

LOAD KING



OPERATORS MANUAL

LOAD KING

80-160

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WARNING Operating, servicing and maintaining this equipment can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. These chemicals can be emitted from or contained in other various parts and systems, fluids and some component wear by-products. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your equipment and vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your equipment or vehicle and after operation. For more information go to www.P65Warnings.ca.gov/passenger-vehicle.

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.



Company

Load King has been producing first-class heavy equipment since 1956. Cutting-edge innovation and engineering excellence make us the market leader. Load King is a key part of the Custom Truck One Source family of brands, offering standard and custom trailers, vocational equipment, and a full line of Boom Trucks and truck cranes. For more information, please visit Load King's website: www.loadkingmfg.com.

About Custom Truck One Source

Custom Truck One Source is the first true single-source provider of specialized truck and heavy equipment solutions. With sales, rentals, aftermarket parts and service, equipment customization, remanufacturing, financing solutions, and asset disposal, our team of experts, vast equipment breadth and integrated network of locations across North America offer superior service and unmatched efficiency for our customers.

Table of Contents

Introduction.....	11
Construction and Industrial Equipment Product Safety	11
Nomenclature.....	12
Intended Use.	13
Bulletin Distribution and Compliance.....	14
Contacting Manufacturer	15
Transfer of Machine Ownership.....	16
Safety	19
Safety Introduction.	19
Product Safety Decals.....	20
Safety Definitions Used in this Manual.	20
General Safety	25
Safety Sign Maintenance.	25
80-160 Safety Sign Locations.....	26
Safety Guidelines.	44
Personal Protection Equipment.....	45
Workplace Safety	46
Effects of Wind Conditions	55
Lightning Storm.	57
Temporary Interruption of Crane Operations.	58
Resuming Crane Operations.	61
Ending Crane Operations.	62
Turning/Driving in Reverse.....	63
Parking the Vehicle.	64
Lock Out & Tag Out.	65
Access/Egress.	67
Personal Safety	71
Seat Belts.....	72
Assembly	73
Erecting the Jib.....	73
Changing the Offset of the Jib.	79
Mounting the folding Jib Section.....	82
Jib Stow Assist Remote	84
Spooling Wire Rope on Drums.	85
Cable Sockets.....	89
Hoist-Line Reeving.....	91

80-160

Contents

Cable Reeving.....	94
Dead Ending Wire Rope in Socket.	95
Counterweight Installation.....	96
Description Of Machine and Controls.	99
Controls in the Cab.....	99
Upper Controls and Instruments.....	112
Control Screens.	115
Universal Symbol Identification.	118
Power Take-Off.....	122
Carrier Controls and Instruments.	124
Side-Stow Jib.	126
Rated Capacity Indicator and Anti-Two-Block.	128
Rated Capacity Indicator System.	128
Anti-Two-Block Components.	129
Inspection.	131
Pre-Start Inspection.	131
Suggested Hydraulic Crane Inspection Checklist.....	133
Daily Check (8 Hours).	138
Weekly Check (40 Hours).....	139
Monthly Check (80 hours).	140
Quarterly Checks (250 Hours).....	141
Semiannual Checks (1000 Hours).....	142
Annual Check (1500 - 2000 Hours).	143
Crane Boom.	144
Wire Rope Inspection.	147
Wire Rope Inspection Record.....	149
Mobile Crane Load Test Inspection.	150
Operating Instructions.....	153
Job-Site.....	153
Job Site Setup Procedure.....	153
Outrigger Positioning.....	154
Work Site Position.	156
Cold Weather Operation.....	157
General Operational Issues.....	158
Ignition Switch-Carrier Cab & Upper Operator's Cab.....	158
General Rules	159

Safety Devices.	160
Training and Operator Qualifications.	161
Operator Aids	162
Load Handling Operations.....	163
Max. Load and Boom Angle Charts.	164
Using the Load Chart.....	164
Operating Radius.	166
Boom Angle Placards.	167
Operating the Unit.	168
Operator Shutoff Devices.	168
Operating the Unit.	171
Jump Starting an Engine- Booster Cable Instructions.	172
Unusual Operating Conditions.	173
Initiating Operation.	177
Arm and Hand Signals.....	178
Lifting the Load.	179
Making a Typical Lift.	180
Moving the Unit.	185
Removable Counterweight.....	185
Vehicular Operation.	188
Traveling around the Jobsite.....	190
Roading the Unit.....	193
Towing or Pushing Vehicle.	194
Dolly	195
Emergency Procedures.....	202
Emergency Procedures.....	202
Emergency Boom Retraction.	203
Emergency Lowering of Boom.	204
Emergency Rotation.....	205
Disassembly	207
Side Stow Jib Stowage.....	207
Transportation.....	213
Transporting the Crane.	213
Instructions for Loading and Unloading	214

Maintenance.	215
Maintenance Introduction.	215
Cold Weather Package Specification.	216
Cold Weather Package Recommendations.	217
Safety Practices.	221
General Work Practices.	223
Storing Components.	224
Cleanliness.	225
Operator Observation.	226
Maintenance Checks and Lubrication.	227
90-Day Maintenance Items	229
Semi-Annual Maintenance Items	230
Machine Maintenance Checklist.	231
Hydraulic Hoses.	234
Filters and Maintenance.	236
Diesel Exhaust Fluid Specification.	238
TIRES.	242
Tire Maintenance.	244
Aluminum Decking & Fender Maintenance Procedure.	247
Swing Lock Maintenance.	248
HVAC.	249
Wire rope and reeving.	253
Lubrication.	255
Lubrication Introduction.	255
Master Lubrication Chart.	257
Hydraulic Oil Requirements.	259
Turntable and Swing Pinion.	263
Cable Lubrication Methods.	265
Boom Lubrication.	268
Boom Lubrication & Wear Pads Inspection Record.	273
Swing Reducers.	274
Slider Pads.	275
Swing System Maintenance.	276
Swing Bearing Bolting Procedure.	276
Winch Lubrication.	278
Wire Rope Lubrication.	279
Drive Shaft Maintenance.	280

Brake System Maintenance.	283
Air System Maintenance.	284
Hydraulic System Maintenance.....	285
Anti-Two-Block System.....	289
Storage.	291
Machine Storage.	292
Chrome Cylinder Rod Storage.	293
Restoration to Service.	294
Specifications.....	295
Wire Rope Specifications.	295
Vehicle Dimensions.....	296
Pumps and Function Speeds.	299
Troubleshooting.....	301
Introduction.	301
General Procedure.....	303
Hydraulics - General.....	304
Operator Controls.....	305
Swing Circuit.	306
Boom Hoist Circuit.....	307
Telescope Circuit.....	308
Winch Circuit.	309
Outrigger Circuit.	311
Swing Pumps Circuit.	312
Swing Circuit Control Valves.....	315
Swing Circuit Control Valves.....	317
Fluid Motor.....	318
Cylinders.	320
Cylinder Leakage.	321
Excessive Heating of Oil In System.	323
Electrical Controls.	324
Two-Block System.....	325
Service / Parts.....	327
General Service Information.....	327
Outrigger Position Sensors	328
General Work Practices.....	330
Repairs-Adjustments-Remarks Log.	331

80-160

Contents

Torque Wrench Extensions.....	332
Welding Instructions	334
Hydraulic System.	336
Pressure Settings-Pumps & Valves.....	336
Pumps.....	343
Rotation System.....	344
Inspection of Rotation Bearing Clearance.	344
Swing Reducer.....	346
Electrical System.....	347
Fuse Block-Operator's Cab.	347
Relay & Fuse Block-Chassis.	349
Electrical System Collector Ring.	350
Maintenance -Free Battery Testing.	352
Appendix.....	355
Conversion Tables.....	355
Average Weight of Materials.....	359
Torque Specs -SAE & Metric.	361
California Proposition 65 Warning.	363
Lead Warning - State of California.....	364
Greer Element VGA Operator's Manual.	365
Notes & Warranty	366

Introduction



Construction and Industrial Equipment Product Safety

It is the responsibility of the owner of the equipment to be knowledgeable about federal, state and local regulations that effect the total usage of the equipment, and responsibility to working personnel and the public. Since regulations are subject to change, and also differ from one locality to another, this manual makes no attempt to provide such information.

Load King provides appropriate operation and maintenance manuals for various construction and industrial equipment products that it manufactures and sells. In addition, where applicable, appropriate national consensus standards, industry standards and safety related manuals are included with the Load King manuals in the shipment of each product. It is company policy to provide this information for the owner or user of the equipment. It is expected that the owner or user will utilize these manuals and standards to provide the appropriate information and training to those people who are to operate, maintain and supervise the use of equipment.

Construction and industrial equipment is designed and manufactured to perform heavy-duty work. Under normal usage, the equipment will wear. For this reason it is essential that the owner/ user establish and perform a periodic inspection of the equipment. The objective of inspection programs is to prevent accidents, reduce downtime and keep the equipment working efficiently. These inspection programs should be designed to discover worn, cracked, broken or deteriorated parts and loose or missing fasteners before they result in a problem.

Proper training and inspection programs are essential to avoiding injury to persons, damage to property and excessive maintenance costs.

Read and understand the manuals provided with this equipment. Assistance is available from the distributors of your Load King product and from the Load King manufacturing facility.



When operating a hydraulic crane, the operator should realize that hydraulic and structural competence, NOT TIPPING LOAD, is often the determinant of lifting capacity. Therefore, THE OPERATOR MUST BE GUIDED SOLELY BY THE APPROPRIATE MANUFACTURER'S LOAD RATING CHART when considering load weights. The manufacturers rated loads must never be exceeded.

Follow the recommended operating and maintenance procedures and keep your machine operating at MAXIMUM EFFICIENCY. Use the Suggested Inspection Check List provided. In addition, a MAINTENANCE LOG should be kept in conjunction with all maintenance performed on the machine.

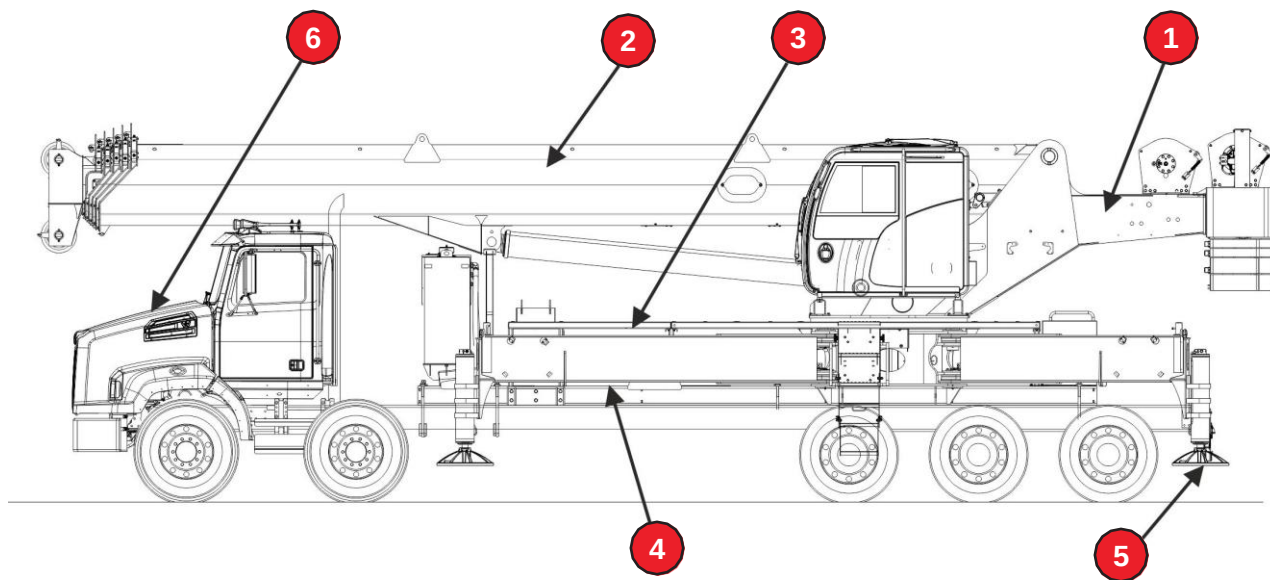
If you desire any special information regarding the care and operation of the machine, we will gladly furnish it upon request. We ask that you include your machine model and serial number in all correspondence so that we can provide the correct information.

The information, specifications, and illustrations in this publication are based on the information in effect at the time of approval for printing. We reserve the right to make changes at any time without obligation.

Nomenclature

This manual contains instructions and information on the operation, maintenance, lubrication and adjustments of the Boom Truck. The operator should not attempt to operate the machine before he has gained a thorough understanding of the material presented in the following pages. To aid in understanding the contents of this manual, the following terms will always have the meanings given whenever they are used.

- | | |
|-------------------|---|
| 1. SUPERSTRUCTURE | Supports swing mechanism, operator's cab, boom, winch and hoist cylinders. |
| 2. BOOM | The telescopic boom with hydraulic winch, lift cylinder, hook block assembly, and jib arrangement. |
| 3. DECK | The deck of the Boom Truck. |
| 4. SUBFRAME | The frame of the crane that is mounted to the truck chassis and supports the deck and superstructure. |
| 5. OUTRIGGERS | The beams, cylinders, floats, boxes, hydraulic control system. |
| 6. TRUCK | The vehicle on which all boom and operator structures are mounted. |
| 7. ATB | Anti-Two Block |
| 8. RCI | Rated Capacity Indicator |





Intended Use

This mobile crane is designed to lift, lower, move, and position freely suspended loads within its rated capacity while on firm, level ground. The crane is designed exclusively for assembly type, non-duty cycle operations. Use of this product in any other way is prohibited and contrary to its intended use.

Other crane applications outside of the intended use statement above must be approved in writing by **Load King**.

Bulletin Distribution and Compliance

Safety of product users is of paramount importance to **Load King**. Various bulletins are used by **Load King** to communicate important safety and product information to dealers and machine owners.

The information contained in bulletins is tied to specific machines using the machine model number and PIN/serial number.

Distribution of bulletins is based on the most current owner of record along with their associated dealer, so it is important to register your machine and keep your contact information up-to-date.

To ensure safety of personnel and the reliable continued operation of your machine, be sure to implement the action indicated in a respective bulletin.

Contacting Manufacturer

At times it may be necessary to contact the manufacturer of this machine. When you do, be ready to supply the model and PIN/serial number of your machine, along with your name and contact information. At minimum, the manufacturer should be contacted for:

- Accident Reporting
- Questions regarding product applications and safety
- Standards and regulations compliance information
- Questions regarding product modifications
- Current owner updates, such as changes in machine ownership or changes in your contact information (see Transfer of Machine Ownership, in this chapter, for more information).

Manufacturer contact information:

Custom Truck One Source
7701 Independence Ave, Kansas City, MO
64125
Parts: (816) 241- 8387
Service: (833) 281-7911
info@customtruck.com
<https://store.loadkingmfg.com>

Transfer of Machine Ownership

Complete the New Owner Registration Form on the following page. The Model Name, Product Identification Number (PIN), and serial number is located on a plate inside the operator's cab. The six-digit serial number is shown on a plate on the outside of the operator's cab.



LOAD KING WARRANTY DATA RECORD

Warranty Form Submission		Date	
Date of Delivery			
Model Number			
S/N			
Dealer			
Address			
Customer			
Address			

Record this information at the time that warranty registration form is completed and returned to Load King.

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Safety Introduction

Owners, Users, and Operators:

Load King appreciates your choice of our machine for your application. Our number one priority is user safety, which is best achieved by our joint efforts. We feel that you make a major contribution to safety if you, as the equipment users and operators:

1. Comply with OSHA, Federal, State, and Local Regulations.
2. Read, Understand, and Follow the instructions in this and other manuals supplied with this machine.
3. Use Good, Safe Work Practices in a common sense way.
4. Only have trained and competent operators, directed by informed and knowledgeable supervision, running the machine.



OSHA prohibits the alteration or modification of this crane without written manufacturer's approval. Use only factory-approved parts to service or repair this unit.

If there is anything in this manual that is not clear or you believe should be added, please send your comments to Load King Cranes, 7701 Independence Ave, Kansas City, MO 64125; or contact us by telephone at Parts: (816) 241- 8387 Service: (833) 281-7911.
Email: info@loadkingmfg.com.



THIS SYMBOL MEANS YOUR SAFETY IS INVOLVED! READ, UNDERSTAND, AND FOLLOW ALL DANGER, WARNING, AND CAUTION DECALS ON YOUR MACHINE.

Many aspects of crane operation and testing are discussed in standards published by the American National Standards Institute. These Standards are updated on an annual basis with addenda, that are sent by ASME to the original purchasers of the standard. Load King recommends you purchase and refer to the following standards.

ANSI/ASME B30.5 - Mobile & Locomotive Crane (Latest Version)

These standards can be purchased from:

American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
800-843-2763 (U.S/Canada)
001-800-843-2763 (Mexico)
973-882-1170 (outside North America)

Email:

CustomerCare@asme.org
www.ASME.ORG/SHIP/STANDARDS

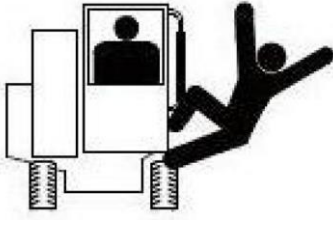
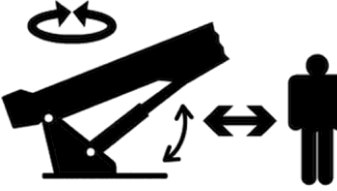
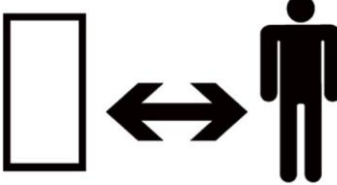
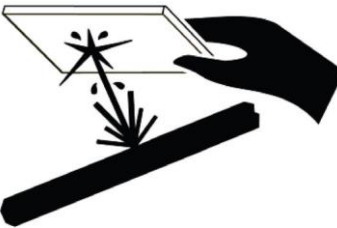
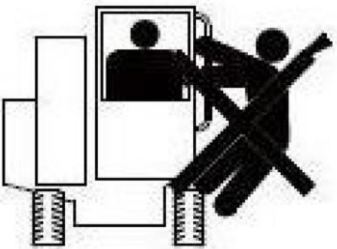
Product Safety Decals

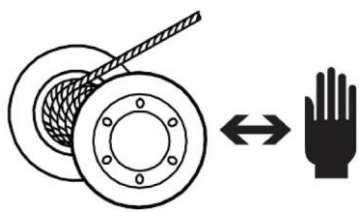
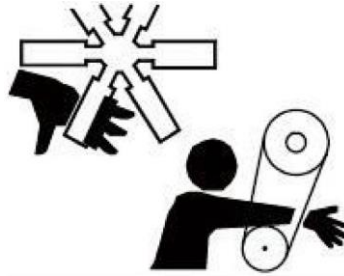
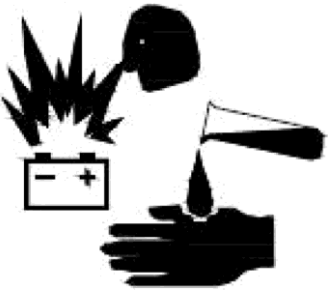
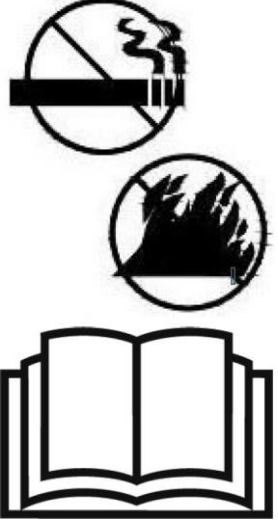
Safety Definitions Used in this Manual

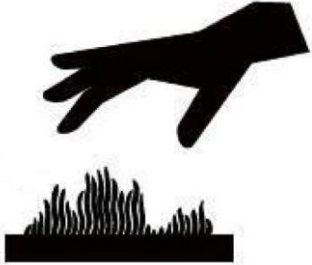
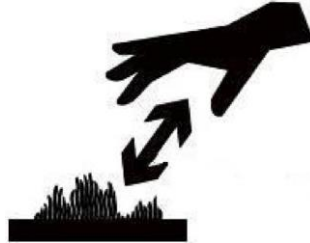
The following table describes text and symbols used to highlight important information.

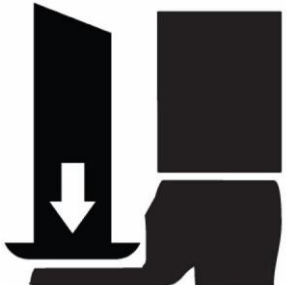
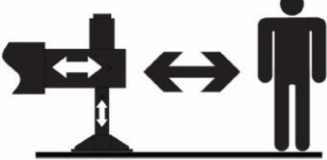
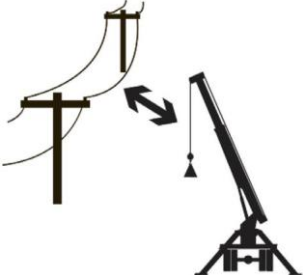
Signal Word	Symbol	Explanation
DANGER		Danger is used to alert readers about an immediate and serious hazard that will likely be fatal.
WARNING		Warning is used to alert readers about the potential for serious injury or death or serious damage to equipment.
CAUTION		Caution is used to alert readers about the potential for anything from moderate injury to serious equipment damage or destruction.
READ		Read is used to alert readers of information to be read on machinery.
NOTE		Note is used for a tip or suggestion to help readers carry out a procedure successfully.

SYMBOLS AND PICTORIALS

Hazard	Avoidance
	CRUSH HAZARD Crushing of fingers or hand - force applied two directions (pinched).
	CRUSH HAZARD Death or Serious Injury can result from contact with moving machine.
	Safety Alert Symbol
	Skin Injection from High Pressure Fluid.
	Falling from Wheeled Machine.
	Stay Clear of Moving Turret and Boom.
	Keep clear of moving machine.
	Use personnel lift in compliance with OSHA and ANSI regulatory instructions.
	Use Cardboard or Wood to Check for Leaks.
	NO RIDERS

Hazard		Avoidance	
	Hand Entanglement in Pulley / Winch.		Keep Hands Clear of Winch and Load Line.
	Entanglement in Drive Shaft.		Stay Clear of Rotating Shafts.
	ENTANGLEMENT HAZARD Rotating parts can cause personal injury.		Keep away from fan and belt when engines running. Stop engine before servicing.
	Explosion / Burn Hazard Will cause death, burns or blindness due to ignition of explosive gases or contact with corrosive acid.		Keep all open flames and sparks away. Wear personal protective equipment, including face shield, gloves and long sleeve shirt. READ MANUALS Read all manuals prior to operation. DO NOT OPERATE equipment if you do not understand the information in the manuals.

Hazard		Avoidance	
	BURN HAZARD Fuel and fumes can explode and burn.		No smoking. No flame. Stop engine.
	BURN HAZARD Contact with hot surfaces can cause burns.		Allow surfaces to cool before servicing.
	Falling from height.		Use personnel lift or appropriate ladder to reach high places. Maintain 3-Point Contact when using access system.
	Two blocking the crane can cause death, serious injury or property damage. Do not allow the hook block to contact the boom tip by hoisting up, extending or lowering the boom.		Check ATB System.

Hazard		Avoidance	
	CRUSH HAZARD Contact with moving outriggers can result in death or serious injury.		Stay Clear of Outriggers.
	Electrical Shock / Electrocutation from Crane to Power Line Contact.		Stay Sufficient Distance From Electrical Power Lines.



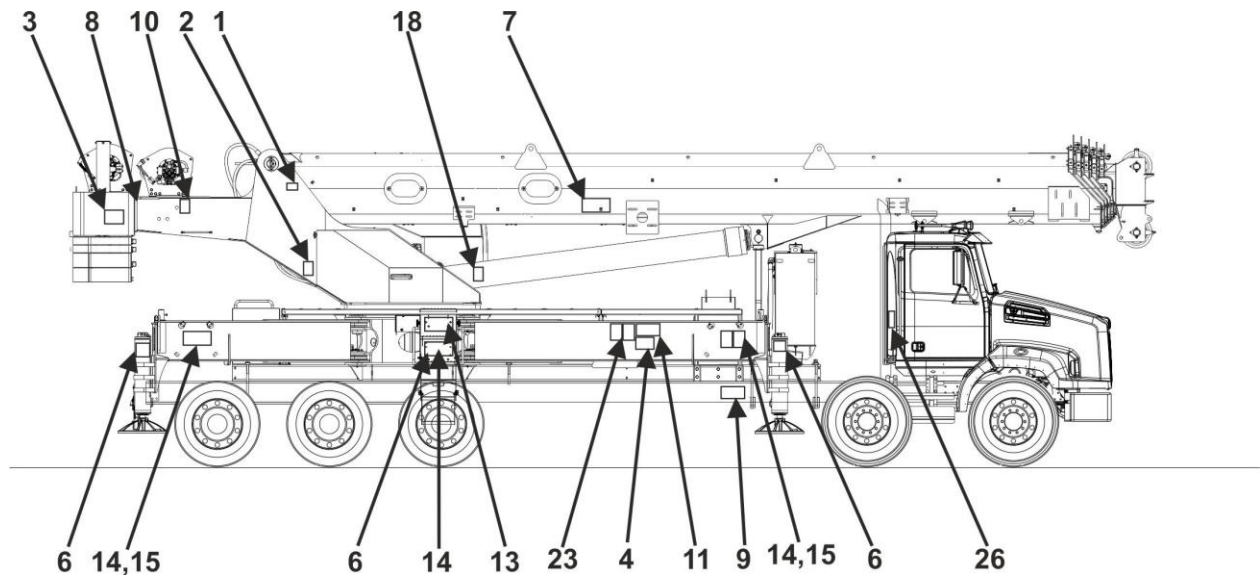
These are general safety rules, that must be followed. You are also required to read and understand the Operators Manual as there are instructions that are more detailed, specific to this machine.

General Safety

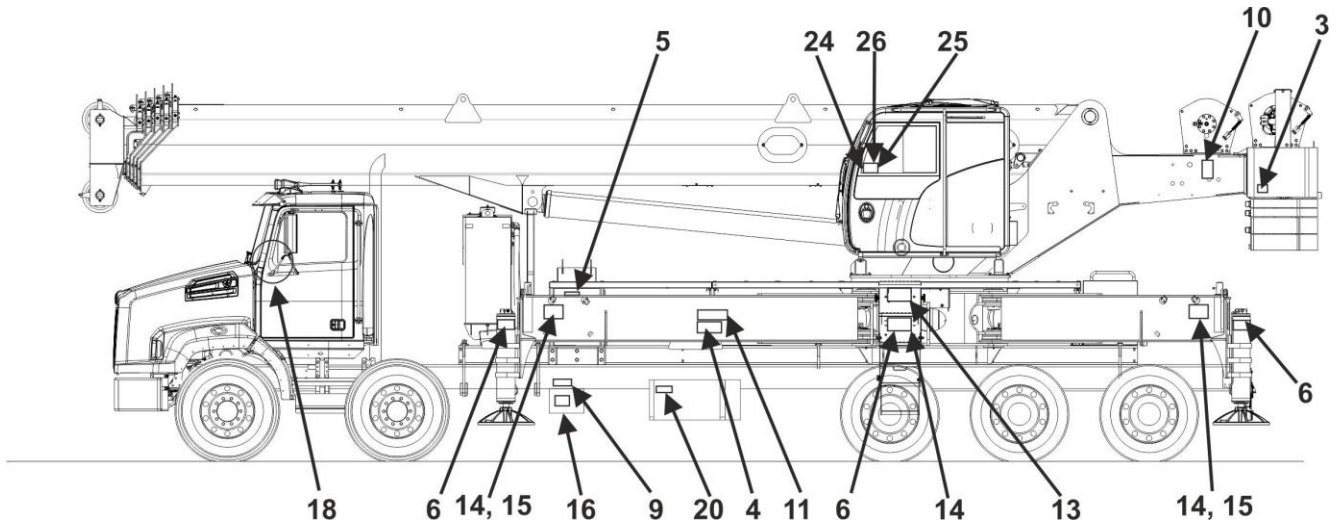
Safety Sign Maintenance

Replace any missing or damaged safety signs. Keep operator safety in mind at all times. Use mild soap and water to clean safety signs. Do not use solvent-based cleaners because they will damage the safety sign material.

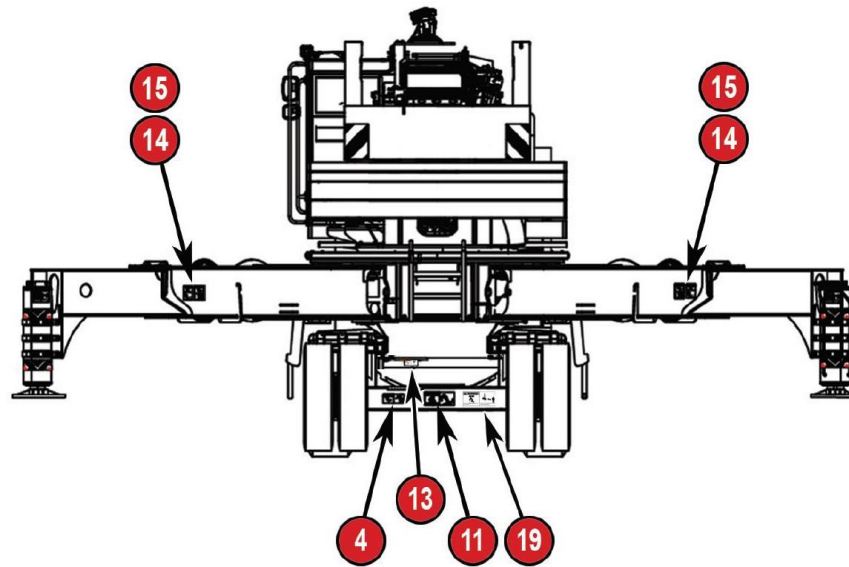
80-160 Safety Sign Locations



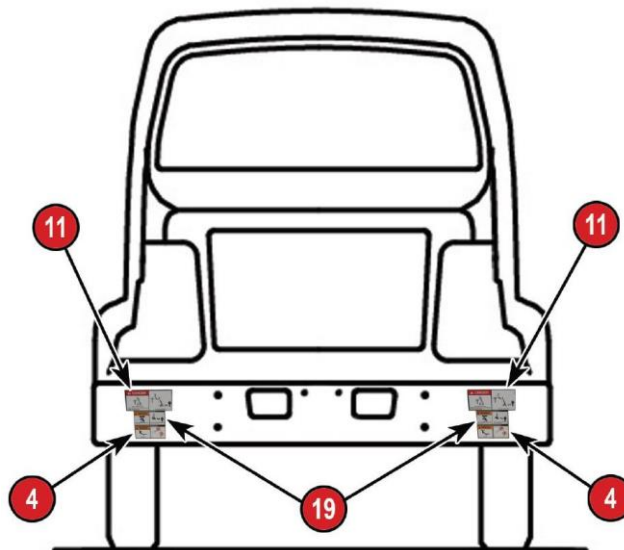
Right Hand Side View



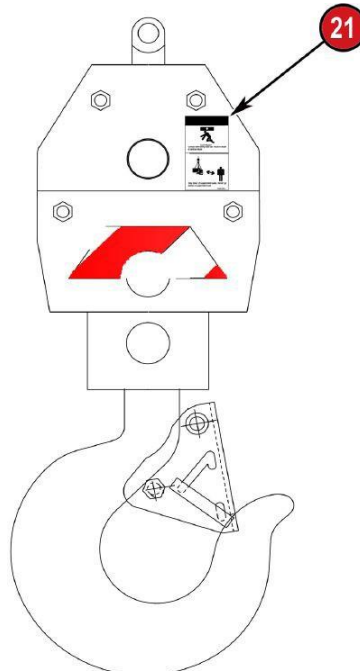
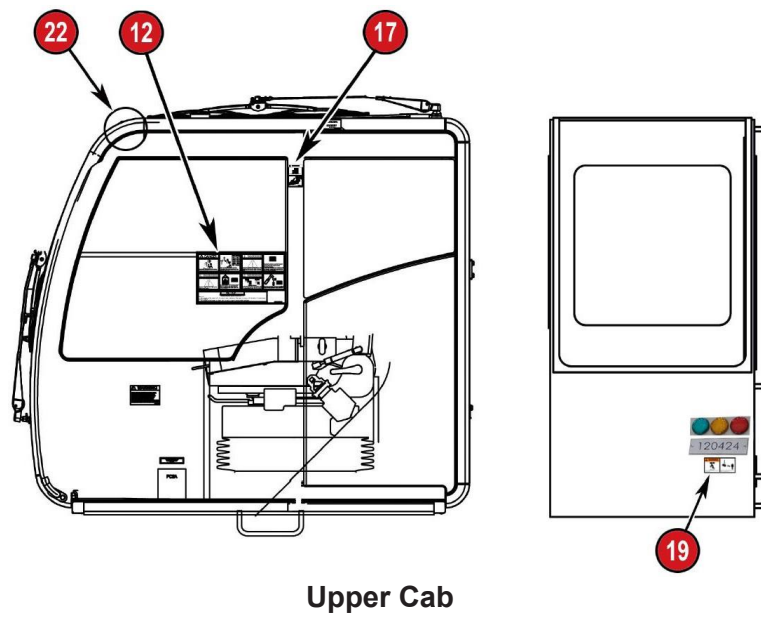
Left Hand Side View



Rear View



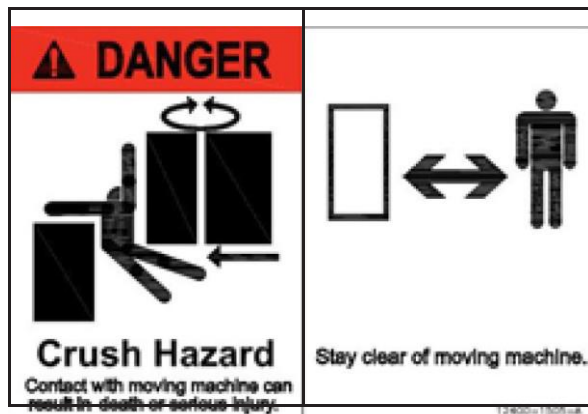
Front View





1

Crush Hazard	Stay clear of moving boom or turret.
Contact with moving boom or turret can result in death or serious injury.	



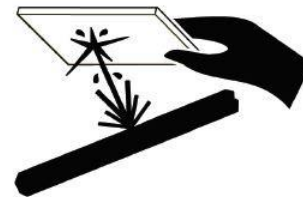
3

Crush Hazard	Stay clear of moving machine.
Contact with moving machine can result in death or serious injury.	



Injection Hazard

Fluid escaping under pressure can penetrate skin and result in death or serious injury.



Relieve pressure before disconnecting hydraulic lines.

Stay clear of leaks and pin holes. Use a piece of cardboard or wood to search for leaks. Do not use hand.

Fluid injected into skin must be surgically removed within a few hours by a doctor familiar with this type of injury, or gangrene will result.

