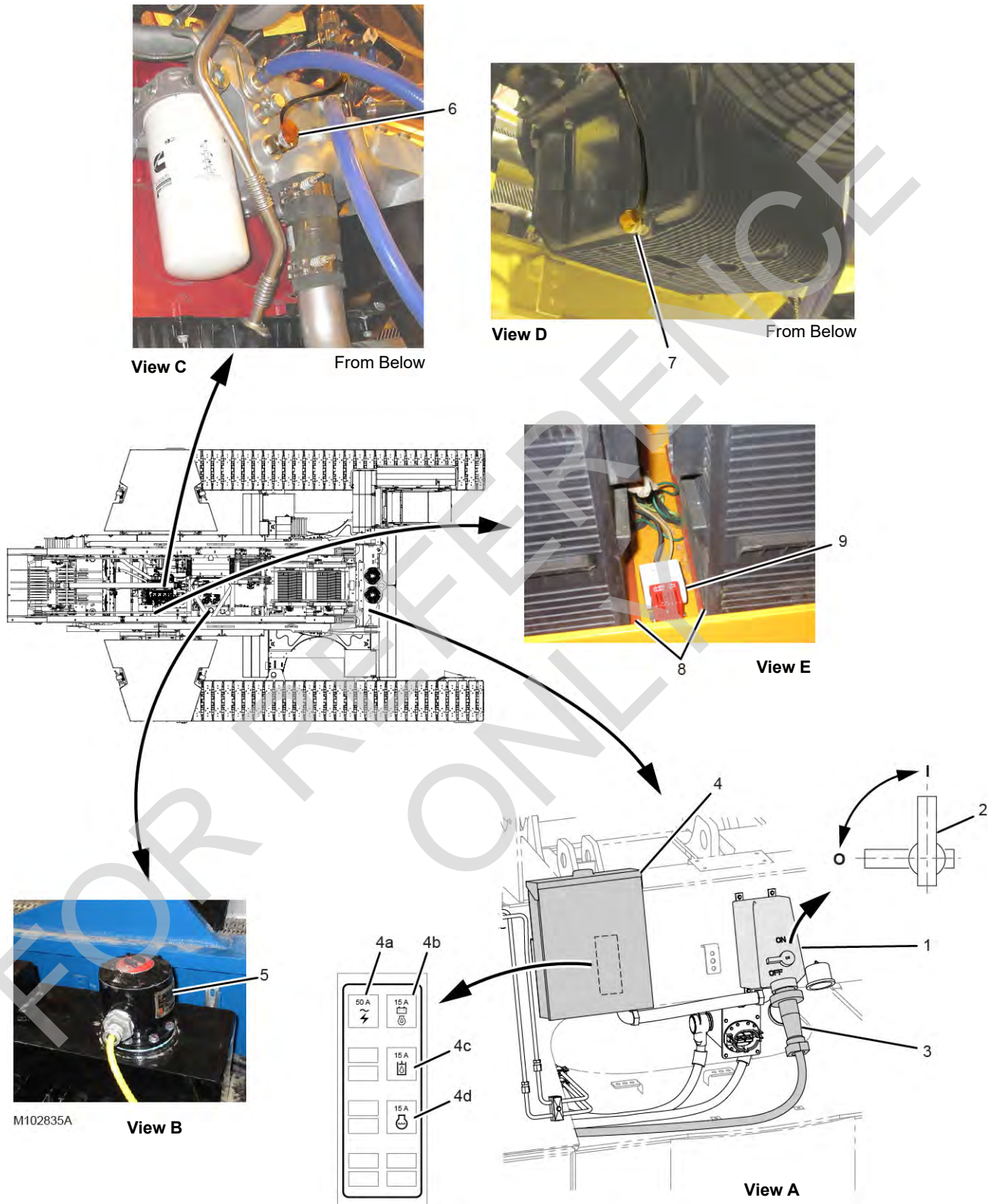


Figure 3-29. Cold Weather Heaters

Legend for [Figure 3-29](#)

Item	Description
1	Receptacle, 125/250VAC, 60A
2	Interlock Switch
3	Power Supply Cable (AC)
4	Load Center
4a	Circuit Breaker: 50A Main
4b	Circuit Breaker: 15A Engine Oil and Batteries
4c	Circuit Breaker: 15A Hydraulic Tank
4d	Circuit Breaker: 15A Engine Coolant
5	Hydraulic Tank Heater
6	Engine Coolant Heater
7	Engine Oil Heater
8	Battery Pad Heater (2)
9	Battery Pad Thermostat

## COLD WEATHER HEATER PACKAGE

To preheat critical components and lubricant sumps during a cold weather shutdown, an optional Cold Weather Heater Package is available. The package contains the following 240VAC heaters:

See [Figure 3-29](#)

- Hydraulic tank heater (5, View B): 2,000 watt.

The hydraulic tank heater is designed to keep the hydraulic oil temperature 16°C (30°F) warmer than the ambient air temperature.

A thermostat, located under the heater cover, is factory set to turn the heater ON at 16°C (60°F) and OFF at 27°C (80°F).

- Engine coolant heater (6, View C): 1,500 watt.
- Engine oil heater (7, View D): 300 watt.

### CAUTION

#### Avoid Machinery Damage

When the ambient temperature is above -1°C (30°F) or when the engine is running, do not turn on the engine oil or coolant heaters. Doing so may result in overheating because they are not supplied with thermostats.

**NOTE** When operating below -34°C (-30°F), the heater package may not provide adequate protection.

Contact your Manitowoc dealer for recommendations.

- Battery pad heaters (8, View E): two, 75 watts each.  
The battery pad thermostat (9, View E) turns the heaters ON at 5°C (41°F) and OFF at 15°C (59°F).

The heater package is powered by 125/250VAC, 60A electricity supplied by either of the following:

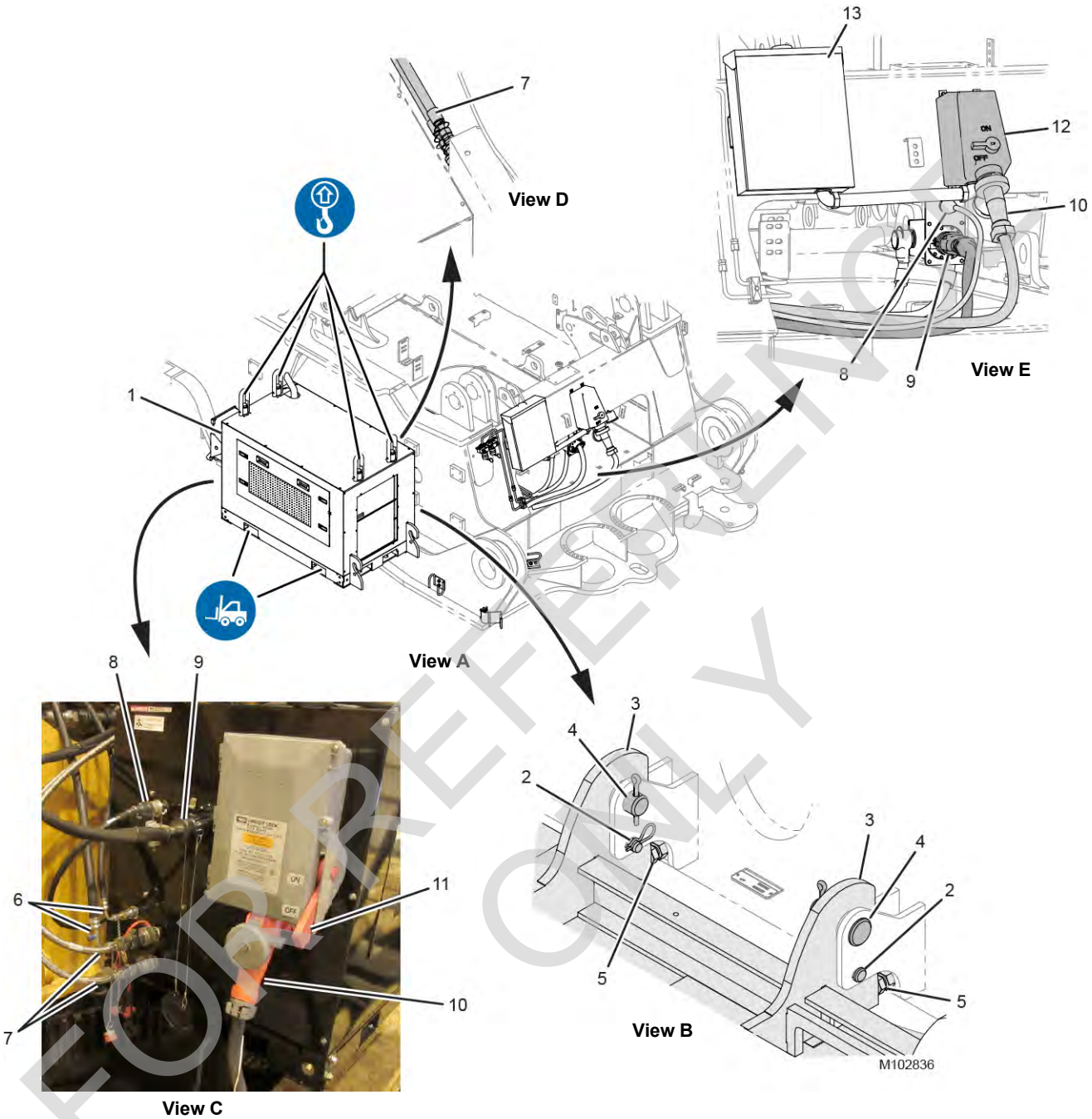
- Owner furnished generator.
- Manitowoc furnished APU (see [Figure 3-30 on page 3-82](#)).

## Turning Heaters ON

- Make sure the generator engine (APU) is OFF.
- Turn OFF the circuit breakers in the load center (4, View A).
- Make sure the interlock switch (2, View A) is OFF at the receptacle (1) on the crane and at the receptacle on the generator (APU).
- Connect the power supply cable (3, View A) to the receptacle (1) on the crane and to the receptacle on the generator (APU).
- Start the generator (APU) engine. The Manitowoc supplied APU can be started from inside the operator cab.
- Turn ON the interlock switch at the generator (APU).
- Turn ON the interlock switch (2, View A) at the receptacle (1) on the crane.
- Turn ON the circuit breakers in the load center (4, View A).

## Turning Heaters OFF

- Turn OFF the circuit breakers in the load center (4, View A).
- Turn OFF (O) the interlock switch (2, View A) at the receptacle (1) on the crane.
- Turn OFF the interlock switch at the generator (APU).
- Stop the generator (APU) engine. The Manitowoc supplied APU can be stopped from inside the operator cab.
- If necessary, disconnect the power supply cable (3, View A) from the receptacle (1) on the crane. Store the cable on the generator (APU).



Item	Description	Item	Description
1	APU	8*	Electric Cable (DC, WAC1)
2	Locking Pin with Hair-Pin Cotter (2)	9*	Electric Cable (DC, WAD1)
3	Hook (2)	10*	Power Supply Cable (AC, WAA1)
4	Fixed Pin (2)	11	Interlock Switch
5	Adjusting Bolt with Nuts (2)	12	Interlock Switch
6	Air Conditioner Hose (2)	13	Load Center
7*	Fuel Hose (2)		* Stored in Job Box

Figure 3-30. AC Generator



## AC OPERATION

See [Figure 3-30](#) for the following procedure.

An optional APU equipped with a 10 KW, continuous duty, 60 HZ AC generator and a DC charging system is available from Manitowoc to power the following operations when the crane engine is off:

- Cab heater and air conditioner
- Crane batteries (charging)
- Optional cold weather heaters
- Any AC lighting the crane is equipped with

Refer to the APU manufacturer's manual for operation and maintenance instructions.

The APU can be started with the switch in the crane operator cab. See [APU Ignition Switch on page 3-20](#).

The APU prep package includes an external heater which heats the water used to heat the operator cab. The heater is controlled using screens in the Main Display. See the MLC300 Main Display Operation Manual for heater instructions.

## Installing APU

**NOTE** The fuel hoses (7) and the electric cables (8, 9, and 10) are stored for shipping in the job boxes provided with your crane.

1. Stop the crane engine.
2. Using a forklift or an assist crane, lift the APU (1, View A) into position on the right side of the crane.
3. Remove the locking pins (2, View B) from the mounting brackets on the rotating bed.
4. Position the APU so the hooks (3, View B) engage the fixed pins (4) on the rotating bed,
5. Install the locking pins (2, View B).
6. Remove the forklift or the assist crane.
7. Adjust bolts (5, View B), as needed, to level the APU.
8. Connect two air conditioner hoses (6, View C) from the crane to the quick couplers on the APU.

Match the identification numbers on the hoses with the identification numbers on the quick couplers for proper connection.

9. Connect two fuel hoses (7, View C) to the quick-couplers on the APU and to the quick couplers on the right side of the rotating bed (View D).

Match the identification numbers on the hoses with the identification numbers on the quick couplers for proper connection.

10. Connect the electric cable (8, View C) to the receptacle on the APU and to the receptacle on the rotating bed (View E).
11. Connect the electric cable (9, View C) to the receptacle on the APU and to the receptacle on the rotating bed (View E).
12. Connect the power supply cable (10, View C) to the interlock switch (11) on the APU and to the interlock switch (12, View E) on the rotating bed.

## Turning ON AC Powered Components

**NOTE** The following instructions assume that the electric cables are connected between the APU and the crane. It is only necessary to disconnect the electric cables when the APU is removed from the crane.

1. Stop the crane engine and turn the ignition switch to off.
2. Start the APU engine using the switch in the operator cab or on the APU.

**NOTE** If the switch in the cab is used, the main engine ignition switch must be in the RUN position.

The APU will not start if the APU doors are removed.

3. Turn ON the interlock switch (11) at the APU and the interlock switch (12) on the rotating bed.

This step is required only at installation. Thereafter, the interlock switches can remain on except when servicing the APU or removing it.

4. Turn ON the circuit breakers in the load center (13).
5. The AC and DC powered components can now be turned on in the operator cab (heater and air conditioner, work lights, and other such components).

## Turning OFF AC Powered Components

1. Turn OFF the circuit breakers in the load center (13, View E).
2. Stop the APU engine using the switch in the operator cab or on the APU.

**NOTE** Turning OFF the interlock switch (11) at the APU and the interlock switch (12) on the rotating bed is required only when servicing the APU or removing it.

## Removing APU

1. If the air conditioning hoses are connected, proceed as follows to prevent the air conditioner from losing its charge:
  - a. Leave the air conditioner hoses connected and stop the APU.

- b. Start the crane engine and run the air conditioner in the cab using the crane engine for at least two minutes.
  - c. Turn off the air conditioner in the cab and stop the crane engine.
  - d. Disconnect all hoses and cables.
2. Remove the APU from the crane (reverse Installing APU steps).

FOR REFERENCE ONLY

## SECTION 4

### SET-UP AND INSTALLATION

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## SECTION 4

### SETUP AND INSTALLATION

#### BOOM AND JIB ASSEMBLY DRAWINGS

The Boom and Jib Rigging drawings that apply to your crane are located at the end of this section.

#### LIFTCRANE MAST CAPACITIES

Lifting capacities for the live mast are located at the end of this section and in the Capacity Chart Manual for this crane.

#### OPTIONAL ATTACHMENTS

If applicable, instructions for optional attachments (such as luffing jib) are provided in separate serialized Operator Manuals.

#### GENERAL SAFETY

To prevent accidents that can result in death or injury during crane assembly and disassembly, comply with the following general safety information and with specific safety information contained in assembly and disassembly steps.



#### WARNING

##### Death or Serious Injury Hazard!

Read and understand setup and installation instructions in this section before attempting to assemble or disassemble the crane.

##### Tipping/Overload Hazard!

Avoid tipping the crane over or collapsing the live mast:

- Assemble and disassemble the crane on a firm, level, uniformly supporting surface.

**Level** = 1% of grade or  
0,3 m (1 ft) in 30,5 m (100 ft)

The area selected must be large enough to accommodate the crane, the selected boom and jib length, and movement of an assist crane.

- Do not exceed the operating limits given in [Table 4-2](#).
- Keep the crane level when operating carbody jacks.



#### WARNING

##### Avoid Falling Off Crane and Boom!

It is necessary to climb onto the crane and boom during assembly and disassembly steps.

Use sturdy owner furnished ladders or an approved personnel hoist to gain access to areas which cannot be reached from ladders or steps provided with crane.

##### Moving Parts/Pinch Points!

Avoid death or crushing injury during crane assembly and disassembly:

- Assembly personnel — take every precaution to prevent injury when working near moving parts.
- Maintain communication between operator and assemblers to avoid accidents.
- Do not raise or lower the live mast until all personnel are off the crane.
- Keep unauthorized personnel well clear of the crane.

##### Falling Load Hazard!

To prevent lifting equipment from failing and load from dropping, the crane owner/user shall verify the following prior to each lift:

- All lifting equipment (shackles, hooks, slings, blocks) has been properly maintained and is safe for use.
- All lifting equipment has a capacity equal to or greater than load to be lifted.

#### CRANE ORIENTATION

The terms RIGHT, LEFT, FRONT, REAR used in this section refer to the operator's right, left, front, and rear sides when seated in the operator cab looking forward.

- The operator cab is at the front of the upperworks.
- A yellow arrow and dot on the right top and right front sides of the carbody indicate the FRONT of the carbody.

## ASSEMBLY AND DISASSEMBLY NOTES

The crane, boom, and jib must be assembled and disassembled by experienced personnel trained in erection and operation of construction cranes.

Before attempting to assemble, operate, or disassemble the crane, the experienced personnel shall read and become thoroughly familiar with the following:

- The instructions in the applicable capacity charts located in the Capacity Chart Manual or at the end of this section.
- The safety, assembly and disassembly instructions in this section.
- The instructions in the Boom and Jib Assembly Drawings located at the end of this section.

Contact your Manitowoc dealer for assistance if any procedure is not fully understood.

## ASSEMBLY AND DISASSEMBLY AREA



### WARNING

#### Moving Parts/Pinch Points!

Avoid death or crushing injury during crane assembly and disassembly:

- Assembly personnel — take every precaution to prevent injury when working near moving parts.
- Maintain communication between operator and assemblers to avoid accidents.
- Do not raise or lower the live mast until all personnel are off the crane.
- Keep unauthorized personnel well clear of the crane.

Select an assembly/disassembly area that has a firm, level, uniformly supporting surface. Make sure the area is large enough to accommodate the crane and the selected boom length, movement of trucks with trailers, and movement of an assist crane.

Set the carbody jack pads on a flat, firm foundation that will support the load placed on them. See [Table 4-1](#) for loadings.

**Table 4-1**

Maximum Jack Pad Load on First Stage of each Jack — 60 115 kg (132,530 lb) at 207 bar (3,000 psi)
Jack Pad Diameter — 775 mm (30-1/2 in)
Jack Pad Weight — 45 kg (99 lb)

Do not set the carbody jack pads in holes, on rocky ground, or on extremely soft ground.

If necessary, use wood blocking or steel plates under the carbody jack pads to properly distribute loading. The wood blocking or steel plates must be:

- Free of defects
- Strong enough to prevent being crushed or bent
- Of sufficient length and width to prevent settling under load

Contact your Manitowoc dealer for ground bearing information.

## ACCESSING PARTS



### WARNING

#### Fall Hazard!

To avoid serious injury, the owner/user shall provide workers with approved ladders or aerial work platforms to access those areas of the crane, live mast, and boom that cannot be reached from the ground or from Manitowoc-provided steps, ladders, catwalks and platforms.

Adhere to local, state, and federal regulations for handling personnel and personnel fall protection.

Some parts of the crane, boom, and jib cannot be reached from the ground. Take the necessary precautions to prevent slipping and/or falling off the crane, live mast, boom, or jib during assembly disassembly, maintenance, or other work. **Falling from any height could result in serious injury or death.**

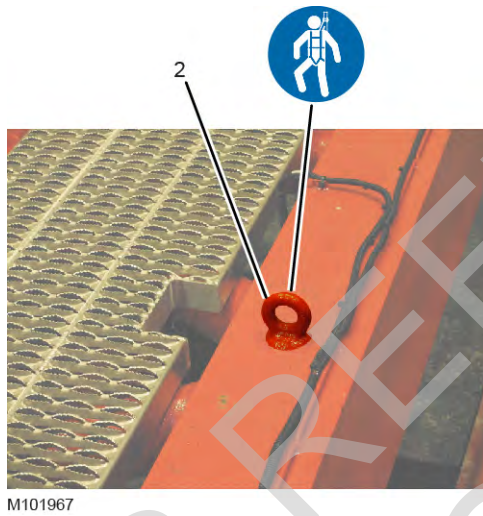
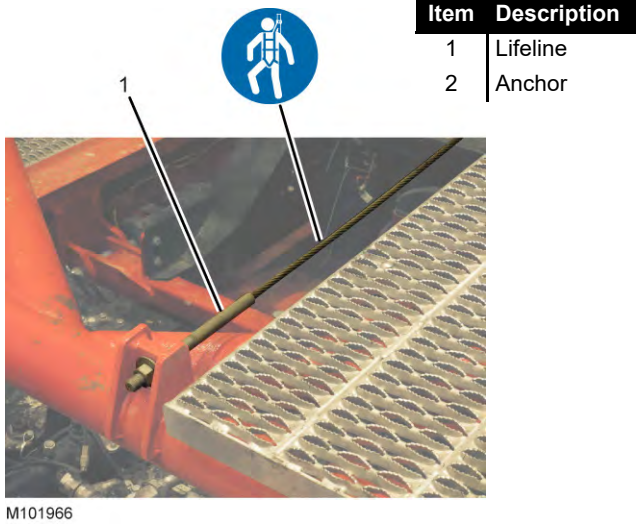


Figure 4-1

### PERSONAL FALL-PROTECTION

Manitowoc has provided lifelines and anchors throughout the crane and attachment (see [Figure 4-1](#)) to which workers can attach their personal fall-protection equipment.

**! WARNING**  
**Fall Hazard!**

To prevent falling from any height during crane assembly and disassembly, personnel shall wear fall-protection equipment.

- Anchors and lifelines are designed to handle only one person at a time.
- Do not use anchors for lifting or pulling loads.

### HANDLING COMPONENTS

The major components are equipped with lifting lugs. The lifting lugs are identified by the following symbol in the assembly and disassembly illustrations.

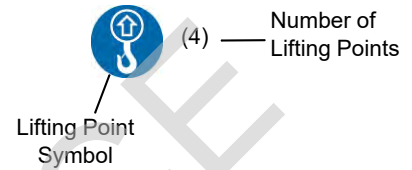


Figure 4-2

When lifting lugs are not provided, use nylon lifting slings to lift the components. If wire rope or chain slings are used, install protective covering (such as sections of rubber tire) between slings and component being lifted.

It is the crane owner's/user's responsibility to ensure that all lifting slings, hooks, and shackles are in safe working order and capable of handling the load applied to them.

In some cases, a forklift is required to lift components. When required, the lift points are identified by the following symbol in the assembly and disassembly illustrations.

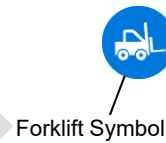


Figure 4-3

### RETAINING CONNECTING PINS

Connecting pins are retained in various ways:

- Wire-lock pins
- Quick-release pins
- Cotter pins
- Hitch Pins
- Safety pins
- Keeper plates with cap screws and lock washers

*Do not operate the crane until all connecting pins are installed and properly retained.*

### CRANE WEIGHTS AND SHIPPING DATA

See the Crane Weights topic in Section 1 for the weights of individual crane components.

See the MLC300 Product Guide in Section 1 for outline and shipping dimensions.

## PARTS BOX

Manitowoc provides a parts box that can be lifted with a forklift.

The following types of parts are shipped in the parts box:

- Lifting slings, links, and shackles
- Quick-disconnect wrenches or strap wrench
- Quick-drain drainer assembly (for oil changes)
- Touch-up paint
- Spray lubricant
- Camera parts
- Button sockets, links, swivels, and pins
- APU (auxiliary power unit) hoses and cables

Carefully inventory the parts boxes according to the parts diagram on the parts box.

## SELF-ERECT COMPONENTS

The MLC300 can be used to assemble and disassemble itself. An assist crane is required for the following procedures:

- To install the live mast package (mast, boom hoist, equalizer). See [Remove Live Mast Package from Trailer on page 4-27](#).
- To install Drums 2 and 3. See [Install Drum 2 on page 4-35](#) and [Install Drum 3 on page 4-35](#).

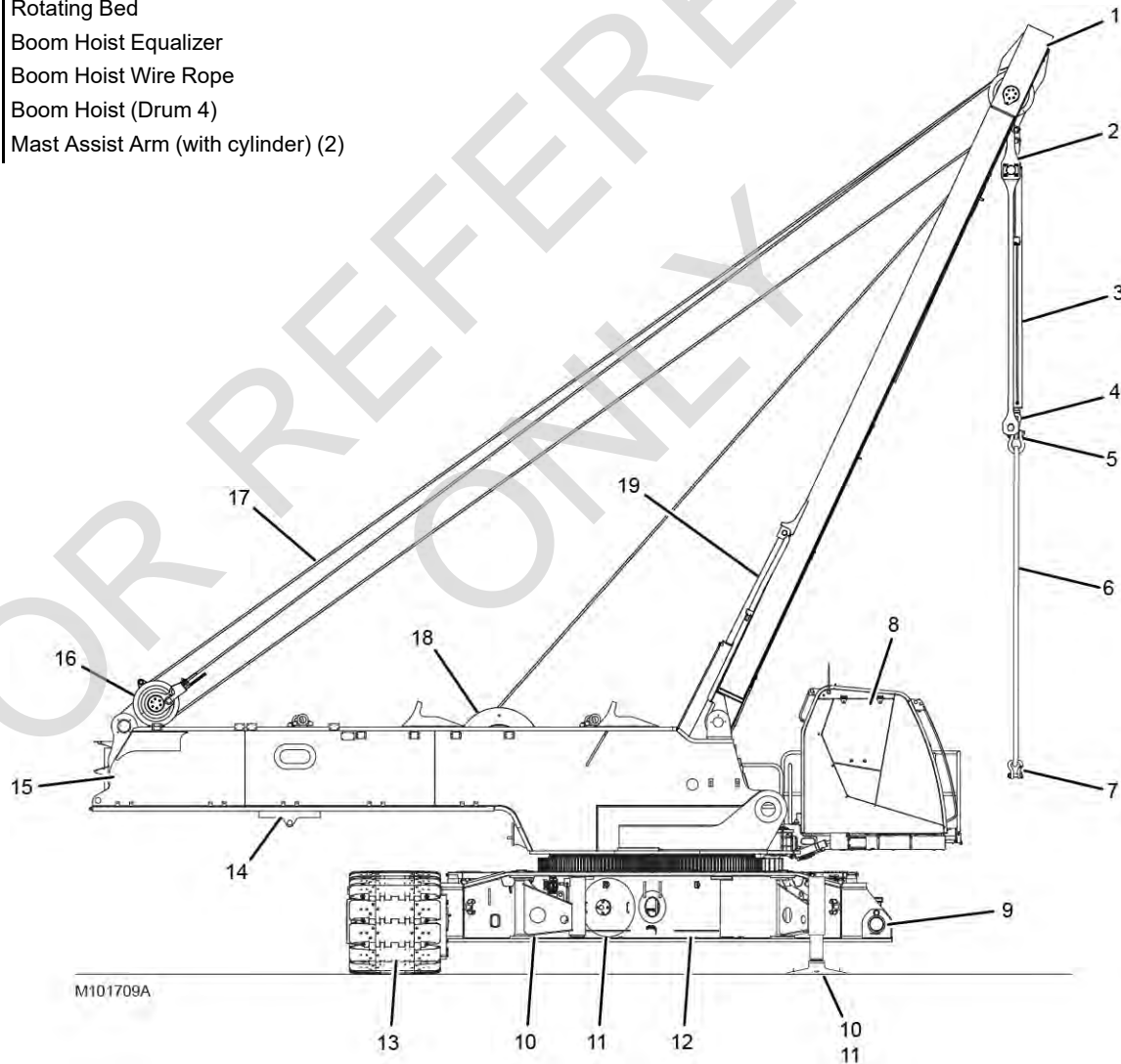
- To install the counterweight tray and counterweight boxes. See [on page 4-58](#) and [Install Counterweight Boxes on page 4-63](#).

The MLC300 is equipped with the following self-erect components (see [Figure 4-4](#)):

- Self-erect cylinder (3) for lifting major parts. The cylinder is attached to the top of the live mast (1).
- Lifting link (4) which is attached to the self-erect cylinder.
- Shackles and synthetic slings (5-7) for attaching to the various self-erect loads.
- Carbody jacks (10) with pads (11) for lifting the crane onto and off a trailer.
- Hydraulic pin pullers (9) for connecting and disconnecting the crawlers to and from the carbody.
- Hydraulic pin pullers (not shown) for connecting and disconnecting the live mast package from the rotating bed.
- Hydraulic mast assist arms (19) for raising the live mast to the operating position and lowering it to the transport position.
- Hydraulic pin pullers (not shown) for connecting the boom butt to the rotating bed.
- Remote control for operating the above components. See [Remote Control on page 4-8](#).



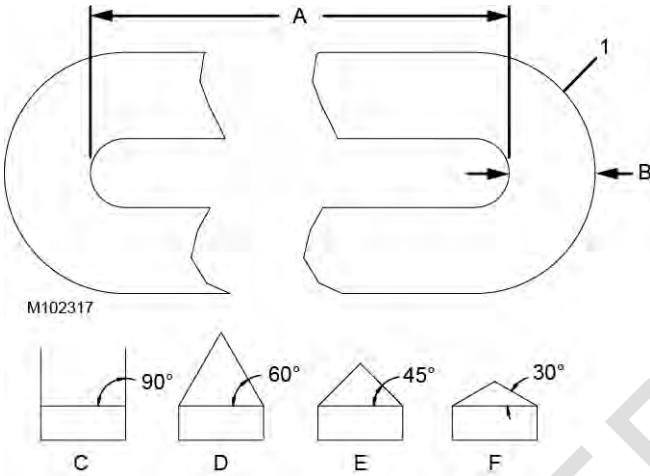
Item	Description
1	Live Mast
2	Mast Strap (2)
3	Self-Erect Cylinder
4	Lifting Link (see <a href="#">Figure 4-6 on page 4-7</a> )
5	Shackle: 25 t (28 USt) (2) (see <a href="#">Figure 4-6 on page 4-7</a> )
6	Synthetic Lifting Sling: 4,0 m (13 ft) (4) (see <a href="#">Figure 4-5 on page 4-6</a> )
7	Shackle: 20,5 t (23 USt) (4) (see <a href="#">Figure 4-5 on page 4-6</a> )
8	Cab
9	Crawler Pin Puller (4)
10	Carbody Jack (4)
11	Jack Pad (4)
12	Carbody
13	Crawler (2)
14	Counterweight Retainer (2)
15	Rotating Bed
16	Boom Hoist Equalizer
17	Boom Hoist Wire Rope
18	Boom Hoist (Drum 4)
19	Mast Assist Arm (with cylinder) (2)



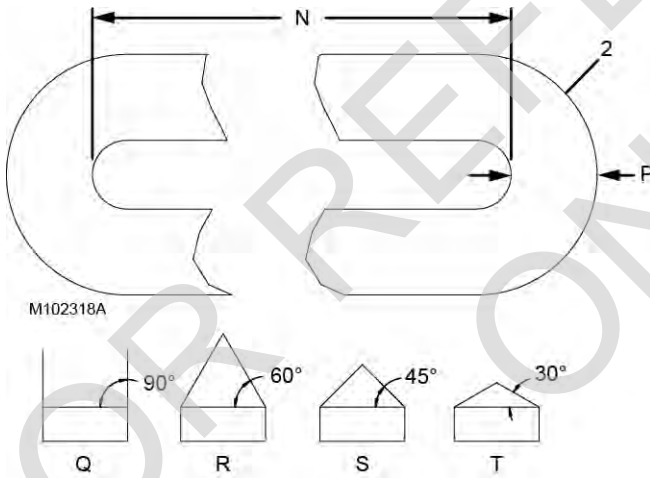
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Figure 4-4

### Lifting Slings



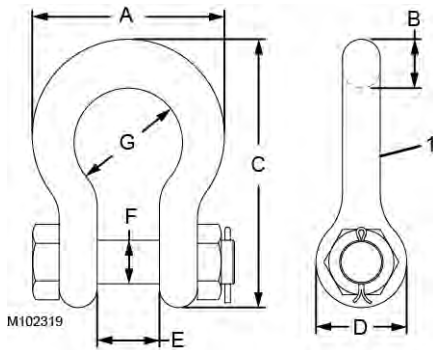
Item	Description	
1	Endless Synthetic Rope Sling Working Load Limit: 18 144 kg (40,000 lb) Straight 14 515 kg (32,000 lb) Chocker 36 287 kg (80,000 lb) Basket Four Supplied by Manitowoc	
Item	m	ft
A	2,8	9
Item	mm	in
B	59,7	2-11/32
Item	kg	lb
C	18 144	40,000
D	15 712	34,640
E	12 828	28,280
F	9 072	20,000



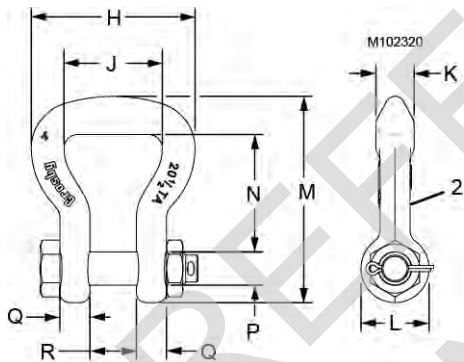
Item	Description	
3	Endless Synthetic Rope Sling Working Load Limit: 18 144 kg (40,000 lb) Straight 14 515 kg (32,000 lb) Chocker 36 287 kg (80,000 lb) Basket Four Supplied by Manitowoc	
Item	m	ft
N	4	13.0
Item	mm	in
P	59,7	2-3/8
Item	kg	lb
Q	18 144	40,000
R	15 712	34,640
S	12 828	28,280
T	9 072	20,000

Figure 4-5

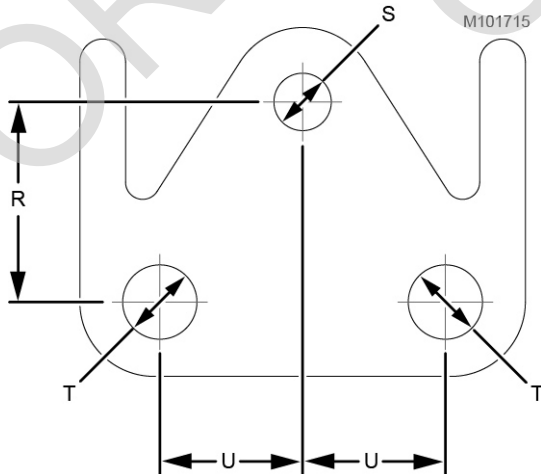
### Shackles and Lifting Link



Item	Description	
1	Shackle: 25 t (28 USt) Two Supplied by Manitowoc	
Item	mm	in
A	225,0	8.86
B	57,0	2.25
C	313,0	12.34
D	106,0	4.19
E	73,0	2.88
F	51,0	2.00
G	127,0	5.00



Item	Description	
2	Shackle: 20,5 t (23 USt) Four Supplied by Manitowoc	
Item	mm	in
H	190,5	7.5
J	114,3	4.5
K	44,5	1.75
L	79,2	3.12
M	240,0	9.45
N	136,5	5.37
P	38,9	1.53
Q	35,1	1.38
R	54,1	2.13



Item	Description	
3	Lifting Link: 40 t (44 USt) Attached to Self-Erect Cylinder	
Item	mm	in
R	175,0	6.89
S	50,2	1.98
T	65,0	2.56
U	125,0	4.92

Figure 4-6

Item	Description
1	Operator Cab
2	Storage Compartment
3	Remote Control
4	Electric Cable: 20 m (66 ft)
5	Transceiver
6	Front of Rotating Bed
7	DC Load Center
8	External Engine Switch

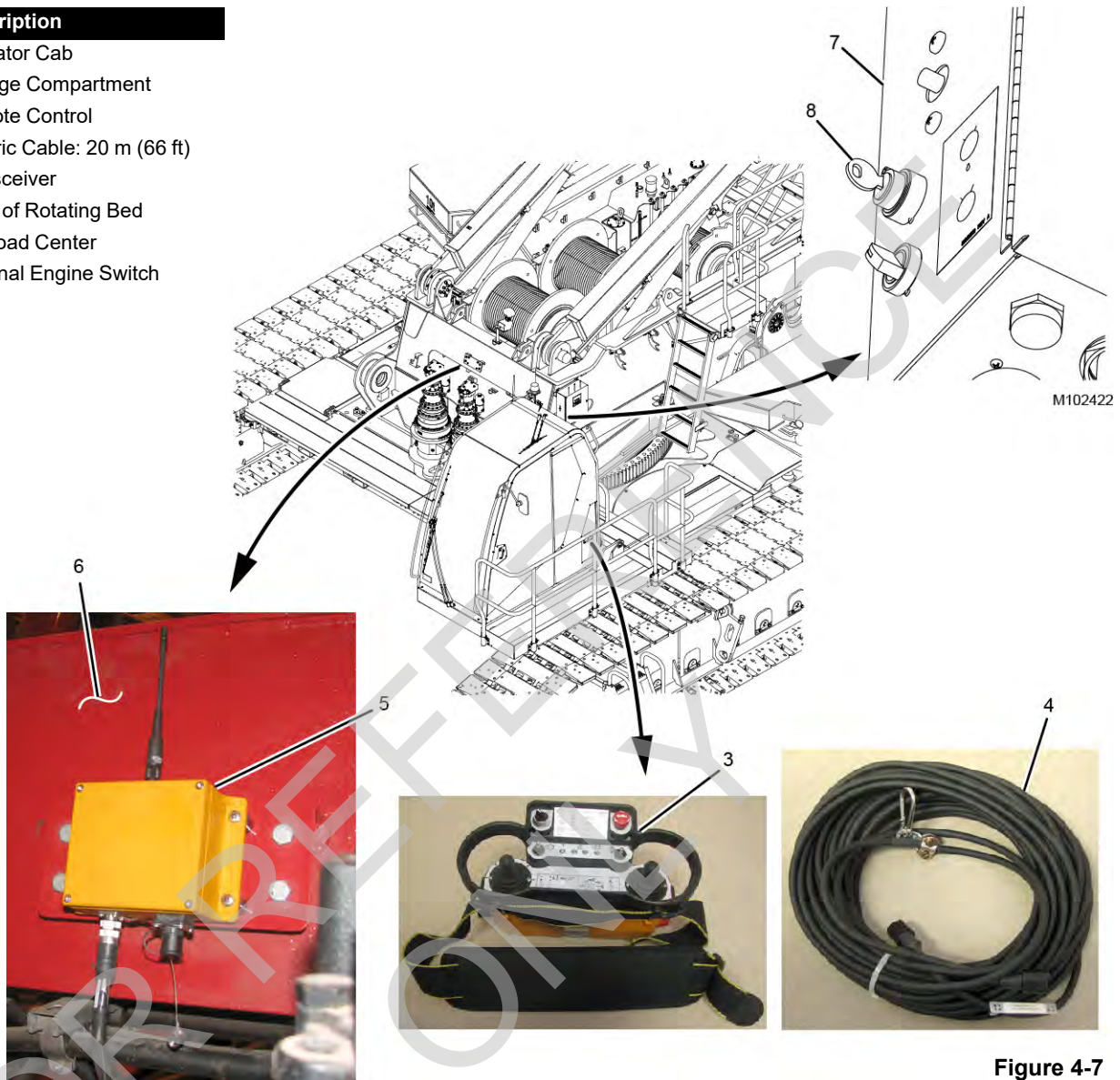


Figure 4-7

## REMOTE CONTROL

See [Figure 4-7](#) for the following procedure.

For identification and operation of the self-erect controls provided on the remote control, refer to Section 3 of this manual.

Do not operate the self-erect controls without first reading Section 3 and the applicable procedures in this section.

**NOTE** The speed of all self-erect functions depends on engine speed: the faster the engine speed, the faster the self-erect functions (and vice versa).

The remote control can be operated without the electric cable (4) (wireless) if job site conditions allow a wireless signal.

If you are unable to get a wireless signal, connect the electric cable (4) between the receptacle on the remote control (3) and the receptacle on the transceiver (5).

Controls for the following functions are provided on the remote control (3):

- Engine start, stop, and speed
- Counterweight tray pins
- Boom hinge pins (2)

- Mast assist arms and cylinders (for manually lowering mast assist arms; also provided in cab) (2)
- Live mast hinge pins (2)
- Cab tilt
- Carbody jacks (4)
- Rigging winch
- Crawler pins (4)
- Boom hoist equalizer hinge pins (2)
- Horn

## Activating Remote Control

To activate the remote control upon arriving at the job site, proceed as follows:

1. Remove the remote control (3) from the storage compartment (2) on the side of the operator cab (1).
2. Using the key provided, turn the external engine switch (8) CLOCKWISE to the RUN position.
3. Turn the power switch on the side of the remote control CLOCKWISE to the ON (I) position. The communication light on the remote control will flash green.
4. Press the communication switch on the side of the remote control for approximately one second and release it. The function light on the remote control for the last function used will glow green.

The remote control will remain active until the external engine switch (8) is turned COUNTERCLOCKWISE to the STOP position or the remote control is deactivated in the Remote Control Selection Screen in the Main Display (see MLC300 Main Display Operation Manual).

The remote control will “go to sleep” after 10 minutes of non-use. If this happens, press the communication switch on the side of the remote control for approximately one second and release it to re-establish communication.

**NOTE** The remote control can also be activated in the Remote Control Selection Screen in the Main

Display (see MLC300 Main Display Operation Manual).

## Starting Engine with Remote Control

To start the engine using the remote control:

1. Activate the remote control as instructed above.
2. Read the Startup Procedures in Section 3.
3. Turn the power switch on the side of the remote control CLOCKWISE to the START position to start the engine.
4. Release the power switch to the ON (I) position as soon as the engine starts.

**NOTE** To stop the engine when using the remote control, turn the external engine switch (8) COUNTERCLOCKWISE to the STOP position

## SETUP MODE

To operate in the setup mode during crane assembly and disassembly, perform the following steps:

- Select the live mast configuration in the RCL/RCI Display. See the MLC300 RCL/RCI Display Operation Manual for instructions.

This step allows the boom control handle to raise and lower the live mast and the center drum control handle to extend and retract the self-erect cylinder.

- For current production cranes (CCM-10 software version 0.022 and newer), activate the self-erect cylinder in the Mode Selection Group of the Main Display. See the MLC300 Main Display Operation Manual for instructions.
- Activate the remote control in the Mode Selection Group of the Main Display. See the MLC300 Main Display Operation Manual for instructions.

**NOTE** All of these steps are performed automatically when the remote control is turned on using the procedure under the topic [Activating Remote Control](#).



## PIN AND CONNECTING HOLE CLEANLINESS

To prevent dirt from damaging closely machined surfaces of pins and connecting holes:

- Thoroughly clean all pins and connecting holes.
- Apply a light coat of grease to all pins and connecting holes.

## HOSE AND CABLE CLEANLINESS

To prevent dirt from entering the hydraulic systems or from damaging the electric connectors:

- Thoroughly clean the hydraulic fittings and the electric connectors before connecting them.
- Thoroughly clean the dust caps before attaching them to hoses, tubes, or cables.
- Do not drag the hydraulic hose fittings, the hydraulic hoses, the electric cable connectors, or the electric cables on the ground.

**NOTE** Apply a light coat of silicone lubricant to the threads of all dust caps, couplers, and connectors to help in preventing the threads from seizing.

## HYDRAULIC HOSE IDENTIFICATION

Where necessary, the hydraulic hoses and corresponding couplers have identification tags as shown in [Figure 4-8](#). Match the number on the hose with the number on the corresponding coupler to ensure proper connection.

## CONNECTING/DISCONNECTING HYDRAULIC HOSES AND ELECTRIC CABLES

Always STOP ENGINE before performing the following steps during crane assembly and disassembly:

- Connecting and disconnecting hydraulic lines. It will be easier to connect and disconnect the couplers when there is no pressure in the system.
- Connecting and disconnecting electric cables. The potential for operating faults or damage to the electric components exists if the engine is not stopped.

**NOTE** To stop the engine if it was started from the remote control, turn the external engine switch (8, [Figure 4-7 on page 4-8](#)) COUNTERCLOCKWISE to the STOP position.

To stop the engine if it was started from the cab, use the ignition switch in the cab.

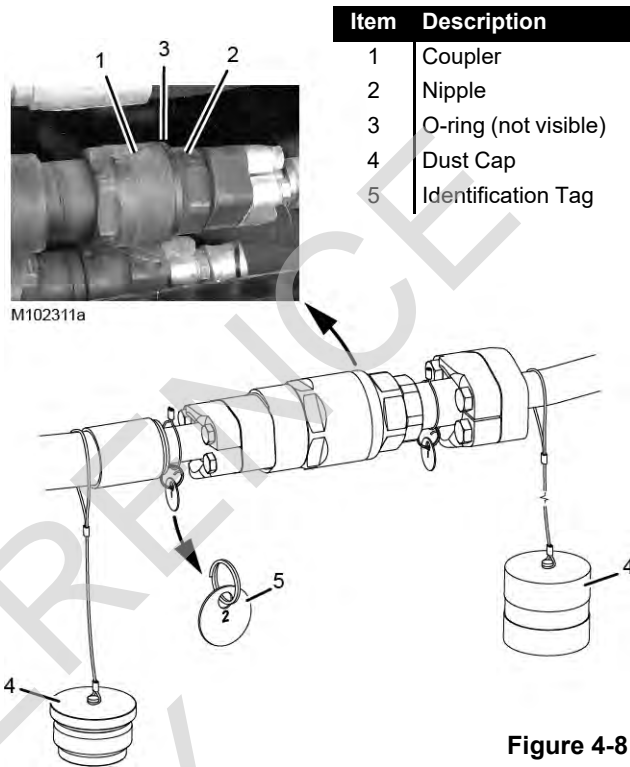


Figure 4-8

## TIGHTENING HYDRAULIC COUPLERS

Connect each screw-to-connect coupler and nipple ([Figure 4-8](#)) as follows:

1. Lubricate coupler (1) threads, nipple (2) threads, and nipple O-ring (3) with LPS-2 Aerosol Lubricant.
2. Hand tighten coupler (1) onto nipple (2).
3. Using appropriate wrenches, tighten the coupler until there is metal-to-metal contact between the coupler and the nipple. **O-ring (3) must not be visible.**

To avoid damage, do not exceed a torque of:

- Size -06 = 1.62 lbf ft (2,2 Nm)
  - Size -08 = 1.33 lbf ft (1,8 Nm)
  - Size -12 = 4.13 lbf ft (5,6 Nm)
  - Size -20 = 6.04 lbf ft (8,2 Nm)
  - Size -24 = 19.16 lbf ft (26,0 Nm)
4. Check for leaks after the crane has been operated and the hydraulic oil is at operating temperature. Retighten the couplers if necessary.
  5. All plugs, regardless of location, must be fully screwed together into their corresponding caps until there is metal to metal contact during crane assembly.

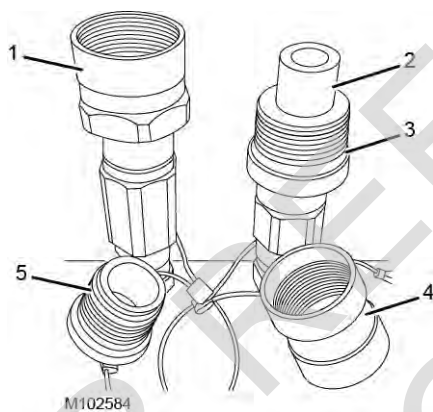
Examples of locations of caps and plugs:

- hanging lanyards
  - storage brackets
  - job box
6. All quick disconnects must be fully screwed together with their corresponding cap and plug until there is metal to metal contact during crane disassembly.

The following threaded areas of the quick disconnects, caps, and plugs must be lubricated during crane assembly and disassembly (see Figure 4-9):

- threaded surface of male quick disconnect
- threaded surface of female quick disconnect
- threaded surface of aluminum caps and plugs
- o-rings

**NOTE** If the crane is stored without operating for long duration, the hydraulic quick disconnects, caps, and plugs must be lubricated every 6 months.



Item	Description
1	Female Quick Disconnect
2	Male Quick Disconnect
3	O-ring
4	Aluminum Cap
5	Aluminum Plug

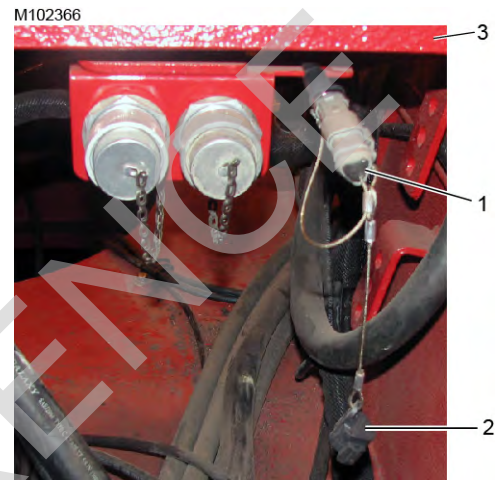
Figure 4-9

### PRE-START CHECKS

Make the following checks before starting the engine upon arrival at the assembly site. See Section 3 for starting instructions.

### Electric System

Check that all shorting plug is attached as shown in Figure 4-10 on page 4-11. The engine may not start and faults will be activated if the plugs are not connected.



Item	Description
1	CAN D Terminator
2	Dust Cap
3	Left-Front Side of Rotating Bed

Figure 4-10

### Engine

1. Check for leaks.
2. Check fuel, oil, and coolant levels.
3. Repair or refill as required.

### Gear Boxes

1. Check for leaks.
2. Check levels.
3. Repair or refill as required.

### Hydraulic System

1. Check for leaks.
2. Check level.
3. Repair or refill as required.
4. Make sure hydraulic tank shut-off valves are open.



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### SWING LIMITS

Refer to [Table 4-2](#) for swing limits during crane assembly and disassembly.

- In all cases, Drums 2 and 3 can be either installed or removed.
- In all cases, **the grade in any direction must not exceed 1% (0.5°).**
- **Do not install the counterweight tray until both crawlers are installed.**

Table 4-2

Crane Configuration	Can Swing	Note
<ul style="list-style-type: none"> <li>• Rotating bed and carbody module on carbody jacks</li> <li>• Without live mast, equalizer, Drum 4 (boom hoist)</li> <li>• Without counterweight tray</li> </ul>	Yes, 360°	—
<ul style="list-style-type: none"> <li>• Rotating bed and carbody module on carbody jacks</li> <li>• Live mast in transport position (lowered fully to rear)</li> <li>• Without counterweight tray</li> </ul>	NO!	TIPPING CAN OCCUR
<ul style="list-style-type: none"> <li>• Rotating bed and carbody module on carbody jacks</li> <li>• Live mast in operating range (forward of vertical)</li> <li>• Without counterweight tray</li> </ul>	Yes, 360°	Swing limited to 30° over either side of carbody when lifting first crawler (see <a href="#">Figure 4-11</a> ). Refer to Liftcrane Mast Capacities chart at end of this section for detailed lifting capacities.
<ul style="list-style-type: none"> <li>• Rotating bed and carbody module on carbody jacks</li> <li>• Live mast in operating range (forward of vertical)</li> <li>• First crawler installed and on ground</li> <li>• Without counterweight tray</li> </ul>	Yes, 360°	Can lift second crawler over either side of crane.
<ul style="list-style-type: none"> <li>• Rotating bed and carbody module</li> <li>• Live mast in transport position or in operating range</li> <li>• Both crawlers installed and on ground</li> <li>• Counterweight installed or removed</li> </ul>	Yes, 360°	Live mast can be used as a boom to assemble boom and jib. Refer to Liftcrane Mast Capacities chart at end of this section for detailed lifting capacities. Machine can swing 360° and travel. <ul style="list-style-type: none"> <li>• Travel surface must be on a firm, level, uniformly supporting surface.</li> <li>• Grade in any direction must not exceed 1% (0.5°).</li> </ul>

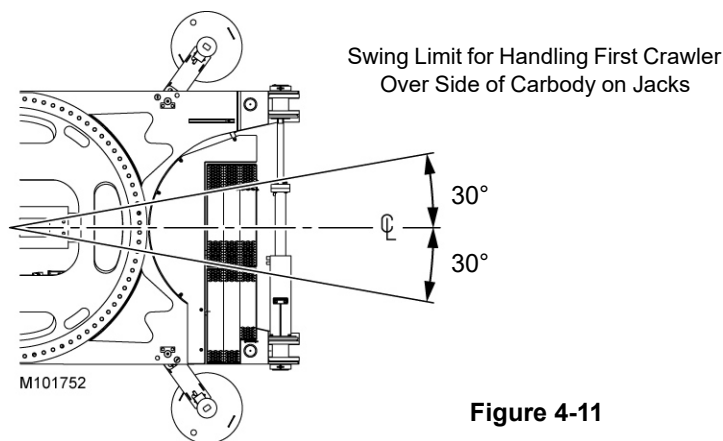
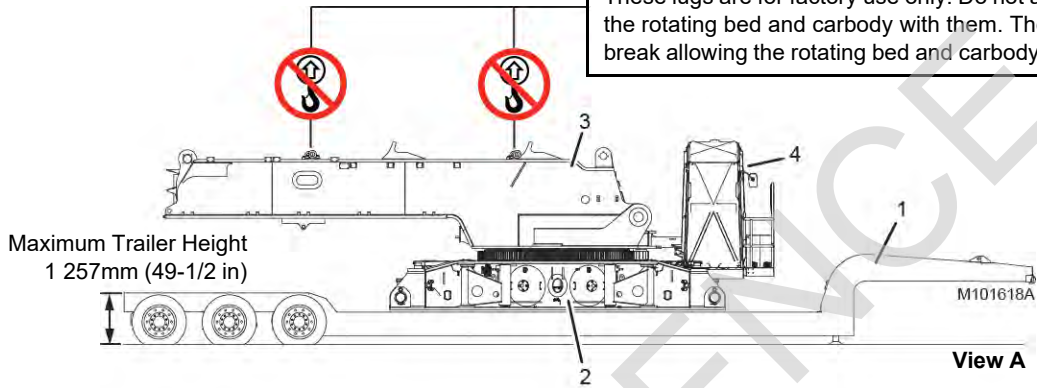


Figure 4-11

**⚠ WARNING**  
**Falling Load Hazard!**  
 These lugs are for factory use only. Do not attempt to lift the rotating bed and carbody with them. The lugs could break allowing the rotating bed and carbody to fall.



Item	Description	Item	Description
1	Trailer	5A	Storage Hole
2	Carbody	5B	Working Hole
3	Rotating Bed	6	Carbody Jack (4)
4	Operator Cab	7	Jack Pad (4)
5	Pin with Hair-Pin Cotter (4)	8	Storage Pin (4)

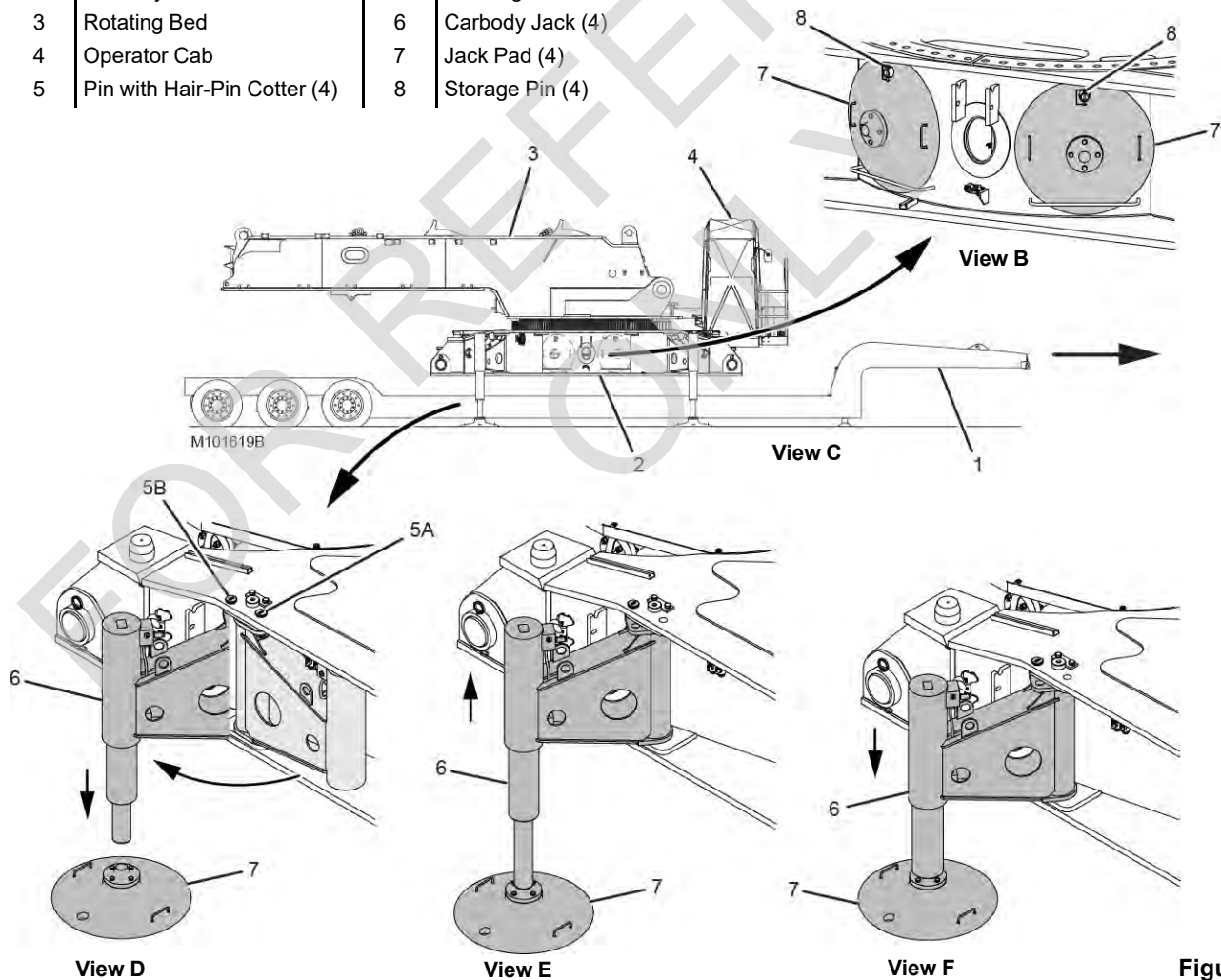


Figure 4-12

## CRANE ASSEMBLY

### Start Engine

1. Perform the pre-start checks given on [page 4-11](#).
2. Remove the remote control from the storage compartment on the left side of the operator cab (see [Figure 4-7 on page 4-8](#)).
3. Activate the remote control. See [Activating Remote Control on page 4-9](#).
4. Start the crane engine with the start switch on the remote control. See [Starting Engine with Remote Control on page 4-9](#).

### Raise Operator Cab

1. Remove the tie-downs and blocking securing the cab (4, View A) to the trailer.
2. Tilt the cab up to the level position with the cab tilt switch on the remote control.

### Remove Carbody-Rotating Bed Module from Trailer

See [Figure 4-12](#) for the following procedure.

#### **WARNING** Tipping Hazard!

Small diameter of jacking cylinders must be fully retracted before handling the first crawler, otherwise cylinders will be overloaded.

1. Position the trailer (1, View A) carrying the carbody-rotating bed module at the desired location in the assembly site.
2. Perform the pre-start checks.
3. Using the remote control, start the engine.

**NOTE** It is normal for the system fault alert for low engine oil pressure to come on at startup. The alert should go off as engine oil pressure rises to normal. If the alert does not clear soon after start-up, stop the engine and correct the cause of the fault.

4. Remove the connecting pin (5, View D) from the storage hole (A).

### CAUTION

#### Avoid Structural Damage

Do not extend the carbody jacks when they are stored. Serious structural damage will occur to the carbody and jacks.

5. Rotate the carbody jack (6, View D) out from the storage position to the working position.
6. Install the pin (5) in the working hole (B).
7. Remove the jack pad (7, View B) from storage and place it on the ground below the jack rod (View D). Each jack pad weighs 45 kg (99 lb).
8. Reinstall the storage pin (8) in the lug on the carbody.

#### **WARNING** Moving Part Hazard!

To avoid serious crushing injury — warn all personnel to stand clear of the jacks.

9. Using the remote control, extend the carbody jack (6, View E) until the jack rod engages the jack pad.
10. Repeat steps 4 - 9 for each jack.
11. Remove the tie-downs and blocking securing the carbody (2, View A) to the trailer.

#### **WARNING** Tipping Hazard!

Avoid tipping the crane over — keep the crane level while jacking.

**NOTE** A level is provided on the front of the carbody. See Section 3 of the Crane Operator Manual.

12. Using the remote control, fully extend the carbody jacks (6, View E) to raise the carbody-rotating bed module off the trailer.
13. Remove the trailer. **Take extreme care not to hit jacks with trailer. Provide a signal person to give instructions to truck driver.**
14. Retract the carbody jacks (6, View F) — keep the crane level — until the carbody is approximately 26 in (660 mm) above the ground and the small diameter jack rod is fully retracted.

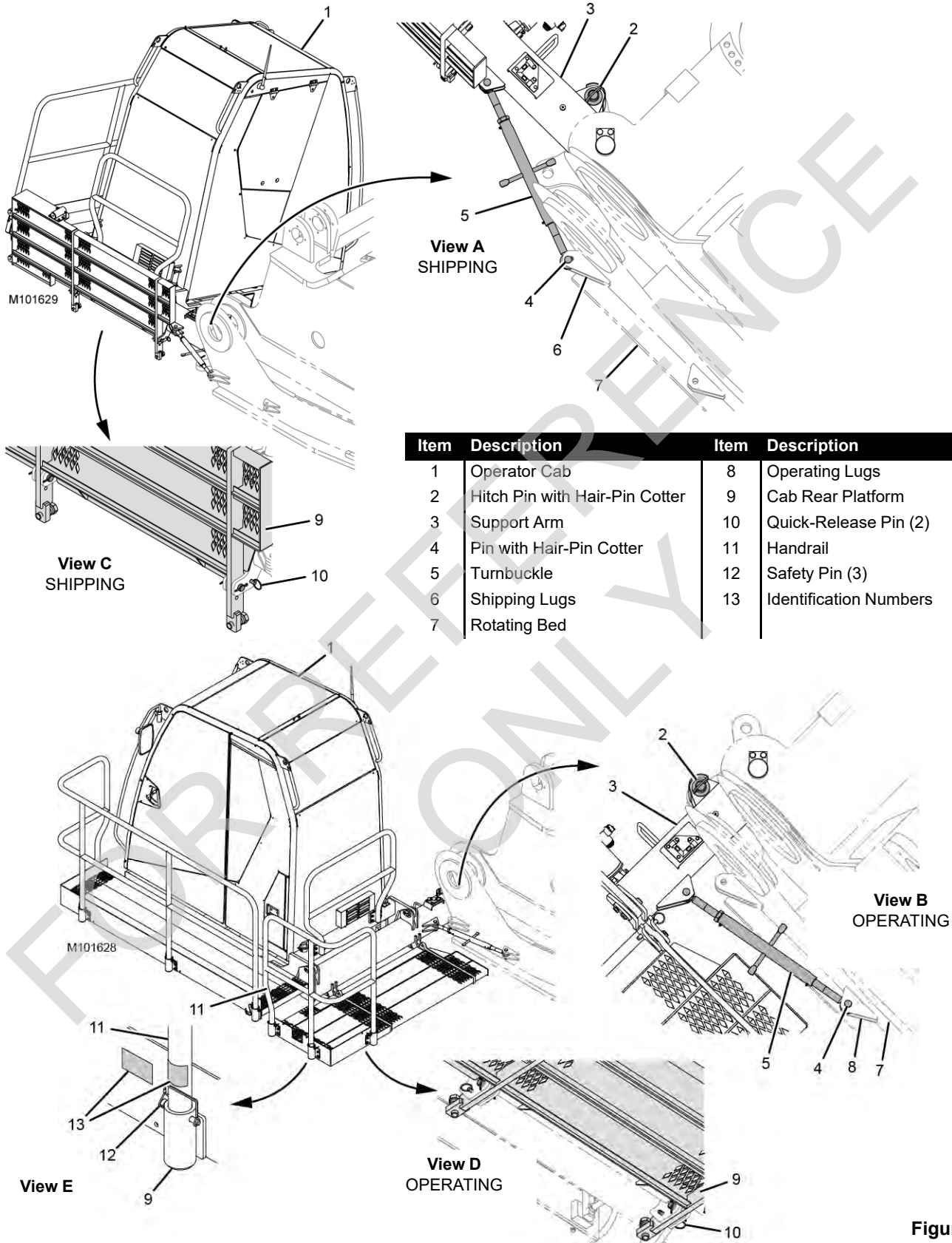


Figure 4-13



### Deploy Operator Cab

See [Figure 4-13](#) for the following procedure.

1. If not already done, raise the operator cab (1) to the level position using the remote control.
2. Remove the hitch pin (2, View A) from the shipping position.
3. Remove the pin (4, View A) to disconnect the turnbuckle (5) from the shipping lugs (6) on the rotating bed (7).
4. Rotate the operator cab (1) to the operating position.
5. Install the hitch pin (2, View B) in the operating position.
6. Using the pin (4, View B) pin the turnbuckle (5) to the operating lugs (8) on the rotating bed (7).

### Deploy Cab Rear Platform

See [Figure 4-13](#) for the following procedure.

1. Support the cab rear platform (9, View C) so it cannot fall. It weighs 30 kg (66 lb).
2. Remove the quick-release pins (10, View C) from the shipping position and lower the platform to the operating position (View D).
3. Install the quick-release pins (10, View D) to secure the platform in the operating position.