2

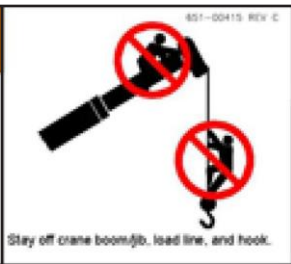
Injection Hazard

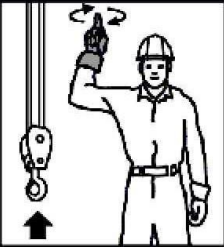
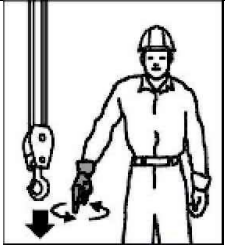
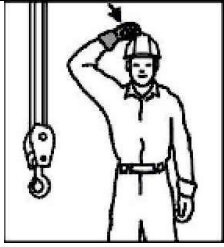
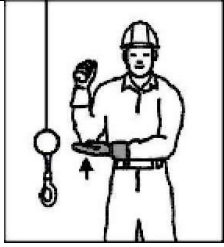
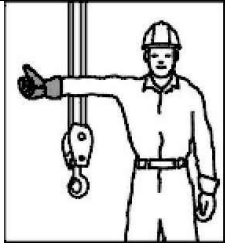
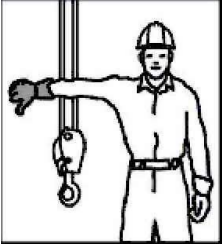
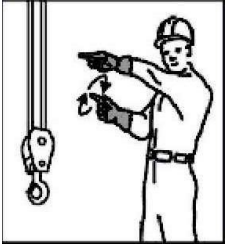
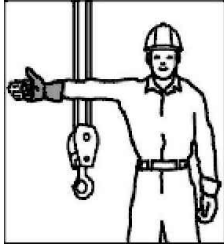
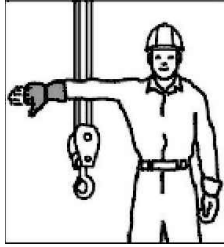
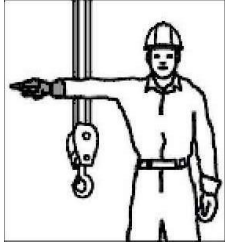
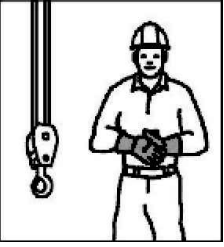
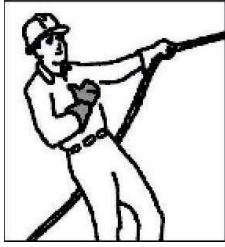
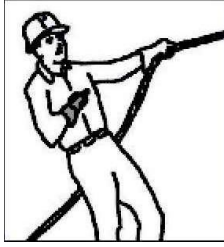
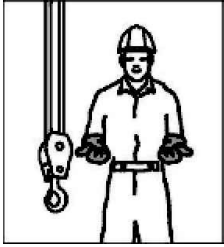
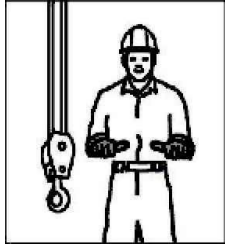
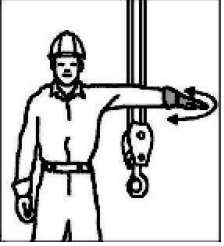
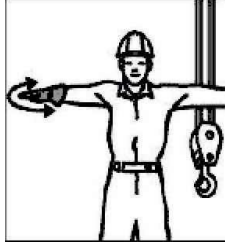
Fluid escaping under pressure can penetrate skin and result in serious injury.

Relieve pressure before disconnecting hydraulic lines.

Stay clear of leaks and pin holes. Use a piece of cardboard or wood to search for leaks. Do not use hand.

Fluid injected into skin must be surgically removed within a few hours by a doctor familiar with this type of injury, or gangrene will result.

				
4				
<table border="1"><tr><td>Fall Hazard</td></tr><tr><td>Falling can result in death or serious injury.</td></tr></table>	Fall Hazard	Falling can result in death or serious injury.	<table border="1"><tr><td>Stay off crane boom/jib, load line, and hook.</td></tr></table>	Stay off crane boom/jib, load line, and hook.
Fall Hazard				
Falling can result in death or serious injury.				
Stay off crane boom/jib, load line, and hook.				

A					
	HOIST Forearm vertical, forefinger pointed up, move hand in small horizontal circles.	LOWER Arm extended down, forefinger pointed down, move hand in small horizontal circles.	USE MAIN HOIST Tap fist on head; then use standard signals.	USE AUXILIARY HOIST (Whipline) Tap elbow with one hand; then use standard signals.	RAISE BOOM Arm extended, fingers closed, thumb pointed up.
					
	LOWER BOOM Arm extended, fingers closed, thumb pointed down.	MOVE SLOWLY Use one hand to give any standard motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)	RAISE BOOM AND LOWER LOAD Arm extended, thumb pointed up, flex fingers in and out as long as load movement necessary.	LOWER BOOM AND RAISE LOAD Arm extended, thumb pointed down, flex fingers in and out as long as load movement necessary.	SWING Arm extended, point with finger in direction of swing of boom.
					
	DOG EVERYTHING Clasp hands in front of body.	EXTEND BOOM (Telescoping Boom) One Hand Signal. One fist in front of chest with thumb tapping chest.	RETRACT BOOM (Telescoping Boom) One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.	EXTEND BOOM (Telescoping Boom) Both fists in front of body with thumbs pointing outward.	RETRACT BOOM (Telescoping Boom) Both fists in front of body with thumbs pointing toward each other.
D			 HAND SIGNALS Do not deface or remove this label from the machine. Order replacement labels from your Load King dealer.		
	STOP Arm extended, palm down, move arm back and forth horizontally.	EMERGENCY STOP Both arms extended, palms down, move arms back and forth horizontally.			
1	2	3	4	5	

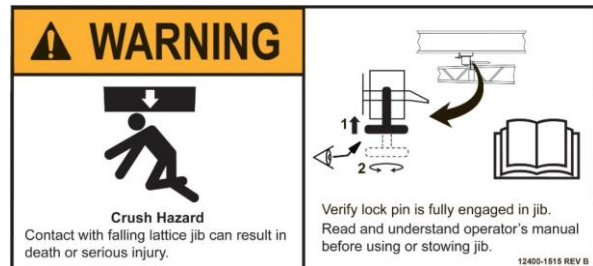
80-160
Safety

	DESCRIPTION OF MOVEMENT
A1	HOIST. Forearm vertical, forefinger pointed up, move hand in small horizontal circles.
A2	LOWER. Arm extended down, forefinger pointed down, move hand in small horizontal circles.
A3	USE MAIN HOIST. Tap fist on head; then use standard signals.
A4	USE AUXILIARY HOIST (Whipline). Tap elbow with one hand; then use standard signals.
A5	RAISE BOOM. Arm extended, fingers closed, thumb pointed up.
B1	LOWER BOOM. Arm extended, fingers closed, thumb pointed down.
B2	MOVE SLOWLY. Use one hand to give any standard motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)
B3	RAISE BOOM AND LOWER LOAD. Arm extended, thumb pointed up, flex fingers in and out as long as load movement necessary.
B4	LOWER BOOM AND RAISE LOAD. Arm extended, thumb pointed down, flex fingers in and out as long as load movement necessary.
B5	SWING. Arm extended, point with finger in direction of swing of boom.
C1	DOG EVERYTHING. Clasp hands in front of body.
C2	EXTEND BOOM (Telescoping Boom). One Hand Signal. One fist in front of chest with thumb tapping chest.
C3	RETRACT BOOM (Telescoping Boom). One Hand Signal. One fist in front of chest, thumb pointing outward and heel of first tapping chest.
C4	EXTEND BOOM (Telescoping Boom). Both fists in front of body with thumbs pointing outward.
C5	RETRACT BOOM (Telescoping Boom). Both fists in front of body with thumbs pointing toward each other.
D1	STOP. Arm extended, palm down, move arm back and forth horizontally.
D2	EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.



6

Crush Hazard	Stay clear of outrigger path and contact point.
Contact with moving outriggers can result in death or serious injury.	



7

Crush Hazard	Verify lock pin is fully engaged in jib. Read and understand operator's manual before using or stowing jib.
Contact with falling lattice jib can result in death or serious injury.	



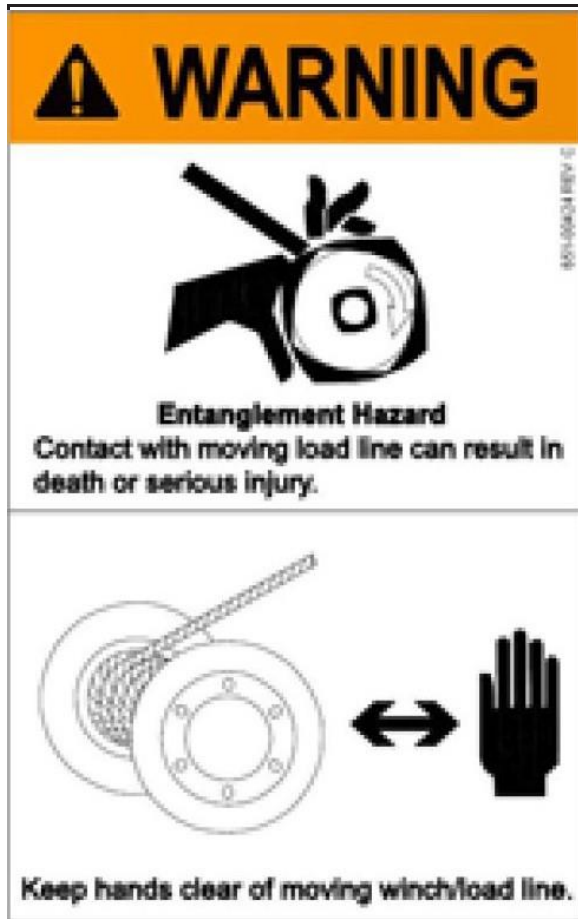
8

Crush Hazard	Keep clear of counterweight slabs while lowering.
Serious injury can result from contact with moving counterweights.	



9

Entanglement Hazard	Keep clear of rotating drivelines. Switch off engine before performing service.
Death or serious injury can result from contact with rotating drivelines.	

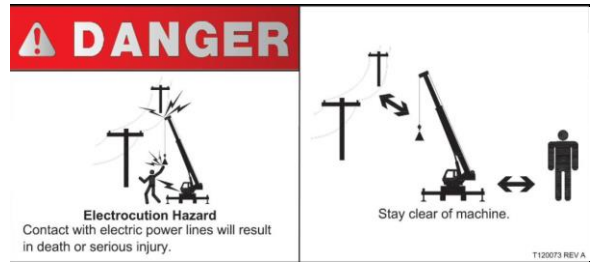


10

Entanglement Hazard

Contact with moving load line can result in death or serious injury.

Keep hands clear of moving winch/load line.

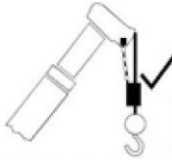


11

Electrocution Hazard

Contact with electric power lines will result in death or serious injury.

Stay clear of machine

⚠ DANGER  Electrocution Hazard Contact with electric power lines will result in death or serious injury.	Maintain Clearance Listed <table border="1"> <thead> <tr> <th>Line Voltage</th> <th>Required Clearance</th> </tr> </thead> <tbody> <tr> <td>0 to 50 kV</td> <td>10 ft (3 m)</td> </tr> <tr> <td>>50 to 100 kV</td> <td>15 ft (4.6 m)</td> </tr> <tr> <td>>100 to 150 kV</td> <td>20 ft (6.1 m)</td> </tr> <tr> <td>>150 to 200 kV</td> <td>25 ft (7.6 m)</td> </tr> <tr> <td>>200 to 250 kV</td> <td>30 ft (9.1 m)</td> </tr> <tr> <td>>250 to 300 kV</td> <td>35 ft (10.7 m)</td> </tr> <tr> <td>>300 kV</td> <td>40 ft (12.2 m)</td> </tr> </tbody> </table> Before operating the machine, contact the electric power line owner to disconnect, move, or insulate power lines.	Line Voltage	Required Clearance	0 to 50 kV	10 ft (3 m)	>50 to 100 kV	15 ft (4.6 m)	>100 to 150 kV	20 ft (6.1 m)	>150 to 200 kV	25 ft (7.6 m)	>200 to 250 kV	30 ft (9.1 m)	>250 to 300 kV	35 ft (10.7 m)	>300 kV	40 ft (12.2 m)	⚠ WARNING  Improper operation or maintenance of this equipment can result in death or serious injury.	 Read and understand operator's manual and all safety signs before using or maintaining machine. If you do not understand the information in the manuals, consult your supervisor, the owner or the manufacture.
Line Voltage	Required Clearance																		
0 to 50 kV	10 ft (3 m)																		
>50 to 100 kV	15 ft (4.6 m)																		
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>250 to 300 kV	35 ft (10.7 m)																		
>300 kV	40 ft (12.2 m)																		
⚠ WARNING  Improper lifting of personnel can result in death or serious injury.	  Use of this machine to hoist, lower, swing or otherwise handle personnel must only be done in compliance with OSHA 1926.1431 and ANSI B30.23.	⚠ WARNING  Fall/Crush Hazard Two blocking the crane can result in death or serious injury. Do not allow hook block to contact the boom tip.	  Check anti-two block system after installation of each line and at start of every work shift. Read and understand operator's manual.																
NOTICE  Equipment Damage Hazard Damage to equipment can result if turbo charger is not fully lubricated before loading engine.	Read and understand manuals.     1. Start engine and run at idle speed. 2. Wait for indicated oil pressure. 3. Operate engine normally.	NOTICE  Equipment Damage Hazard Damage to equipment can result if turbo charger is not allowed to cool before stopping engine.	Read and understand manuals.     1. Run engine at less than half speed. 2. Wait at least five (5) minutes. 3. Stop engine.																

Electrocution Hazard

Contact with electric power lines will result in death or serious injury.

Before operating the machine, contact the electric power line owner to disconnect, move or insulate power lines.

Improper lifting of personnel can result in death or serious injury

Use of this machine to hoist, lower, swing or otherwise handle personnel must only be done in compliance with OSHA 1926.1431 and ANSI B30.23.

Equipment Damage Hazard

Damage to equipment can result if turbo charger is not fully lubricated before loading engine.

1. Start engine and run at idle speed.
2. Wait for indicated oil pressure.
3. Operate engine normally.

Improper operation or maintenance of this equipment can result in death or serious injury.

Read and understand operator's manual and all safety signs before using or maintaining machine.

If you do not understand the information in the manuals, consult your supervisor, the owner or the manufacture.

80-160

Safety

Fall/Crush Hazard

Two blocking the crane can result in death or serious injury. Do not allow hook block to contact the boom tip.

Check ATB system after installation of each line and at start of every work shift. Read and understand operator's manual.

Equipment Damage Hazard

Damage to equipment can result if turbo charger is not allowed to cool before stopping engine.

Read and understand manuals

1. Run engine at less than half speed.
2. Wait at least five (5) minutes.
3. Stop engine



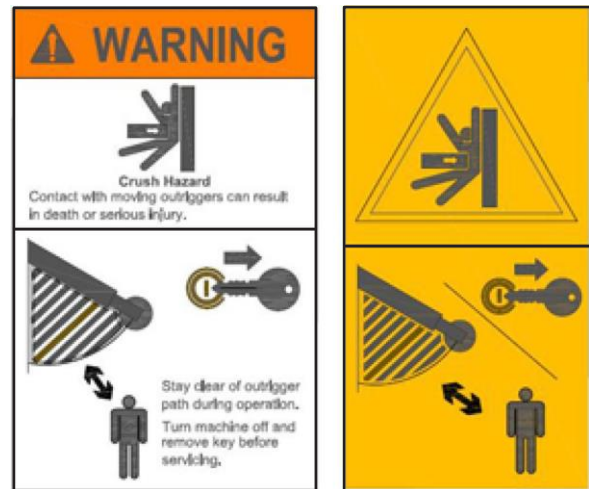
13

Fall Hazard	Use the provided access system.
Falling can result in death or serious injury.	



15

Fall Hazard
Falling can result in death or serious injury.
Stay off of outrigger.



14

Crush Hazard
Contact with moving outriggers can result in death or serious injury.
Stay clear of outrigger path during operation. Turn machine off and remove key before servicing.



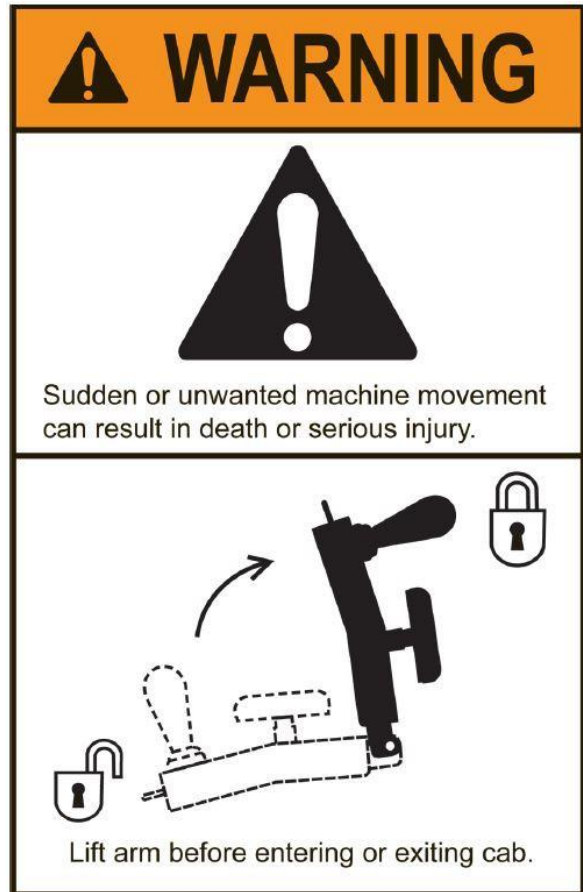
16

Explosion / Burn Hazard

Battery explosion and/or contact with corrosive acid will result in death or serious injury.

Keep all open flames and sparks away.

Wear appropriate personal protective equipment, including gloves, face shield and long sleeve shirt. Read manuals. If you do not understand the information in the manuals, consult your supervisor, the owner or the manufacturer.



17

Sudden or unwanted machine movement can result in death or serious injury.

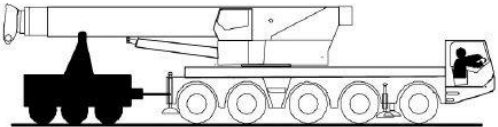
Lift arm before entering or exiting cab.



WARNING



Unexpected machine response from improper operation of free swing or free float boom functions can result in death or serious injury.




→

Read and understand manuals. Manuals provide specific instructions for proper use of swing and float modes, and dolly operation.

18

Unexpected machine response from improper operation of free swing or free float boom functions can result in death or serious injury.

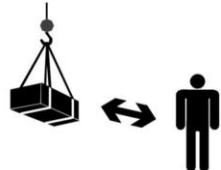
Read and understand manuals. Manuals provide specific instructions for proper use of swing and float modes, and dolly operation.



WARNING



Crush Hazard
Contact with falling load can result in death or serious injury.



Stay clear of suspended loads. Never go below a suspended load.

19

Crush Hazard

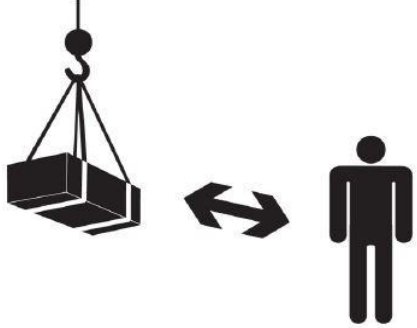
Contact with falling load can result in death or serious injury.

Stay clear of suspended loads. Never go below a suspended load.

 ! DANGER Explosion/Burn Hazard Fuel and fumes can explode and burn, resulting in death or serious injury.		   No smoking. Keep all open flames and sparks away. Stop engine before adding fuel. 12400-1508 REV C
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20

Explosion/Burn Hazard	No Smoking
Fuel and fumes can explode and burn, resulting in death or serious injury.	Keep all open flames and sparks away. Stop engine before adding fuel.

 ! WARNING Crush Hazard Contact with falling load can result in death or serious injury.	
 Stay clear of suspended loads. Never go below a suspended load.	

21

Crush Hazard
Contact with falling load can result in death or serious injury.
Stay clear of suspended loads. Never go below a suspended load.



22

Close and latch securely before driving this crane

DANGER

Electrocution Hazard
Contact with electric power lines will result in death or serious injury.

Line voltage	Required clearance
0 to 50 kv	10 ft (3 m)
>50 to 200 kv	15 ft (4.6 m)
>200 to 350 kv	20 ft (6.1 m)
>350 to 500 kv	25 ft (7.6 m)
>500 to 750 kv	35 ft (10.7 m)
>750 to 1000 kv	45 ft (13.7 m)
>1000 kv	Refer to Operator's Manual

Before operating the machine, contact the electric power line owner to disconnect, move, or insulate power lines.

12400-1512

23

Electrocution Hazard

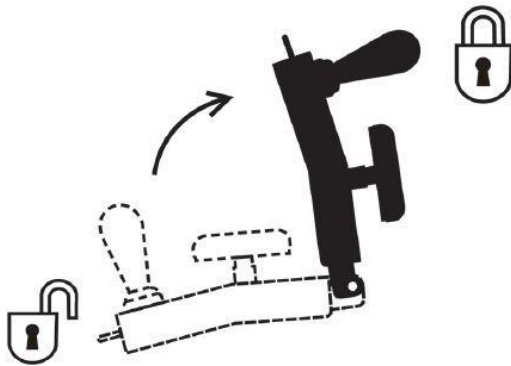
Contact with electric power lines will result in death or serious injury.

Before operating the machine, contact the electrical power line owner to disconnect, move or insulate power lines.

WARNING



Sudden or unwanted machine movement can result in death or serious injury.



Lift arm before entering or exiting cab.

24

Sudden or unwanted machine movement can result in death or serious injury.

Lift arm before entering or exiting cab.

WARNING



Riding Hazard

Riding on this machine can result in death or serious injury.



No riders.

Stay out of upper structure cab during machine travel.

25

Riding Hazard

Riding on this machine can result in death or serious injury.

No riders.

Stay out of upper structure cab during machine travel.



WARNING



Fall Hazard

Falling can result in death or serious injury.



Use the provided access system.

T141898 REV A

26

Fall Hazard

Falling can result in death or serious injury.

Use the provided access system.

Safety Guidelines



These are general safety rules, that must be followed. You are also required to read and understand the Operators Manual as there are instructions, which are more detailed specific to this machine.

Personal Protection Equipment

Before beginning operation, service or maintenance conduct a hazard assessment to determine appropriate personal protective equipment for the working conditions and the operating environment. For more information refer to the applicable OSHA 1910.132 Standards, ANSI Standards, Federal, State, Local and Jobsite Regulations.

Common Types of PPE



Safety Glasses – Impact resistant lenses offering limited protection for the user's eyes from flying debris.



Ear Plugs – A device that is inserted into the ear canal to protect the user's hearing from loud noises or the intrusion of foreign bodies and dust.



Hard Hat – A helmet used to protect the user's head from injuries obtained from falling objects and debris.



Leather Gloves – Gloves used to protect the user's hands from minor cuts and other injuries.



Safety Boots – A boot designed to protect the user's feet from various types of injury such as cuts, puncture wounds, crushed toes, etc.

Workplace Safety



HANDLING PERSONNEL

Cranes can only be used to lift people when it is the least hazardous way to do the job.
(See OSHA 1926.1431, 1926.550g, and ASME / ANSI B30.23.)



TRAINING AND KNOWLEDGE

1. Safe operation must always be the operator's most important concern.
2. Do not operate this crane until you have been trained in its operation. This crane must only be operated by trained personnel, who have demonstrated their ability to do so safely.
3. Comply with the requirements of current Occupational Safety and Health Administration (OSHA) standards, the current ASME B30.5 (latest edition).
4. Read and understand all safety signs and warnings.
5. Read and understand the Load Ratings Charts.
6. By understanding the Load Ratings Charts, the operator can determine what the crane can safely lift before attempting the actual lift.
7. The operator must understand crane signals and take signals only from designated signal people. However, the operator must obey the stop signal from anyone.



OPERATOR'S RESPONSIBILITIES

1. Read and understand the Operator's Manual.
2. Make sure the machine is in proper order and that all operational aids and warning signals are functional before operating.
3. Keep the machine clean, including all instrumentation, windows, lights and other glazed surfaces.
4. Remove all oil, grease, mud, ice and snow from walking surfaces.
5. Store all tools, rigging and other necessary items in the tool box.
6. Never lift a load without consulting the Rating Chart Manual located in the operator's cab.
7. Know the load to be lifted.
8. Be alert, physically fit and free from the influences of alcohol, drugs or medications that might affect the operator's eyesight, hearing, or reactions.

(Continued on next page ...)



OPERATOR'S RESPONSIBILITIES

9. Keep people, equipment and material outside of the work area.
10. Signal person(s) must be used when the operator's vision is blocked or when working in hazardous areas such as near power lines or people.
11. Keep a fully charged fire extinguisher and first aid kit in the operator's cab at all times and be familiar with the use of these items.
12. Always know the location of other machinery, vehicles, personnel and other obstacles in the work area.
13. Never permit people on the machine platform while the machine is in operation.
14. Make sure everyone is clear of the work area before moving the hook, boom, load or outriggers.
15. Start and stop movements smoothly and swing at speeds that will keep the load under control.
16. Keep at least two full wraps of wire rope on drum when operating.
17. Use tag lines to keep loads under control when feasible.
18. Keep the load as close to the ground as possible.
19. Use shortest boom length required to complete job.
20. Never leave a running machine unattended or load suspended.
21. Always use outriggers in accordance with requirements of the Load Rating Chart and Operator's Manuals.



SIGNAL PERSON'S RESPONSIBILITIES

1. Standard crane signals must be used, and understood.
2. Assist the operator in safe and efficient operation, without endangering people or property.
3. Have a clear understanding of each lift to be made.
4. Signal people must place themselves where they can be clearly seen and where they can safely observe the entire operation and out of harms way should something unexpected happen.



RESPONSIBILITIES OF ALL CREW MEMBERS

1. Unsafe conditions and/or practices must be corrected.
2. Obey all warning signs.
3. Watch out for your safety and the safety of others.
4. Know and understand proper machine erection and rigging procedures.
5. Alert operator and signal person of hazards, such as power lines, unstable ground, etc.



MANAGEMENT RESPONSIBILITIES

1. Operators must be competent, physically fit and, if required, licensed.
2. Operator, signal people and riggers must be trained in correct crane operation and use.
3. Operator and signal people must know standard crane signals.
4. Have a supervisor at job site responsible for site safety.
5. Crew members must be given specific safety responsibilities and be instructed to report any unsafe conditions to supervisor.
6. Supply the weight and the characteristics of all loads to be lifted to the operator.
7. Verify that all crew members are familiar with OSHA, ANSI B30.5 requirements, state and local jobsite requirements, as well as the instructions in manuals, and all other applicable requirements.



PLANNING THE JOB

1. Have a clear understanding of the work to be done.
2. Consider all hazards at the jobsite.
3. Know what crew members are needed to complete the job.
4. Assign job responsibilities.
5. Appoint a competent signal person.
6. Establish how the signal person will communicate with the operator.
7. Know the weight and the characteristics of the loads to be lifted.
8. Utilize rigging and other equipment which will complete the job safely.
9. Establish how equipment can be safely transported to the job site.

(Continued on next page ...)



PLANNING THE JOB

10. Determine how the load will be rigged.
11. Determine the lift radius, boom angle and the rated lifting capacity of the crane.
12. Always pre-plan the course of each lift to determine the best route to reach the load's target destination.
13. Identify the location of gas lines, power lines, or other structures and determine if the crane or structures need to be moved.
14. Ensure that the supporting surface is strong enough to support the machine and load.
15. Establish special safety precautions, if necessary.
16. Consider the weather conditions.
17. Keep unnecessary people and equipment away from the work area.
18. Position the machine to use shortest boom and radius possible.



OPERATOR PRELIFT CHECK

1. Check the machine log book, to see if periodic maintenance and inspections have been performed.
2. Ensure that necessary repairs have been completed.
3. Inspect wire rope for damage (kinks, broken wires etc.)
4. Be sure no unauthorized field modifications have been made.
5. Check for air and hydraulic oil leaks.
6. Check that all controls are in the neutral position before starting engine.
7. After starting the engine, check all gauges and indicators for proper readings.
8. Test all controls in the cab or control station, such as swing, boom extend / retract / up / down, outriggers extend / retract, throttle.
9. Check brakes and clutches.
10. Check hoist brakes by lifting a load a few inches off the ground and holding it.



OPERATOR AIDS CHECK

Ensure that the listed items are in place and operational.

1. Boom angle indicator.
2. Backup Alarms.
3. ATB devices.
4. Overload Protection, Load Indicators, Rated Capacity Indicator.



OPERATION OVERLOAD PROTECTION

1. Know the weight and characteristics of all loads to be lifted.
2. Place the boom lifting point directly above the load when lifting.
3. The load radius will increase when the load is lifted due to boom deflection. To compensate for the boom deflection, maintain the radius by raising the boom.
4. Know the weight of the hook and rigging, the boom and/or jib length, parts of line and the work area.
5. Use next lower rated capacity when working at boom lengths or radius between the figures on the rated lifting capacity chart.
6. Never lift a load without knowing whether it is within the rated capacity.
7. Never operate with anything other than recommended counterweight. Unauthorized reduction or additions of counterweight constitute a safety hazard.
8. Do not lift loads if winds create a hazard. Lower the boom if necessary. Refer to the Rating Chart and Operator's Manual for possible restrictions.
9. Avoid side loading the boom.
10. Never allow the load or any other object strike the boom.
11. Loads shall be freely suspended.
12. Never use the RCI to "weigh" the load.



OPERATION SETUP

1. Be sure the load bearing surface is strong enough to support the machine with lifted load.
2. Be sure the crane is level. Check frequently and re-level when necessary.
3. Stay away from rotating cranes. Erect barricades to keep people away. Make sure these areas are clear before swinging. **WARNING-INJURY CAN OCCUR!**



POWER LINE SAFETY

1. Determine whether there are power lines in the area before starting any job. Only operate around power lines in accordance with Federal, State and Local Regulations as well as ASME B30.5 (latest edition).
2. Never remove materials from under powerlines with a crane if the boom or machine is capable of contacting them.
3. No part of the crane or the load should contact, or violate the minimum allowable clearance required for operation of the crane near electrical lines.

(Continued on next page ...)



POWER LINE SAFETY

DANGER

Electrocution Hazard
Contact with electric power lines will result in death or serious injury.

Maintain Clearance Listed

Line voltage	Required clearance
0 to 50 kv	10 ft (3 m)
>50 to 200 kv	15 ft (4.6 m)
>200 to 350 kv	20 ft (6.1 m)
>350 to 500 kv	25 ft (7.6 m)
>500 to 750 kv	35 ft (10.7 m)
>750 to 1000 kv	45 ft (13.7 m)
>1000 kv	Refer to Operator's Manual

Before operating the machine, contact the electric power line owner to disconnect, move, or insulate power lines.

Electrocution Hazard	
Contact with electric power lines will result in death or serious injury.	
Maintain Required Clearance	
LINE VOLTAGE	REQUIRED CLEARANCE
0 TO 50 kV	10 FT (3.0 M)
500 TO 200 kV	15 FT (4.6 m)
2000 TO 350 kV	20FT (6.1 m)
350 TO 500 kV	25FT (7.6 m)
500 TO 750 kV	35 FT (10.7 m)
750 TO 1000 kV	45FT (1.37 m)
>1000 kV	Refer to Item 7
Before operating the machine, contact the electric power line owner to disconnect, move, or insulate power lines.	

(Continued on next page ...)



POWER LINE SAFETY

4. If contact occurs, stay on crane until the boom is cleared or until the electrical current is turned off.
5. If contact occurs, keep all personnel away from the crane. If you must leave the crane, **JUMP WITH BOTH FEET TOGETHER COMPLETELY CLEARING THE MACHINE.** Continue jumping with both feet together to leave the area.
6. Use a signal person when working around power lines as established by the utility owner / operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution per OSHA regulation 1926.1408 and 1926.1409.



TRAVEL

1. Care must be taken when cranes are driven (traveled) whether on or off the job site.
2. Always pre-plan the path of travel to determine the best route to the destination.
3. A signal person shall be utilized when the operator's vision is blocked or obstructed during traveling operations.
4. Watch for people, power lines, low or narrow clearance, bridge or road load limits, steep hills or uneven terrain.
5. Place the boom in the stowed position.
6. Inflate the tires to the specified pressure.
7. Travel slowly and avoid sudden stops and starts.
8. Use the seat belt during all transit and travel.
9. Make sure travel surfaces can support the weight of machine and any stored load.
10. Always set the parking brake when parking the machine.



OPERATIONAL AIDS - EMERGENCY PROCEDURES

When operational aids are inoperative or malfunctioning, the following requirements shall apply for continued use or shutdown of the crane.

1. Steps shall be taken to schedule repairs immediately. The operational aids shall be put back into service as soon as replacement parts, if required, are available and the repairs and calibration can be carried out. "Can be carried out" does not mean, when convenient. Every effort must be made to expedite the repairs and recalibration.
2. When a load indicator, rated capacity indicator, or rated capacity limiter is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish procedures for determining load weights. Loads with unknown weights shall not be lifted without a properly functioning load indicating device.
3. When a boom angle or radius indicator is inoperative or malfunctioning, radii or boom angle shall be determined by measurement.
4. When an ATB device, two-blocking damage prevention or two-block warning device is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish procedures, such as assigning an additional signal person, to furnish equivalent protection.
5. When a boom length indicator is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish the boom length at which the lift will be made by actual measurement or marking on the boom.
6. When a level indicator is inoperative or malfunctioning, other means shall be used to level the crane.
 - ▶ ANSI / ASME B30.5 Standard calls for the crane to be leveled within 1% or 0.6°.
 - ▶ If there is no mechanical level on the crane, a 4 ft carpenter's level (on a machined surface that would be parallel to the top of the swing bearing) is the generally accepted substitute.
 - ▶ Risk of overturning! Operation of the crane is only permitted when the crane is aligned horizontally!

In certain situations, it may be necessary to override the automatic motion limiter of the RCI / ATB unit in order to safely operate the crane. These include but are not limited to:

The load block may lift the ATB weight before the load line can be tensioned while stowing the boom. This will cause a motion cutout. Overriding the system, in this situation is acceptable in order to continue to winch in slack line, securing the boom. Boom must be in the lowered position.

If the Boom Up/Down control joystick is pushed in up position after the boom is fully raised, pressure will be trapped in the base of the main cylinder. This will cause a motion cutout. Overriding the system is acceptable in order to boom down enough to release the trapped pressure.

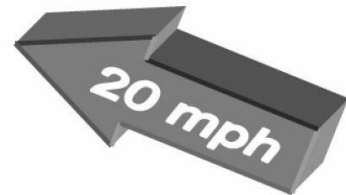
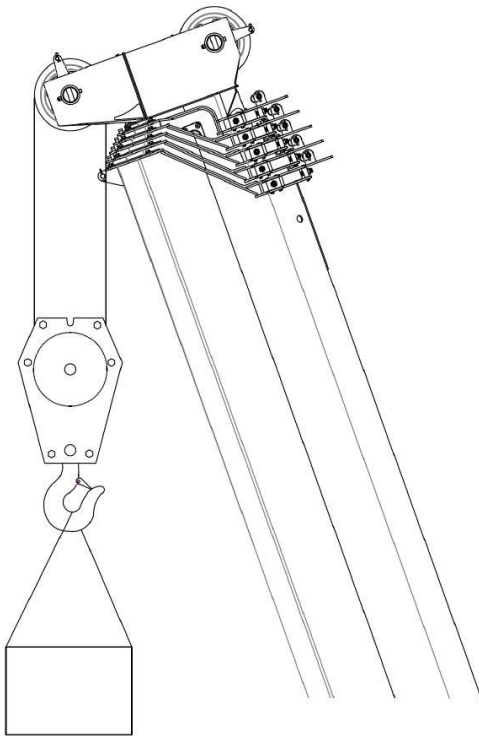
Effects of Wind Conditions

Lifting Constraints

The crane can be used safely by following the values given in the load capacity tables up to a wind speed of 20 mph (32 km/h) on a load surface of 11.7 ft²/ton (1.1 m²/tonne).



Check the forecast and monitor wind speed conditions near the job site. When wind speed exceeds 20 mph (32 km/h), derating of the cranes lifting capacity is required. See the cranes WARNING section of the LOAD CHART.



Wind

MAXIMUM OPERATIONAL WIND SPEED BEFORE DERATING OF LIFTING CAPACITY IS REQUIRED.

80-160 Safety



Pay attention to the wind speed values in table below in relation to the information in the WARNING section of the LOAD CHART. Any governmental regulations applicable to the job site must also be observed.

Wind Force		Wind Speed		Consequences
Scale	Terms Described	mph	km/h	
0	Calm	0 - 1	1	Calm, Smoke rises vertically.
1	Very Light	1- 3	1 - 5	Wind direction indicated by the smoke and not by the banner.
2	Light Breeze	4 - 7	6 - 11	The wind can be felt on the face, the leaves rustle , the banner moves.
3	Gentle Breeze	8 - 12	12 - 19	Leaves and small branches move, banners lift.
4	Mild Breeze	12 - 18	20 - 28	The wind raises dust and leaves. Branches move.
5	Fair Breeze	18 - 24	29 - 38	Small bushes sway. Wave crests form on the sea.
6	Strong Breeze	24 - 31	39 -49	Large branches sway.
7	Strong Wind	31 - 38	50 - 61	All the trees sway.

Lightning Storm

When lightning is striking in the vicinity of the crane, the operator should never attempt the following procedures:

- Getting into the operator's cab or attempting to get onto the carrier, superstructure or boom assembly.
- If on the machine, do not try to get off the machine.

If you are in the operator's cab during an electrical storm, stay in the cab. If you are on the ground during an electrical storm, stay away from the vicinity of the machine.

Temporary Interruption of Crane Operations

As a general rule, if it is not possible to maintain sufficient control over a rigged crane, the boom and the equipment shall be taken down if the crane's operations are interrupted and may be left unsupervised.

The following instructions are valid for every mobile crane, regardless of the type, the configuration, the rigging mode and the environment:

- The crane shall be left in the smallest, most stable, valid operational configuration that the job site practically allows; this includes parameters such as boom angle, slewing orientation, jib angle.
- The engines shall be switched off.
- All control levers shall be put into the neutral or in a "locked" position.
- The heating system should be switched off.
- The crane shall be secured and the cabins shall be locked to prevent unauthorized use or unintended movement.
- Close all control panels that are fitted with a lock/key when they are not in use.
- Depending on the crane type, mobile control panels connected to the crane with cables shall be removed when they are not in use.
- The radio remote control, if it is available, shall be kept in a safe place to prevent unauthorized use or unintended movement. Make sure that the batteries are recharged.
- The parking brake of the crane chassis shall be applied.
- Transmission gear shall be set to neutral.
- The wheels shall be secured with chocks, the slew brake applied and the main boom secured.

If the crane is in erected mode and the jobsite conditions do not permit the boom and jib of a crane to be fully lowered to the ground, the configuration in which the crane should be left while unmanned shall be determined by a qualified crane operator familiar with the crane, the job site configuration, conditions, and limitations. In addition, following instructions shall be observed:

- A suitable and safe emergency plan shall be worked out to allow bringing the crane into a safe position in case of emergency such as an unforeseen weather change or other possible incidents as listed at the beginning of this document. This plan shall also include sufficient space around the crane to enable dismantling or lowering of boom or equipment, etc.
- The crane shall be left with no load on the hook.
- All slings or fastening ropes shall be removed from the crane hook.
- The hook block shall be at the highest position so that there is no contact possible between the wire ropes and the boom or other obstacles.
- The crane location and configuration does not create hazards to the road traffic, e.g. risk of collision with surrounding obstacles; this may require a specific risk assessment prior to leaving the crane unattended.

- Check for leakage and unintended (slow) movement on all load bearing hydraulic cylinders and winches:
 - Outrigger vertical cylinders
 - Boom lifting cylinder(s)
 - Hoist winch
 - Boom extension cylinder(s)



NOTE: *Slight movement can also be due to changing oil temperature (e.g. slight cylinder movement due to sun warming or hydraulic oil cooling).*

- Weather forecast shall be obtained in advance for the whole period the crane is erected.
 - Changing meteorological conditions, including, but not limited to: wind, ice accumulation, precipitation, flooding, lightning, etc., should be considered when determining the location and configuration of a crane when it is to be left unattended.
 - The crane boom should be lowered before wind speeds exceed the permitted values. This may not be possible depending on job site and crane setup.
 - If, due to unforeseen weather conditions, the wind speeds are in excess of the permitted values with the boom in the up position, the crane should be secured as best it can and everyone cleared from the area.
 - The boom may only be lowered if the expected wind speed during the lowering process is less than the wind speed allowed during assembly and disassembly according to the wind speed charts.

Potential hazards from Unattended Crane - Possible Issue/Risk

The following are examples of possible events that could occur while a crane is left unattended; these possible risks shall be taken into account:

- Ground failure:
 - Ground giving way due to severe rain/ landslides/ washout
 - Melting ice under the supports
- Bad weather:
 - Storm and wind
 - Lightning
 - Rain/Flooding
- Crane hydraulic cylinders movement:

80-160

Safety

Slow retraction of outrigger support cylinders, lift cylinders and/or telescoping cylinders on unpinned telescoping systems (e.g. due to changes in ambient and oil temperature, leakage).

- Vandalism.

Any or a combination of the above may result in the following events:

- The crane may topple over.
- The crane may move.
- Unsafe operational conditions may be created.
- Unauthorized operation of the crane may occur.

Resuming Crane Operations

Before crane operation is resumed after a period of inactivity/crane being unattended, the operator is required to check the condition of the crane and its location.

Whenever the operator has left the cab, the Rated Capacity Limiter (RCL) settings must be verified and reset.

Ending Crane Operations

Prior to leaving the crane, the operator must be certain the crane is in a condition acceptable to be left unattended.

End of Operations checklist

1. _____ Is the load fully on the ground and unhooked from the crane?
2. _____ Is telescopic boom all the way in?
3. _____ Is work-site crane boom all the way down and disassembled if necessary?
4. _____ Is parking brake on crane chassis set?
5. _____ Is crane engine off and ignition key removed?
6. _____ Is the crane cab locked?
7. _____ Is the crane secured from unauthorized use?
8. _____ Is the vehicle cab unoccupied?
9. _____ Is the vehicle engine off and the key removed?
10. _____ Is the vehicle parking brake set?
11. _____ All controls in neutral?

Turning/Driving in Reverse

While operating a mobile crane in reverse, the risk of accident or injury is greater and extra caution must be exercised.



Risk of accidents and personnel injury or death is increased when operating in reverse.

The following cautions must be observed at all times:

- When backing up, the driver must be aware of the needs of other traffic and their safety.
- If the driver does not have visual access to all the areas into which he will be travelling, a guide, who is in communication with the driver at all times, must be used who can see those areas the driver cannot.
- An acoustical back-up warning device does not replace the need for a guide.
- Be certain that no personnel or objects are behind the vehicle before moving.



Injury or death may occur while driving in reverse.



Property damage may occur while driving in reverse.

- Rated maneuvering speed is the maximum speed allowed while driving in reverse.
- Follow all other regulations pertaining to driving on construction sites or on local streets.

Parking the Vehicle



NOTE: *Parking Instructions only apply to mobile cranes.*



Failure to adequately secure a parked vehicle may result in vehicle roll-off and injury or death to personnel and/or damage to property.



Risk of Death

The following conditions must be strictly adhered to by the crane operator:

- A vehicle should never be parked on a slope greater than 18%.
- The parking brake should always be applied when the crane is parked.
- The ground on which the crane is parked must be even and solid with sufficient load-bearing capacity.



Mobile cranes can roll away, if not properly prepared, causing injury, death or property damage.

Under the following conditions, the vehicle must employ the use of the (4) four wheel chocks on the rear axle, where (2) wheel chocks are on front side of rear tires and (2) wheel chocks are on rear side of rear tires in addition to the parking brake to prevent it from rolling away:

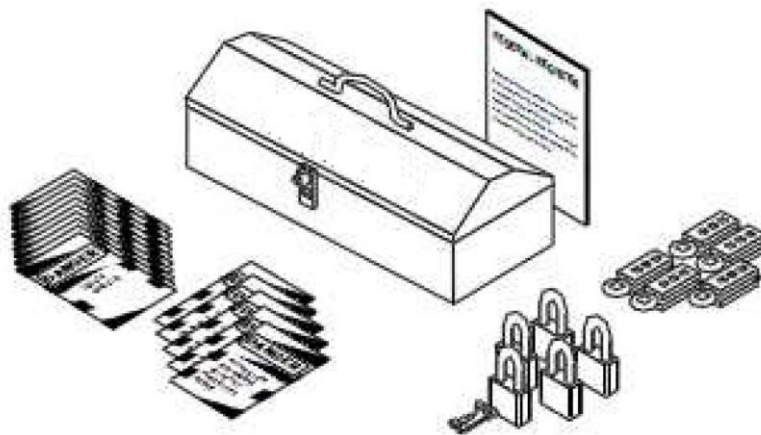
- The vehicle is parked on a slope.
- The vehicle is under repair or in need of repair, especially concerning any deficiencies in the brake system.

Lock Out & Tag Out

Occupational Health & Safety Code of Federal Regulations number 1910.147 requires that employers establish and follow a Lock Out & Tag Out procedure and train their employees in that procedure before any employee can operate, service or maintain any piece of power equipment.

Employers are required to make periodic inspections to see that their Lock Out & Tag Out procedures are being followed, and they must monitor and update their program on an ongoing basis. Employees are responsible for seeing that equipment is locked out and tagged out in accordance with the employer's policy.

A typical Lock Out & Tag Out kit contents are illustrated in the figure below.



Typical Lock Out & Tag Out Kit

What is Lock Out & Tag Out

Lock Out & Tag Out is a procedure that's designed to prevent the unexpected or accidental startup of equipment and to alert all workers whenever it is unsafe to operate any piece of equipment. When used as intended, Lock Out & Tag Out also protects personnel from energy stored in devices such as springs, accumulators, batteries, hydraulic systems, etc.

How to Lock Out & Tag Out

- Install one or more locks to hold the master switch lever in the **OFF** position.
- If the switch is keyed, turn the key to the **OFF** position and remove the key.
- Disconnect the batteries.
- Regardless of which lockout method is used, place one or more tags on machine control panels, access doors and electrical panels.

When is Lock Out & Tag Out required

- Any time anyone is maintaining, repairing, lubricating, or for whatever reason, working on the equipment.
- When the equipment is broken or for whatever reason, unfit or unsafe to operate
- Whenever the equipment is left unattended.

Who must apply a lock & tag

- Any person working on the equipment.
- Foreman or other person responsible for the work being done.
- If several people are working on a machine at the same time, each person must apply his or her own lock and tag.

When can a lock and tag be removed

After performing these six steps:

1. All safety guards are back in place.
2. All work is complete and tools are put away.
3. All workers are notified that a lock is being removed.
4. All workers are positioned safely for startup.
5. Controls are positioned for safe startup.
6. The machine is ready for safe operation.

Who can remove a lock and tag

- Only the person who applied a lock and tag is permitted to remove them.

The Lock Out & Tag Out rules laid out here are generic. To get instructions for your particular workplace, consult your employer's Lock Out & Tag Out procedure.

Access/Egress



Access/Egress Safety

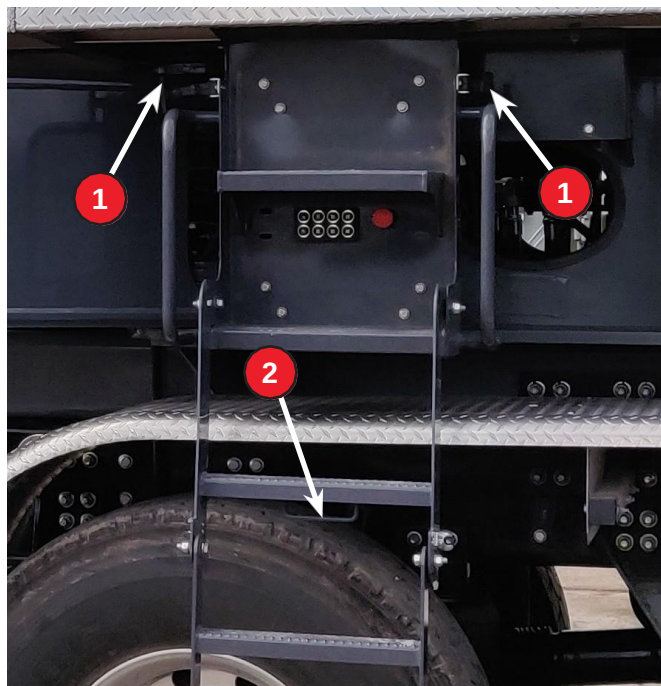
Access and egress from the crane operator's cab must always be accomplished using a three point system. Either two-feet and a hand or two hands and a foot should be in contact with the crane while moving from the ground into the operator's cab or moving from the operator's cab to the ground.

To provide safe access and egress to/from the crane, Load King provides a number of steps, ladders and handrails allowing three-point access to all areas of the crane where it is necessary for the operator to be when moving from the ground to the operator's cab or from the operator's cab to the ground.



Access/egress to/from areas of the crane not accessible through the provided three-point access devices should only be attempted using OSHA approved access devices (ladders, lifting platforms, etc) providing three-point access capability.

Operator's Cab Access / Egress Procedure



1. Rubber "T" Handle Retainer- Pull to unlatch and prepare to deploy access steps to operator's cab (2) places.
2. Pull handle towards person and pivot downward for access steps to deploy.
3. Pivot down lower step.
4. Reverse procedure and store step assembly before traveling.

80-160 Safety

Operator's cab steps and grab handles with lower steps deployed



NOTE: Use 3 pts of contact when entering both cabs.





NOTE: Do not use item 4 Console Arm lift handle as a grab handle for entering or exiting the operator's cab.

Access / Egress-Rear



Personal Safety



SLIP AND FALL PREVENTION

1. Always wait until machine has stopped before getting on and off the equipment.
2. Do not use controls or steering wheel as hand holds.
3. Keep the machine clean and dry. Remove all oil, grease, mud, ice and snow from walking surfaces.
4. Store all tools, rigging and other items in the tool box.
5. Replace all broken ladders or other access system components.
6. Keep non-slip surfaces in good condition.
7. Never jump off the machine. Instead, use the hand holds and step designed for entering and exiting the machine. Face the machine and use three points of contact to ensure your safety.

Seat Belts

SOME SUGGESTED USAGE AND MAINTENANCE INSTRUCTIONS FOR SEAT BELTS:

1. Wear your lap belt low and snug.
2. Lift joystick arms on both LH & RH side to easily access the seat belt while seated. Pull out auto-retracting seat belt male end on LH side and attach to fixed buckle receptacle on RH side with a noticable click. Belt will snug into place due to recoil assembly.
3. Move LH & RH arms down once belts is properly positioned.
4. To release buckle and exit cab, press release button within buckle assembly on RH side.
5. For maintenance of belt, hand wash webbing with warm water and mild soap. Rinse thoroughly and dry in the shade.
6. Inspect seat belt assembly frequently. Anytime it does not operate properly, or if there are any defects in the webbing (i.e. torn or frayed), the seal belt must be replaced.



1. **Seat Belt Retractor Assembly** - Pull out web end and attach to RH fixed receptacle.

Erecting the Jib



Do not lower the boom to an angle below 1°. This action could cause the jib to disengage and drop off.

Make sure that nobody enters the area over which the jib will swing.

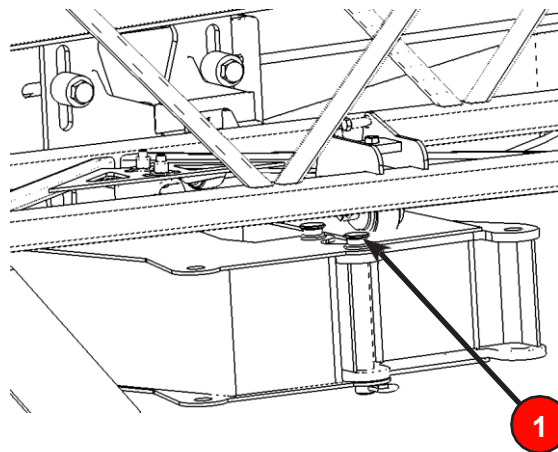
Retract the boom fully before mount the jib. The jib cannot be mounted/stowed if the boom is extended even slightly.

Before fitting the Jib assembly on the main boom head, wind speed indicator and / or hazard light (optional) including bracket must be completely removed from the main boom head.

At a later point, when the Jib is fitted, the hazard light and the rotor of the wind speed indicator must be fitted onto the head of the respective fitted Jib.

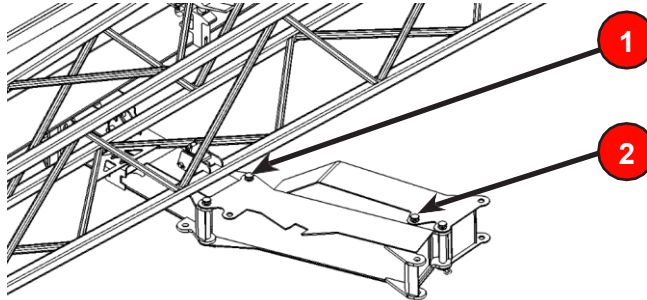
Procedure for Jib Erection:

1. Set the crane on fully extended outriggers in a location where enough space available for mounting the jib.
2. Attach a guide rope to the eye on the bottom tip of the jib.
3. Remove pin (1) and swing out the middle folding section of tri-fold ramp.

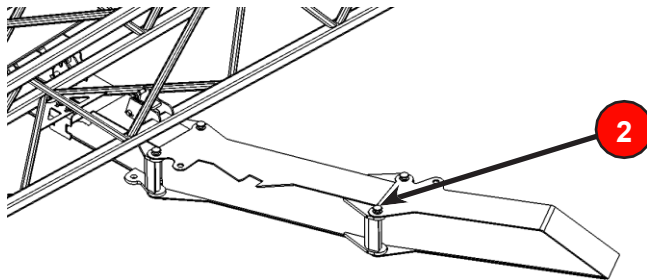


80-160 Assembly

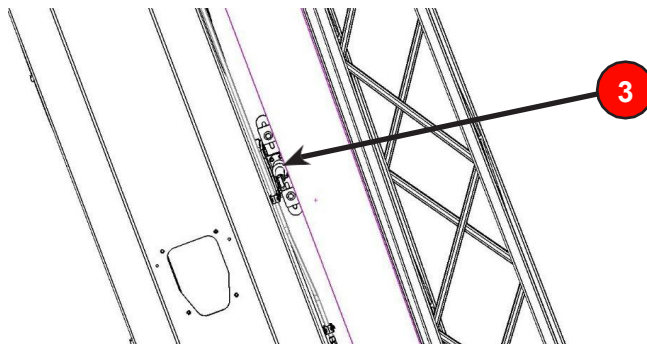
4. Install the pin (1) after the middle folding section align with the fixed ramp. Remove the pin (2) and swing out the folding section of tri-fold ramp.



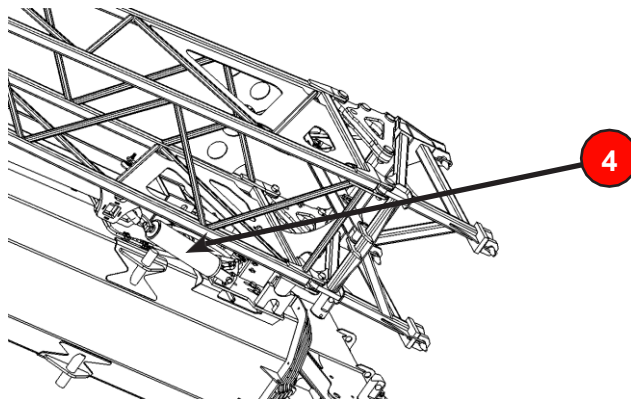
5. Install the pin (2) after the folding section align with the middle folding section.



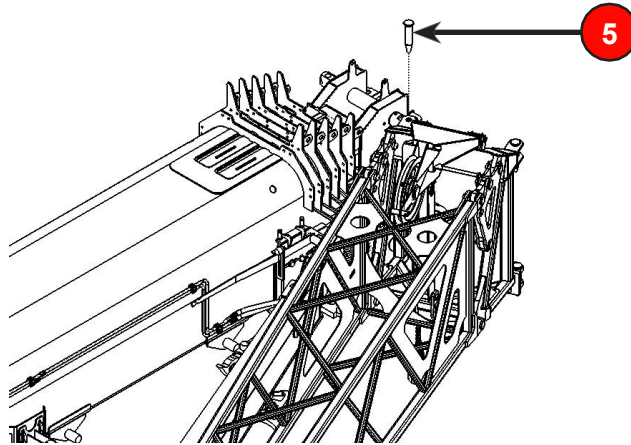
6. Pull the T-handle (3) and rotate to unlock the jib from the storage bracket.



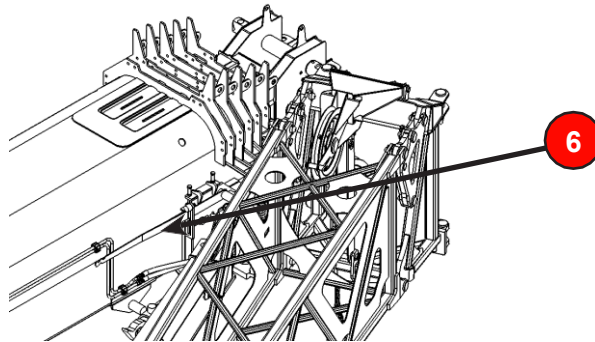
7. Extend the jib deployment cylinder (4) using the jib remote control until the pins in the jib adaptor frame align with the pins in the boom head.



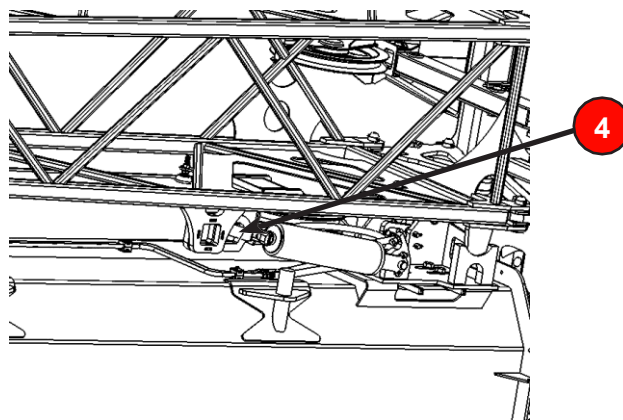
8. Install the pins (5) on both upper and lower mounting holes of the Jib.



9. Pull the lever (6) to disengage the secondary pivot pin.

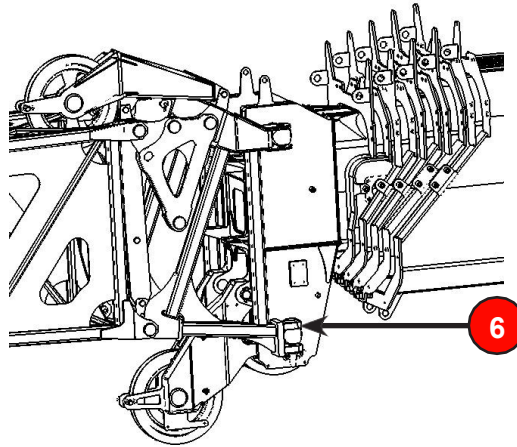


10. Use jib deployment cylinder (4) to push jib off the ramp. Disengage the jib deployment cylinder hook by lifting the cylinder up and rotating out of the latch.

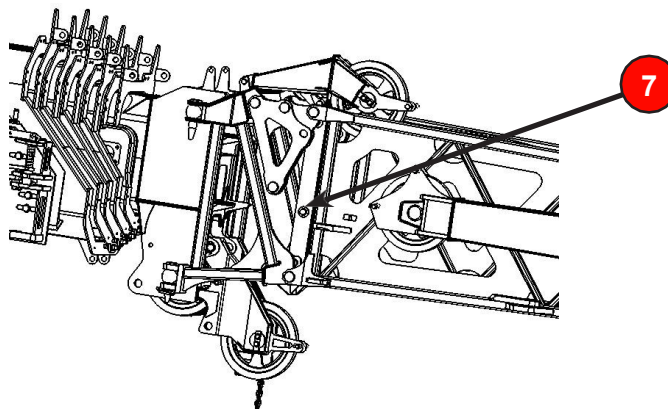


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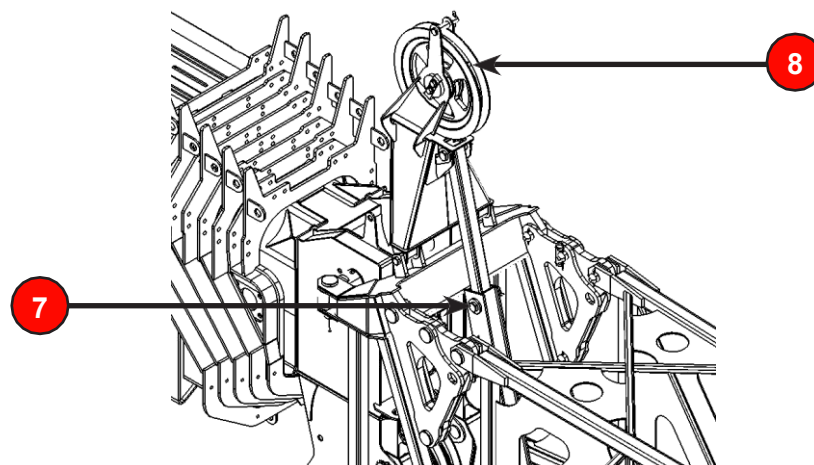
11. Swing jib with guide rope until the left side mounting holes of jib line up with the boom mounting holes. Install lower left-hand pin (6).



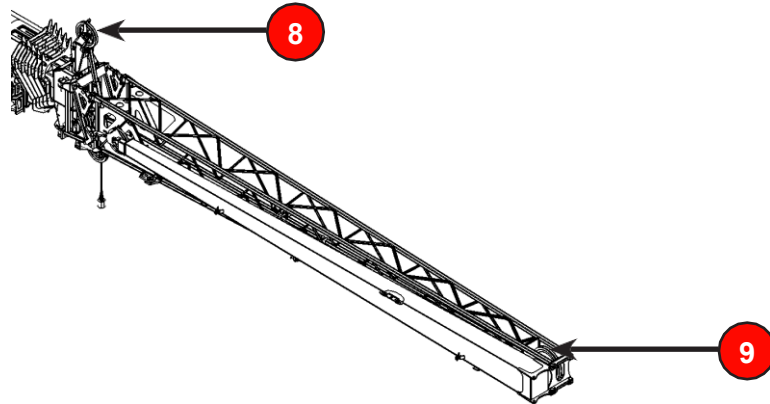
12. Remove pin (7) from guide sheave kickstand.



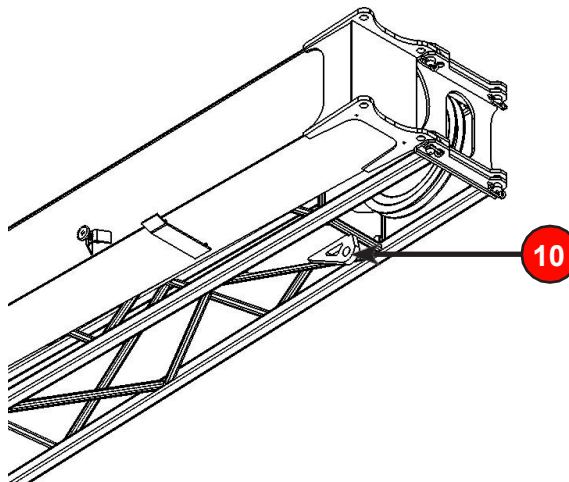
13. Flip up guide sheave (8) and reinstall pin (7) in upper hole.



14. Reeve cable through guide sheave (8) and sheave (9) at end of jib base section.

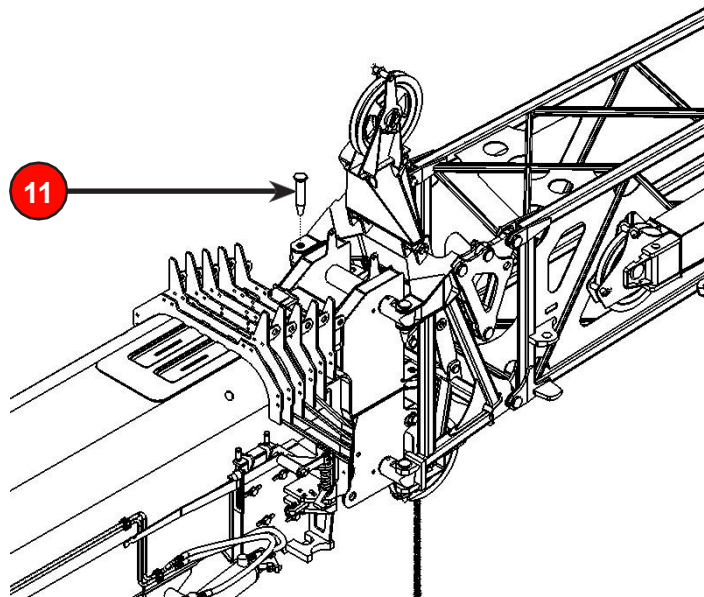


15. Install winch line and socket to jib base dead-end (10).



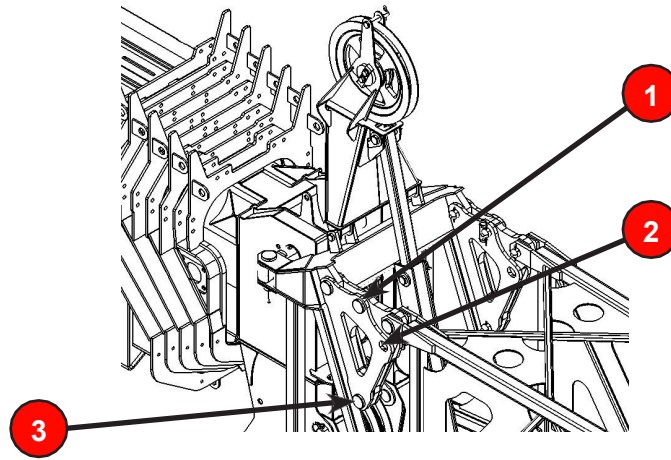
80-160 Assembly

16. Winch up using jib remote control until 4th pin comes into alignment and install 4th pin (11).



17. Remove the guiderope.

Changing the Offset of the Jib



1	0° Offset Hole
2	20° Offset Hole
3	40° Offset Hole

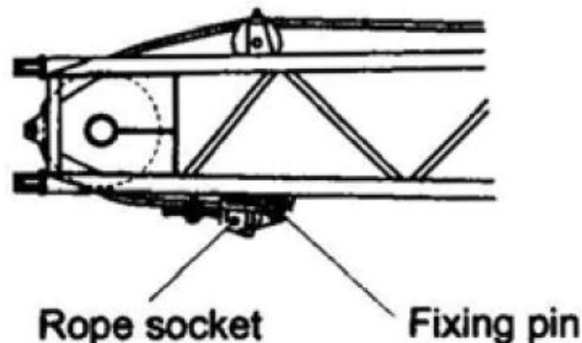
Jib Offset Angle: “Jib offset angle” refers to the angle formed by the centreline of the jib and the centreline of the boom. The jib is mounted on the boom head and is used for lifting a relatively light load to a higher location. There are three offset angles (0°, 20° and 40°) can be set based on the requirement of the operation.

The above Figure, shows that the Jib at 0° offset angle position. If need to change the offset angles, refer to the below procedure.

Procedure for Offset Angle Change:

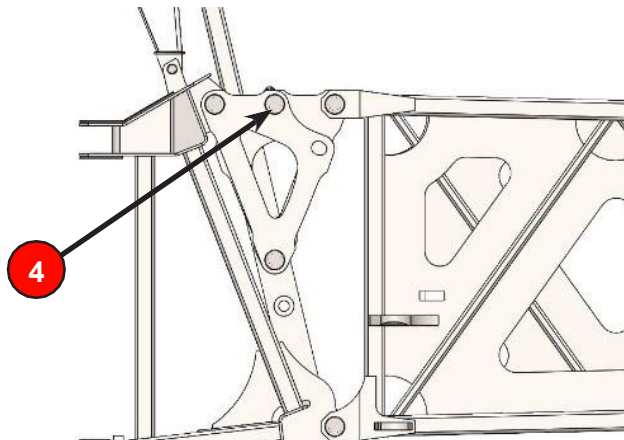
Increasing the Jib Offset Angle (from 0° to 20° or 40°)

1. Set the crane on fully extended outriggers position.
2. Retract the boom fully and set it to the horizontal.
3. Lower the boom to minimum boom angle.
4. Remove the auxiliary hook block and secure the rope socket to the bracket on the jib using the fixing pin.

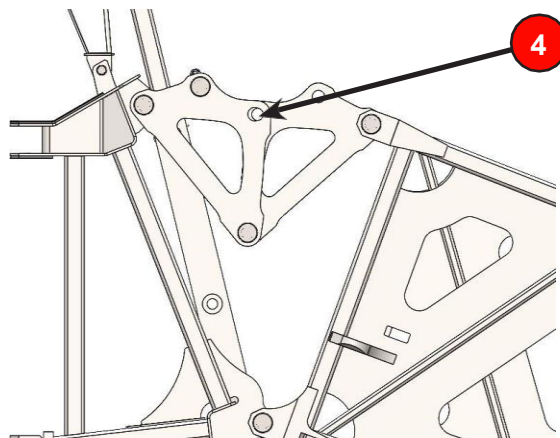


80-160 Assembly

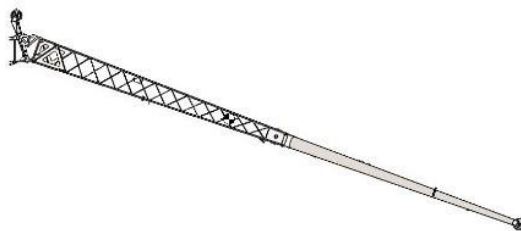
5. Remove the jib offset pin (4) from the 0° offset hole (1).



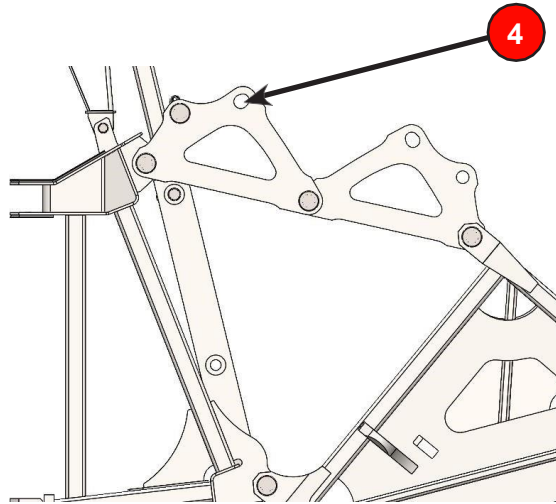
6. Install the offset pin (4) at the 20° offset hole (2).



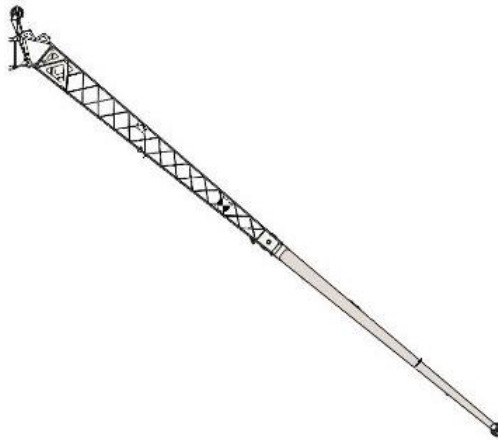
7. Refer to the Fig. which shows that the jib is at 20° offset angle position.