4. Attach the handrail (11) to the cab rear platform (9, View E) with the safety pins (12).

**NOTE** The handrail and cab rear platform have matching identification numbers (13).

### Move Cab Tilt Stop Pins to Working Position

The cab tilt stop pins (4, [Figure 4-14](#)) will be in the shipping position when the crane arrives at the job site.

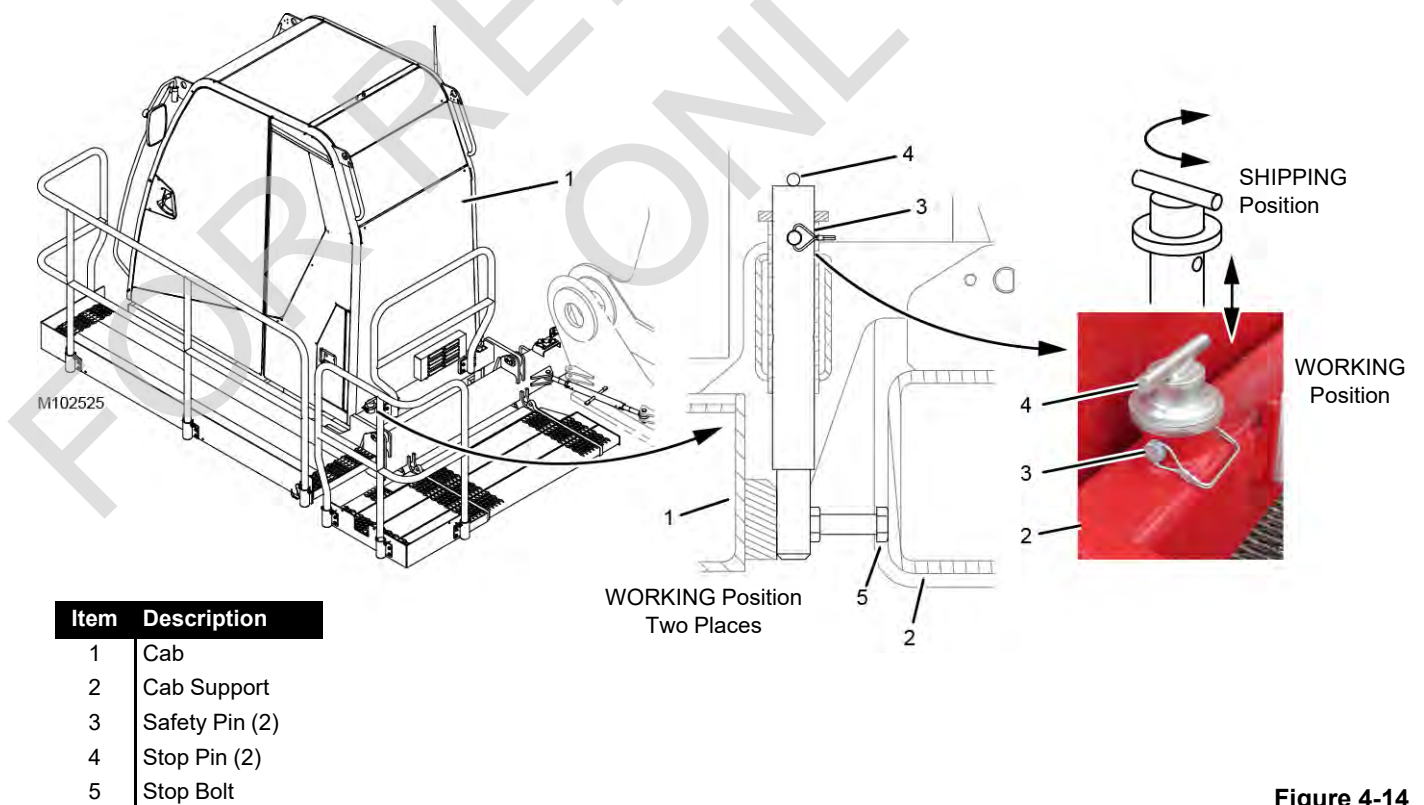
After the cab and platforms are deployed, proceed as follows:

1. Tilt the cab (1) up a few degrees above horizontal.
2. Remove the safety pins (3).
3. Lower the stop pins (4) and rotate them to align the connecting holes in the working position.
4. Install the safety pins (3).

### CAUTION

The cab tilt stop pins must be in the working position for crane operation.

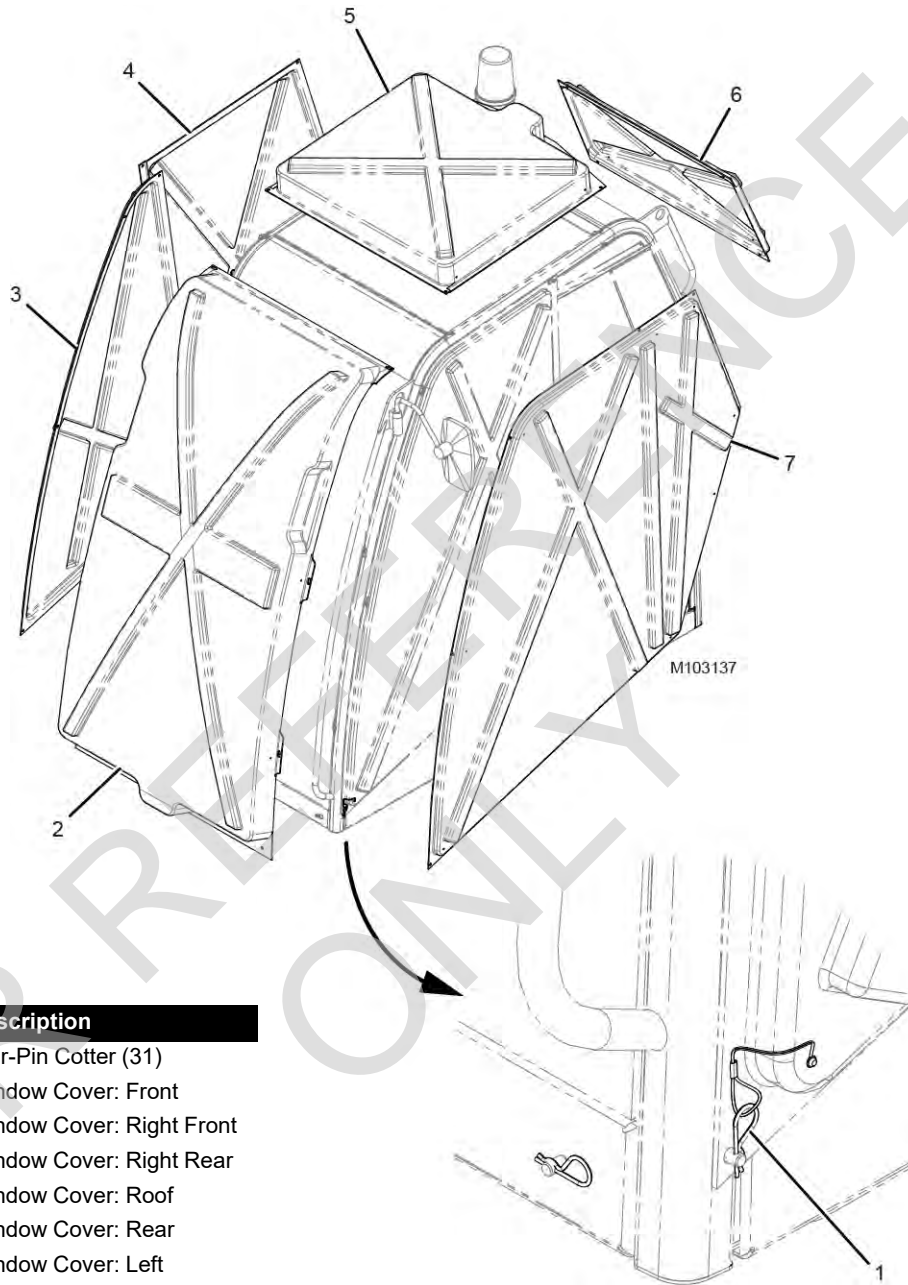
The cab will hit the crawlers and be damaged when the crane is swung if the cab is tilted down below horizontal.



Item	Description
1	Cab
2	Cab Support
3	Safety Pin (2)
4	Stop Pin (2)
5	Stop Bolt

Figure 4-14





Item	Description
1	Hair-Pin Cotter (31)
2	Window Cover: Front
3	Window Cover: Right Front
4	Window Cover: Right Rear
5	Window Cover: Roof
6	Window Cover: Rear
7	Window Cover: Left

Figure 4-15

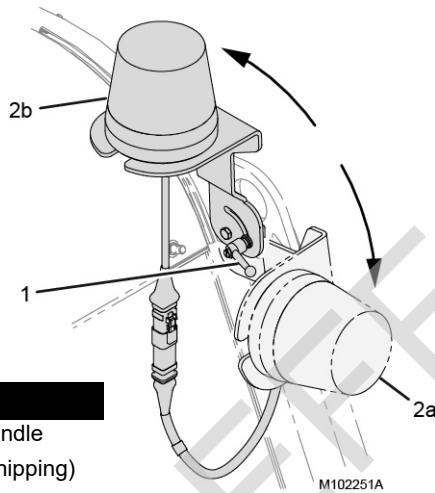
### Remove Window Covers

If equipped, remove and store the operator cab window covers. See [Figure 4-15](#).

### Raise RCL Light to Working Position

See [Figure 4-16](#) for the following procedure.

1. Loosen the clamping handle (1).
2. Rotate the light from the shipping position (2a) to the working position (2b).
3. Tighten the clamping handle (1).



Item	Description
1	Clamping Handle
2a	RCL Light (shipping)
2b	RCL Light (working)

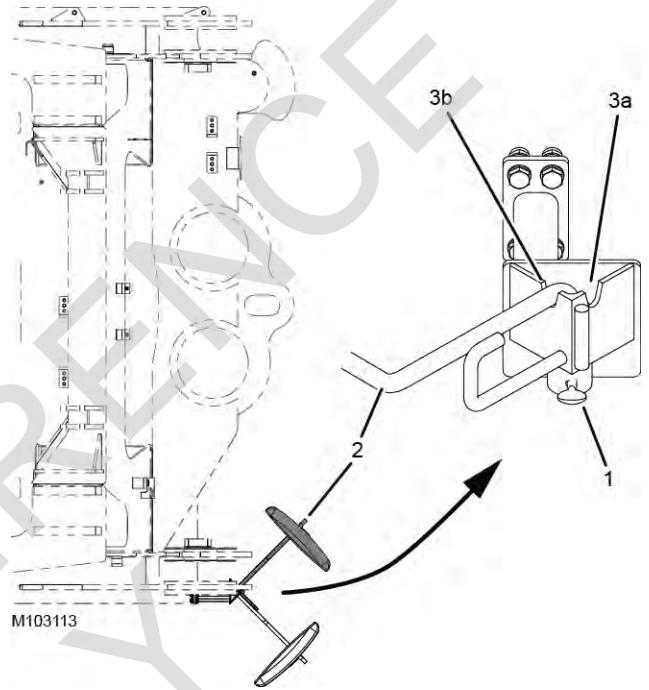
Figure 4-16

### Deploy Right Side Rear View Mirror

This mirror is optional.

See [Figure 4-17](#) for the following procedure.

1. Loosen the thumb screw (1).
2. Move the mirror (2) from the shipping notch (3a) to the working notch (3b).
3. Tighten the thumb screw (1).



Item	Description
1	Thumb Screw
2	Rear View Mirror
3a	Shipping Notch
3b	Working Notch

Figure 4-17

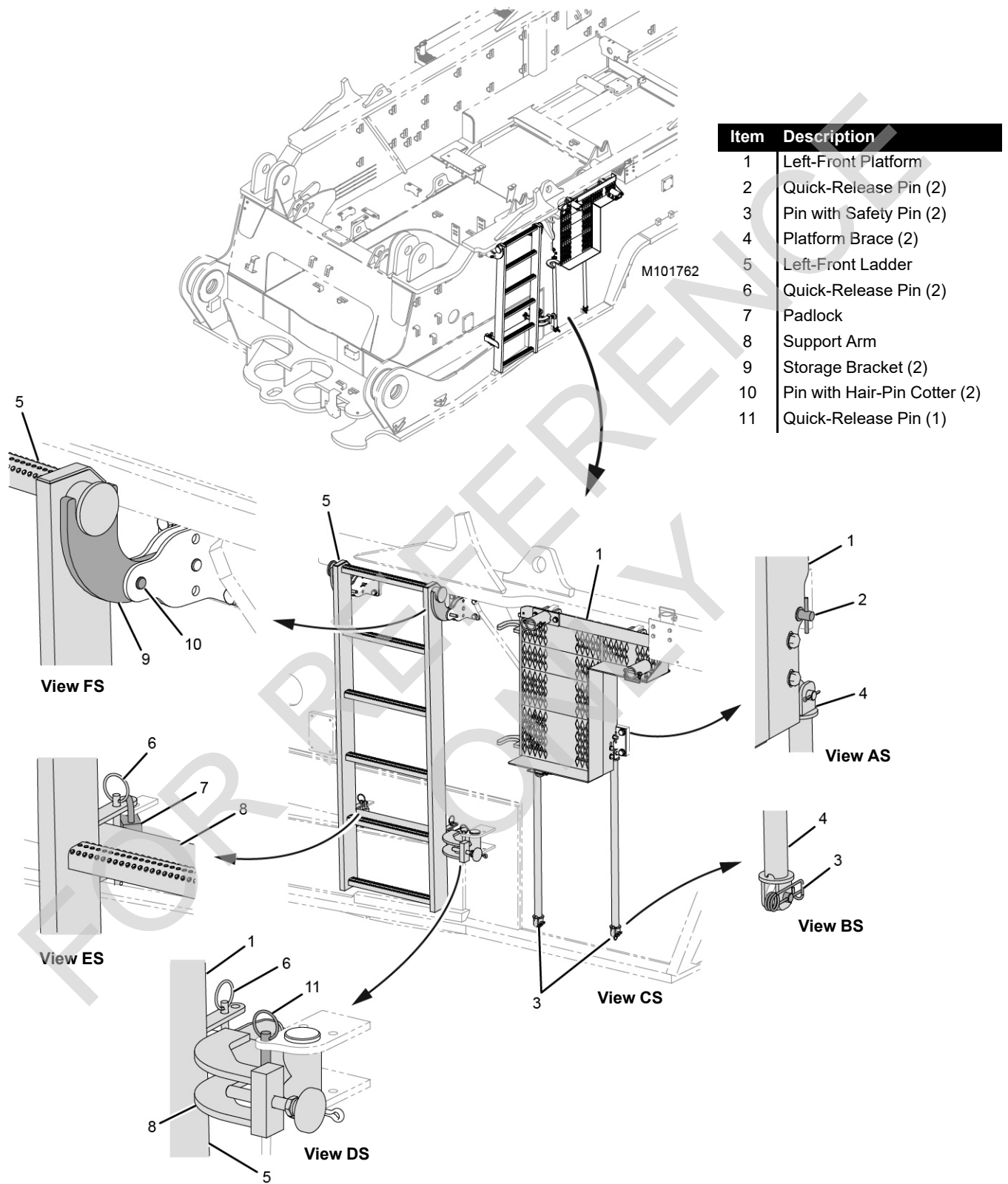


Figure 4-18

## Move Rotating Bed Left-Front Platform to Working Position

See [Figure 4-18](#) for the following procedure.

1. Remove the quick-release pins (2, View AS) and pins (3, View BS) to unpin the left-front platform (1, View CS) from the shipping position.
2. Rotate the left-front platform (1, View CW) up to the working position.
3. Pin the platform braces (4, View BW) to the lugs on the rotating bed with the pins (3).
4. Store the quick-release pins (2, View AW) in the holes in the left-front platform (1).

## Move Rotating Bed Left-Front Ladder to Working Position

See [Figure 4-18](#) for the following procedure.

1. Remove the quick-release pins (6, View DS and ES) and the padlock (7, View ES) to disconnect the left-front ladder (5, View DS) from the ladder support arm (8).

2. Unhook the left-front ladder (5, View FS) from the storage brackets (9).
3. Place the ladder to the side temporarily.
4. Remove the pins (10, View FS), lower the storage brackets (9, View FW) to the working position and install the pins (10).
5. Remove the quick-release pin (11, View DS), swing the support arm (8, View DW) out, and reinstall quick-release pin (11, View DW).
6. Hook the left-front ladder (5, View FW) onto the left-front platform (1) and rest the ladder against the support arm (9, View DW and EW).
7. Install the quick-release pins (6, View DW and EW) to connect the left-front ladder (5) to the support arm (8).
8. Store the padlock (7, View DW).

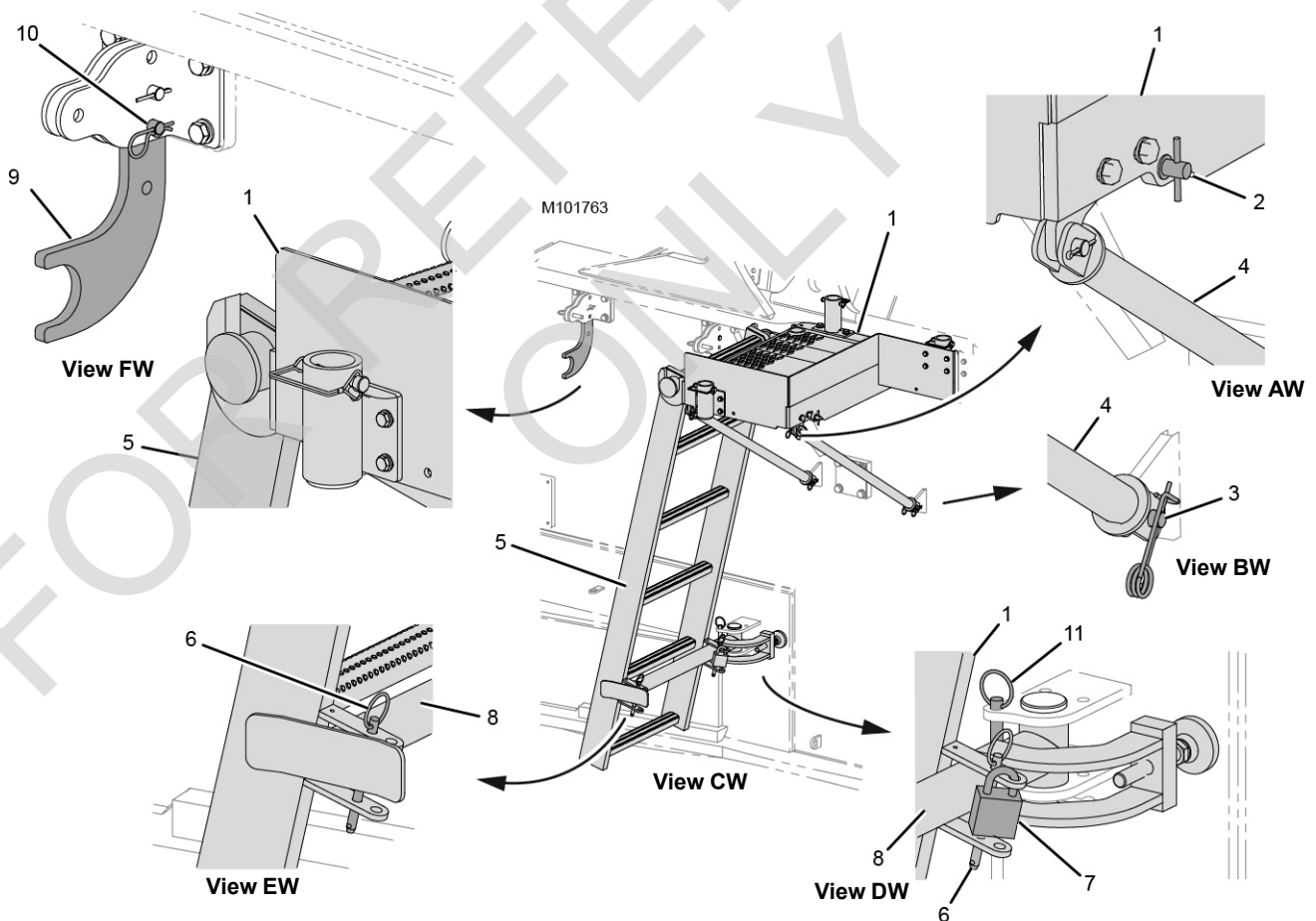


Figure 4-18 continued



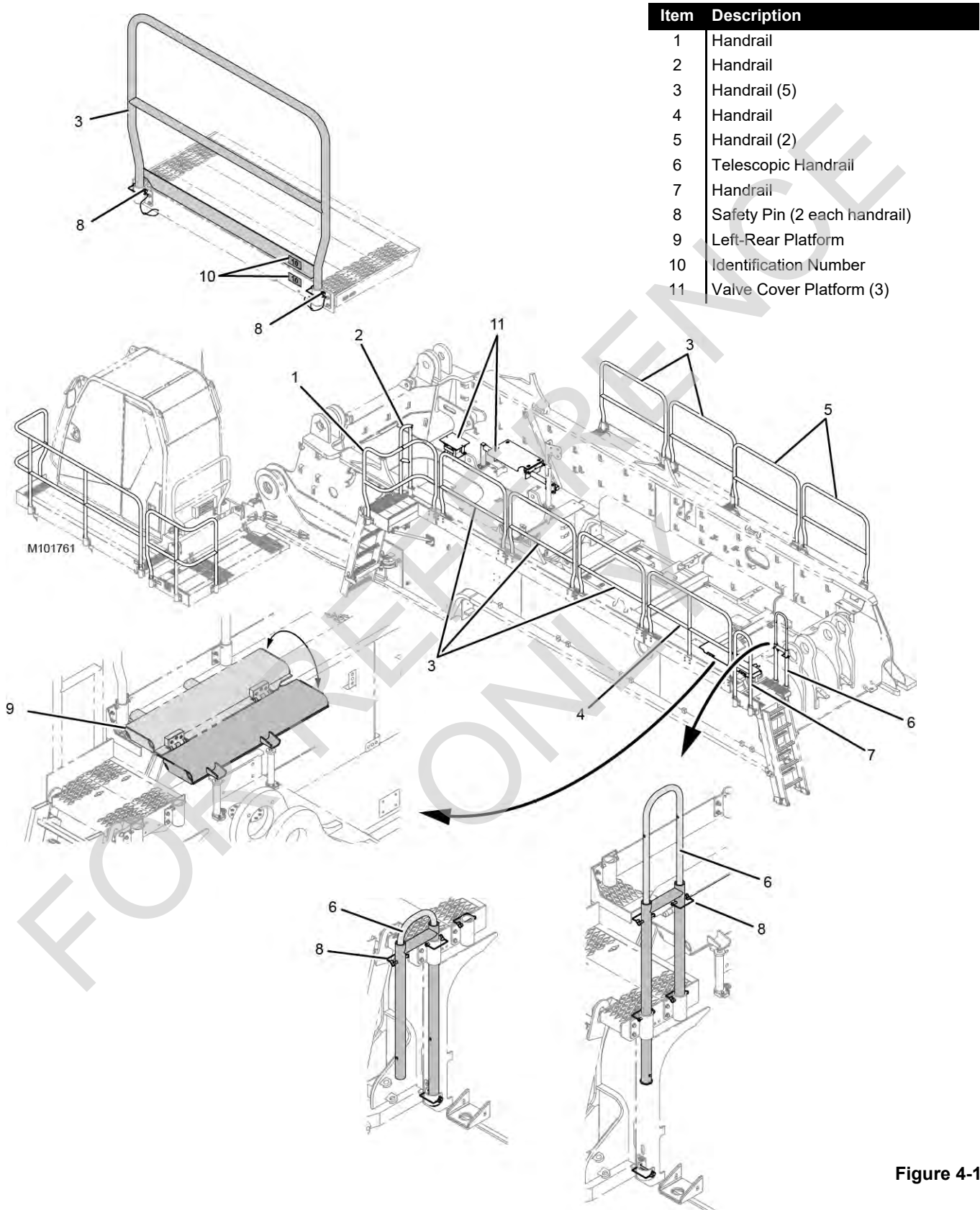


Figure 4-19

### Install Rotating Bed Handrails

See [Figure 4-19](#) for the following procedure.

The rotating bed has eleven handrails. The heaviest handrail weighs 9 kg (20 lb).

Use a tagline to lift each handrail into position.

For proper installation, match the identification number (10) on the handrail with the identification number on the platform.

1. Lift the desired handrail (1-7) into position with a tagline.
2. Align the legs of the handrail with the pockets in the platform.
3. Align the connecting holes and install the safety pins (8).
4. Repeat the steps until all handrails (1-7) are installed.

### Deploy Rotating Bed Left-Rear Platform

AFTER the live mast is raised:

1. Rotate the left-rear platform (9, [Figure 4-19](#)) from the stored position to the working position.
2. Extend the handrail (6, [Figure 4-19](#)) from the stored position and pin it in the working position.

### Deploy Valve Cover Platforms

Three valve cover platforms (11, [Figure 4-19](#)) are located in the rotating bed.

For normal operation, always pin the two large platforms in the operating position as shown in [View A, Figure 4-20](#).

For maintaining the hydraulic valves, pin the two large platforms in the servicing position as shown in [View B, Figure 4-20](#).

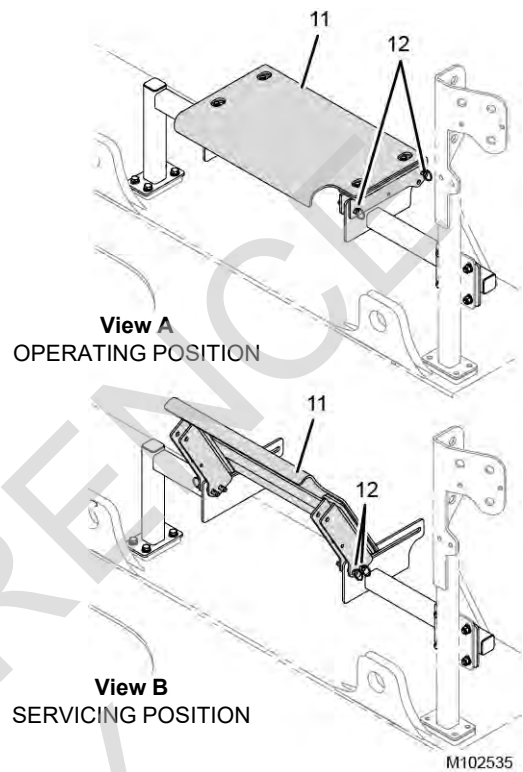
For maintaining the hydraulic valve under the small platform, remove the platform. Reinstall it when done.

### Deploy Exhaust Shield

See [Figure 4-21](#) for the following procedure.

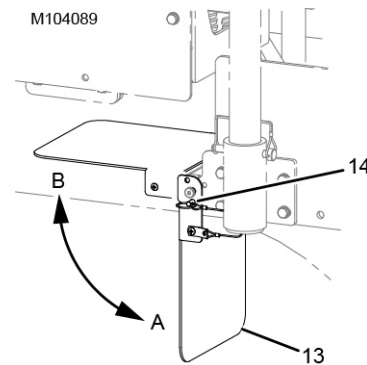
At the left rear ladder platform, proceed as follows:

1. Remove the quick-release pin (14).
2. Rotate the exhaust shield (13) down.
3. Install the quick-release pin (14).



Item	Description
11	Valve Cover Platform (3)
12	Quick-Release Pin (4 each platform)

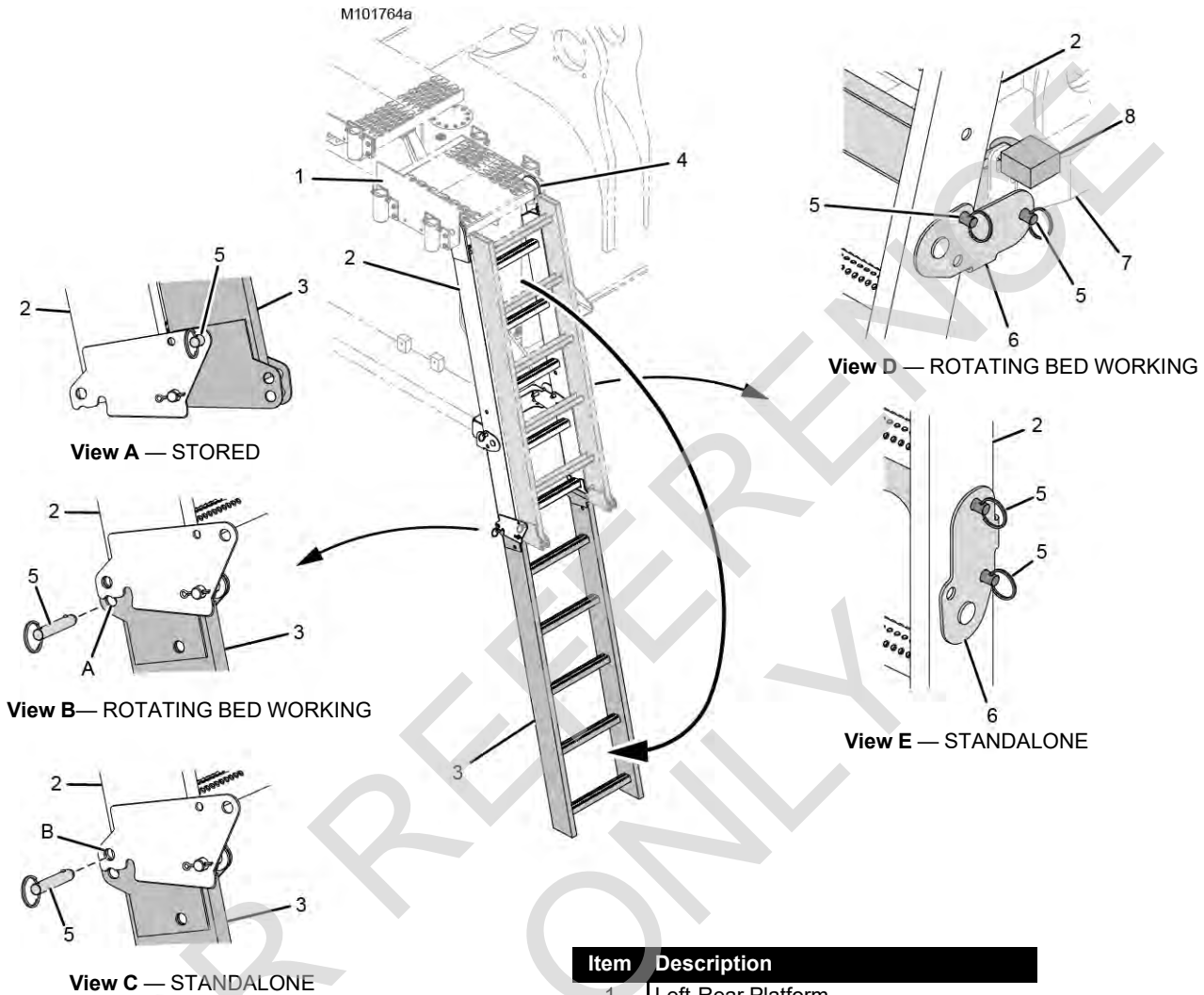
Figure 4-20



Item	Description
13	Exhaust Shield
14	Quick-Release Pin
A	Down
B	Up

Figure 4-21





Item	Description
1	Left-Rear Platform
2	Top Ladder
3	Bottom Ladder
4	Ladder Hook (2)
5	Quick-Release Pin (5)
6	Ladder Support Bracket
7	Rotating Bed Lug
8	Padlock
A	Lower Hole for Rotating Bed Working
B	Upper Hole for Standalone

Figure 4-22

## Using Rotating Bed Left-Rear Ladder

The folding ladder ([Figure 4-22](#)) provides access to the rotating bed for servicing the crane.

The ladder weights 18 kg (40 lb).



### WARNING

#### Fall Hazard

Do not use the ladder when operating the crane. Only use the ladder when servicing the crane.

- When using the ladder to service the crane, the quick-release pins (5, View B) must be installed or the ladder could fold when you are climbing it.
- When operating the crane, the ladder must be either stored or removed.
- Do not exceed the ladders capacity of 227 kg (500 lb).

The ladder has been provided only for accessing and servicing the Manitowoc MLC300 crane. Any other use is neither intended nor approved.

See [Figure 4-22](#) for following procedures.

### Installing Ladder

If the ladder has been removed, install it as follows:

1. Lower the bottom ladder (3, View B) to the working position and install the pins (5).
2. Hook the ladder to the pins in the left-rear platform (1) with the hooks (4) on the end of the ladder.
3. Remove the three pins (6, View C).
4. Raise the ladder support bracket (7, View D) and pin it to the upper holes in the top ladder (2) with two pins (6).

5. Pin the ladder support bracket (7, View D) to the rotating bed lug (8) with the remaining pin (6).

6. Install the padlock (9, View D).

### Storing Ladder

The ladder must be stored (or removed) before operating the crane or damage will occur.

1. Remove the pins (5, View B) and rotate the bottom ladder (3) up.
2. Pin the bottom ladder (3, View A) to the top ladder (2) with the pins (5).

### Using Ladder (Working Position)

1. If the ladder has been removed, install it as instructed earlier.
2. If the ladder is stored, remove the pins (5, View A) and rotate the bottom ladder (3) down.
3. Install the pins (5, View B).

### Removing Ladder

1. Lower the bottom ladder (3) to the working/standalone position as shown in View B and install the pins (5).
2. Remove the padlock (9, View D).
3. Unpin the ladder support bracket (7, View D) from the rotating bed lug (8) by removing one pin (6).
4. Remove the other two pins (6, View D).
5. Lower the ladder support bracket (7, View C) and install three pins (6).
6. Attach the padlock (9, View D) to the rotating bed lug (8).
7. Unhook the ladder hooks (4) from the pins in the left-rear platform (1) and lift the ladder away from the rotating bed.

**Assist Crane Requirements:**  
 – 9 072 kg (20,000 lb) Capacity  
 – 8,2 m (26 ft 9 in) Hook Height with Manitowoc Slings  
 – 7 m (23 ft) Minimum Radius

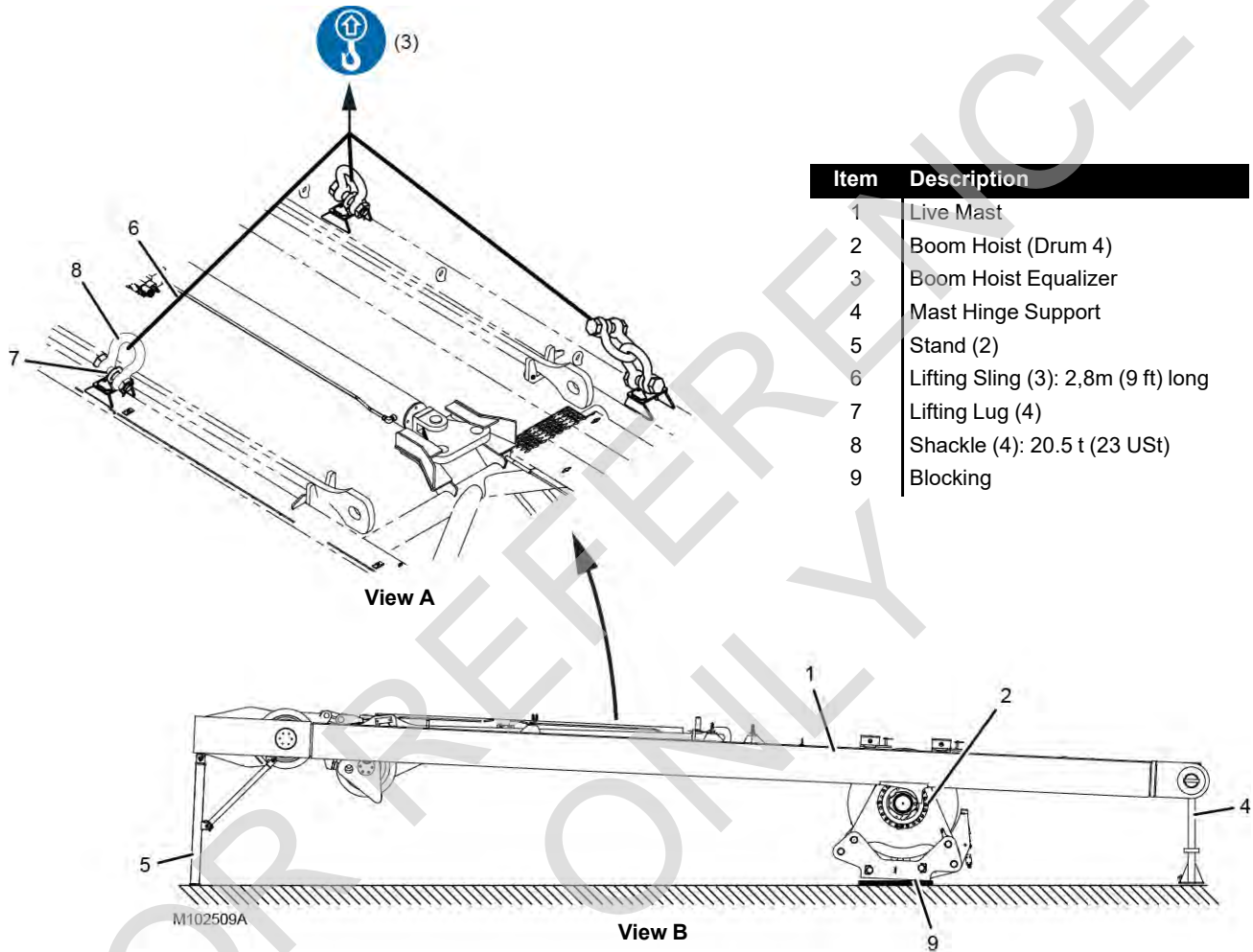


Figure 4-23

## Remove Live Mast Package from Trailer

See [Figure 4-23](#) for the following procedure.

The live mast (1, View A), the boom hoist (2), and the boom hoist equalizer (3) are shipped as an assembled package on the mast hinge supports (4) and the stands (5).

An assist crane is required to handle, install, and remove the live mast. The assist crane must meet the specifications given in [Figure 4-23](#).

1. Position the trailer carrying the live mast package in the assembly area.
2. Attach the Manitowoc supplied lifting slings (6, View A) to the hook of the assist crane.
3. Connect the other end of the lifting slings (6, View A) to the lifting lugs (7) on the live mast (1) with the Manitowoc supplied shackles (8).
  - Use one shackle at both rear lifting lugs.
  - Use two shackles at the left-front lifting lug.
4. Remove the tie-downs and blocking securing the live mast package to the trailer.
5. Lift the live mast package off the trailer and remove the trailer.

The live mast package will hang approximately 6° out of level (rear higher than front).



### WARNING Falling Load Hazard

Prevent the live mast package from falling when lifted:

- Lift only with the specified rigging at the locations shown in [Figure 4-23](#).
- Lifting in any other manner will cause the mast package to hang out of level from side to side and may cause the mast package to slide or rock to one side.

### CAUTION

The purpose of the hinge support (4, View B) is to prevent excessive bending in the mast legs when the mast package is tied down to the trailer.

Lateral movement of the live mast package as it is lowered to the ground or other foundation will cause the hinge support to pivot and not support the mast.

6. If the live mast package will be stored on the job site for future installation, proceed as:
  - a. Lower the live mast package so the stands (5, View B), the mast hinge support (4), and the boom hoist (2) are firmly contacting level ground or other foundation.
  - b. If the ground/foundation is not level, install blocking (9, View B) between the boom hoist (2) and the ground/foundation.
 

***The boom hoist (2) must not be allowed to hang suspended (unsupported) from the live mast (1).***
  - c. Slacken and disconnect the lifting slings and the shackles from the live mast.

***Continued on next page.***

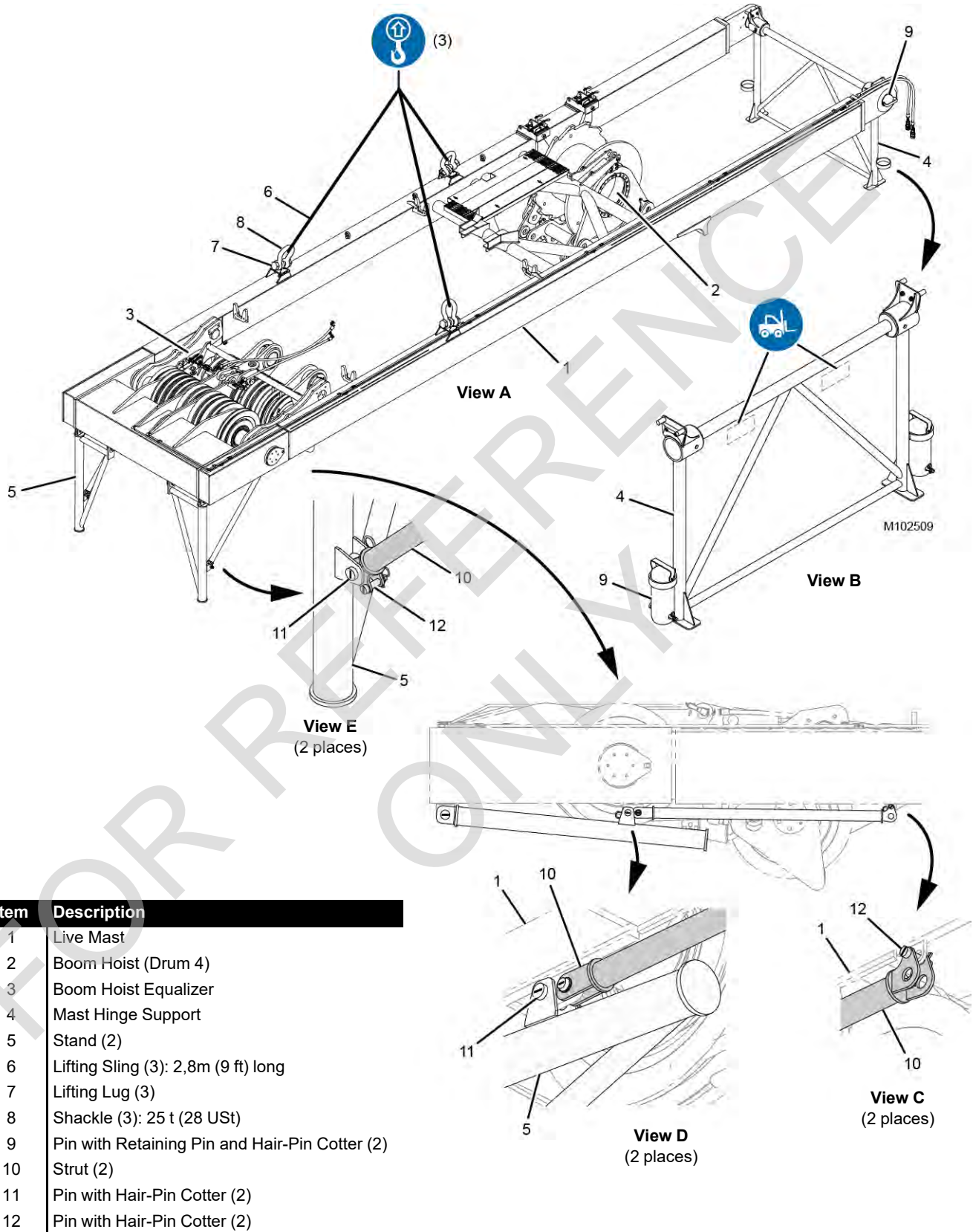
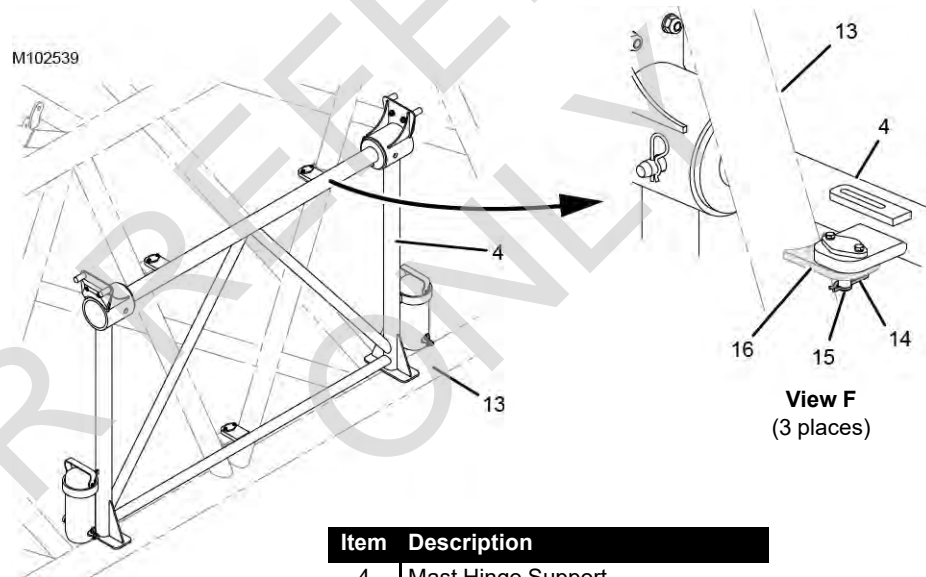


Figure 4-24



See [Figure 4-24](#) for the following procedure.

7. If the live mast will be installed directly onto the crane from the trailer, proceed with the remaining steps.
8. Lower the live mast package so the stands (5, View A) and the boom hoist (2) frame are firmly contacting the ground or other foundation.
9. If desired, install blocking between the boom hoist (2) frame and the ground/foundation.
10. Remove and store the mast hinge support (4):
  - a. Support the mast hinge support (4, View B) with the forks from a forklift. The support weighs 82 kg (181 lb).
  - b. Remove the pins (9, View A) from the shipping position and store the pins in the mast hinge support (4, View B).
  - c. Using the forklift, lift the mast hinge support (4) away from the live mast (1).
  - d. Remove the hair-pin cotters (14, View F) from the pins (15) on the mast hinge support (4).
- e. Using the forklift, lift the mast hinge support (4) into position on the right outboard side of the 12 m (39.4 ft) insert (13).
- f. Engage the pins (15) with the lugs (16) on the insert (13).
- g. Install the three hair-pin cotters (14).
11. Store the stands (5):
  - a. Lift the live mast package with the assist crane so the stands (5, View E) are just clear of the ground.
  - b. Remove the pins (11, View E) to unpin the struts (10) from the stands (5).
  - c. Remove the pin (12, View E) from the end of each strut (10).
  - d. Pin the struts (10, View C) to the underside of the live mast (1) with the pins (12).
  - e. Pin the stands (5, View D) to the underside of the live mast (1) with the pins (11).



Item	Description
4	Mast Hinge Support
13	12 m (39.4 ft) Insert with Sheaves
14	Hair-Pin Cotter (3)
15	Pin (3)
16	Lug (3)

Figure 4-24 continued



Item	Description	Item	Description
1	Live Mast	9	Rotating Bed Lug (2)
2	Keeper Pin with Safety Pin (4)	10	Alignment Pin (4)
3	Mast Hinge Pin	11	Alignment Notch (4)
4	Equalizer Hinge Pin	12	Rotating Bed Frame
5	Pin with Safety Pin (4)	13	Alignment Lug (2)
6	Boom Hoist Mounting Frame	14	Boom Hoist Equalizer
7	Alignment Lug (2)	15	Alignment Ring (2)
8	Alignment Ring (2)	16	Rotating Bed Lug (2)

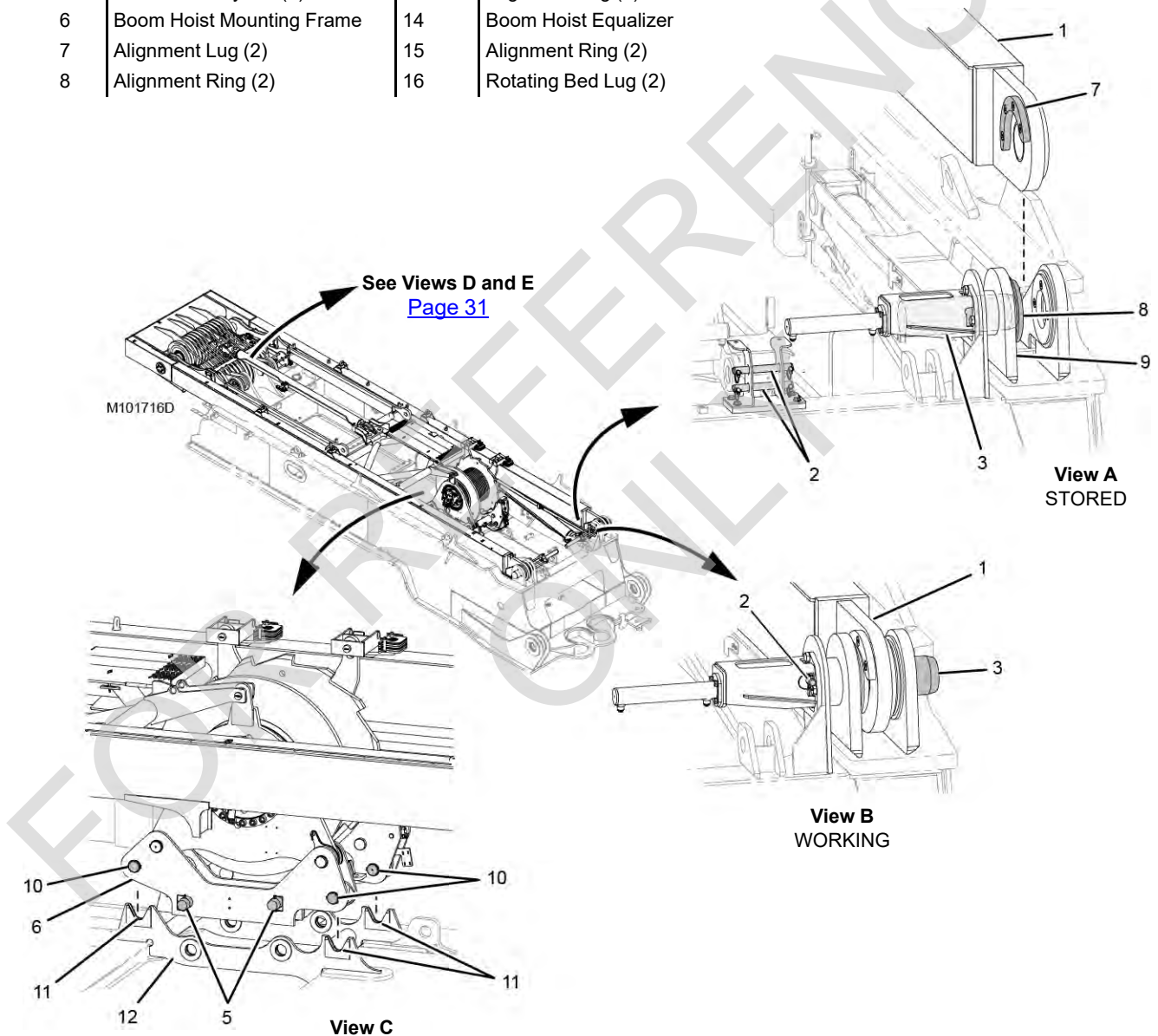


Figure 4-25

## Install Live Mast Package

See [Figure 4-25](#) for the following procedure.

1. Remove the keeper pins (2, Views B and E) from the mast hinge pins (3, View B) and the equalizer hinge pins (4, View E).
2. Store the keeper pins (2, Views A and D).
3. Using the remote control, disengage the mast hinge pins (3, View A) and the equalizer hinge pins (4, View D).
4. Remove pins (5, View C) from the boom hoist mounting frame (6) and place the pins to the side.
5. Lift the live mast package into position over the upperworks.  
The live mast will hang approximately 6° out of level.
6. Lower the live mast package until the alignment lugs (7, View A) on the mast (1) engage the alignment rings (8) on the rotating bed lugs (9).

7. Using the remote control, engage the mast hinge pins (3, View B) and install the locking pins (2).
8. Continue to lower the live mast package until:
  - a. The alignment pins (10, View C) in boom hoist mounting frame (6) engage the alignment notches (11) in the rotating bed frame (12).
  - b. The alignment lugs (13, View D) on the boom hoist equalizer (14) engage the alignment rings (15) on the rotating bed lugs (16).
9. Using the remote control, engage the equalizer hinge pins (4, View E) and install the locking pins (2).
10. Install the pins (5, View C) to connect the boom hoist mounting frame (6) to the rotating bed frame (12).
11. Disconnect the shackles and lifting slings from the live mast.

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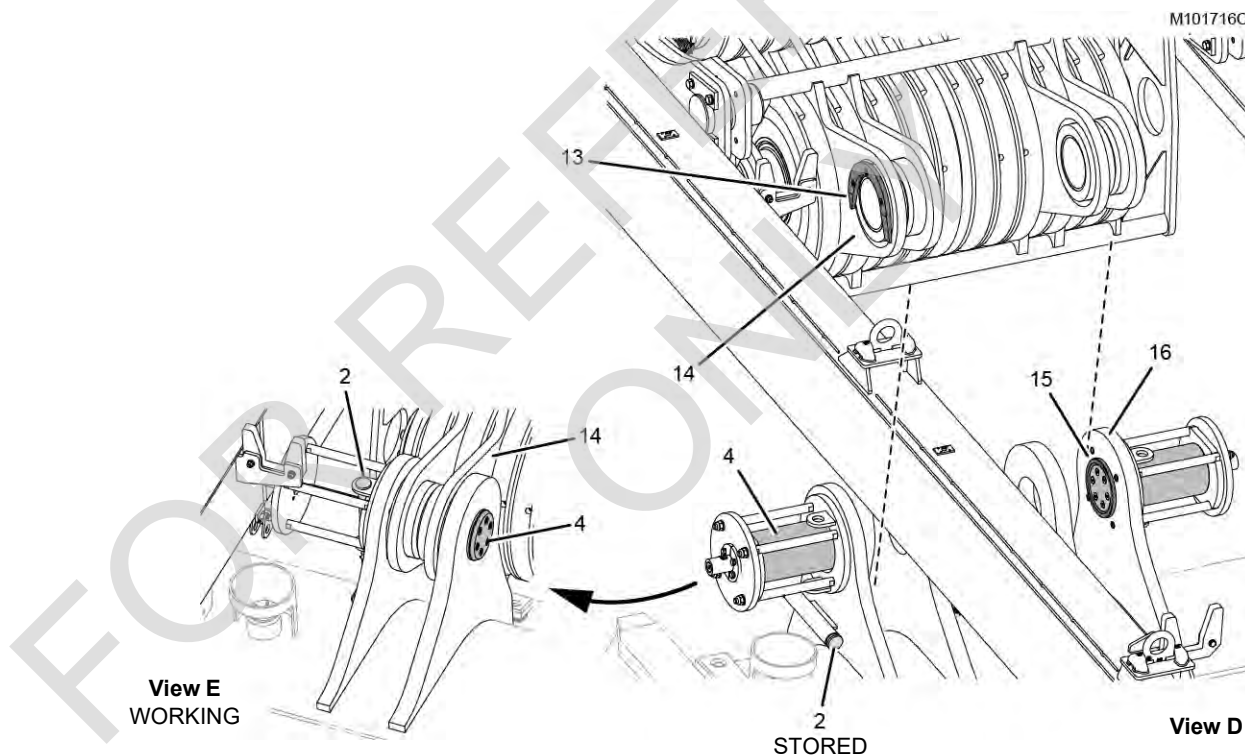


Figure 4-25 continued

Item	Description	Item	Description	Item	Description
1	Boom Hoist Equalizer	8	Safety Pin	15	Hydraulic Hose (2)
2	Quick-Release Pin	9	Pin	16	Hydraulic Couplers (2)
3	Shims	10	Shims	17	Electric Cable (WRM1)
4	Safety Pin	11	Hydraulic Hose (5)	18	Receptacle (WRR1-J3)
5	Pin	12	Hydraulic Couplers (5)	19	Camera Switcher
6	Boom Hoist (Drum 4)	13	Electric Cable	20	Ground Cable (from mast)
7	Pin with Safety Pin	14	Receptacle (WRC3)	21	Ground Screw (on rotating bed)

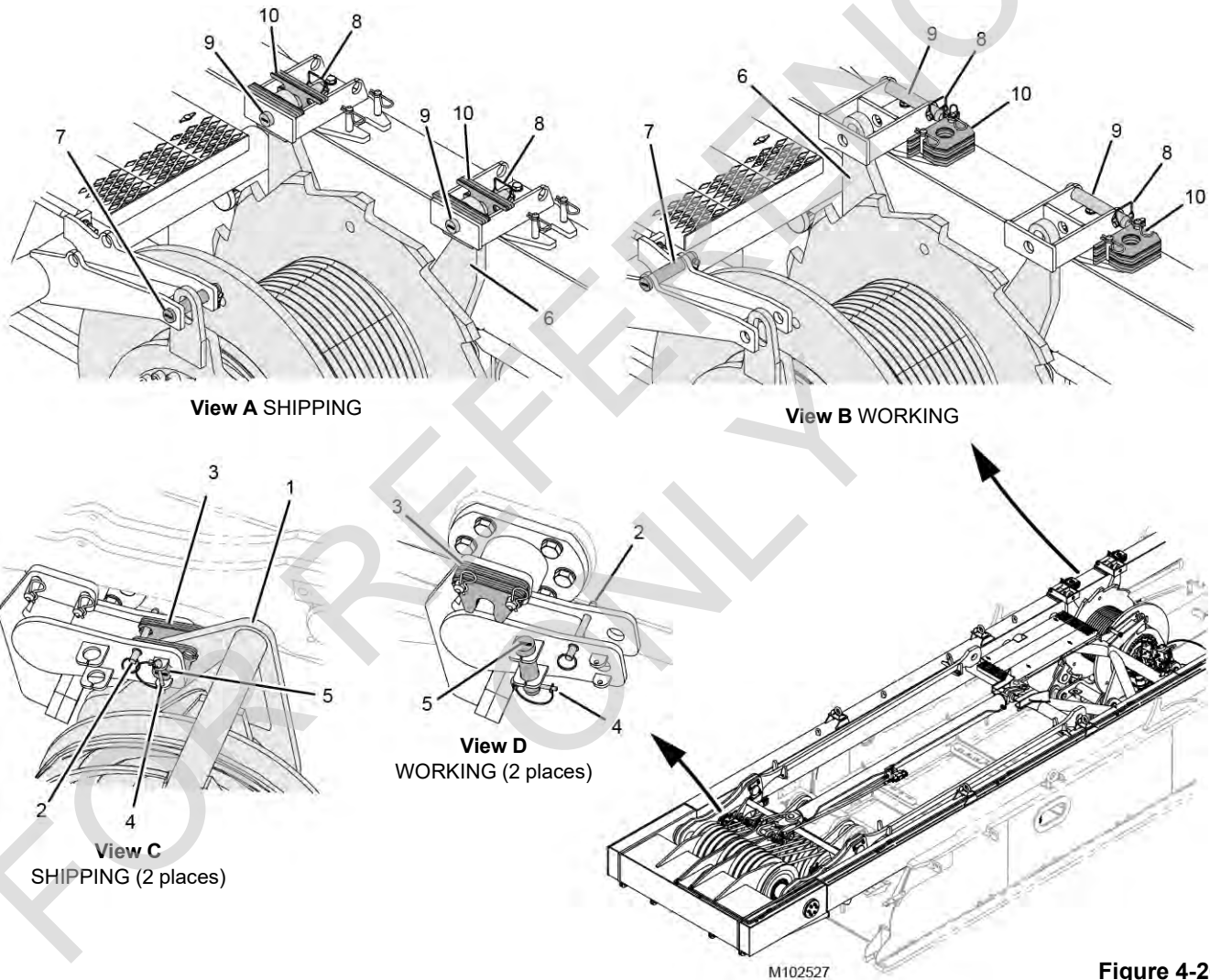


Figure 4-26

See [Figure 4-26](#) for the following procedure.

12. Proceed as follows on both sides of the boom hoist equalizer (1, View C):

- a. Remove the quick-release pin (2, View C) and the shims (3) from the shipping position.
- b. Store the pin (2, View D) and the shims (3).

c. Remove the safety pin (4, View C) and the pin (5) from the shipping position.

d. Store the pin (5, View D) and the safety pin (4).

13. Proceed as follows at the boom hoist (6, View A):

- a. Remove the pin (7, View A) from the shipping position.



- b. Store the pin (7, View B).
14. Proceed as follows (two places) at the boom hoist (6, View A):
- Remove the safety pin (8, View A) and the pin (9) from the shipping position.
  - Store the pin (9, View B) and the safety pin (8).
  - Remove the shims (10, View A) from the shipping position.
  - Store the shims (10, View B).
15. Disconnect the dust caps from four hydraulic couplers (12, View E) on the boom hoist.
16. Connect four hydraulic hoses (11, View E) to four hydraulic couplers (12) on the boom hoist (6).
- The hoses are attached to storage couplers on the right inboard side of the rotating bed. See [Figure 4-86 on page 4-126](#).
  - Match the identification numbers on the hoses with the identification numbers on the couplers for proper connection.
- Connect the dust caps to the storage couplers.
17. Connect the electric cable (13, View E) from the rotating bed to the receptacle (14) on the boom hoist.
18. Connect the two hydraulic hoses (15, View G) from the live mast to the two hydraulic couplers (16) on the rotating bed.
- The hydraulic hoses (15) the electric cable (17) and the ground cable (20) are stored on the live mast as shown in View H.
19. Connect the electric cable (17, View G) from the live mast to the receptacle (18) on the rotating bed.
20. Attach the ground cable (20, View G) from the live mast to the rotating bed with the ground screw (21) and washer.
21. Connect the Drum 2/3 camera cable from the live mast to the camera switcher (19, View F) on the rotating bed. See [Figure 4-29 on page 4-39](#).

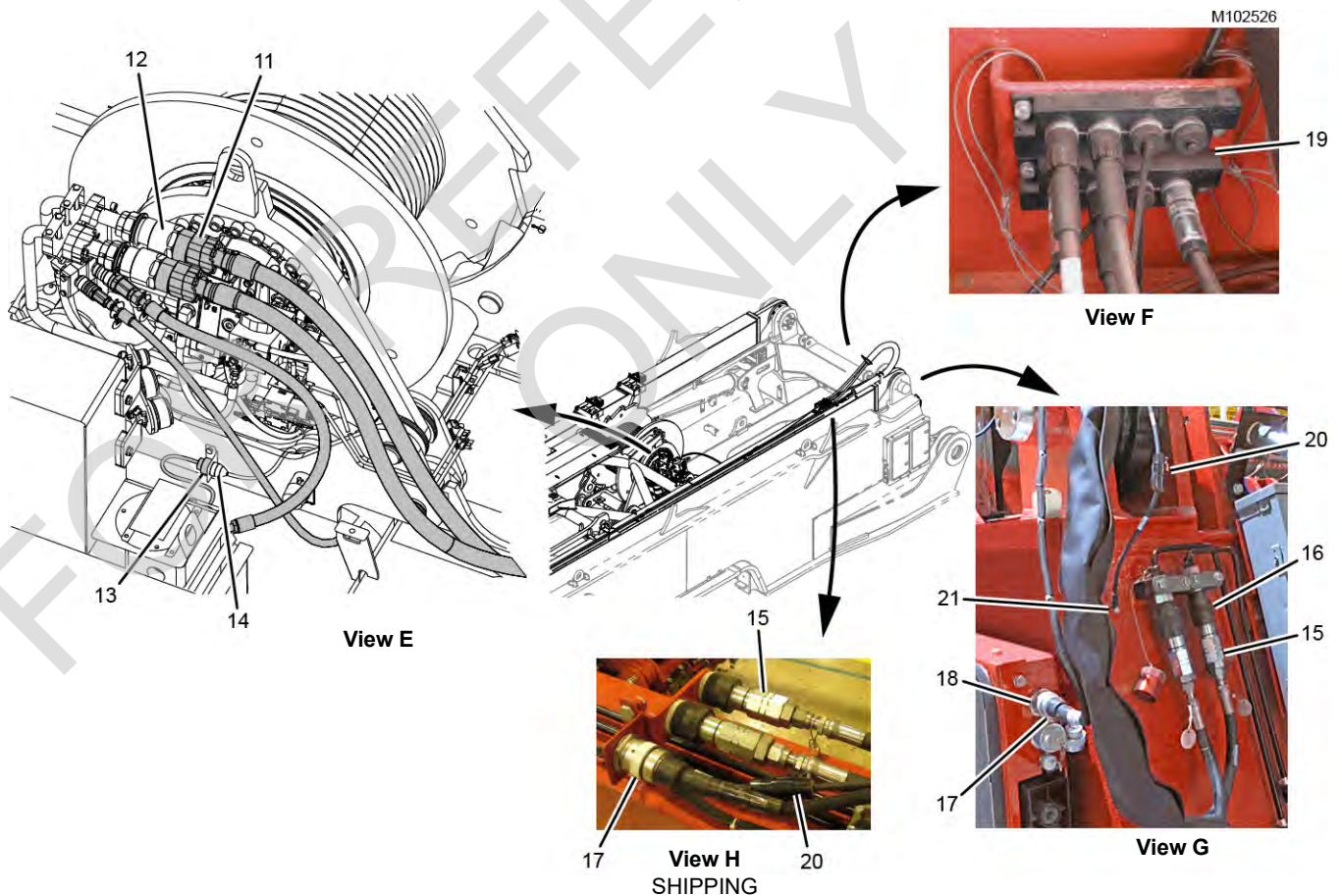


Figure 4-26 continued

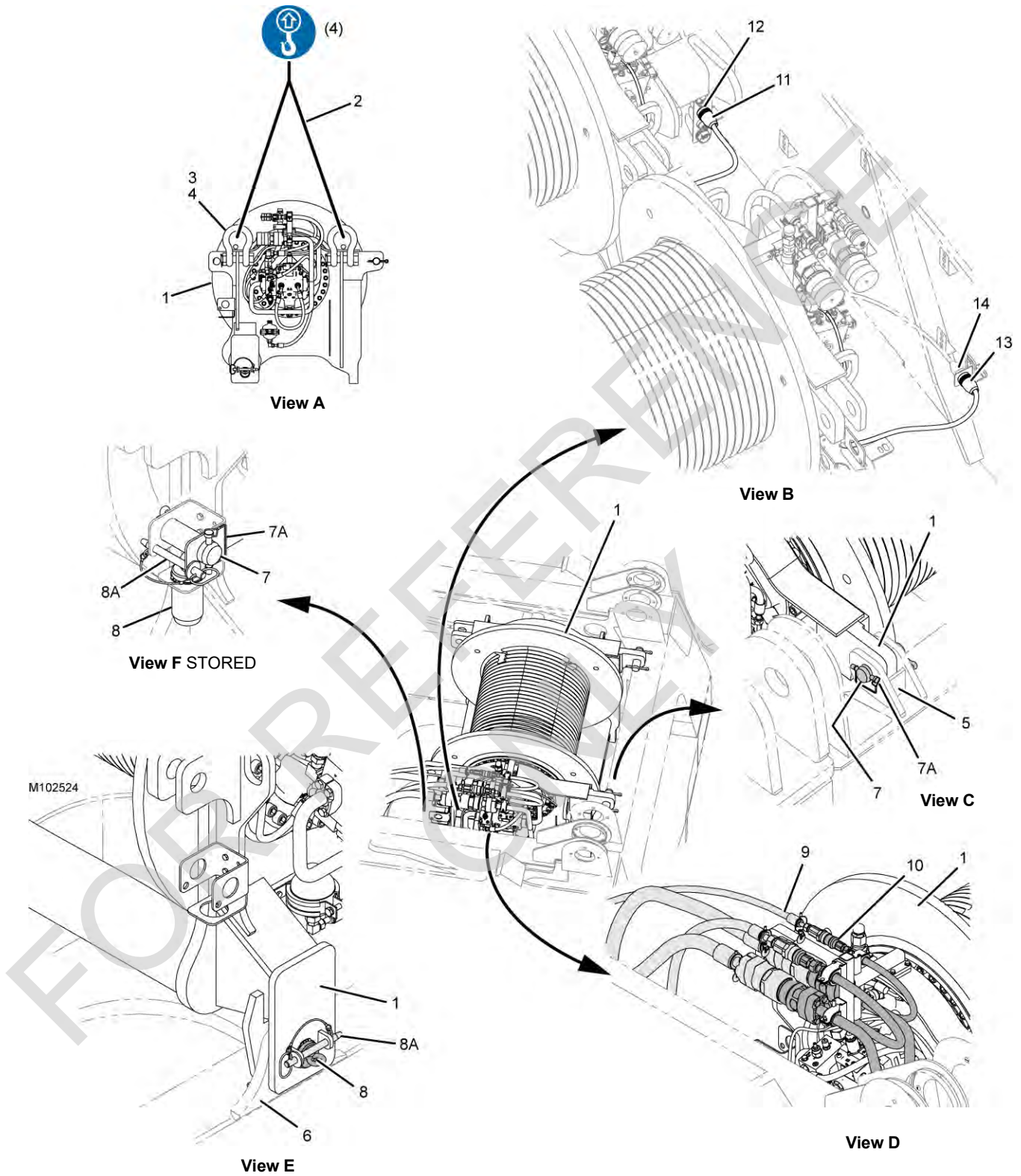


Figure 4-27

legend for [Figure 4-27](#)

Item	Description
1	Drum 2
2	Lifting Sling (4): 2,8m (9 ft) long
3	Lifting Lug (4)
4	Shackle (4): 25 t (28 USt)
5	Rotating Bed Lugs
6	Rotating Bed Lugs
7	Pin (2)
7A	Safety Pin (2)
8	Pin (2)
8A	Hair-Pin Cotter (2)
9	Hydraulic Hose (4)
10	Hydraulic Coupler (4)
11	Electric Cable (WRF1-P1)
12	Electric Receptacle (WRR1-J4)
13	Electric Cable (WRF1-P1)
14	Electric Receptacle (WRR1-J5)

## Install Drum 2

An assist crane is required to lift the drum into position in the rotating bed. The assist crane must be capable of lifting 4 650 kg (10,253 lb) to a height of approximately 6 m (20 ft) above the ground.