8. Remove the jib offset pins (4) from the 20° offset hole (2) and keep the pin (4) in the toolbox.

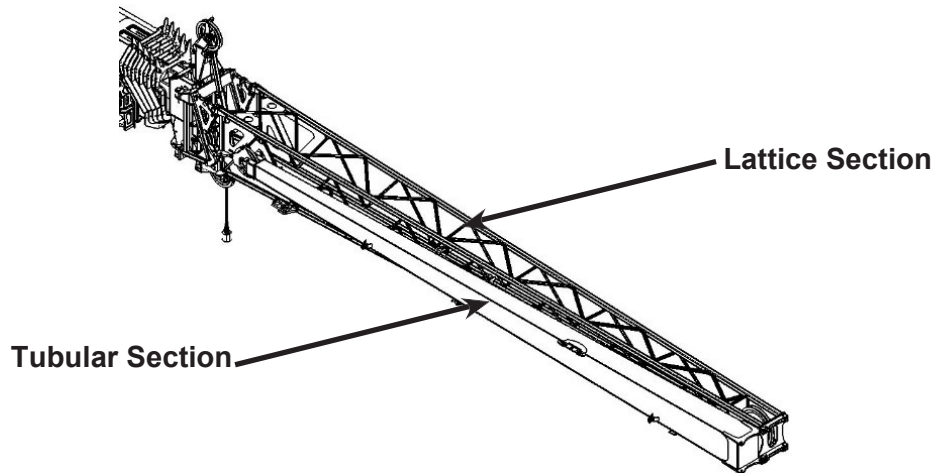


9. Refer to the Fig. which shows that the jib is at 40° offset angle position.



10. Reverse the above procedure to return the jib to 0° offset position.

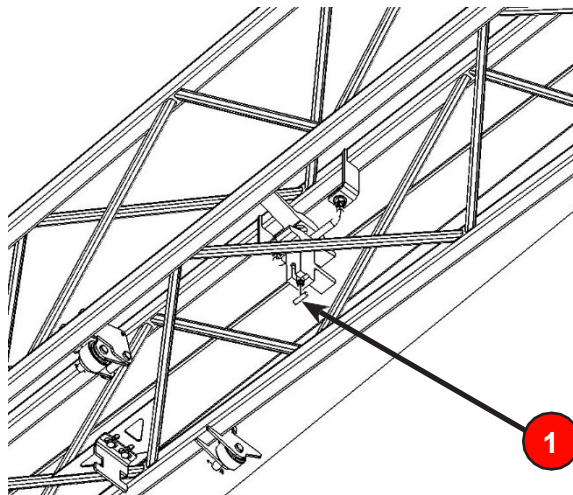
Mounting the folding Jib Section



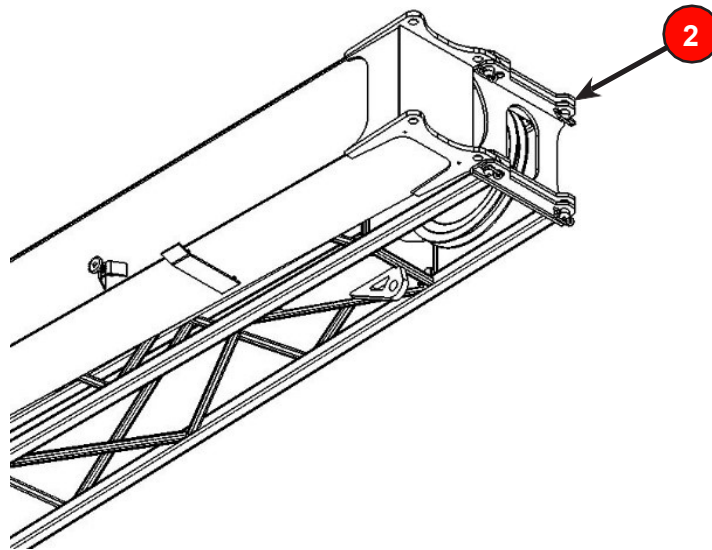
Before mounting the folding Jib assembly, wind speed indicator and / or hazard light (optional) including bracket must be completely removed from the jib head.

At a later point, when the folding Jib is fitted, the hazard light and the rotor of the wind speed indicator must be fitted on to the head of the folding Jib.

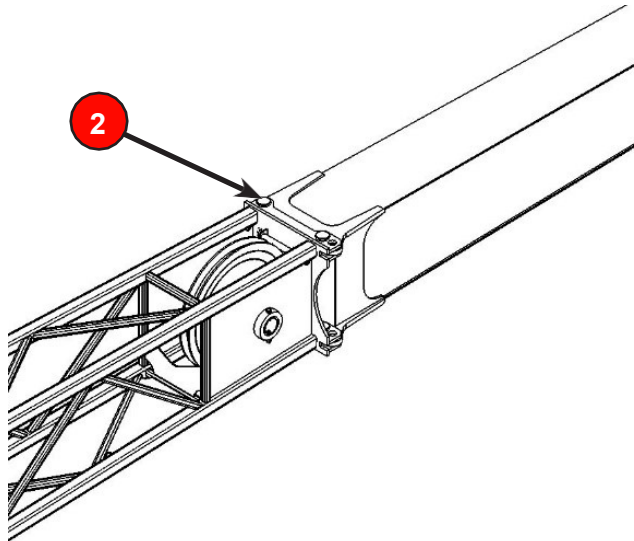
1. Set the crane on fully extended outriggers position.
2. Retract the boom completely and lower down to minimum boom angle.
3. Attach a guide rope to the eye on the tubular section of the jib.
4. Pull the T-Handle (1) to disconnect tubular section from the lattice sections of the jib.



5. Remove the mounting pins (2) from lattice sections of the jib.

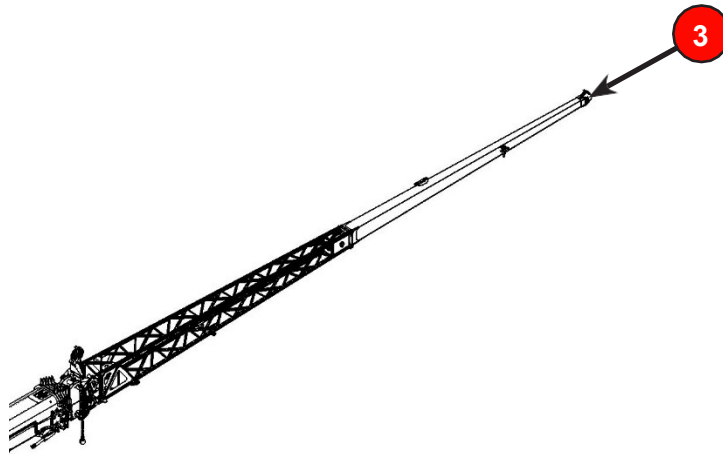


6. Swing the tubular section of jib with guide rope until the left side mounting holes line up with the left side mounting holes of lattice sections of the jib.
7. Install the upper and lower mounting pins (2).

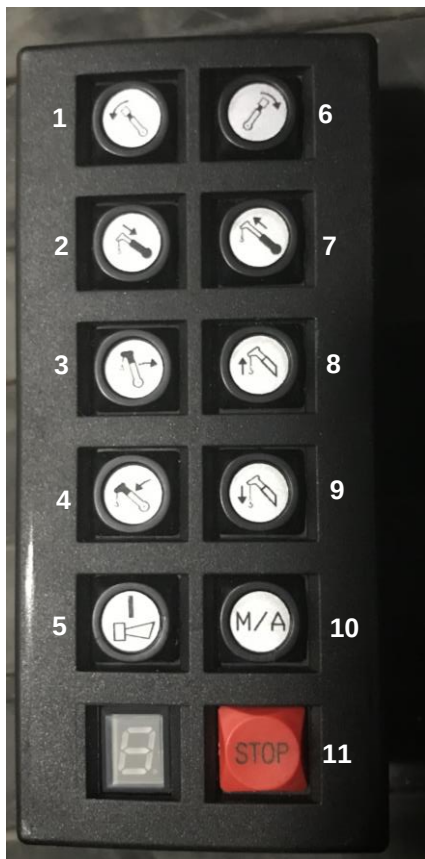


80-160 Assembly

8. Remove the guiderope.
9. Reeve the hoist line over the tubular jib sheave (3).



Jib Stow Assist Remote



1. Boom Swing Counterclockwise
2. Jib Assist Cylinder In
3. Boom Up
4. Boom Down
5. Horn
6. Boom Swing Clockwise
7. Jib Assist Cylinder Out
8. Winch Up
9. Winch Down
10. Winch Toggle
11. Emergency Stop

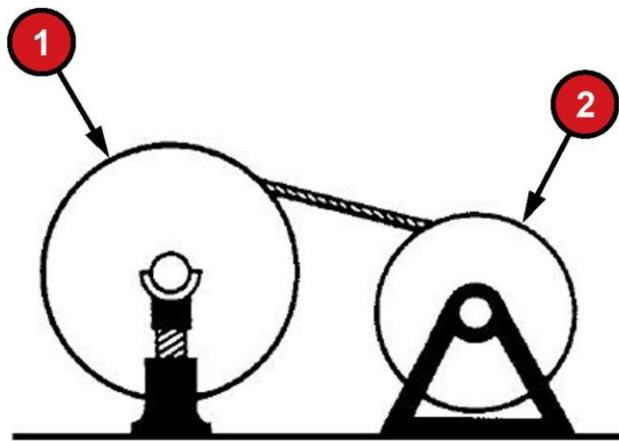
Note: This remote will only function when the "Remote Control Enable" button is selected on the lifting control screen. (See Page 117)

Spooling Wire Rope on Drums

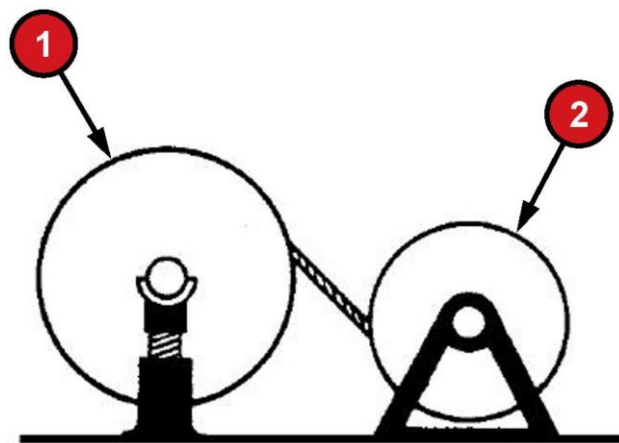
Care must be exercised when installing wire rope on the winch drum. Improper spooling can result in rope damage through crushing, kinking, dog-legs, abrasion and cutting. Poorly installed wire rope will also adversely affect the operating characteristics of the machine by causing uneven application of force and motion. This, in turn, can cause premature fatiguing and failure of the rope.

Thoroughly inspect and clean the winch before proceeding with the installation. Check the lagging and drum flanges for cracks, breaks and excessive wear. Deformed or outsized drum and excessive undercutting at the base of the flange also indicate that repair or replacement of the drum is necessary.

Check the bearings for excessive wear and play. After correcting any defects revealed by the inspection and determining that the winch is in good operating condition, spool the wire rope as follows:



Correct Spooling



Incorrect Spooling

Mount the cable shipping reel (1) vertically on jacks or a suitable supporting structure, with a pipe or bar through the reel center. The cable should be drawn from the top of the reel, as shown, in order to avoid reverse bending as it is spooled onto the drum (2).

If cable is wound from the storage reel onto the drum, the reel should be rotated in the same direction as the hoist.

80-160 Assembly

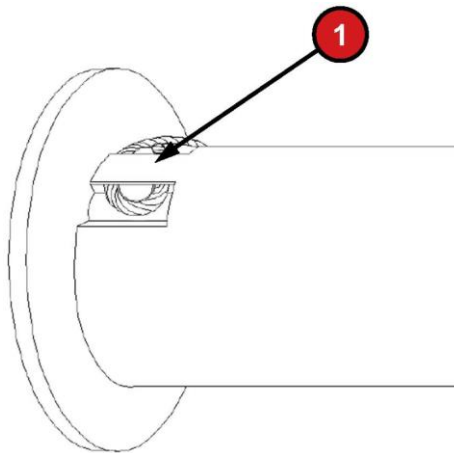
Apply braking force to the reel flange in order to prevent overrun as the rope is being drawn off. Loops formed by overrun can cause kinks and doglegs in the rope, resulting in damage and premature rope failure. A timber or block forced against the shipping reel flange can be used to provide the required braking force.

Install cable on the winch drum in accordance with the following procedure.

1. Position the cable over the boom tip sheave and route back to the winch drum.
2. Position the winch drum with the cable anchor slot on top.
3. Insert cable through slot and position around the cable wedge.
4. Position the anchor wedge in the drum slot; pull firmly on the free end of the cable to secure the wedge.
5. Slowly rotate the drum, ensuring the first layer of cable is evenly wound on the drum.
6. Install the remainder of the cable, as applicable. The end of the cable should be even with the bottom of the anchor wedge.



NOTE: *If the wedge does not seat properly in the slot, carefully tap the top of the wedge with a mallet.*



The wrong cable wedge could permit the wire rope to work loose and detach itself from the drum; possibly causing property damage or personal injury.

Tension the wire rope by braking the shipping reel and slowly operate the winch in the raise mode to wind the cable onto the winch drum. As the spooling proceeds, make sure the adjacent turns are tight against one another. A lead or brass hammer may be used to tap the rope over against preceding turns. Tight winding on the drum is absolutely essential.



Never use a steel hammer or pry bar to move the rope over on the drum. These tools can easily damage the rope.

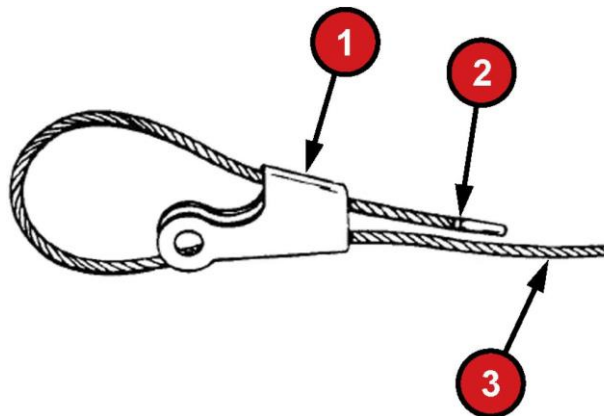
After the rope is wound onto the winch drum, reeve the cable as desired.



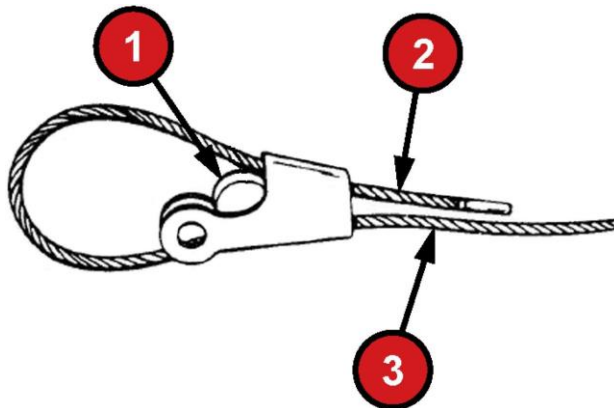
Use only factory supplied sockets, wedges and pins of the proper size; make no substitutions.

Follow the procedure below when installing wedge type sockets on wire rope. Be certain the correct socket and wedge are used.

1. Lead the rope (3) through the socket (1), form a large loop and draw the rope end (2) back through the socket. A length of rope equal to at least one rope lay should be drawn back through.



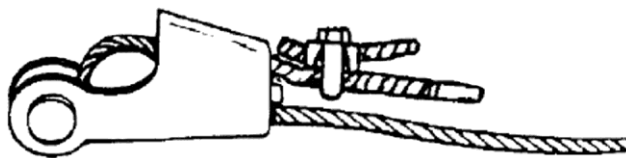
2. Insert the wedge (1) and allow the rope strands to adjust around it.



3. Seat the wedge and loop just tightly enough to allow handling by attaching the socket to a strong support and engaging the winch to take a strain on the rope.

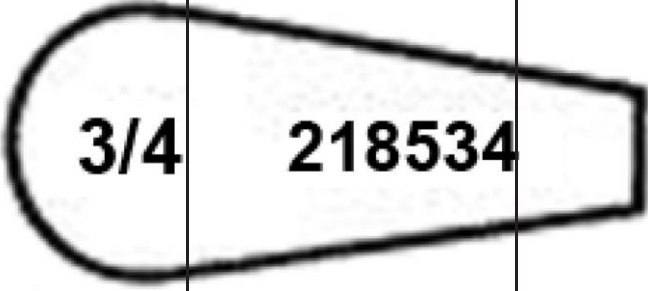
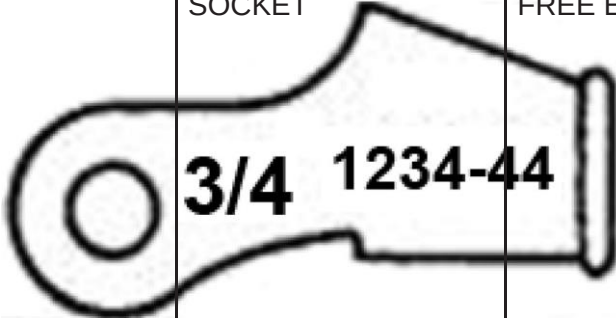
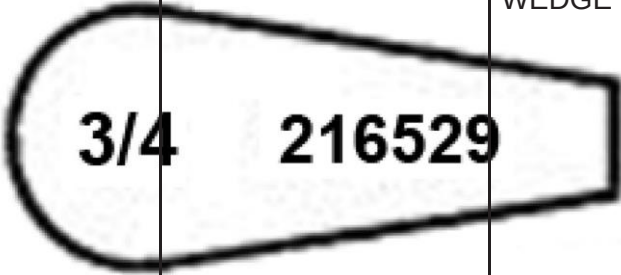
80-160 Assembly

4. Final seating of the wedge is accomplished by making lifts of gradually increasing loads. avoid imposing shock loads on the rope until the wedge is firmly in place.



5. After the wedge has been firmly seated, a short length (6 inches) of the cable should be secured to the free end of the wire rope to act as a stop as shown.
DO NOT clamp the free end to the load supporting end as this will weaken the rope.

Cable Sockets

ROPE SIZE	PART NUMBER	DESCRIPTION	WHERE USED
3/4"	218534	WEDGE	FREE END OF ROPE
			
3/4"	1234-44	SOCKET	FREE END OF ROPE
			
3/4"	216529	WEDGE	MAIN & AUX. DRUM WEDGE POCKET
			



The wrong cable wedge could permit the wire rope to work loose and detach itself from the drum; possibly causing property damage or personal injury.

Tension the wire rope by braking the shipping reel and slowly operate the winch in the raise mode to wind the cable onto the winch drum. As the spooling proceeds, make sure that adjacent turns are tight against one another. A lead or brass hammer may be used to tap the rope over against preceding turns. Tight winding on the drum is absolutely essential.



Never use a steel hammer or pry bar to move the rope over on the drum. These tools can easily damage the rope.

After the wire rope is wound onto the winch drum, reeve the cable as desired.

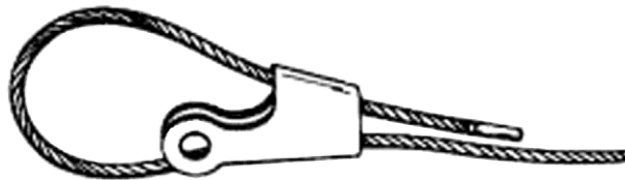
80-160 Assembly



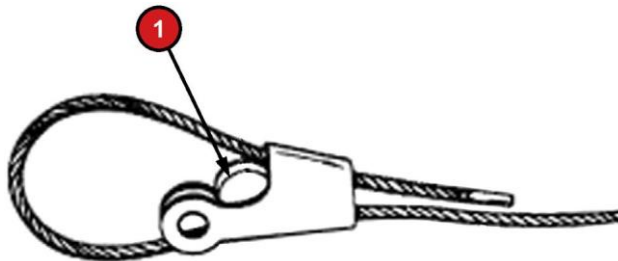
Use only factory supplied sockets, wedges and pins of the proper size; make no substitutions.

Follow the procedure below when installing wedge type sockets on wire rope. Be certain the correct socket and wedge are used.

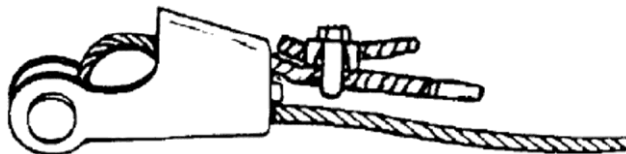
1. Lead the rope through the socket, form a large loop and draw the rope end back through the socket. A length of rope equal to at least one rope lay should be drawn back through.



2. Insert the wedge (1) and allow the rope strands to adjust around it.

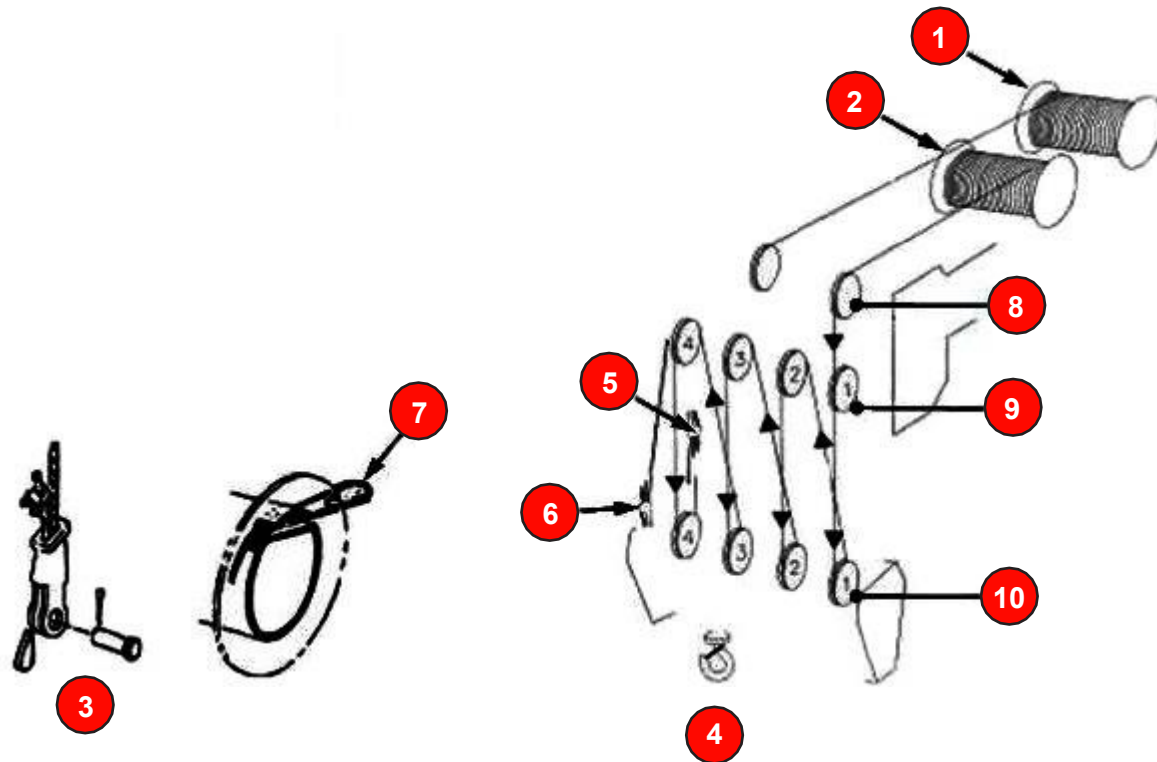


3. Seat the wedge and loop just tightly enough to allow handling by attaching the socket to a strong support and engaging the winch to take a strain on the rope.
4. Final seating of the wedge is accomplished by making lifts of gradually increasing loads. Avoid imposing shock loading on the rope until the wedge is firmly in place.



5. After the wedge has been firmly seated, a short length (6 inches) of the cable should be secured to the free end of the wire rope to act as a stop as shown. DO NOT clamp the free end to the load supporting end as this will weaken the rope and prevent the wedge from fully seating.

Hoist-Line Reeving



1	Auxiliary Winch	7	Winch Dead End
2	Main Winch	8	Idler Sheave
3	5 Sheave	9	Load Sheave
4	4 Sheave	10	Block Sheave
5	Dead End for Even Parts of Line		
6	Dead End for Odd Parts of Line		

80-160 Assembly



NOTE: Sheaves in Boom Head and Hook Block are Numbered from Left to Right as viewed from the Operator's Station. "D" indicates Pinned End of Rope.

PARTS OF LINE	BOOM HEAD (LOAD SHEAVE)	HOOK BLOCK (BLOCK SHEAVE)
1	1	D
2	1 D	3
3	1 4	3 D
4	1 4 D	14
5	1 2 3	2 4 D
6	1 2 4 D	2 3 4
7	1 2 3 4	2 3 4 D
8	1 2 3 4 D	1 2 3 4

These patterns represent some, though not all, of the options for reeving patterns for hookblocks. Always use a reeving pattern that allows the block to hang level.

When reeving the crane in preparation for any job, it should be kept in mind that hoisting and lowering speeds decrease as the number of parts of line increases. For the most efficient use of the crane, it is therefore desirable to use the minimum required number of parts for lifting the load as determined by referring to the load rating chart.

This crane incorporates a "Quick Reeving" boom head and block which do not require removal of the wedge and socket from the rope in order to change the reeving. Removal of two pins in the boom head and three in the hook block will allow the wedge and socket to pass through.



Never use less than the number of parts called for by the load rating chart.

If it is not practical to alter the reeving during the course of the work, the required number of rope parts must be determined on the basis of the heaviest load to be lifted during operations.

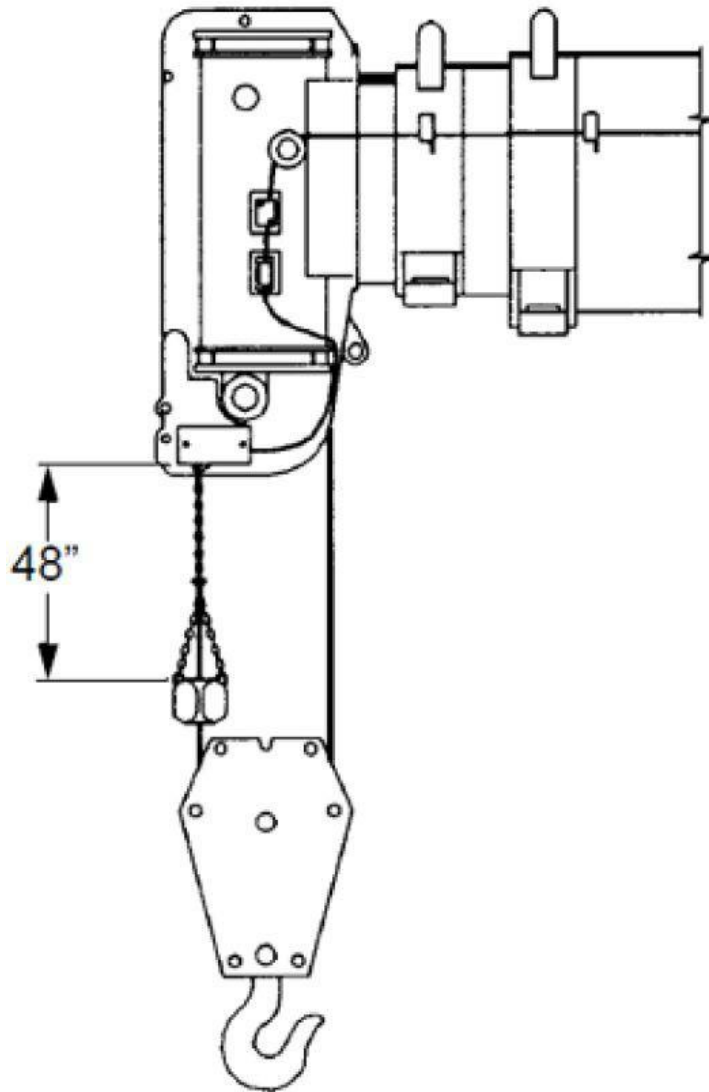
When the required number of rope parts has been determined, reeve the rope as shown on the previous page. Attach a wedge type rope socket (refer to Wire Rope User's Manual) to the wire rope dead end and secure it to either the boom peak or hook block as required.

Dead end the rope on the hook block for an odd number of line parts, and on the boom peak for an even number of parts.



NOTE: It may not be possible for the hook block to reach the ground if more than the minimum number of "parts of line" are used.

Attach the ATB weight to the ATB switch and to the first part of line as shown on the previous page. The ATB chain should be 48 inches long. Verify that the chain is not twisted or knotted after installation.



Test the ATB system by lifting the ATB weight. The light and audible alarms should be actuated in the cab and the boom down, boom extend, and winch up controls should disconnect.

As shipped from the factory, the crane has sufficient wire rope provided to allow the hook to reach ground level with any boom length and elevation when reeved with minimum parts of line required for the load being lifted. Refer to the Crane Capacity Chart for parts of line required.

Cable Reeving

CABLE REEVING When reeving the machine for any job, remember that hoisting and lowering speeds decrease as the number of parts of line increases. For the most efficient use of the machine, it is desirable to use the minimum number of required parts for lifting the anticipated loads.



Never use less than the number of parts called for by the load rating chart. The minimum required number of parts is determined by referring to the load rating chart.

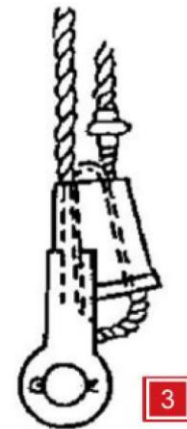
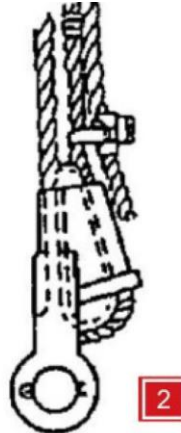
This machine incorporates a “Quick Reeving” boom head and block which do not require removal of the wedge and socket from the rope in order to change the reeving. Removal of two pins in the boom head and three in the hook block will allow the wedge and socket to pass through.



NOTE: *If a socket is changed or replaced, or if you are changing hook block weights, it is IMPORTANT to use the correct socket.*

Dead Ending Wire Rope in Socket

Below are shown the three different ways to dead end wire rope:



1	Loop Back Method	3	Special Clip Method
2	Extra Piece Same Size Rope Clipped to Main Rope Method		

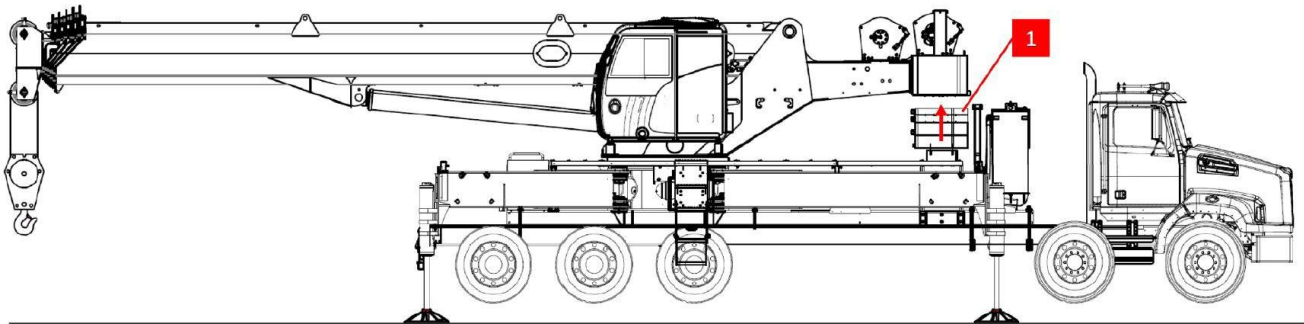
Counterweight Installation

INSTALLATION FROM FRAME DECKING TO MAIN COUNTERWEIGHT

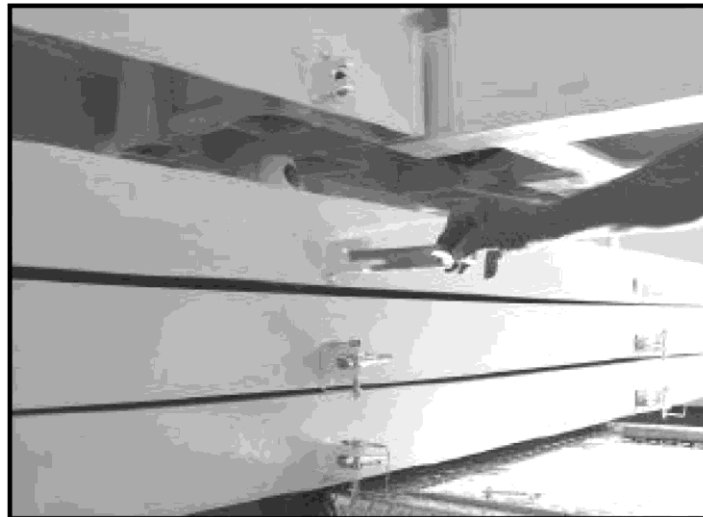


NOTE: The counterweight slabs are an integral part of this crane. When the crane is to be traveled at highway speeds, a portion of these slabs are intended to be moved to and carried on the counterweight supports on the deck of the crane in order to equalize the axle loading.

1. Lower the outrigger jacks to support the weight of the crane.
2. Rotate the upper to a position straight over the rear of the crane.



3. With the crane still running, move to a position on the decking facing the counterweight RAISE / LOWER switch item #1.
4. Insert the long horizontal pins and the locking pins into the top slab.



5. Remove the locking pins and long horizontal pins from the lower most slab that you wish to attach to the counterweight.



6. With engine idling slowly, press rocker switch to the “UP” position to raise the counterweight slabs tightly against the shell of the counterweight.
7. Install horizontal pins item #2 and locking pins item #3 on each side to attach the stack to the counterweight.



80-160 Assembly



Description Of Machine and Controls

Controls in the Cab



Upper Operator's Cab

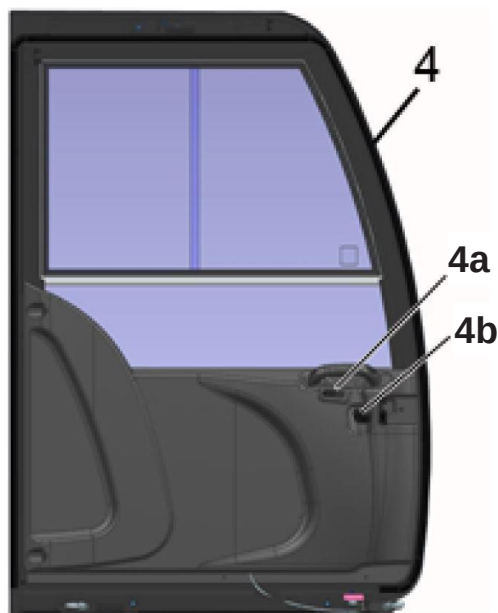
1. **Top Working Light** - press top part of switch to activate roof work lights.
2. **Front Working Light** - press top part of switch to activate the front working light.

80-160

Description Of Machine and Controls

3. **Windscreen Wiper**

4. **Sliding Door**



Sliding Door (Inside Controls)

4a - **Door Release Knob** - to unlock door from the closed position for exiting cab or to move the door to the open position.

4b - **Door Open Release Knob** - to unlock the door from the full open position, so door can be closed.

5. **GS Control Screen** - Refer to [\(Control Screens - page 115\)](#)

80-160

Description Of Machine and Controls

- 7. **HVAC VENT** - Air vents not only control direction, but also flow. They can be closed to direct air where needed most.
- 8. **Stereo Radio and CD Player (Option)**
- 9. **Dome Light**
- 10. **Storage Compartment**
- 11. **Beacon / Rotary Light (option)**



Beacon / Rotary Light (option)

12. **Cab Tilt Switch** - hold down upper part of switch and cab will tilt from 0° - 20°. Hold down lower part of switch to return tilt angle of cab to 0°.



Do not activate Cab Tilt Switch while swinging the upper structure. Due to hydraulic circuit being shared between Cab Tilt and Swing circuit, if Cab Tilt is activated while swinging, the swing will become jerky and load handling will become difficult to control.



KEEP CLEAR OF THIS AREA DURING CAB TILTING



Keep hands and feet clear of exterior operator's cab area during tilting. Sound horn before tilting cab to make personnel aware of cab movement.

80-160

Description Of Machine and Controls

13. Outrigger Extend / Retract switch

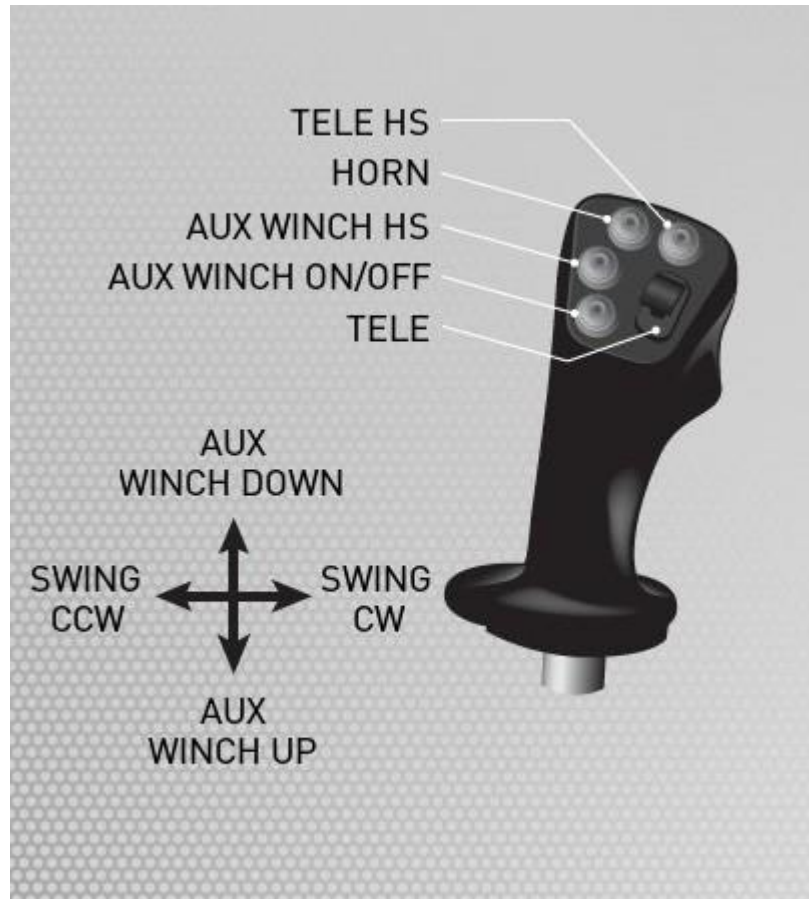


Outrigger Extend / Retract switch



Operator's Seat Controls

14. LH Control Lever



LH Control Lever

Accommodates the controls for turret slewing, release of the superstructure rotation brake, telescopic boom extension / retraction, auxiliary winch and two speed winch.

Safety switch device is in the L. H. armrest. Lowering the armrest will activate both joystick controls. Exiting and egress of cab the Left Hand armrest must be in the UP position to prevent accidental maneuvers.

Main Winch - Two Speed Switch - depressing the switch at the top will cause the winch speed to shift to HI SPEED mode and the red LED light will illuminate. Depressing the switch at the bottom will switch to normal LOW SPEED mode and red LED light will go off.

Winch Disable Switch - depressing the switch will engage the winch and green LED light will illuminate. Depressing the switch will disable the winch and the green LED light will go off.

Boom Telescope Switch - Pushing upward and forward on the rocker switch will extend the boom sections. Pulling downward on the switch will retract the boom sections.

OPERATION WITH ONLY ONE WINCH

- Push forward on center rocker switch to extend the boom sections. The speed of the boom extend is proportional to the throttle setting and movement of the switch.
- Pull back on center rocker switch to retract the boom sections. The speed of the boom retract is proportional to the throttle setting and movement of the switch.
- Move to the right to turn the turret clockwise. The swing speed is proportional to the throttle setting and movement of the joystick.
- Move to the left to turn the turret counterclockwise. The swing speed is proportional to the throttle setting and movement of the joystick.

When the hand control is in the middle position (e.g. boom extension and turret clockwise rotation) the two functions are activated at the same time.

OPERATIONS WITH AUXILIARY WINCH (optional)

- Push "AUX WINCH ON/OFF" to "DISABLE" the Auxiliary winch, LED green light will come "ON", winch function will be disabled. The Auxiliary winch function when it is not being utilized prevents damage to the cable when it is on the winch, but not rigged over the boom head. (e.g. cable tied off to winch drum, etc)
- Depress switch to change Auxiliary winch speed to "HI", LED red light will come "ON" and Auxiliary winch wire rope take in and pay out speed will be in "HIGH" speed mode.
- Move to the right to turn the turret clockwise
- Move to the left to turn the turret counterclockwise
- Pull back to lift the load with the auxiliary winch
- Push forward to lower the load with the auxiliary winch



Release the main or auxiliary winch rope when extending the boom to prevent the hoisting block head from tripping the limit stop device. Failure of this device can result in serious damage to the boom head or telescopic extension and the rope. The rope could break causing the load to drop, with resulting serious damage or fatal accidents.

Internal to the handle is a thumper indicator that is felt by the operators hand to assist in the speed the winch drum is traveling when the Auxiliary winch joystick is moved forward or backward.

Manual superstructure rotation brake release switch

To release the friction swing brake manually and allow self-alignment of the boom end vertically over the center line of the load being lifted, flip the **Swing Brake Switch** on the right armrest.



Do not change the winch speed if the winch joystick is not in the neutral position and the drum is turning.

15. RH Control Lever



RH Control Lever

The RH joystick commands load lifting and lower with the main winch, raising and lowering the telescopic boom, two speed winch control, winch disable and horn.

- Push WINCH DISABLE switch to “DISABLE” the Main Winch, LED green light will come “ON”, winch function will be disabled. The Main winch function when it is not being utilized prevents damage to the cable when it is on the winch, but not rigged over the boom head. (e.g. cable tied off to winch drum, etc.)
- Push TWO SPEED WINCH switch to change Main winch speed to “HI”, LED red light will come “ON” and Main winch wire rope take in and pay out speed will be in “HIGH” speed mode.
- Push joystick forward (MAIN WINCH DOWN) to lower the load with the main winch. The winch wire rope speed for lowering the load is proportional to the throttle setting and movement of the joystick.
- Pull back joystick (MAIN WINCH UP) to lift the load with the main winch. The winch wire rope speed for raising the load is proportional to the throttle setting and movement of the joystick.
- Move the joystick to the left (BOOM UP) to raise the boom. The boom raising is proportional in speed to the throttle setting and movement of the joystick.
- Move the joystick to the right (BOOM DOWN) to lower the boom. The boom lowering is proportional in speed to the throttle setting and movement of the joystick.

When the joystick control is in the middle position (e.g. load and boom lowering) the two functions are activated at the same time.

Internal to the joystick handle is a thumper indicator that is felt by the operators hand to assist in the speed the winch drum is traveling when the MAIN WINCH joystick is moved forward or backward.

16. **Seat Controls** - see Operators Seat Controls Section.



DO NOT COMBINE OPPOSITE FUNCTIONS. (Example: retracting one outrigger beam while simultaneously extending another, or lowering one vertical cylinder while simultaneously raising another).

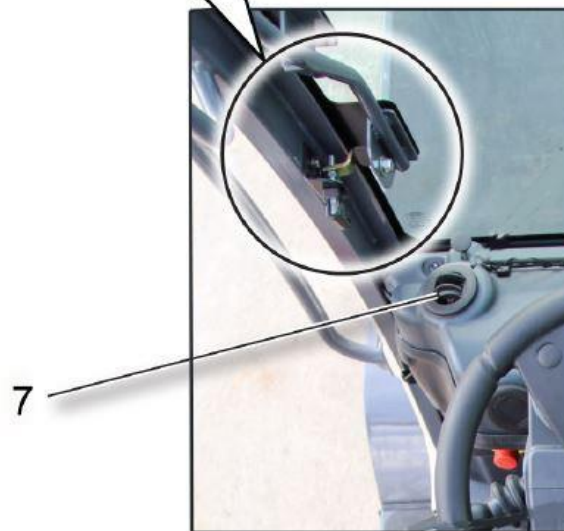
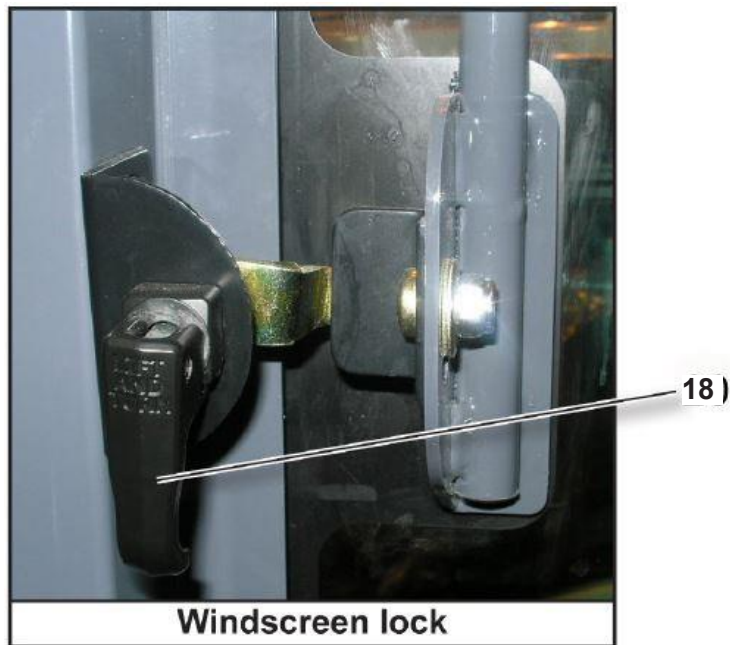


Be sure the machine is perfectly stabilized before handling loads. Check the spirit level in the Greer Element VGA screen frequently to ensure leveling adjustment is correct.

17. **Roof Hatch Lock Handle** - retain control of both raise / lower handles when unlatching (19) until hatch is fully open. Pull down on both handles when closing hatch and rotating (19) lock handles. Keep head clear when pulling hatch down.

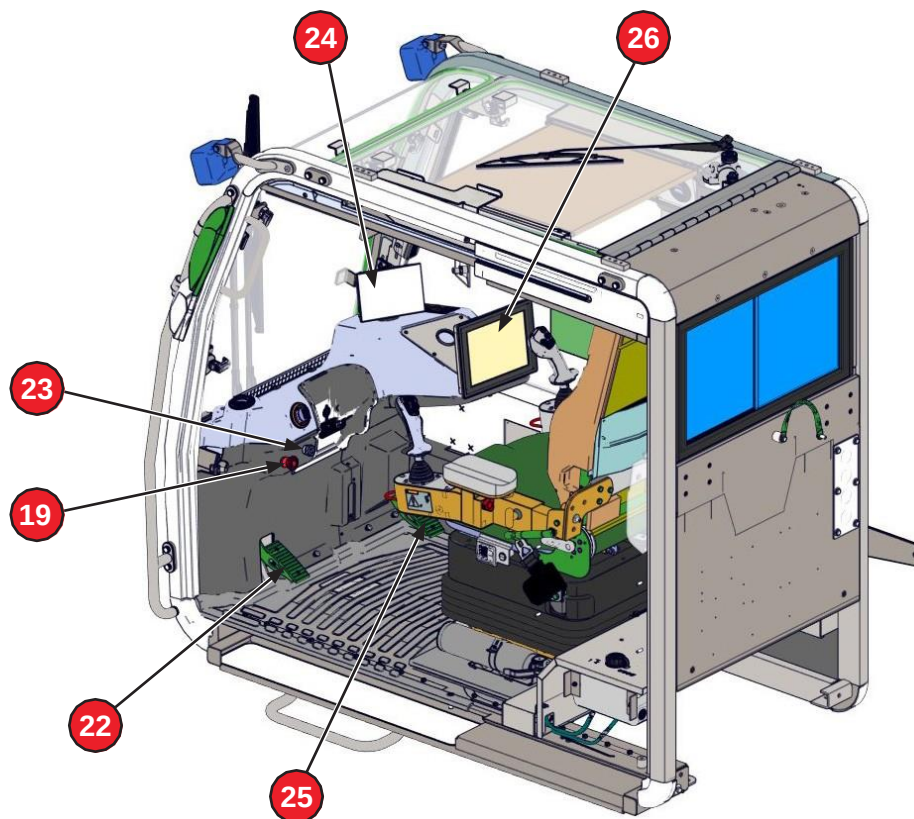


18. Windscreen Lock



80-160

Description Of Machine and Controls



Cab Interior Controls

19. **Emergency Stop Button** - Push to stop Engine operation. Push in on red button and rotate clockwise to reset button prior to restarting engine.
20. **Fire Extinguisher** - The fire extinguisher is mounted inside the operator's cab next to the seat base accessible from the outside of the cab with the door in the open position or from the seated position inside the cab.



20a

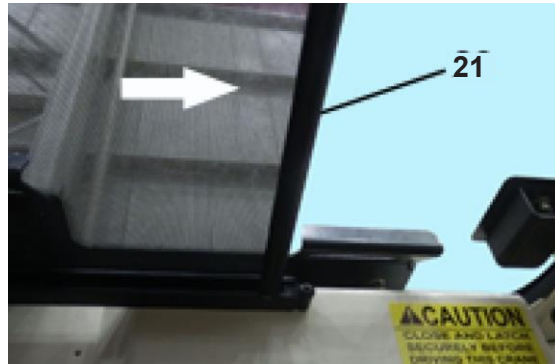
20b

20

20a - **Gauge** - check daily to verify the charge level needle is in the “Green” zone.

20b - **Release Latch** - lift latch to remove extinguisher from mount.

21. **Roof Sunshade**



Roof Sunshade

22. **Swing Brake Pedal** - depress pedal to apply swing brake.

23. **Ignition Key Switch**

24. **Engine Display Monitor**

25. **Accelerator Pedal** - depress to increase engine RPM.

26. **GS Control Screen** (see page 115)

Upper Controls and Instruments

Operator's Seat Controls



1. **Seat Control Arm (Down Position)** - When arm is in “DOWN” or horizontal position, engine running, the joystick control is “live”. Use lift handle on arm to rotate arm to “UP” position when entering or exiting the cab.



Warning: Do not enter or exit the cab with the arm in the “DOWN” or horizontal position, joystick control is “LIVE” in this position when engine is running.

2. **Seat Control Arm (Up Position)** - When arm is in “UP” or vertical position, engine running, the joystick control is “OFF”. The arm must be in this position to enter or exit the cab. Use lift handle on arm to lower into position once operator is seated.



1. **Armrest Adjustment Knob** - Loosen knob and position armrest can be adjusted up / down to operator's preference. Retighten knob to lock in position setting.
2. **Arm-Fore / Aft Adjustment Knob** - Loosen knob and arm will slide forward or rearward so joystick can be comfortably positioned to operator's preference. Retighten knob to lock into position.
3. **Backrest Angle Control Lever** - Lift lever to release backrest angle locking mechanism, and position to preferred angle and release lever. Seat backrest can be folded completely forward onto seat base for access to heater or windshield washer bottle behind seat.

4. **Retractable Seat Belt** - Before operating crane, attach seat belt. Lift RH arm to up position will allow easier access for latching or unlatching seat belt. Press red button on seat belt to unlatch and exit seat and cab.
5. **Heated Seat Control Switch** - Rocker switch in "OFF" position (no LED light), "ON"-Low Heat (LED light-Green), "ON"-Hi Heat (LED light-Red). Press switch to "OFF" position when engine is not running to prevent any battery drain.
6. **Lumbar Switch** - Press top part of rocker switch to inflate the seat backrest lumbar.
7. **Height Adjustment** - Press top part of rocker switch to "Raise" seat base height. Keep weight off the base until height position is obtained as air system will not raise the operator. To lower height, press lower part of rocker switch while remaining seated.
8. **Seat Fore / Aft Slide Bar** - Lift on bar and push forward or backward to adjust seat location in relation to foot controls. Release bar when preferred position is obtained.
9. **Heat Adjustment Louver** - Heat output can be controlled to feet by adjusting wheel on louver.

Control Screens

This section is intended to familiarize the operator with the control screens provided for the operation of this machine.



Home Page Screen

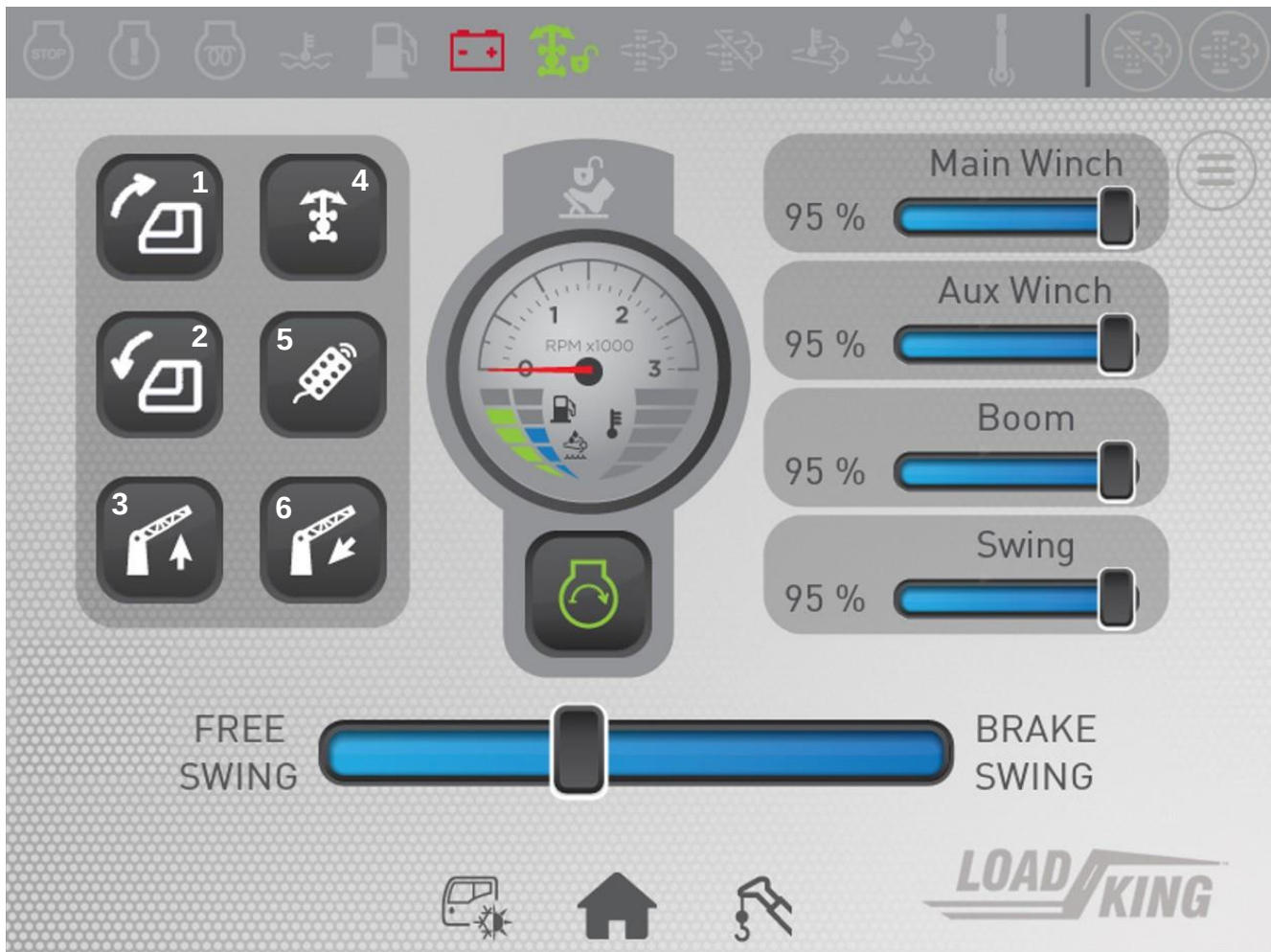
- | | |
|---------------------------------|----------------------------|
| 1. Cab Controls (pg. 116) | 7. Diagnostics |
| 2. Outrigger Controls (pg. 125) | 8. Lifting Screen (pg 117) |
| 3. Manuals | 9. Engine Information |
| 4. Unit Information | 10. Fuse Box |
| 5. Joystick Controls | 11. Hydraulic Information |
| 6. Tools Menu | 12. Users |

Note: For more information, refer to the GS manual provided with your unit.



Cab Controls Screen

- | | |
|-------------------------|--------------------------------|
| 1. Power | 10. Lights |
| 2. Heat | 11. Roof Wiper Speed Decrease |
| 3. Defrost | 12. Roof Wiper Speed Increase |
| 4. Air Conditioning | 13. Roof Washer |
| 5. Fan Speed Decrease | 14. Front Wiper Speed Decrease |
| 6. Fan Speed Increase | 15. Front Wiper Speed Increase |
| 7. Temperature Decrease | 16. Front Wiper Speed Decrease |
| 8. Temperature Increase | 17. Front Wiper Speed Increase |
| 9. Beacon Light | 18. Front Washer |



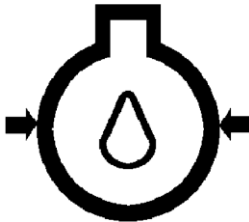
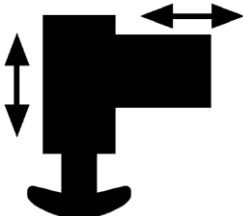
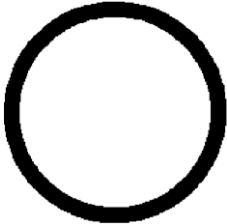
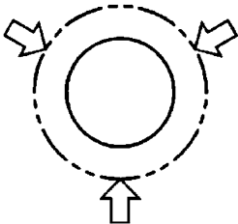
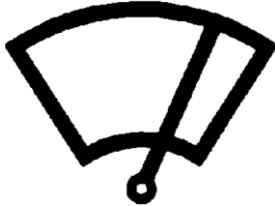
Lifting Controls Screen

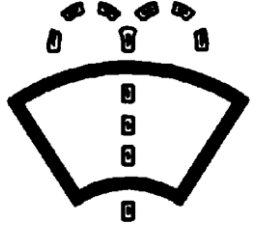
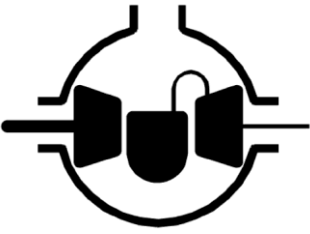
1. Cab Tilt Raise
2. Cab Tilt Lower
3. Jib Stow Assist Extend
4. House Lock Engage/Disengage
5. Remote Control Enable
6. Jib Stow Assist Retract

Universal Symbol Identification

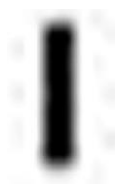
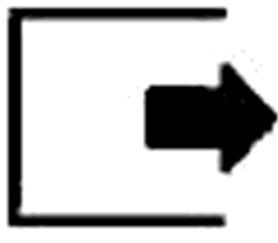
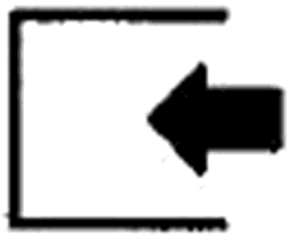
This section is intended to familiarize the operator with the controls and instruments provided for the operation of this machine. It should be emphasized, however, that merely knowing the controls is inadequate preparation for operating hydraulic cranes. Do not attempt to operate the machine until the other sections of this manual have been covered. Sections 1 and 3 are especially important with respect to machine operation.

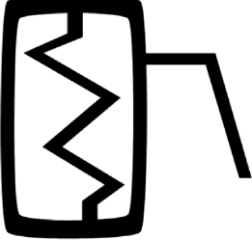
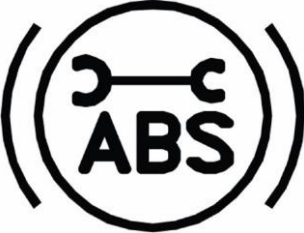
Diagrams of the various carrier and upper controls are illustrated on the following pages. A list of these controls and instruments are shown opposite each illustration. More detailed explanations of each control or instrument follow in the same order as they appear in the number key.

FLOODLIGHTS 	PARKING BRAKE 	ENGINE OIL PRESSURE 
ELECTRICAL ACCESSORIES 	OUTRIGGERS 	COOLANT TEMPERATURE 
ELECTRICAL SYSTEM OFF 	AIR PRESSURE 	WIPER 

ELECTRICAL SYSTEM ON 	HEADLIGHTS 	WASHER 
IGNITION ON 	FAST 	ENGINE DIAGNOSTIC 
IGNITION 	SLOW 	INCR / IDLE ADJ INCREASE 
AXLE DISENGAGE / RANGE SHIFT 	INCR / IDLE ADJ DECREASE 	KEY - ACC 

80-160
Description Of Machine and Controls

ENGINE STOP 	KEY - OFF 	DIFF LOCK OFF 
HIGH SPEED REAR AXLE 	KEY - ON 	KEY SWITCH 
LOW SPEED REAR AXLE 	KEY - START 	PTO OUT 
DIFF LOCK ON 	PTO IN 	ENGINE WARN 

MIRROR HEAT 	SUSPENSION RAISE / LOWER 	TAG AXLE LIFT 
ABS-DIAGNOSTIC 		

Power Take-Off

Disengage PTO before driving truck. Failure to do so will cause damage to the transmission and hydraulic pump.

Transmission Mounted, Electric Clutch Shift**PTO's Allison Transmission****Eaton Fuller Manual Transmission**

To Engage PTO

1. Set parking brake.
2. Shift transmission to neutral
3. Engage PTO with rocker switch on dash (item 1 as shown below).

To Disengage PTO

1. Store boom in boom rack.
2. Store outriggers.
3. Disengage PTO with rocker switch on dash.
4. Shift transmission into gear (if necessary).
5. Release parking brake (if necessary).

Split Shaft Mounted, Electric Clutch Shift (PTO gearbox mounted in drive**line) Eaton Fuller Manual Transmission**

To Engage PTO

1. Set Parking Brake.
2. Shift Transmission to neutral (N).
3. Engage PTO with rocker switch on dash (item 1 as shown below). This also disengages the rear axle.
4. Shift transmission into highest gear.

To Disengage PTO

1. Store boom in boom rack.
2. Store outriggers.
3. Shift transmission to neutral.
4. Disengage PTO with rocker switch on dash. This also re-engages rear axle.
5. Shift transmission into gear (if necessary).
6. Release parking brake (if necessary).



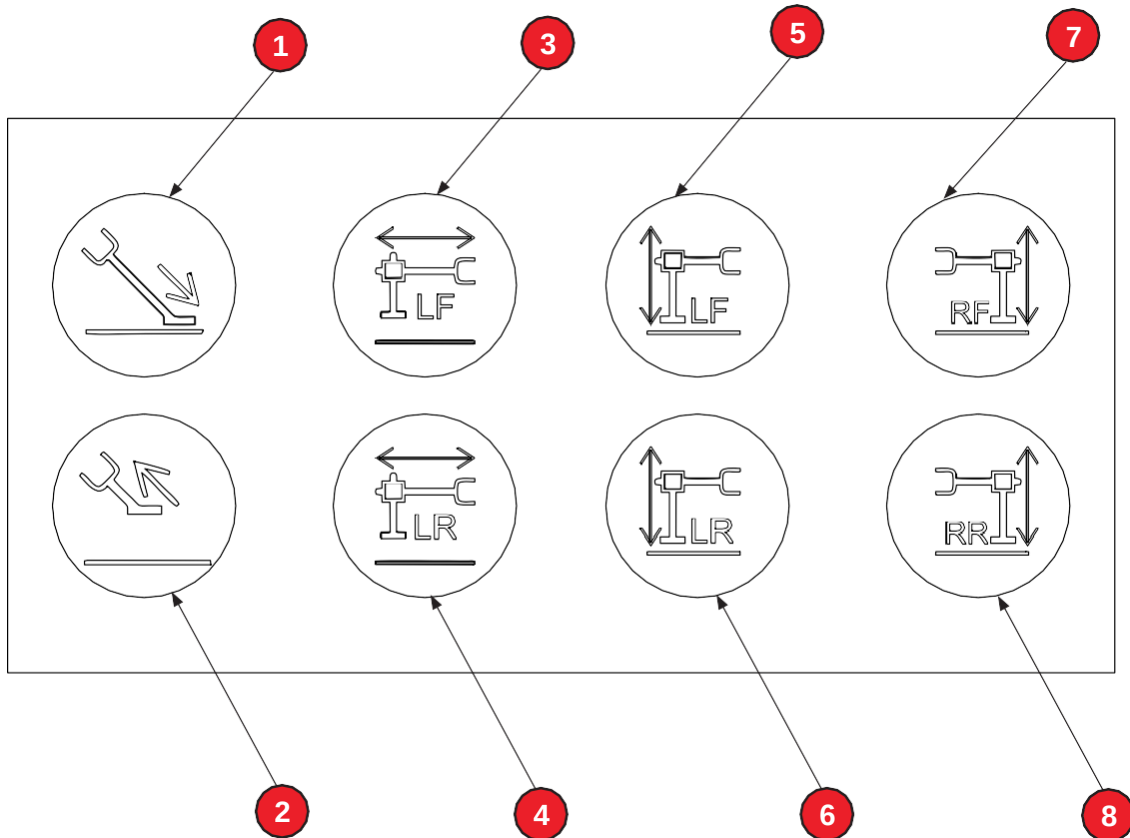
1. PTO Engage Switch

Carrier Controls and Instruments

OUTRIGGER CONTROL BOX-Carrier Frame



Notice: When deploying outriggers, raise evenly on all jacks. Do not extend rear jacks alone without extending front jacks or damage can result to the cranes frame structure.

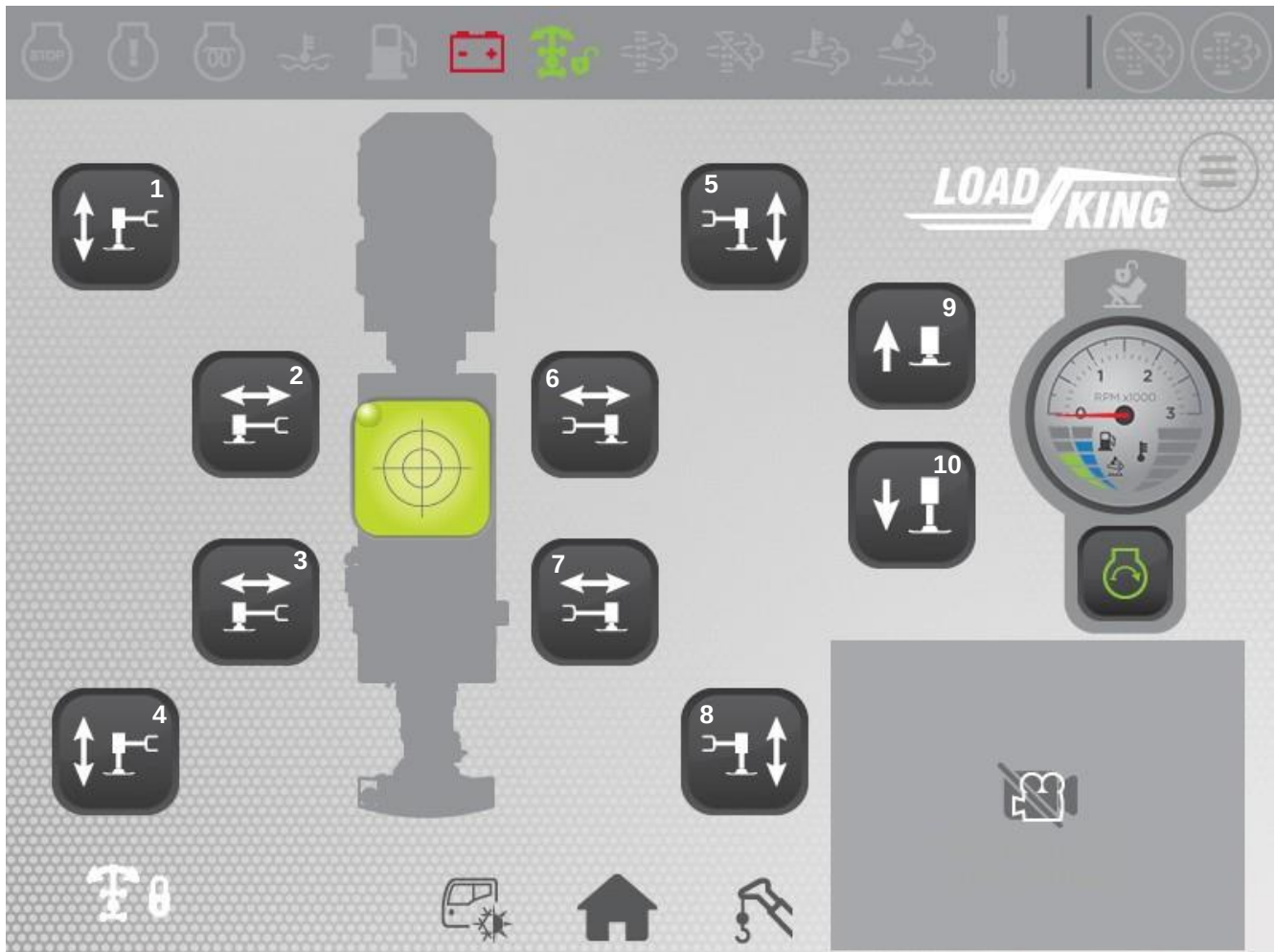


1. EXTEND SWITCH: This switch is used to extend the outrigger. When activated the backlight is GREEN.	5. FRONT LEFT JACK SWITCH: This switch is used to extend/retract the jack.
2. RETRACT SWITCH: This switch is used to retract the outrigger. When activated the backlight is BLUE.	6. REAR LEFT JACK SWITCH: This switch is used to extend/retract the jack.
3. FRONT BEAM SWING OUT / IN SWITCH: This switch is used to swing out the beam.	7. FRONT RIGHT JACK SWITCH: This switch is used to extend/retract the jack.
4. REAR BEAM SWING OUT / IN SWITCH: This switch is used to swing out the beam.	8. REAR RIGHT JACK SWITCH: This switch is used to extend/retract the jack.



NOTE: Outrigger Control Box is located on both driver and passenger side of vehicle.