The MLC300 live mast and self-erect cylinder can be used to lift the drum off the trailer.

1. Store the front platform (1, View A, [Figure 4-28](#)) as shown in View C, [Figure 4-28](#).
2. Position the trailer carrying the drum in the assembly area.

See [Figure 4-27](#) for the remaining steps.

3. Attach the Manitowoc supplied lifting slings (2, View A) to the hook of the assist crane.
4. Connect the other end of the lifting slings (2, View A) to the lifting lugs (3) on the drum (1) with the Manitowoc supplied shackles (4).
5. Remove the tie-downs and blocking securing the drum to the trailer.
6. Lift the drum off the trailer and remove the trailer.

7. Lift the drum (1) into position over the rotating bed.
8. Remove the pins (7 and 8, View F) from the stored position and place them nearby for installation.
9. Lower the drum (1) into the rotating bed and align the bottom connecting holes in the rear of the drum (1, View E) with the connecting holes in the rotating bed lugs (6).
10. Install the pins (8, View E) and the hitch pins (8A) in the bottom connecting holes.
11. Align the top connecting holes in the front of the drum (1, View C) with the connecting holes in the rotating bed lugs (5).
12. Install the pins (7, View C) and the safety pins (7A).
13. Slacken the lifting slings and disconnect the shackles (4, View A) and the lifting slings (2) from the drum.
14. Disconnect the dust caps from the four hydraulic couplers (10, View D) on the drum.
15. Connect the four hydraulic hoses (9, View D) from the rotating bed to the four hydraulic couplers (10) on the drum (1).
  - The hoses are attached to storage couplers on the right inboard side of the rotating bed. See [Figure 4-86 on page 4-126](#).
  - Match the identification numbers on the hoses with the identification numbers on the couplers for proper connection.
  - Connect the dust caps to the storage couplers.
16. Connect the electric cable (11, View B) from the drum (1) to the electric receptacle (12) on the rotating bed.

## Install Drum 3

Drum 3 installation is identical to Drum 2 installation with the following exceptions:

- The top connecting holes in Drum 3 are pinned to the top connecting holes in the rear of Drum 2.
- The electric cable (13, View B, [Figure 4-27](#)) from Drum 3 is connected to the electric receptacle (14) on the rotating bed.

Both platforms (1 and 2, View A, View A, [Figure 4-28](#)) must be removed and stored as shown in View D, [Figure 4-28](#).



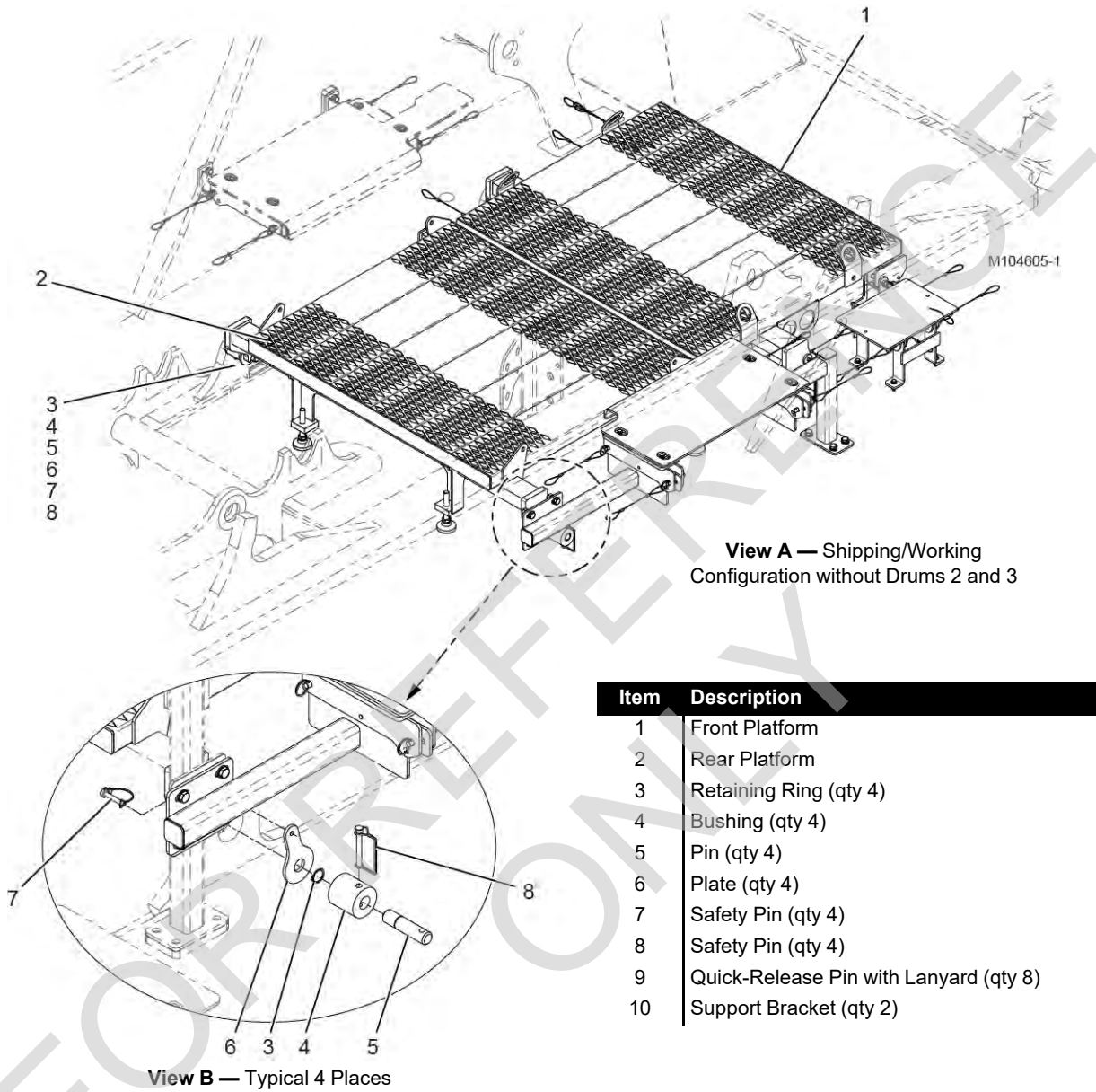
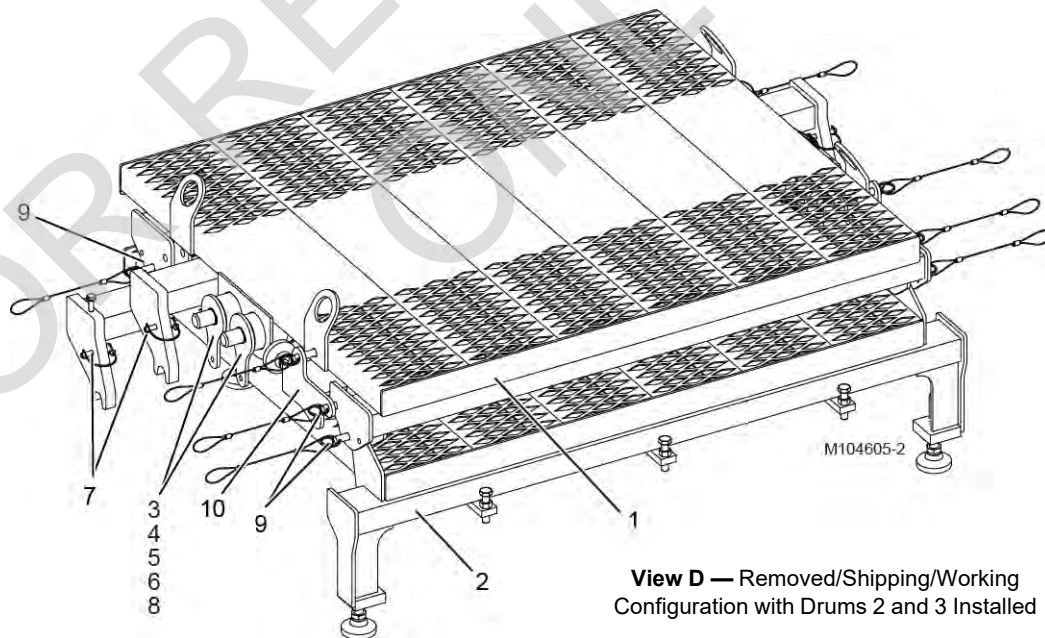
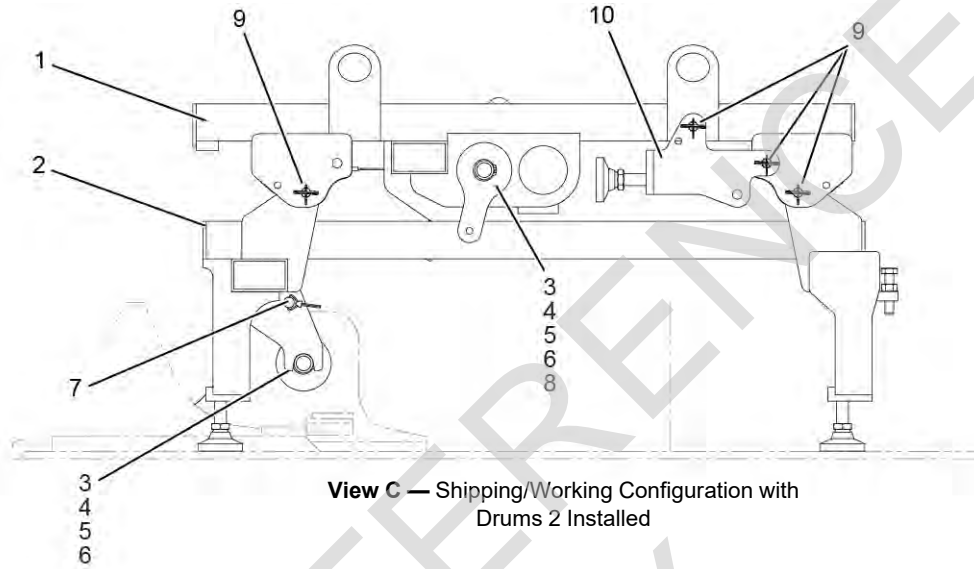


Figure 4-28



4

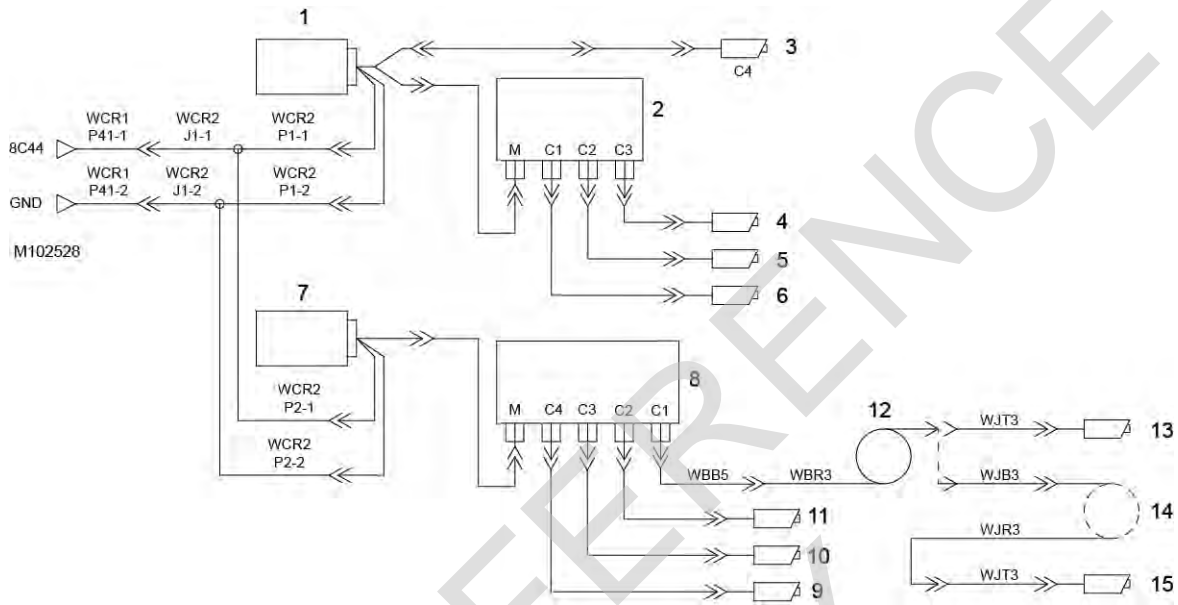
Figure 4-28 continued

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### Camera Connections

Figure 4-29 shows Manitowoc recommended connections to the camera (CCTV) switchers on the front of the rotating bed.

The crane owner can rearrange the connections as desired to meet operator preference.



Item	Description	Item	Description
1	Upper Monitor (in cab)	9	Camera: Drum 2/3
2	Camera Switcher	10	Not Used
3	Lower Monitor (in cab)	11	Camera: Drum 4
4	Camera Switcher	12	Cable Reel in Boom
5	Not Used	13	Camera: Boom Top
6	Camera: Drum 1	14	Cable Reel in Jib
7	Camera: Drum 6	15	Camera: Jib Top
8	Not Used		

Figure 4-29

Item	Description
1	Live Mast
2	Mast Assist Arm and Cylinder (2)
3	Boom Hoist
4	Boom Hoist Wire Rope
5	Equalizer
6	Mast-to-Boom Straps
7	Self-Erect Cylinder
8	Lifting Link
9	Storage Bracket
A	Transport Position
B	Vertical
C	Operating Angle for Installing Crawlers
D	Mast Assist Arm Cylinders Fully Extended
E	Operating Range
F	Maximum Operating Angle with Load
G	Maximum Angle for Connecting Rigging

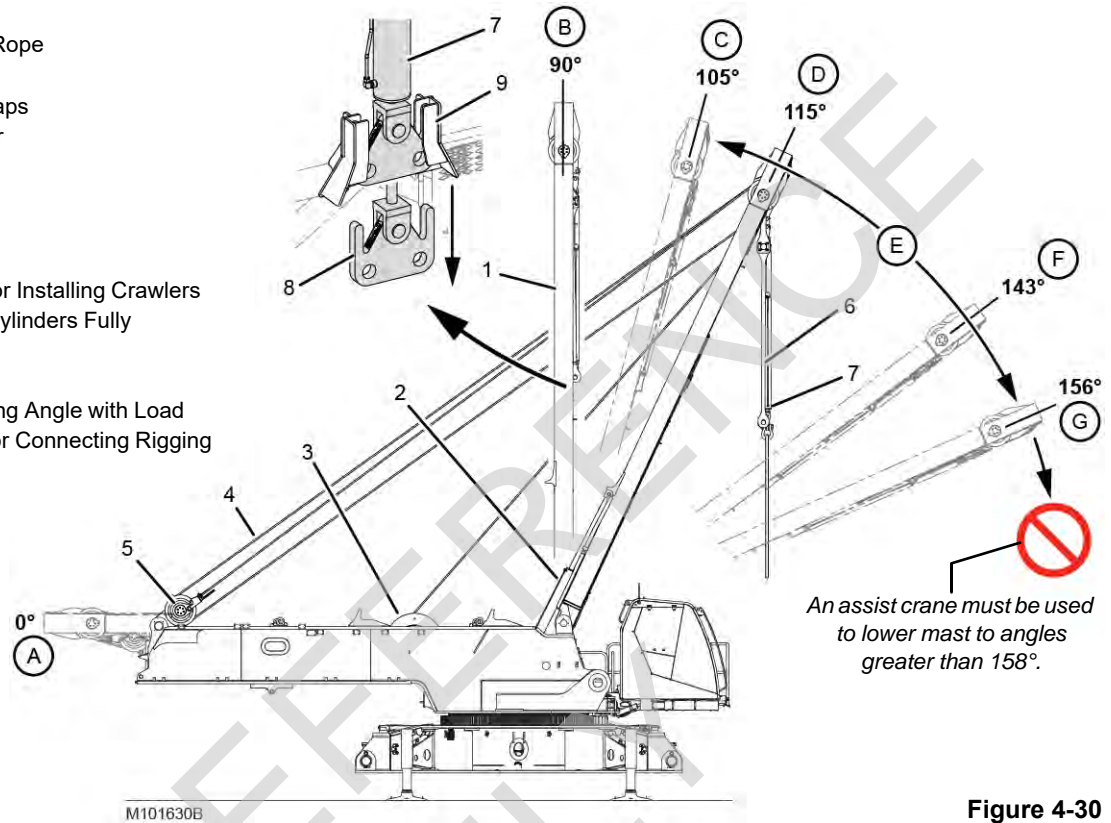


Figure 4-30

**WARNING**

**Falling Mast Hazard!**

Prevent mast from falling over backwards or forward:

- Read and thoroughly understand the live mast raising instructions.
- Select the Liftcrane Mast Capacities chart in RCL/RCI Display before raising mast and using it as a boom. The mast operating limits remain off until this step is performed.

**CAUTION**

**Mast Damage!**

Make sure the mast angle indicator is properly installed and adjusted prior to raising the live mast (see Section 4 of MLC300 Service Manual).

The live mast can be damaged if the angle indicator is not properly installed or adjusted.

**Activate Setup Mode**

Perform the steps under [Setup Mode on page 4-9](#).

**Raise Live Mast To Operating Position**

See [Figure 4-30](#) for the following procedure.

The following controls are used to raise and lower the live mast. See the Operating Controls in Section 3 for identification and operation of these controls.

- RCL/RCI Display to select (turn on) the live mast mode. See the RCL/RCI Operation Manual for instructions.
- Main Display to turn on the remote control, to monitor the live mast angle, and to view operating faults. See the MLC300 Main Display Operation Manual for instructions.
- MAST ASSIST ARMS SWITCH to raise and lower the mast assist arms independently of the live mast. The control is mounted on the right side control console in the cab and on the remote control.

- BOOM CONTROL HANDLE to raise and lower the live mast while using it as a boom for crane assembly and disassembly.
  - CENTER DRUM CONTROL HANDLE (on right console) to extend and retract the self-erect cylinder.
1. Make sure all pins between the live mast (1), the equalizer (5) and the boom hoist (3) are removed and stored. Damage can occur if pins are still installed.
  2. Select the Liftcrane Mast Capacities Chart in the RCL/RCI Display.
  3. During the raising procedure, monitor the MAST ANGLE in the crane status information bar of the Main Display Working Screen.
  4. Increase engine speed to the desired RPM.
  5. Check the boom hoist wire rope between the sheaves in the end of the live mast (1) and the equalizer. If the wire rope is slack, proceed as follows:
    - a. Extend the mast assist arm cylinders (2) with the switch on the remote control or on the right console in the cab.
    - b. Stop when the slack is out of the wire rope.
  6. BOOM DOWN with the boom control handle to raise the live mast (1).  
The live mast will rise as the mast assist arm cylinders (2) extend automatically.
  7. Stop raising the live mast when it is vertical (position B).
  8. If required, slowly extend the self-erect cylinder (7) using the center drum control handle until the lifting link (8) disengages the storage bracket (9).
  9. Continue to boom down to lower the live mast to the desired operating position.  
The mast assist arms will stop rising automatically when the cylinders are fully extended at approximately 115° (position D).
  10. Proceed to use the live mast as a boom with the boom control handle and the middle drum control handle for the remainder of the self-erect assembly procedures.  
**See Liftcrane Mast Capacities chart at the end of this section for detailed lifting capacities.**
  11. AFTER the live mast is raised:
    - a. Rotate the left-rear platform (9, [Figure 4-19 on page 4-22](#)) from the stored position to the working position.

- b. Extend the handrail (6, [Figure 4-19 on page 4-22](#)) from the stored position and pin it in the working position.

## Live Mast Operating Precautions

### **WARNING** **Falling Mast Hazard!**

Prevent the live mast from falling:

- Do not use the limit bypass switch to lower the live mast below 158°. The mast will fall suddenly. **Connect an assist crane to end of mast if it is necessary to lower it below 158°.**
- Do not lower the mast assist arms until the live mast is connected to the boom straps. The mast will fall over backwards if raised toward vertical when the mast assist arms are down.
- Do not raise the boom with the live mast until the mast assist arms are fully lowered.

The following will occur if the live mast is lowered to 158°:

- The mast will stop lowering.
- The hazard warning will come on and the MAST TOO FAR FORWARD icon will appear in the fault bar of the Main Display Working Screen.



When the SETUP MODE is ON, the following will occur if you attempt to raise the live mast when the mast assist arms are down:

- The boom hoist will not operate.
- The hazard warning will come on and the MAST ASSIST ARMS DOWN icon will appear in the fault bar of the Main Display Working Screen.
- Make sure the mast assist arms are fully raised before raising the mast.



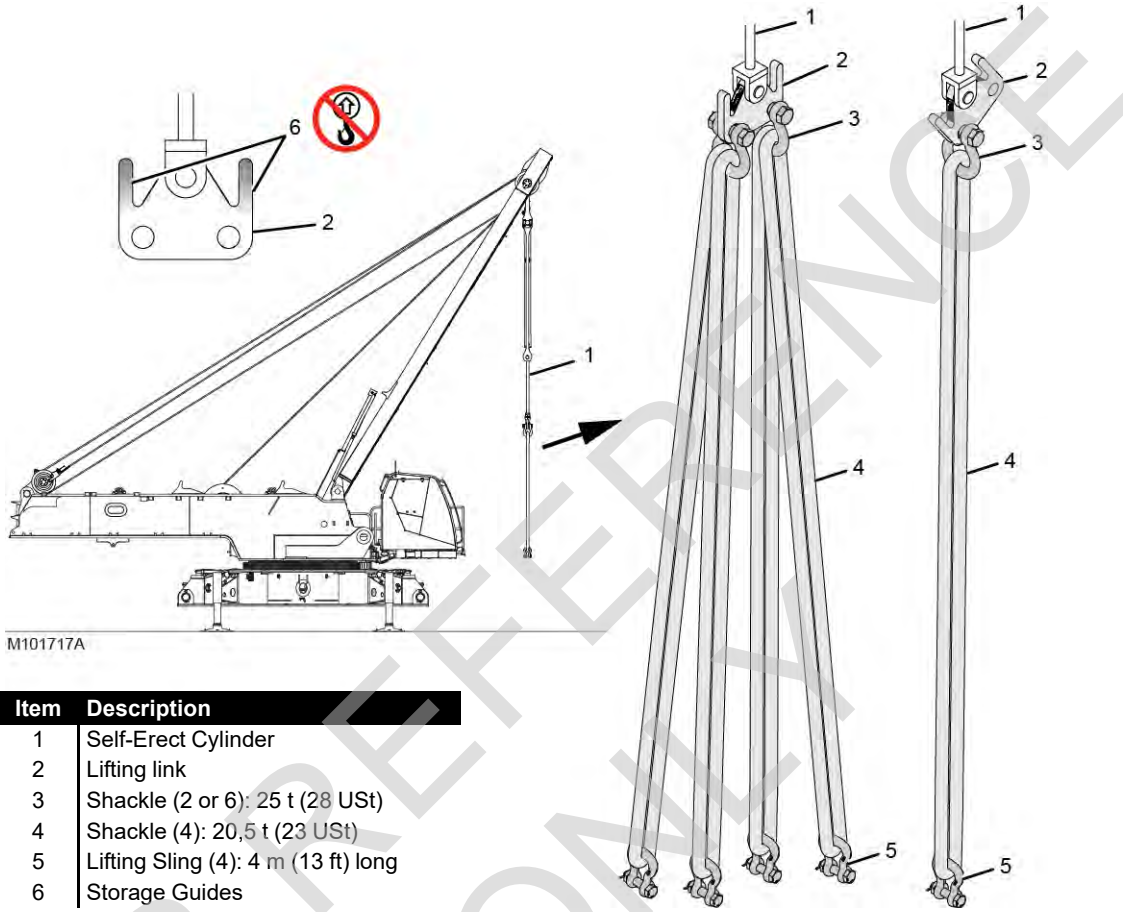
When the SETUP MODE is OFF, the following will occur if you attempt to raise the boom when the mast assist arms are up:

- The boom hoist will not operate.
- The hazard warning will come on and the MAST ASSIST ARMS UP icon will appear in the fault bar of the Main Display Working Screen.
- Make sure the mast assist arms are fully lowered before raising the mast and boom.





The lifting capacity from one hole is the same as it is from two holes. See the Liftcrane Mast Handling Capacities chart for lifting capacities at various radii and live mast angles. Refer to [Figure 4-5 on page 4-6](#) for the capacity of the Manitowoc supplied lifting slings and shackles.



M101717A

Item	Description
1	Self-Erect Cylinder
2	Lifting link
3	Shackle (2 or 6): 25 t (28 USt)
4	Shackle (4): 20,5 t (23 USt)
5	Lifting Sling (4): 4 m (13 ft) long
6	Storage Guides

Figure 4-31

### Attach Lifting Slings to Self-Erect Cylinder

Attach the lifting slings and shackles to the lifting link (2) on the self-erect cylinder as shown in [Figure 4-31](#).

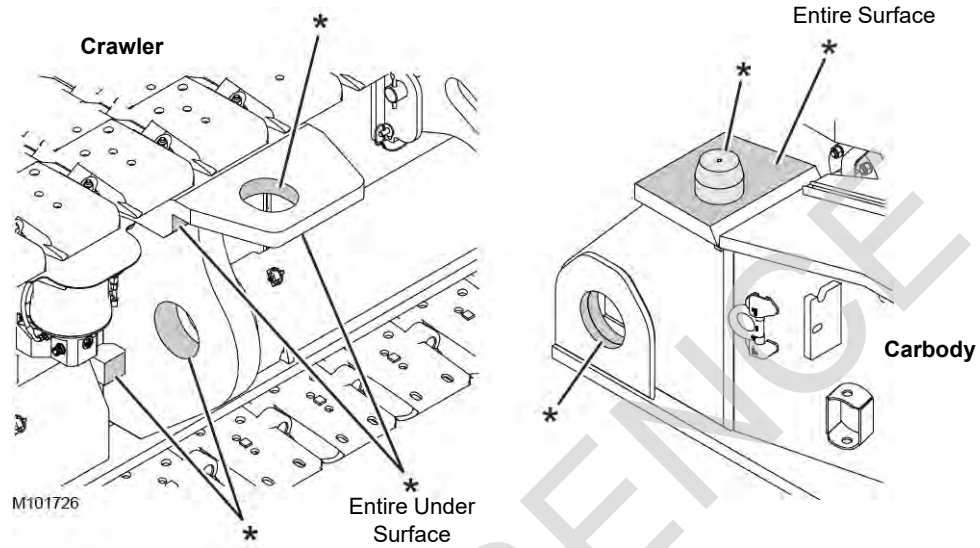


### WARNING

#### Falling Load Hazard!

Do not lift loads at the storage guides (8):

- Sharp edges can cut the slings causing them to break.
- The storage guides can be overloaded and break.



Both Views Typical Four Places

Figure 4-32

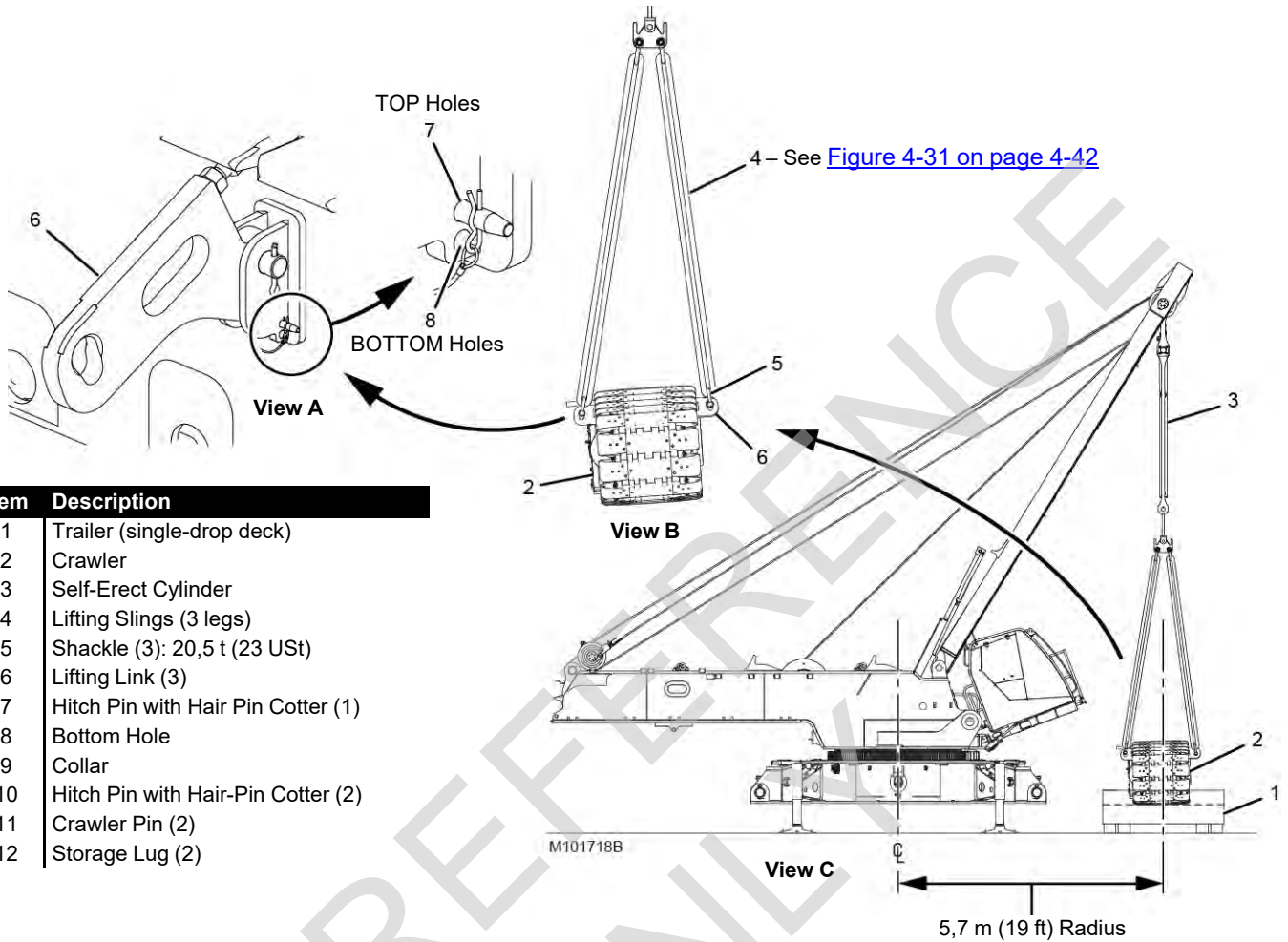
### Lubricate Crawler-to-Carbody Machined Surfaces

Each time the crawlers are assembled to the carbody, thoroughly clean and grease all machined surfaces on the

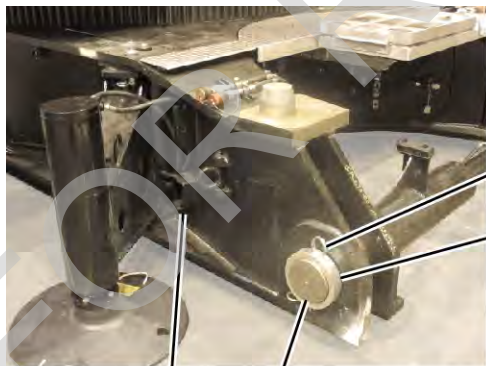
crawlers and the carbody — surfaces marked with an asterisk (\*) in [Figure 4-32](#).

Failing to perform this step will result in loud noises coming from the lowerworks when turning (cutting) the crawlers or swinging the rotating bed over the corner of the crawlers.

FOR REFERENCE ONLY



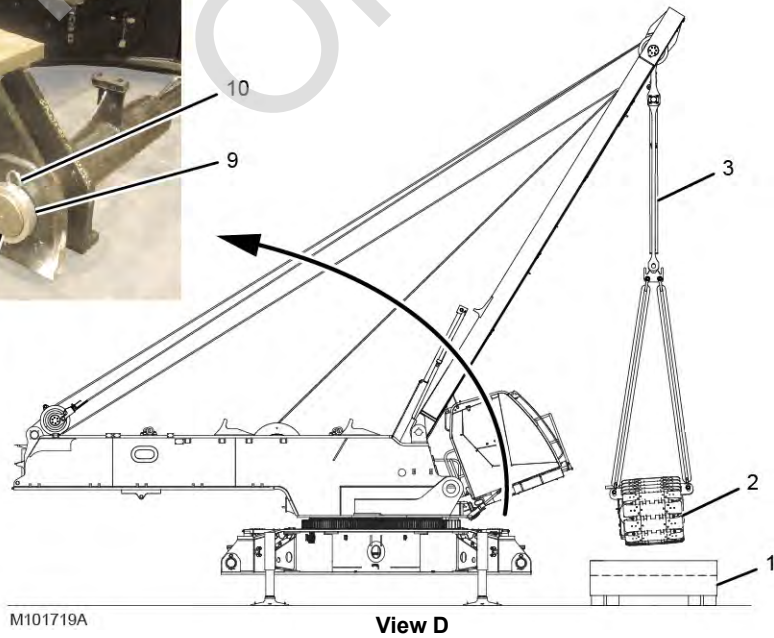
Item	Description
1	Trailer (single-drop deck)
2	Crawler
3	Self-Erect Cylinder
4	Lifting Slings (3 legs)
5	Shackle (3): 20,5 t (23 USt)
6	Lifting Link (3)
7	Hitch Pin with Hair Pin Cotter (1)
8	Bottom Hole
9	Collar
10	Hitch Pin with Hair-Pin Cotter (2)
11	Crawler Pin (2)
12	Storage Lug (2)



View E

12

11



M101719A

View D

Figure 4-33

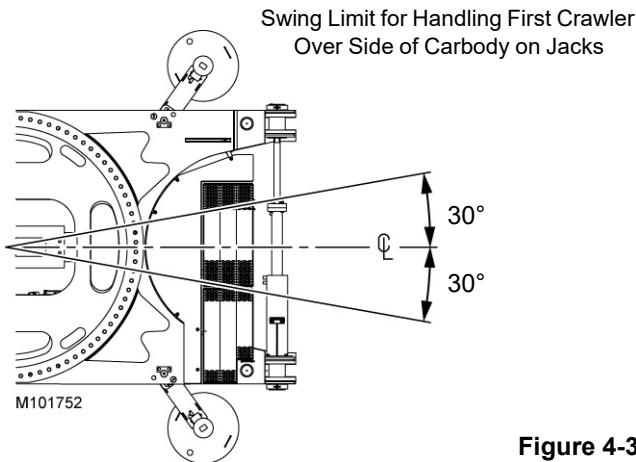


Figure 4-34

## Install First Crawler

See [Figure 4-33](#) for the following procedure.



### DANGER

#### Tipping Hazard!

Prevent the crane from tipping over:

- Make sure the crane is level. Adjust the carbody jacks as required.
- Make sure the small diameter rods of the jacking cylinders are fully retracted before handling the crawlers, otherwise the jacking cylinders will be overloaded and possibly collapse.
- Limit swing to 30° in either direction from center when lifting the first crawler (see [Figure 4-34](#)).
- Do not exceed a radius of 5,7 m (19 ft) when lifting first crawler.

### CAUTION

#### Parts Damage!

Do not attempt to lift the crawler off the trailer by booming up. Damage to the self-erect cylinder can occur.

Avoid hitting the carbody jacks with the crawler.

1. Position the trailer (1, View C) carrying the crawler (2) on the desired side of the crane at the specified radius.

The side of the crawler with one lifting link must face the crane.

2. Remove the tie-downs and blocking securing the crawler to the trailer.
3. Swing the upperworks so the self-erect cylinder (3) and lifting slings (4) are centered over the crawler.
4. Connect three legs of the lifting slings (4, View B) to the lifting links (6) on the crawler with shackles (5).
5. Retract the self-erect cylinder until the lifting links (3, View B) start to rotate up.
6. At the inboard lifting link (6, View A):
  - a. Remove the hitch pin (7) from the bottom holes (8) in the bracket.
  - b. Lift the inboard link (6).
  - c. Reinstall pin (7) in the TOP holes in the bracket.
  - d. Lower the link (6) onto the pin (7).

The inboard lifting link will interfere with crawler pin installation if this step is not performed.

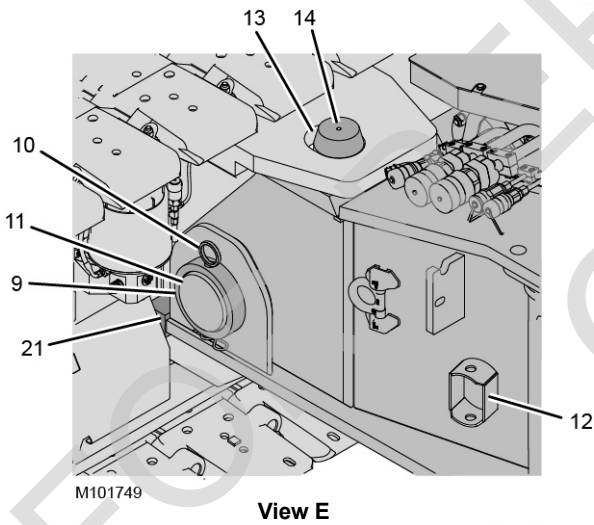
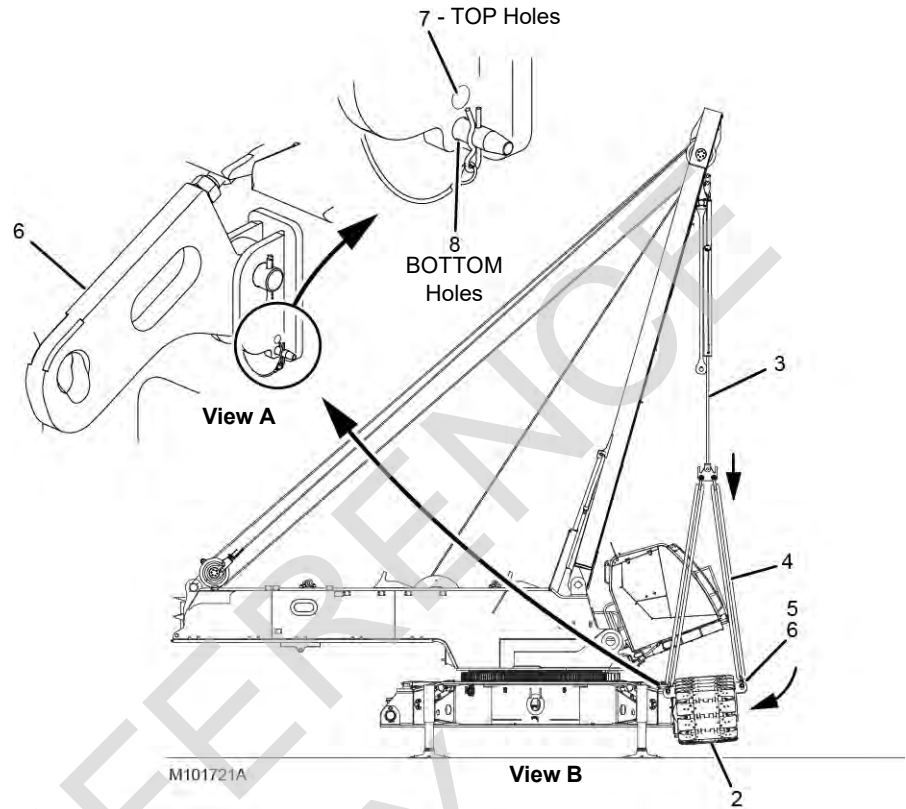
7. Continue to retract the self-erect cylinder to lift the crawler (2) clear of the trailer (1, View D).

**NOTE** The crawler will hang at an angle as shown.

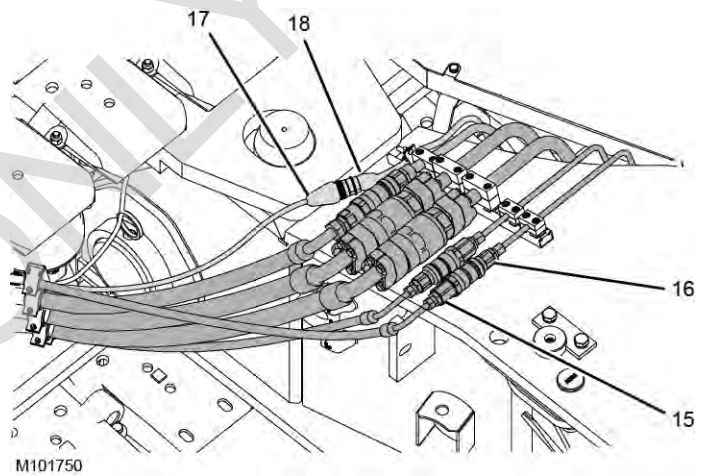
8. Remove the trailer.
9. Remove the collars (9, View E) from both crawler pins (11).
10. Temporarily store the collars on the storage lugs (12, View E).
11. Using the remote control, disengage the corresponding crawler pins (11).
12. Tilt the operator cab up so it is not damaged during [step 13](#) on the next page.



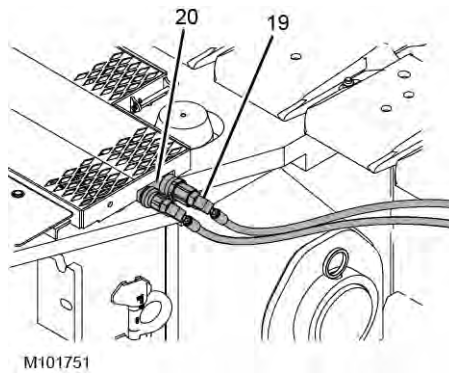
Item	Description
1	Not Used
2	Crawler
3	Self-Erect Cylinder
4	Lifting Slings (3 legs)
5	Shackle (3): 20,5 t (23 USt)
6	Lifting Link (3)
7	Top Holes
8	Hitch Pin with Hair Pin Cotter (1) (in bottom holes)
9	Collar
10	Hitch Pin with Hair-Pin Cotter (2)
11	Crawler Pin (2)
12	Storage Lug (2)
13	Top Connecting Hole (2)
14	Top Connecting Pin (2)
15	Hydraulic Hoses (5 from crawler)
16	Hydraulic Coupler (5 on carbody)
17	Electric Cable (from crawler)
18	Electric Cable (on carbody)
19	Hydraulic Hoses (2 from crawler)
20	Hydraulic Coupler (2 on carbody)
21	Crawler Lug (2)



View E



View C



View D

Figure 4-35

See [Figure 4-35](#) for the remaining steps.

13. Lower the crawler, raise the live mast, and swing as needed to engage the top connecting holes (13, View E) in the crawler frame with the top connecting pins (14) on the carbody.
14. Once the top connecting holes (13, View E) engage the top connecting pins (14), continue to lower the crawler until the crawler lugs (21) are just contacting the carbody. The bottom connecting holes should now be aligned with the crawler pins (11).  
  
Keep tension on the lifting slings until [step 15](#) is performed. **Do not allow the full weight of the crawler to rest on the crawler lugs (21), or the crawler pins (11) and the bottom connecting holes can be damaged.**
15. Using the remote control, engage the crawler pins (11, View E).
16. Remove the collars (9, View E) from the storage lugs (12) and install them on the crawlers pins (11) with hitch pins (10).
17. Extend the self-erect cylinder so the lifting slings are slack.
18. Disconnect the shackles (5, View B) from the lifting links (6) on the crawler (2).

19. At the inboard lifting link (6, View A), move the hitch pin (7) from the top holes (8) in the bracket to the bottom holes in the bracket.

The inboard lifting link will interfere with platform installation if this step is not performed.

20. Proceed as follows at the drive end of the crawler:
  - a. Connect five hydraulic hoses (15, View C) from the crawler to five hydraulic couplers (16) on the carbody.  
  
Match the identification numbers on the hoses with the identification numbers on the couplers for proper connection.
  - b. Connect the electric cable (17, View C) from the crawler to the electric cable (18) on the carbody.
21. At the front roller end of the crawler connect two hydraulic hoses (19, View D) from the crawler to the hydraulic couplers (20) on the carbody.  
  
Match the identification numbers on the hoses with the identification numbers on the couplers for proper connection.
22. SLOWLY travel the crawler in either direction to center the treads on the crawler frame.
23. Install the second crawler. See ["Install Second Crawler" on page 4-49](#).



Item	Description
1	Trailer (single-drop deck)
2	First Crawler Installed and Lowered to Ground
3	Second Crawler

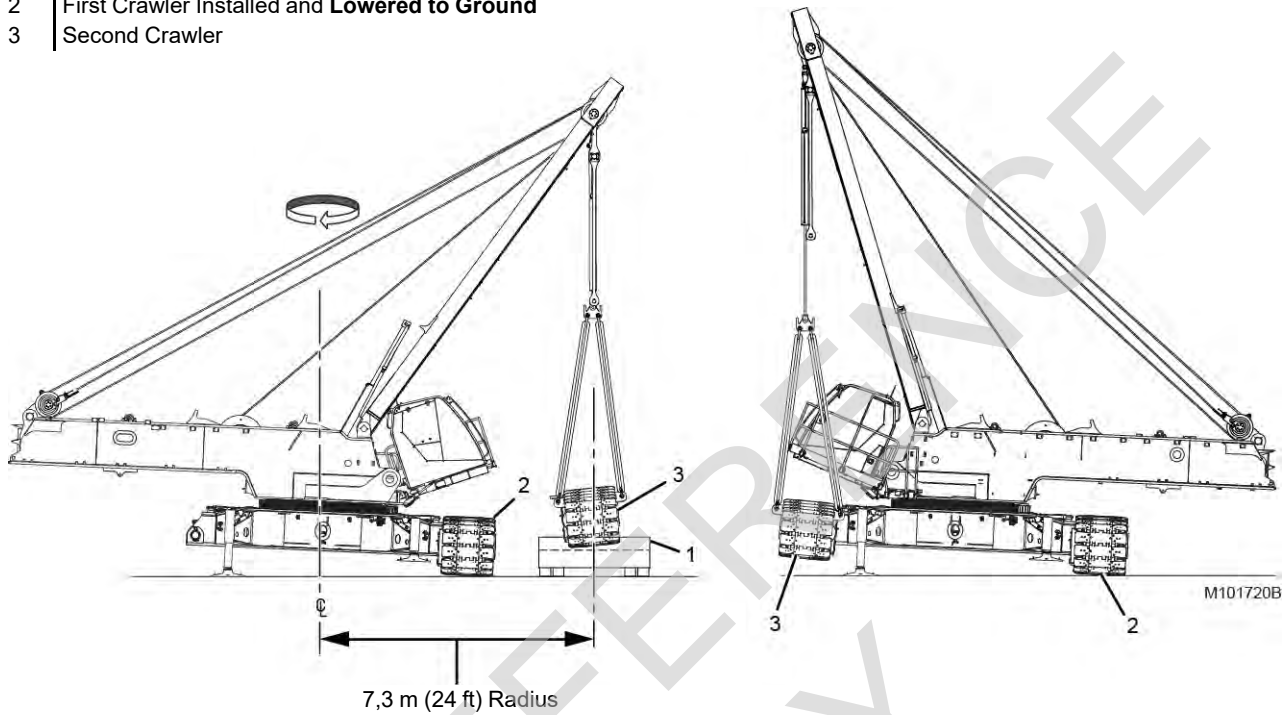


Figure 4-36

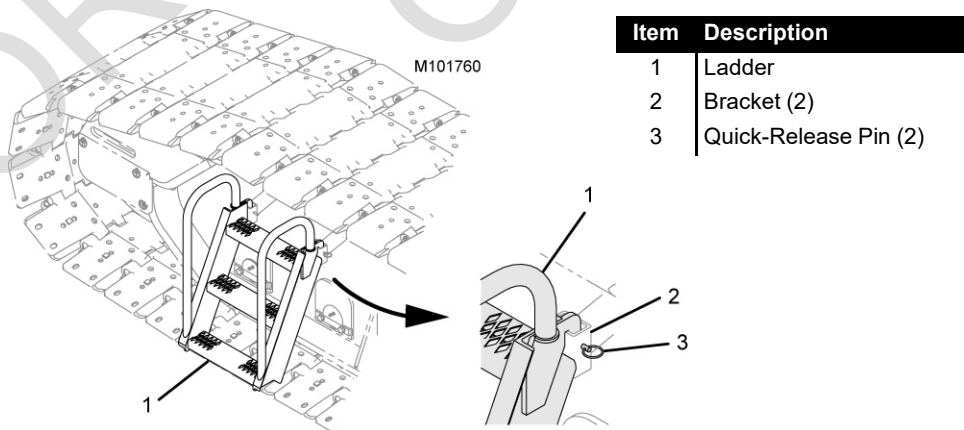


Figure 4-37

## Install Second Crawler

See [Figure 4-36](#) for the following procedure.



### DANGER

#### Tipping Hazard!

Prevent the crane from tipping over when installing the second crawler:

- Do not attempt to lift the second crawler until the first crawler is lowered to the ground.
- Do not exceed a radius of 7,3 m (24 ft) when lifting second crawler.

### CAUTION

#### Parts Damage!

Do not attempt to lift the crawler off the trailer by booming up. Damage to the self-erect cylinder can occur.

Avoid hitting the carbody jacks with the crawler.

1. Lower the first crawler to the ground by fully retracting the corresponding jacks.

**NOTE** The second crawler can be lifted at the 7,3 m (24 ft) radius from either side of the carbody.

2. Repeat First Crawler Installation steps [1](#) – [8](#) on [page 4-45](#).

3. If the second crawler is being lifted from the same side of the carbody as the first crawler, swing 180°.
4. Repeat First Crawler Installation steps [9](#) – [23](#) on [page 4-45](#).
5. Retract the carbody jacks until the second crawler is on the ground.
6. Install the crawler ladders. See [Install Crawler Ladders](#) below.
7. Fully retract the carbody jacks and store them. See [Store Carbody Jacks on page 4-51](#).

## Install Crawler Ladders

See [Figure 4-37](#) for the following procedure.

**NOTE** Two ladders are shipped separately from the crawler assemblies. Each ladder weighs 18 kg (40 lb).

To provide access that meets user needs, there are four installation positions on each crawler: two front, inboard and outboard; two rear, inboard and outboard.

1. Lift the ladder (1) into position at the desired location on the crawler.
2. Hook the ladder (1) into the brackets (2) on the crawler.
3. Install quick-release pins (3) to lock the ladder (1) in the brackets (2).

Item	Description
1	Carbody Jack (4)
2	Pin (4)
3	Jack Pad (4)
4	Storage Pin (4)
A	Working Hole
B	Storage Hole

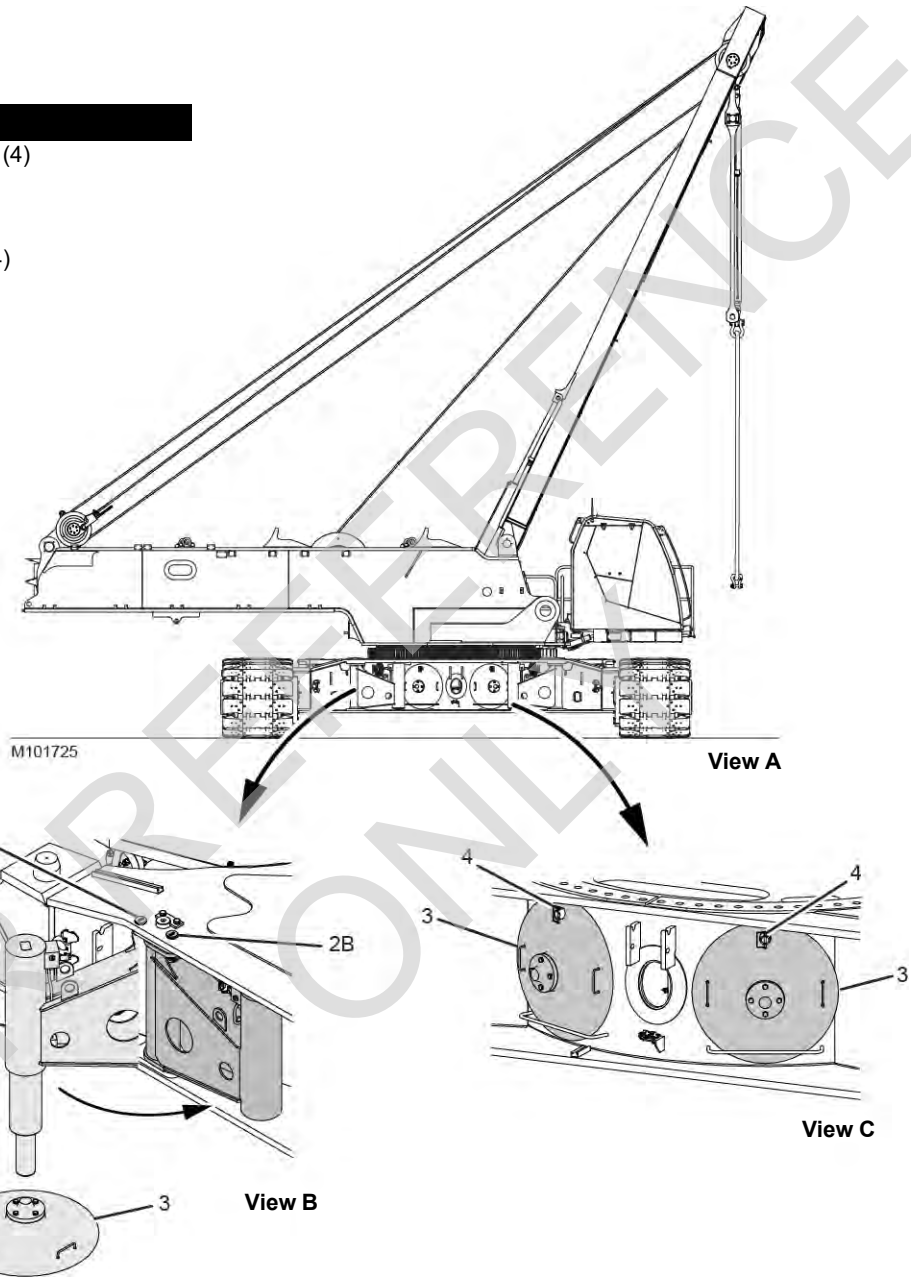
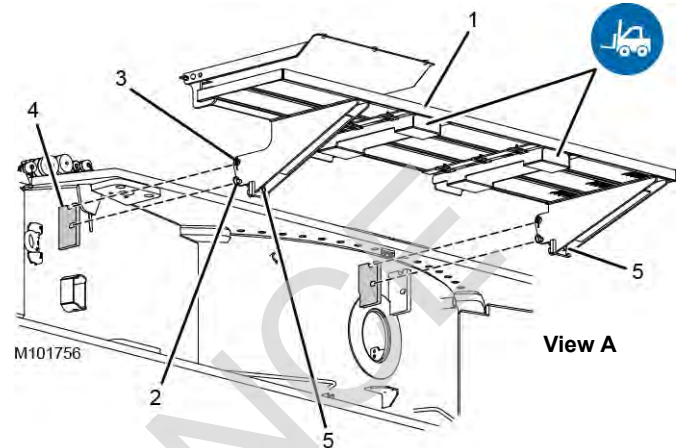


Figure 4-38

## Store Carbody Jacks

See [Figure 4-38](#) for the following procedure.

1. Using the remote control, fully retract the carbody jack (1, View B).
2. Store the jack pad (3) as shown in View C.
3. Remove the connecting pin (2, View B) from the working hole (A).
4. Rotate the carbody jack (1, View B) inward to the storage position.
5. Install the pin (2) in the storage hole (B).
6. Repeat the steps for each carbody jack.



### CAUTION

#### Avoid Structural Damage

Do not extend the carbody jacks when they are stored. Serious structural damage will occur to the carbody and jacks.

## Install Carbody Front and Rear Platforms

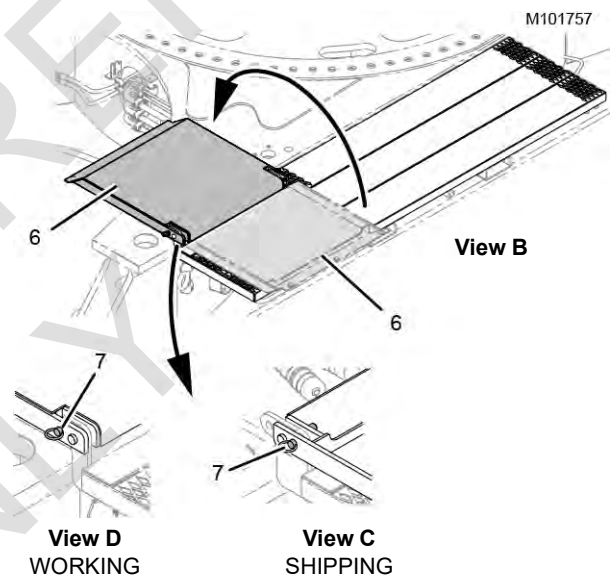
See [Figure 4-39](#) for the following procedure.

Two platforms are installed side-by-side on both ends of the carbody. One of the platforms on each end has an access cover. The access covers must be next to the crawlers.

Each platform has forklift pockets for handling with a forklift.

All four platforms are installed in the same manner.

1. Using a forklift, lift the platform (1, View A) into position at the end of the carbody.
2. Remove the quick-release pins (2) from the platform (1).
3. Lower the platform so the fixed pins (3) engage the saddles in the brackets (4).
4. Install the quick-release pins (2).
5. If necessary, adjust the bolts (5) to provide a snug fit.
6. Repeat the steps for the remaining platforms.
7. Remove the quick-release pin (7, View C) and rotate the access cover (6, View B) to the working position (View D).
8. Install the quick-release pin (7, View D).



Item	Description
1	Platform
2	Quick-Release Pin (2)
3	Fixed Pin (2)
4	Bracket
5	Bolts with Lock Nut (2)
6	Access Cover
7	Quick-Release Pin

Figure 4-39

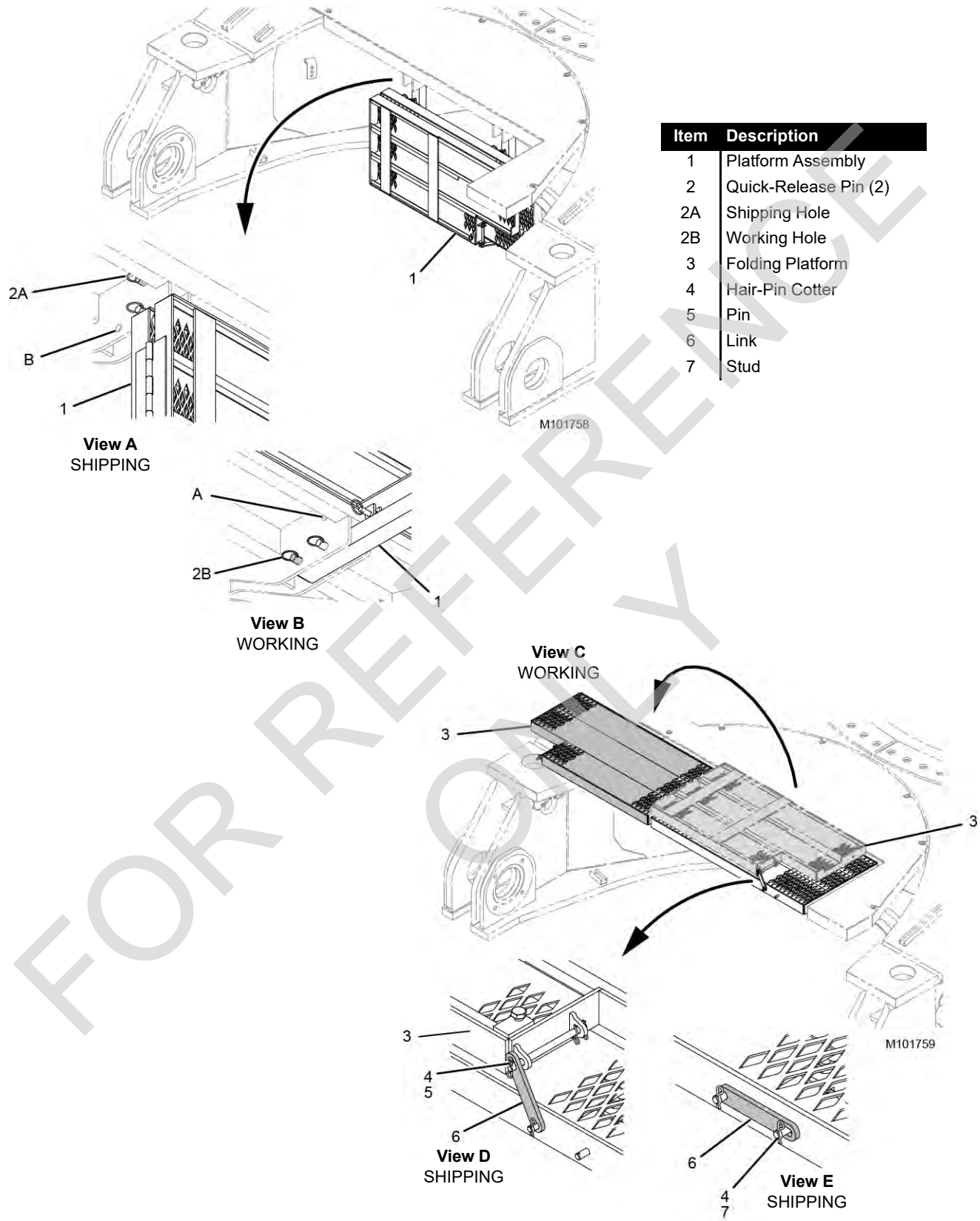


Figure 4-40

## Deploy Carbody Side Platforms

The carbody side platform assemblies (1, View A) are shipped in the closed position attached to the carbody. Deploy each carbody side platform assembly, as follows:

See [Figure 4-40](#) for the following procedure.

1. Remove pins (2, View A) from the shipping holes (A).
2. Raise the platform assembly to the working position.
3. Install pins (2, View B) in the working holes B.
4. Rotate the folding platform (3) to the working position (View C).
  - a. Remove the hair pin cotter (4, View D) pin (5) and disconnect the link (6) from the pin.
  - b. Rotate the link (6, View E) down and pin it to the stud (7) with hair-pin cotter (4).
5. Repeat the steps for the other carbody side platform.
6. DO NOT rotate the folding platforms (3, View C) to the working position until after the crawlers are installed.

FOR REFERENCE ONLY



Item	Description
1	Trailer
2	Counterweight Tray
3	Lifting Lug (4)
4	Shackle (4): 20,5 t (23 USt)
5	Lifting Slings (4) 4 m (13 ft) long
6	Shackle (2): 25 t (28 USt)
7	Self-Erect Cylinder
R	Radius: 6,4 m (21 ft) see Liftcrane Mast Handling Capacities Chart

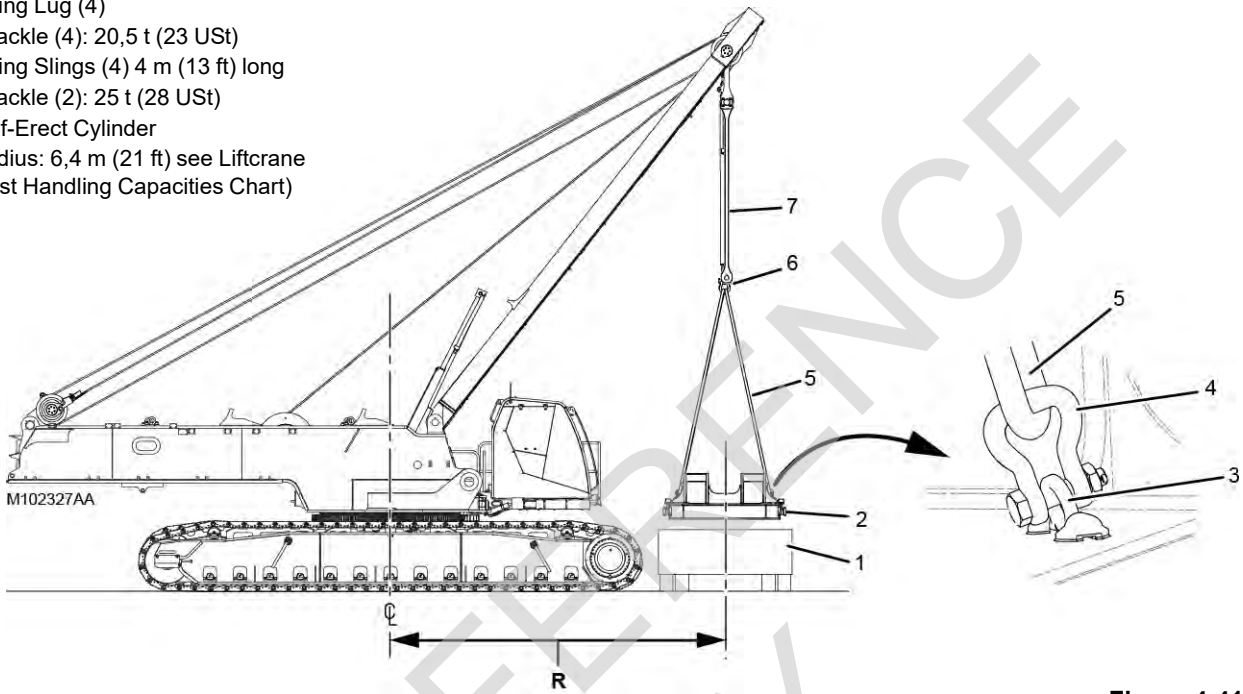


Figure 4-41

Item	Description
1	Trailer
2	Counterweight Box (1 or 2)
3	Self-Erect Cylinder
4	Lifting Sling (2): 2,8 m (9 ft) long
5	Shackle (2): 25 t (28 USt)
6	Lifting Lug (2)
R	Radius: 6,7 m (22 ft) see Liftcrane Mast Handling Capacities Chart

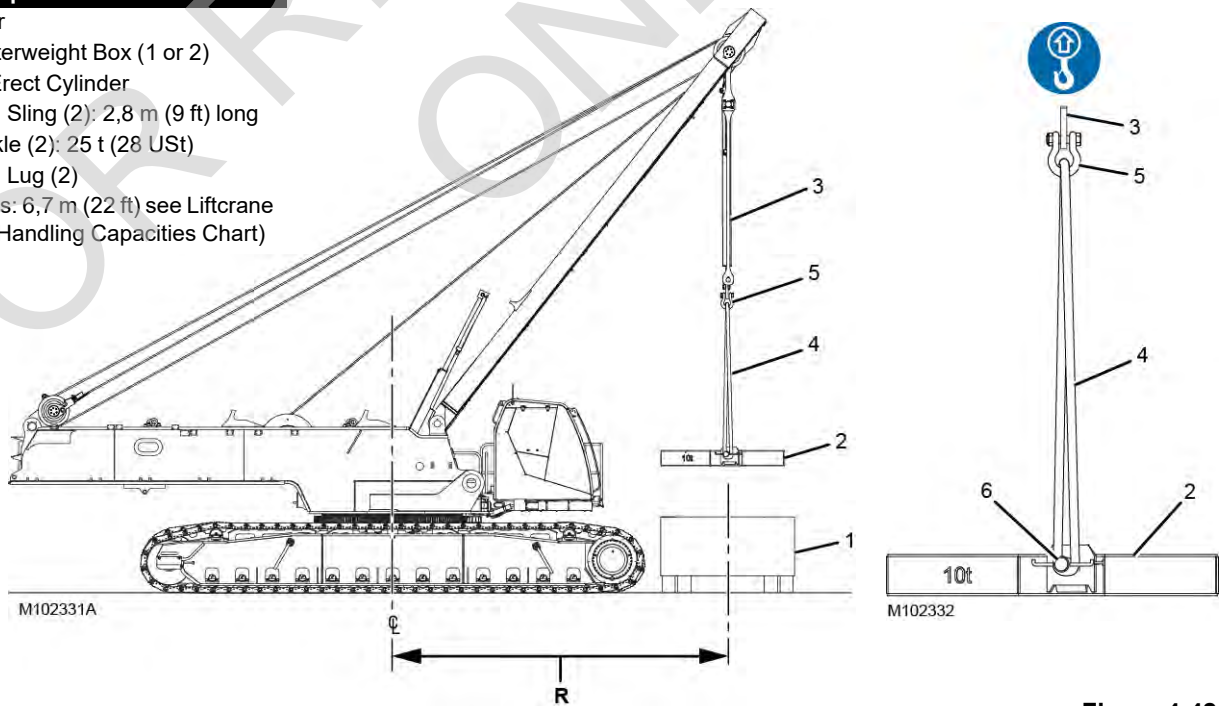


Figure 4-42

## Remove Counterweight Tray from Trailer

If desired to expedite removal, the MLC300 live mast and self-erect cylinder can be used to remove the counterweight tray from the trailer. Alternatively, an assist crane can be used for this procedure.

See [Figure 4-41](#) for the following procedure.

1. Position the trailer (1) carrying the counterweight tray (2) on the desired side of the crane at the specified radius (R).
2. Remove the tie-downs and blocking securing the counterweight tray to the trailer.
3. Swing the upperworks so the self-erect cylinder (7) and the lifting slings (5) are centered over the counterweight tray (2).
4. Connect the four lifting slings (5) to the four lifting lugs (3) on the counterweight tray with shackles (4).

Adjust the rigging as required to accommodate trailer height.

5. Retract the self-erect cylinder to lift the counterweight tray clear of the trailer.
6. Remove the trailer.
7. Place the counterweight tray on blocking in the assembly area.
8. Disconnect the lifting slings.

## Remove Counterweight Boxes from Trailer

If desired to expedite removal, the MLC300 live mast and self-erect cylinder can be used to remove the counterweight boxes from the trailer. Alternatively, an assist crane can be used for this procedure.

See [Figure 4-42](#) for the following procedure.

**NOTE** One or two boxes can be lifted at a time.

---

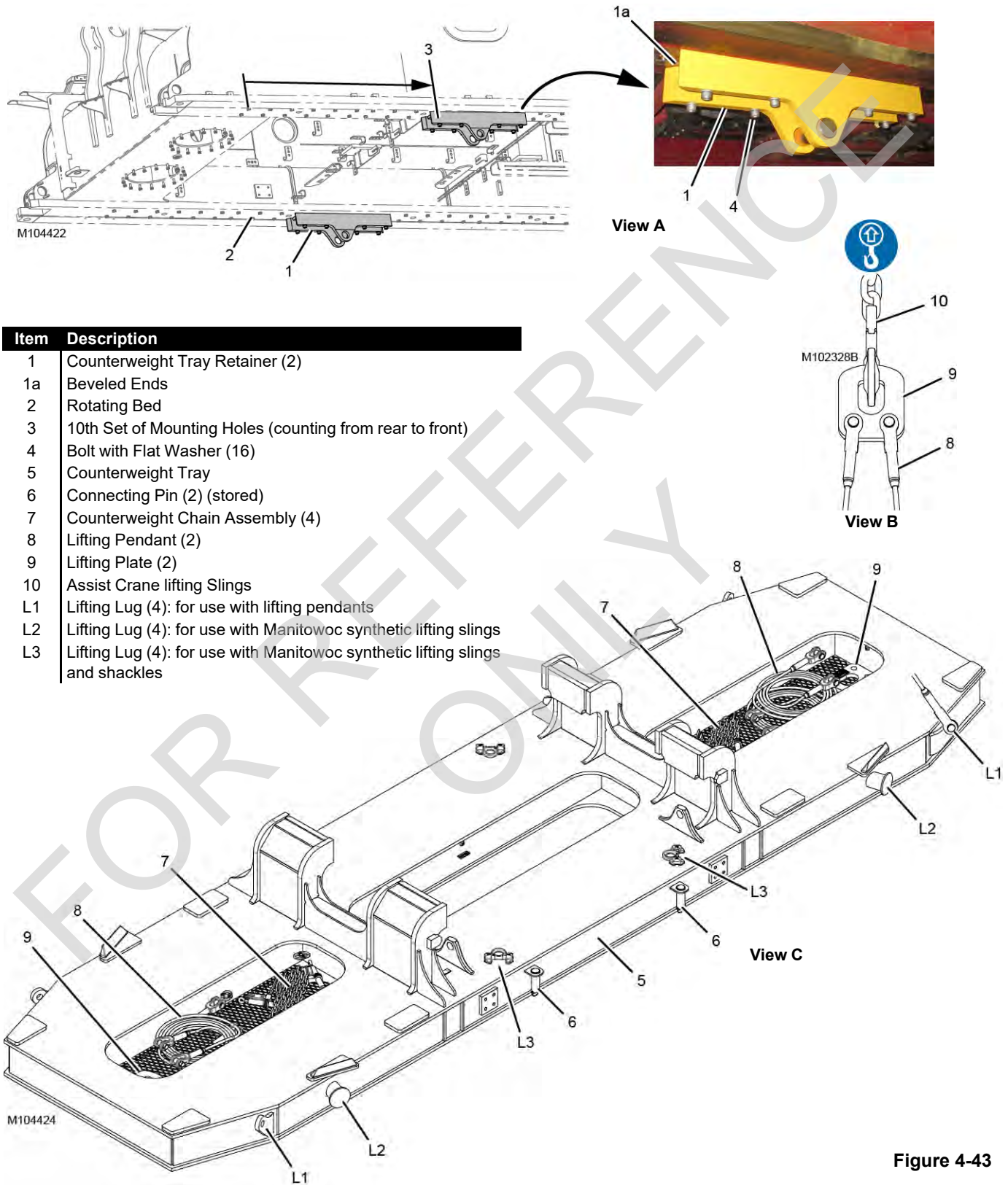
### **WARNING** Crush Hazard!

- Do not lift more than two boxes at a time. The lifting lugs may break resulting in the boxes falling.
- 
1. Position the trailer (1) carrying the counterweight box (2) on the desired side of the crane at the specified radius (R).
  2. Remove the tie-downs and blocking securing the counterweight box to the trailer.
  3. Swing the upperworks so the self-erect cylinder (3) and lifting slings (4) are centered over the counterweight boxes.
  4. Connect the lifting slings (4) to the two lifting lugs (6) on the counterweight box.  
Adjust the rigging as required to accommodate trailer height.
  5. Retract the self-erect cylinder to lift the counterweight box clear of the trailer.
  6. Remove the trailer.
  7. Place the counterweight box in the assembly area for installation later.
  8. Disconnect the lifting slings.
  9. Repeat the steps for all of the counterweight boxes.

## Assemble Boom and Jib

The boom and jib can be assembled with the MLC300 live mast and self-erect cylinder or with an assist crane. See ["Boom and Jib Rigging — General" on page 4-64](#) for instructions.

If the MLC300 will be used to assemble the boom and jib, install the counterweight tray and counterweight boxes AFTER the boom and jib are assembled. The MLC300 will be much easier to maneuver without crane counterweight.



Item	Description
1	Counterweight Tray Retainer (2)
1a	Beveled Ends
2	Rotating Bed
3	10th Set of Mounting Holes (counting from rear to front)
4	Bolt with Flat Washer (16)
5	Counterweight Tray
6	Connecting Pin (2) (stored)
7	Counterweight Chain Assembly (4)
8	Lifting Pendant (2)
9	Lifting Plate (2)
10	Assist Crane lifting Slings
L1	Lifting Lug (4): for use with lifting pendants
L2	Lifting Lug (4): for use with Manitowoc synthetic lifting slings
L3	Lifting Lug (4): for use with Manitowoc synthetic lifting slings and shackles

Figure 4-43

## Prepare for Counterweight Installation

See [Figure 4-42](#) for the following procedure.

1. Verify that both counterweight tray retainers (1, View A) are installed at the proper location on the underside of the rotating bed (2).
  - The counterweight tray retainers are symmetrical and interchangeable from side-to-side.
  - The beveled ends (1a) of the counterweight tray retainers must face the rear of the crane.

The following steps are performed at Manitowoc when the counterweight tray retainers (1) are installed:

- a. The mating surfaces of the counterweight tray retainers (1) are cleaned with Loctite® 7070 Cleaner and Degreaser and a continuous bead of Loctite 515 Gasket Eliminator is applied.
- b. Counting from the rear of the rotating bed (2), each counterweight tray retainer (1) is bolted to the bottom of the rotating bed starting at the 10th set of mounting holes (3).

- c. Loctite 263 Threadlocker is applied to the threads of all bolts (4) and the bolts are torqued to 270 Nm (199 ft lb).

If Loctite 263 is not available, Loctite 271 Threadlocker with Loctite 7649 Primer can be used.

2. Remove the counterweight chain assemblies (7, View C) from the storage pockets in the counterweight tray and place chains to the side for future use.

**NOTE** The counterweight tray (1) must be installed with an assist crane. The weight of the tray is 20 000 kg (44,092 lb).

For ease of counterweight tray handling and lifting, Manitowoc provides two lifting pendants (8, View C), a lifting plate (9), and two lifting lugs (L1) on each side of the tray.

3. Attach the four lifting pendants (8, View C) to the assist crane lifting slings (10, View B) with the lifting plates (9).
4. Lift the lifting pendants (8, View B) out of the counterweight tray (5, View C) and connect the lifting pendants to the four lifting lugs (L1) on the counterweight tray.

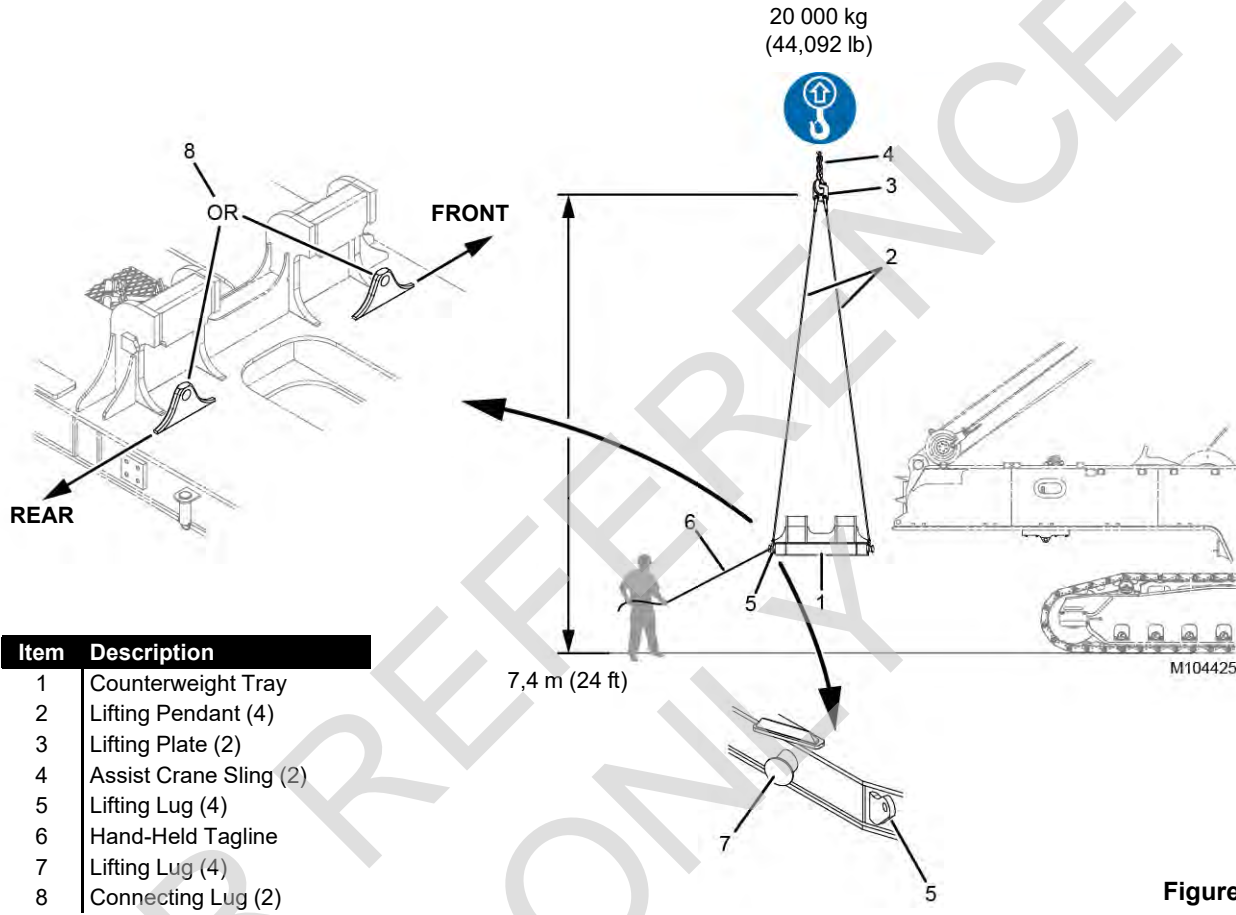


Figure 4-44



### Install Counterweight Tray

See [Figure 4-44](#) for the following steps.



#### DANGER

##### Tipping Crane Hazard!

Prevent the crane from tipping over:

- Do not attempt to install the counterweight tray until the crawlers are installed.



#### WARNING

##### Falling Load Hazard!

Prevent counterweight tray from falling:

- The lifting slings are provided for lifting only the counterweight tray. Do not attempt to lift the counterweight tray with the counterweight boxes installed. The pendants could break allowing the tray to fall.

##### Fall Hazard!

Prevent personnel from falling:

- Do not allow personnel to ride the counterweight tray while it is being lifted into position.

1. Position the live mast at 150°.
2. If not already done:
  - a. Attach four lifting pendants (2) to the lifting slings (4) from the assist crane with the lifting plates (3).
  - b. Attach the other end of the lifting pendants (2) to the lifting lugs (5) on the counterweight tray (1).

3. Attach hand-held taglines (6) to the lifting lugs (7) on the rear corners of the tray. Have ground personnel control swinging of the tray with the taglines.
4. Lift the counterweight tray into position at the rear of the rotating bed.
5. Position the tray as follows:
  - Series 0 Counterweight: connecting lugs (8) toward FRONT of crane. This is the 5,5 m (18.1 ft) position given in the Series 0 Capacity Chart ([Figure 4-45](#)).

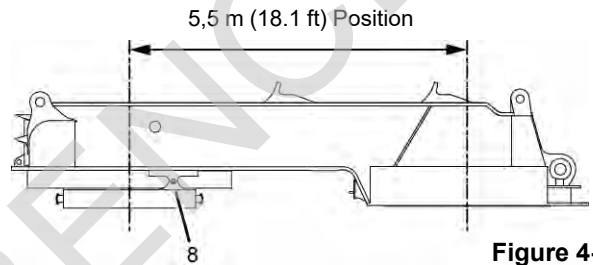


Figure 4-45

- Series 1, 2, 3 Counterweight: connecting lugs (8) toward REAR of crane. This is the 4,1 m (13.4 ft) position given in the Series 1, 2, 3 Capacity Charts ([Figure 4-46](#)).

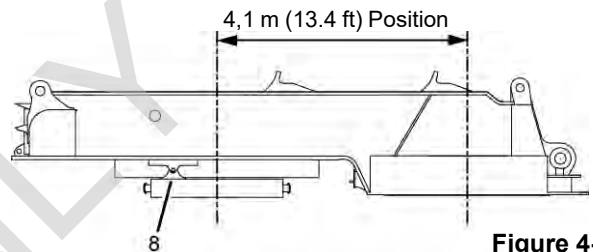


Figure 4-46

Continued on next page.



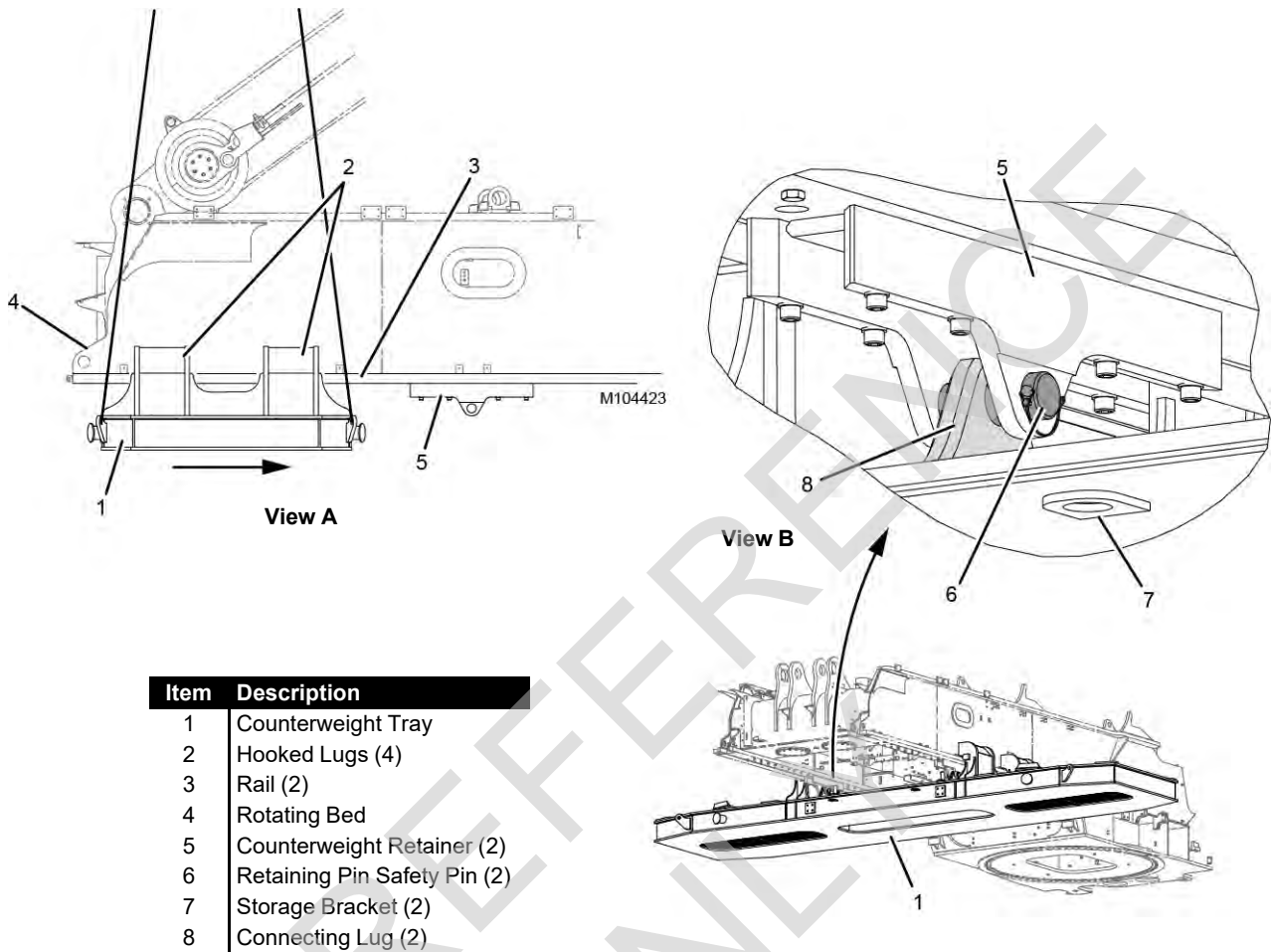


Figure 4-47

See [Figure 4-47](#) for the following steps.

6. Hoist, travel, swing, and boom the assist crane as required so the hooked lugs (1, View A) on the counterweight tray (2) are above the rails (3) on the rotating bed (4).
7. Using the assist crane, slowly travel the counterweight tray (1) onto the rotating bed until the holes in the connecting lugs (8, View B) are aligned with the holes in the counterweight retainers (5).

**NOTE** An alternate installation method is to hold the counterweight tray in position with the assist crane and travel the MLC300 in reverse to install the tray.

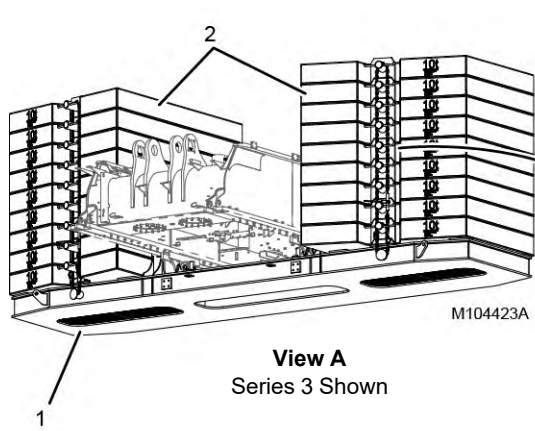
8. Remove the retaining pins (6, View B) from the storage brackets (7) on the counterweight tray.

9. Install the retaining pins (6, View B or C) in the holes of the counterweight retainers (5) and the connecting lugs (8).

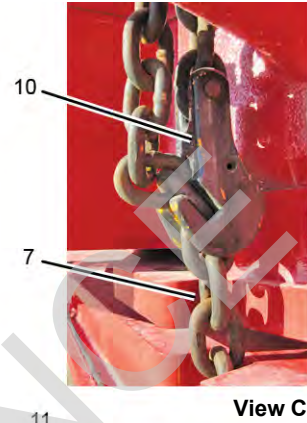
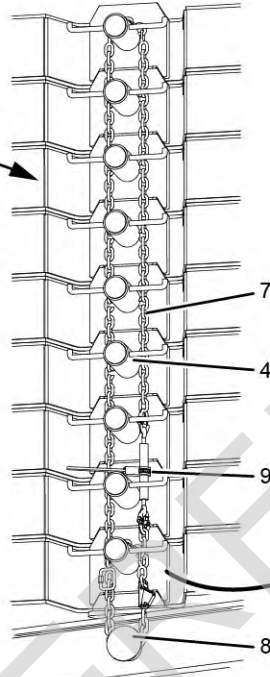
10. Store the lifting pendants:

See View B and C, [Figure 4-43 on page 4-56](#).

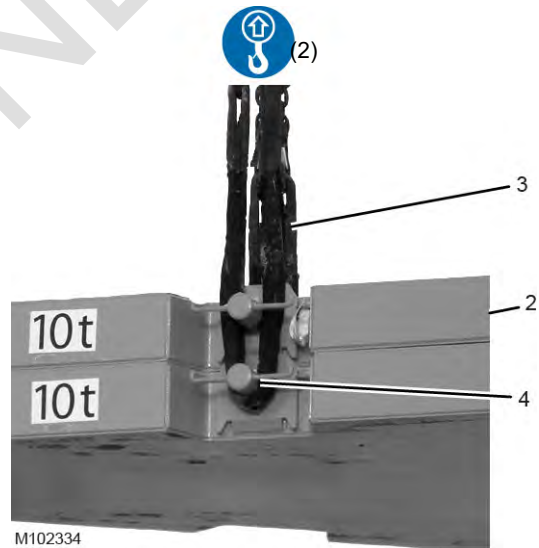
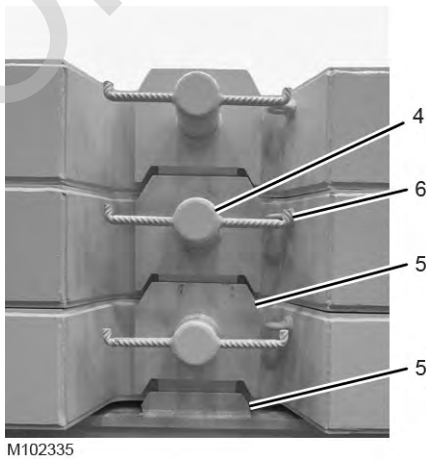
- a. Slacken the lifting pendants (9) and disconnect them from the lifting lugs (12) on the counterweight tray.
- b. Lower and coil the lifting pendants (9) into the storage pockets in the counterweight tray.
- c. Disconnect the lifting plates (10) from the assist crane lifting slings (11) and place the lifting plates into the storage pockets.



Series	Item 2 Quantity	
	Each Side	Total
0	3	6
1	6	12
2	8	16
3	9	18



Item	Description
1	Counterweight Tray
2	Counterweight Box — 10 000 kg (22,046 lb) each
3	Lifting Slings (2): 2,8 M (9 ft) long
4	Lifting Lug (2 each box)
5	Alignment Lug
6	Climbing Rungs
7	Counterweight Chain Assembly (4)
8	Counterweight Tray Lug
9	Turnbuckle
10	Connector
11	Safety Pin



View F

View E

Figure 4-48

## Install Counterweight Boxes

See [Figure 4-48](#) for the following procedure.



### WARNING

#### Crush Hazard!

To prevent the counterweight boxes from falling and crushing personnel:

- Do not lift more than two boxes at a time. The lifting lugs may break, causing the boxes to fall.
- Install the counterweight boxes in the sequence specified in step [1](#) of this procedure.

**NOTE** The counterweight boxes (2) must be installed with an assist crane.

1. Install the desired number of counterweight boxes (see Counterweight Series table in [Figure 4-48](#)) in the following sequence:
  - a. One counterweight box installed on either side of the tray.
  - b. Two counterweight boxes installed on the other side of the tray.
  - c. Continue installing the counterweight boxes in an alternating sequence, two boxes at a time.
  - d. Finally, install one counterweight box on the required side so that both stacks have an equal number of boxes.

Note that a difference of not more than one counterweight box must be maintained side-to-side during assembly and disassembly.

2. Attach synthetic lifting slings (3, View E) around the lifting lugs (4) on the counterweight boxes (2). Two boxes may be lifted at one time.
  3. Boom, swing, and hoist as necessary to position the counterweight boxes on the desired side of counterweight tray.
  4. Lower the boxes so that the alignment lug (5, View F) on the tray or box engages the notch on the adjacent box.
  5. Disconnect the lifting slings.
  6. Repeat the steps until the required number of boxes are installed.
  7. When all boxes have been installed, secure them as follows:
    - a. Wrap the counterweight chain assembly (7, View B) around the lifting lugs (4) on the counterweight boxes and the counterweight tray lug (8).  
The counterweight chain assemblies are designed to minimize counterweight movement during travel and operation permitted by Manitowoc's operating instructions.
    - b. Adjust the position of the chain so the turnbuckle (9, View B) handle is accessible between two lifting lugs (4).
    - c. Pull the chain tight by hand and attach the free end of the chain to the connector (10, View C).
    - d. Tighten the turnbuckle until the counterweight chain assembly is snug.
- NOTE** The ratchet on the turnbuckle must be flipped in one direction to tighten the turnbuckle and in the opposite direction to loosen the turnbuckle.
- e. Secure the excess chain with the safety pin (11, View D).
  - f. Repeat step [7](#) at the remaining three locations.

Item	Description
1	Mast Assist Arms (fully raised)
2	Live Mast in Operating Range
3	MLC300 Assembled WITHOUT COUNTERWEIGHT
4	Self-Erect Cylinder
5	Lifting link
6	Shackle (2): 25 t (28 USt)
7	Lifting Sling (4): 2,8 m (9 ft) long
8	See Liftcrane Mast Capacities Chart

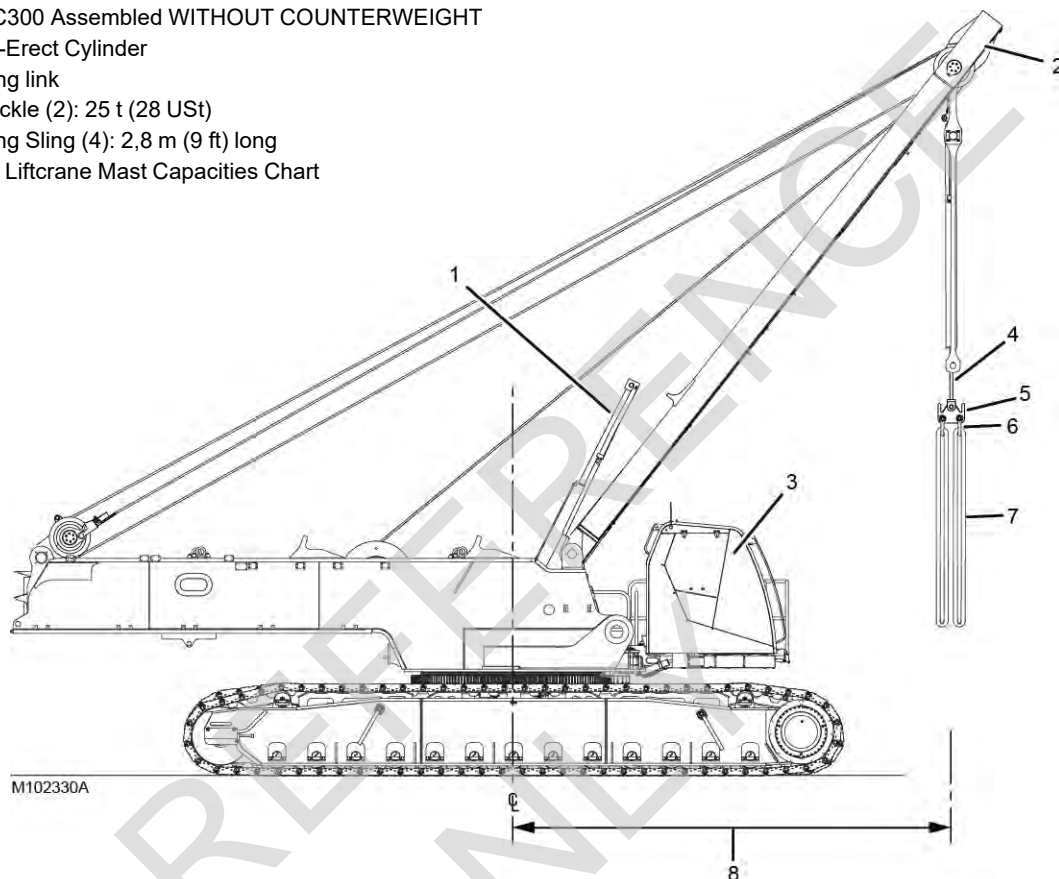


Figure 4-49

## BOOM AND JIB RIGGING — GENERAL

### Assist Crane Requirements

The MLC300 can be used to handle, assemble, and disassemble the boom and jib components. See the Crane Weights topic in Section 1 the MLC300 Operator Manual for the weights of boom and jib components.



### DANGER

#### Falling Load Hazard!

Prevent structural failure of components:

- Do not exceed the lifting capacities given in the Liftcrane Mast Capacities chart at the end of this section.

The MLC300 must be in the following configuration (Figure 4-49):

- Counterweight tray and counterweight boxes NOT INSTALLED.
- Mast assist arms (1) fully raised.
- Lifting link (5) attached to the self-erect cylinder (4).
- Lifting slings and shackles (6) attached the lifting link (5).
- Liftcrane Mast Capacities chart selected in the configuration screen of RCL/RCI Display.
- Live mast (2) operated between the fully extended mast assist arms and the maximum allowable radius (7).
- Radius (7) and capacity limited to that given in the Liftcrane Mast Capacities chart at the end of this section.



### Blocked Crawlers

To prevent the crane from tipping, some boom and jib lengths must be raised and lowered over blocked crawlers. See the appropriate boom or jib capacity chart for blocked crawler requirements and the Crawler Blocking Diagram in the Capacity Chart Manual for instructions.

**! DANGER**  
**Tipping Hazard!**

Do not attempt to raise or lower the boom or the boom and jib from or to the ground until the crawlers are blocked, if required. Otherwise, the crane will tip.

### Boom Handling with Mast

Boom handling with the mast must be limited to the boom length given in the Boom Rigging Drawing at the end of this section.

**! WARNING**  
**Falling Boom Hazard!**

Do not attempt to handle more boom with the mast than specified in the Boom Rigging Drawing. Structural failure of components can occur, allowing the boom to fall.

### Assembly Drawings

Boom and jib components (top, inserts, butt, straps) must be assembled in the proper sequence according to the applicable Boom and Jib Assembly Drawings at the end of this section.

### Identifying Boom and Jib Components

The boom and jib sections are marked for proper identification as shown in View A, [Figure 4-50](#). An identification plate is located near the top end of all four chords.

The boom inserts also have two chord identification plates as shown in View B, [Figure 4-50](#). The plate is located on top end of the right-top chord and the butt end of the left-top chord.

The jib pendants are marked for proper identification as shown in View C, [Figure 4-50](#).

The boom straps and links are marked for proper identification as shown in View D, [Figure 4-50](#).

Item	Description
1	Boom or Jib Chord
2	Boom or Jib Number
3	Manitowoc Part Number
4	Manitowoc Manufacturing Code
5	Chord Identification: H = Heavy L = Light M = Medium
6	Pendant
7	Diameter
8	Length
9	Manitowoc Purchase Order Number
10	Wire Rope Type
11	Set Number
12	Manufacturer's Number
13	Aluminum Tag (if equipped)
14	Boom or Jib Strap

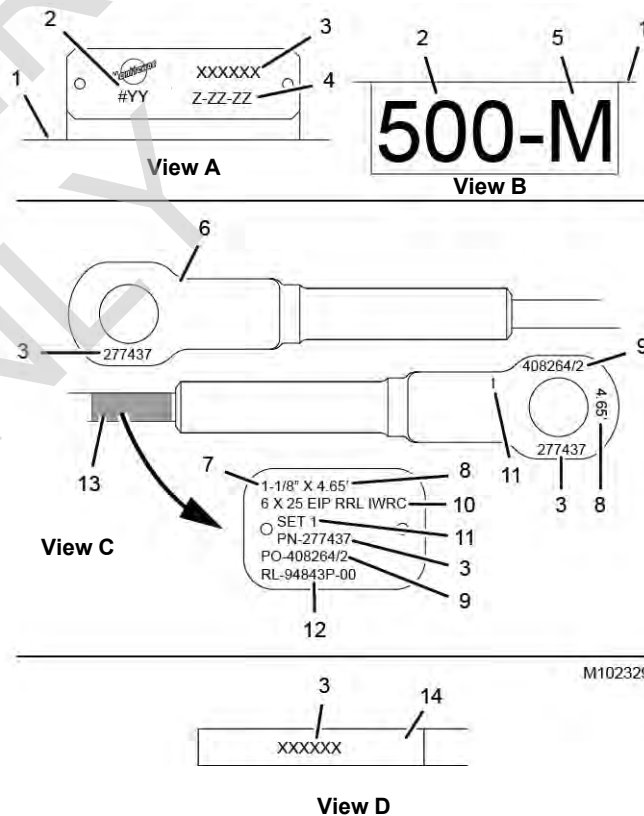
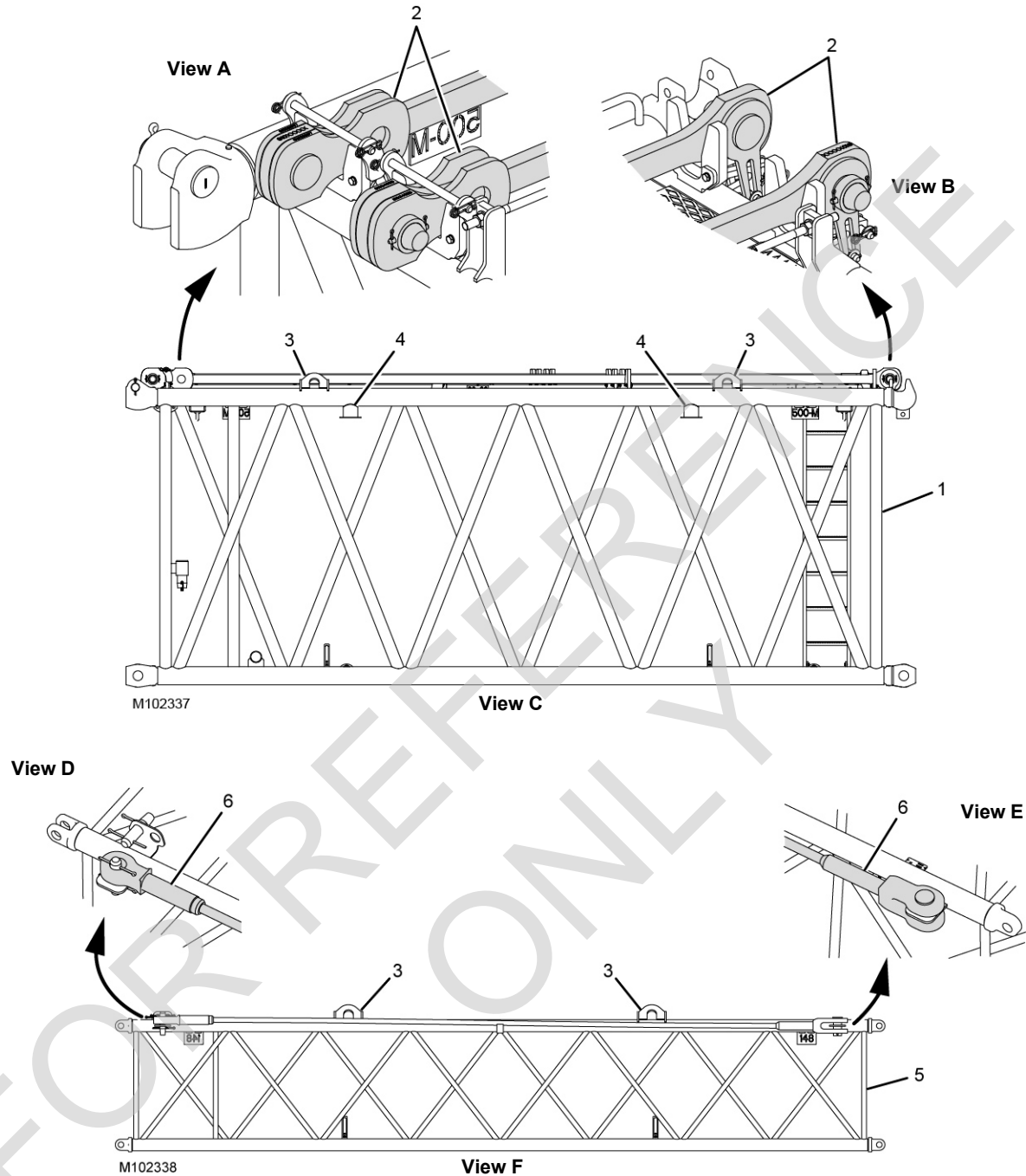


Figure 4-50





Item	Description
1	Boom Section (typical) (also see item 7, View G)
2	Boom and Luffing Jib STRAPS STORED
3	Lifting Lug (4) (if equipped, for shackles or lifting sling hooks)
4	Lifting Lug (4) (for synthetic lifting slings)
5	Jib Section (typical)
6	Jib PENDANT STORED

Figure 4-51

### Handling Components

Handle the boom and jib sections with care to avoid damaging the lacings and chords.

All boom and jib sections have lifting lugs as shown in [Figure 4-51](#).



**WARNING**

**Falling Load Hazard!**

The lifting lugs on each boom or jib section are designed only for lifting that section. Do not attempt to lift two or more boom or jib sections with the lifting lugs on one section. The lifting lugs may break allowing the boom or jib sections to fall.

**CAUTION**

**Lacing Damage!**

Ensure the boom straps and links ([Figure 4-51](#), Views A and B) and the jib pendants (Views D and E) are secured in the shipping position on the boom or jib inserts and top during handling and transportation unloading.



**WARNING**

**Personal Injury or Property Damage!**

Ensure the boom straps and links and the jib pendants remain properly secured in the shipping position on the boom or jib inserts and top during transportation loading or unloading and assembly or disassembly of the boom and jib. The straps and links or the pendants could shift or fall resulting in personal injury or property damage if not properly secured.

Item	Description
7	12 m Boom Insert with Wire Rope Guides
L1	Lifting Lugs (4) if equipped, for Lifting only the 12 m Boom Insert with Hooked Lifting Chains or Synthetic Lifting Slings with Shackles
L2	Lifting Lugs (4) for Lifting only the 12 m Boom Section with Synthetic Lifting Slings

The lifting lugs L3 are used only for assembling the boom with the VPC-MAX fixed mast on cranes equipped with a VPC.

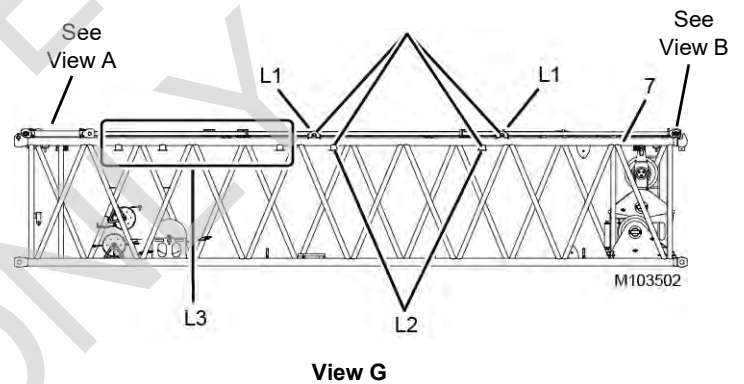


Figure 4-51 continued

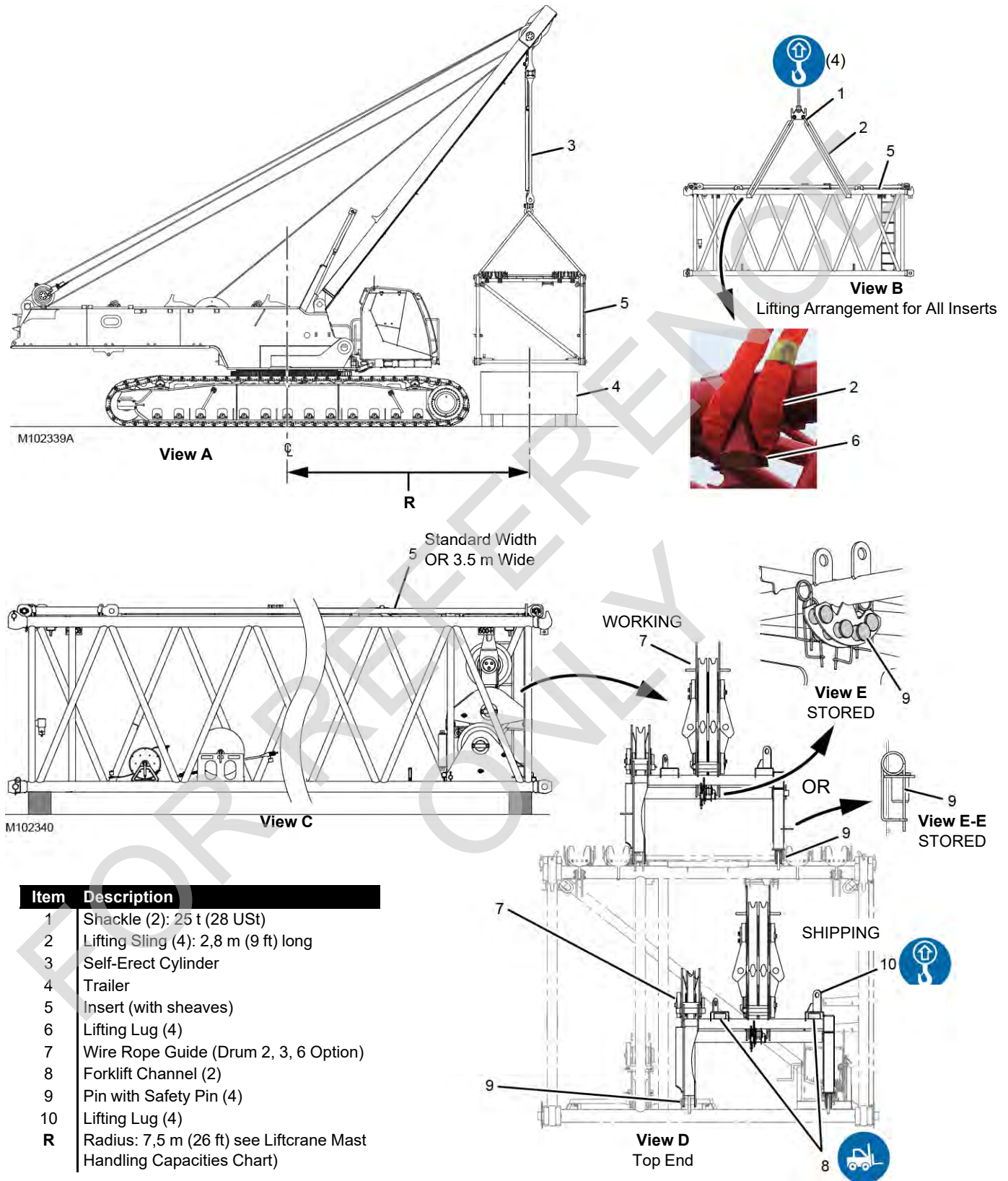


Figure 4-52

## BOOM #500 ASSEMBLY



### WARNING

#### Crush Hazard!

Never work under or inside boom sections that are not securely blocked.

#### Falling Load Hazard!

The luffing jib backstay straps can be stored on the boom sections for shipping.

Refer to the Capacity Chart for operating restrictions if the luffing jib backstay straps, links, and retaining hardware will be left on the boom sections during operation without a luffing jib.

#### Fall Hazard!

The boom sections are equipped with catwalks and ladders for accessing boom components during crane assembly and disassembly. Take every precaution to prevent falling off boom sections: use personal fall protection. See [Personal Fall-Protection on page 4-3](#).

Assemble the boom in the exact sequence shown in the Boom Rigging Drawing at the end of this section.

Some boom lengths require intermediate suspension. To determine the correct installation position of the intermediate suspension insert or the drop-down suspension, see the Boom Rigging Drawing at the end of this section.

If equipped with an Extended Upper Boom Point, see the supplemental assembly/disassembly instructions in the separate publication at the end of this section.

### Assemble Boom Inserts

See [Figure 4-52](#) for the following steps.

1. Rig the lifting slings from the self-erect cylinder as shown in View B. This rigging will be used for all inserts and the boom top.
2. Remove the insert from the trailer:

- a. Position the trailer (4) carrying the insert (5, View A) on the desired side of the crane at the desired radius. Do not exceed radius (R).

**NOTE** The first insert must be the 12 m (39.4 ft) insert with sheaves.

- b. Attach the lifting slings (2, View A) to the lifting lugs (6) on the insert (5).
- c. Lift the insert off the trailer.
- d. Remove the trailer.

3. Place the insert (5, View C) on blocking 381 mm (15 in) high. This height will allow for installation of the boom top.

4. Adjust the blocking as needed so the insert is level.

5. Disconnect the lifting slings.

6. If you will be using Drum 2, 3, or 6, move the wire rope guide (7, View D) from the shipping position to the working position, as follows:

Disregard this step if you will be using only Drum 1. The wire rope guide can be left inside the insert.

- a. Position the forks from a forklift in the forklift channels (8, View D).
- b. Lift the wire rope guide with the forklift just enough to loosen the pins (9) and remove the pins.
- c. Carefully lift the wire rope guide (7) out of the insert (5).
- d. Lift the wire rope into position on top of the insert (5) so the attaching holes line up.
- e. Install the pins (9).
- f. Remove the forklift.

**NOTE** If the wire rope guide (7) is removed from the insert and stored on the job site, the pins (9, View E or View E-E) can be stored as shown.

Continued on [page 4-71](#).

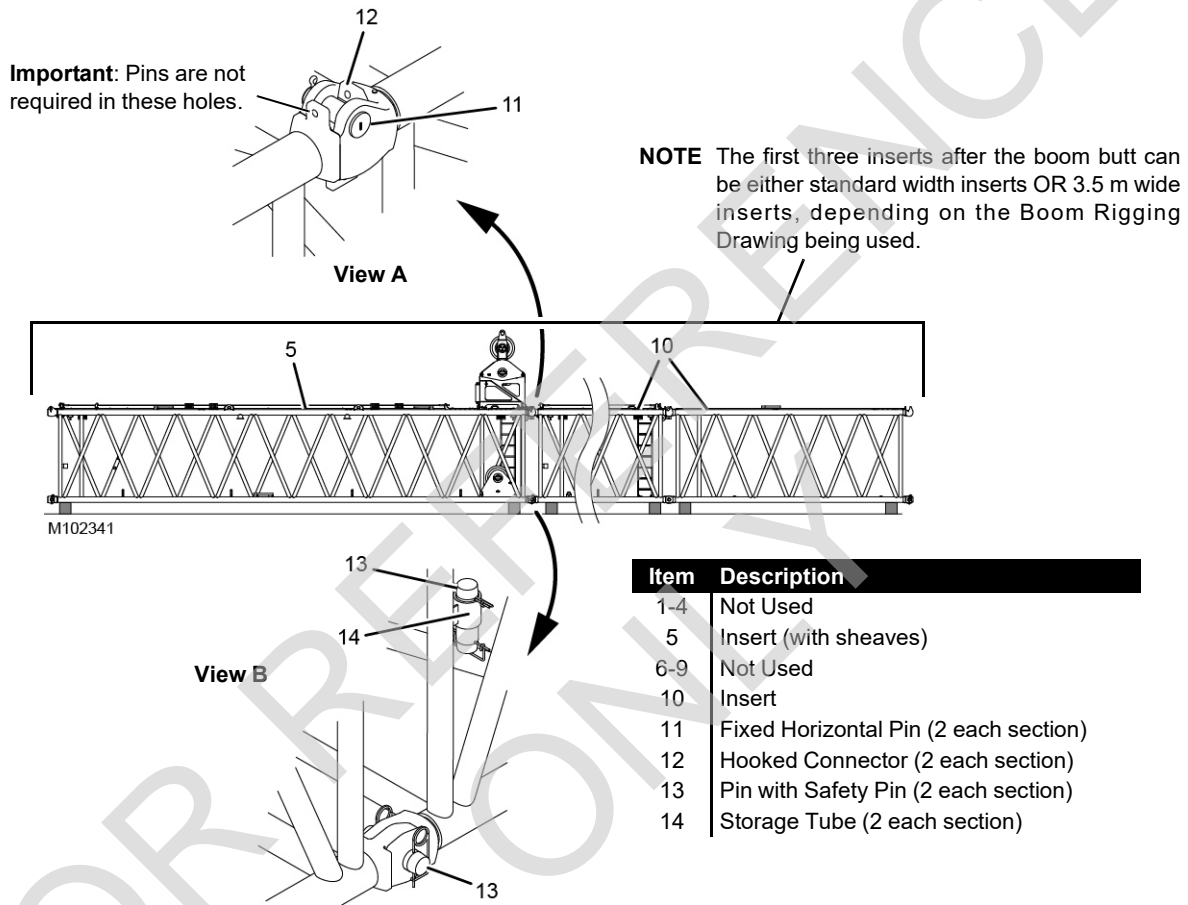


Figure 4-53

7. Repeat [step 2](#) on [page 4-69](#) for the next insert (10).

See [Figure 4-53](#) for the following steps.

8. Lift the next insert into position and engage the fixed horizontal pins (11, View A) with the hooked connectors (12) on the adjacent insert.

9. Lower the insert (10) until the bottom connector holes are aligned.

10. Remove the pins (13, View B) from the storage tubes (14) and install the pins in the bottom connector holes.

11. Block under the top end of the insert.

**NOTE** The blocking can be moved from the end of one insert to the end of the next insert.

12. Disconnect the lifting slings.

13. If necessary per the Boom Rigging Drawing being used, perform the following steps as the boom inserts are assembled:

- Install the Drop-Down Suspension at the proper location (see [Install Drop-Down Suspension on page 4-73](#)).
- Install the Intermediate Suspension Insert at the proper location (see [Prepare Intermediate Suspension Pendants on page 4-98](#)).

14. Repeat the above steps until all inserts are installed in PROPER SEQUENCE.

FOR REFERENCE ONLY



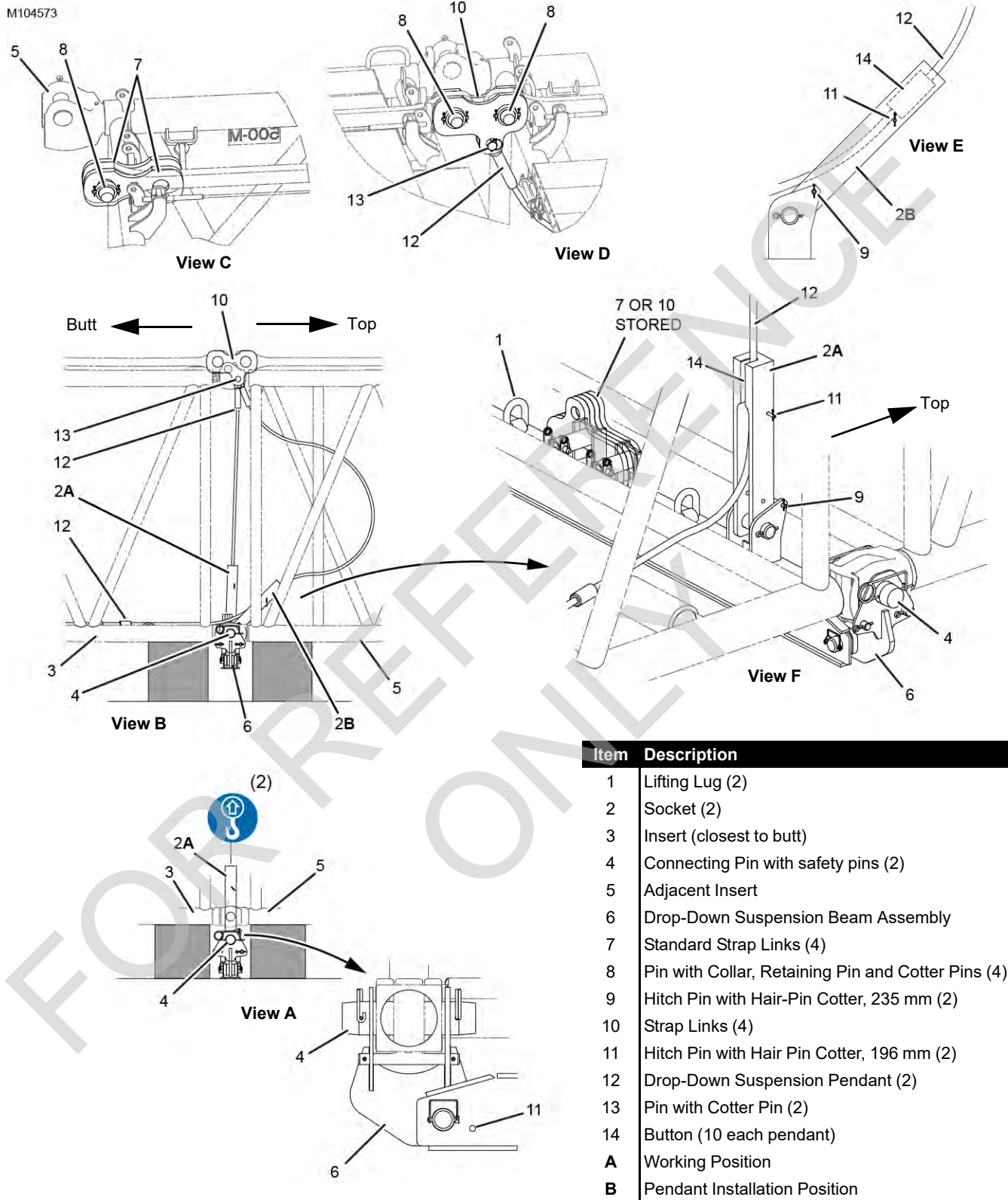


Figure 4-54

## Install Drop-Down Suspension

If the drop-down suspension is required per the Boom Rigging Drawing in use, install it as follows:

1. Refer to the Boom Make-Up Table (see **A**, [Figure 4-55](#)) in the appropriate Boom Rigging Drawing at the end of this section to determine the following:
  - Whether or not the drop-down suspension is required and its location
  - Pendant button number that must be pinned to the sockets

The Boom Make-Up Table will vary from one Boom Rigging Drawing to another.

FOR BOOM MAKE-UP				
ER	COLLA	SUSPENSION	OWER CONN PIN	SAF
J	R113	106 (13)	114 AND/OR R116	
R	COLLAF	PENDANT BUTTON NUMBER SEE (11)	PIN SEE (2B)	SAF SEF
	14	-	6	
	18	-	8	
	30	-	12	
	34	-	12	
	36	-	14	
	34	-	14	
	38	1	14	
	34	-	14	
	42	1	14	
	38	-	14	

Example of Boom Make-Up Table in Boom Rigging Drawing

Figure 4-55

See [Figure 4-54](#) for the remaining steps.

2. Prepare the drop-down suspension beam assembly (6, View A):
  - Unpin sockets (2, View E) from the pendant installation position (**B**). The sockets should be resting against the socket locking hitch pins (9, View F).
  - Install the hitch pins (11, View A) in the drop-down suspension beam.
3. Attach lifting slings from the assist crane to the lifting lugs (1, View F).  
The drop-down suspension beam assembly weighs 400 kg (882 lb).
4. Lift the drop-down suspension beam assembly (6, View A) into position at the end of the proper insert (3) so the connecting pins (4) are in line with the bottom connectors on the insert.
5. Disconnect the lifting slings.
6. Remove the standard strap links (7, View C) from both sides of the adjacent insert (5). Place the pins with collars (8) to the side for use later.

7. Store the standard strap links in the parts box or on the suspension beam (View F) after the strap links (10) are removed.
8. Attach the adjacent insert (5, View A) to the insert (3).
9. Block the adjacent insert (5, View A) so the bottom connecting pin holes are aligned.
10. Remove the bottom connecting pins (4, View A) from the drop-down suspension beam assembly.
11. Reattach the lifting slings from the assist crane to the lifting lugs (1, View A) and lift the drop-down suspension beam assembly into position so all of the connecting holes are aligned (View B).
12. Install the connecting pins (4, View B) and the safety pins.
13. Remove the socket locking hitch pins (9, View F), lower the sockets (2, View E) to the pendant installation position (**B**), and install the socket locking hitch pins (9, View E).
14. Disconnect the lifting slings.
15. Remove the strap links (10, View F) from storage on the beam.
16. Install the strap links (10, View D) with the pins (8). The pin heads must face out.
17. Lay the drop-down suspension pendants (12, View B) inside the insert (3).
18. Pin the drop-down suspension pendants (12, View B and D) to the strap links (10) with the pendant pins (13).
19. Perform the remaining steps as the boom is raised:
  - a. As the boom straps rise during the boom raising procedure ([page 4-99](#)), guide the drop-down pendants through the opening between the boom inserts. **Take care not to damage lacings.**
  - b. Signal the crane operator to stop the boom raising procedure when the required pendant buttons (14, View E) are near the sockets (2B).
  - c. Remove the socket locking hitch pins (11, View A) from the drop-down suspension beam.
  - d. Engage the required pendant button in each socket (2, View E) and install the button retaining hitch pin (11).
  - e. Remove the socket locking hitch pins (9, View E) from the pendant installation position (**B**), rotate the sockets to the working position (2A, View F) and reinstall the socket locking hitch pins (9).
  - f. Continue with the boom raising procedure.