OUTRIGGER CONTROLS SCREEN



Outrigger controls screen

- | | |
|----------------------|----------------------|
| 1. C.S. Front Jack | 6. S.S. Front Extend |
| 2. C.S. Front Extend | 7. S.S. Rear Extend |
| 3. C.S. Rear Extend | 8. S.S. Rear Jack |
| 4. C.S. Rear Jack | 9. Retract Function |
| 5. S.S. Front Jack | 10. Extend Function |

To operate the outriggers, select the desired function from items 1-8, then use item 9 or 10 to extend or retract the selected function

Side-Stow Jib

DESCRIPTION

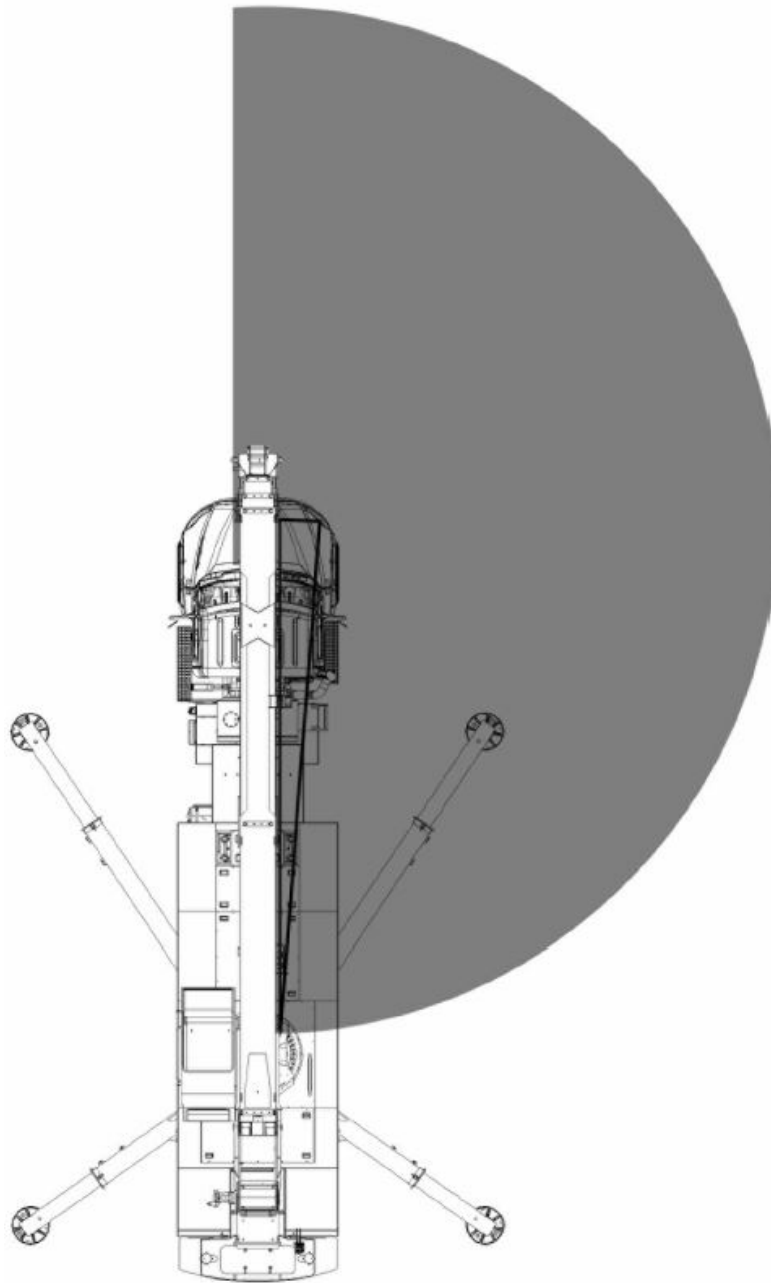
A optional jib extensions is available to provide additional boom reach.

The jib is a 30-58 ft. (9.1m - 17.67m) side stow swing-on. It is a bi-fold with a lattice section and a tubular section. Total Weight: 2,400 lbs. (1089 kg)

The optional jib extension is pinned directly to the ends of the sheave pins. When not in use, the jib can be unpinned from the boom head and stored on mounting brackets on the right side of the boom base section.

See **Erecting the Jib** under **Assembly** topic.

See **Stowing the Jib** under **Disassembly** topic. **Jib Swing Path - Erecting & Stowage**



Before stowing the jib, ensure that no personnel or obstacles are in the swing path of the jib.

Rated Capacity Indicator and Anti-Two-Block

Rated Capacity Indicator System

The Load King Boom Truck is equipped with the Greer Insight Rated Capacity Indicator System. The operator is provided with a continuous readout of rated capacity, approach to overload, and two-block condition. Refer to the Greer operation and setup manual, located in back of this manual, for proper maintenance and setup of unit.

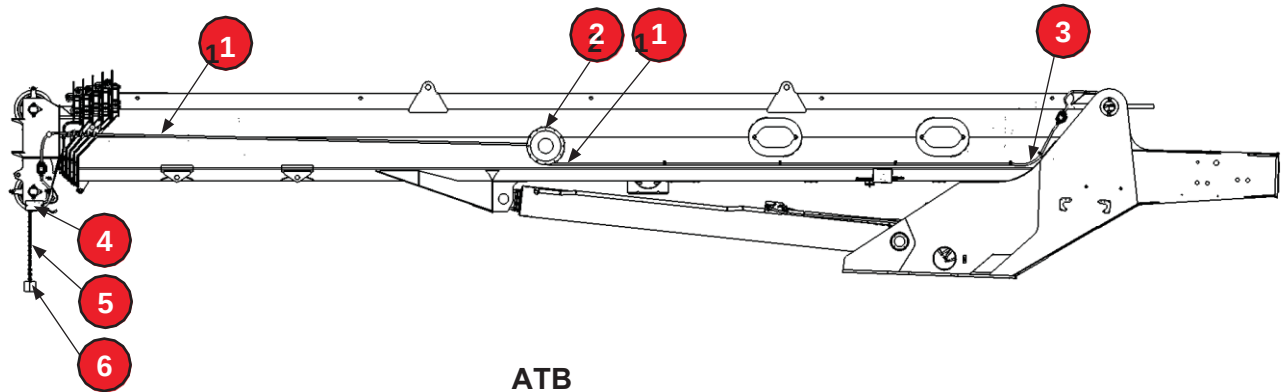
Anti-Two-Block Components

CABLE REEL

The ATB cable is wound onto a spring loaded cable reel which is bolted to the left side of the boom base. The reel allows the cable to pay-out and pay-in as the length of the boom is changed. The cable reel has slip rings which allow electric current to flow even while the reel is turning. This cable and reel assembly is also used to measure boom extension when the Boom Truck is fitted with a RCI system.

LIMIT SWITCH

An ATB switch is mounted on the left side of the boom tip. The switch is normally open. During operation the switch is held closed by a counterweight suspended from the switch lever by a chain. The closed limit switch allows current to close the relay in the junction box in the mainframe. When the load block (or downhaul weight) is lifted too high, it will lift the counterweight. This action will cause the limit switch to open, breaking the circuit to the relay. This, in turn, de-energizes the coil on the unloader block assembly.



ATB

1	ATB Wire	4	ATB Switch
2	ATB Reel	5	ATB Chain
3	ATB (to collector ring)	6	ATB Weight



The Greer VGA ELEMENT is designed as an aid. Refer to Maximum Load chart for proper areas of operation.

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Pre-Start Inspection

The following items should be checked each day before start-up and the start of operations. Also see [“Daily Check.” on page 138.](#)

ENGINE OIL

The level should be at the full mark.

COOLANT

The level should be near the bottom of fill neck in coolant tank when cold.

DIESEL EXHAUST FLUID

Check diesel exhaust fluid (DEF) or Urea tank level is full. An illuminated Warning on dash or Check Engine light will indicate a low level. (Tier 4 engine models only)

LEAKAGE

Make a ground check below the machine for signs of leaks. See Hydraulic Hose topic in Maintenance section.

FUEL

Fuel for the engine and for upper unit heater should be adequate for sustained operations.

LUBRICATION

Perform the daily lubrication as required in the Lubrication Recommendations. Lubricate cylinder mounting bushings, and pins.

LINES AND BLOCKS

Inspect the hoist lines, hoist block and ball hook, and the crane attachment in general for readiness.

SAFETY EQUIPMENT

Check the safety equipment, including all lights, brakes, and hazard warning devices.

TIRES

The tires should be checked for proper pressure before traveling the machine. The tires should only be checked when cold. Refer to the Tire Pressure Chart in the operator's cab.

WHEEL NUTS

Torque all lug nuts to carrier chassis supplier recommendations. Check tightness daily during the first 50 miles of service on new units and any time the wheels have been removed. Ensure proper alignment of tire and rim assemblies.

80-160 Inspection

GENERAL CONDITION

Inspect the machine in general for wear, leakage, and damage.

AIR TANKS

Open the air tank drain cocks to blow out moisture and sediment.

FUEL FILTER

See carrier chassis supplier recommendations for service. See also, [“Daily Check.” on page 138.](#)

Anti-Two-Block SYSTEM

Inspect all ATB switches found on boom, jib, and auxiliary sheave heads for damage. Check the freedom of counterweight attached to these switches; and also, that counterweight is attached around correct line of hoisting cable in the proper manner. Inspect all electrical connections and wires as well as the entire length of cable attached to the cable reel and its connections for evidence of excessive wear, damage, or improper installation. Check spring loaded cable reel for proper tension and to insure that reel is free to rotate. Verify visual and audible warning devices by lifting each of the counter weights.

This crane is equipped with a disconnect system on the control linkages. A check of this system should be made prior to lifting. Hoist the hook block to the boom point so that actual contact between block and ATB counterweight is made. If all functions are operating properly, winch hoisting will cease and the boom cannot be extended or lowered. Should any of these functions continue, disconnect system is functioning improperly and a complete system check must be made. Boom raise, boom retract, and winch downfunctions remain active and will be unaffected by ATB system.



When performing disconnect test, care should be taken as damage may result if disconnect system malfunctions and the hook block is drawn into the boom point.

PUMP DISCONNECT

See Power Take-Off topic in Description of Machine and Controls section of the manual.

Suggested Hydraulic Crane Inspection Checklist

This check list is to be used in addition to the information provided in this manual to properly operate and maintain the machine.

ITEMS TO BE INSPECTED & CHECKED	INSPECTION CODE	SATISFACTORY	ADJUST	REPAIR
* VISUAL INSPECTION (Complete Machine)	D			
* Inspect OVERALL machine (including carrier) for cracks, weld separation, leaks, damage, and vandalism.				
HYDRAULIC SYSTEM (**Leaks or Damage)	D, A			
**See Hydraulic Hose topic in Maintenance section				
OVERALL CLEANLINES	D			
AIR SYSTEM (Leaks or Damage)	D			
HYDRAULIC FLUID	D			
TRANSMISSION FLUID LEVEL	D			
ENGINE CRANKCASE FLUID LEVEL	D			
FUEL TANK FLUID LEVEL	D			
RADIATOR FLUID LEVEL	D			

80-160
Inspection

ITEMS TO BE INSPECTED & CHECKED	INSPECTION CODE	SATISFACTORY	ADJUST	REPAIR
MACHINE LUBRICATION	D			
ATTACHMENT PIN BOLTS	D			
MUFFLER / EXHAUST SYSTEM	D			
ALL CONTROL MECHANISMS	D			
INSTRUMEN T GAUGES	D			
CLUTCHES & BRAKES	D			
WIRE ROPE, SHEAVES & GUARDS	D			
TWO BLOCK DAMAGE PREVENTIO N SYSTEM	D			
LOAD SUPPORTING COMPONENT S CONDITION	D			
FIRE EXTINGUISHE R	D			
BACKUP ALARM	D			
BOOM ANGLE INDICATOR	D			
HEAD/TAIL / BRAKE LIGHTS & 4 - WAY FLASHERS	D			

ITEMS TO BE INSPECTED & CHECKED	INSPECTION CODE	SATISFACTORY	ADJUST	REPAIR
HORN	D			
PROPER CABLE SPOOLING	D			
WEDGE SOCKET S	D			
AXLE FLUID LEVEL	W			
SWING REDUCER FLUID LEVEL	W			
DRIVE SHAFTS & U JOINTS	W			
TIRE & WHEEL CONDITION & INFLATION PRESSURE	W			
AIR REGULATORS	W			
AIR CLEANER ELEMENT	W			
CLUTCH & BRAKE LINKAGE & PINS	W			
WHEEL LUG NUT TORQUE	W			

80-160
Inspection

ITEMS TO BE INSPECTED & CHECKED	INSPECTION CODE	SATISFACTORY	ADJUST	REPAIR
FAN BELT TENSION	W			
STRUCTURAL MEMBERS & WELDS	W			
BOOM INSPECTION	W			
BATTERIES & STARTING SYSTEM	M			
TRANSMISSION FILTER	P			
ENGINE OIL FILTER	P			
ENGINE FUEL FILTER	P			
SWING BEARING BOLT TORQUE	P			
MACHINERY GUARDS	P			
LOAD CHART & SAFETY WARNINGS	P			
INSPECTION CODE INTERVALS	D - DAILY W - WEEKLY M - MONTHLY A - ANNUALLY P - PERIODIC			



NOTES:

1. Indicate inspection result by checking in the satisfactory, adjust, or repair boxes provided.
2. When appropriate, enter your diagnosis on back of page for repairs or adjustments made.

80-160

Inspection

Daily Check (8Hours)

- ☐ Perform Daily Lubrication
- ☐ Check Hydraulic Reservoir Fluid Level
- ☐ Fill Fuel Tank
- ☐ Check Engine Oil Level
- ☐ Check Coolant Level
- ☐ DEF Aftertreatment Fluid (Urea) Tank Level (Tier 4 engines only)
- ☐ Check Hydraulic Cylinder Mounting Bushings and Pins
- ☐ Check Hydraulic Components including hoses. (See the Hydraulic Hose topic in Maintenance section of this manual).
- ☐ Check Transmission Oil Level
- ☐ Drain Fuel Filters or Water Separator
- ☐ Check Boom Front Slider Pads
- ☐ Check Boom Chains And Ends
- ☐ Drain Air Tanks
- ☐ Check Wire Rope and Related Components
- ☐ Check Air Cleaner
- ☐ Check Controls
- ☐ Check Instruments, Gauges, Lights, & Safety Equipment
- ☐ Make Overall Visual Inspection
- ☐ Check Anti-Two-Block System
- ☐ Check Engine Manufacturer's Manual for additional Maintenance Requirements
- ☐ Ensure Swing Brake is able to hold against full Torque of Swing Motor

Weekly Check (40Hours)

- ☐ Perform The Daily Check
- ☐ Perform Weekly Lubrication
- ☐ Check Swing Reducer Oil Level
- ☐ Check Axle Oil Level (after initial change)
- ☐ Check Battery Condition
- ☐ Check Tire Pressure And Condition
- ☐ Check Air System Safety Valve
- ☐ Check Torque on Wheel Lug Nuts
- ☐ Check Hydraulic Cylinders and Rods
- ☐ Make Thorough Inspection of Wire Rope
- ☐ Visually Inspect all Structural Members and Welds For Cracks, Alignment and Wear
- ☐ Check Boom For Wear Cracked Welds, Alignment and Missing or Illegible Decals
- ☐ Check Engine Manufacturer's Manual for additional Maintenance Requirements
- ☐ Clean Machine Weekly if Salt Covered to Prevent Rust and Corrosion

80-160

Inspection

Monthly Check (80 hours)

- ☐ Perform Daily and Weekly Checks
- ☐ Perform Monthly Lubrication
- ☐ Check Engine Belts
- ☐ Check Hydraulic Reservoir for Moisture
- ☐ Check all Slider Pads
- ☐ Have Hydraulic Oil sample Analyzed
- ☐ Clean Radiator & Oil Cooler Exterior
- ☐ Check Engine Manufacturer's Manual for additional Maintenance Requirements

Quarterly Checks (250Hours)

- ☐ Perform Daily, Weekly and Monthly Checks
- ☐ Perform Quarterly Lubrication
- ☐ Drain Fuel Tank of Water and Sediment if necessary
- ☐ Check Brake Shoes for Wear Condition
- ☐ Change Transmission Oil and Shift Air Filter
- ☐ Change Hydraulic Return Line Filters
- ☐ Replenish Cooling System Corrosion Inhibitor (refer to engine manufactures manual)
- ☐ Check Engine Manufacturer's Manual for additional Maintenance Requirements
- ☐ Lubricate Valve Disconnects
- ☐ Clean and Wax all Exterior Painted Surfaces

Semiannual Checks (1000Hours)

- ☐ Perform Daily, Weekly, Monthly and Quarterly Checks
- ☐ Perform Semiannual Lubrication
- ☐ Clean Crankcase Breather
- ☐ Check Hydraulic Reservoir Relief Valve
- ☐ Clean Hydraulic Reservoir Intake Suction Filter
- ☐ Check Air Dryer Desiccant for Signs of Oil Accumulation
- ☐ Change Power Steering Filter Element
- ☐ Check Hydraulic Relief Valve Pressure Settings
- ☐ Torque Swing Bearing Bolts
- ☐ Check Engine Manufacturer's Manual for additional Maintenance Requirements
- ☐ Check all adjustments specified in the "Service / Parts" section of this manual and any vendor manuals supplied

Annual Check (1500 - 2000 Hours)

- ☐ Perform Daily, Weekly, Monthly, Quarterly and Semiannual Checks
- ☐ Perform Annual Lubrication
- ☐ Disassemble Winch and Inspect
- ☐ Drain And Clean Hydraulic Reservoir
- ☐ Change Hydraulic Fluid (unless checked by oil analysis).
- ☐ Drain and Refill the Winch Lubricant
- ☐ Change Axle Oil
- ☐ Check the hose lines (see Hydraulic Hose topic in the Maintenance section of this manual).

80-160 Inspection

Crane Boom

MAIN BOOM INSPECTION & MAINTENANCE PROCEDURE

Task	Action
• Broken wire rope or cut strands.	Replace
• Corrosion of wire rope.	Replace
• Wire rope kinking, crushing, un-stranding, bird caging, main strand displacement or core protrusion.	Replace
DAILY	
• Check the sheaves for wear.	
• Check pins for cracks.	
• Lubricate the wire ropes.	
• Clean the wire ropes.	
EVERY 50 HOURS	
• Lubricate the hook block.	
EVERY 250 HOURS	
• Lubricate the slides.	
• Lubricate the main boom head.	
• Lubricate sliding surfaces.	
EVERY 1000 HOURS	
• Check the sheaves roller bearings or bushings and are properly lubricated.	
EVERY 1500 HOURS	
• Check wear pads, shims & wear pad fasteners.	Replace as req'd
• Check chains for adequate lubrication.	
• Check for corrosion of fasteners.	
EVERY 4 YEARS	
• Visually inspect extension & retraction ropes.	Disassemble Boom ¹
• Check chains for wear.	Disassemble Boom ¹
• Check cable anchors for corrosion or cracking.	Disassemble Boom ¹
• Clean boom sections and remove internal grease and re-grease with specified lubricant.	Disassemble Boom ¹
• Sheave pins check for corrosion and wear.	Disassemble Boom ¹



NOTES: *The disassembly of boom is a recommendation for proper inspection related to wear, corrosion, cracks or breakage of components. If crane is used in a highly corrosive environment due to salts or chemicals, then inspection and maintenance intervals should be more frequent than shown above.*

WEEKLY:

STRUCTURAL MEMBERS AND WELDS Visually inspect all structural members and welds including (but not limited to) the extended boom for straightness, roller (or pad) adjustment, and cracks. Pay special attention to the longitudinal welds joining the top, side and bottom plates. Check the welds attaching the jib ears to the boom head and the welds attaching the boom head to the tip section. Inspect the cylinder attaching supports and the boom pivot area.

Inspect the superstructure welds, the welds on the hoist cylinder supports and the welds between the bottom mounting plate and the vertical plates. This is especially important if the machine is being used extensively in clamshell, concrete pouring, headache ball, or other high duty cycle applications.

On the carrier, inspect the swing bearing weld band and supporting header welds. Check the welds attaching the outrigger box to the frame, outrigger box ends at the collar, jack cylinder mounting tube, and the beamwelds.

Visually inspect all boom sections at least weekly or every fifty (50) hours, whichever occurs first. Preparatory to making the inspection, set the outriggers and rotate the upper to an area where the boom can be fully lowered and extended.

With the boom fully lowered and extended, visually inspect the sides, top and bottom of each section for any unusual deformation, scrubbing, wear, or cracking in either the plates or welds, particularly the fillet welds along the bottom edge of the side plates of the telescoping sections. In addition, note any missing or illegible indicator mark decals on the telescoping sections.



If any cracks in either fillet welds or plates are noted, the particular component must be replaced before any further crane operations are performed. This is necessary to maintain the structural strength of the boom and prevent possible catastrophic failure resulting in injury or property damage.

Field repair of boom sections is NOT recommended because distortion may be introduced” and original structural strength not restored.

Boom extension indicator decals are extremely important and must be in place at all times.” Boom section failures can occur due to overstressing within rated capacities if the sections” are not equally extended within one indicator mark difference between the telescoping” sections.

80-160

Inspection

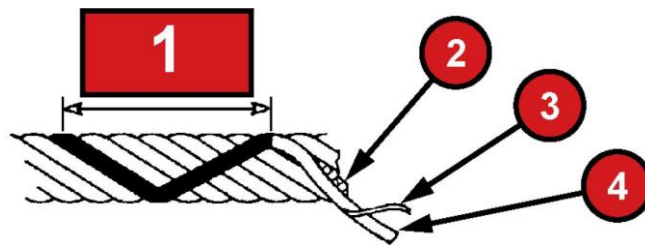
If any indicator decals are missing or illegible (either triangle markers or boom length numbers), order the applicable items through your distributor.

Wire Rope Inspection

Safe operation of your **Load King** Boom Truck is dependent on the proper use of wire rope in all operations. The ideal situation is to remove a wire rope from service after receiving maximum service life, but without sacrificing safety. The end point of useful service life is determined by regular inspections of the wire rope by competent personnel.

OSHA and other agencies having jurisdiction, issue instructions governing the inspection of wire rope used on special equipment and in specified industries. All wire rope users are urged to comply with the law for their particular situation. Inspections must be carried out at stated intervals. When the data obtained from these inspections indicates that the strength of the wire rope has appreciably decreased, and that further use would constitute a safety hazard, the rope must be removed from service. It is the responsibility of the user to know what codes apply to his situation and to comply with their requirements.

In the interest of safety, **Load King** believes that any wire rope, where failure might endanger personnel, equipment, or the load, must be removed from service when any of the listed conditions are detected. We recommend a daily visual inspection of the entire length of rope, and a thorough inspection at least once per month - including a full written report that is dated, signed, and kept on file. The following conditions for removal of a wire rope from service should be regarded as a guide, with any specific regulations covering your equipment and industry taking precedence.

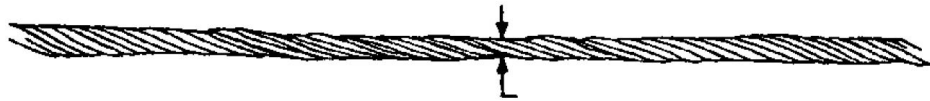


1 One Rope Lay Length	3 One Wire
2 Core	4 One Strand

1. Six broken wires in one rope lay or three broken wires in one strand in one rope lay. One rope lay is the linear distance, measured along the rope, required by a strand to make one 360° turn around the axis.
2. Wear of 1/3 of the original diameter of outside individual wires.
3. Kinks, crushing, cuts, unstranding, or any other damage resulting in distortion of the rope structure, are cause for removal of rope from service.
4. Heavy rusting, corrosion, pitting, or any evidence of burning, are cause for removal.
5. Any reduction in rope diameters below nominal, for any reason, should be evaluated. A reduction in diameter of more than the following is cause for removal of the rope from service:

80-160
Inspection

1/32"	For rope diameters 3/8" through 1/2"
3/64"	For rope diameters 9/16" through 3/4"
1/16"	For rope diameters 7/8" through 1 1/8"



REDUCTION OF WIRE ROPE DIAMETER

Wire Rope Inspection Record

WIRE ROPE INSPECTION RECORD (Refer to Wire Rope User's Manual for Criteria)					
PLACE OF INSPECTION				DATE	
DESCRIPTION OF CRANE					
Make		Model		Serial No.	
Type and arrangement of attachments					
Date of Last Rope Inspection					
Hours and Time of Service Since Last Inspection					
Results of Inspection					
Rope Inspected	Type and Size	Conditions Noted		Recommendations	
	Inspector				

Mobile Crane Load Test Inspection

General

As a worldwide crane manufacturer, **Load King** does not recommend carrying out a regular overload test on mobile cranes.

An overload test after every change of location or crane reconfiguration is not a reliable and safe inspection method and can cause premature material fatigue.

In some countries, national laws require overload tests e.g. in accordance with information from the crane manufacturer.

Every mobile crane is subjected to a load test by the manufacturer within a final acceptance procedure before delivery. These tests are carried out with test loads in different configurations in accordance with the scenarios with the lowest safety reserves in relation to mechanical strength and stability of the crane. This includes an overload test with defined conditions and standards which can be applied accordingly.

Further acceptance tests with overloads during the cranes working life must only be carried out after modifications or repairs of load-bearing components or after an extensive overhaul. In some countries, national regulations may require tests with overload and/or overload tests before carrying out hoist work after any change to the crane configuration.

The calculation of the load-bearing structure of mobile cranes satisfies all applicable international standards (EN, ISO, FEM, etc.) and does not provide for continuous operation. The cranes therefore have a service life which is defined by the permitted number of working cycles. Any overloading of the crane can have a negative effect and leads to a reduction in the cranes service life. This can become a critical problem if the crane is tested with overload before every hoist operation (e.g. when building a wind farm with 80 to 100 wind turbines at one location within a few weeks).

Load King strictly prohibits operators to overload any crane. Safety equipment such as load limit devices prevent overloads being raised; the corresponding bridging / override switch is only provided for emergency situations or when the load limiter fails (as determined in the operating instructions).

Load and Overload Test

As the manufacturer, **Load King** does not recommend using the bridging / override switch regularly for overload tests and generally advises against regular overload tests - even including tests during which the test load is attached via external equipment without activating the bridging / override switch.



Decreased service life due to regular overload tests.

As a manufacturer, Load King aims to avoid overload tests, as such tests decrease the service life of the cranes.

The following aspects must also be taken into consideration from the viewpoint of the user / operator:

- Operational planning:
 - Higher floor loading than provided for,
 - difficult handling of the additional test load,
 - ban on carrying out any overload tests on-site in some fields of industry (e.g. petrochemical plants).
- Operational safety:
 - Anyone in the vicinity of the crane must be warned of the test procedure and
 - must leave the area during the test.



Risk of accidents due to damage to load-bearing parts.

After an overload test, carry out extensive investigations to ensure the intactness of the load-bearing components.

Damage to load-bearing parts can occur due to cracks caused by overload and/or fatigue; such defects are not exposed by an overload test. For this reason, an overload test can give owners and operators a false sense of security.

To ensure the intactness of load-bearing components, extensive investigations are recommended after an overload test and before carrying out hoist work. Such an investigation consists of a visual inspection combined with function tests (including the safety equipment) and can necessitate non-destructive inspections such as magnetic particle or ultrasonic inspections.

Any malfunction or irregularity discovered during the inspection must be evaluated by an expert. This person must determine whether the movement can be carried out safely or whether immediate repair/modification is required.

Recommendations of Load King with Regard to Load Tests

Checking Assembly

Checking the correct crane assembly (e.g. after reconfiguration) must include:

- a visual inspection of all assembled parts on the ground before erecting the boom,
- a function check of the crane without or with limited load including:
 - any movements important for the job
 - an inspection of all limit switches (among others, the hoist limit switches),
- an inspection to ensure the assembly has been carried out in accordance with the assembly instructions.

Load Test Factors

If load tests are required by laws mandating checking the assembly of the crane, 100% of the permitted load of the crane in the given configuration must not be exceeded.

This applies to all **Load King** mobile cranes for the static and dynamic load tests. A period of 5 minutes is sufficient for static tests.

80-160

Inspection

Load tests may be required by law.

- after assembling the crane or
- after changes in location.



The conditions listed above do not apply after reconfiguration or repairs to loadbearing crane parts. In this case, the load test factor can be higher (in accordance with the safety factors from the product standards). It is recommended to involve the crane manufacturer in such tests.

Load Test Configurations

If a load test is required (by law), the test conditions must correspond with the conditions during the scheduled lift. It is acceptable to **Load King** to carry out a load test for a given crane configuration with reduced loads (below the max. capacity), but at a greater radius, up to the maximum radius (max. load moment).

Job-Site

Job Site Setup Procedure

1. Position vehicle on solid level ground, fully set parking brake, and place transmission in neutral.
2. Refer to Power Take-Off section of Operator's manual for PTO engagement due to the differences in activation, transmission types and PTO locations.
3. When the pump PTO is engaged, allow hydraulic oil to warm up by circulating to prevent pump damage. NEVER DRIVE VEHICLE WITH PUMP PTO ENGAGED.
4. Check hydraulic system filter indicator to confirm that filter is functioning properly.
5. Extend all outriggers to firm contact with solid level surface, and level vehicle. Raise the crane enough to lift the tires off the ground.
6. Always pay out winch line before extending boom. Failure to do so will result in the load block contacting the ATB switch which will shut down the boom extend function or damage the crane.
7. Always know your operating radius (distance from centerline of rotation to load hook), and the actual weight of load being lifted. Load radius may vary at different rotation positions.
8. Operation ahead of the main outriggers requires the use of an optional front bumper stabilizer. The least stable boom position is immediately ahead of the mainframe outriggers over the truck cab.
9. Consult manual for cold weather operation.

Outrigger Positioning

Before conducting any boom operation you must extend all outriggers to a firm and level surface. In the event that other conditions exist such as: loose or sandy soil, crusty or frosty surface with soft soil underneath, icy or slick pavement, sloping surfaces, etc., you will be required to restrict your operations. In some areas, you may be able to level your crane with the use of outrigger pads or blocks. These pads must be made of adequate material and should not exceed 2 inches in thickness. If the main outriggers can not be placed at or near the same level as the wheels, the outrigger spread will be affected. This can result in damage to the crane and/or instability.

OUTRIGGER POSITIONING - FOR LOAD HANDLING 360 DEGREES, OVER SIDE, REAR OR FRONT OF UNIT

The outrigger spread has (3) positions related to the LOAD RATING CHART INTERPRETATION section of this manual.

OUTRIGGER POSITIONS
Position 1 • Beam swing-out cylinders are fully RETRACTED • Inner beam extend cylinders are fully RETRACTED • Jack cylinders are EXTENDED • Outrigger pads are on ground and tires off ground. Crane is leveled by adjusting each jack cylinder length.
Position 2 • Beam swing-out cylinders are fully EXTENDED • Inner beam extend cylinders are fully RETRACTED • Jack cylinders are EXTENDED • Outrigger pads are on ground and tires off ground. Crane is leveled by adjusting each jack cylinder length.
Position 3 • Beam swing-out cylinders are fully EXTENDED • Inner beam extend cylinders are fully EXTENDED • Jack cylinders are EXTENDED • Outrigger pads are on ground and tires off ground. Crane is leveled by adjusting each jack cylinder length.

The front tires should remain close to the ground when the unit is setup and leveled.

Proximity sensors are located within each outrigger beam to prevent the swing-out beam to be inadvertently extended in **Position 1** which will prevent damage to chassis. The proximity sensors also prevent the outrigger jack cylinder beams from being extended until the swing-out beams are fully extended 1st as in **Position 3**.



OBSERVE CAUTION NOTES ON OUTRIGGER MOVEMENT WHENEVER SETTING UP OR STOWING OUTRIGGERS.

Work Site Position

The best possible work site should always be sought when you are positioning the crane. An ideal location is where the ground is firm, level and dry. The crane should be situated in close proximity to the work area. The site should be free of overhead obstructions. Maintain safe clearances from electrical power lines and apparatus. You must allow for boom and platform sway, rock or sag, and electrical line and load lineswaying.

Cold Weather Operation

The best possible work site should always be sought when you are positioning the crane. An ideal location is where the ground is firm, level and dry. The crane should be situated in close proximity to the work area. The site should be free of overhead obstructions. Maintain safe clearances from electrical power lines and apparatus. You must allow for boom and platform sway, rock or sag, and electrical line and load line swaying.

During cold weather operation the operator must allow the oil to warm up to operating temperature. This can be accomplished by allowing the hydraulic pump to run under no load for ten minutes at low engine speed. Next, actuate all the controls slowly until controls move smoothly and easy. In extreme cold, extra care must be taken to avoid any impact loading. Materials which are normally ductile can become brittle at extreme cold temperatures.

An optional Cold Weather Package is available for this crane. Information about the operation of this equipment in cold weather conditions and components included in the Cold Weather Package can be found in [Cold Weather Package Recommendations on page 217 and Cold Weather Package Specifications on page 216](#).



FAILURE TO ALLOW OIL TO WARM UP MAY CAUSE DAMAGE TO PUMP AND SLOW RESPONSE TO FUNCTION CONTROLS.

General Operational Issues

Ignition Switch-Carrier Cab & Upper Operator's Cab

When moving from the carrier cab to the upper cab:



NOTE: *The carrier cab ignition switch must be in the “OFF” position for the upper craning cab ignition switch to function and start the engine.*

General Rules

1. Always operate controls to lower the load line while extending the boom. This will maintain clearance between boom tip and downhaul weight.
2. Make certain load line is not twisted or kinked, and that load line is properly seated on drum and in sheaves.
3. During winching, meter all controls and apply power smoothly - no sudden starts or stops.
4. When hoisting a load, raise it a few inches and allow controls to return to neutral to determine if winch brake and boom holding valves are working properly.
5. You must not make side pulls with the boom. This type of loading can damage the boom and rotation mechanism. Do not raise or lower a load in such a manner that would cause side loading.



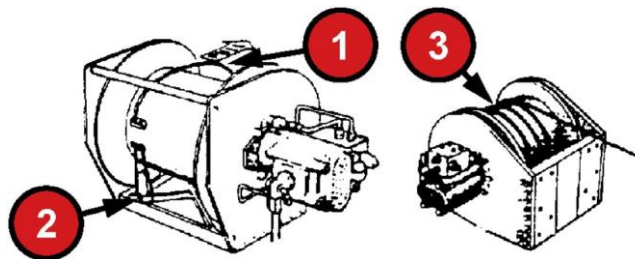
OBSERVE CAUTION NOTES ON OUTRIGGER MOVEMENT WHENEVER SETTING UP OR STOWING OUTRIGGERS.

6. When lifting a load, you must always make certain that three (3) full wraps of rope remain on winch drum at all times. Maintain tension on the load line at all times to prevent rope from becoming twisted or kinked and to keep cable properly seated on drum and sheaves. When lifting loads that exceed the single part line limitation shown on your maximum load chart, consult chart instructions on how to multipart the load line.



WHEN USING A MULTIPART LOAD LINE, BOOM EXTENSION MUST BE LIMITED TO MAINTAIN (3) FULL WRAPS ON WINCH DRUM.

7. The proper maintenance and care of the wire rope load line on your Load King Boom Truck is most important. Refer to standard ANSI/ ASME B30.5 for wire rope inspection and maintenance procedures as well as special provisions for handling maximum rated loads with rotation resistant ropes. A rope inspection record is provided in the maintenance manual.
8. Load line loop and drum wedge must be properly seated inside winch drum before winding load line on winch drum. Refer to maintenance and installation manuals for instructions.



1	Load Line	3	Three Wraps Minimum
2	Drum Wedge		

Safety Devices

The safety devices on your **Load King** Boom Truck are described below. These devices will help you maintain control of a load should power or hydraulic line failure occur. You must understand the function and operation of these devices so that a continual check on their performance can be made.



SHOULD ANY OF THESE DEVICES FAIL TO FUNCTION, STOP ALL OPERATIONS AND CONSULT YOUR AUTHORIZED **LOAD KING** DEALER. THIS CRANE CAN BE OVERLOADED BY AN OPERATOR WHO FAILS TO FOLLOW THE INSTRUCTIONS CONTAINED IN THIS MANUAL.

BOOM LIFT CYLINDER HOLDING VALVE

A single acting holding valve is cartridge-mounted in the cylinder base. This valve holds the boom in the elevated position should power or hydraulic pressure line failure occur. Should any of these happen, "STOP NOW." If the boom creeps down, consult your authorized **Load King** dealer.



NEVER, UNDER ANY CIRCUMSTANCES, REMOVE OR ATTEMPT TO REMOVE THE CARTRIDGE FROM THE LIFT CYLINDER BASE UNTIL AN AUTHORIZED MAINTENANCE PERSON IS PRESENT AND THE BOOM IS PROPERLY SUPPORTED AND BLOCKED. AN UNSUPPORTED BOOM CAN FALL UNCONTROLLED; CAUSING DEATH OR SERIOUS INJURY OR PROPERTY DAMAGE.