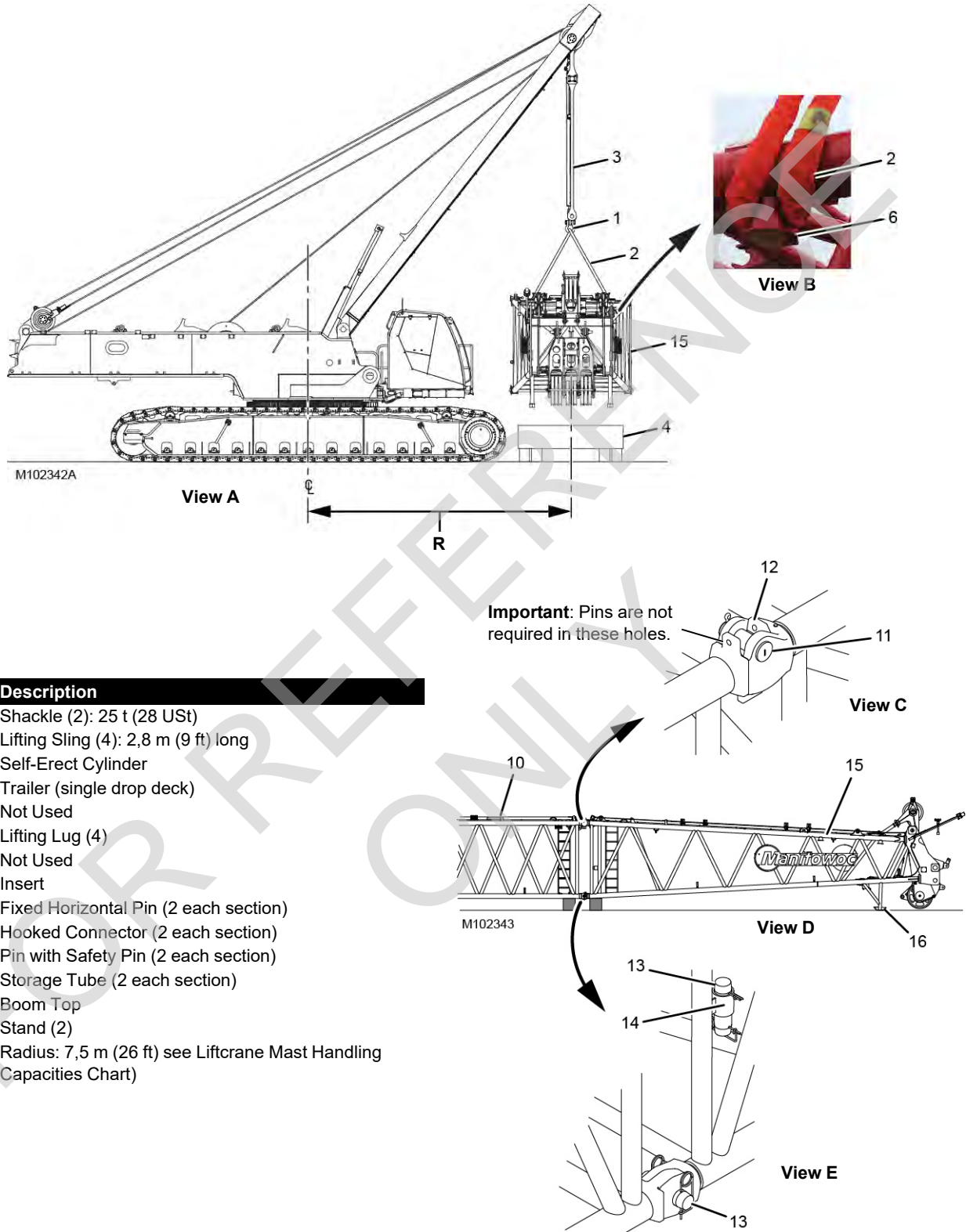


Figure 4-56

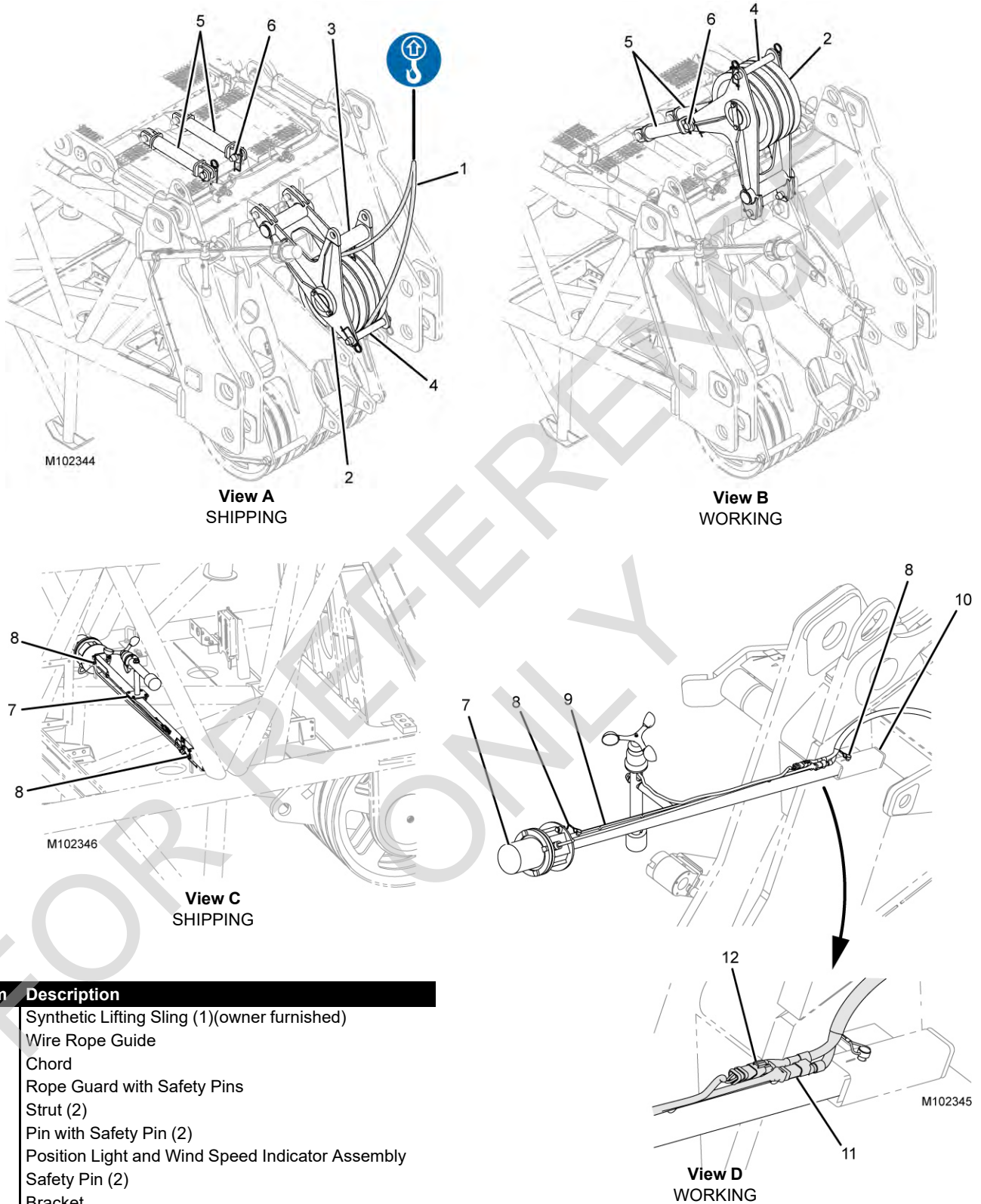
## Assemble Boom Top to Inserts

See [Figure 4-56](#) for the following steps.

20. Lift the boom top (15, Views A and B) off the trailer in the same manner the inserts were removed from the trailers.
21. Lift the boom top (15, View D) into position and engage the fixed horizontal pins (11, View C) with the hooked connectors (12) on the insert (10).
22. Lower the boom top (15, View E) until the bottom connector holes are aligned.
23. Remove the pins (13, View E) from the storage tubes (14) and install the pins in the bottom connector holes.
24. Block under the boom top stands (16, View D) if needed.
25. Disconnect the lifting slings.

FOR REFERENCE ONLY





Item	Description
1	Synthetic Lifting Sling (1)(owner furnished)
2	Wire Rope Guide
3	Chord
4	Rope Guard with Safety Pins
5	Strut (2)
6	Pin with Safety Pin (2)
7	Position Light and Wind Speed Indicator Assembly
8	Safety Pin (2)
9	Bracket
10	Tube
11	Electric Cable (WBT1-P8 Position Light)
12	Electric Cable (WBT1-P4 Wind speed)

Figure 4-57

### Raise Boom Top Wire Rope Guide

See [Figure 4-57](#) for the following procedure.

1. Wrap a small synthetic lifting sling (1, View A) — 340 kg (750 lb) capacity — around the center sheave in the wire rope guide (2).

Make sure the lifting sling is on the front side of the wire rope guide chord (3) and on the rear side of the rope guard (4).

2. Hoist just enough to loosen the rope guard (4, View A) and remove the rope guard.
3. Raise the wire rope guide (2, View B) to the working position.
4. Unpin the struts (5, View A) from the shipping position.
5. Raise the struts (5, View B) to the working position and pin them to the wire rope guide (2).
6. Disconnect the lifting sling.
7. Reinstall the rope guard (4).

### Install Position Light and Wind Speed Indicator

See [Figure 4-57](#), for the following procedure.

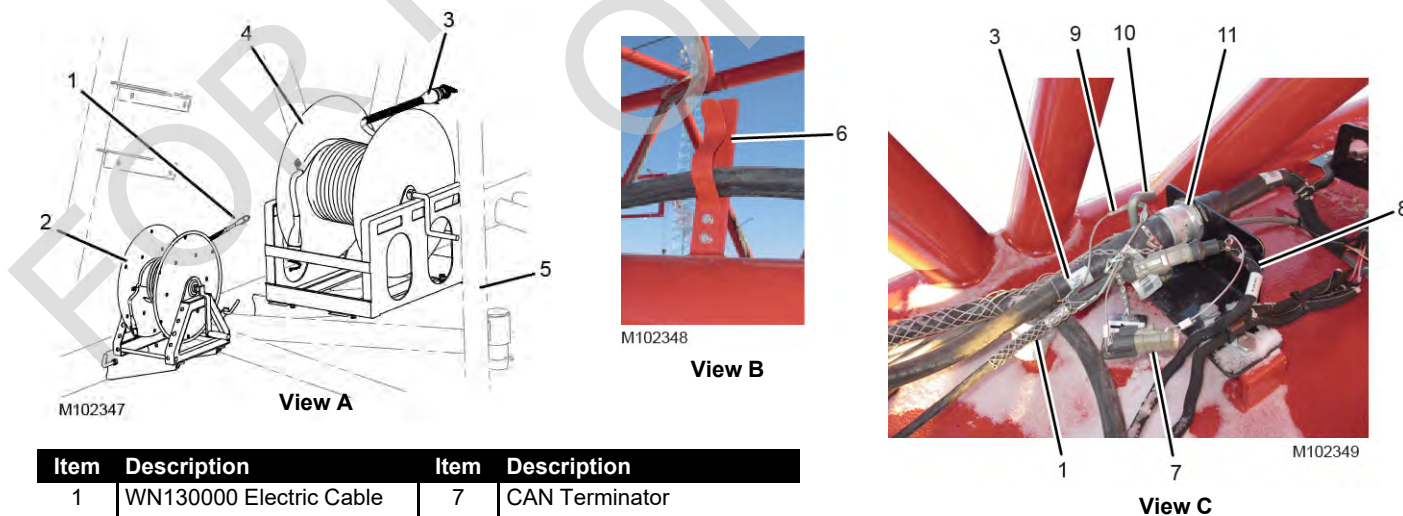
1. Unpin the position light and wind speed indicator assembly (7, View C) from the storage lugs in the boom top.
2. Insert the position light and wind speed indicator bracket (9, View D) into the tube (10) on the right side of the boom top and install a safety pin (8).

3. Install the other safety pin in the top hole of the bracket (9, View D).
4. Connect the electric cable (11, View D) from the boom top to the electric cable from the position light.
5. Connect the electric cable (12, View D) from the boom top to the electric cable from the wind speed indicator.

### Connect Boom Top Electric Cables

See [Figure 4-58](#) for the following procedure. Refer to the decal on the side of the boom top for a detailed wiring diagram.

1. Payout the electric cables (1 and 3, View A) from the cable reels (2 and 4) in the 12 m (39.4 ft) insert with sheaves (5).
2. Pull the cables all the way to the boom top (View C).
3. Secure the cables in the cable clips (6, View B) on the boom sections.
4. Disconnect the CAN terminator (7, View C) from the CAN NET IN electric cable (8).
5. Connect WN130000 electric cable (1, View C) to the CAN NET IN electric cable (8)
6. Connect the strain relief (9, View C) to the J-bolt (10).
7. Connect the WBR1 electric cable (3, View C) to the WBT1 receptacle (11).



Item	Description	Item	Description
1	WN130000 Electric Cable	7	CAN Terminator
2	Cable Reel	8	CAN NET IN Electric Cable
3	WBR1 Electric Cable	9	Strain Relief
4	Cable Reel	10	J-Bolt
5	Insert	11	WBT1 Receptacle
6	Cable Clip		

Figure 4-58



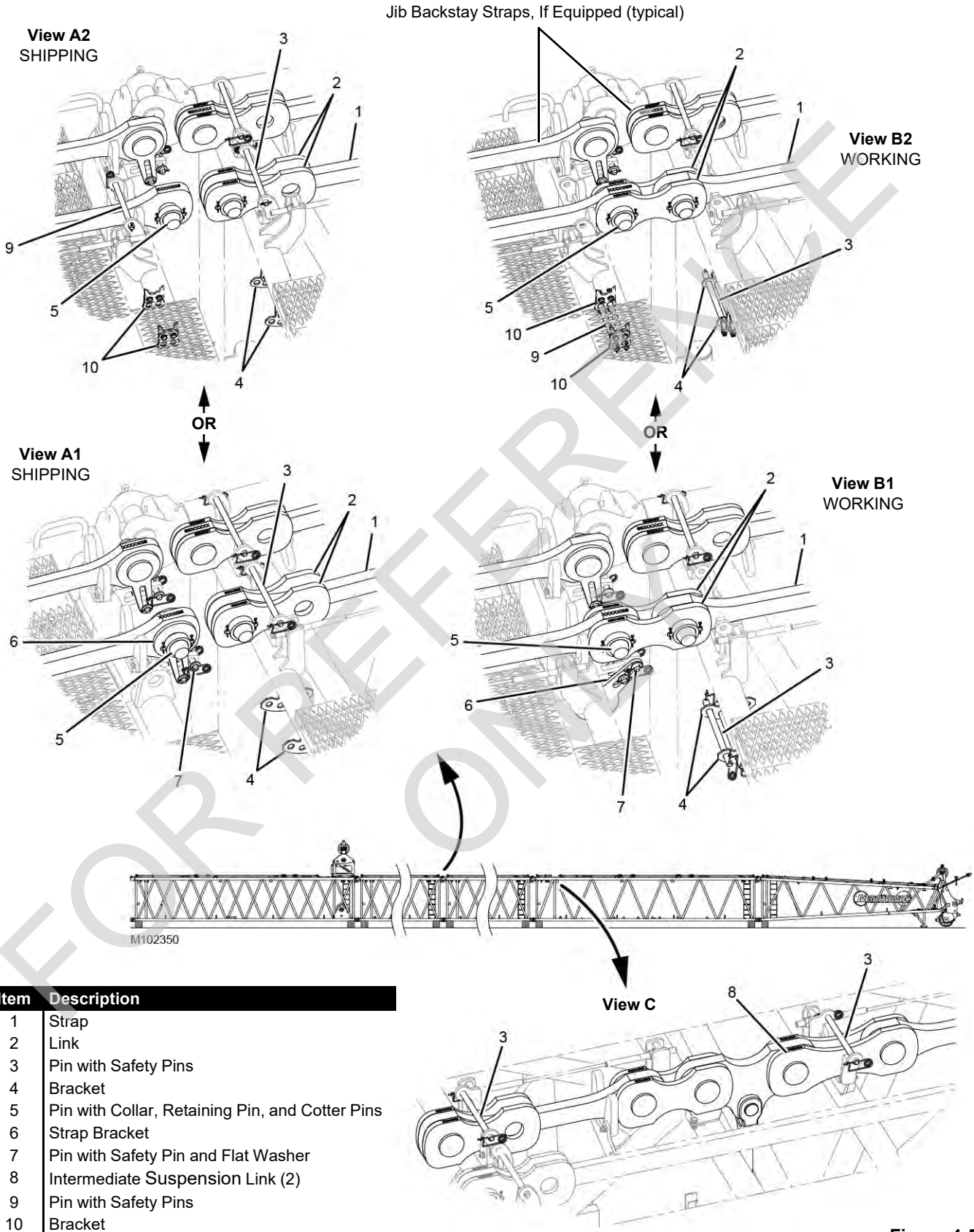


Figure 4-59

## Connect Boom Straps

See [Figure 4-59](#) for the following procedure.

The boom straps and, if equipped, the luffing jib straps are shipped on the boom sections as shown in View A. The luffing jib straps are shaded.



### WARNING

#### Falling Load Hazard!

The luffing jib backstay straps can be stored on the boom sections for shipping.

Refer to the appropriate Liftcrane Boom Capacity Chart for operating restrictions if the luffing jib backstay straps, links, and retaining hardware will be left on the boom sections during operation without a luffing jib.

Remove the luffing jib straps, links, and connecting hardware from the boom sections if instructed to do so in the capacity chart.

Starting at the boom top, proceed as follows:

1. Remove retaining pins (3, View A1 or A2) and store them in the brackets (4, View B1 or B2).
2. Remove pin (5, View A1 or A2).
3. Rotate strap bracket (6, View A1) down and pin it in the working position (View B1) with pin (7).

OR

Remove retaining pins (9, View A2) and store them in the brackets (10, View B2).

4. Rotate links (2, View A1 or A2) rearward from the shipping position to the working position (View B1 or B2).
5. Install pin (5, View B1 or B2). The PIN HEADS for the boom straps **MUST FACE OUT** (collars face center of boom sections).
6. Repeat the above steps for both straps at both ends of each boom section.
7. If equipped with the intermediate suspension insert, remove pins (3, View C) from the intermediate suspension links (8) and store the pins in the brackets (4, View B1 and B2).

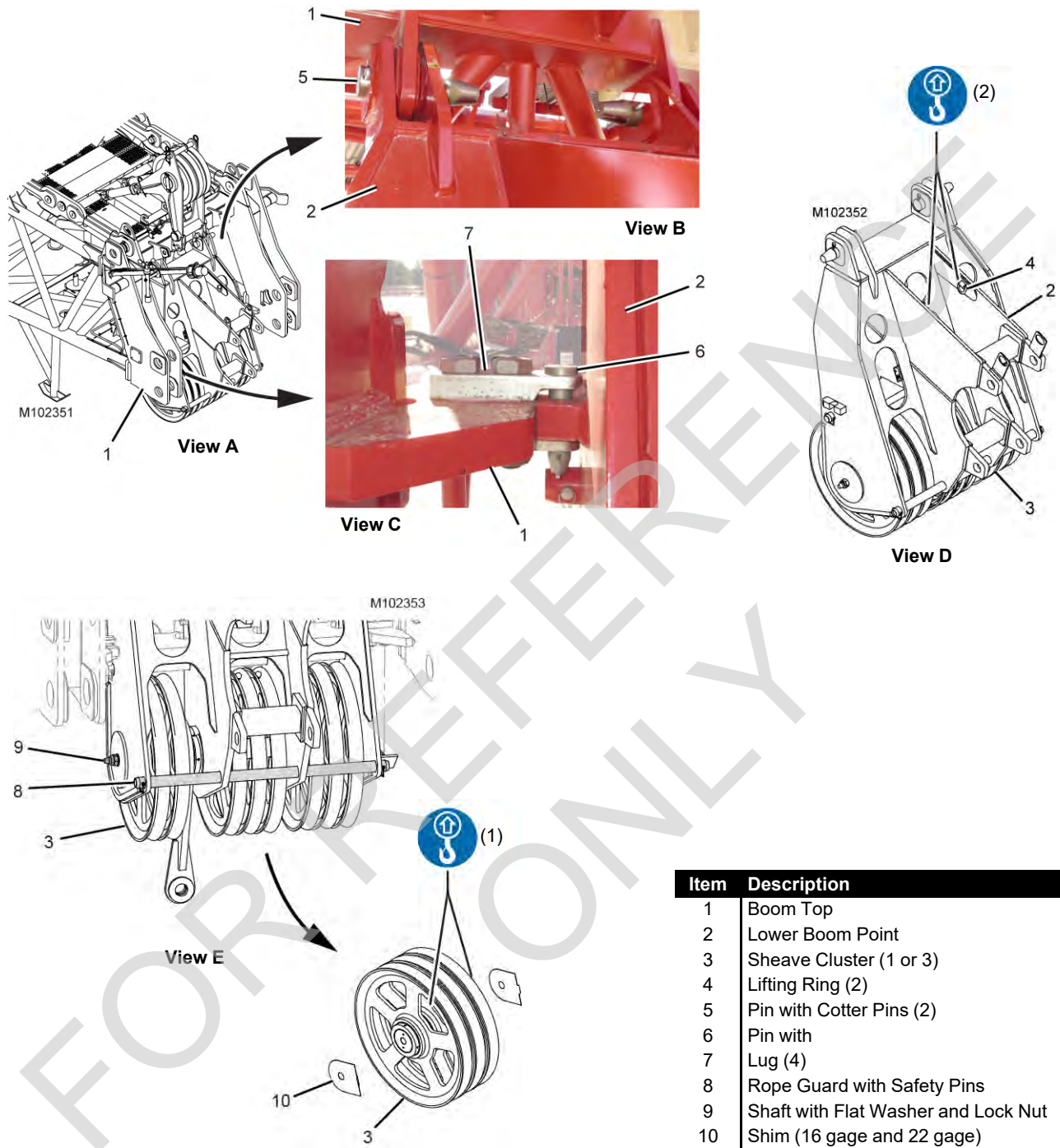


Figure 4-60

## Install/Remove Lower Boom Point

See [Figure 4-60](#) for the following procedure.

If removed, install the lower boom point as follows.

If required per the Capacity Chart, it may be necessary to remove the lower boom point for some boom and luffing jib combinations.

### Installing Lower Boom Point

1. Attach owner furnished lifting slings to the lifting rings (4, View D) on the lower boom point (2).
2. Remove the pins (5, View B) and pins (6, View C) from the lugs on the lower boom point (2).
3. Lift the lower boom point (2, View A) into position on the boom top so the upper pin holes (View B) and the lower pin holes (View C) are aligned.
4. Install the pins (5, View B) and the pins (6, View C).

### Removing Lower Boom Point

Reverse the installation steps to remove the lower boom point.

## Remove/Install Lower Boom Point Sheaves



### WARNING

#### Crane Tipping Hazard!

To raise some boom and luffing jib lengths, the two outer lower boom point sheave clusters must be removed. The crane will tip if this is not done.

Refer to the appropriate Liftcrane Luffing Jib Capacity Chart to determine the lower boom point sheave requirements and deducts.

### Removing Lower Boom Point Sheave Clusters

See [Figure 4-60](#) View E, for the following procedure.

1. Remove the rope guard (8).
2. Remove the shaft (9).
3. Using appropriate lifting equipment, pull the sheave clusters (3) out of their saddles in the lower boom point. Each sheave cluster weighs approximately 240 kg (530 lb).
4. Keep the shims (10) that come out with the sheave clusters.
5. Reinstall the shaft (9) with the flat washer and lock nut. Securely tighten the lock nut.
6. Reinstall the rope guard (8).

### Installing Lower Boom Point Sheave Clusters

Reverse the removal steps to install the lower boom point sheave clusters.

Install shims (10) on both sides of each sheave cluster to limit side play of each sheave cluster to 0,76 mm (1/32 in).



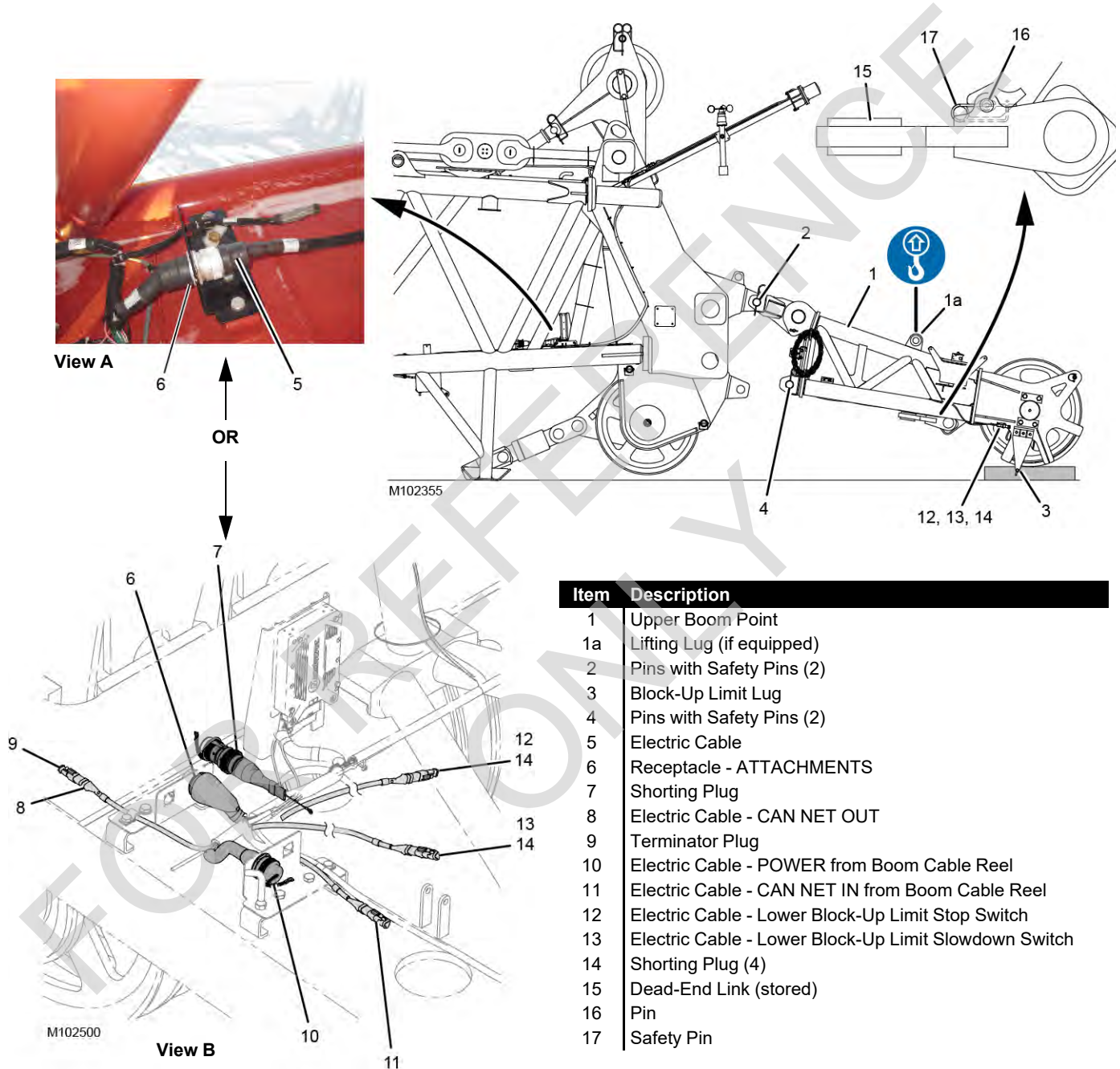


Figure 4-61

## Install Upper Boom Point



### WARNING

#### Tipping Crane Hazard!

To raise some boom lengths, the upper boom point must be removed. The crane will tip if this is not done.

Refer to the appropriate Liftcrane Boom Capacity Chart to determine the upper boom point requirements and deducts.

See [Figure 4-61](#) for the following procedure.

1. Attach lifting slings from the self-erect cylinder (or an assist crane) to the upper boom point (1).  
Current production cranes have a lifting lug (1a).
2. Lift the upper boom point into position at the lower boom point.
3. Remove the upper pins (2) from the upper boom point. The lower pins can remain in place.
4. Align the upper holes in the upper boom point with the holes in the lower boom point and install the upper pins (2).
5. Lower the upper boom point so the sheaves rest on blocking high enough to prevent the block-up limit lug (3) from contacting the ground.
6. Disconnect the lifting slings.

7. Connect the electric cable (5) from the upper boom point to the WBT1-J2 receptacle (6) on the boom top (View A).

The electric cable is stored on the brackets on the left side of the upper boom point.

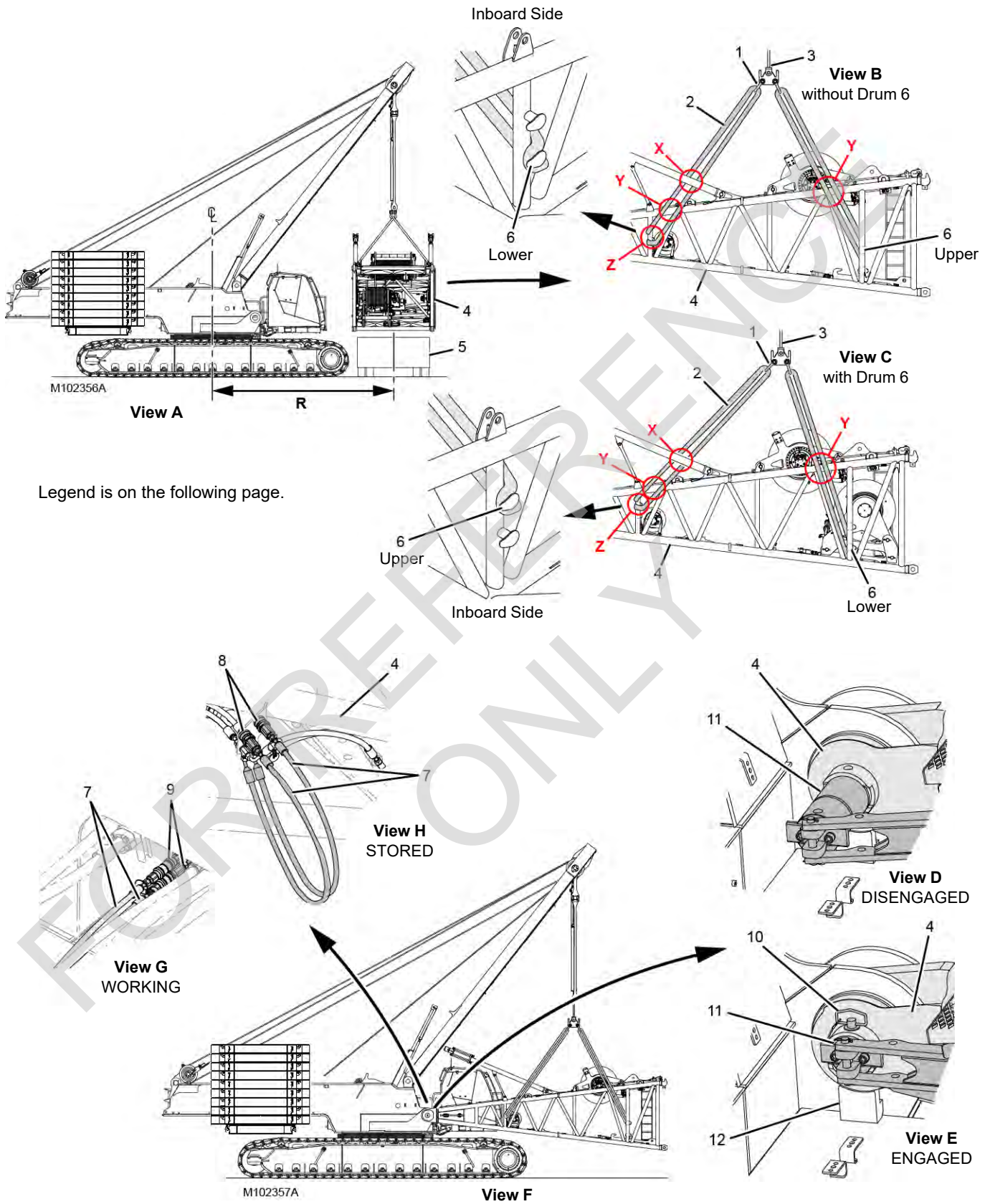
8. Install the lower pins (4), as follows, when the boom is raised:
  - a. Remove the lower pins (4) from the upper boom point.
  - b. Slowly boom up to align the bottom connecting holes.
  - c. Install the lower pins (4).

### Connect Terminator/Shorting Plugs at Boom Top

See [Figure 4-61](#) for the following procedure. Refer to the decal on the side of the boom top for a detailed wiring diagram.

- If the crane will not be equipped with a luffing jib, terminator plug (9) must be connected to the CAN NET OUT electric cable (8) in the boom top.
- If the crane will not be equipped with an upper boom point or a fixed jib, the shorting plug (7) must be connected to the ATTACHMENTS receptacle (6).
- If the block-up limit is disconnected at either boom point (lower or upper) the shorting plug (14) must be connected to the corresponding electric cable (12 and/or 13).





Legend is on the following page.

Figure 4-62

legend for [Figure 4-62](#)

Item	Description
1	Shackle (2 or 6): 25 t (28 USt)
2	Lifting Sling (4): 4 m (13 ft) long
3	Self-Erect Cylinder
4	Boom Butt
5	Trailer
6	Lifting Lug (4)
7	Hydraulic Hose (2)
8	Storage Coupler (2)
9	Hydraulic Coupler (2)
10	Hitch Pin with Hair-Pin Cotter (2)
11	Boom Hinge Pin (2)
12	Alignment Lug (2)
<b>R</b>	Radius: 7,5 m (26 ft) see Liftcrane Mast Handling Capacities Chart
<b>X</b>	Inboard Side
<b>Y</b>	Outboard Side
<b>Z</b>	Outboard Side

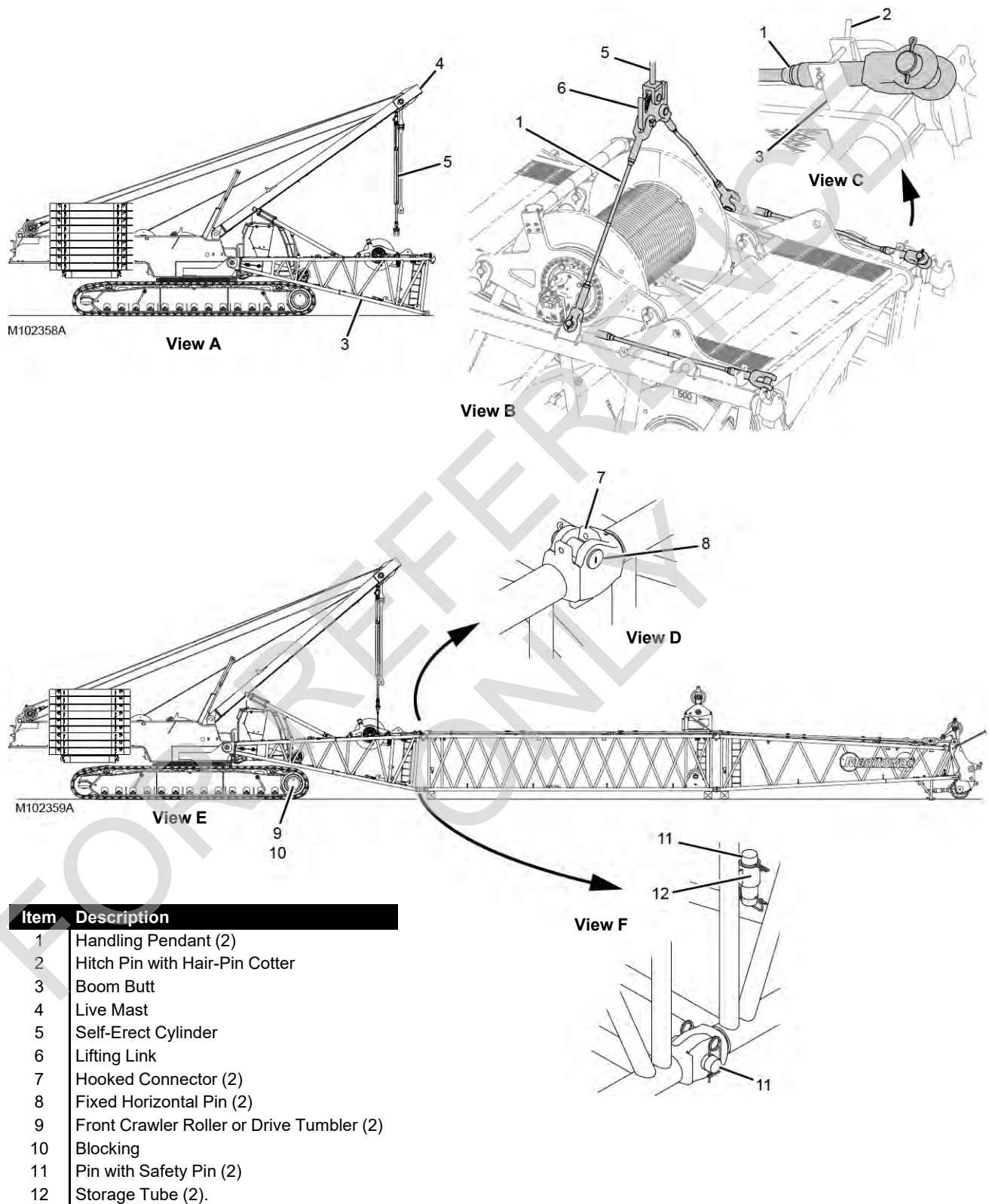
**NOTE** If not already done, install the counterweight tray and boxes. See:

- [on page 4-58](#)
- [Install Counterweight Boxes on page 4-63](#)

### Connect Boom Butt to Crane

See [Figure 4-62](#) for the following steps.

- Attach the lifting slings to the self-erect cylinder as shown in View B or C.
  - Route the slings to the inboard side of the boom stops at the **X** locations.
  - Route the slings over the outboard side of the boom butt chords at the **Y** locations.
  - Route the slings around the outboard side of the boom butt lacings at the **Z** locations to the lifting lugs (6) on the inboard side of the lacings.
  - Loop the slings over the proper lifting lugs (6) — upper or lower as indicated.
- Remove the boom butt (4, View A) from the trailer (5):
  - Position the trailer (5, View A) carrying the boom butt (4) on the desired side of the crane at the desired radius. Do not exceed radius (**R**).
  - Attach the lifting slings (1c or 2, View B or View C) to the lifting lugs (6) on the boom butt (4).
  - Lift the boom butt off the trailer.
  - Remove the trailer.
- Lift the boom butt into position at the front of the rotating bed (View F).
- Disconnect the hydraulic hoses (7, View H) from the storage couplers (8) on the boom butt.
- Connect the hydraulic hoses (7, View G) from the boom butt to the hydraulic couplers (9) on the front of the rotating bed.
- Remove the hitch pins (10, View E) to UNLOCK the boom hinge pins from the engaged position.
- Using the switch on the remote control, disengage the boom hinge pins (11, View D).
- Lower the boom butt onto the alignment lugs (12, View E) on the rotating bed.
- Using the switch on the remote control, engage the boom hinge pins (11, View E).
- Install the hitch pins (10, View E) to LOCK the boom hinge pins in the engaged position.
- Lower the boom butt onto blocking at ground level.
- Disconnect and remove the lifting slings and shackles from the boom butt and from the lifting link on the self-erect cylinder.
- Store the lifting slings and shackles in the job box.
- Disconnect the hydraulic hoses (7, View G) from the hydraulic couplers (9) on the rotating bed.
- Connect the hydraulic hoses (7, View H) to the storage couplers (8) on the boom butt.



Item	Description
1	Handling Pendant (2)
2	Hitch Pin with Hair-Pin Cotter
3	Boom Butt
4	Live Mast
5	Self-Erect Cylinder
6	Lifting Link
7	Hooked Connector (2)
8	Fixed Horizontal Pin (2)
9	Front Crawler Roller or Drive Tumbler (2)
10	Blocking
11	Pin with Safety Pin (2)
12	Storage Tube (2).

Figure 4-63

**NOTE** For the MLC300 with fixed position counterweight, ALL boom lengths can be closed and opened using the self-erect cylinder.

If desired, the live mast and Manitowoc supplied lifting slings and shackles can be used to close and open the boom as instructed in the Boom Rigging Drawing at the end of this section.

## Connect Boom Butt to Boom

See [Figure 4-63](#) for the following procedure.

1. Unpin handling pendants (1, View C) from storage on the boom butt (3).
  2. Lower the live mast (4, View A) and extend the self-erect cylinder (5) as needed.
  3. Pin the handling pendants (1, View B) to the lifting link (6) on the self-erect cylinder (5).
  4. Boom up or down so the self-erect cylinder (5) is vertical.
8. Check the appropriate capacity chart to see if the crawlers need to be blocked to raise the boom. If so, proceed as follows:
    - a. Mark the ground at the center of the front crawler rollers or the drive tumblers (9, View E).  
See the Crawler Blocking Diagram in the Capacity Chart Manual for blocking requirements.
    - b. Boom down to disengage the hooked connectors (7, View D) on the boom butt from the fixed horizontal pins (8) on the adjacent insert.
    - c. Slowly travel in reverse several feet.
    - d. Place the required blocking (10, View E) on the ground at the points marked in step [8a](#).
    - e. Repeat step [7](#) while traveling onto the blocking.

### CAUTION

#### Avoid Structural Damage to Mast or Cylinder!

- Do not attempt to raise the boom butt with the mast.
  - Use only the self-erect cylinder to raise the boom butt during the following steps.
5. Lift the boom butt clear of the ground.
  6. Position the crane so the boom butt (3, View E) is in line with the boom insert.
  7. Travel forward slowly, swing, and extend or retract the cylinder as needed to engage the hooked connectors (7, View D) on the boom butt with the fixed horizontal pins (8) on the adjacent insert.



### WARNING

#### Crushing Injury Hazard!

Prevent serious crushing injury:

- Do not stand inside the boom sections while installing the connector pins — STAND OUTSIDE BOOM.
9. Retract the self-erect cylinder to raise the boom butt until the bottom connector holes are aligned (View F).
  10. Remove the pins (11, View F) from the storage tubes (12) and install the pins in the bottom connector holes.
  11. Extend the self-erect cylinder to slacken the rigging.
  12. Disconnect the handling pendants (1, View B) from the lifting links (6).
  13. Pin the handling pendants to the boom butt (View C) for storage.



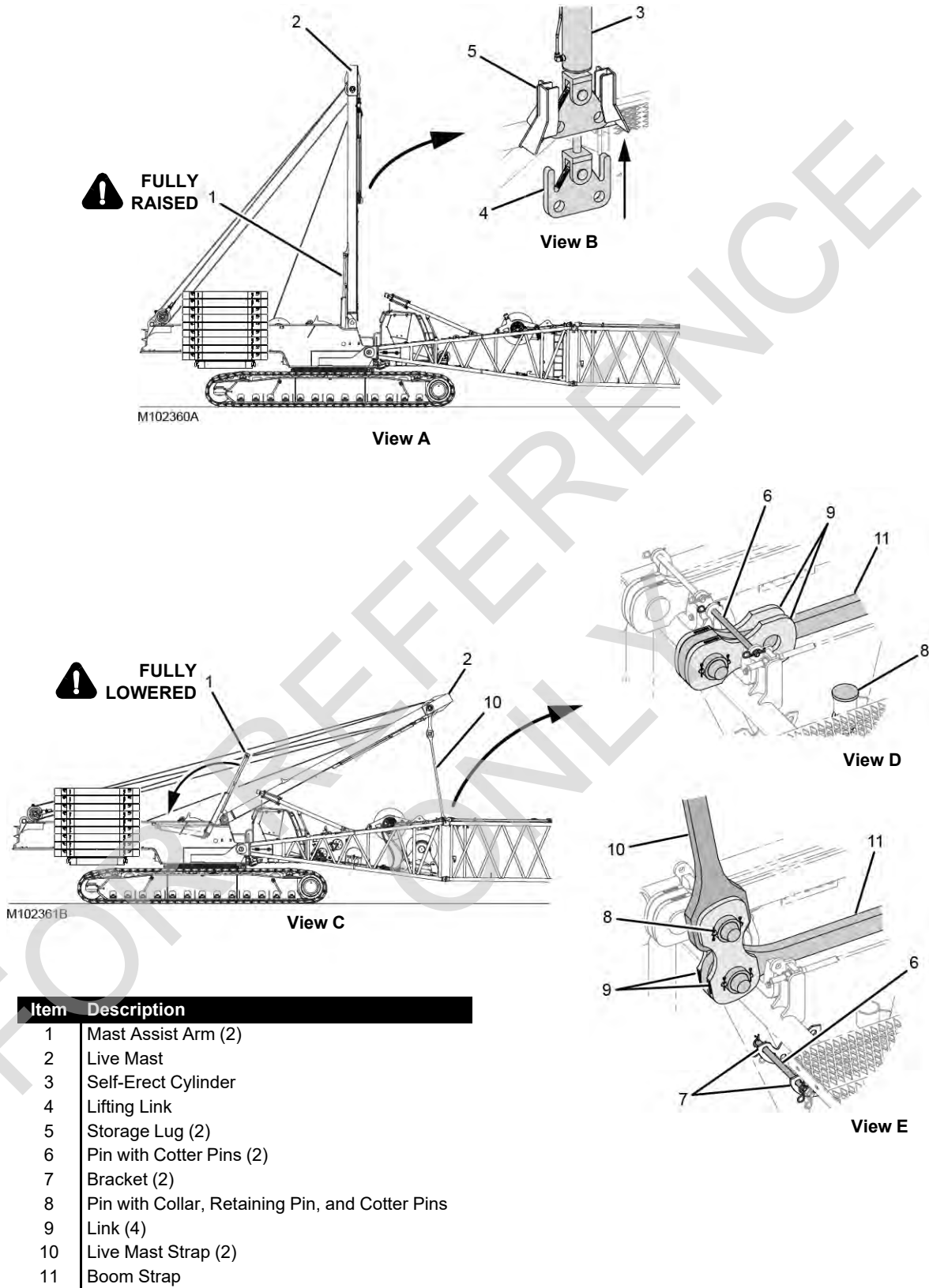
### WARNING

#### Tipping Hazard!

Prevent the crane from tipping:

- Block the crawlers — if required per the capacity chart — before attempting to raise the boom.





Item	Description
1	Mast Assist Arm (2)
2	Live Mast
3	Self-Erect Cylinder
4	Lifting Link
5	Storage Lug (2)
6	Pin with Cotter Pins (2)
7	Bracket (2)
8	Pin with Collar, Retaining Pin, and Cotter Pins
9	Link (4)
10	Live Mast Strap (2)
11	Boom Strap

Figure 4-64

## Connect Mast Straps to Boom Straps

See [Figure 4-64](#) for the following steps.

1. Confirm that the mast assist arms (1, View A) are fully raised before proceeding.

**NOTE** When the SETUP MODE is ON, the following will occur if you attempt to raise the mast when the mast assist arms are down:



- The mast will stop rising.
- The hazard warning will come on and the MAST ASSIST ARMS DOWN icon will appear in the fault bar of the Main Display Working Screen.
- Make sure the mast assist arms are up before raising the mast.

2. Secure the self-erect cylinder (3, View B) in the stored position:

- a. Make sure the storage pin (4, View B) and the lifting link (5) are properly aligned.

If necessary, jog the self-erect cylinder switch on the remote control or the drum control handle in the cab to relieve the pressure in the cylinder. Then, using the lifting link, rotate the cylinder rod by hand to properly position the pin and storage lugs.

- b. Boom up until the mast is vertical (90°).
- c. Slowly retract the self-erect cylinder (3, View B) until the storage guides (4) fully engage the storage lugs (5).



### WARNING

#### Falling Load Hazard!

Do not exceed a maximum mast angle of 156°. The mast could fall suddenly.

3. Lower the live mast to 156°.
4. Remove the pins (6, View D) and store them in the brackets (7, View E).

5. Remove the pins (8, View D) from storage.
6. Rotate the links (9, View D) rearward and pin them to the live mast straps (10, View E) with the pins (8).
7. Using the switch on the remote control or on the right control console (in cab), fully LOWER the mast assist arms (1, View C).



### DANGER

#### Falling Mast/Boom Hazard!

Prevent the mast and the boom from falling:

- Fully lower the mast assist arms before raising the boom. The mast can buckle and collapse if it contacts the mast assist arms with a fully rigged boom.

## Deactivate Setup Mode

1. Turn off the power switch on the remote control and deactivate it in the Mode Selection Group of the Main Display.
2. Store the remote control in the compartment on the left side of the operator cab (see [Figure 4-7 on page 4-8](#)).
3. For current production cranes (CCM-10 software version 0.022 and newer), deactivate the self-erect cylinder in the Mode Selection Group of the Main Display.
4. Select the proper Liftcrane Capacity Chart in the configuration screen of the RCL/RCI Display.

**NOTE** When the SETUP MODE is OFF, the following will occur if you attempt to raise the boom when the mast assist arms are up:



- The boom hoist will not operate.
- The hazard warning will come on and the MAST ASSIST ARMS UP icon will appear in the fault bar of the Main Display Working Screen.
- Make sure the mast assist arms are down before raising the mast and boom.



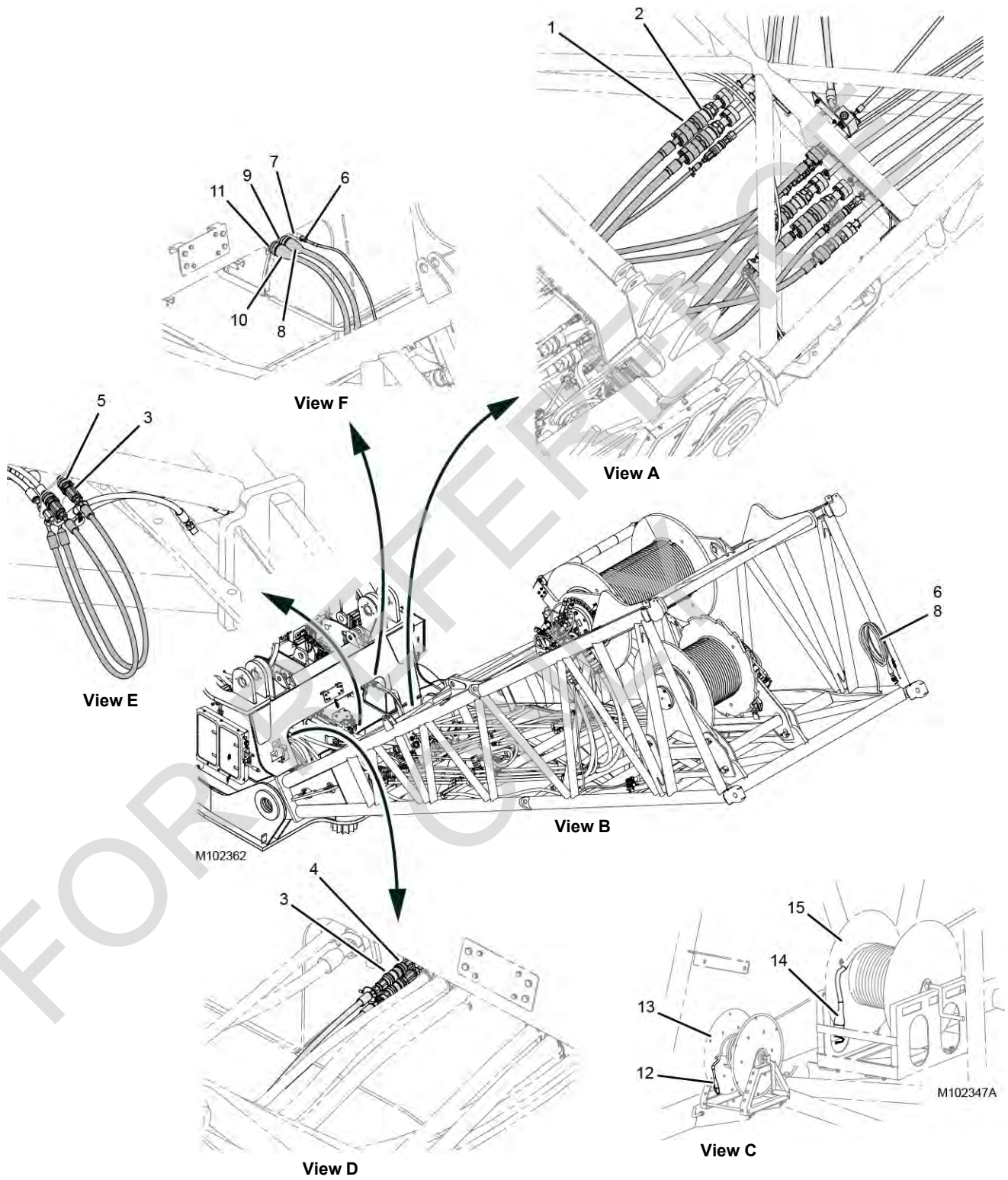


Figure 4-65

Legend for [Figure 4-65](#)

Item	Description
1	Hydraulic Hoses (from crane)
2	Hydraulic Couplers (on boom butt)
3	Boom Hinge Pin Hydraulic Hoses (from boom butt)
4	Hydraulic Couplers (on front of rotating bed)
5	Storage Couplers (on boom butt)
6	WN13500T Electric Cable (from boom butt)
7	WCE2 Electric Cable with CAN Terminator
8	WBB1 Electric Cable
9	WRL2 Receptacle
10	WBB2 Electric Cable
11	WRF2 Receptacle
12	WN1450000 Electric Cable
13	Cable Reel
14	WBR1 Electric Cable
15	Cable Reel

### Connect Hydraulic Hoses from Crane to Boom Butt

See [Figure 4-65](#), for the following steps.

1. Remove the dust caps from the hoses on the crane and from the couplers on the boom butt.
2. Thoroughly clean all hydraulic connections.
3. Connect the hydraulic hoses (1, View A) from the crane to the couplers (2) on the boom butt.

Match the identification numbers on the hoses with the identification numbers on the couplers for proper connection.

**NOTE** The quantity of hydraulic hoses from the crane to the boom butt will vary depending on your drum options.

4. Make sure the boom hinge pin hydraulic hoses (3, View D) are disconnected from the couplers (4) on the rotating bed.

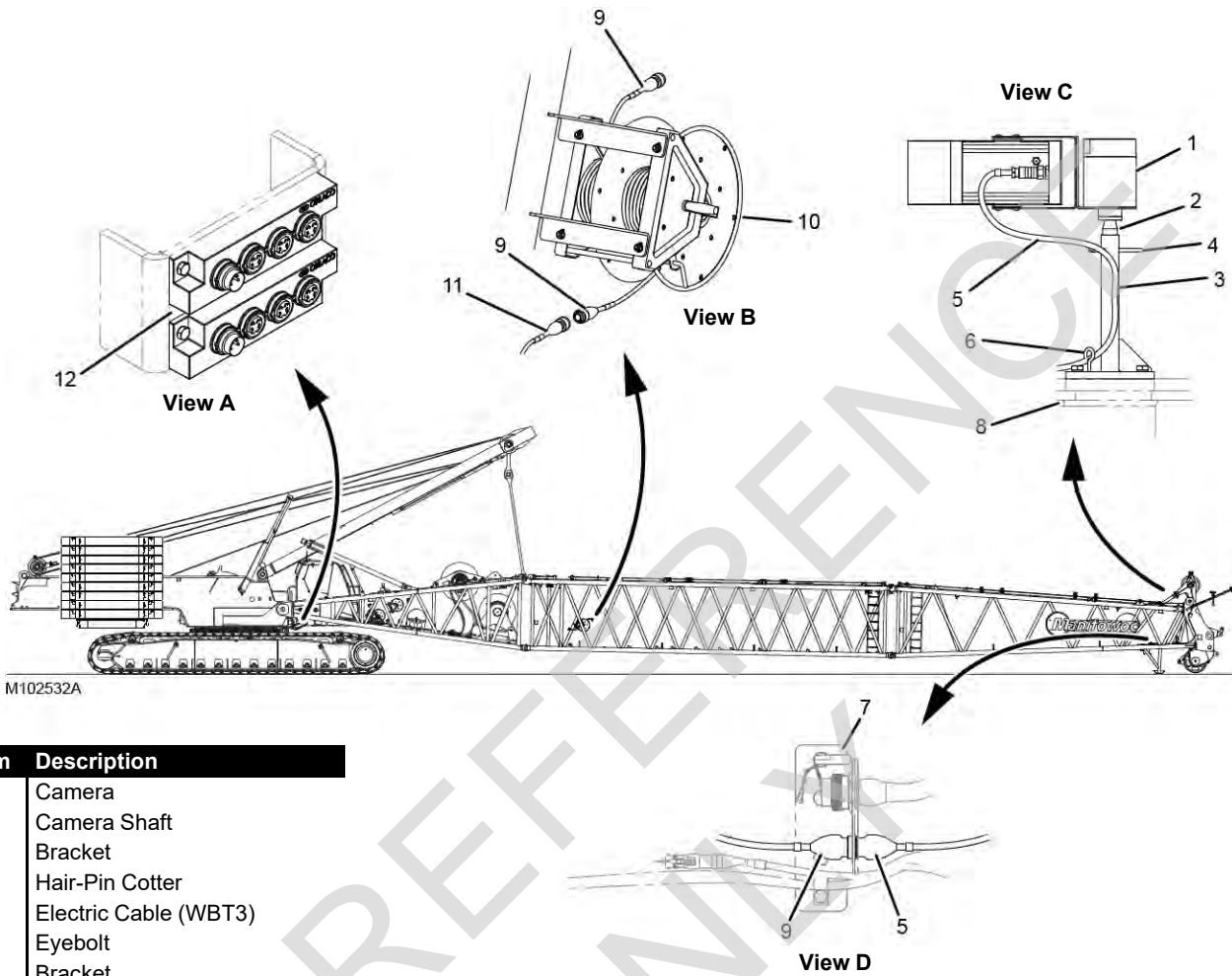
Thoroughly clean the hydraulic connections and install the dust caps.

5. Connect the hydraulic hoses (3, View E) to the storage couplers (5) on the boom butt.

### Connect Electric Cables from Boom Butt to Crane

See [Figure 4-65](#), for the following steps. Refer to the decal on the side of the boom top for a detailed wiring diagram.

1. Remove the dust caps from the electric cables and receptacles.
2. Thoroughly clean all electric connections.
3. Disconnect the CAN terminator from the end of electric cable (7, View F) and attach the dust cap to the terminator.
4. Connect electric cable (6, View F) from the boom butt to the electric cable (7) on the crane.
5. Connect the electric cable (8, View F) from the boom butt to the electric cable (9) on the crane.
6. Connect the electric cable (10, View F) from the boom butt to the electric cable (11) on the crane.
7. Connect the electric cable (6, View B) (coiled on the boom butt for storage) to the electric cable (12, View C) on cable reel (13) in the first insert.
8. Connect the electric cable (8, View B) (coiled on the boom butt for storage) to the electric cable (14, View C) on the cable reel (15) in the first insert.



Item	Description
1	Camera
2	Camera Shaft
3	Bracket
4	Hair-Pin Cotter
5	Electric Cable (WBT3)
6	Eyebolt
7	Bracket
8	Boom Top
9	Electric Cable (WBR3)
10	Cable Reel
11	Electric Cable (WBB5)
12	Camera Switchers

Figure 4-66

## Install Boom Top Camera and Connect Electric Cables

See [Figure 4-66](#) for the following procedure. Refer to the decal on the side of the boom top for a detailed wiring diagram.

1. Remove the camera (1, View C) from storage in the job box.
2. Slide the camera shaft (2, View C) into the bracket (3) and install the hair-pin cotter (4).
3. Attach the security chain from the camera to the eyebolt (6, View C).
4. Connect the electric cable (5, View C) to the bracket (7, View D) in the boom top (8).
5. Pay out electric cable (9, View B) from the cable reel (10) and connect the electric cable (9, View D) to the bracket in the boom top (8).
6. Secure the cable to the cable clips on the bottom left chord of the boom sections.
7. Connect the electric cable (11, View B) from the rotating bed to the other end of the electric cable (9) at the cable reel (10).
8. Connect the electric cables from the boom butt to the suggested receptacles in the camera switchers (12, View A). See the following wiring diagram.

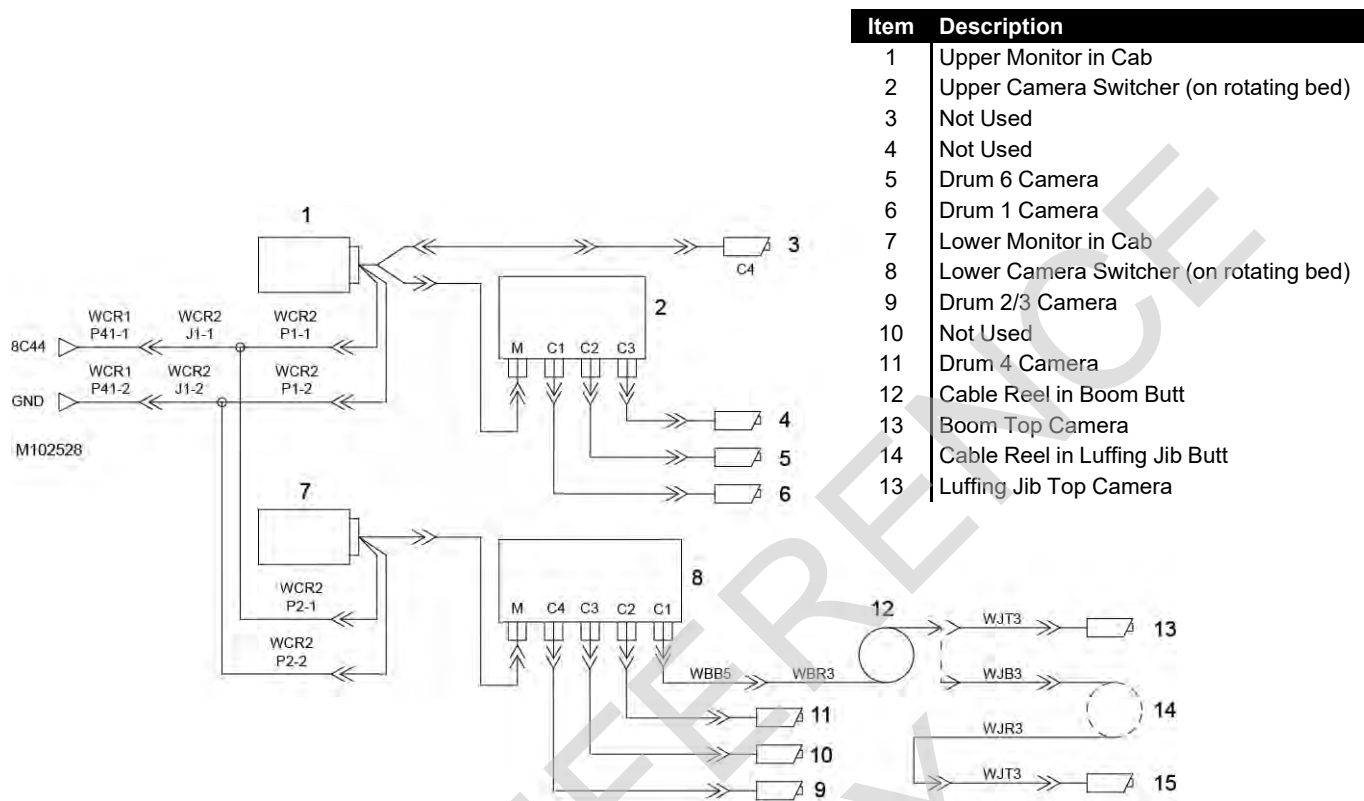
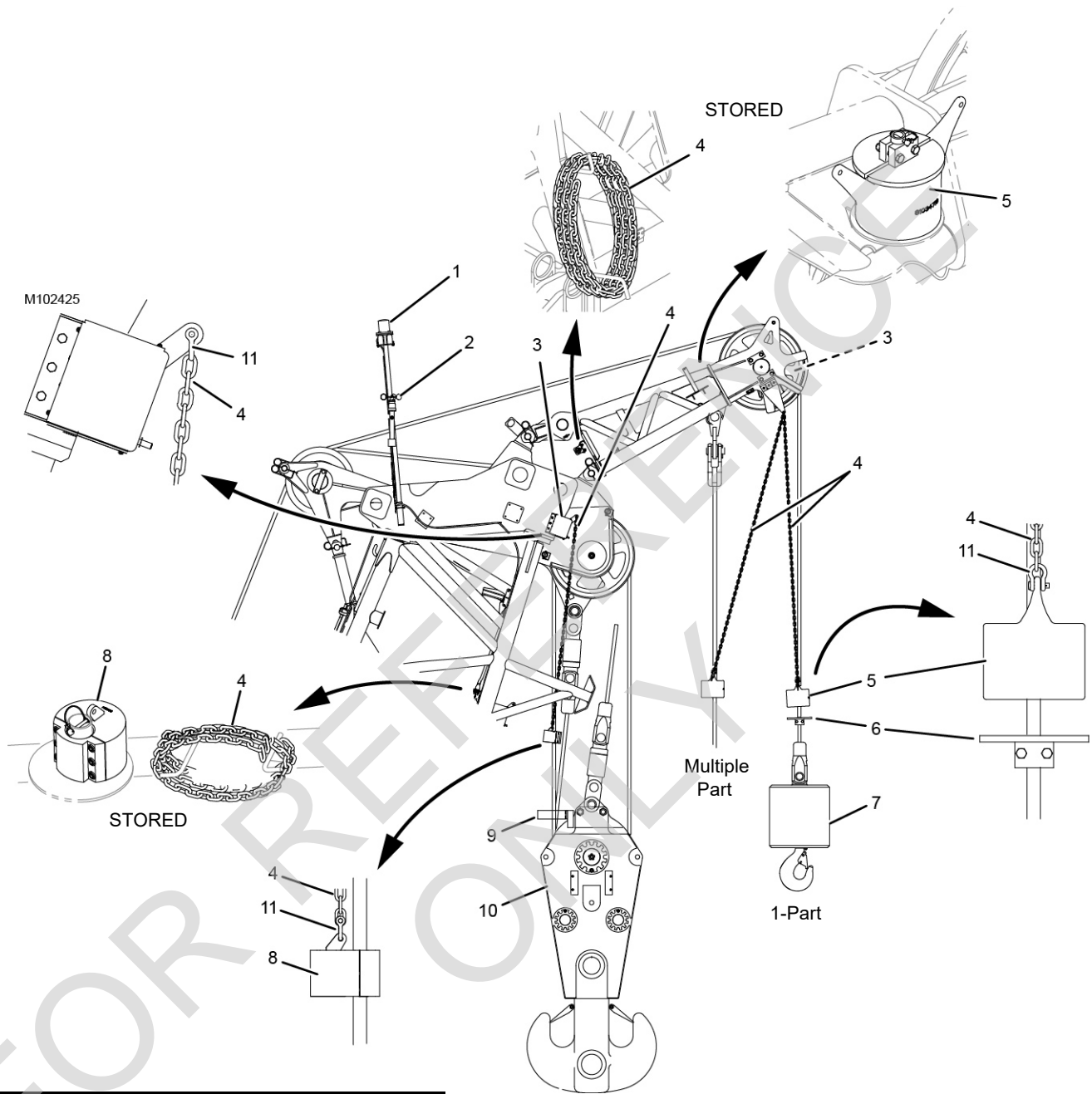


Figure 4-66 continued



4

Item	Description
1	Position Indicator Light
2	Wind Speed Indicator
3	Limit Switch (lower and upper boom point)
4	Chain
5	Weight with 2-Chain Attachments
6	Lift Plate
7	Hook-and-Weight Ball
8	Weight with 1-Chain Attachment
9	Lift Block
10	Load Block
11	Shackle

Figure 4-67



## Install the Boom Load Lines

1. Route the load lines up the boom. See [Figure 4-105 on page 4-155](#).
2. Pull the load lines approximately 20 ft (6,1 m) past the end of the boom.
3. Install the load block(s) and hook-and-weight ball after the boom is raised to a convenient height. See Boom Raising Procedure on [Boom Raising Procedure on page 4-99](#).

If equipped, the rigging winch can be used to assist in pulling the load lines. See [Rigging Winch Operation on page 4-153](#).

4. Read the following topics:

- [Wire Rope Installation on page 4-146](#)
- [Load Line Reeving on page 4-156](#)
- [Wire Rope Specifications on page 4-156](#)
- Reeving diagrams at the end of this section

## Install Boom Block-Up Limit Components

Install the block-up limit components as shown in [Figure 4-67](#).

- The chain and weight for the lower boom point are stored on brackets in the boom top.
- The chain and weight for the upper boom point are stored on brackets on the upper boom top.

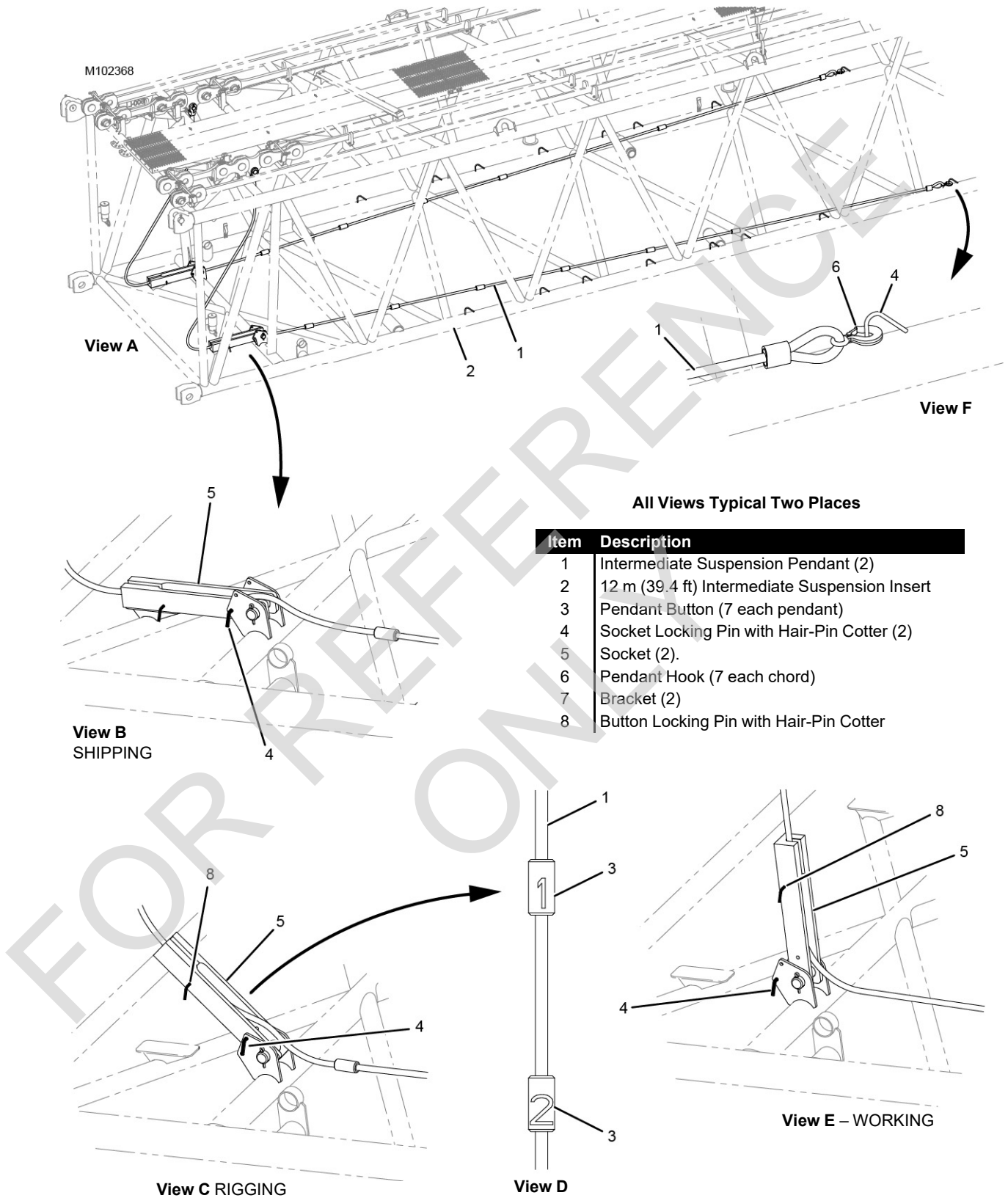


Figure 4-68

### Prepare Intermediate Suspension Pendants

See [Figure 4-68](#), for the following procedure.

The intermediate suspension pendants (1, View A) and rigging components are pre-assembled and shipped in the 12 m (39.4 ft) intermediate suspension insert (2).

Each pendant (1) is equipped with seven buttons (3, View D) The pendant buttons are numbered 1 through 7.

1. Make sure the intermediate suspension insert (2) is installed at the proper location in the boom.
2. Refer to Boom Rigging Drawing at the end of this section to determine the pendant button number that must be pinned to the sockets (see the example in [Figure 4-69](#)).

3. Remove the socket locking pins (4, View B) and raise the sockets (5) from the shipping position to the rigging position (View C).
4. Reinstall the socket locking pins (4, View C) in the top bracket holes.
5. Disconnect the pendant hooks (6, View F) from the brackets (7).
6. Remove the button locking pins (8, View C).
7. Perform the remaining steps as the boom is raised:
  - a. As the boom straps rise during the boom raising procedure ([page 4-99](#)), guide the intermediate suspension pendants through the opening between the boom inserts. **Take care not to damage lacings.**
  - b. Signal the crane operator to stop the boom raising procedure when the required pendant buttons (3, View D) are near the sockets (5, View C).
  - c. Engage the proper pendant button in each socket (5, View C).
  - d. Reinstall the button locking pins (8, View C).
  - e. Remove the socket locking pins (4, View C) and install the pins (4, View E) in the working position (bottom bracket holes).
  - f. Connect each pendant hook (6, View F) to the closest point on the chord to remove the slack from the pendants.
  - g. Continue the boom raising procedure.

Boom Makeup Table on Boom Rigging Drawing

DLLAR	PENDANT BUTTON NUMBER SEE (1)
R113	
10	-
14	-
18	-
14	-
22	-
18	-
22	-
18	-
26	-
22	-
26	-
22	-
30	-
26	-
38	-
34	-
42	1
38	-
42	1
38	-
46	-
42	1
46	-
42	2

M102369

Button Number

Figure 4-69

## RAISE BOOM

**NOTE** Refer to the MLC300 Luffing Jib Operator Manual for the pre-raising checks and raising procedure when equipped with a luffing jib.

### Pre-Raising Checks

Perform the following checks before raising the boom and jib:

- Maintenance and lubrication checks have been performed according to Maintenance Checklist and Lubrication Guide.
- Crane is on a firm, level surface.
- Crawlers are blocked if required per capacity chart in use.
- Boom hinge pins are fully engaged and secured.
- Crawler connecting pins are engaged and locking pins installed.
- Carbody jack pads are removed and secured in storage position.
- Carbody jacks are fully retracted and stored.
- Boom and jib inserts are installed in proper sequence per boom and jib assembly drawings.
- Intermediate suspension insert (if required) is installed in proper position.
- Intermediate suspension pendants (if required) are secured in proper operating position and sockets are in working position.
- Drop-down suspension (if required) is installed in proper position.
- Drop-down suspension pendants (if required) are secured in proper operating position and sockets are in working position.
- All straps are unpinned from storage lugs.
- All straps are properly pinned together. Cotter pins are installed and spread.
- Live mast straps are properly connected to boom straps.
- Mast assist arms are fully lowered.
- Boom hoist wire rope is spooled tightly onto boom hoist and engaged with the proper sheaves.
- Load lines are spooled tightly onto drums and engaged with proper sheaves.
- Load lines are securely anchored at boom and jib points or at load block and hook-and-weight ball.
- Left-rear rotating bed ladder is folded in stored position or removed.

- All tools and other items are removed from boom and jib.
- Electrical boom stop is properly installed, operational, and adjusted to proper angle.
- Electric cables from crane control system are connected to cable reel in boom butt.
- Electric cables in boom and jib are connected to proper receptacles.
- Block-up limit control is properly installed, operational, and adjusted.
- RCL/RCI is properly configured and operational.
- Proper capacity chart is selected on configuration screen of RCL/RCI Display.
- Operator has read and is thoroughly familiar with selected capacity chart. **Consult the selected capacity chart for applicable deducts and boom length raising limitations.**
- Wind is within allowable limits for operation as shown in Wind Conditions document located at end of Section 3.

### Boom Raising Procedure

1. Verify that the pre-raising checks have been performed.
2. SLOWLY start to boom up:
  - a. Have an assistant watch the boom straps as the boom rises.
 

Signal the operator to STOP raising the boom if the straps get caught on the brackets, pins, or timber guards. **Correct the problem before continuing.**
  - b. If equipped with suspension pendants —
    - **drop-down:** perform [step 19 \(a through f\)](#) on [page 4-73](#)
    - **intermediate:** perform [step 7 \(a through g\)](#) on [page 4-98](#)

Signal the operator to STOP raising the boom if the pendants get caught or do not rise smoothly out of the inserts. Correct the problem before continuing.
3. SLOWLY continue to boom up.
4. If equipped with an upper boom point, stop when the bottom holes in the upper boom point are aligned with the holes in the boom top. Install the connecting pins. [Figure 4-61 on page 4-82.](#)
5. Continue to raise the boom until the lower and upper boom points are at a convenient height for installing the load block(s) and hook-or-weight ball.
6. Install the load block(s) and hook-or-weight ball at the lower and upper boom points.
7. Install the block-up limit components at the boom points. See [Figure 4-67 on page 4-95.](#)

8. If equipped with a jib, continue to raise the boom until the jib point is at a convenient height to install the load block or the hook-or-weight ball.
  - a. Signal the operator to STOP raising the boom if the jib pendants get caught on the brackets, pins, or timber guards. **Correct the problem before continuing.**
  - b. Make sure the jib stop pins are properly installed. See the #148 Fixed Jib Assembly and Disassembly Guide at the end of this section.
9. Install the load block or hook-or-weight ball at the jib point.
10. Install the block-up limit components at the jib point.
11. Continue to boom up until the boom is at an angle that safely allows the load block(s) and/or hook-and-weight balls to be lifted.
12. Once the boom is raised:
  - a. Check all crane functions for proper operation.
  - b. Check all safety devices for proper operation (see Section 3 of the MLC300 Operator Manual).

- c. Check that the boom stop is adjusted for the proper maximum boom angle.
- d. Check that the RCL/RCI is properly calibrated.

**SHIPPING CRANE COMPONENTS**

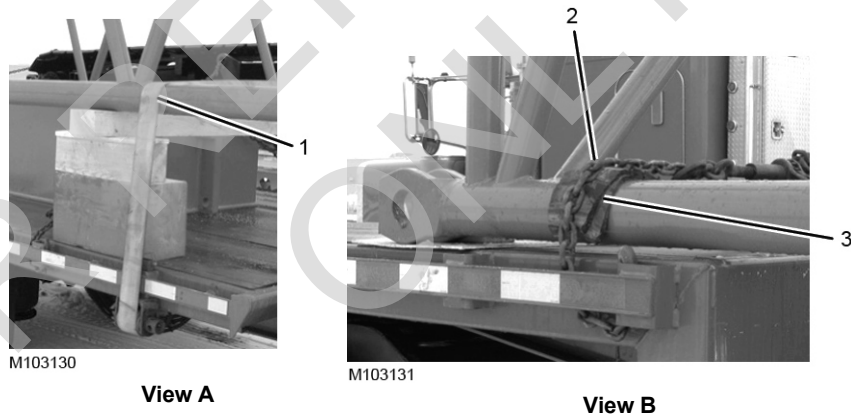
It is the owner/user’s responsibility to ensure the following:

- All trailer loads comply with local, state, and federal transportation requirements.
- All crane components are properly blocked and secured so they cannot shift or fall off trailers.
- To avoid damage to components:

Use synthetic tie-downs to secure components as shown in [Figure 4-70](#), View A.

If chain tie-downs are used, install protective covering (such as sections of rubber tire) between the chain and the component being secured as shown in [Figure 4-70](#), View B.

When securing boom sections, wrap the tie-downs over the chords — never over the lacings. Keep the tie-downs as close to the blocking as possible (View A) to prevent bending the chords.

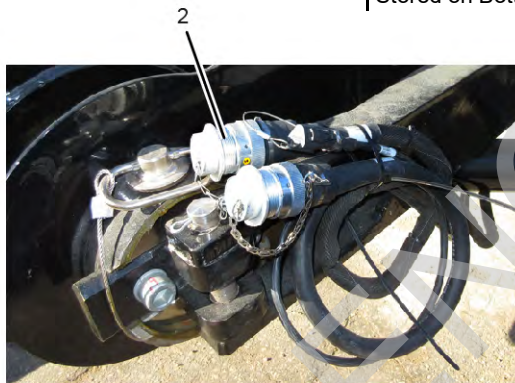


Item	Description
1	Synthetic Tie-Down Wrapped Over Boom Chord
2	Chain Tie-Down Wrapped Over Boom Chord
3	Protective Covering (section of rubber tire)

Figure 4-70



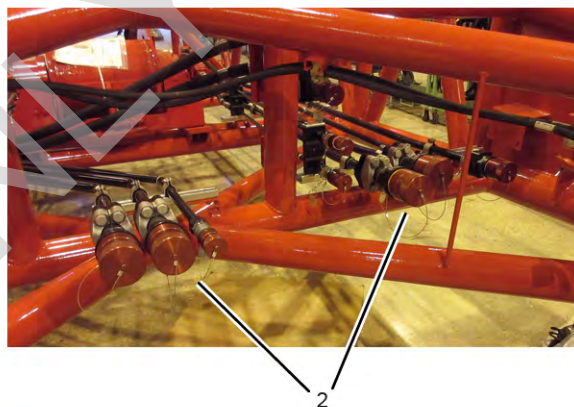
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Item	Description
1	Electric Cables from Cable Reels in Boom Insert Stored on Top End of Boom Butt
2	Electric Cables from Boom Butt to Rotating Bed Stored on Bottom End of Boom Butt

Figure 4-71

Item	Description
1	Hydraulic Hoses from Rotating Bed to Boom Butt Stored on Front of Rotating Bed
2	Dust Caps Installed on Couplers in Bottom End Boom Butt



M103126

Figure 4-72

### CRANE DISASSEMBLY

Before proceeding, read and understand all of the topics on [page 4-1](#) through [page 4-13](#).

#### Prepare Crane

1. Position the crane in the desired disassembly area.
2. If required, **block under the boom end of the crawlers**. See the following:
  - Appropriate Liftcrane Boom or Jib Capacity Chart for blocked crawler requirements.

- Crawler Blocking Diagram in the Capacity Chart Manual for blocking dimensions.

**!** **DANGER**  
**Tipping Hazard!**

Do not attempt to lower the boom or the boom and jib to the ground until the crawlers are blocked, if required. Otherwise, the crane will tip.



## Lower Boom

1. Swing the boom to either side of center and lower the load blocks and/or the hook-and-weight balls to the ground. Take every precaution to prevent damage to the load lines.
2. Swing the boom in line with the crawlers and slowly lower the boom.
  - a. If equipped with a **luffing jib**, refer to the Luffing Jib Operator Manual for lowering instructions.
  - b. If equipped with a **fixed jib**, disengage the jib stops before the jib point contacts the ground. See the #148 Fixed Jib Assembly and Disassembly Guide at the end of this section.
  - c. If equipped with an **upper boom point**, remove the bottom connecting pins when the upper boom point just contacts the ground. See [Figure 4-61 on page 4-82](#).

**NOTE** The boom top stands will prevent the boom stop sheaves from digging into the ground. Block under the stands if necessary.

3. If equipped with suspension pendants:
  - **drop-down** ([Figure 4-54 on page 4-72](#))
  - **intermediate** ([Figure 4-68 on page 4-97](#))

make sure the suspension pendants lower into the corresponding insert as the boom lowers.
4. Continue to lower the boom until:
  - The boom straps are resting in the brackets on the top of the boom sections.
  - The mast is at approximately 159° (see [Figure 4-64 on page 4-88](#)).
5. Stop the engine.

## Remove Block-Up Limit Components

Remove the block-up limit weights and chains (see [Figure 4-67 on page 4-95](#)) and store them as shown.

- The chain and weight for the lower boom point are stored on brackets in the boom top.

- The chain and weight for the upper boom point are stored on brackets on the upper boom top.

## Store the Load Lines

1. Disconnect the button sockets, swivels, and links from the boom and jib tops (see [Figure 4-107 on page 4-157](#)).
2. Disconnect the load lines from the button sockets.
3. Wind the load lines onto the load drums and secure them for shipping.
4. Store the button sockets, swivels, links, and connecting pins in the parts box.

## Remove Boom Top Cameras

Reverse the camera installation steps (see [page 4-93](#)) and store the camera in the job box.

- Clean all cable connectors and dust caps.
- Securely fasten dust caps to all cable ends and receptacles.

## Disconnect Boom Butt Electric Cables

Reverse the installation steps (see [Connect Electric Cables from Boom Butt to Crane on page 4-91](#)).

- Clean all cable connectors and dust caps.
- Securely fasten dust caps to all cable ends and receptacles.
- Store the electric cables on the boom butt as shown in Views A and B, [Figure 4-71](#) and secure them with plastic wire ties.

Be sure to install the CAN terminator on the end of the electric cable (7, View F, [Figure 4-65 on page 4-90](#)) or you will encounter faults when the engine is started.

## Disconnect Boom Butt Hydraulic Hoses

Disconnect the hydraulic hoses between the boom butt and the rotating bed (View A, [Figure 4-65 on page 4-90](#)).

- Clean all hose couplers and dust caps.
- Securely fasten dust caps to all hose couplers.
- Store the hydraulic hoses as shown in Views A and B, [Figure 4-72](#).

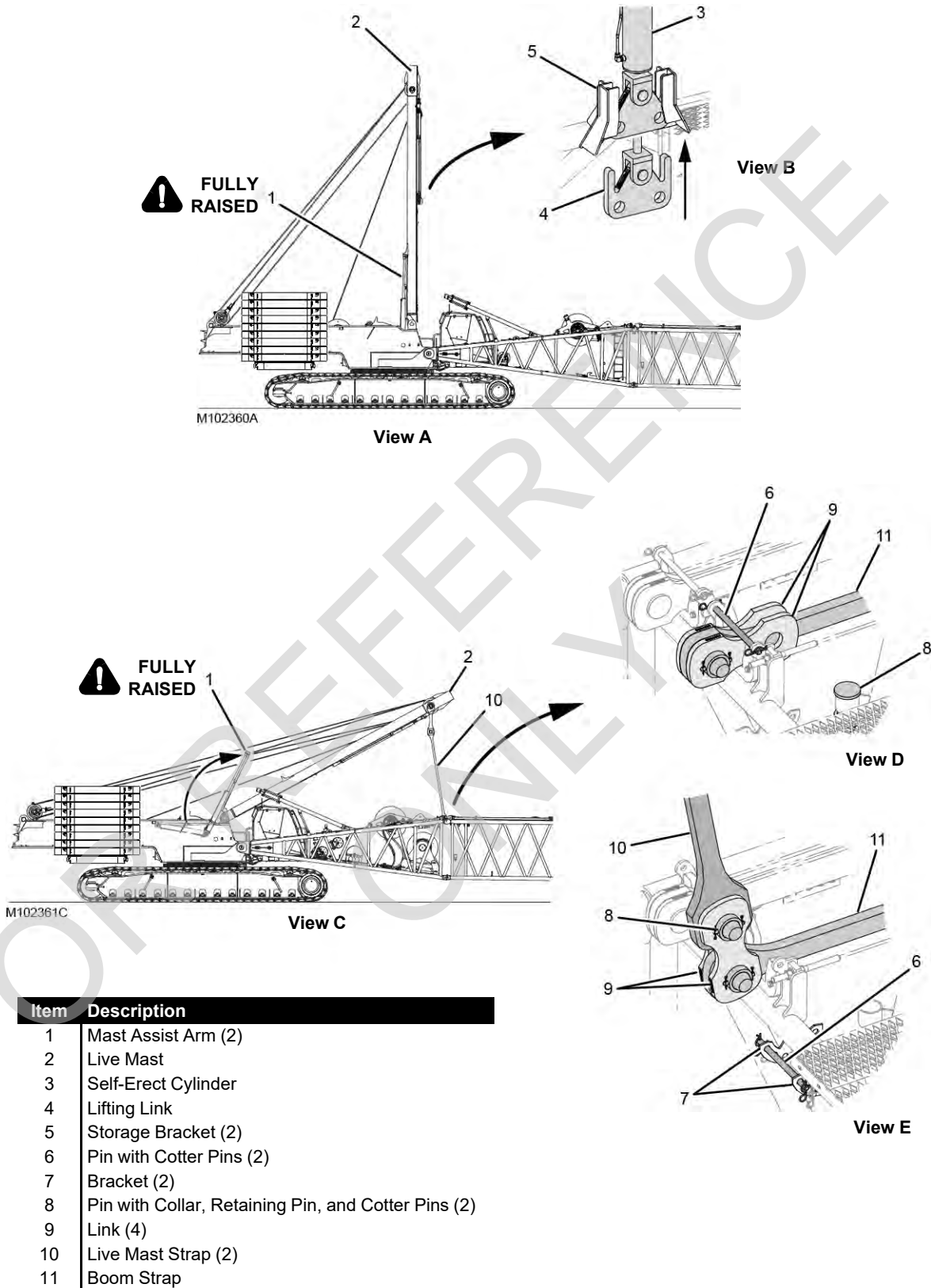


Figure 4-73

## Activate Setup Mode

Perform the steps under [Setup Mode on page 4-9](#).

## Disconnect Mast Straps from Boom Straps

See [Figure 4-73](#) for the following steps.

1. Using the switch on the remote control on the right control console (in cab), fully RAISE the mast assist arms (1, View C).

**NOTE** When the SETUP MODE is ON, the following will occur if you attempt to raise the mast when the mast assist arms are down:



- The mast will stop rising.
- The hazard warning will come on and the MAST ASSIST ARMS DOWN icon will appear in the fault bar of the Main Display Working Screen.
- Make sure the mast assist arms are up before raising the mast.

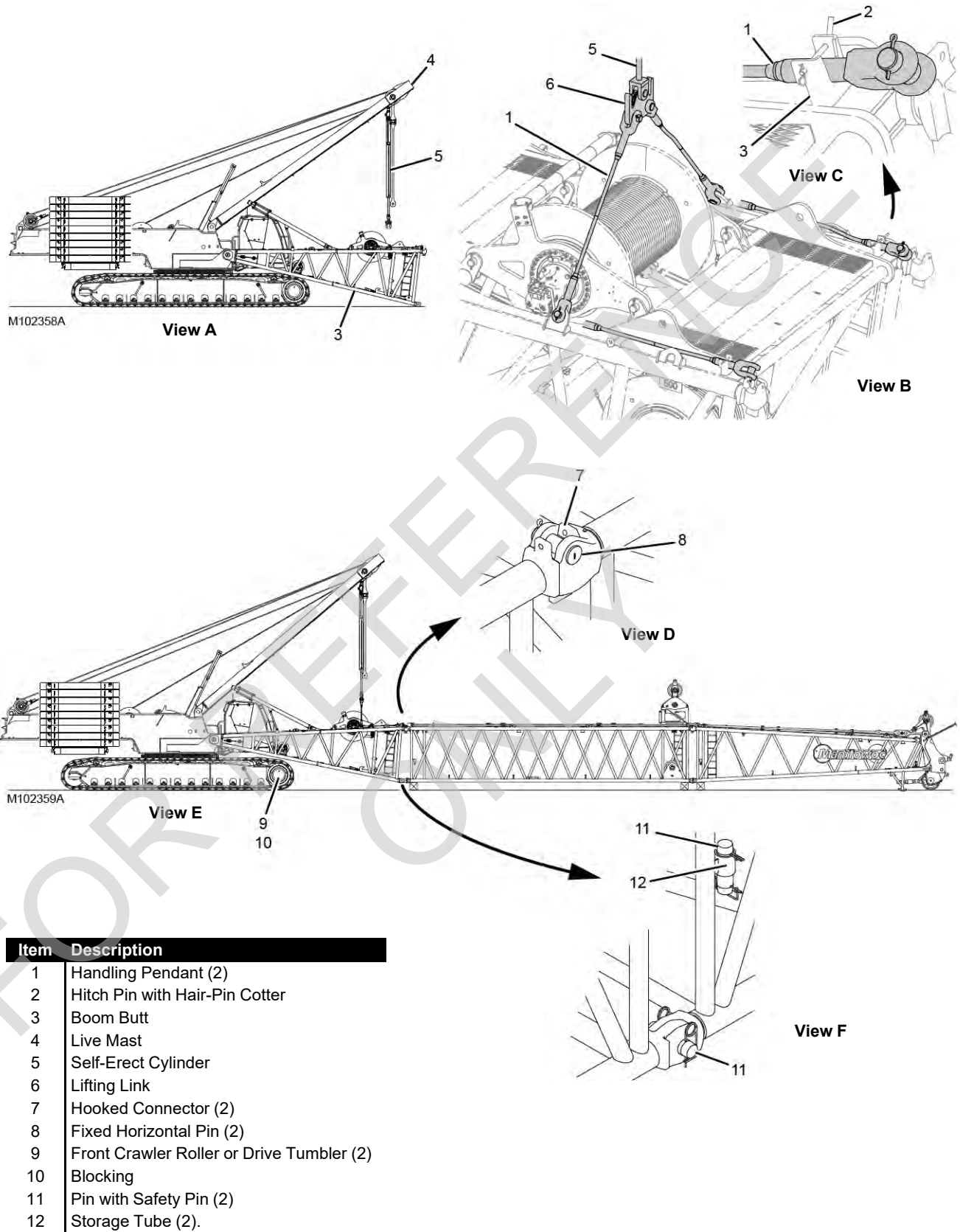


### WARNING

#### Falling Load Hazard!

Do not exceed a maximum mast angle of 156°. The mast could fall suddenly.

2. Lower the live mast to 156° maximum (View C).
3. Remove the pins (8, View E) and store them (View D).
4. Remove the pins (6, View E) from the brackets (7, View E).
5. Rotate the links (9, View E) forward and secure them with the pins (6, View D).
6. Deploy the self-erect cylinder (3, View B):
  - a. Boom up until the mast is vertical (90°) as shown in View A.
  - b. Slowly extend the self-erect cylinder (3, View B) until the lifting link (4) fully disengages the storage brackets (5).
  - c. Boom down to lower the live mast into the operating range.



4

Item	Description
1	Handling Pendant (2)
2	Hitch Pin with Hair-Pin Cotter
3	Boom Butt
4	Live Mast
5	Self-Erect Cylinder
6	Lifting Link
7	Hooked Connector (2)
8	Fixed Horizontal Pin (2)
9	Front Crawler Roller or Drive Tumbler (2)
10	Blocking
11	Pin with Safety Pin (2)
12	Storage Tube (2).

Figure 4-74

**NOTE** For the MLC300 with fixed position counterweight, ALL boom lengths can be closed and opened using the self-erect cylinder.

If desired, the live mast and Manitowoc supplied lifting slings and shackles can be used to close and open the boom as instructed in the Boom Rigging Drawing at the end of this section.

## Disconnect Boom Butt from Boom

See [Figure 4-74](#) for the following steps.

1. Unpin the handling pendants (1, View C) from storage on the boom butt (3).
2. Lower the live mast (4, View A) and extend the self-erect cylinder (5) as needed.
3. Pin the handling pendants (1, View B) to the lifting link (6) on the self-erect cylinder (5).
4. Make sure the self-erect cylinder (5) is vertical before lifting against the boom.

### CAUTION

#### Avoid Structural Damage to Mast or Cylinder!

- Do not attempt to raise the boom butt with the mast.
  - Use only the self-erect cylinder to raise the boom butt during the following steps.
5. Retract the self-erect cylinder to lift against the boom butt only enough to loosen the bottom pins (11, View F).

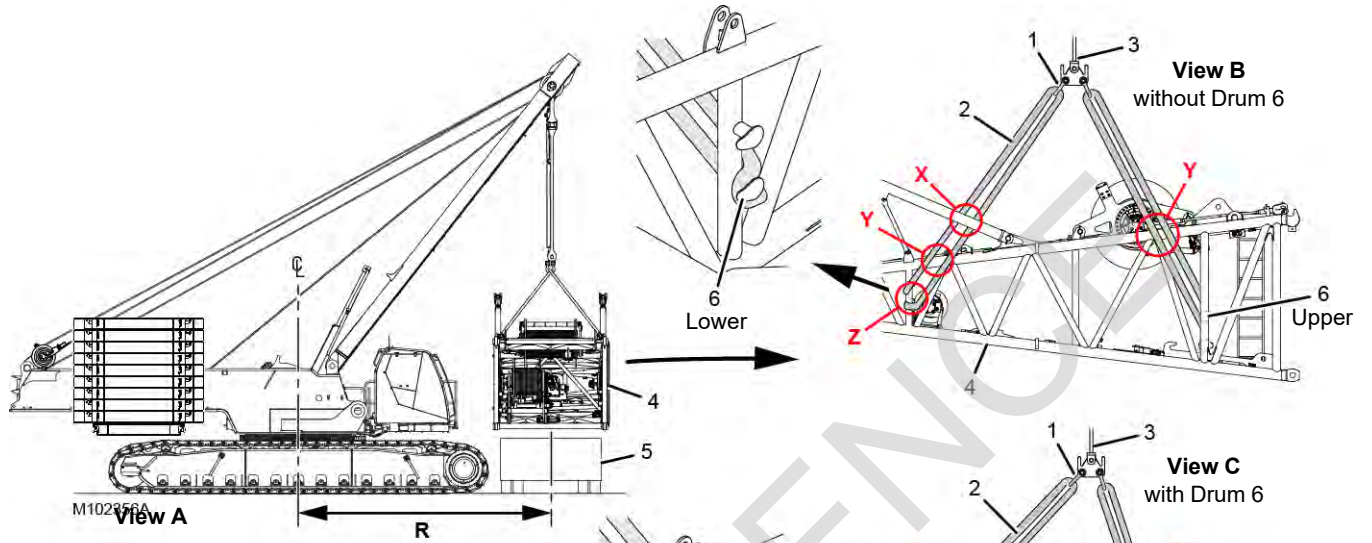


### WARNING

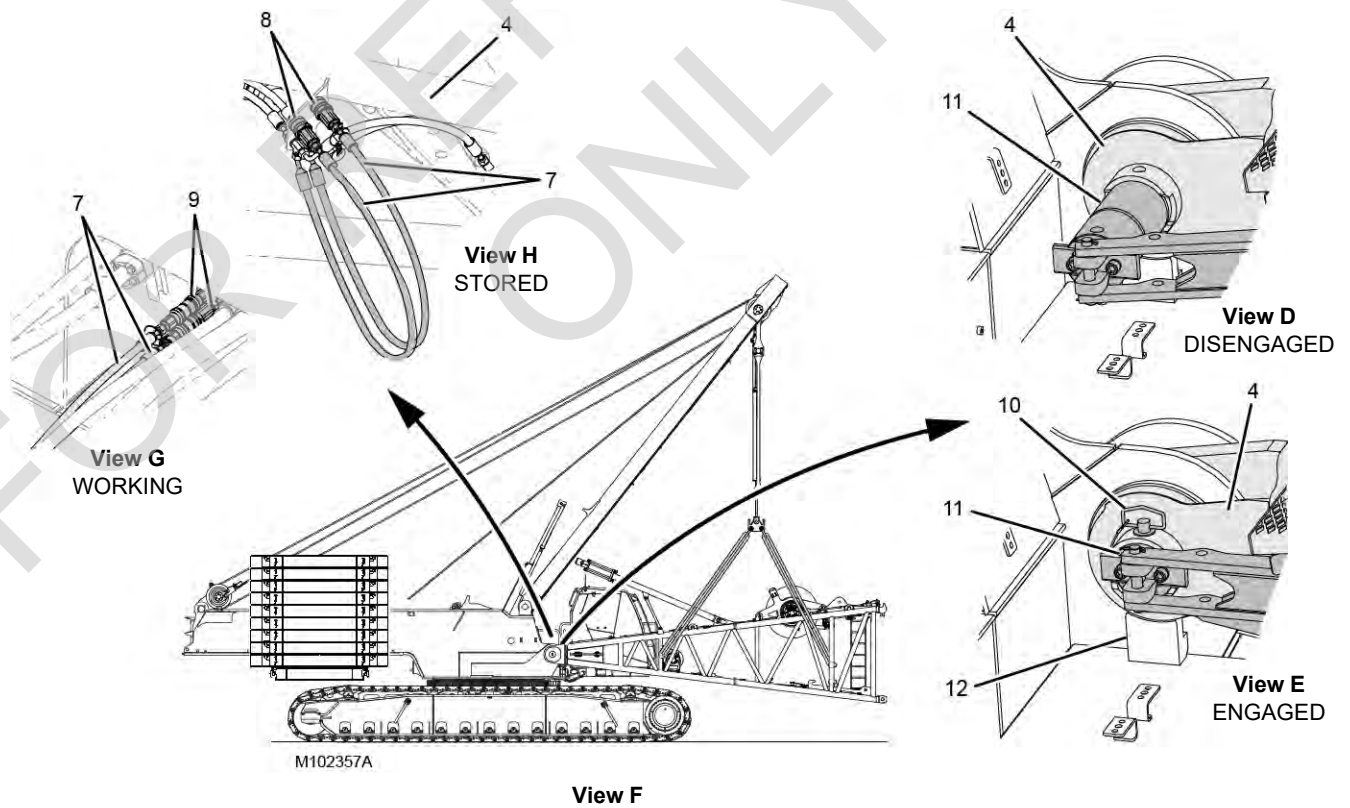
#### Crushing Injury Hazard!

Prevent serious crushing injury:

- Do not stand inside the boom sections while removing the connector pins — STAND OUTSIDE BOOM.
6. Remove the pins (11, View F) and store them in the storage tubes (12).
  7. Extend the self-erect cylinder to lower the boom onto blocking (View E).
  8. Extend the self-erect cylinder to disengage the hooked connectors (7, View D) on the boom butt from the fixed horizontal pins (8) on the adjacent insert.
  9. Slowly travel the crane away from the boom and position the crane and boom butt in the desired disassembly area.
  10. Lower the boom butt to the ground or blocking as desired (View A) and slacken the rigging.
  11. Disconnect the handling pendants (1, View B) from the lifting links (6).
  12. Pin the handling pendants to the boom butt (View C) for storage.



Legend is on the following page.



4

Figure 4-75



legend for [Figure 4-75](#)

Item	Description
1	Shackle (2 or 6): 25 t (28 USt)
2	Lifting Sling (4): 4 m (13 ft) long
3	Self-Erect Cylinder
4	Boom Butt
5	Trailer
6	Lifting Lug (4)
7	Hydraulic Hose (2)
8	Storage Coupler (2)
9	Hydraulic Coupler (2)
10	Hitch Pin with Hair-Pin Cotter (2)
11	Boom Hinge Pin (2)
12	Alignment Lug (2)
R	Radius: 7,5 m (26 ft) see Liftcrane Mast Handling Capacities Chart
X	Inboard Side
Y	Outboard Side
Z	Outboard Side

### Disconnect Boom Butt from Crane

See [Figure 4-75](#) for the following steps.

1. Attach the lifting slings to the self-erect cylinder as shown in View B or C.
  - a. Route the slings to the inboard side of the boom stops at the **X** locations.
  - b. Route the slings over the outboard side of the boom butt chords at the **Y** locations.
  - c. Route the slings around the outboard side of the boom butt lacings at the **Z** locations to the lifting lugs (6) on the inboard side of the lacings.
  - d. Loop the slings over the proper lifting lugs (6) — upper or lower as indicated.
2. Attach the lifting slings (2, View B or View C) to the lifting lugs (6) on the boom butt (4).
3. Disconnect the hydraulic hoses (7, View H) from the storage couplers (8) on the boom butt.

4. Connect the hydraulic hoses (7, View G) from the boom butt to the hydraulic couplers (9) on the front of the rotating bed.
5. Remove the hitch pins (10, View E) to UNLOCK the boom hinge pins from the engaged position.
6. Raise the boom butt to horizontal (View F).



### WARNING

#### Moving Load Hazard!

The boom butt may swing away from the crane when the boom hinge pins are disengaged.

Prevent personnel from being struck by the boom butt:

- Warn all personnel to stand well clear of the boom butt.
- Stabilize the boom butt movement with taglines.

7. Using the switch on the remote control, disengage the boom hinge pins (11, View D).
8. Lift the boom butt clear of the pin holes in the rotating bed.
9. Using the switch on the remote control, engage the boom hinge pins (11, View E).
10. Install the hitch pins (10, View E) to LOCK the boom hinge pins in the engaged position.
11. Disconnect the hydraulic hoses (7, View G) from the hydraulic couplers (9) on the rotating bed.
12. Connect the hydraulic hoses (7, View H) to the storage couplers (8) on the boom butt.
13. Place the boom butt on a trailer.
14. Disconnect the lifting slings from the boom butt.
15. Secure the boom butt to the trailer (see [Shipping Crane Components on page 4-100](#)).

FOR REFERENCE ONLY

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## Disassemble Boom

Read and understand all of the topics under [Boom and Jib Rigging — General on page 4-64](#) through [page 4-67](#).



### WARNING

#### Crush Hazard!

Never work under or inside boom sections that are not securely blocked.

#### Fall Hazard!

The boom sections are equipped with catwalks and ladders for accessing boom components during crane assembly and disassembly. Take every precaution to prevent falling off boom sections: use personal fall protection. See [Personal Fall-Protection on page 4-3](#).

If the MLC300 will be used to disassemble the boom, remove the counterweight boxes and tray before proceeding. See:

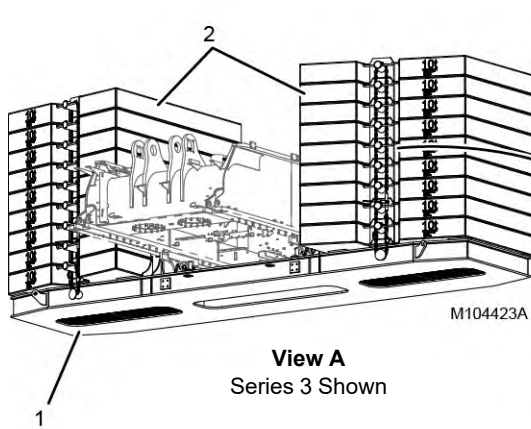
- [Remove Counterweight Boxes on page 4-112](#)
- [Remove Counterweight Tray on page 4-114](#)

1. Disconnect the electric cables in the boom top. Reverse the steps under [Connect Boom Top Electric Cables on page 4-77](#).

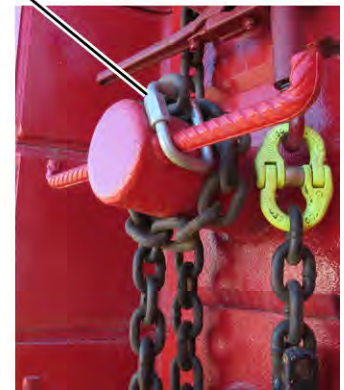
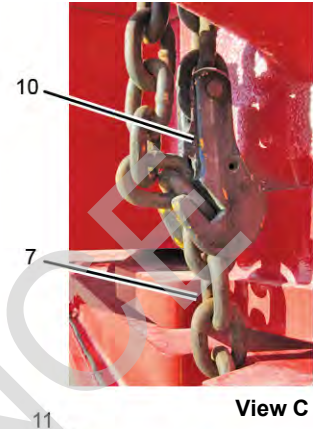
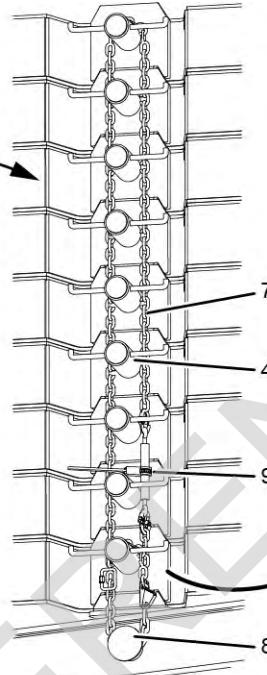
Be sure to connect the terminator and shorting plugs shown in [Figure 4-61 on page 4-82](#).

2. Remove the upper boom point. Reverse the steps under [Install Upper Boom Point on page 4-83](#).
3. Remove and store the boom top position light and wind speed indicator. Reverse the steps under [Install Position Light and Wind Speed Indicator on page 4-77](#).
4. Lower the boom top wire rope guide. Reverse the steps under [Raise Boom Top Wire Rope Guide on page 4-77](#).
5. Disconnect and store the boom straps and links. Reverse the steps under [Connect Boom Straps on page 4-79](#).
6. Disassemble the boom sections. Reverse the steps under [Assemble Boom Inserts on page 4-69](#).

Lift the boom sections as shown in [Figure 4-52 on page 4-68](#) and [Figure 4-56 on page 4-74](#).



Series	Item 2 Quantity	
	Each Side	Total
0	3	6
1	6	12
2	8	16
3	9	18



Item	Description
1	Counterweight Tray
2	Counterweight Box — 10 000 kg (22,046 lb) each
3	Lifting Slings (2): 2,8 M (9 ft) long
4	Lifting Lug (2 each box)
5	Alignment Lug
6	Climbing Rungs
7	Counterweight Chain Assembly (4)
8	Counterweight Tray Lug
9	Turnbuckle
10	Connector
11	Safety Pin

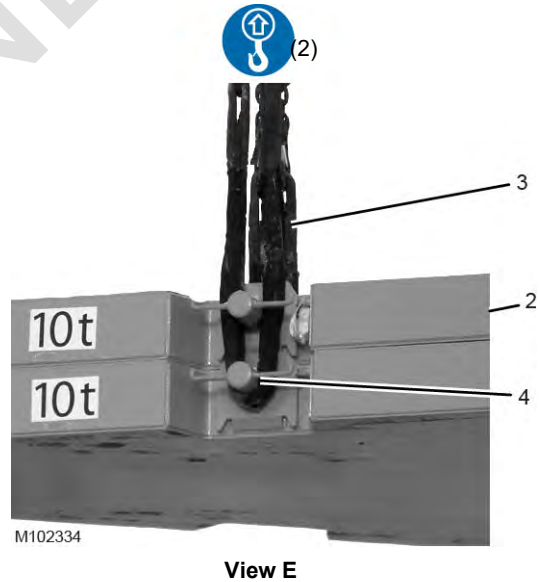
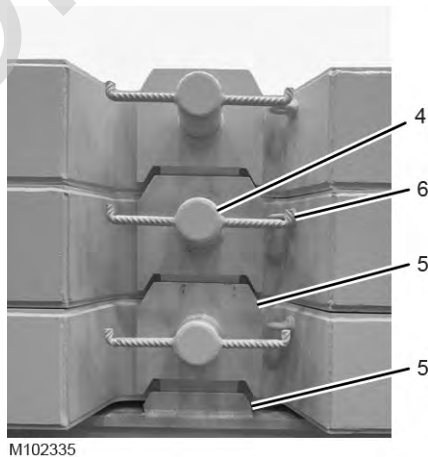


Figure 4-76

## Remove Counterweight Boxes

See [Figure 4-76](#) for the following procedure.

**NOTE** The counterweight boxes (2) must be removed with an assist crane.



### WARNING

#### Crush Hazard!

To prevent the counterweight boxes from falling and crushing personnel:

- Do not lift more than two boxes at a time. The lifting lugs may break, causing in the boxes to fall.
- Remove the counterweight boxes in the sequence specified in step [3](#) of this procedure.

1. Loosen the turnbuckles (9, View B) and remove the counterweight chain assemblies (7) from the counterweight boxes and the counterweight tray.

The ratchet on each turnbuckle must be flipped in one direction to tighten the turnbuckle and in the opposite direction to loosen the turnbuckle.

2. Store the counterweight chain assemblies in the counterweight tray after the counterweight boxes are removed.
3. Remove the counterweight boxes in the following sequence:

- a. One counterweight box removed from either side of the tray.
- b. Two counterweight boxes removed from the other side of the tray.
- c. Continue removing the counterweight boxes in an alternating sequence, two boxes at a time.
- d. Finally, remove one counterweight box from the required side.

Note that a difference of not more than one counterweight box must be maintained side-to-side during disassembly.

4. Attach lifting slings (3, View E) around the lifting lugs (4) on the counterweight boxes (2). Two counterweight boxes may be lifted at a time.
5. Lift the counterweight boxes off the counterweight tray.
6. Place the counterweight boxes:
  - Onto blocking at ground level for job site storage
  - OR
  - Directly onto a trailer and secure them with tie-downs.
7. Disconnect the lifting slings.
8. Repeat the steps until all of the of counterweight boxes are removed.

**NOTE** If desired, the counterweight boxes can be installed onto a trailer using the MLC300 live mast as shown in [Figure 4-42](#). Reverse the steps for removing the counterweight tray from a trailer on [page 4-55](#).

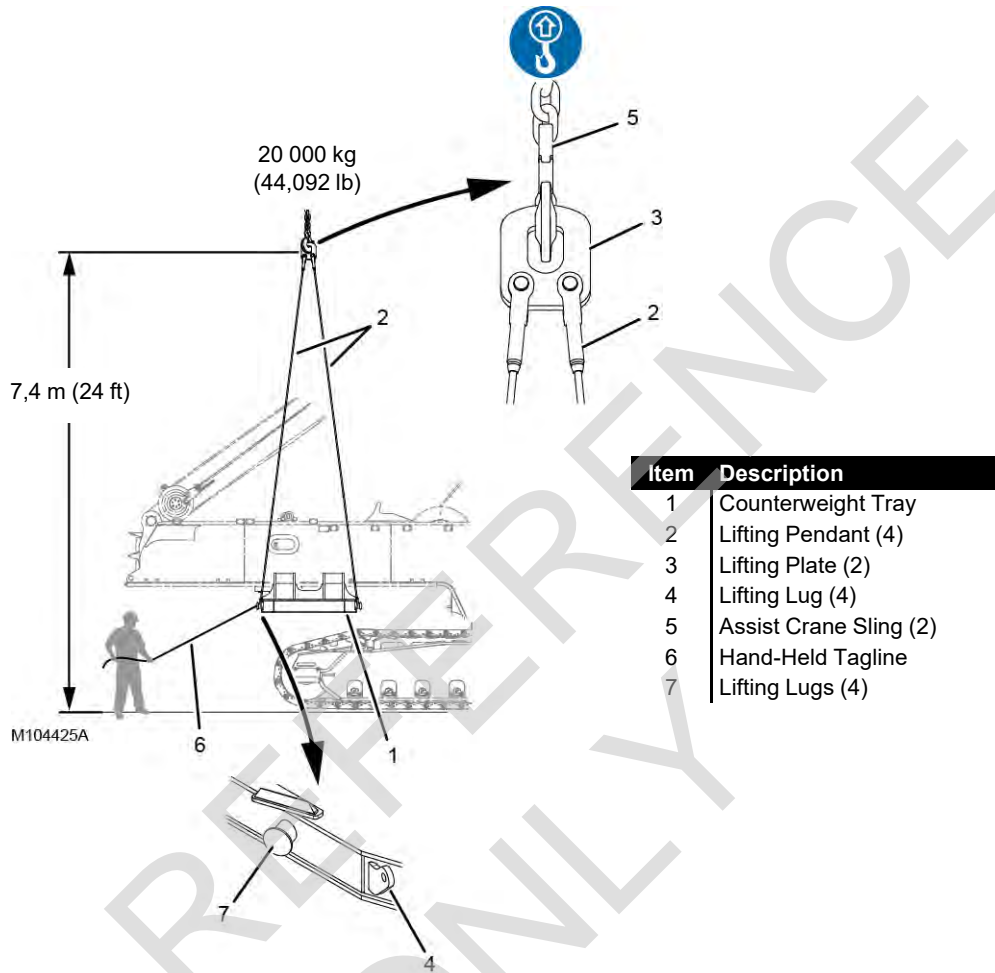


Figure 4-77



## Remove Counterweight Tray

See [Figure 4-77](#) for the following steps.

**NOTE** The counterweight tray must be removed with an assist crane.

For ease of counterweight tray handling and lifting, Manitowoc provides two lifting pendants (2), a lifting plate (3), and two lifting lugs (4) on each side of the tray. The lifting pendants and plates are stored in the pocket on either end of the tray.

1. Position the live mast at 150°.
2. Attach the four lifting pendants (2) to the assist crane lifting slings (5) with the lifting plates (3).
3. Lift the lifting pendants (2) out of the counterweight tray (1) and connect the lifting pendants to the four lifting lugs (4) on the counterweight tray.
4. Attach hand-held taglines (6) to the lifting lugs (7) on the rear corners of the tray. Have ground personnel control swinging of the tray with the taglines.



### WARNING

#### Falling Load Hazard!

Prevent counterweight tray from falling:

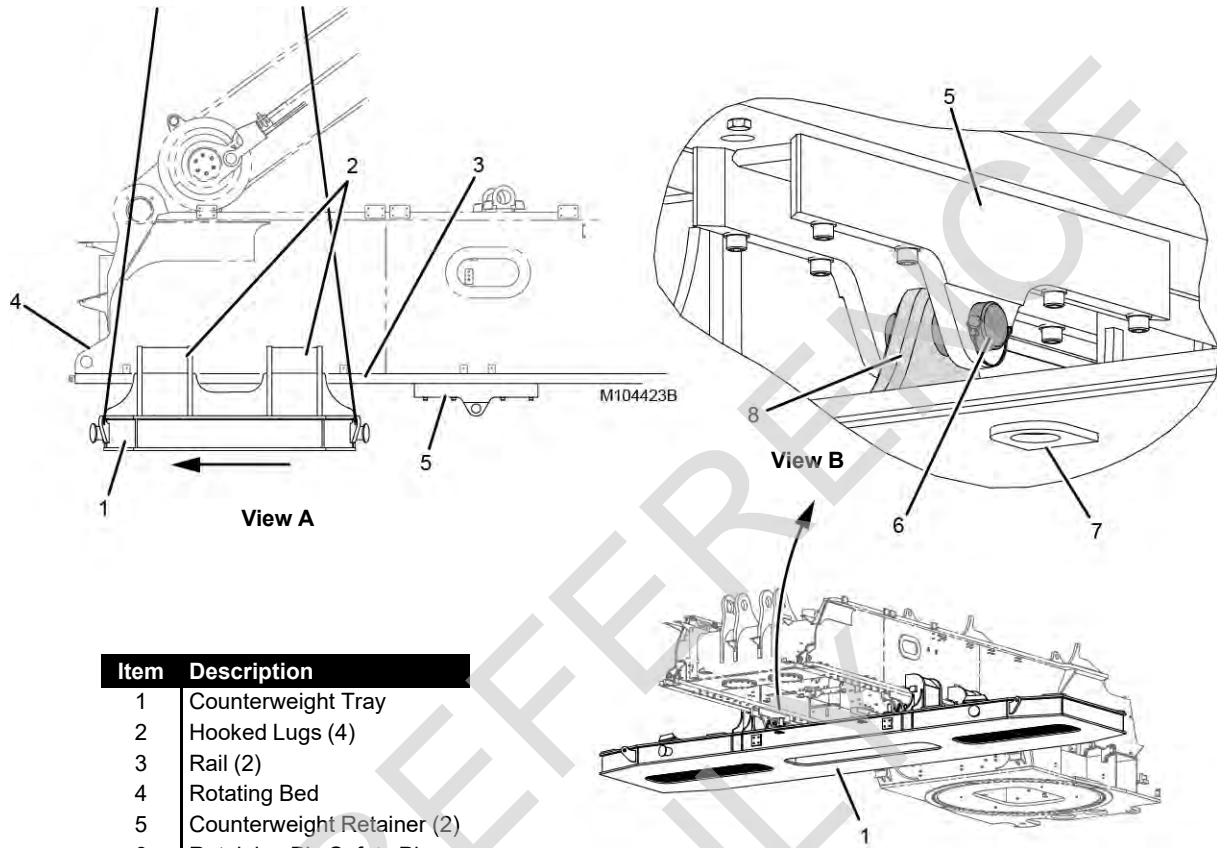
- The lifting slings are provided for lifting only the counterweight tray. Do not attempt to lift the counterweight tray with the counterweight boxes installed. The pendants could break allowing the tray to fall.

#### Fall Hazard!

Prevent personnel from falling:

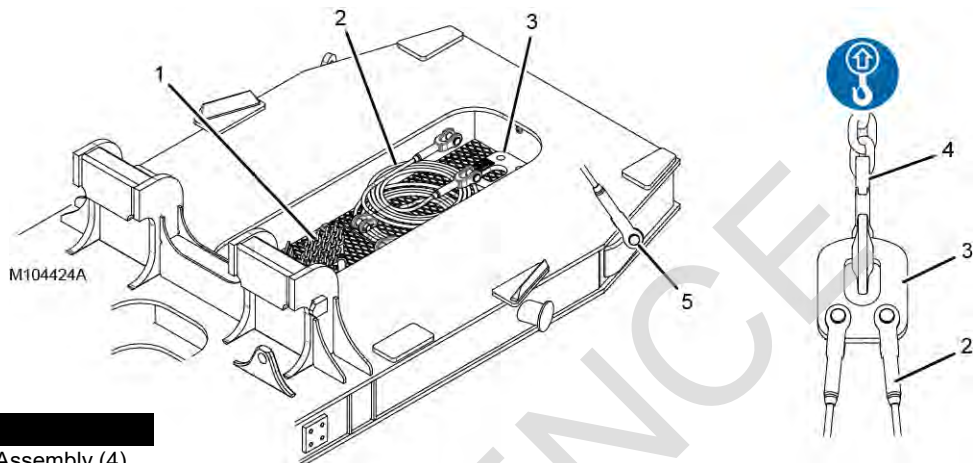
- Do not allow personnel to ride the counterweight tray while it is being lifted into position.
- 

*Continued on next page.*



Item	Description
1	Counterweight Tray
2	Hooked Lugs (4)
3	Rail (2)
4	Rotating Bed
5	Counterweight Retainer (2)
6	Retaining Pin Safety Pin (2)
7	Storage Bracket (2)
8	Connecting Lug (2)

Figure 4-78



Item	Description
1	Counterweight Chain Assembly (4)
2	Lifting Pendant (2)
3	Lifting Plate (2)
4	Assist Crane lifting Slings
5	Lifting Lug (4)

Figure 4-79

See [Figure 4-78](#) for the following steps.

5. Hoist with the assist crane so the retaining pins (6, View B) are loose.
6. Remove the retaining pins (6, View B) from the holes of the counterweight retainers (5) and the connecting lugs (8).
7. Store the retaining pins (6, View B or C) in the storage brackets (7) on the counterweight tray.
8. Hoist, travel, swing, and boom the assist crane as required to guide the counterweight tray (1, View A) off the rails (3) on the rotating bed.

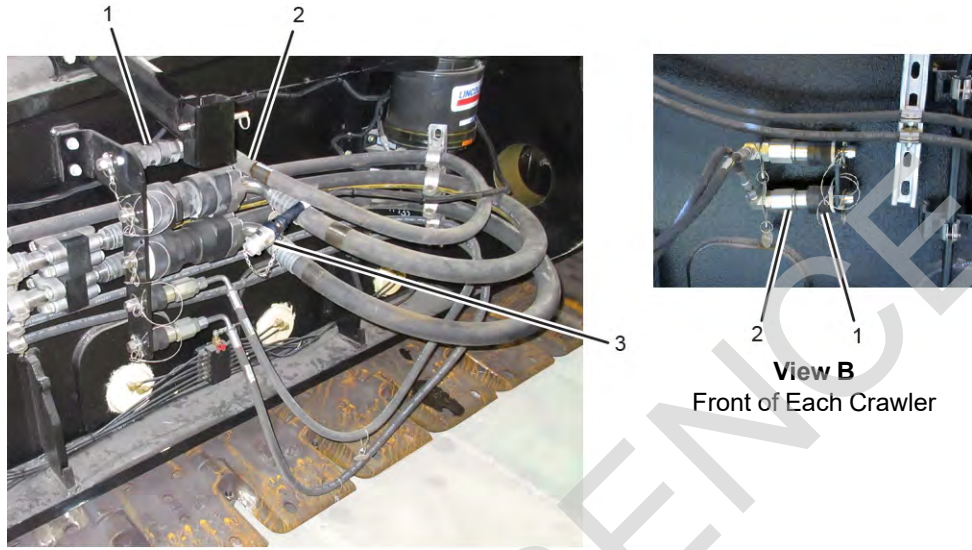
**NOTE** An alternate removal method is to hold the counterweight tray in position with the assist crane and travel the MLC300 forward away the tray.

9. Place the counterweight tray onto blocking at ground level for job site storage or place the counterweight tray onto a trailer and secure it with tie-downs.

See [Figure 4-79](#) for the remaining steps.

10. Store the counterweight chain assemblies (1) in the counterweight tray storage pockets.
11. Slacken the lifting pendants (2) and disconnect them from the lifting lugs (5) on the counterweight tray.
12. Lower and coil the lifting pendants (2) into the counterweight tray storage pockets.
13. Disconnect the lifting pendants (2) and the lifting plates (3) from the assist crane slings (4).
14. Store the lifting plates (4) in the counterweight tray storage pockets.

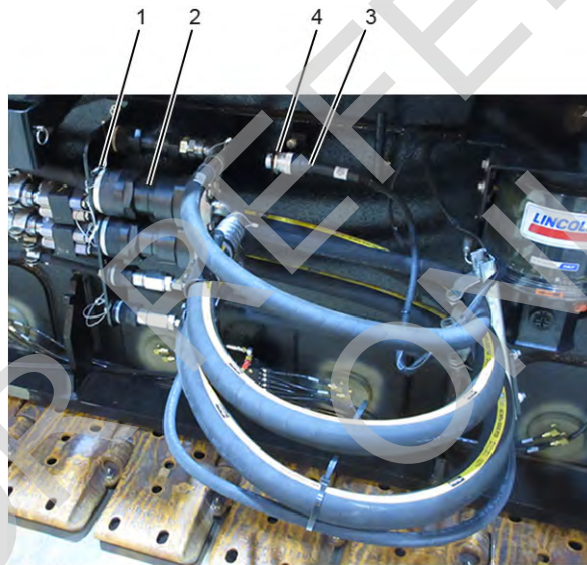
**NOTE** If desired, the counterweight tray can be installed onto a trailer using the MLC300 live mast as shown in [Figure 4-41](#). Reverse the steps for removing the counterweight tray from a trailer on [page 4-55](#).



M103132

**View A1**  
Rear of Each Crawler PAST

**View B**  
Front of Each Crawler



M104274A

**View A2**  
Rear of Each Crawler CURRENT

Item	Description
1	Storage Couplers
2	Hydraulic Hoses
3	Electric Cable
4	Storage Receptacle

Figure 4-80

## Store Carbody Side Platforms

Reverse the installation steps to store the carbody side platforms (see [Deploy Carbody Side Platforms on page 4-53](#)).

## Remove Carbody Front and Rear Platforms

Reverse the installation steps to store the carbody front and rear platforms (see [Install Carbody Front and Rear Platforms on page 4-51](#)).

Secure the platforms to a trailer for shipping.

## Prepare Crawlers for Removal

1. Disconnect the hydraulic hoses and the electric cable from between the carbody and each crawler. See Views C and D, [Figure 4-35 on page 4-46](#).
2. Thoroughly clean:
  - Hydraulic hose ends
  - Hydraulic couplers
  - Electric cable connectors
  - Dust caps

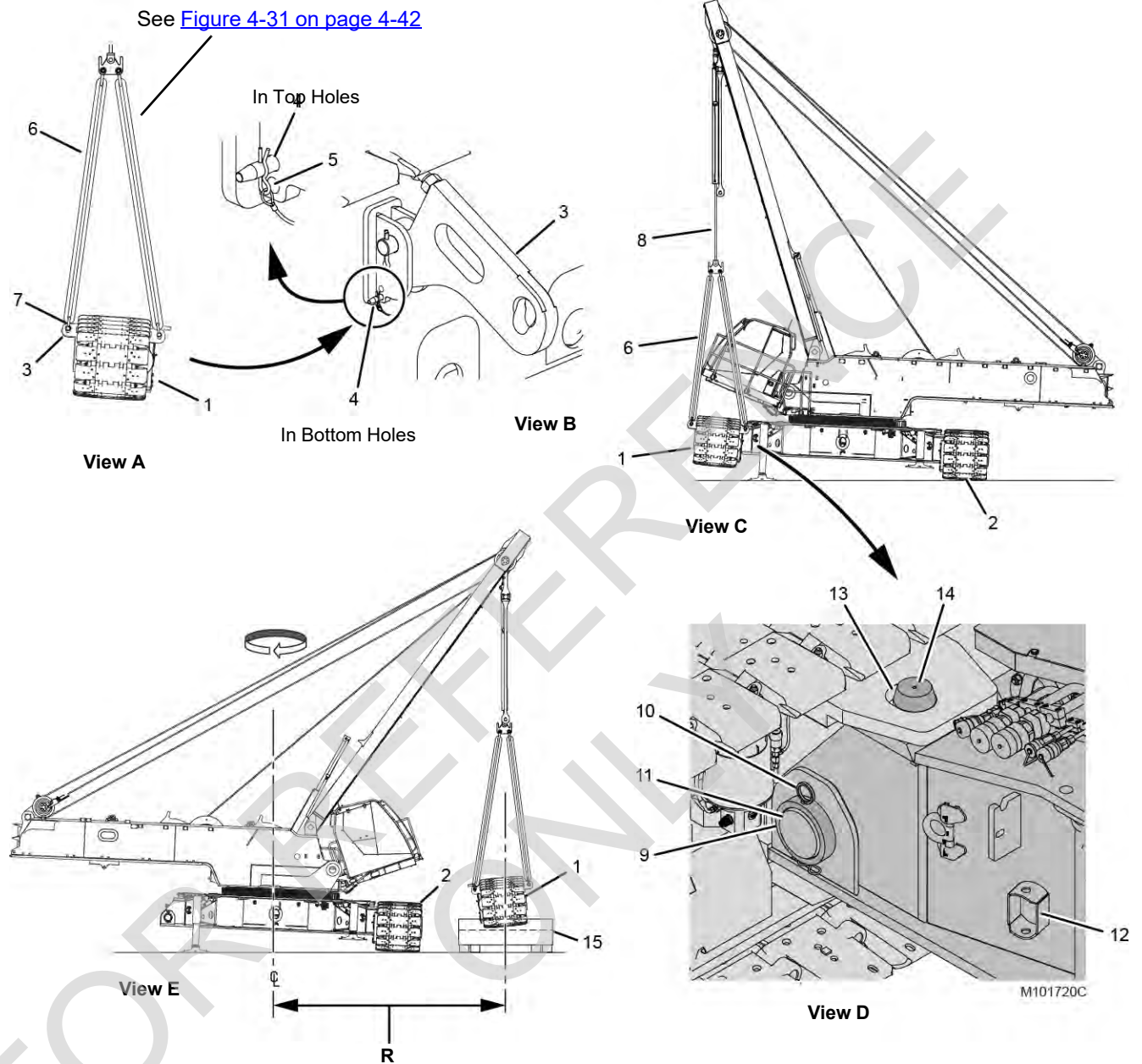
3. Install dust caps on the carbody hydraulic couplers (7 places each crawler).
4. Install dust caps on the carbody electric receptacles (2 places).

See [Figure 4-80](#) for the remaining steps.

5. At each crawler on past production units, install a dust cap on the end of the electric cable (3, View A1) and attach the cable to the crawler with a plastic wire tie.
6. At each crawler on current production units, connect the electric cable (3, View A2) to the storage receptacle (4).
7. At each crawler, connect the hydraulic hoses (2, Views A1 or A2 and B) to the storage couplers (1).

## Deploy Carbody Jacks

Reverse the storage steps (see [Store Carbody Jacks on page 4-51](#)) to deploy the carbody jacks.



Item	Description	Item	Description
1	First Crawler	9	Collar
2	Second Crawler	10	Hitch Pin with Hair-Pin Cotter (2)
3	Lifting Link (3)	11	Crawler Pin (2)
4	Hitch Pin with Hair Pin Cotter (1)	12	Storage Lug (2)
5	Bottom Holes	13	Top Connecting Hole (2)
6	Lifting Slings (3 legs)	14	Top Connecting Pin (2)
7	Shackle (3): 20,5 t (23 USt)	15	Trailer (single-drop deck)
8	Self-Erect Cylinder	R	Radius: 7,3 m (24 ft) see Liftcrane Mast Handling Capacities Chart

Figure 4-81



## Remove First Crawler

See [Figure 4-81](#) for the following procedure.



### DANGER

#### Tipping Hazard!

Prevent the crane from tipping over when removing the first crawler:

- Do not attempt to remove the first crawler until the second crawler (2, on opposite side) is lowered to the ground, if raised.
- Do not exceed the radius specified in [Figure 4-81](#), View E when lifting the first crawler.
- Make sure the small diameter rods of the jacking cylinders are fully retracted before handling the crawler, otherwise the jacking cylinders will be overloaded and possibly collapse.

### CAUTION

#### Parts Damage!

Do not attempt to lift the crawler off the crane by booming up. Damage to the self-erect cylinder can occur.

Avoid hitting the carbody jacks with the crawler.