EXTENSION CYLINDER HOLDING VALVES

There are 2 boom extend cylinders, and each has its own hold valve. One cylinder extends boom section 2 and the other cylinder extends sections 3, 4, 5 and 6. The valve holds the cylinder in the extended position should power or hydraulic pressure line failure occur. If the boom creeps in under load, consult your authorized **Load King** dealer.

OUTRIGGER CYLINDER HOLDING VALVE

All outriggers are equipped with internal cartridge type lock valves. If outriggers creep up under load, or down while roading, consult your authorized **Load King** dealer.

WINCH SAFETY BRAKE

To determine if the brake is working, set the outriggers, raise a load a few feet and release control handle. Shut truck engine off; actuate winch control handle in down direction. If the load creeps down, consult your authorized **Load King** dealer.

SWING DRIVE BRAKE (ROTATION GEARBOX)

The rotation gear drive has a spring-applied hydraulic release brake. To determine if the brake is working, set the outriggers, swing the boom and release the control handle. If the boom continues to swing, consult your authorized **Load King** dealer.

Training and Operator Qualifications

It is extremely important that you have a thorough knowledge of all the operating characteristics of your crane. This crane will not be safe if improperly used! Crane operation shall be limited to personnel with the following minimum qualifications:

1. Designated, competent and experienced persons. If required, a valid certification for operation must be on file.
2. Trainees or untrained persons under direct supervision of qualified persons.
3. Maintenance and test personnel, only if it is necessary for the performance of their duties.
4. Supervisors with a designated experienced person present.

Operators and trainees will meet the following qualifications:

1. An operator shall be physically and mentally capable of operating the unit.
2. Demonstrate ability to read and comprehend all placards, operator's manuals, codes, and other information pertinent to correct and safe crane operation.
3. Operator shall demonstrate to employer the ability to operate specific type of equipment or provide satisfactory evidence of qualifications and experience to do so.
4. Recognize and be responsible for all maintenance requirements of the crane operated by him/her or trainees under supervision.
5. If an operator becomes physically or mentally unfit, they shall disqualify themselves.

Operator Aids

Anti-Two-Block

The ATB system will sense the presence of the load block in close proximity to the boom tip and will automatically interrupt the operation of those boom functions which could bring the load block in contact with the boom tip. A warning horn will sound to alert the operator to the two-block condition.

Those boom functions which could be used to move the load block further from the boom tip will remain operational.

DO NOT RELY ON THE ATB DEVICE AS A WINCH HOIST

STOP. OUTRIGGER WARNING ALARM

The outrigger warning alarm will sound an audible signal whenever any outrigger leg is moving.



LOAD INDICATING EQUIPMENT ON THIS CRANE IS INTENDED ONLY AS AN AID TO SAFE OPERATION. LOAD/RADIUS INDICATING ELECTRONICS SHOULD NOT BE RELIED UPON TO REPLACE THE USE OF CAPACITY CHARTS AND PROPER OPERATING PROCEDURES.

RATED CAPACITY INDICATOR (GREER VGA ELEMENT)

This system is designed to provide the operator with information on the load he/she is lifting and also help prevent overloading of the crane. In order for this system to be effective, the operator must read and understand the instructions contained in this manual.

When limits are reached, an overload warning is activated. At the same time, the crane movements that would increase the overload condition - such as hoist up, telescope out, and boom down will be stopped.

To reset the rated capacity indicator system telescope in, winch down, or boom up.

If the RCI system must be overridden for any reason, the "Cancel Alarm" button on the face of the rated capacity indicator display unit should be depressed for 5 seconds. At this point the system is overridden until the overload or ATB condition is removed. See the RCI system manual at the end of this book for more detail.



ABUSE OR MISUSE OF THE ATB/RCI OVERRIDE CAN RESULT IN DEATH, SERIOUS INJURY, OR PROPERTY DAMAGE.

Load Handling Operations

Before moving a load, you must study the capacity placards carefully and adhere the load capacities and radii of operation given. During operations when lifting, swinging, or extending the load, the controls should always be metered when beginning or terminating movement to prevent sudden starting or stopping which imposes undue shock loads on the equipment. This is especially true when handling heavy loads and in extreme cold temperatures.

80-160 Operating Instructions

Max. Load and Boom Angle Charts

Using the Load Chart

The crane load charts list rated load for various boom lengths and load radii. There are many different load charts depending on the various crane boom modes, counterweight options, outrigger positions, etc. The maximum load a crane can lift is found on the load chart at the intersection of the boom length and load radius. If the operating radius is between radii listed on the load chart, use the larger radius. If the operating boom length is between lengths listed on the load chart, use the longer boom length.

Example:

Operating radius 72 ft

Operating boom length 105 ft

Looking at the example load chart below, the 72 ft operating radius is between the 70 and 75 ft radii. We will therefore use the 75 ft chart radius. The 105 ft boom length is between the 100 and 110 ft chart boom lengths. We will therefore use the 110 ft boom length. At the intersection of the 75 ft radius row and the 110 ft boom length column is the crane rated load. In this case the crane is rated to lift 10,950 lbs in the current configuration.

	35	40	50	60	70	80	90	100	110	120	130	140	150	160
10	160,000													
12	130,650	44,900	43,850	43,600	39,450									
15	113,950	44,900	43,850	40,950	36,400	33,850	31,400	29,400	27,550					
20	93,350	44,900	43,850	37,050	33,150	30,350	28,000	25,650	24,050	22,150	20,550			
25	76,300	44,900	42,350	34,450	30,300	27,550	24,900	23,200	21,750	20,100	18,750	18,800	19,100	
30		44,900	40,850	32,150	27,950	24,800	22,800	21,150	19,800	18,500	17,300	17,350	17,800	18,150
35			39,850	30,350	25,600	22,950	21,000	19,500	18,250	17,000	16,000	16,000	16,600	16,750
40			37,050	28,900	24,050	21,400	19,500	18,050	16,900	15,750	14,950	14,950	15,450	15,750
45				27,800	22,700	20,050	18,250	16,900	15,750	14,700	14,000	14,050	14,550	15,000
50				25,400	21,550	18,950	17,100	15,850	14,750	13,900	13,200	13,250	13,750	13,200
55					20,700	17,950	16,200	14,900	13,900	12,550	11,850	11,850	12,200	12,950
60					18,700	17,100	15,350	14,050	13,150	11,900	11,200	11,250	11,650	11,500
65						16,450	14,600	13,350	12,000	11,250	10,750	10,600	11,150	10,150
70						14,350	14,000	12,350	11,450	10,750	9,900	9,650	10,300	9,150
75							12,800	11,850	10,950	10,100	9,100	8,900	9,400	8,200
80							11,350	11,350	10,300	9,300	8,400	8,250	8,500	7,450
85								10,150	9,550	8,600	7,750	7,700	7,750	6,700
90								9,050	8,900	7,950	7,150	7,150	7,150	6,050
95									8,200	7,450	6,700	6,700	6,650	5,550
100									7,350	6,900	6,200	6,200	6,050	5,100
105										6,500	5,850	5,800	5,300	4,450
110										5,950	5,450	5,450	4,650	3,800
115											5,150	4,900	4,050	3,200
120											4,850	4,350	3,500	2,650
125												3,850	3,000	2,200
130												3,400	2,550	1,750
135													2,150	1,350
140													1,800	

The load chart shows the maximum allowable lifted load. Maximum load is the weight of material being handled plus load handling equipment such as slings, buckets, downhaul weights, etc. The weight of load handling equipment must be deducted from the maximum load rating to determine how much payload you can lift.

Example:

Hook block	750 lbs
Slings	215 lbs
Object being lifted	19,000 lbs
Total lifted load	19,965 lbs



It is important that you know the weight of any material that you attempt to handle. This can be determined by use of a dynamometer or scales.

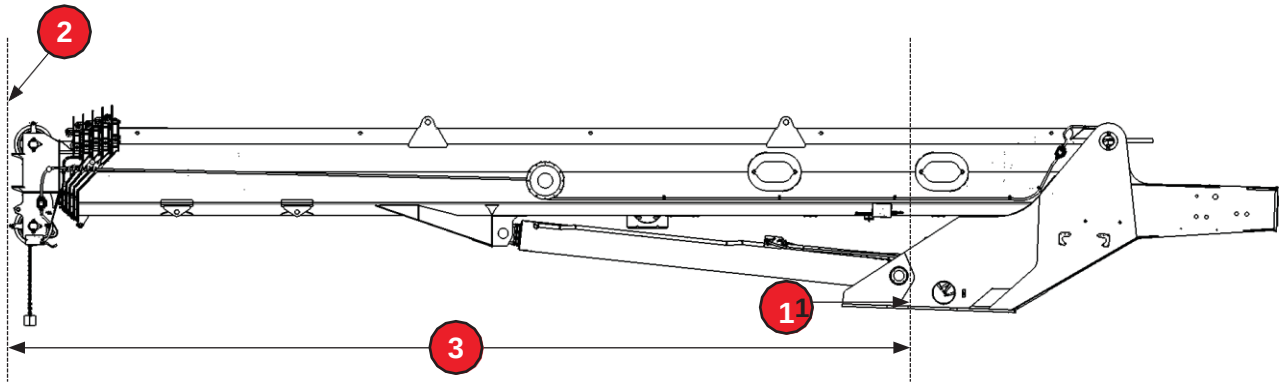


Swinging of a suspended load can cause the load to drift away from the crane. The drifting of the load away from the crane will increase the cranes operating radius. The increase in operating radius may cause the crane to tip or the boom to fail.



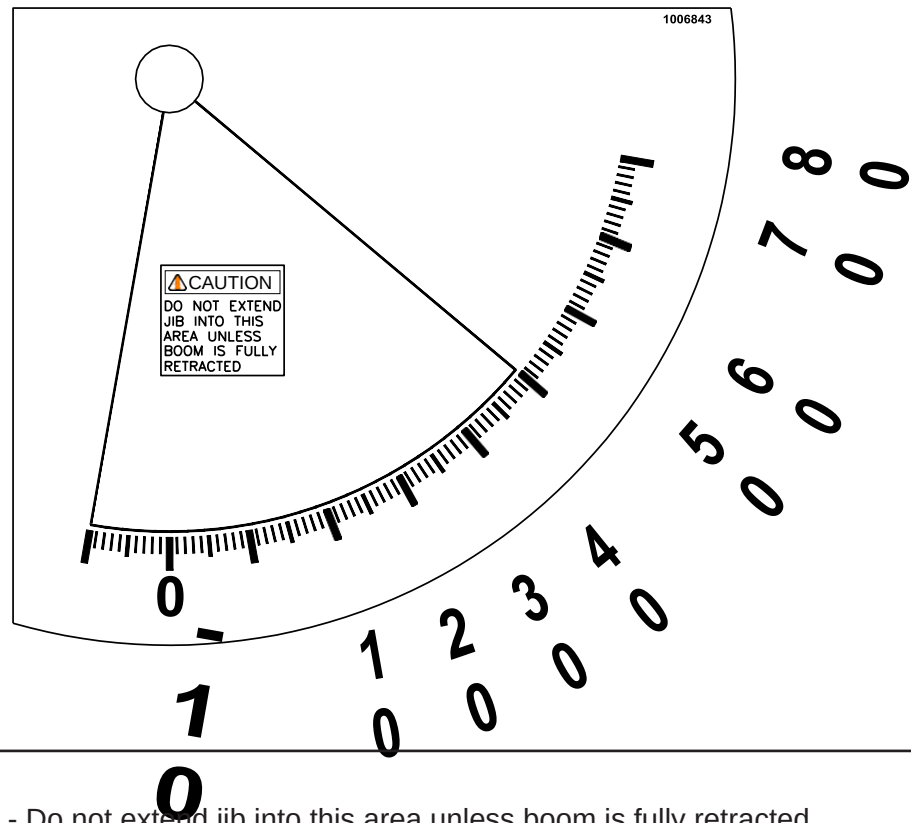
Bouncing or jerking of a load will cause shock loading to many critical parts of the crane. The shock loads may cause these critical parts to fail.

Operating Radius



1	Center Line of Bearing	3	Load Radius
2	Center Line of Load		

Boom Angle Placards



CAUTION - Do not extend jib into this area unless boom is fully retracted.

Operating the Unit

Operator Shutoff Devices

Anti-Two-Block SYSTEM

Inspect all ATB switches found on the boom, jib and auxiliary sheave heads for damage. Check the freedom of the counterweight attached to these switches; and also, that the counterweight is attached around correct line of hoisting cable in the proper manner. Inspect all electrical connections and wires as well as the entire length of cable attached to the cable reel and it's connections for evidence of excessive wear, damage or improper installation. Check spring loaded cable reel for proper tension and to insure that reel is free to rotate. Verify visual and audible warning devices by lifting each of the counterweights.



NOTE: A warning light will appear on the dash mounted panel and an audible signal will be heard when the switch is in the ON position.

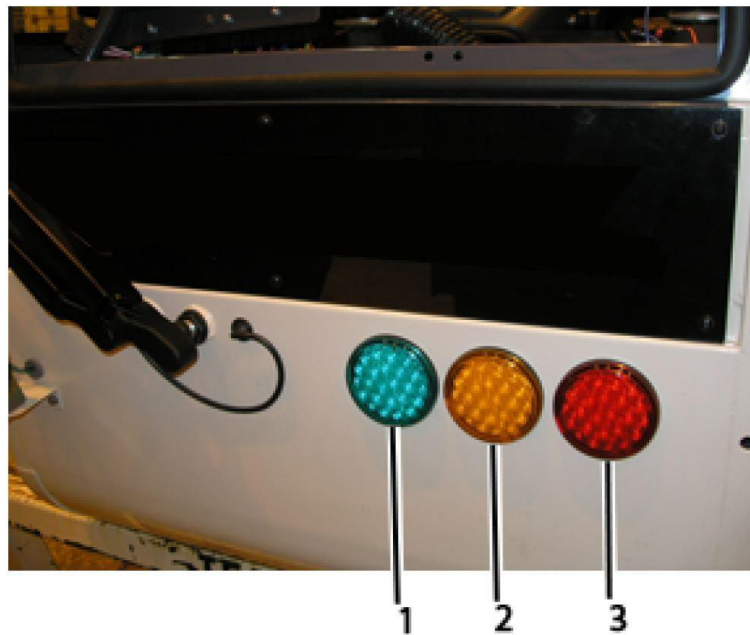
RATED CAPACITY LIMITER

The RCL will indicate an overload condition with an audible alarm. All boom functions will be disabled except boom retract, boom up, and winch down. Move the load into an acceptable condition to stop alarms and continue normal crane operation. (See the relevant user manual section for further details).



STATE OF LOAD LIMIT DEVICE

On the exterior front of the operator's cab are three load indicator warning lights (1), (2) & (3) showing the load utilization as crane is in operation. Visual warning lights are displayed on Element VGA screen for operator. When the crane's prewarning range or overload range is reached an audible warning buzzer or a warning buzzer and siren are activated as shown in chart below depending on the load condition. Crane functions "STOP" when in the **Overload Range** (from 100%). The overload data is recorded.



Load	(X)		(Y)		(Z)
	"Crane Operation" Screen	Warning buzzer	Warning light (15)	Warning siren	
Normal range (below 90%)	Load utilisation display (1) green		 illuminat ed in green		 unlimited
Prewarning range (90% – 100%)	 Warning symbol + Load utilisation display (2) yellow	 Sound interrupt ed	 illuminat ed in yellow		 unlimited
Overload range (from 100%)	 Warning symbol + Overload display (3) red LLD (red)	 continuo us sound	 illuminat ed in red	 Sound interrupt ed	 stopped
 The overload data is recorded.					

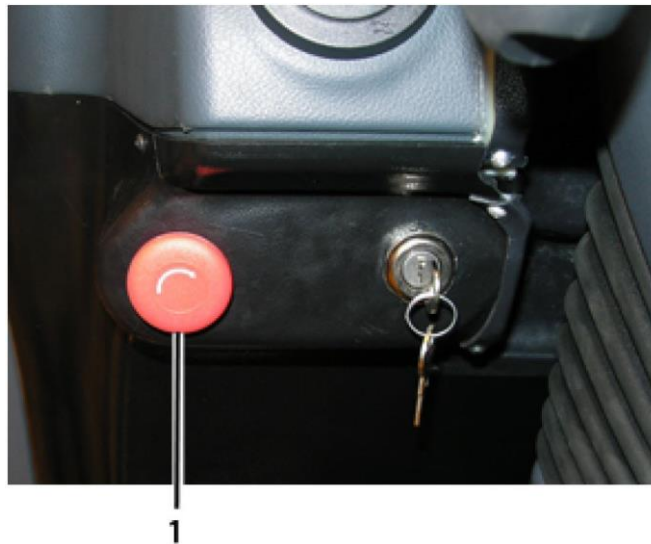
LEGEND	
(X)	Signals for drivers of the crane in the crane cab
(Y)	Signals for people in the crane's danger zone
(Z)	Execution speed of the crane movements

80-160

Operating Instructions

EMERGENCY STOP

The (RED) emergency stop button (1) is located on the lower part of the dash to the left of the steering wheel column in the operator's cab. In an emergency, this button can be pushed in to stop all crane functions including engine operation. You must rotate the button clockwise and pull the button out before you can resume normal operation of the crane.



3RD WRAP

Winch down function will be disabled when less than 3 wraps of rope are available on the winch. You must retract boom or winch up.

OPERATOR'S ARMREST

When Operator's left arm rest is raised, all joystick functions are disabled. Lower arm rest to resume normal crane operation.



Operating the Unit

Now that you are familiar with the controls and function of the Load King Boom Truck, practice making some typical job applications. As with any piece of equipment, practice is required to develop the coordination and knowledge necessary for smooth and efficient operation.

Jump Starting an Engine- Booster Cable Instructions

Position the vehicle with the booster battery adjacent to the vehicle with the discharged battery so that booster cables can be connected easily to the batteries in both vehicles. Make certain vehicles do not touch each other.

1. On both vehicles, turn off all electrical loads. Set the parking brake. Place transmission in "PARK" or "NEUTRAL".
2. Determine whether the discharged battery has the negative (-) or positive (+) terminal connected to ground. The ground lead is connected to the engine block, frame, or some other good metallic ground. The battery terminal connected to the starter relay is the one which is not grounded.
3. Be sure that vent caps are tight and level on both batteries. Place a damp cloth over the vent caps of each battery making certain it is clear of fan blades, belts, and other moving parts.



NOTE: *The following steps must be performed in sequence:*

4. On a negative grounded system, connect both ends of one cable to positive (+) terminals of each battery.
5. Connect one end of the other cable to negative (-) terminal of the booster battery.
6. Connect other end of cable, away from battery, to engine block, frame, or some other good metallic ground - except carburetor or tubing on vehicle with discharged battery.
7. Make certain that all cables are clear of fan blades, belts, and other moving parts of both engines and be sure everyone is standing away from vehicles. Then start the engine with the booster battery. Wait a few minutes, then attempt to start the engine of the vehicle with the discharged battery.
8. After starting, allow the engine to return to idle speed and remove the cable connection at the engine block or good metallic ground. Then remove the other end of the same cable from the booster battery.



WARNING - BATTERIES PRODUCE EXPLOSIVE GASES. These instructions are designed to minimize the explosion hazard. Keep sparks, flames, cigarettes, etc. away from batteries at all times - protect eyes at all times - do not lean over batteries during this operation.

Both batteries should be of the same voltage.

Unusual Operating Conditions

Special problems in maintenance and operation are caused by unusual conditions such as extremes in heat, cold and humidity, high altitude, salt water, and dusty or sandy work sites. When operating under such conditions, special precautions must be taken to prevent damage, minimize wear, and avoid component deterioration.

EXTREME COLD

In periods of extreme cold, the problems of freeze damage, adequate lubrication and battery failure may become particularly troublesome. With the onset of very cold weather, it is advisable to “winterize” the crane by servicing the cooling system and switching to the lubricants recommended for cold weather usage. Follow the recommendations in this manual when the crane must be operated in very cold conditions.

1. To prevent freeze damage to the cooling system and cracking of the engine block or head, drain and flush the cooling system. Clean the radiator exterior, making certain the air passages through the core and the cooling fins are free of foreign matter.

Refill the cooling system, adding an antifreeze solution recommended by the engine manufacturer in an amount and strength appropriate to the anticipated temperatures. A corrosion inhibitor is recommended. Consult engine manufactures recommendation.



Never use a chromate base corrosion inhibitor when the coolant contains ethylene glycol. Chromate base inhibitors reacting with ethylene glycol can produce chromium hydroxide, commonly known as “green slime”. This substance reduces the heat transfer rate and can cause serious engine overheating.

Inspect the thermostat, clamps, radiator hoses and radiator core for proper condition. Replace or repair any cooling system component found to be defective.

2. Condensation in the fuel tank contaminates the fuel supply with water, which can freeze in the fuel lines and block the fuel flow to the engine. To minimize this possibility, keep the tank as full as is practical during cold weather. This may entail refilling the tank more frequently than usual, but the inconvenience is small compared to clearing a blocked fuel line.

If water should be noticed in the fuel supply, drain the tank and refill it with uncontaminated fuel.

3. Lubricate the crane with the lubricants recommended for cold weather operation on the Lubrication Chart. If necessary, change the engine oil and other lubricants in order to conform to the recommendations.
4. The battery is more likely to sustain freeze damage if not kept fully charged because its electrolyte will freeze at a higher temperature than that in a fully charged battery. Be certain the battery is charging when the engine is running and use an external charger to restore full charge when the crane is not being operated.

The battery can discharge if snow or ice short circuits the terminals. Keep the battery posts and cable connectors clean and dry. Remove any corrosion with a solution of soda and water.

During extremely cold weather, it is advisable to remove and store the battery in a heated area when the crane is to remain idle for any extended period.

Water added to the battery can freeze before it mixes with the electrolyte. During very cold weather, add water to the battery just prior to, or during operation of the crane. If the crane is not to be run, water may be added if an external charger is connected to the battery.

5. Cold, sluggish oil can cause pump cavitation. If the crane is not equipped with a reservoir immersion heater and running the oil over relief will not warm it sufficiently to prevent pump cavitation with the engine running very slowly, cease attempts to load the hydraulic system until an external heat source can be obtained.

The hydraulic oil may be run over relief to aid in the warm-up process. To do this, actuate a function, allow the cylinders involved to reach the limits of their travel and hold the control in the engaged position for a few seconds.

When running hydraulic oil over relief to warm it, be sure to restrict the flow to as slow a speed as possible by moderating pressure on the controls being engaged and running the engine at low speed.

Continue warming the oil and slowly cycle all crane functions, actuating all cylinders in turn, swinging the upper and operating the winches in both directions.

6. At the end of the work period, or whenever the crane is to be left idle for extended periods, prevent it from being frozen to the ground by parking it on a wood, concrete, asphalt or mat surface.

EXTREME HEAT

Like extreme cold, extreme heat requires that precautions be taken with respect to the cooling system, the battery and lubrication. Protect the crane by performing the following recommended procedures:

1. High temperatures necessitate the use of lubricants which are both more viscous and which resist deterioration at higher operating temperatures. Refer to the Lubrication Chart and lubricate the crane using the lubricants recommended for the expected temperatures.

Crankcase oil is particularly important because it helps dissipate heat. Check the oil level frequently and add oil as necessary to maintain required level. Too little oil will hinder heat dissipation.

2. To ensure proper coolant circulation, drain and flush the cooling system, clean any foreign matter from the radiator cooling fins and through core air passages, replace defective hoses, tighten hose clamps, inspect water pump drive belt properly, eliminate any leaks detected and fill the system with a 50% solution of ethylene glycol. A corrosion inhibitor is recommended by the engine manufacture.



Allow the engine to cool before draining and flushing the cooling system.

Water containing more than small concentrations of salt or minerals should not be used in the cooling system. Salt facilitates corrosion and minerals deposited on the coolant passage walls. Both processes inhibit proper cooling.

3. Air circulation around the engine and battery must not be restricted. Keep air intake and exhaust openings clear of leaves, paper or other foreign matter which may restrict air flow.
4. Keep the engine clean of dirt, grease and other substances which inhibit heat dissipation.
5. Use sound judgment in operating the engine. Avoid the two extremes of racing and lugging.

Advance the throttle only enough to handle the load, yet be certain that the engine speed is high enough to maintain adequate fan speed for cooling.

SANDY OR DUSTY WORK SITES

The presence of large amounts of sand or dust at the work site can contribute to accelerated component wear. Either substance will act as an abrasive when deposited on moving parts of the crane. The problem is combated by more frequent lubrication and by the servicing of breathers and filters at shorter intervals. Follow the recommendations below when operating in sand or dust on a regular basis.

1. Increase frequency of lubrication and service per lube chart.

The increased frequency of lubrication and service discussed above should be determined by observations made at the work site. Inspection will determine how long it takes for lubricants, breathers and filters to accumulate unacceptable amounts of sand or dust. The frequency of lubrication and service should be adjusted accordingly.

HIGH HUMIDITY OR SALTWATER

In some locations, such as coastal areas, the crane may be exposed to the deteriorating effects of salt, moisture, or both. To protect exposed metallic surfaces, wiring, hoist rope, paint and other items, keep them dry and well lubricated where salt or high humidity are encountered. Follow the recommendations below when operating in these conditions:

1. Always perform frequent inspections for rust and corrosion and remove them as soon as they are detected. Dry and paint exposed surfaces after rust and corrosion have been removed.
2. Where paint may not be applied, such as on polished or machined surfaces, coat the area with grease or lubricant to repel water.
3. Keep bearings and their surrounding surfaces well lubricated to prevent the entry of water.
4. Hoist rope must be kept well lubricated to prevent moisture and salt from penetrating the cable strands.

80-160

Operating Instructions

HIGH ALTITUDES

Variations in altitude alter the fuel/air mixture burned in the engine and affect the engine's performance. At high altitudes, atmospheric pressures are lower and less oxygen is available for combustion of the fuel. Above 10,000' the engine fuel injectors may have to be changed to ensure proper performance. Consult engine manufacturer should this problem arise.

Keeping the air cleaner clean and free of obstructions will help alleviate high altitude problems.

At high altitudes, closely monitor the engine temperature for overheating.

AIR BRAKES

At least once a day, drain the water accumulation from the air tanks.

Initiating Operation

1. If possible, position the unit at the job site in such a manner as to assure all work operations can be performed without repositioning the truck (see [Work Site Position on page 156](#)). However, strict observance of load weight, radius and maximum load rating must always be complied with.
2. Set parking brake securely.
3. Place transmission in neutral and engage PTO.
4. Outrigger can be controlled and set from the upper operator's cab or from the side of the truck. (see Upper Controls & Instruments or Outrigger Positioning topics).
5. Extend all outriggers to make firm contact with ground. See OUTRIGGER POSITIONING topic. Provide outrigger pads if terrain is soft or if outriggers tend to sink into ground. Properly level the machine using the console mounted bubble level. While operating the crane, frequently check that proper level condition is maintained.



NOTE: Console mounted bubble levels must be periodically checked for proper adjustment. See Maintenance manual for more information.

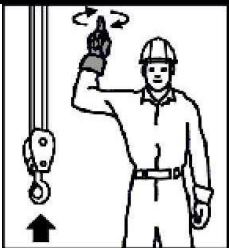
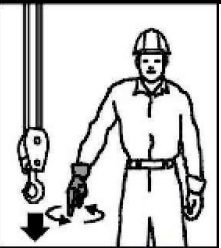
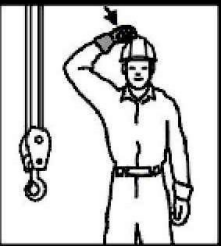
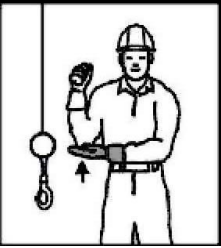
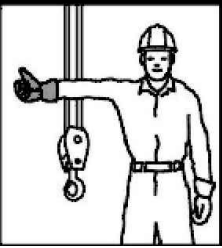
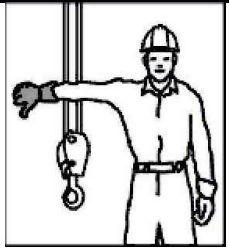
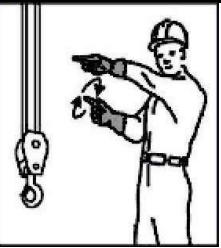
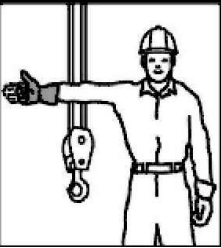
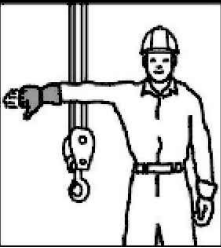
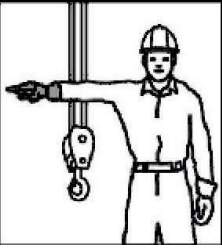
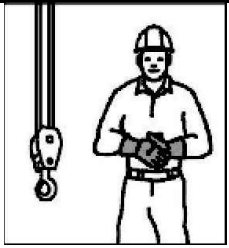
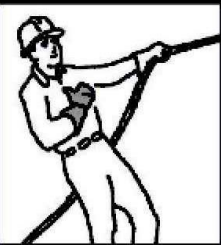
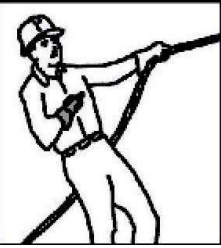
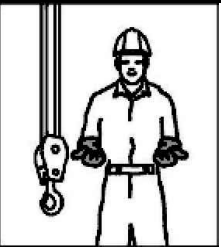
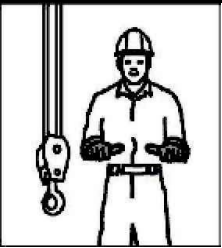
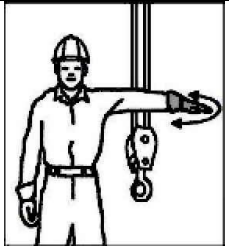
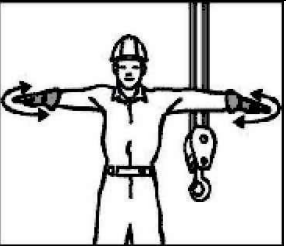
6. Position yourself at the operator's console and accelerate the truck engine to desired speed.
7. Bring the hydraulic oil up to operating temperature. (See [Cold Weather Operation on page 157.](#))
8. Check all controls for proper operation. During all operations, the controls should be metered to prevent sudden starting and stopping.



FAILURE TO METER YOUR CONTROLS INDUCES HIGH SHOCK LOADS ON THE EQUIPMENT WHICH MAY RESULT IN STRUCTURAL FAILURE OR OVERTURNING OF THE CRANE. DEATH OR SERIOUS INJURY MAY RESULT.

80-160
Operating Instructions

Arm and Hand Signals

A					
	HOIST Forearm vertical, forefinger pointed up, move hand in small horizontal circles.	LOWER Arm extended down, forefinger pointed down, move hand in small horizontal circles.	USE MAIN HOIST Tap fist on head; then use standard signals.	USE AUXILIARY HOIST (Whipline) Tap elbow with one hand; then use standard signals.	RAISE BOOM Arm extended, fingers closed, thumb pointed up.
					
	LOWER BOOM Arm extended, fingers closed, thumb pointed down.	MOVE SLOWLY Use one hand to give any standard motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)	RAISE BOOM AND LOWER LOAD Arm extended, thumb pointed up, flex fingers in and out as long as load movement necessary.	LOWER BOOM AND RAISE LOAD Arm extended, thumb pointed down, flex fingers in and out as long as load movement necessary.	SWING Arm extended, point with finger in direction of swing of boom.
					
	DOG EVERYTHING Clasp hands in front of body.	EXTEND BOOM (Telescoping Boom) One Hand Signal. One fist in front of chest with thumb tapping chest.	RETRACT BOOM (Telescoping Boom) One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.	EXTEND BOOM (Telescoping Boom) Both fists in front of body with thumbs pointing outward.	RETRACT BOOM (Telescoping Boom) Both fists in front of body with thumbs pointing toward each other.
D		 HAND SIGNALS Do not deface or remove this label from the machine. Order replacement labels from your Load King dealer.			
	STOP Arm extended, palm down, move arm back and forth horizontally.				
					
	EMERGENCY STOP Both arms extended, palms down, move arms back and forth horizontally.				
	1	2	3	4	5

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Lifting the Load

Follow recommended procedures for work site position, outrigger positioning, and control metering.

Always inspect downhaul weight, load line, hook and/ or any load handling equipment for damage or excessive wear before use.

The following general instructions should be adhered to each time a lifting operation is performed.



IT IS IMPORTANT THAT YOU KNOW THE WEIGHT OF ANY MATERIAL THAT YOU ATTEMPT TO HANDLE. THIS CAN BE DETERMINED BY USE OF A DYNAMOMETER OR SCALES.

STEPS TO LIFTING A LOAD

1. Determine what the total load weighs.



NOTE: Total load includes the weight of the material being lifted plus any material handling devices such as slings, yokes, personnel platforms, load blocks, jib deducts, etc.

2. Consult the maximum load chart on your crane and determine the correct boom radius and parts of line required based upon your load weight using VGA ELEMENT RCI system.
3. Check the configuration setting number for the VGA ELEMENT RCI - It must match the actual crane configuration (Including parts of line rigged).
4. Attach load line to material and begin operation. Observe proper sling or chain usage and make sure any load handling attachment used has adequate size and capacity for the load being lifted.



THE RATED CAPACITY INDICATOR SYSTEM DOES NOT PROTECT THE CRANE WHEN THE BOOM IS OPERATED BELOW HORIZONTAL.

Observe position of boom and load at all times. The rated capacity indicator system does not protect against shock loads or side loading.

Making a Typical Lift

LIFT PROCEDURE In making lifts, the operator must successfully coordinate several crane functions. These include the boom raise/lower, boom extend/retract, load hoist/lower and swing functions. Although experienced operators tend to operate two or more of these functions simultaneously, the lift procedure can be broken down into the following sequence of operations.

OUTRIGGERS Set the outriggers as follows before initiating any lifting operations:

1. Remove the outrigger beam retaining pins, extend beams, and reinstall retaining pins.
2. To set the four (4) outriggers evenly, operate switches to raise crane to a level position. When level, retract jacks (together) at one end of crane an inch or so, and then extend them again (together) until crane is level. Then repeat this process for the opposite end of crane. This equalizes pressure in all four jacks. The controls for the out and down outriggers are mounted on the dash. The extend/retract master switch must be actuated before the appropriate function switches can be actuated to operate the outriggers.

The outrigger beams **MUST BE PROPERLY POSITIONED FOR THE LOAD RATING CHART BEING USED**, and the crane leveled prior to extending the boom or lifting loads. To achieve this condition, the vertical jack cylinders should be extended until the tires are raised free of the supporting surface.



FULL extension of the vertical jack cylinders should be avoided if not necessary to level the crane and raise wheels clear of the ground because oil expansion under extreme heat conditions can cause cylinder seal failure. Check to ensure that all beams are fully extended, swinging the upper if necessary to visually check that each beam reaches full extension. Level the crane by viewing the IC-1 screen which will show the crane on the X-axis and Y-axis relative to 0.0 degrees. While operating the crane, frequently check and level the outriggers between lifts.



The operator must exercise sound judgment in positioning the outriggers. The outriggers should not be set near holes, on rocky ground or on extremely soft ground. Setting the outriggers in such locations may result in the crane tipping, causing personal injury or property damage. Where a firm footing or level ground is not otherwise available, it should be provided by substantial timbers, solid blocking, or other structural members sufficient to distribute the load so as not to exceed the safe bearing capacity of the underlying material, and to enable leveling of the crane.

Proper positioning of the outriggers is critically important to both the safety and effectiveness of craning operations.

3. Use the load rating chart attached to the crane to interpret the conditions and limitations that exist when making a lift with the crane. The determining factors are lifted load, radius, boom angle, working position, hoist line reeving, tire pressure, travel data, and use of a jib.

The examples given in this section are given for your interpretation of the terminology used on the chart -(see Load Rating Chart Interpretation topic).