**NOTE** The first crawler (1) can be lifted at the specified radius from either side of the carbody. 360° swing is permitted as long as the second crawler (2) is on the ground.

1. At the inboard lifting link (3, View B):
  - a. Remove the hitch pin (4) from the bottom holes (5) in the bracket.
  - b. Lift the inboard link (3).
  - c. Reinstall the hitch pin (4) in the TOP holes in the bracket.
  - d. Lower the link (3) onto the hitch pin (4).

***The inboard lifting link will interfere with crawler pin removal if this step is not performed.***

2. Connect three legs of the lifting slings (6, View A) to the lifting links (3) on the first crawler with the shackles (7).
3. Using the remote control, extend the jacking cylinders next to the first crawler (1, View C) until the first stage of each cylinder is fully extended.

***Do not extend the cylinders to the point that the small diameter rods (second stage) are exposed.***

4. Using the remote control, fully retract the jacking cylinders next to the second crawler (2, View C).

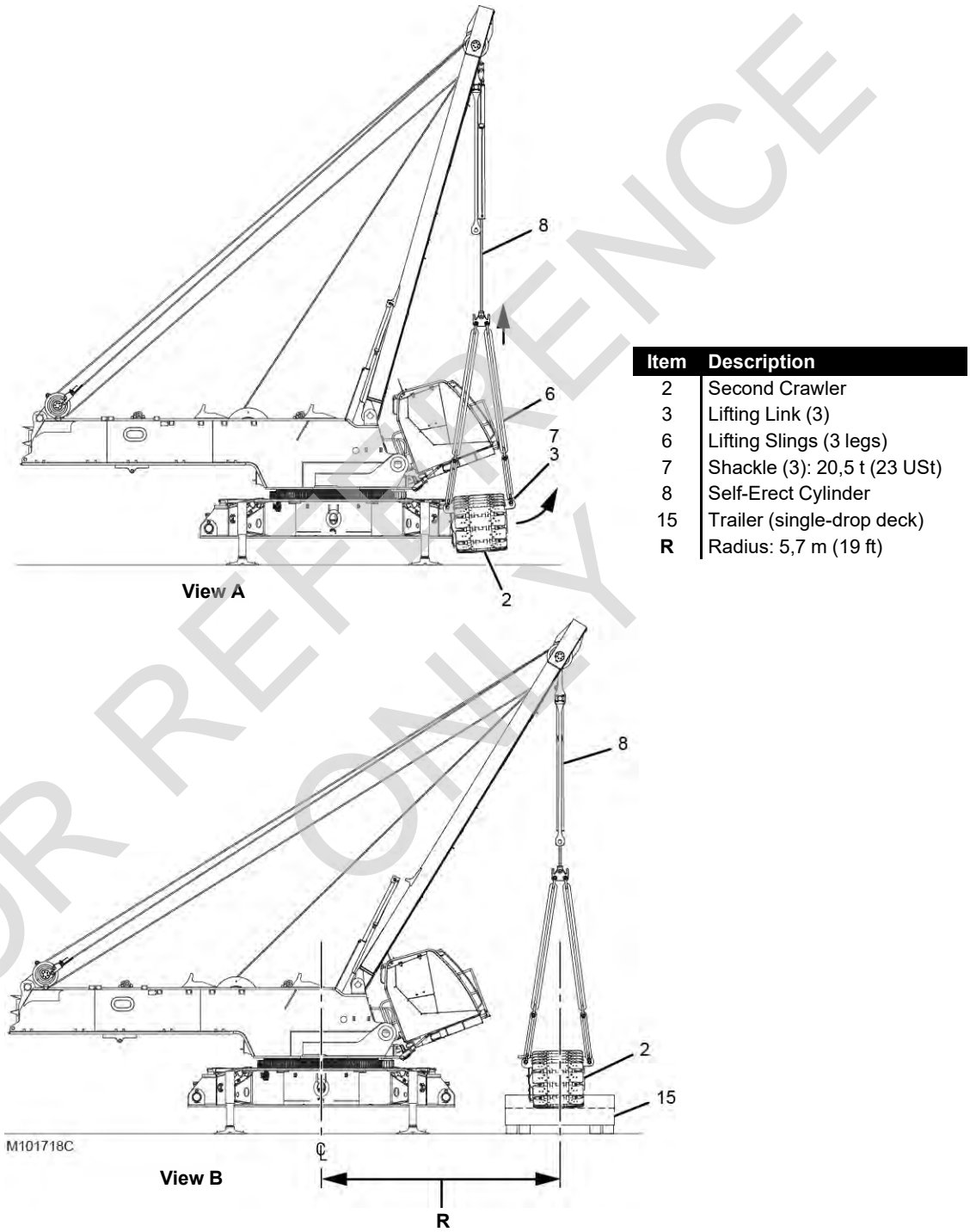
***The opposite side crawler must be on the ground.***

5. Boom up and down as needed to center the self-erect cylinder (8, View C) over the first crawler (1).
6. Tilt the operator cab up so it is not damaged during crawler removal.
7. Remove the collars (9, View D) from both crawler pins (11).
8. Temporarily store the collars on the storage lugs (12, View D).
9. Hoist with the self-erect cylinder until the lifting slings are taut.
10. Using the remote control, disengage the corresponding crawler pins (11).
11. Hoist with the self-erect cylinder until the top connecting holes (13, View D) in the crawler frame disengage the top connecting pins (14) on the carbody.
12. Boom down until the crawler is clear of the carbody.

***Do not exceed the specified radius.***

13. The crawler will hang at an angle as shown.
14. Position the trailer (1, View E) on the desired side of the crane at the specified radius.
15. Lower the crawler onto the trailer until the lifting slings are slack.
16. Disconnect the shackles and lifting slings from the crawler.
17. Secure the crawler to trailer with tie-downs.
18. If necessary remove the crawler ladder from the crawler and secure it to the trailer. Reverse the installation steps (see [Install Crawler Ladders on page 4-49](#)).
19. Remove the trailer from the area.
20. Using the remote control, engage the crawler pins (11, View D).
21. Remove the collars (9, View D) from the storage lugs (12) and install them on the crawlers pins (11) with the hitch pins (10).
22. Proceed to remove the second crawler.

**NOTE** The item numbers in this illustration correspond to the item numbers in [Figure 4-81](#).



4

Figure 4-82

## Remove Second Crawler

Swing Limit for Handling Second Crawler  
Over Side of Carbody on Jacks

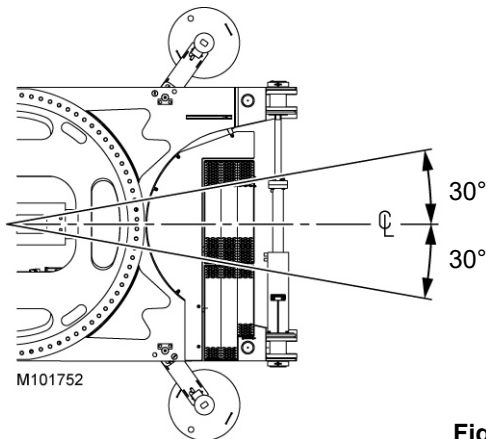


Figure 4-83

### **DANGER** Tipping Hazard!

Prevent the crane from tipping over:

- Make sure the crane is level. Adjust the carbody jacks as required.
- Make sure the small diameter rods of the jacking cylinders are fully retracted before handling the crawler, otherwise the jacking cylinders will be overloaded and possibly collapse.
- Limit swing to 30° in either direction from center when lifting the second crawler (see [Figure 4-83](#)).
- Do not exceed the radius specified in [Figure 4-82](#), View B when lifting the second crawler.

### **CAUTION** Parts Damage!

Do not attempt to lift the crawler off the crane by booming up. Damage to the self-erect cylinder can occur.  
Avoid hitting the carbody jacks with the crawler.

1. Using the remote control, extend the jacking cylinders next to the second crawler (2, View A, [Figure 4-82](#)) until the first stage of each cylinder is fully extended.

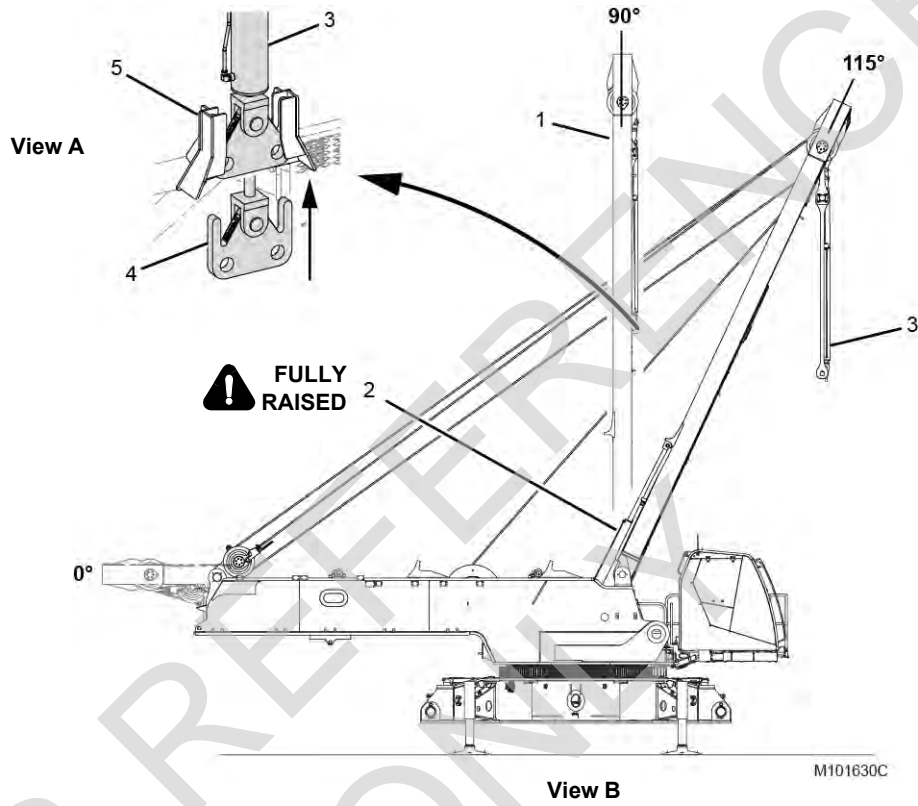
**Do not extend the cylinders to the point that the small diameter rods (second stage) are exposed.**

2. Swing the upperworks and boom up or down as required so the self-erect cylinder (8, View A, [Figure 4-82](#)) is centered over the second crawler (2).
3. Repeat Remove First Crawler step [1](#) on [page 4-120](#).
4. Connect three legs of the lifting slings (6, View A, [Figure 4-82](#)) to the lifting links (3) on the second crawler with the shackles (7).
5. Repeat Remove First Crawler steps [6](#) – [13](#) on [page 4-120](#).
6. Position the trailer (15, View B, [Figure 4-82](#)) on the same side of the crane that the second crawler was removed from.
  - Do not exceed specified radius.
  - Do not exceed swing limits ([Figure 4-83](#)).
7. Repeat Remove First Crawler steps [15](#) – [21](#) on [page 4-120](#).

### Remove Lifting Slings from Self-Erect Cylinder

Remove the lifting slings and shackles from the lifting link on the self-erect cylinder (see [Figure 4-31](#)).

Store the lifting slings and shackles in the parts box.



Item	Description
1	Live Mast
2	Mast-Assist Arm and Cylinder (2)
3	Self-Erect Cylinder
4	Lifting Link
5	Storage Bracket (2)

Figure 4-84

## Lower Live Mast to Transport Position

See [Figure 4-84](#) for the following procedure.



### WARNING

#### Falling Mast Hazard!

Prevent the mast from falling over backwards or forward:

- Do not raise mast to 115° until the mast-assist arms (2) are fully raised.

1. If not already done:

- Turn on the setup remote control.
- Select the Liftcrane Mast Handling Capacities Chart in the RCL/RCI display.

2. Verify that the mast-assist arms (2) are fully raised.

When the SETUP MODE is ON, the following will occur if you attempt to raise the live mast when the mast assist arms are down:

- The boom hoist will not operate.
- The hazard warning will come on and the MAST ASSIST ARMS DOWN icon will appear in the fault bar of the Main Display Working Screen.
- Make sure the mast assist arms are fully raised before raising the mast.



3. During the lowering procedure, monitor the MAST ANGLE in the crane status information bar of the Main Display Working Screen.

4. Increase engine speed to the desired RPM.

5. BOOM UP with the boom control handle to raise the live mast (1).

Once contacted by the mast, the mast-assist arm cylinders (2) will retract automatically.

6. Make sure the lifting (4) is aligned with the storage bracket (5):

- If necessary, jog the self-erect cylinder switch on the remote control or the drum control handle in the cab to relieve the pressure in the cylinder.
- Then, using the lifting link, rotate the cylinder rod by hand to align the pin with the storage bracket.

7. Boom up until the mast is vertical (90°).

8. Slowly retract the self-erect cylinder (3, View A) until the storage pin (4) fully engages the storage bracket (5).

9. Continue to boom up to lower the live mast to the transport position.

10. The mast will stop lowering automatically when it is at 4°.

The hazard warning will come on and the MAST AT 4° icon will appear in the fault bar of the Main Display Working Screen.



11. Using the mast-assist arms switch on the remote control, lower the mast the remainder of the way to the transport position (0°).



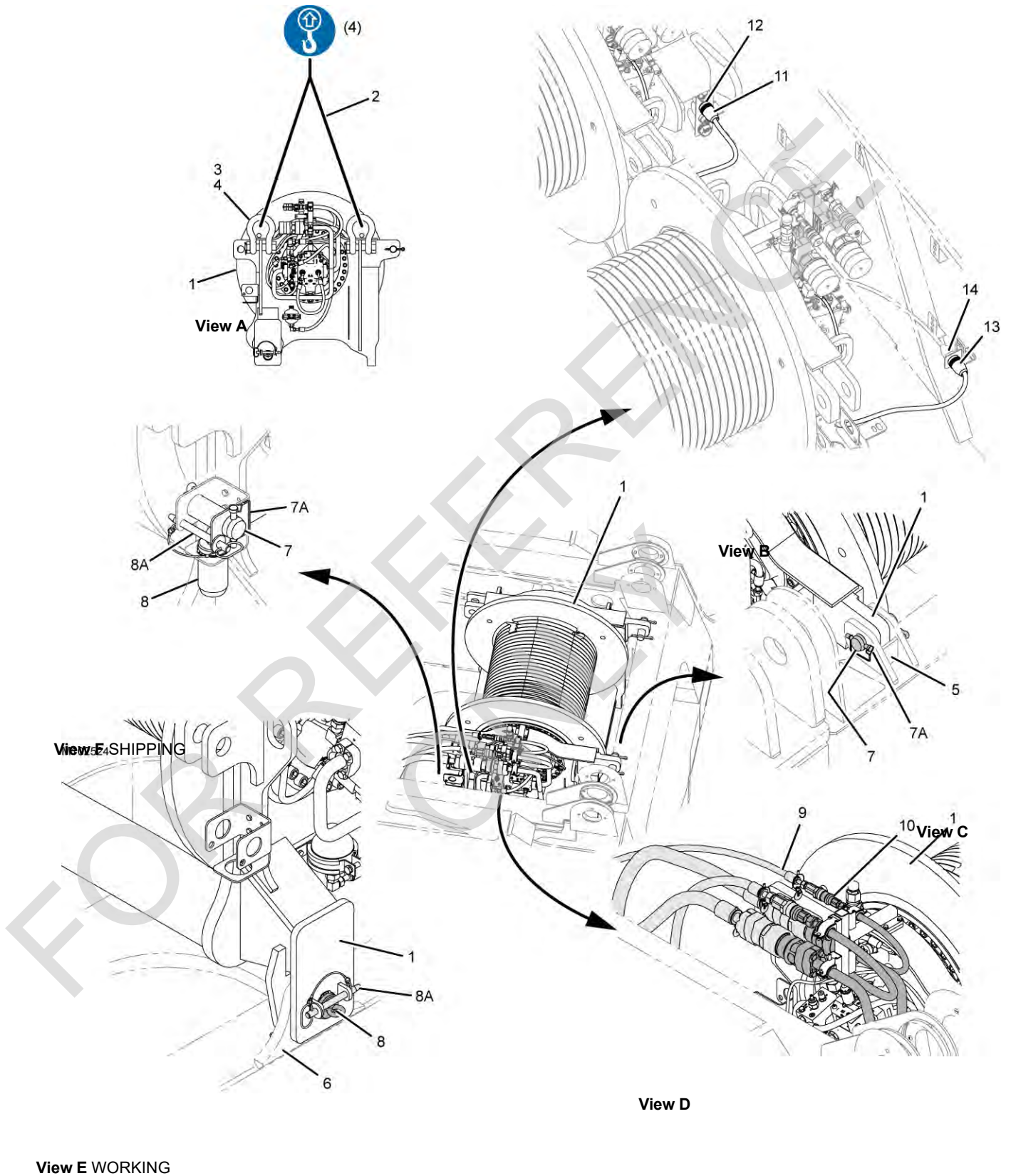


Figure 4-85



Legend for [Figure 4-85](#)

Item	Description
1	Drum 2
2	Lifting Sling (4): 2,8m (9 ft) long
3	Lifting Lug (4)
4	Shackle (4): 25 t (28 USt)
5	Rotating Bed Lugs
6	Rotating Bed Lugs
7	Pin with Cotter Pins (2)
8	Hitch Pin with Hair-Pin Cotter (2)
9	Pin (2)
10	Hydraulic Hose (4)
11	Hydraulic Coupler (4)
12	Electric Cable (WRF1-P1)
13	Electric Receptacle (WRR1-J4)
14	Electric Cable (WRF1-P1)
15	Electric Receptacle (WRR1-J5)

### Remove Drum 2

See [Figure 4-85](#) for the following procedure.

An assist crane capable of lifting 4 650 kg (10,253 lb) to a height of approximately 6 m (20 ft) above the ground is required for the procedure.

- As they are disconnected, thoroughly clean:
  - Hydraulic hose ends and couplers
  - Electric cable connectors
  - Dust caps
- Disconnect the electric cable (12, View B) from the drum (1) at the electric receptacle (13) on the rotating bed.
  - Connect a dust cap to the cable end and to the receptacle.
  - Wire tie the electric cable to the drum for storage.
- Disconnect four hydraulic hoses (10, View D) at the hydraulic couplers (11) on the drum (1).

- Disconnect the dust caps from the storage couplers (16, [Figure 4-86](#)) on the rotating bed and connect the dust caps to the couplers on the drum.
  - Connect the hydraulic hoses from the rotating bed to the storage couplers (16, [Figure 4-86](#)).
- Attach the Manitowoc supplied lifting slings (2, View A) to the hook of the assist crane.
  - Connect the other end of the lifting slings (2, View A) to the lifting lugs (3) on the drum (1) with the Manitowoc supplied shackles (4).
  - Remove the hitch pins (8, View E) and the pins (9) from the working position and store the pins (9, View F) and the hitch pins (8).
  - Remove pins (7, View C) from the working position and store the pins (7, View F).
  - Slowly and carefully lift the drum (1) out of the rotating bed and place it on trailer.
  - Disconnect the shackles (4, View A) and the lifting slings (2) from the drum.
  - Secure the drum to the trailer with tie-downs.

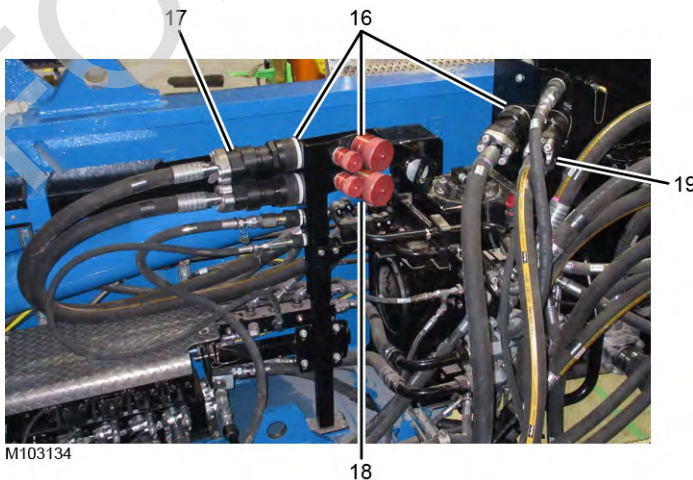
### Remove Drum 3

Drum 3 removal is identical to Drum 2 removal with the following exceptions:

- The top connecting holes in Drum 3 are pinned to the top connecting holes in the rear of Drum 2.
- The electric cable (14) from Drum 3 is connected to the electric receptacle (15) on the rotating bed.

### Install/Store Rotating Bed Platforms

The rotating bed platforms (1 and 2) can be stored as shown in [Figure 4-28 on page 4-36](#).



Item	Description
16	Storage Couplers with Dust Caps
17	Drum 3 Hydraulic Hoses
18	Store Drum 2 Hydraulic Hoses Here
19	Drum 4 Hydraulic Hoses

View of Right Inboard Side of Rotating Bed

Figure 4-86

Item	Description	Item	Description	Item	Description
1	Boom Hoist Equalizer	8	Safety Pin	15	Hydraulic Hose (2)
2	Quick-Release Pin	9	Pin	16	Hydraulic Couplers (2)
3	Shims	10	Shims	17	Electric Cable (WRM1)
4	Safety Pin	11	Hydraulic Hose (5)	18	Receptacle (WRR1-J3)
5	Pin	12	Hydraulic Couplers (5)	19	Camera Switcher
6	Boom Hoist (Drum 4)	13	Electric Cable	20	Ground Cable (from mast)
7	Pin with Safety Pin	14	Receptacle (WRC3)	21	Ground Screw (on rotating bed)

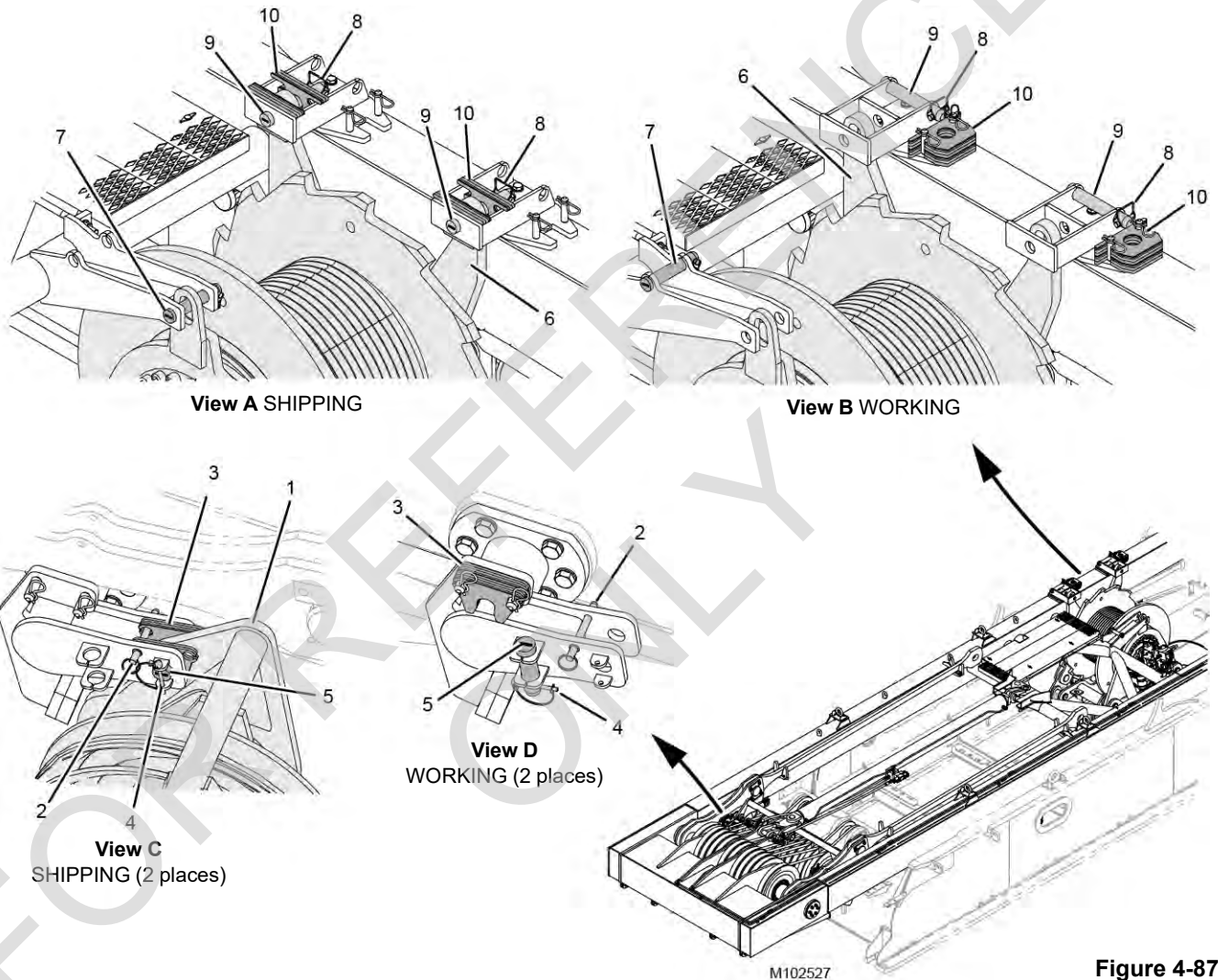


Figure 4-87

**Remove Live Mast Package**

See [Figure 4-87](#) for the following procedure.

- As they are disconnected, thoroughly clean:
  - Hydraulic hose ends and couplers
  - Electric cable connectors
  - Dust caps

**Be sure to install dust caps on all cable connectors**

**and hydraulic couplers.**

- Disconnect the Drum 2/3 camera cable from the camera switcher (19, View G) on the rotating bed. Wire tie the camera cable to the live mast for storage.
- Disconnect the ground cable (20, View H) from the ground screw (21) on the rotating bed.
- Reattach the ground screw and washer to the rotating bed.



5. Disconnect the electric cable (17, View H) from the receptacle (18) on the rotating bed.
6. Disconnect the two hydraulic hoses (15, View H) from the two hydraulic couplers (16) on the rotating bed.
7. Store the hydraulic hoses (15), the electric cable (17), and the ground cable (20) on the live mast as shown in View F.
8. Proceed as follows on both sides of the boom hoist equalizer:
  - a. Remove quick-release pin (2, View D), shims (3), safety pin (4), and pin (5) from the working position.
  - b. Install the shims (3, View C), the pin (5), the safety pin (4), and the quick-release pin (2), in the shipping position.

Install enough shims on both sides of both equalizer lugs to prevent lateral movement of the boom hoist equalizer during shipping.
9. Proceed as follows at the boom hoist:
  - a. Disconnect the electric cable (14, View E) at the receptacle (13) and secure it to the boom hoist with

a wire tie.

- b. Disconnect four hydraulic hoses (11, View E) from the couplers (12) on the boom hoist.
- c. Disconnect the dust caps from the storage couplers (16, [Figure 4-86 on page 4-126](#)) and connect them to the couplers on the boom hoist.
- d. Connect the hydraulic hoses to the storage couplers (16, [Figure 4-86](#)) on the rotating bed.
- e. Remove the pin (7, View B) from the working position and install it in the shipping position (View A).
- f. Remove the safety pins (8, View B), the pins (9), and the shims (10) from the working position.
- g. Install the shims (10, View A), the pins (9), and the safety pins (8) in the shipping position.

Install enough shims at both attaching lugs to prevent lateral movement of the boom hoist during shipping.

**Continued on next page.**

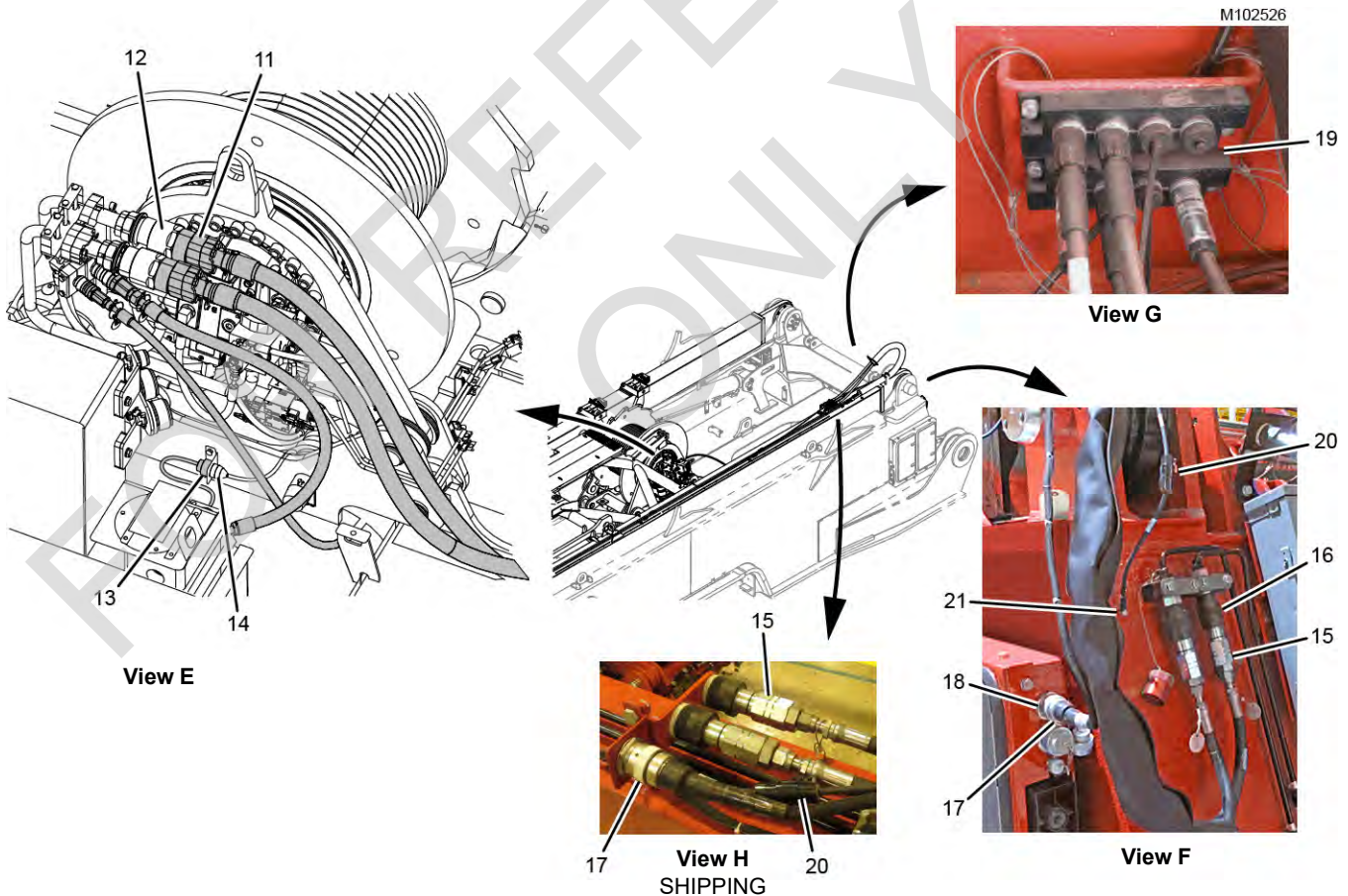


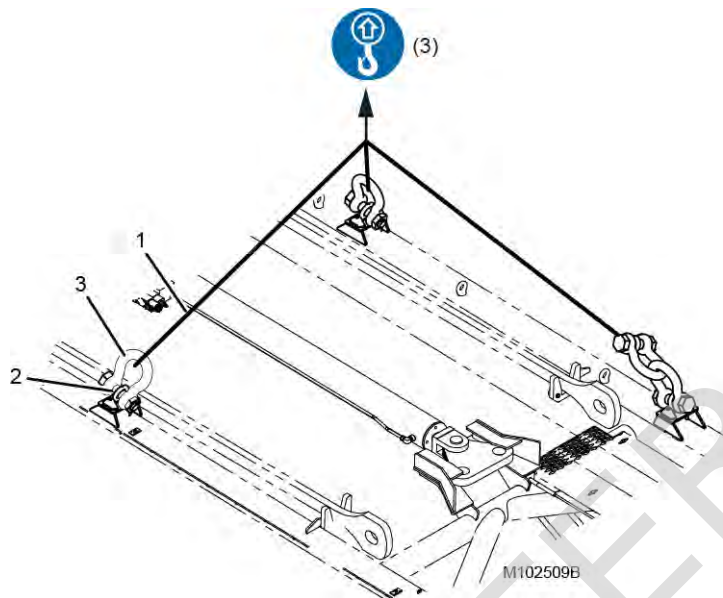
Figure 4-87 continued

FOR REFERENCE ONLY

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**Assist Crane Requirements:**

- 9 072 kg (20,000 lb) Capacity
- 8,2 m (26 ft 9 in) Hook Height with Manitowoc Slings
- 7 m (23 ft) Minimum Radius



Item	Description
1	Lifting Slings (3): 2,8m (9 ft) long
2	Lifting Lug (3)
3	Shackle (3): 20,5 t (23 USt)

Figure 4-88

**NOTE** The live mast, the boom hoist, and the boom hoist equalizer are shipped as an assembled package.

An assist crane is required to lift the live mast package. The assist crane must meet the specifications given in [Figure 4-88](#).

**10.** Attach the Manitowoc supplied lifting slings (1) to the hook of the assist crane.

**11.** Connect the other end of the lifting slings (1) to the lifting lugs (2) on the live mast with the Manitowoc supplied shackles (3).

- Use one shackle at both rear lifting lugs.
- Use two shackles at the left-front lifting lug.

*Continued on next page.*

**WARNING**  
Falling Load Hazard

Prevent the live mast package from falling when lifted:

- Lift only with the specified rigging at the locations shown in [Figure 4-88](#).
- Lifting in any other manner will cause the live mast package to hang out of level from side to side and may cause the live mast package to slide or rock to one side.

Item	Description	Item	Description
1	Live Mast	9	Rotating Bed Lug (2)
2	Keeper Pin with Safety Pin (4)	10	Alignment Pin (4)
3	Mast Hinge Pin	11	Alignment Notch (4)
4	Equalizer Hinge Pin	12	Rotating Bed Frame
5	Pin with Safety Pin (4)	13	Alignment Lug (2)
6	Boom Hoist Mounting Frame	14	Boom Hoist Equalizer
7	Alignment Lug (2)	15	Alignment Ring (2)
8	Alignment Ring (2)	16	Rotating Bed Lug (2)

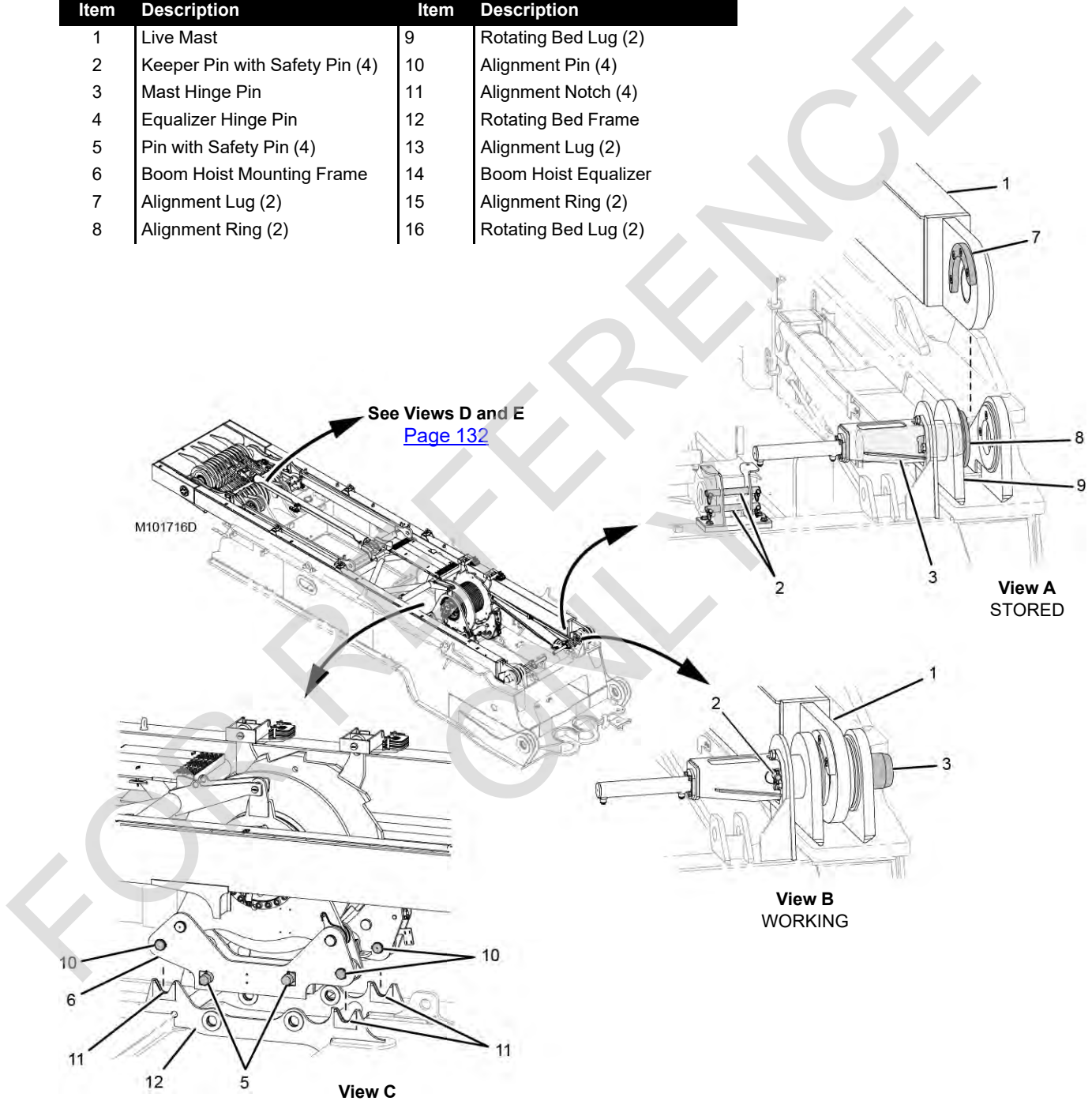


Figure 4-89



See [Figure 4-89](#) for the remaining steps.

12. Hoist with the assist crane just enough to tension the lifting slings.
13. Remove the keeper pins (2, Views B and E) from the mast hinge pins (3, View B1 or B2) and the equalizer hinge pins (4, View E).
14. Store the keeper pins (2, Views A and D).
15. Using the remote control, disengage the mast hinge pins (3, View A) and the equalizer hinge pins (4, View D).
16. Remove pins (5, View C) from the boom hoist mounting frame (6) and place the pins to the side.
17. Using the assist crane, slowly and carefully lift the live mast package out of the upperworks.

The live mast package will hang approximately 6° out of level (rear higher than front) when lifted.

18. Lower the live package to ground level on either side of the upperworks and deploy the shipping stands and hinge supports (see [Install Live Mast Package on Trailer on page 4-134](#)).
19. Using the remote control, engage the mast hinge pins (3, View B) and install the locking pins (2).
20. Using the remote control, engage the equalizer hinge pins (4, View E) and install the locking pins (2).
21. Install the pins (5, View C) in the boom hoist mounting frame (6).

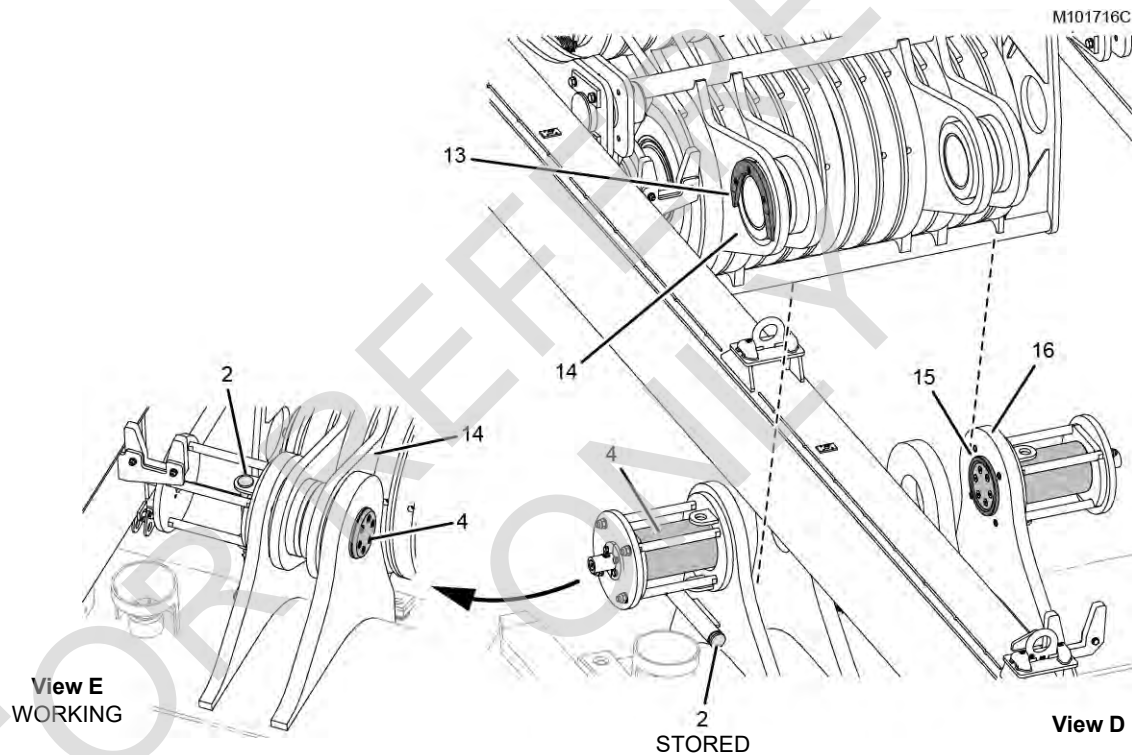
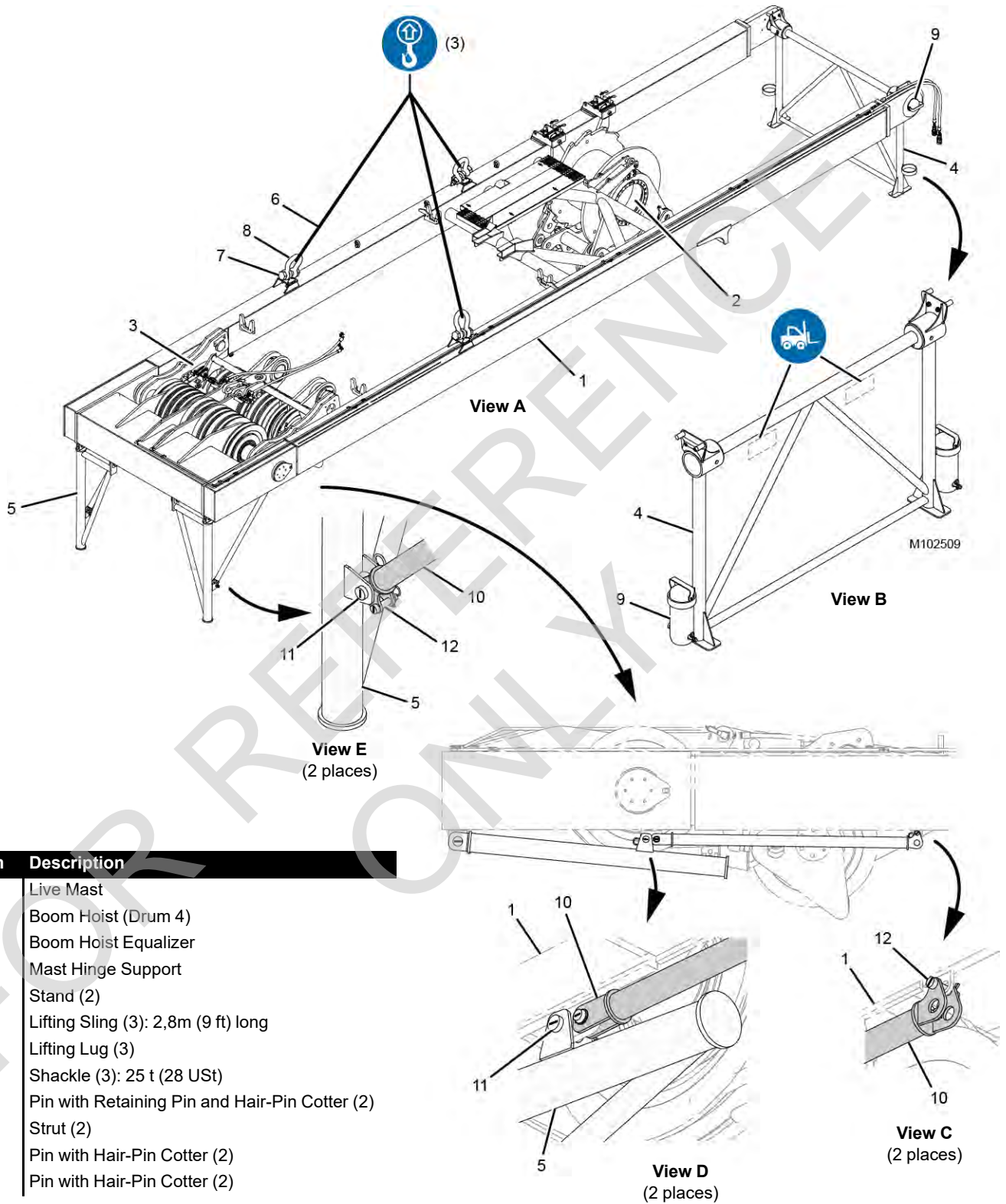


Figure 4-89 continued



4

Figure 4-90

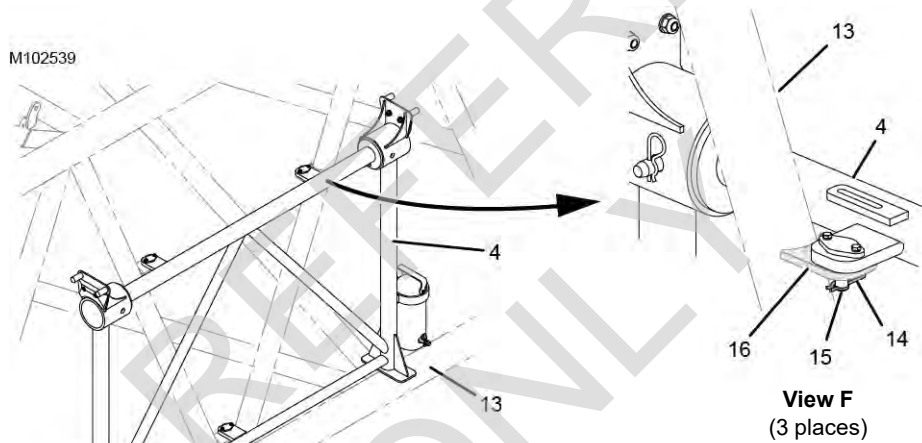
### Install Live Mast Package on Trailer

See [Figure 4-90](#) for the following procedure.

1. Hold the live mast package approximately 1,321 mm (52 in) above the ground with the assist crane.
2. Deploy each stand (5):
  - a. Support the stand (5, View D) so it cannot fall. The stand weighs 30 kg (66 lb).
  - b. Unpin the strut (10, View C) and the stand (5, View D) from the underside of the live mast (1).
  - c. Lower the stand and the strut and pin them in the shipping position as shown in View E.
  - d. Repeat the steps for the other stand.
3. Install the mast hinge support (4):

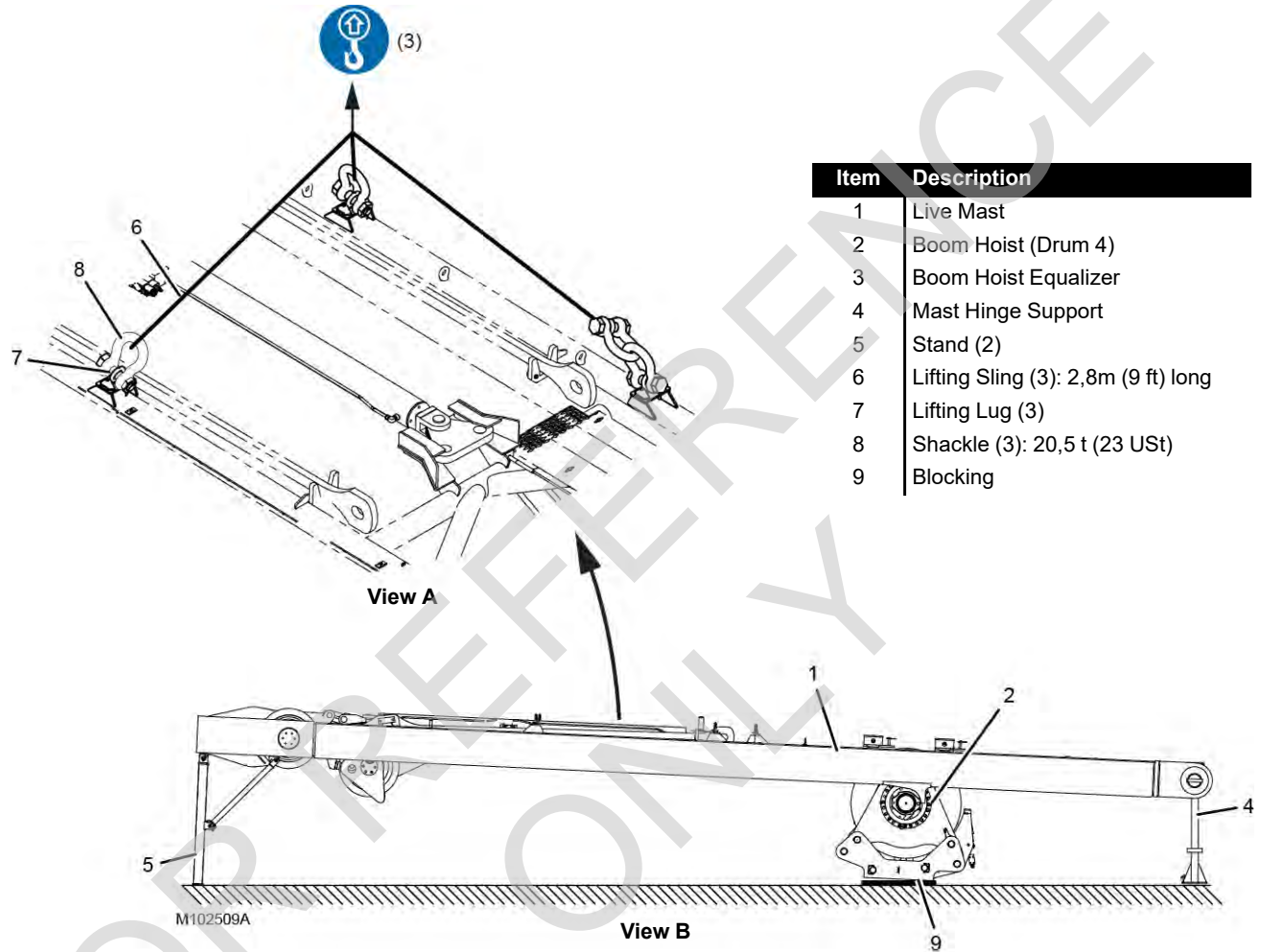
- a. Support the mast hinge support (4, View F) with the forks from a forklift. The mast hinge support weighs 82 kg (181 lb).
  - b. Remove the three hair-pin cotters (14, View F).
  - c. Using the forklift, lift the mast hinge support (4, View F) away from the right side of the 12 m (39.4 ft) insert (13).
  - d. Reinstall the three hair-pin cotters (14, View F) in the pins (15) on the mast hinge support (4).
  - e. Using the forklift, lift the mast hinge support (4, View A) into position on the end of the live mast (1).
- Remove the pins (9, View B) from the mast hinge support (4, View B) and install the pins in the shipping position (View A).

*Continued on next page.*



Item	Description
4	Mast Hinge Support
13	12 m (39.4 ft) Insert with Sheaves
14	Hair-Pin Cotter (3)
15	Pin (3)
16	Lug (3)

Figure 4-90 continued



4

Figure 4-91

4. Position the trailer carrying the live mast package in the assembly area.
5. Lift the live mast package onto the trailer.

---

 **WARNING**  
**Falling Load Hazard**

Prevent the live mast package from falling when lifted:

- Lift only with the specified rigging at the locations shown in [Figure 4-91](#).
- Lifting in any other manner will cause the mast package to hang out of level from side to side and may cause the mast package to slide or rock to one side.

---

**CAUTION**

The purpose of the hinge support (4, View B) is to prevent excessive bending in the mast legs when the mast package is tied down to the trailer.

Lateral movement of the live mast package as it is lowered onto the trailer will cause the hinge support to pivot and not support the mast.

---

6. Lower the live mast package so the stands (5, View B), the mast hinge support (4), and the boom hoist (2) are firmly contacting the deck of the trailer.
7. If necessary, install blocking (9, View B) between the boom hoist (2) and the deck of the trailer.

***The boom hoist (2) must not be allowed to hang suspended (unsupported) from the live mast (1).***

8. Secure the live mast package to the trailer with tie-downs.
9. Slacken and disconnect the lifting slings and shackles from the live mast.



Item	Description
1	Handrail
2	Handrail
3	Handrail (5)
4	Handrail
5	Handrail (2)
6	Telescopic Handrail
7	Handrail
8	Safety Pin (2 each handrail)
9	Left-Rear Platform
10	Identification Number
11	Valve Cover Platform (3)

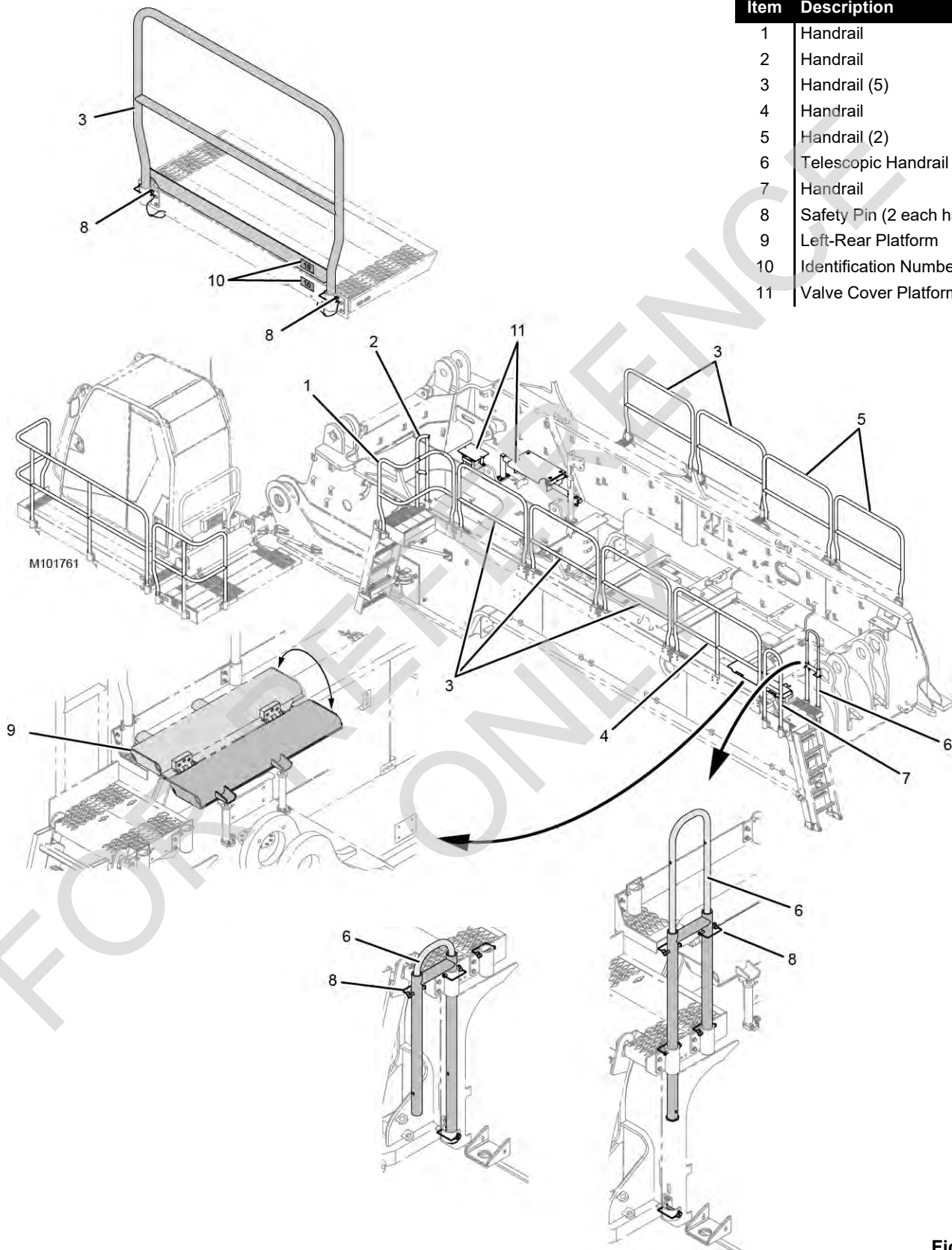


Figure 4-92



## Store Rotating Bed Left-Rear Platform and Handrails

See [Figure 4-92](#) for the following procedure.

1. Rotate the left-rear platform (9) from the working position to the stored position.
2. Lower the handrail (6) from the working position and pin it in the stored position.

## Remove Rotating Bed Handrails

See [Figure 4-92](#) for the following procedure.

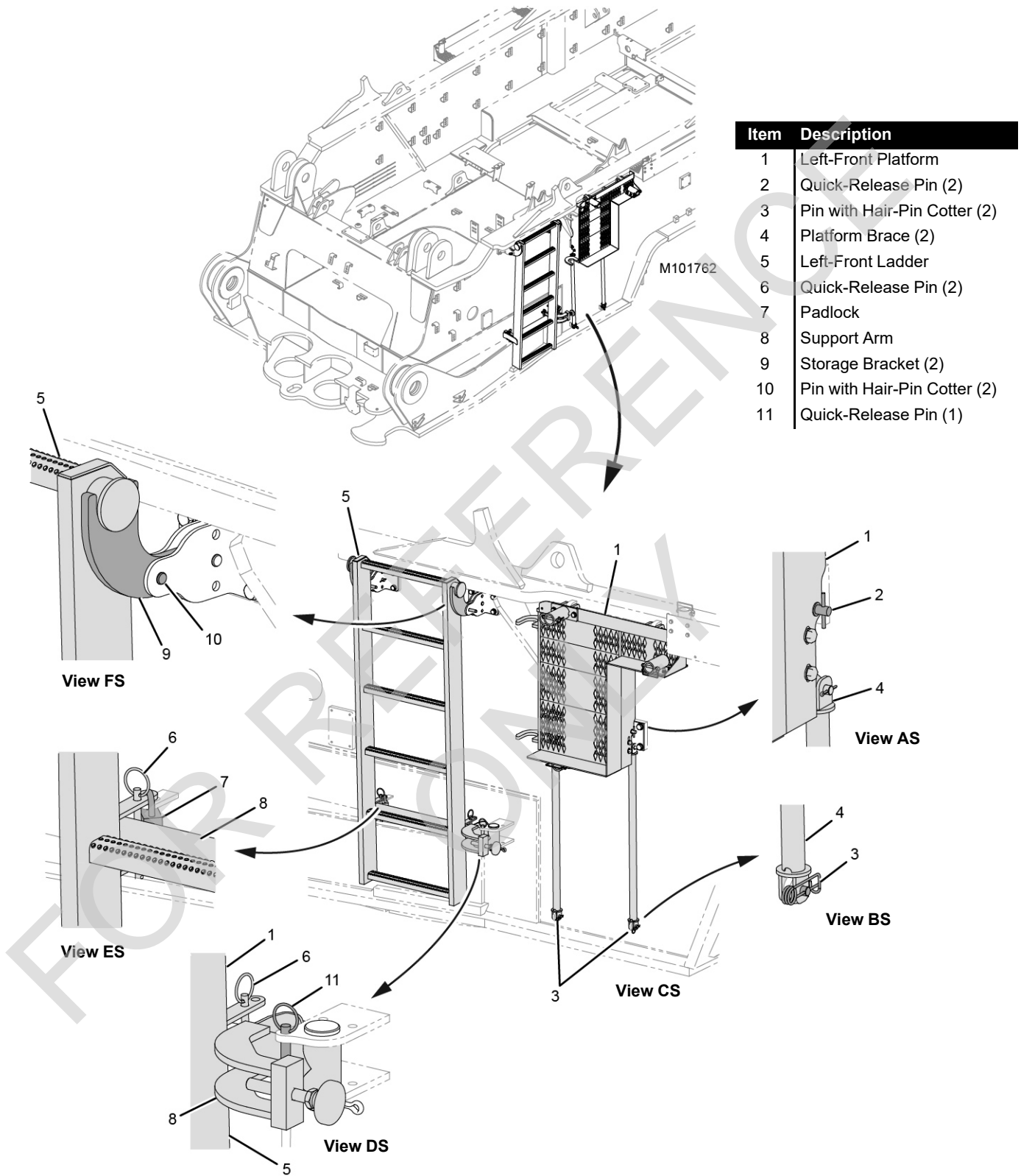
The rotating bed has eleven handrails. The heaviest handrail weighs 9 kg (20 lb).

1. Starting at the desired handrail (1-7), remove the safety pins (8).
2. Lift the handrail out of the pockets in the platform.
3. Use a tagline to lower the handrail to ground personnel.
4. Reinstall the safety pins (8) in the pockets in the platform.
5. Repeat the steps until all handrails are removed.
6. Securely attach the handrails to shipping pallets and secure the pallets to a trailer.

## Remove Rotating Bed Left-Rear Ladder

Reverse the installation steps to remove the left-rear ladder (see [Removing Ladder on page 4-25](#)).

Secure the ladder to a trailer.



4

Figure 4-93

### Move Rotating Bed Left-Front Ladder to Working Position

See [Figure 4-93](#) for the following procedure.

1. Remove the pins (10, View FW), raise the storage brackets (9, View FS) to the shipping position, and install the pins (10).
2. Remove the quick-release pins (6, View DW and EW) and the padlock (7, View DW) to disconnect the left-front ladder (5) from the support arm (8).
3. Lift the ladder away from the storage bracket (9, View EW) and off the hooks on the left-front platform (1, View FW). Place the ladder to the side.
4. Remove the quick-release pin (11, View DW), swing the support arm in, and reinstall quick-release pin (11, View DS).
5. Hook the left-front ladder (5, View FS) onto the storage brackets (9).
6. Install the quick-release pins (6, View DS and ES) and

the padlock (7, View ES) to connect the left-front ladder to the ladder support arm (8).

### Move Rotating Bed Left-Front Platform to Working Position

See [Figure 4-93](#) for the following procedure.

1. Remove the quick-release pins (2, View AW).
2. Support the platform (1, View CW) with the platform braces (4) so the platform cannot fall when the next step is performed. The platform weighs 21 kg (46 lb).
3. Remove pins (3, View BW) to unpin the left-front platform from the working position (View CW).
4. Lower the left-front platform (1, View CS) and the platform braces to the shipping position.
5. Pin the platform braces (4, View BS) to the lugs on the rotating bed with the pins (3).
6. Pin the platform (1, View AS) to the lugs on the rotating bed with the quick-release pins (2).

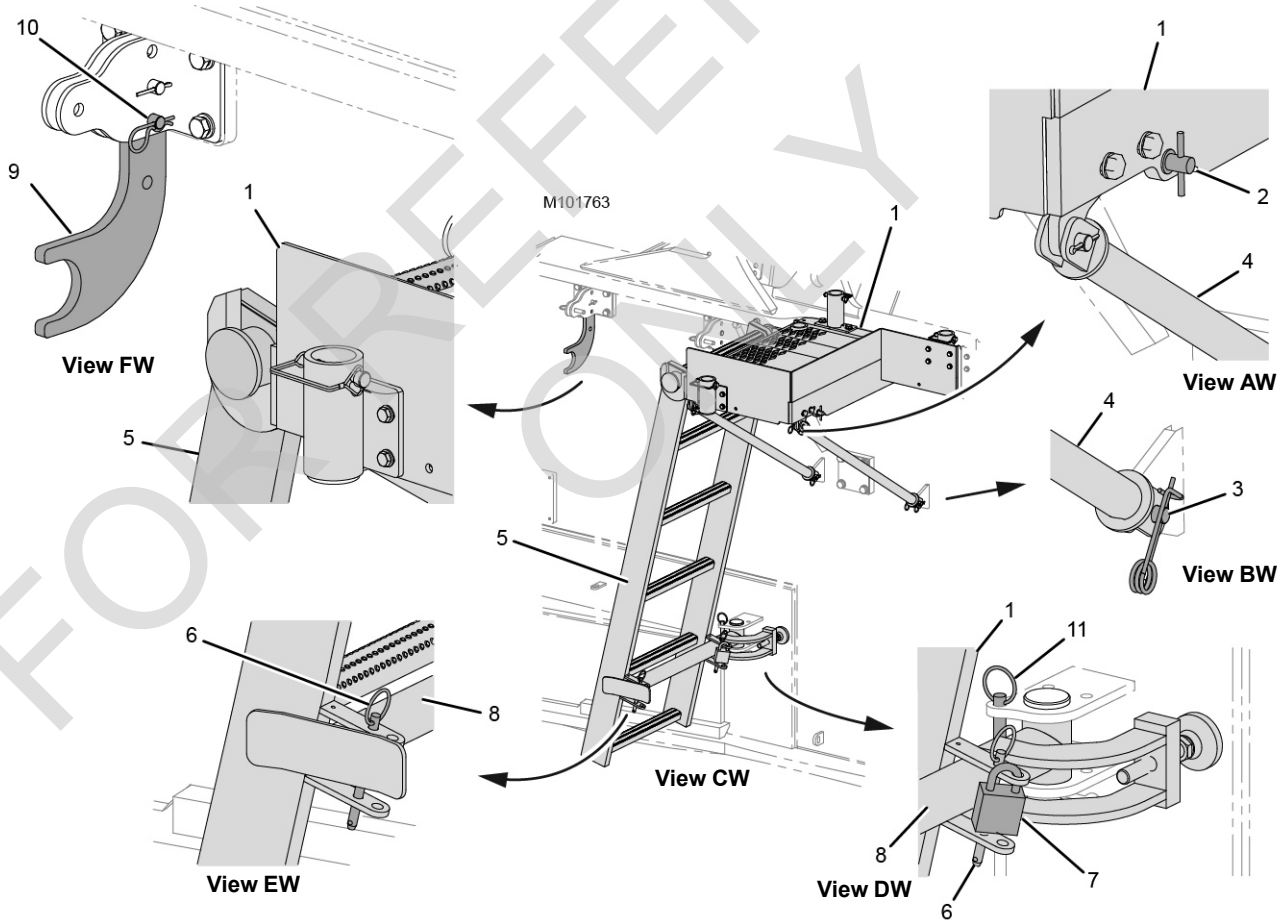
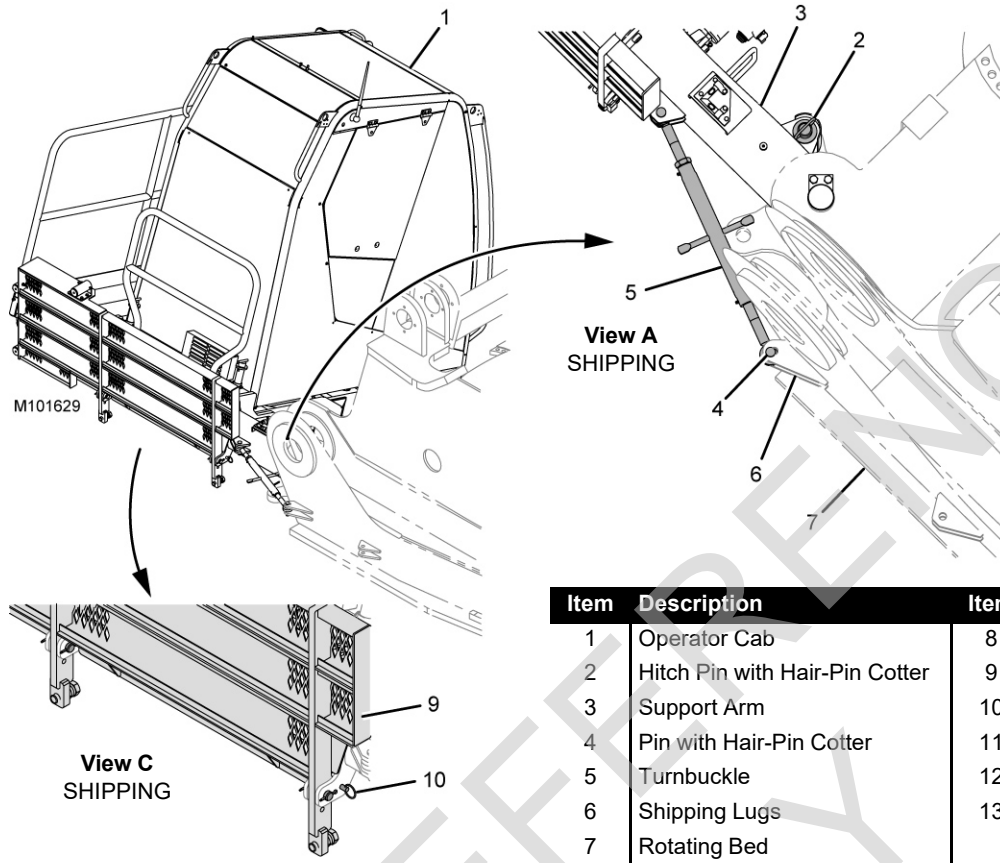


Figure 4-93 continued



Item	Description	Item	Description
1	Operator Cab	8	Operating Lugs
2	Hitch Pin with Hair-Pin Cotter	9	Cab Rear Platform
3	Support Arm	10	Quick-Release Pin (2)
4	Pin with Hair-Pin Cotter	11	Handrail
5	Turnbuckle	12	Safety Pin (3)
6	Shipping Lugs	13	Identification Numbers
7	Rotating Bed		

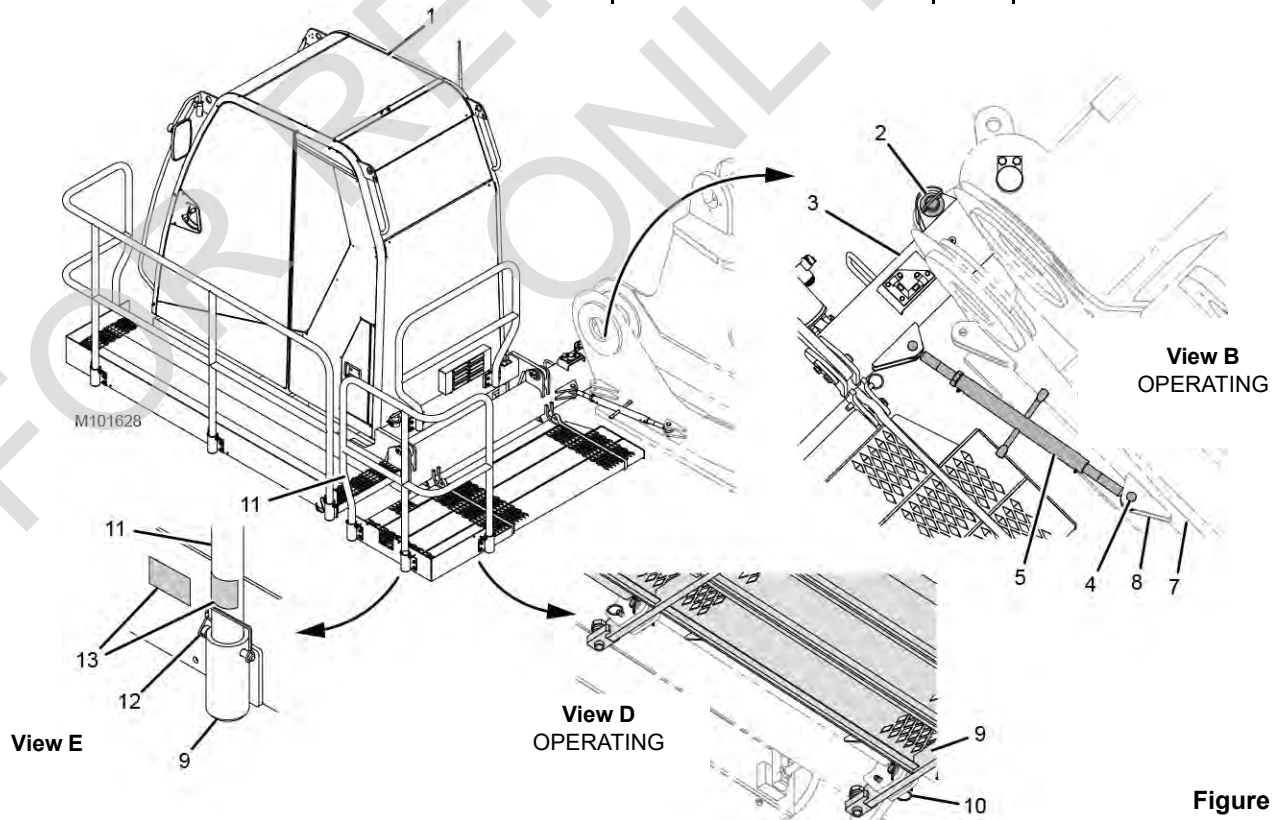


Figure 4-94

### Store Right Side Rear View Mirror

This mirror is optional.

Reverse the installation steps to store the mirror (see [Deploy Right Side Rear View Mirror on page 4-19](#)).

### Store RCL Light

Reverse the installation steps to store the RCL light (see [Raise RCL Light to Working Position on page 4-19](#)).

### Move Cab Tilt Stop Pins to Shipping Position

This step must be performed to allow the cab to be rotated down for shipping.

This step must be performed before you store the cab rear platform.

See [Figure 4-95](#) for the following procedure.

1. Using the remote control, tilt the cab up a few degrees above horizontal.
2. Remove the safety pins (2).
3. Pull the stop pins (1) up and rotate them to align the connecting holes in the shipping position.
4. Install the safety pins (2).

### Store Cab Rear Platform

See [Figure 4-94](#) for the following procedure.

1. Remove the safety pins (12, View E).
2. Remove the handrail (11) from the cab rear platform (9).
3. Attach the handrail to a shipping pallet and secure the pallet to a trailer.
4. Reinstall the safety pins (12, View E) on the cab rear platform.
5. Support the cab rear platform (9, View D) so it cannot fall. It weighs 30 kg (66 lb).
6. Remove the quick-release pins (10, View D) from the operating position and raise the platform to the shipping position (View C).
7. Install the quick-release pins (10, View C) to secure the platform in the shipping position.

### Secure Operator Cab

1. Stop the engine in the cab.
2. Park all crane functions in the cab.
3. Turn off all accessories in the cab.
4. Remove all keys from the control console in the cab.
5. Close and latch all cab windows.

6. Close and lock the cab door.
7. Reactivate the remote control. See [Activating Remote Control on page 4-9](#).
8. Restart the crane engine with the start switch on the remote control. See [Starting Engine with Remote Control on page 4-9](#).

### Install Window Covers

If equipped, install the operator cab window covers. See [Figure 4-15](#).

### Store Operator Cab

See [Figure 4-94](#) for the following procedure.

1. Remove the pin (4, View B)
2. Remove the hitch pin (2, View B).
3. Rotate the operator cab to the shipping position (View A).
4. Install the hitch pin (2, View A).
5. Connect the turnbuckle (5, View A) to the shipping lugs (6) on the rotating bed (7) with the pin (4).

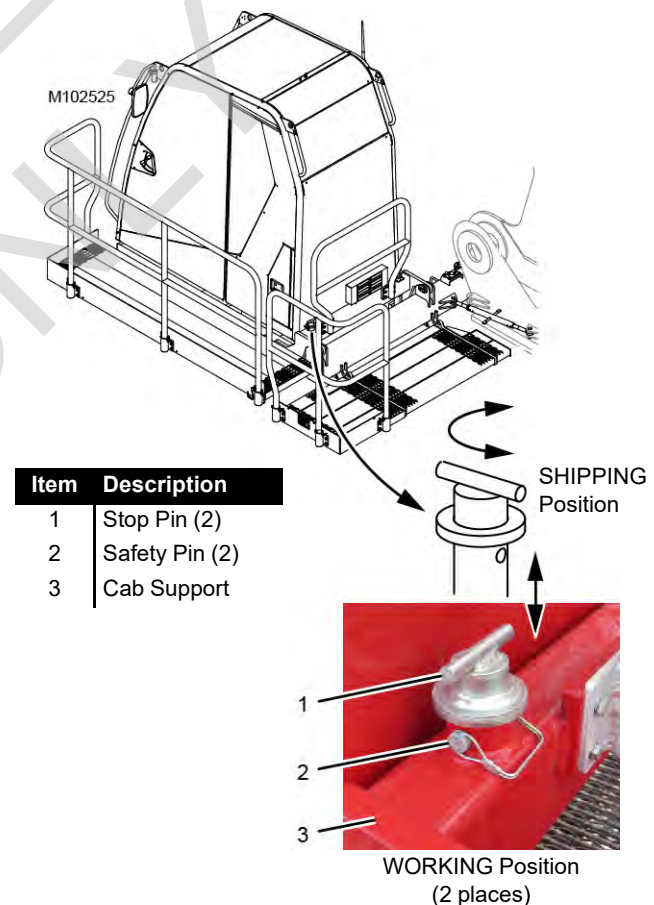
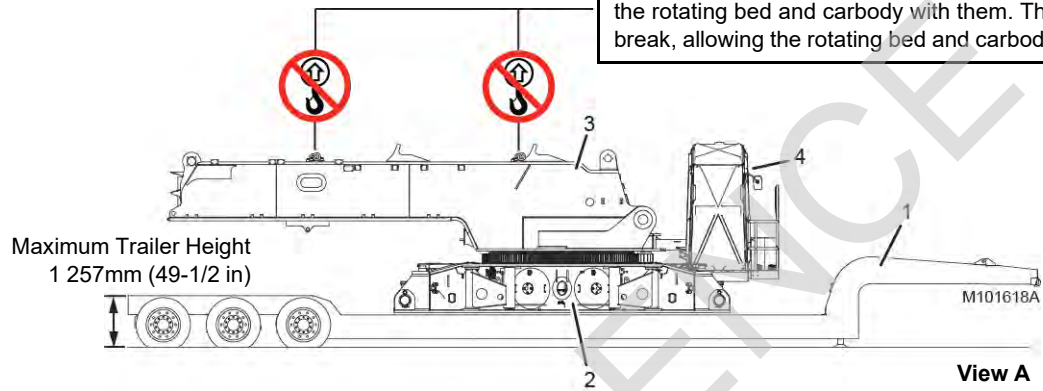


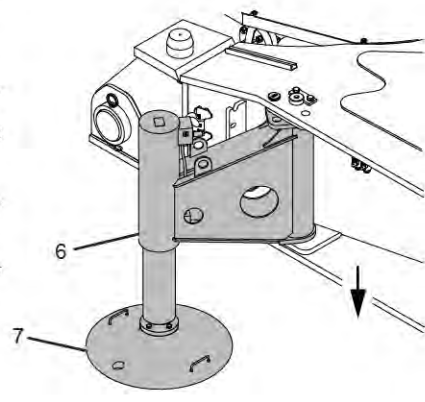
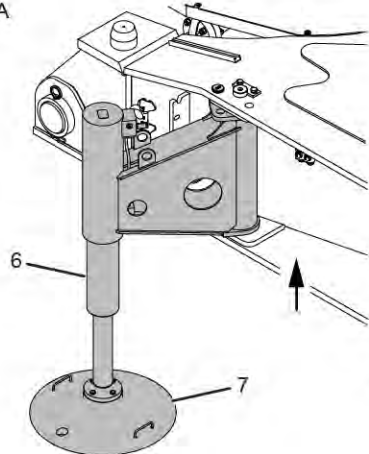
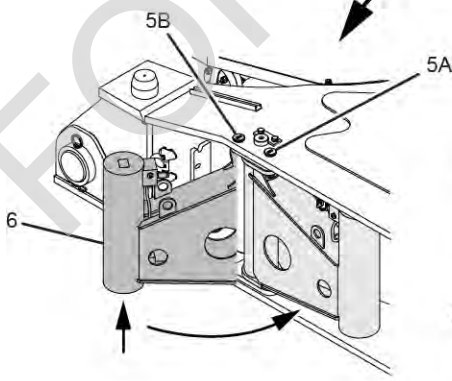
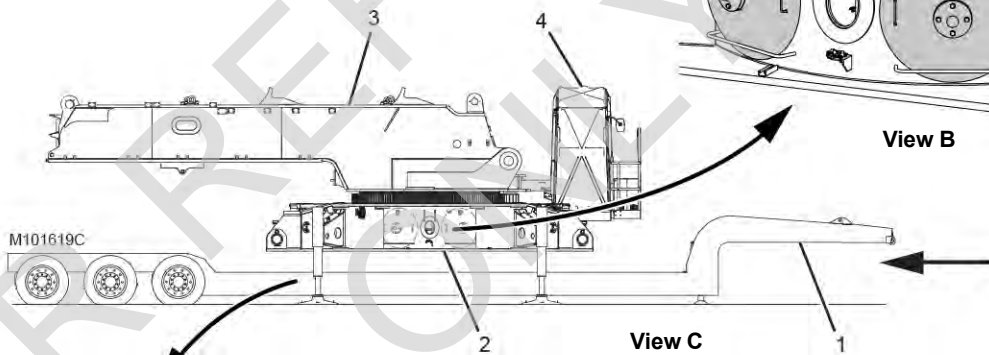
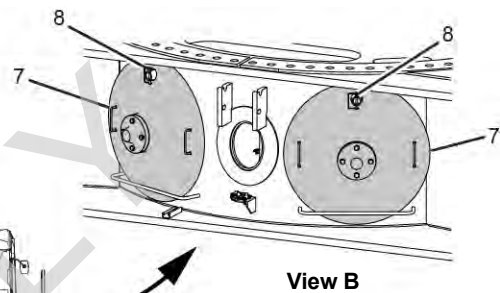
Figure 4-95



**⚠ WARNING**  
**Falling Load Hazard!**  
 These lugs are for factory use only. Do not attempt to lift the rotating bed and carbody with them. The lugs could break, allowing the rotating bed and carbody to fall.



Item	Description	Item	Description
1	Trailer	5A	Storage Hole
2	Carbody	5B	Working Hole
3	Rotating Bed	6	Carbody Jack (4)
4	Operator Cab	7	Jack Pad (4)
5	Pin with Hair-Pin Cotter (4)	8	Storage Pin (4)



View D

View E

View F

Figure 4-96



## Install Carbody-Rotating Bed Module on Trailer

See [Figure 4-96](#) for the following procedure.



### WARNING Moving Part Hazard!

To avoid serious crushing injury — warn all personnel to stand clear of the jacks.

1. Using the remote control, fully extend the carbody jacks (6, View E) to raise the carbody-rotating bed module.
2. Slowly and carefully drive the trailer (1, View C) into position under the carbody-rotating bed module.
3. Install blocking as needed between the carbody-rotating bed module and the trailer.
4. Retract the carbody jacks (6, View F) to lower the carbody-rotating bed module onto the trailer.



### WARNING Tipping Hazard!

Avoid tipping the crane over — keep the crane level while jacking.

**NOTE** A level is provided on the front of the carbody. See Section 3 of the Crane Operator Manual.

5. Using the remote control, tilt the operator cab down onto blocking placed under the lower front corners of the operator cab frame.  
**Use care not to damage components under the operator cab.**
6. Secure the carbody-rotating bed module and the operator cab to the trailer with tie-downs.

7. Using the remote control, fully retract the carbody jacks (View D).
8. Store the jack pads (7, View B). Each jack pad weighs 45 kg (99 lb).
9. Remove the pins (5, View D) from the working holes (B).
10. Rotate the carbody jacks (6, View D) inward to the storage position.
11. Install the connecting pins (5, View D) in the storage holes (A).

### CAUTION

#### Avoid Structural Damage

Do not extend the carbody jacks when they are stored. Serious structural damage will occur to the carbody and jacks.

### Store Remote Control

1. Using the external engine switch (8, [Figure 4-7 on page 4-8](#)), stop the engine.
2. Remove the key from the external engine switch.
3. Turn off the remote control.
4. If the electric cable is being used between the remote control and the transceiver, disconnect the cable from the transceiver.
5. Store the remote control and the electric cable (if used) in the compartment on the left side of the operator cab (see [Figure 4-7 on page 4-8](#)).
6. Lock the compartment and remove the key.

### Final Checks

1. Verify that all loads are securely tied down to the trailers. See [Shipping Crane Components on page 4-100](#).
2. Make sure all required parts are stored in the parts box. See [Parts Box on page 4-4](#).

FOR REFERENCE ONLY

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## WIRE ROPE INSTALLATION

**NOTE** The wire rope manufacturer’s recommendations take precedence over the following information.

### Wire Rope Specifications

See the Wire Rope Specifications Chart in the Capacity Chart Manual for the correct type, size, and amount of wire rope to be installed on the crane.

The Wire Rope Specifications Chart contains the following information:

- Parts of the line required for various loads.
- Wire rope lengths and notes about hoisting distance for various parts of the line.
- Maximum spooling capacity of the load drums.

### Wire Rope Storage

Store the wire rope in coils or on reels off the ground or floor in a clean, dry, indoor location. If outdoor storage is necessary, the wire rope must be covered with a protective wrapper.

Keep the wire rope away from acids, fumes, and other corrosives. Keep the wire rope away from heat that can dry out the lubricant.

If the storage period will be long, lubricate the wire rope and perform the periodic inspection given the Service Manual at least monthly.

### Seizing and Cutting Wire Rope

Apply tight seizings of annealed wire to the ends of all wire rope. If not done, the rope wires and strands may slacken. This will result in overloading of some strands and underloading of others. Bird-caging and breakage of the wire rope can occur.

Before cutting the wire rope, apply seizings on both sides of the point where the cut will be made. Then cut the wire rope with a torch, rope cutter, or abrasive cut-off wheel.

See [Figure 4-97](#) for:

- The number of seizings to be applied to the ends of the wire rope and to both sides of the point where a cut will be made.
- The proper application method. Each seizing should be one rope diameter long.

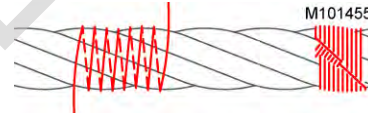
Wire Rope Type	Seizings Required
Preformed	1
Non-preformed	3

Place the free end of the seizing wire in the valley between two stands. Then wind the seizing wire over the free end as shown. Finally, twist and pull the two ends of seizing wire together until the seizing is tight.



**View A**—Rope Diameter 1 in (26 mm) and Larger

Wind the seizing wire around the wire rope as shown. Then twist the two ends of seizing wire together at the center of the seizing. Alternately twist and pull the ends until the seizing is tight.



**View B**—Rope Diameter Smaller than 1 in (26 mm)

**Figure 4-97**

Item	Description
1	Wire Rope
2	Pocket in Drum Barrel
3	Straight Wedge
4	Seizing

Don't Allow End of Wire Rope to Extend Out of Socket Opening

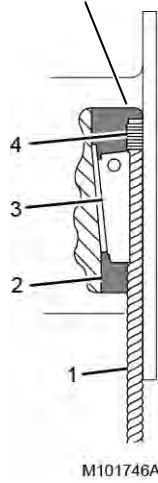
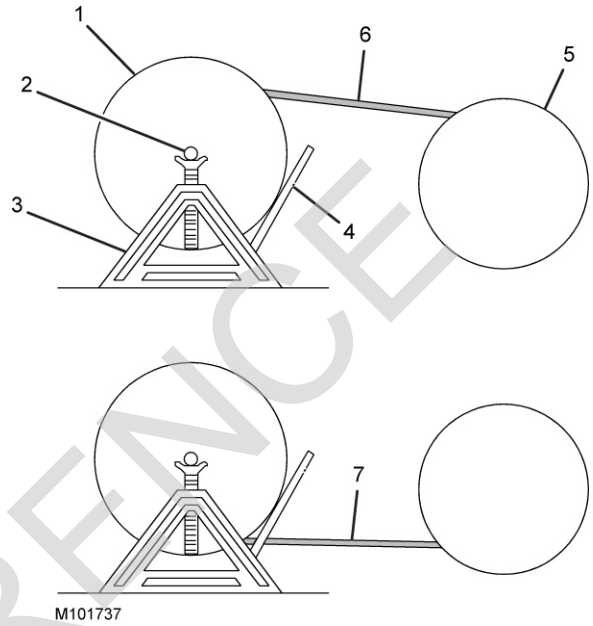


Figure 4-98



### Anchoring Wire Rope to Drum

See [Figure 4-98](#)

Use the correct wedge part number for the size of wire rope being used; see parts drawing for the boom hoist drums or for the load drum shaft to obtain the correct part number.

1. Assemble wire rope and wedge to drum socket.
2. Tighten wedge, rapping back of wedge with a brass drift pin and hammer.

Item	Description	Item	Description
1	Shipping Reel	5	Drum
2	Shaft	6	Top to Top Winding
3	Jack Stand	7	Bottom to Bottom Winding
4	Brake		

Figure 4-99



#### WARNING!

##### Falling Load Hazard!

The wire rope can be pulled out of the drum if the following steps are not taken.

- Install the straight wedge so the corrugated side is against the wire rope.
- Install the wedge so the end of the wire rope extends past the end of wedge, but not out of the drum socket.
- Make sure the seizing is not under the wedge. Remove the seizing if it interferes with assembly.

### Winding Wire Rope onto Drum

#### CAUTION

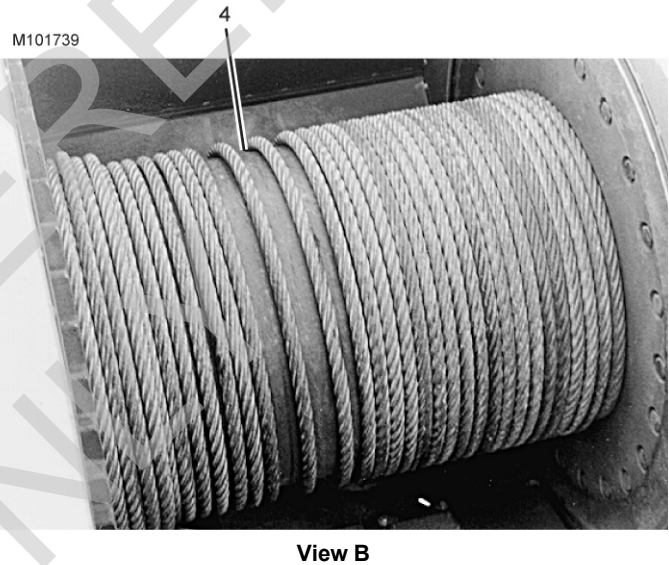
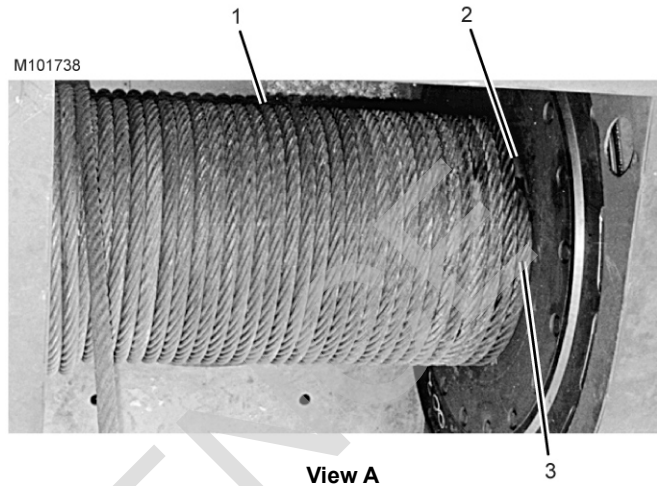
##### Avoid Wire Rope Damage

The shipping reel must rotate when the wire rope is unwound.

Attempting to remove the wire rope from a stationary reel can result in a kinked wire rope, and the wire rope will be ruined.

1. Remove the wire rope from the shipping reel:
  - a. Mount the wire rope shipping reel (1, [Figure 4-99](#)) on a shaft (2) supported at both ends by jacks (3) or blocks.
  - b. Provide a brake at the shipping reel so that the wire rope can be wound tightly on the drum.
  - c. Avoid a reverse bend when winding the wire rope onto the drum: wind from the top of the reel to the top of drum (upper view) or from the bottom of the reel to the bottom of the drum (lower view).

- d. Avoid dragging the wire rope in the dirt or around objects that can scrape, nick, cut, or crush the wire rope.
2. Carefully inspect the drums and all rope guides, rollers, and sheaves for defects that can cause the wire rope to wear or be cut. If defects cannot be fixed, replace the faulty parts.
  3. Apply tension to the wire rope as it is wound slowly onto the drum.
    - a. The first wrap of wire rope must be tight against the drum flange for the approximately three-fourths of the drum diameter (View A, [Figure 4-100](#)).
    - b. Tap the adjacent wraps against each other with a soft metal or wooden mallet as the wire rope is spooled onto the drum.
    - c. Use extreme care not to put twists or turns in the wire rope. Allow the rope to assume its natural lay.



**CAUTION**

**Avoid Wire Rope Damage**

Voids or spaced wraps (View B, [Figure 4-100](#)) in the first layer will permit movement and a wedging action with the subsequent layers. Crushing and abrasion of the wire rope will occur.

Never allow the wire rope to “cross-wind” on the drum.

Item	Description
1	Wraps of first layer tight against drum flanges and each other
2	Wedge
3	Tight against drum flange for 3/4 of diameter
4	Voids and loose wraps in first layer will cause sever wear of wire rope

**Figure 4-100**

Item	Description
1	Seizing
2	Dead End
3	Live End in Straight Line with Socket
4	Socket
5	Wedge
6	Rope Clip
7	Short Piece of Wire Rope
8	Terminator Wedge
9	Shipping holes: <b>Do not reinstall any shipping material</b> (bolt, plastic strap, or wire) in shipping holes of wedge or socket after assembling.

T (Rope Clip Nut Torque)

inch (mm)	Wire Rope/Clip Size			
	7/8 (22,23)	1 (25,4)	1-1/8 (28,58)	1-1/4 (31,75)
Torque				
* ft/lb (kN/m)	225 (0,30)	225 (0,30)	225 (0,30)	360 (0,49)

\* Tightening torque values shown are based on threads being clean, dry and free of lubrication.

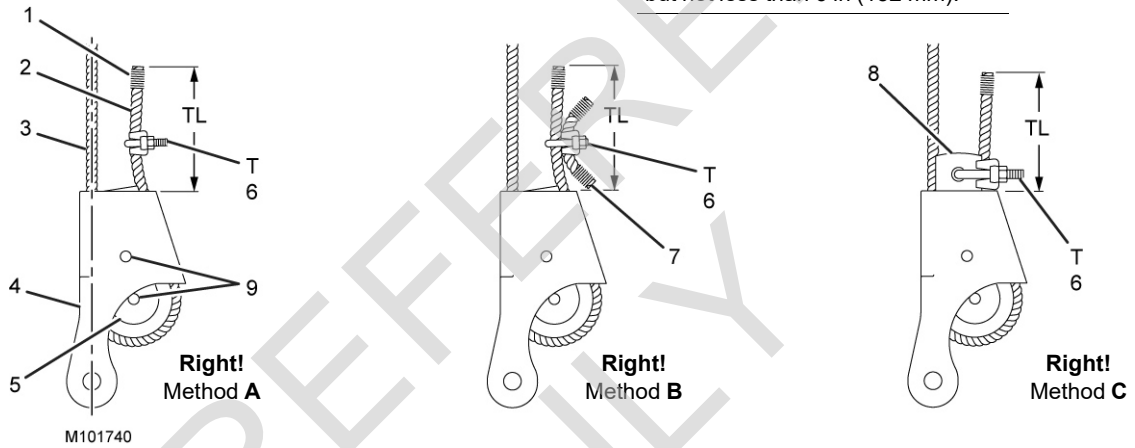
TL (Tail Length)

**Standard 6 to 8 Strand Wire Rope**

Minimum of 6 rope diameters, but not less than 6 in (152 mm).

**Rotation Resistant Wire Rope**

Minimum of 20 rope diameters, but not less than 6 in (152 mm).



ALL ARE DANGEROUS AND PROHIBITED!

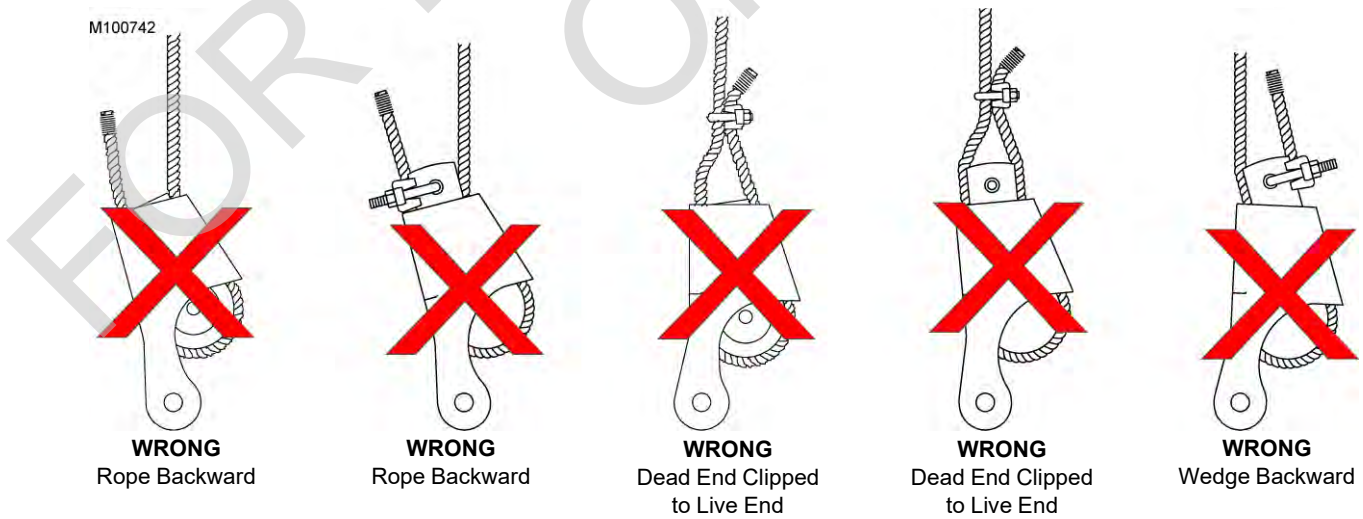


Figure 4-101



## Anchoring Wire Rope to Wedge Socket

**! WARNING**  
**Falling Load Hazard!**

- Inspect all parts prior to use. Do not use parts that are cracked or otherwise defective.
- Remove minor nicks, burrs, or rough edges from socket, wedge, or pin by lightly grinding. Do not reduce original dimensions by more than 10%.
- Do not reinstall shipping material (bolt, plastic strap or wire) in the shipping holes (9) of the wedge or the socket after assembling them. Discard these materials because they can prevent the wedge from tightening in the socket.
- Only use a wedge and socket which are the correct size for the wire rope being used. Do not mix and match parts from one assembly with parts from another assembly.
- The Terminator™ socket and wedge has “go” and “no go” holes to check for proper rope size.
- Attach the wire rope clip to the dead end of the wire rope after assembling the wire rope to the wedge and socket.

See [Figure 4-101](#)

1. Assemble the wire rope and the wedge to the socket so the live end of the wire rope is in a straight line with the socket pin hole. Do not assemble WRONG as shown.
2. Allow the dead end of the wire rope to extend past the end of the socket the amount shown.
3. Allow the wire rope to assume its natural lay.
4. Pull against the wedge and the live end of the wire rope enough to tighten the wedge in the socket.
5. Use a brass hammer to seat the wedge and wire rope as deep into the socket as possible.
6. Attach a wire rope clip to the dead end of the wire rope using one of the RIGHT methods shown. The rope clip will aid in preventing the wire rope from being pulled out of the socket.

**NOTE** Use Right Method A only if the wire rope clip is small enough to be securely tightened to the dead end. Right Method C is only for use with a Terminator wedge socket.

7. After the socket is pinned in place, hoist the load slowly so the wedge seats tightly. Do not shock load the socket and wedge.

**! WARNING**  
**Falling Load Hazard!**

The wire rope can break if the following precaution is not observed:

- Do not attach the dead end of wire rope to the live end of wire rope with a wire rope clip. The wire rope clip will transfer the load from the live side of the wire rope to the dead end, seriously weakening the attachment.

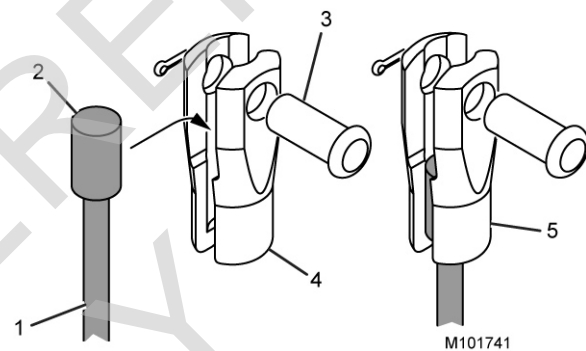
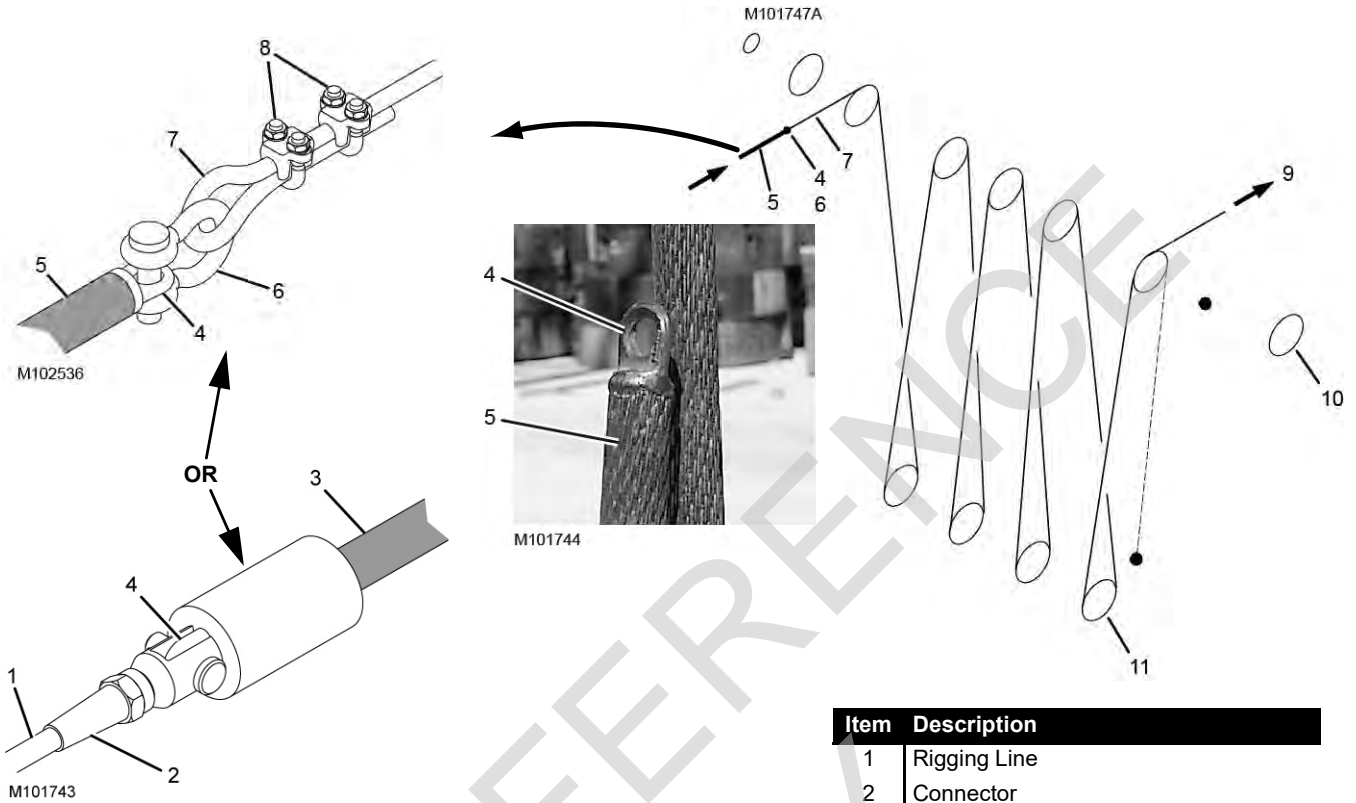


Figure 4-102

## Anchoring Wire Rope to Button Socket

See [Figure 4-102](#)

1. Remove the pin (3) from the socket (4).
2. Install the button (2) end of the load line (1) in the socket (4).
3. Pin the socket to the anchor point.
4. Securely tighten the locking screw (5).



Item	Description
1	Rigging Line
2	Connector
3	Wire Rope with Button
4	Pad Eye
5	Wire Rope without Button
6	Shackle
7	Rigging Line
8	Rope Clips
9	Pull Rigging Line with Winch or Forklift
10	Boom Point Sheaves
11	Load Block Sheaves <b>EXAMPLE</b>

No. 1.5 Pad Eye	Item	mm	Inch
Approximate Capacity 553 kg (1220 lb)	A	16,00	5/8
	B	6,35	1/4
	C	25,40	1
	D	11,18	7/16
	E	28,70	1-1/8
	F	4,06	1/16
	G	33,27	1-5/16

No. 1 Pad Eye	Item	mm	Inch
Approximate Capacity 553 kg (1220 lb)	A	9,65	3/8
	B	6,35	1/4
	C	22,40	7/8
	D	10,40	13/32
	E	22,40	7/8
	F	3,30	1/8
	G	25,40	1-1/32

No. 2 Pad Eye	Item	mm	Inch
Approximate Capacity 1 179 kg (2600 lb)	A	19,05	3/4
	B	9,65	3/8
	C	26,92	1-1/16
	D	12,70	1/2
	E	38,10	1-1/2
	F	4,83	3/16
	G	41,26	1-5/8

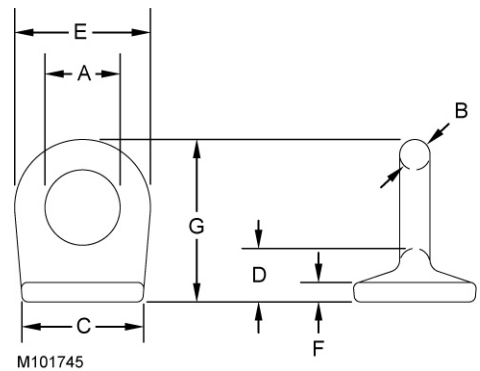


Figure 4-103

## Pad Eye Usage for Wire Rope Reeving



### WARNING

#### Flying Part Hazard!

Pad eye on end of wire rope has been provided **for reeving purposes only**. Any other use is neither intended nor approved.

Pad eye can break and fly apart with considerable force if it is overloaded, not used properly, or not maintained properly.

See [Figure 4-103](#)

### General

Some rotation-resistant wire rope supplied by Manitowoc is equipped with a pad eye welded to the leading end of the wire rope or to the button on the end of the wire rope.

A rigging line can be attached to the pad eye to make it easier to reeve the load block.

### Safety

1. Do not exceed the approximate capacities listed in [Figure 4-103](#).
2. Make sure the rigging line and the attaching hardware (clips and rope connectors) are rated for the approximate capacities shown in [Figure 4-103](#).

3. Inspect the pad eye prior to each use. **Replace it if:**

- Any original dimensions have changed
- Cracks or breaks exist in the metal or the weld

## Breaking in Wire Rope

After installing a new wire rope, break it in by operating it several times under light load at reduced speed. This practice allows the wire rope to form its natural lay and the strands to seat properly.

**NOTE** The wire rope will stretch during the break-in period, reducing the wire rope's diameter as the strands compact around the core.

The dead wraps of wire rope on the drum can become slack during operation, even if the utmost care is used during installation of the wire rope. This slackening is caused by the normal stretch that occurs in a new wire rope under tension and periodically throughout the wire rope's life from release of the load.

When slackness is noted, tightly wind the dead wraps of wire rope onto the drum. If left uncorrected, a wedging action with subsequent layers will occur, and the resultant abrasion may cause broken wires in the dead wraps.

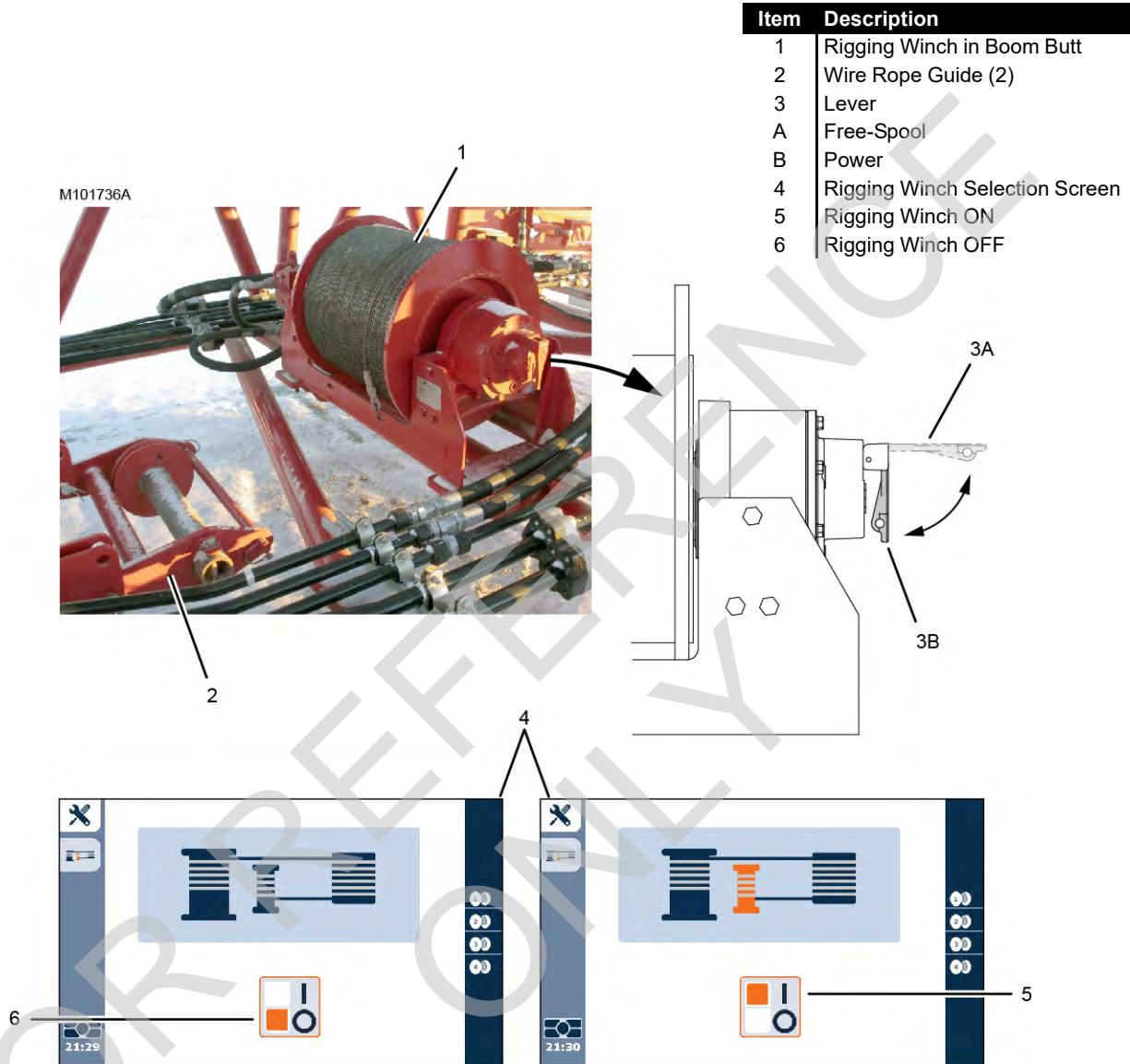


Figure 4-104

## RIGGING WINCH OPERATION

If your crane is equipped with the optional rigging winch (Drum 0), see the Rigging Winch Assembly drawing at the end of this section for wire rope routing and anchoring.

See [Figure 4-104](#) for the following procedures.

### Selecting Rigging Winch Mode

TO TURN RIGGING WINCH ON —

1. Scroll to the rigging winch selection screen (4) in the Main Display. See MLC300 Main Display Operation Manual for instructions.

2. Use either the jog dial on the right console or the scroll keys on the Main Display to highlight the ON (I) icon (5) in the selection box.
3. Press the select button on the jog dial or on the Main Display to select the highlighted mode. The screen changes to reflect the change.

TO TURN RIGGING WINCH OFF —

1. Scroll to the rigging winch selection screen (4) in the Main Display. See MLC300 Main Display Operation Manual for instructions.

2. Use either the jog dial on the right console or the scroll keys on the Main Display to highlight the OFF (O) icon (6) in the selection box.
3. Press the select button on the jog dial or on the Main Display to select the highlighted mode. The screen will change to reflect the change.

## Operating Rigging Winch

### Free-Spool Operation

The winch has a free-spool clutch which allows the drum barrel to be disengaged from the drive mechanism. This position allows the drum to be turned by hand.

#### TO TURN FREE-SPOOL OFF —

1. Make sure the rigging winch is at rest with no load on the rigging line.
2. Rotate the lever (3) UP to the free-spool position (A).

#### TO TURN FREE-SPOOL ON—

1. Make sure the rigging winch is at rest with no load on the rigging line.
2. Rotate the lever (3) DOWN to the power position (B)

### Power Operation

1. Turn free-spool off to provide power operation.
2. Turn on the rigging winch mode.
3. To ensure the winch gears are properly engaged, proceed as follows:
  - a. Push the Drum 0 control handle forward to slowly rotate the winch drum 90° in the pay out direction.
  - b. Pull the Drum 0 control handle back to slowly rotate the winch drum 90° in the haul in direction.
4. Pay out the rigging line by moving the Drum 0 control handle forward.
5. Reeve the rigging line through the load block and the boom point and connect it to the desired load line as shown in the Rigging Winch Assembly drawing at end of this section.
6. Move the Drum 0 control handle to off and push the corresponding load drum control handle forward to pay out the load line. The rigging winch will haul in the rigging line automatically.

**NOTE** Use the engine throttle to increase and decrease rigging winch line pull and to control line slack at the rigging winch.

The stall line pull of the rigging winch is regulated with a proportional relief valve controlled by the crane's programmable controller.

## CAUTION!

### Avoid Rigging Winch or Wire Rope Damage!

The rigging winch will not automatically pay out line if the selected load drum control handle is pulled back to the hoist position.

**Structural damage to the winch and rigging line will occur!**

If it is necessary to haul in the load line on the load drum when the load line is connected to the rigging line, proceed as follows:

- Pay out the rigging line with the Drum 0 control handle while hauling in the load line with the load drum control handle.



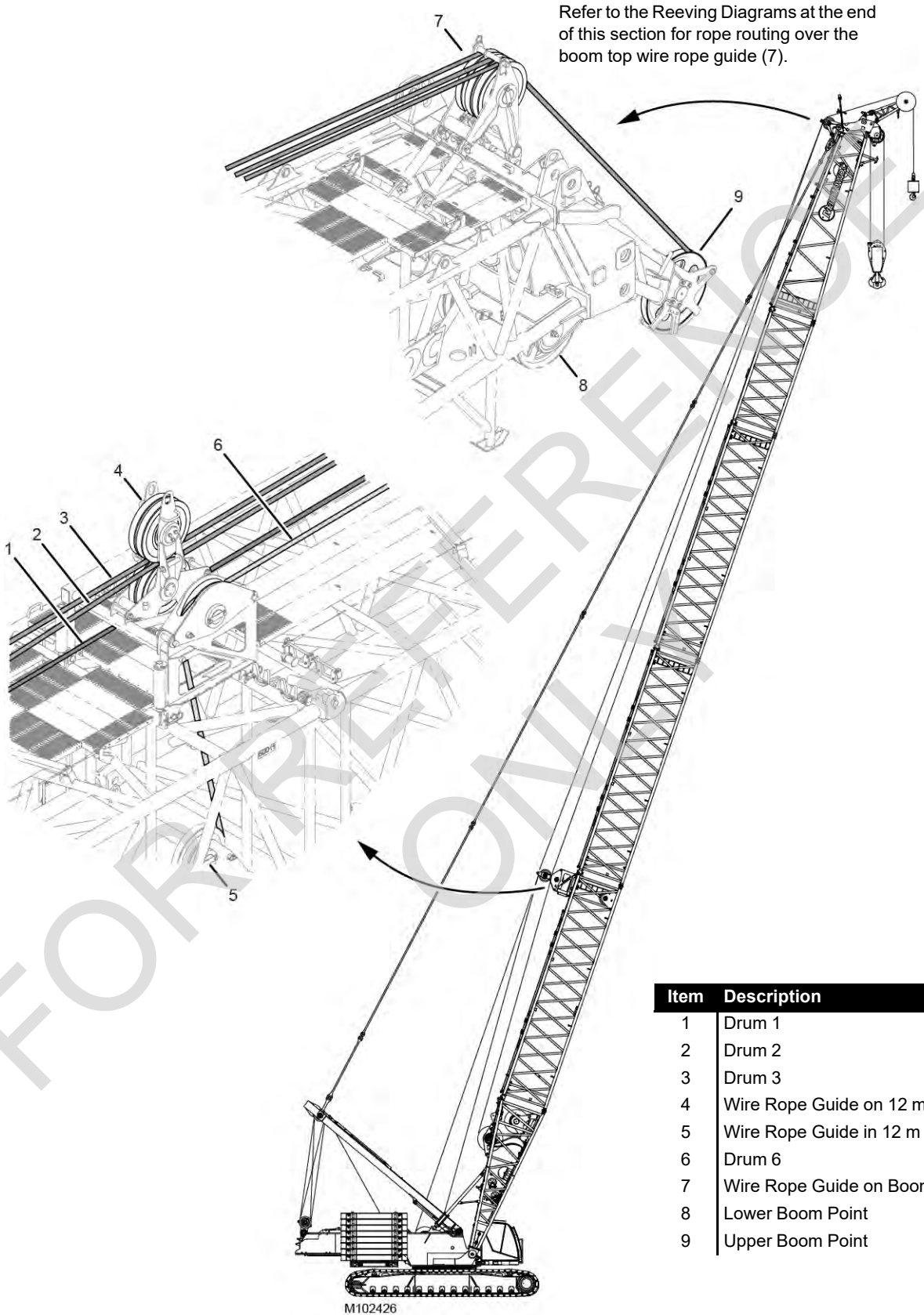
## WARNING

### Flying Object Hazard!

Do not attempt to disconnect the rigging line from the load line until the lines are slack.

The lines could fly apart with explosive force and strike personnel.

7. Once the load line is reeved through the load block and the boom point:
  - a. Move the load drum control handle to off.
  - b. Pay out the rigging line to slacken the load line by pushing the Drum 0 handle forward.
  - c. Disconnect the rigging line from the load line.
  - d. Haul in the rigging line for storage on the rigging winch by pulling the Drum 0 control handle back.
  - e. Secure the end of rigging line to the boom butt for storage.
  - f. Turn OFF the rigging winch mode.
  - g. Connect the load line to dead-end socket. See instructions in this section.



Refer to the Reeving Diagrams at the end of this section for rope routing over the boom top wire rope guide (7).

Item	Description
1	Drum 1
2	Drum 2
3	Drum 3
4	Wire Rope Guide on 12 m (3.5 ft) Insert
5	Wire Rope Guide in 12 m (3.5 ft) Insert
6	Drum 6
7	Wire Rope Guide on Boom Top
8	Lower Boom Point
9	Upper Boom Point

Figure 4-105



**LOAD LINE REEVING**



**WARNING**  
**Falling Load Hazard!**

Use only a load block or hook-and-weight ball with a capacity equal to or greater than load to be handled.  
The load block can fail if overloaded, allowing the load to fall.

**Guide Sheaves and Drums**

See [Figure 4-105](#) for identification of the load drums and the guide sheaves.

Refer to the Reeving Diagrams at the end of this section for rope routing over the boom top wire rope guide (7).

Once the wire rope is routed through the guide sheaves, install all the rope guard pins, bars, and rollers to retain the wire rope on the sheaves. **Wire rope and sheaves can be damaged if the rope is not properly retained on sheaves.**

**Dead End Locations**

See [Figure 4-107 on page 4-157](#) and for the dead end locations and required hardware. All hardware is stored in the job boxes provided with the crane.

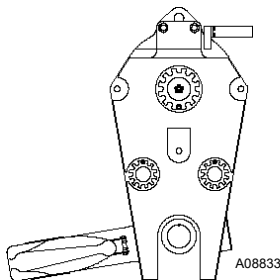
**Load Block Identification**

See the Boom Rigging Drawing at the end of this section for a complete list of load blocks and hook-and-weight balls available for use with this crane.



**WARNING**  
**Avoid Death or Serious Injury!**

Exercise care when block is standing in vertical position, as the potential for tipping exists. Potential causes of tipping are unstable work area, boom movement and the reeving process.  
If work area is unstable, lay block flat on side plate.



**Duplex Hook**

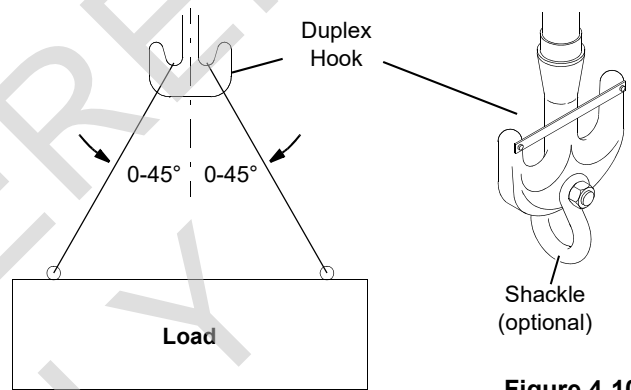
Attach the load so it is balanced equally on the hook. The lifting slings must be within the angles given in [Figure 4-106](#) to achieve maximum hook capacity. The duplex hook has a hole to which an optional shackle can be attached as shown in [Figure 4-106](#).



**WARNING**  
**Falling Load Hazard!**

Limit load to be handled with shackle to capacity of load block or shackle, whichever is less.

Load block or shackle can fail if overloaded, allowing load to fall.



**Figure 4-106**

**Wire Rope Specifications**

Refer to the Wire Rope Specifications chart in the Capacity Chart Manual for:

- Parts of the line required to handle desired load
- Wire rope length required for various boom lengths and parts of line
- Maximum spooling capacity of load drums

**Load Block Reeving**

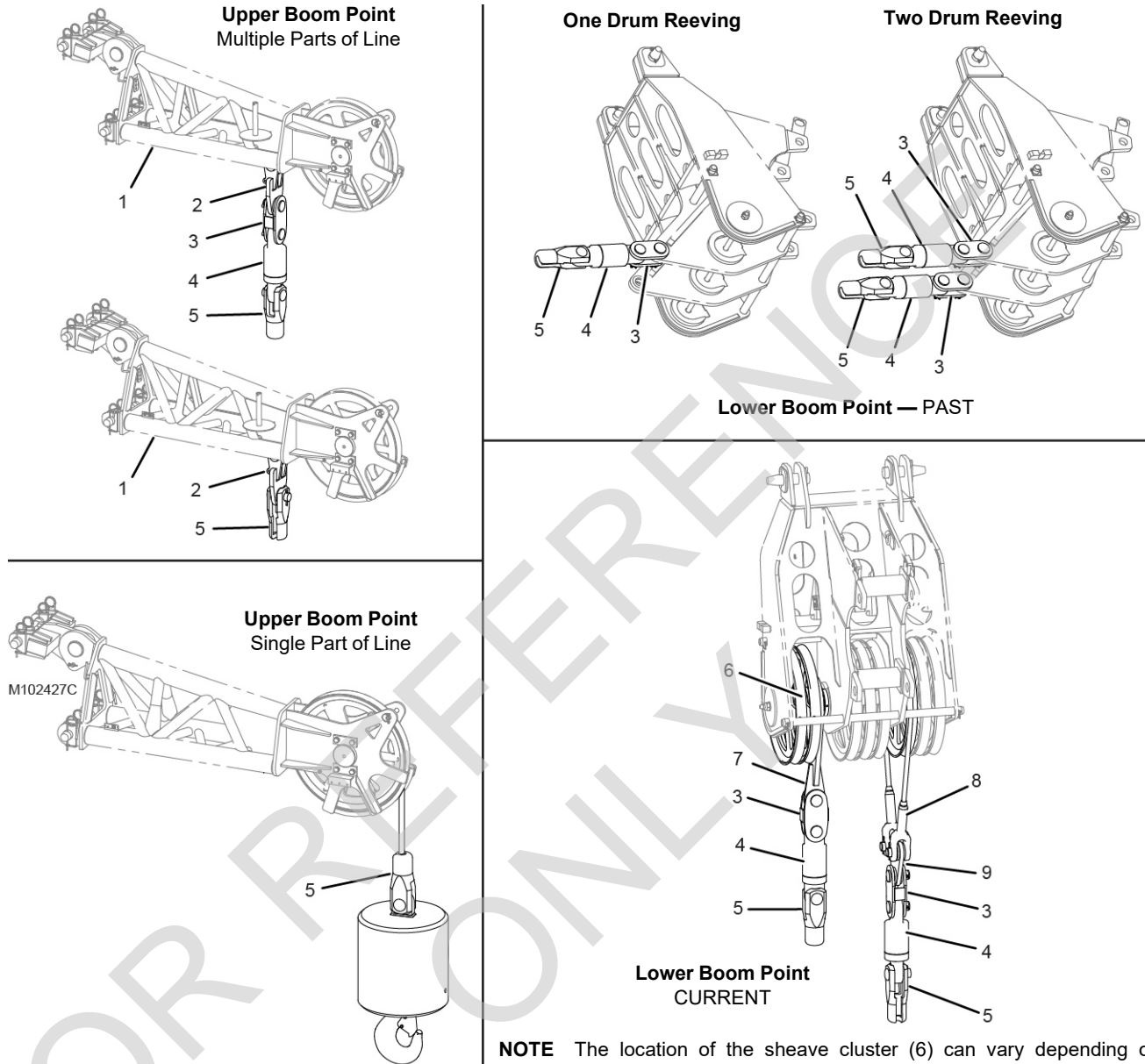
For reeving of the lower boom point, see the Reeving Diagrams at the end of this section.

Reeving in any manner other than shown can result in excessive block twist.

**CAUTION**

**Wire Rope Damage!**

Do not hoist the load block closer to the boom point than shown in the reeving diagrams. Improper fleet angle or contact with other parts can damage the wire rope.



Item	Description
1	Upper Boom Point
2	Dead-End Link
3	Link
4	Swivel
5	Button Socket – 28 mm or 32 mm
6	Sheave Cluster
7	Dead-End Link
8	Pendant: 3,2 m (10 ft 7-1/4 in) Long
9	Dead-End Link

**NOTE** The location of the sheave cluster (6) can vary depending on reeving. See the Reeving Diagrams at the end of this section for dead-end locations. See [Remove/Install Lower Boom Point Sheaves on page 4-81](#).

The pendant (8) and dead-end link (9) have two uses:

- Tandem drum reeving. The pendant and link must be installed around the sheave that is symmetric about the centerline of the boom top with the dead-end link (7).
- They can be used to improve the block-up distance from the boom top to the load block for single drum reeving.

The pendant (8) is stored in the boom butt. The dead-end link (9) is stored in the parts box.

Figure 4-107

## LOAD BLOCK TIEBACK

### General

Tieback hole (1, [Figure 4-108](#)) is provided on the front of the rotating bed for tying back the load block when not in use.

### Specifications

#### *Sling Length*

The sling must be long enough to connect it to the shackles in the tieback hole and to the hook of the freely suspended load block. This will prevent personnel from having to swing the block in, toward the crane, to make the connection.

#### *Sling and Shackle Capacity*

The sling and shackles must be capable of supporting the weight of the load block and 1/2 the weight of the wire rope suspended from the boom point. When sizing the sling and shackles take into account the dynamic affects of traveling and swinging the crane. ***It is the crane user's responsibility to calculate this load.***

---

### CAUTION

Avoid damage:

- Haul in the load line only until the tieback sling is taut. The purpose of the tieback is only to prevent the load block from swinging when not in use.
  - Do not tighten the load line to the point that the load line rubs against the lacings in the boom sections or to the point that the load block can bounce into the lacings.
  - Operator, be aware that as you boom down, the load lines and tieback sling will tighten even more. Pay out the load line while booming down so that you don't pull the load block into the boom. Damage to lacings or chords could result.
  - Only use the hole for tying back the load block. Using the hole for any other purpose is neither intended of authorized. Damage could result.
- 

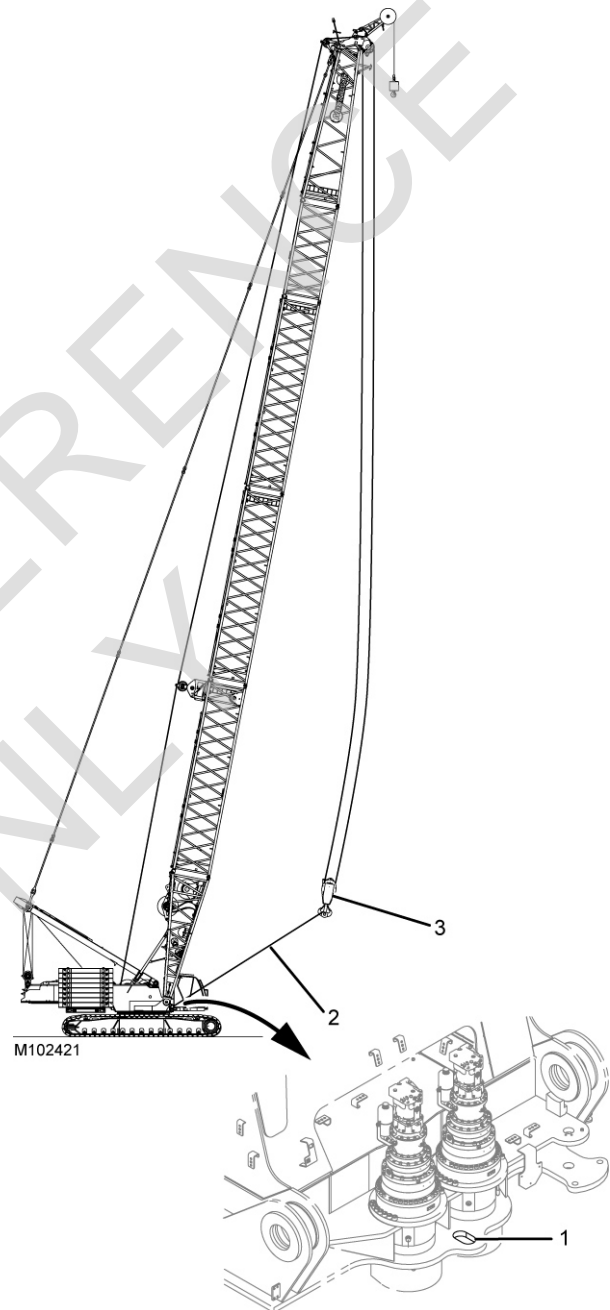


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## SECTION 5 LUBRICATION

### LUBRICATION

See F2280 at the end of this section.

### LUBE AND COOLANT PRODUCT GUIDE

See the publication at the end of this section.

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## SECTION 6 MAINTENANCE CHECKLIST

### INSPECTION AND MAINTENANCE CHECKLIST

See F2273 at the end of this section.

### FIBERGLASS MAINTENANCE

See Bulletin W04-009 at the end of this section.

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