The load rating chart values used in the examples may not be the same as those on your load rating chart. Use the numbers from the chart attached to your crane whenever making lift calculation.

The increased possibility for inadequate wraps remaining on the winch drum occurs when operating with a higher number of parts of line than are required for the load being lifted, particularly at longer boom lengths and high boom angles.

Sufficient wire rope is initially provided to allow the hook block to reach ground level when reeved for the required parts of line indicated on the capacity chart for all given loads. Reeving with more parts of line than required may result in all of the wire rope being payed off the winch drum.



Always consider, anticipate, and/or determine by trial the maximum amount of wire rope which will be payed off the winch drum to perform each different craning application of this crane. Be sure to provide for no less than three full wraps of wire rope remaining on the winch drum as specified in all applicable crane operating safety standards.

The intent of this caution is to prevent any possibility of either reverse winding of the rope on the winch drum, which could cause breakage of the winch rope, or of unseating the rope wedge in the winch drum, which could result in the uncontrolled fall of the hook block and load. Use of more parts of line than required for the lift increases likelihood of rope damage.

4. Raise the boom to the required angle, consulting the boom angle indicator which indicates boom angle relative to upper structure.

The boom elevation is controlled by the RH Joystick. To RAISE the boom, slowly move the RH joystick to the LEFT. To LOWER the boom, slowly move the RH joystick to the RIGHT. Improved control is obtained by operating the engine at low speed while “metering” the controls. Always operate and release the controls slowly to minimize dynamic effects of the load. During a lift where precise control of the load is required, do not attempt to use more than one function at a time.



Always consider possible obstructions when varying the boom height or length; not only those to the front of the cab at the time of the adjustment, but those which may be encountered when swinging.

Play the swing through, considering all obstacles, prior to using swing function.



Never hold the controls in an “activated” position once the hoist/lower cylinder or extend/retract cylinders have reached the limits of their travel. This can cause overheating of the hydraulic oil if it is run over relief for prolonged periods.

80-160

Operating Instructions

5. Swing the boom over the load.

Upper structure swing is controlled by the swing joystick. To swing the upper structure to the RIGHT (CW), move the LH joystick to the direction of required swing which requires moving the joystick to the RIGHT. To swing LEFT (CCW), move the LH joystick to the LEFT. Swing speed increases as the lever is moved further side to side on LH joystick. Swing speed also varies with the engine speed.

Before attempting to swing the upper structure, make sure the swing brake is not set and the swing lock is not engaged. Be certain that no obstructions will block the swing.



Stopping the swing too abruptly will cause the load to oscillate and impose side loads on the boom. Because side loading can damage the boom, **ALWAYS START AND STOP SWINGS GRADUALLY.**

When ready, try for a smooth, controlled, safe swing. The swing should be **SLOW**. Start the swing **SLOWLY** and allow the load to build up only enough momentum to carry it through to the point where it is to be lowered.

Begin slowing the swing in advance of the point where the load is to be lowered. Slow the swing **GRADUALLY**, so that it appears to “coast” to a stop over the desired spot.

GRADUALLY slow the swing by use of the swing lever. First, move the lever to the neutral position and then **VERY SLOWLY** into the opposite swing direction position as required to slow the swing.

Apply the swing brake, with the foot pedal, when the swing is stopped or when emergency situations dictate that the swing be terminated abruptly.

If properly executed, the load will hang motionless when the swing is terminated. If the load is oscillating, the swing was made too rapidly and/or stopped too abruptly.



Never pull sideways with a crane boom. Crane booms are not designed for excessive side pull and may collapse if subjected to excessive side loading.

6. Extend the boom to the desired length. Do not extend the boom further than necessary to perform the lift. **EXTEND** the boom by pushing the top portion of the LH foot pedal **FORWARD** and **RETRACT** by pushing lower part of the LH foot pedal rearward.



While extending the boom, be sure to pay out sufficient hoist rope to prevent the hook block from being drawn up to the boom peak. The force of the extend cylinders can easily break the hoist line, dropping the hook block and load which may result in personal injury or property damage.

The boom extend function on this crane has two positions and two speeds. When the pedal is all the way forward, the regenerative mode provides increased speed. With the pedal approximately on half of the way forward, increased “**PUSH**” is available at reduced speed.

7. Lower the hook block to the load and fasten the hook.

Before making any crane lift, make sure the hook is properly engaged with the slings, or lifting device employed to make the lift. Be certain the hook latch is not supporting any of the load.



Hook latch is intended to retain loose slings or devices under slack conditions. It is not intended to be an anti-fouling device, so caution should be used to prevent the latch from supporting any of the load. Periodic inspection of the latch must be made to insure its proper operating condition.

Hoisting or lowering of the load with the MAIN winch is controlled by the RH Joystick. LOWER the load by pushing the RH joystick FORWARD and RAISE the load by pulling the RH joystick BACK. Improved control is obtained by operating the engine at low speed while “metering” the control. Always actuate and release this joystick slowly to minimize dynamic effects of the load and to prevent “bird nesting” of the cable on the winch drum.

To shift the MAIN winch into the high-speed, select high speed using the two speed switch located on the upper portion of the RH joystick. When slowing the winch, slowly return winch lever to neutral position to bring the load to a gradual stop. The MAIN winch can be disabled by selecting the center switch on the RH Joystick.

Hoisting or lowering of the load with the AUXILIARY winch is controlled by the LH Joystick. LOWER the load by pushing the LH joystick FORWARD and RAISE the load by pulling the LH joystick BACK. Improved control is obtained by operating the engine at low speed while “metering” the control. Always actuate and release this joystick slowly to minimize dynamic effects of the load and to prevent “bird nesting” of the cable on the winch drum.

To shift the AUX winch into the high-speed, select high speed using the two speed switch located on the upper portion of the LH joystick. When slowing the winch, slowly return winch lever to neutral position to bring the load to a gradual stop. The AUXILIARY winch can be disabled by selecting the center switch on the LH Joystick.

8. Lift the load to the desired height. It is good operating practice to not lift the load any higher than necessary.

The crane is equipped with an ATB system which includes a warning light, audible alarm, and control disconnects. When the hook block or ball activate a correctly installed and maintained ATB system, the block or ball will not raise, the boom cannot be extended and the boom cannot be lowered. To return to an operating condition, either lower the hook or ball, retract or raise the boom.

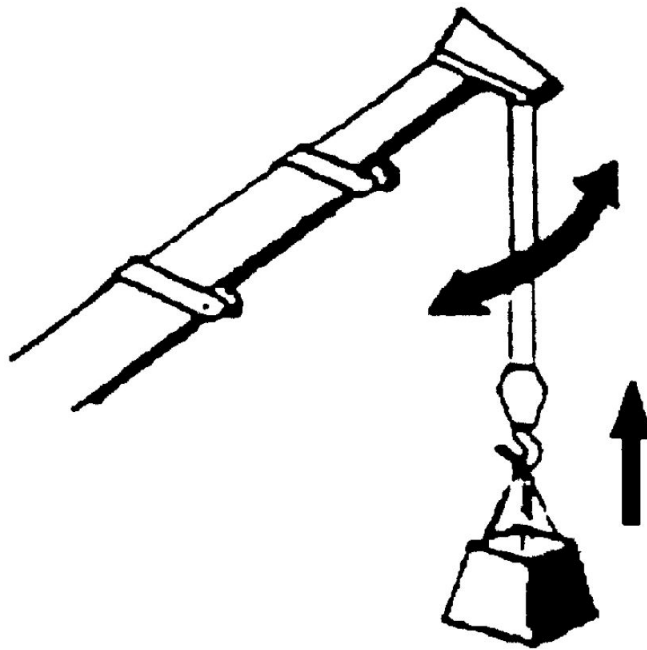
The operator may need to raise the hook block beyond the point at which the ATB system is activated during rigging or travel. The operator may override the system. (shown in control and instrument sections).



Continuing to pull the block up after contact has been made with the boom head may damage the boom head and sheaves or break the cable, causing the load to drop.

80-160 Operating Instructions

9. Swing and spot the load over the location where it is to be deposited.



10. Lower the load and unfasten the hook.



When spotting the load it may be necessary to alter the boom length or boom angle. In making these adjustments, the operator must guard against exceeding the rated load as determined by the load rating charts.

When operating a hydraulic crane, the operator should realize that hydraulic and structural competence, NOT TIPPING LOAD, is often the determinant of lifting capacity.

Therefore, THE OPERATOR MUST BE GUIDED SOLELY BY THE APPROPRIATE MANUFACTURER'S LOAD RATING CHART when considering load weight. The manufacturer's rated loads must never be exceeded.

Cranes which are factory equipped with auxiliary winches may require additional counterweight if the auxiliary winch is removed. Refer to the capacity chart (load rating plate) for the required counterweight total.



When lowering light loads, be sure to maintain sufficient cable tension to prevent the cable from becoming loose on the cable drum. Loose cable can slip and then bind suddenly, causing jerky lowering and shock loading of the boom. Loose wraps may form loops which can be overlain when the cable is wound onto the winch drum. These conditions can result in personal injury or property damage.

Moving the Unit

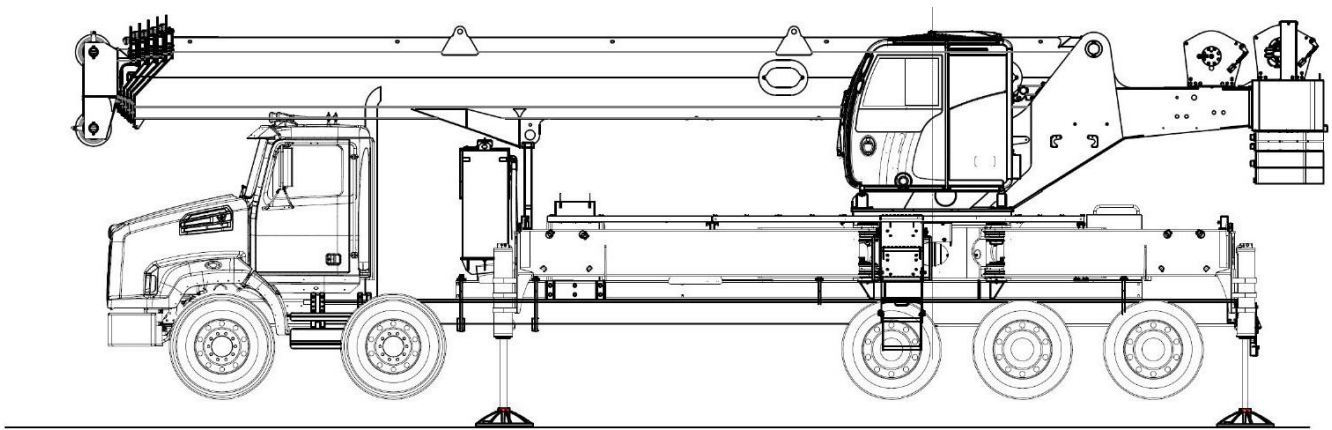
Removable Counterweight

INSTALLATION TO FRAME DECKING

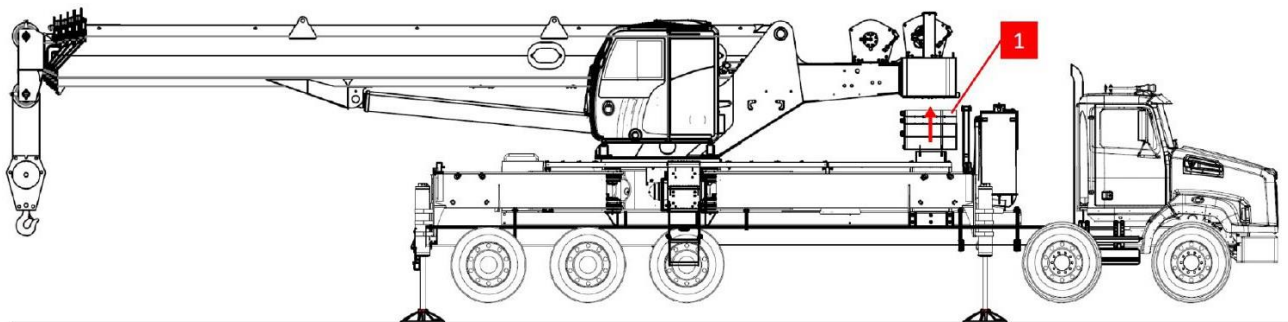


NOTE: The counterweight slabs are an integral part of this crane. When the crane is driven, the counterweights slabs may need to be moved from the upper to the deck or removed from the crane to meet local weight restrictions and axle weight limits.

1. Fully extend outrigger arms and lower the outrigger jacks to support the weight of the crane.



2. Rotate the upper to a position straight over the rear of the crane.



80-160 Operating Instructions



3. With the crane still running, move to a position on the decking facing the counterweight RAISE / LOWER switch item #1.
4. Remove the long horizontal pins item #2, and the locking pins item #3 that secure them, from the top slabs to free it from the counterweight shell. Both pins should pull freely.





NOTE: *If one or both pins will not release, it may be necessary to slightly lower one side of the slabs and raise the other to get the first pin removed, then slightly lower the side still pinned and pull the other side up tightly to remove the second pin.*

5. With the engine idling slowly, press rocker switch to the “Down” position to lower the counterweight slab to the triangular decking guide plates.



Do not continue to extend cylinders after counterweight is resting on the deck.
Severe damage may occur to the cylinders or cylinder mounts.

Vehicular Operation

This Hydraulic Crane is capable of both on-road and limited off-road travel. The kind of travel undertaken determines how the carrier is operated.

Before moving the crane, either around the work site or between sites, carefully consider the terrain type, road conditions, and any hazards likely to be encountered en route. Think the move through in advance and carry it out safely.

PRE-MOVE CHECK LIST

Before moving the crane to and from job sites, make sure the following safety checks have been made:

1. Stow the boom in the boom rack.
2. Lock the upper structure swing brake and engage the mechanical swing lock.
3. Secure hoist block to the bumper loop. If this is impractical, pull the ATB system counterweight up to within approximately 1" of the load sheaves, or until block lightly contacts boom head.

Use the ATB override switch to temporarily bypass the two block system disconnects. Failure to pull the hook block up to the head when traveling, or to secure it to the bumper ring, will result in excessive swinging of the hook block and possible damage to machine.



Continuing to pull the block up after contact has been made may result in damage to the boom head and sheaves.

4. Verify that the hydraulic outrigger beams are fully retracted and secured with retaining pins.
5. Check tires for proper inflation pressure.
6. Adjust the seat and mirrors for clear vision.
7. Disengage the main hydraulic pump drive. Never travel with the main hydraulic pumps engaged.
8. Check the counterweight and removable slabs (if so equipped) to ensure that they are properly secured for roading and that the weight is balanced so as not to over load axles or tires.

MOVING THE MACHINE

The general procedure for moving a machine is as follows:

1. Be seated in the driver's seat with the seat belt fastened low and snug.
2. Thoroughly review the shift pattern of the transmission.
3. Start the engine, as detailed in the vehicle operator's manual.
4. Allow air pressure buildup.
5. Make sure the boom is stowed in the boom rack.
6. Apply the swing brake.
7. Apply the swing lock.
8. Apply the Service Brake.

9. Release the Parking Brake.
10. Push in the clutch (if equipped with a manual transmission).
11. Select the desired transmission range.

OFF-THE-ROAD OPERATION

Good judgement in the selection of gear range and route of travel is essential when operating off the road. Holes and soft or spongy ground subject the machine to excessive stresses and should be avoided.

HARD SURFACE OPERATION

When operating on highways, the machine is subjected to the same regulations as which govern the operation of other heavy equipment on public roads. Adequate lighting, flares, flags and safety equipment should be on the machine at all times.

TIRE INFLATION

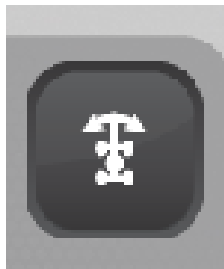
See chassis manufacturer's specifications for tire sizes and pressures.

Traveling around the Jobsite



When traveling around a job site, it is very important that the crane operator is very aware of what is happening with the crane as well as with other vehicles and personnel on the job site. The crane operator should observe the following rules as well as good common sense while moving a crane around a job site.

- Carry the boom over the front only in the boom rack.
- Lock the Swing Brake Switch (friction) and Swing Lock Switch (slewing gear).



- Secure the hook block or ball to the bumper loop or raise the hook block or ball close to the boom head sheaves before moving.
- Make sure all (4) four outriggers are completely swung inboard and beams retracted and locked per instruction on item (1) before moving the crane.



1. **Outrigger Beam Lock Pin** - shown in (locked) position, lift bolt, rotate pin clockwise until bolt drops into slot lowest position which will prevent beam from extending. Never drive crane without locking all (4) four pins.



2. **Outrigger Pad Storage** - Insert lockpin as shown above (1) one place on each pad and repeat this procedure on (4) four outrigger pads.
 - Stow the boom in the boom rack.
 - Watch for overhead obstructions such as trees, power lines, or bridges.
 - If the terrain is rough or uneven it may be necessary to travel at a reduced speed to prevent instability or damage to the crane.
 - Operating on steep grades requires caution because the oil in the engine or transmission will move to one side of the engine or transmission. As a result, the engine or transmission may not be fully lubricated which could damage the engine or transmission.
 - The operator must be very careful on steep side slopes to avoid tipping the crane.

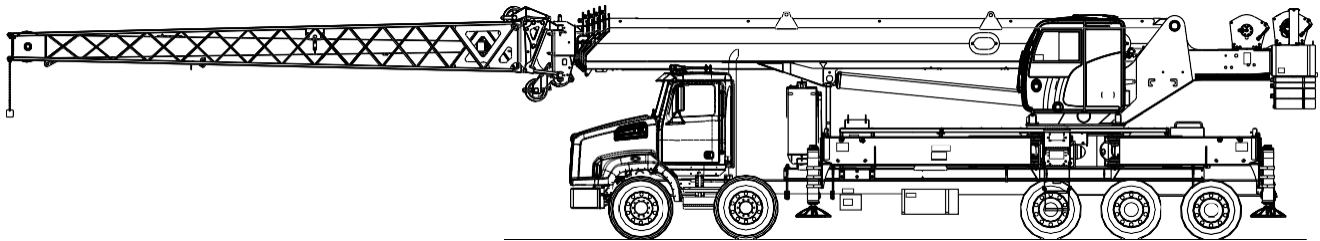


NOTE: This machine can travel on 15° side slopes which have a firm level prepared surface. Due to variations in the ground surface, tire pressure, bumps, potholes, etc., we recommend that travel on side slopes be limited to 5° and that the boom be horizontal or below.

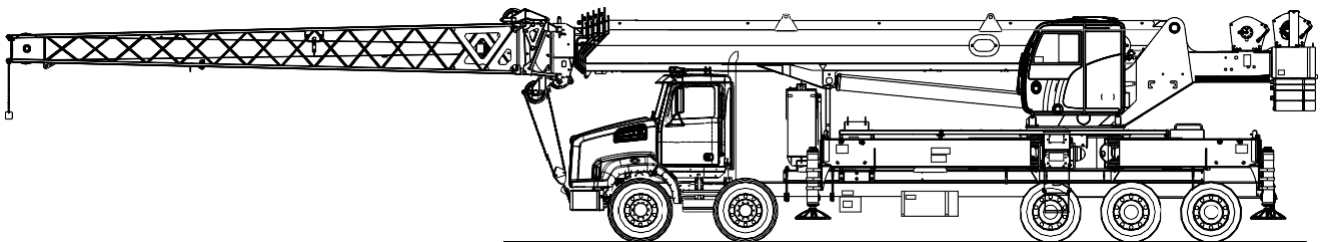


Crane Setup's and Moving of Unit Restrictions - strict adherence to the below chart must be followed or damage can result to front axles due to overloading or structural damage to crane due to dynamics of jib in erected state.

80-160 Operating Instructions



Travel Setup- Jib Extended w / hook ball rigged (Figure 1)



Travel Setup- Jib Extended w / hook ball & hook block rigged (Figure 2)

SETUP	CWT "OFF" / "ON"	JIB LOCATION	BOOM LOCATION	SWING LOCK-OFF / ON	TRAVELING YES / NO	SPEED RESTRICTION
Setup #1	CWT "ON"	Jib Stowed	Boom Retracted & in Boom Rack	Swing Lock- ON	YES	<2 MPH
Setup #2	CWT "ON" - Min. total to prevent axle overload- 2000# SLAB	Jib Erected & Stinger Retracted	Boom Retracted & in Boom Rack	Swing Lock- ON	YES	<2 MPH

Roading the Unit

Before leaving the work site or repositioning the crane at the work site, always:

1. Retract boom. Stow boom on the boom rest. Always use the boom rest.
2. Using D-Ring on rear of truck, attach load line hook and hoist in until slack is taken up. On tractor mount models, always use boom rest for securing the boom and tie off load line hook to attachment provided



NEVER LEAVE BOOM ELEVATED OR LOAD SUSPENDED WHEN UNIT IS UNATTENDED.

3. Fully retract all outriggers.
4. Disengage Power Take Off(PTO).



THE **LOAD KING** BOOM TRUCK IS NOT A PICK AND CARRY CRANE. NEVER DRIVE TRUCK WITH BOOM EXTENDED OR ELEVATED, OR WITH A LOAD SUSPENDED FROM LOAD LINE HOOK.



NEVER LEAVE THE WORK SITE OR REPOSITION THE TRUCK CRANE WITHOUT FIRST SECURING THE BOOM IN ROAD TRAVEL POSITION AND FULLY RETRACTING ALL OUTRIGGERS.

You should always know the maximum road height of your crane when repositioning at the job site or preparing for road travel. A placard like the one shown above, which shows the height of your crane as manufactured and installed is attached to the dash board inside the truck cab. Severe personal injury, as well as damage to the crane and truck, can result from failure to observe overhead obstructions during repositioning at the job site or during road travel.



ALWAYS KNOW YOUR MAXIMUM ROAD HEIGHT AND OBSERVE ALL OVERHEAD OBSTRUCTIONS. FAILURE TO DO SO MAY RESULT IN SEVERE DAMAGE TO THE CRANE/VEHICLE AND/OR DEATH OR SERIOUS INJURY TO OPERATING PERSONNEL.

80-160

Operating Instructions

Towing or Pushing Vehicle

The engine cannot be started by pushing or towing.

Dolly



Increased risk to accidents due to fitting dolly! Drive with special care when a dolly is attached. Particular care is required in curves (swerving outwards, drifting sideways, shifting center of gravity). Note the boom hoist cylinder must be completely retracted, otherwise there is a risk of the dolly failing to maintain sufficient contact with the ground.



Risk of accidents due to speeds being too high! Hill summits may only be passed at reduced speed: Due to the limited telescoping path of the boom hoist cylinder, the wheels of the dolly can be relieved of load or lift off the road surface.



Increased risk of accidents when driving with a dolly! During driving, especially when driving in a curve, the dolly must be observed in the rear - view mirror.



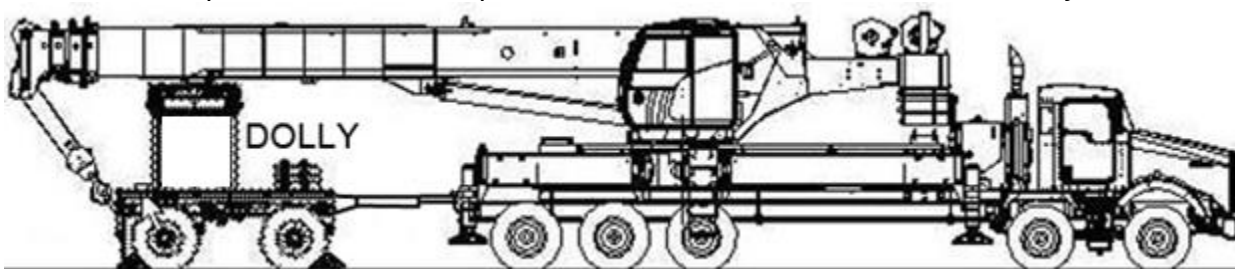
Depending on the construction of the "dolly", the driving behavior of the vehicle can be greatly influenced in a negative way. The reduced axle loads represent an additional negative effect. The instructions must be observed.

Function Description "Dolly Operation"

"Dolly operation" means: During transport travel, the boom is secured to the rear (superstructure to the rear) on a trailer (dolly).

There are very different design types of a "dolly" and different types of storage systems.

An example of a possible construction is illustrated below (not binding). No direct correspondence is to be expected between it and model which is actually at hand.



Connections on the Towing Vehicle (Optional)

Dolly Coupling / Supply Connections

80-160

Operating Instructions

If the crane vehicle is prepared for fitting a trailer / dolly, the following devices are installed at the rear of the vehicle:

1. Electric connection for dolly lighting equipment - rear
2. Compressed air connection (yellow) for braking
3. Compressed air connection (red) for supply output
4. ABS socket 7-pole
5. Dolly coupling (If a dolly coupling is part of our scope of delivery)



Check the dolly coupling daily for longitudinal play. Longitudinal play is not permitted. Risk of dolly ripping free!

Function Description "Float Position" of the Superstructure

In order for the dolly system to be able to follow the vehicle movements in driving operation (curves / bumps), the superstructure must be in the "float position" during "dolly operation".

The "float position" must be set before beginning driving.



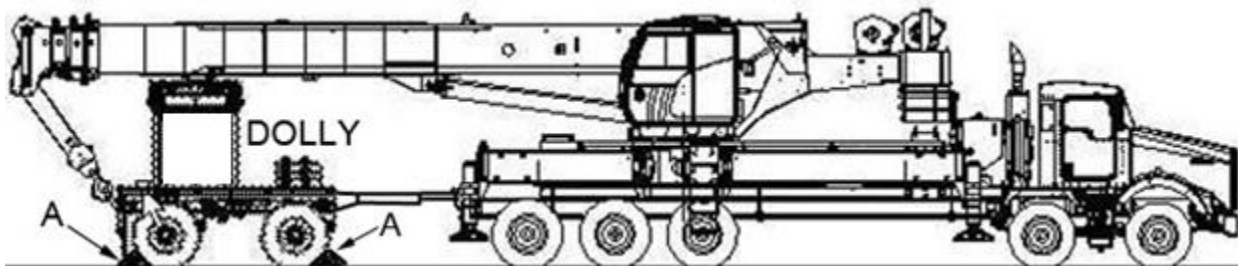
Be sure to follow the sequence of the handling steps described below.

Fitting the Dolly



Risk of accidents due to the dolly rolling independently! Using chocks, secure the dolly against rolling away.

1. Check whether the dolly is secured against rolling away with chocks. If required, the dolly must still be secured against rolling away using chocks (A).



2. Position the crane in front of the dolly so that the dolly can be pinned onto it later, without having to move it.
3. Support the crane on outriggers.
4. Bring basic unit in transport configuration (in accordance with state and federal regulations or national regulations and / or license).
5. Create connections between the dolly and the frame of the crane chassis.

6. Deflate the dolly's air suspension by twisting the "Suspension Dump" to Dump



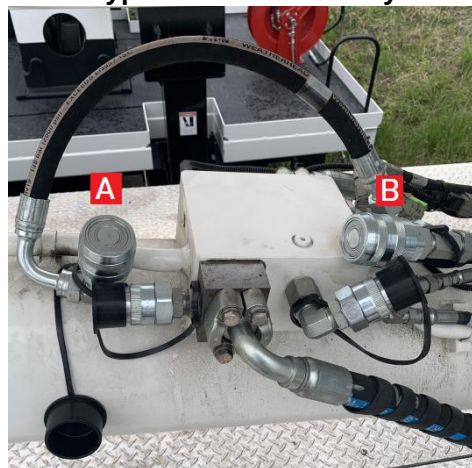
7. Carrier engine running and PTO engaged, Master Power on
8. Place main boom (lengthways) on the dolly, shift pins fasten and secure.
9. Work **Boom Down** lever to reduce pressure in the boom cylinder.
10. If pressure cannot be relieved in the boom cylinder do not proceed with further steps.



Falling boom - never attempt to connect bypass hoses unless boom is fully supported on the boom rack or boom dolly. Death or serious injury could result.

11. Locate the **Bypass Hose Assembly w/Couplings (A) and (B)** in the superstructure center and pull out to connect hose couplings (A) and (B) as indicated in graphic below. Note: If hose couplings cannot be connected, there is still pressure in the boom cylinder.

Bypass Hose Assembly



Bypass Hose Assembly Quick Couplings

12. Fasten hook block to dolly and tension properly if unit is rigged with block.

80-160

Operating Instructions

13. Release the superstructure locking device by pressing button on the 12" touch screen in the cranes operator's cab.



GREEN = UNLOCKED



RED = LOCKED

14. Swing open superstructure side access cover by lifting on the (2) rubber "T" handles at the top of cover to access the Swing circuit hydraulic valve handle and Swing lock Pin Block.

15. Install **Swing Lock Pin Block** (item 1) as indicated in graphic below.



16. Install **Cotter Pin** (item 2) to retain Swing Lock Pin as shown in graphic below.



80-160

Operating Instructions

17. Swing circuit hydraulic valve handle (FIG. 1) is shown in normal craning operation. To allow Swing circuit to "float" for boom dolly transport, move handle by pulling black knob and rotating counter-clockwise to a straight up and down position. (FIG. 2) Once handle is moved, the screen in the crane cab will show "Warning Swing Float Mode Engaged" (FIG. 3)

FIG. 1



CRANE MODE

FIG 2



DOLLY MODE

FIG 3



18. Carrier cab (Kenworth shown below) dolly function indicator lights **"RED"** light **"ON"** indicates dolly transport is OK and "free float" swing system is functioning properly. **"NO"** light indicates malfunction of the "free float" swing circuit. Immediately pull vehicle over to side of road to troubleshoot the problem. Contact your local Load King service representative if indicator light cannot be reset to **"RED"**.



Carrier Cab Dolly Transport Indicator Lights



Failure to immediately pull vehicle over to side of road to address malfunction of "free float" circuit in the swing system can result in serious injury or death as the "Free to Swing" feature required for travel with dolly would be disabled and dolly or crane could overturn.



Risk of accidents when driving with a locked superstructure! Before beginning driving with the dolly, the locking pin of the superstructure locking device must be secured mechanically.

1. Retract all outriggers.
2. Remove the chocks (A) under the tires of the dolly.
3. Inflate dolly air suspension, by turning Suspension Dump Knob to "FULL"

80-160

Operating Instructions



Risk of tilting due to swinging (slewing) the superstructure! When the swing gear brake is open, the superstructure can rotate involuntarily (influenced by wind / tilting position of the crane vehicle). The crane vehicle can overturn when this happens. For this reason only open / lock open the Swing Brake (friction) and Swing Lock (gear) when the boom is fastened to the dolly.



NOTE: *In this condition the Swing Brake (friction) and Swing Lock (gear) are locked open and thus out of function.*

Removing the Dolly

To remove the dolly transport system-reverse the instructional items procedure 1 thru 21.



Danger of overturning while raising the main boom! Only lift the main boom off the dolly when the Swing Brake and Swing Lock are functioning again and are applied.



WARNING

DOLLY INSTALL PROCEDURE

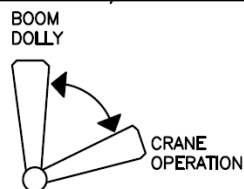
- * WHEN INSTALLING BOOM INTO DOLLY DO NOT ROTATE HANDLE INTO DOLLY MODE UNTIL AFTER BOOM IS FULLY ENGAGED INTO DOLLY
- * WHEN RELEASING BOOM FROM DOLLY ROTATE HANDLE INTO CRANE OPERATION MODE BEFORE DISENGAGING BOOM FROM DOLLY
- * FAILURE TO DO SO MAY CAUSE THE BOOM TO SWING IN AN UNCONTROLLED MOVEMENT

1038741



WARNING

SWING ENGAGE/DISENGAGE



- * DO NOT ROTATE LEVER INTO DOLLY MODE UNLESS BOOM IS FULLY ENGAGED INTO DOLLY
- * FAILURE TO DO SO MAY CAUSE THE BOOM TO SWING IN AN UNCONTROLLED MOVEMENT

1038727

Open Swing gear brake



Risk of tilting due to swinging (slewing) the superstructure! When the swing gear brake is open, the superstructure can rotate involuntarily (influenced by wind / tilting position of the crane vehicle). The crane vehicle can overturn when this happens. For this reason only open / lock open the Swing Brake (friction) and Swing Lock (gear) when the boom is fastened to the dolly.



NOTE: *In this condition the Swing Brake (friction) and Swing Lock (gear) are locked open and thus out of function.*

Removing the Dolly

To remove the dolly transport system-reverse the instructional items procedure 1 thru 21.



Danger of overturning while raising the main boom! Only lift the main boom off the dolly when the Swing Brake and Swing Lock are functioning again and are applied.

Dolly Not Contained in the Delivery Scope of Crane Manufacturer.



If the dolly is not contained in our scope of supply, assembly, operation and maintenance of this component remain the sole responsibility of the crane operator. The crane operator is responsible for careful assembly, operation and maintenance in accordance with the state and federal or national regulations. The manufacturer's instructions must be followed. The dolly must be fitted to the crane in such a way that does not create any risks. For example, the axles of the dolly must be evenly loaded to obtain an optimum braking effect. During driving the operating conditions of the dolly which are dangerous for driving must be monitored.

Emergency Procedures

Emergency Procedures

When operational aids are inoperative or malfunctioning, the following requirements shall apply for limited (temporary) use or shutdown of the crane.

1. Steps shall be taken to schedule repairs and recalibration immediately. The operational aids shall be put back into service as soon as replacement parts, if required, are available and the repairs and recalibration can be carried out. Every reasonable effort must be made to expedite the repairs and recalibration.
2. When a load indicator, rated capacity indicator, or rated capacity limiter is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish procedures for determining load weights and shall ascertain that the weight of the load does not exceed the crane ratings at the radius where the load is to be handled.
3. When a boom angle or radius indicator is inoperative or malfunctioning, the radius or boom angle shall be determined by measurement.
4. When a ATB device, two-blocking damage prevention, or two-block warning device is inoperable or malfunctioning, the machine must be shutdown until the device is corrected and the device must be deemed in good working order. No over ride of the system is permissible by the operator. The supervisor on the job site would be the only person to be allowed to OVER RIDE the system.
5. When a boom length indicator is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish the boom length at which the lift will be made by actual measurement or marking on the boom.
6. When a level indicator is inoperative or malfunctioning, other means shall be used to level the crane within the level requirements specified by the manufacturer.

In certain situations, It may be necessary to override the automatic motion limiter of the RCI / ATB unit in order to safely operate the crane. These include, but are not limited to:

The load block may lift the ATB weight before the load line can be tensioned while stowing the boom. This will cause a motion cutout. Overriding the system, in this situation is acceptable in order to continue to winch in slack line, securing the boom.

Emergency Boom Retraction

The **LOAD KING** Boom Truck is equipped with a pilot operated holding cartridge in the base of the extension cylinder. This cartridge provides a means of supporting loads in a static condition to prevent any inward creep. It also provides support in the event of a ruptured line, or hydraulic failure.

These holding cartridges should be maintained in a condition to hold a rated load suspended with the power source shut off and the handle actuated to the retract position.



APPLY FORCE VERY CAREFULLY SO AS NOT TO DAMAGE ANY BOOM COMPONENT. IF BOOM WILL NOT RETRACT, DO NOT FORCE IT OR INTERNAL DAMAGE MAY RESULT.

Emergency Lowering of Boom

The **LOAD KING** Boom Truck is equipped with a proportional solenoid holding cartridge in the base of the lift cylinder. This cartridge provides a means of supporting loads in a static condition to prevent any downward creep. It also provides support in the event of a ruptured line, or hydraulic failure.

This holding cartridge should be maintained in a condition to hold a rated load suspended with the power source shut off and the handle actuated in the down position.



DO NOT PUT ANY PART OF YOUR BODY BETWEEN THE LIFT CYLINDER,
THE BOOM, OR THE TURRET. CRUSHING INJURY OR DEATH CAN OCCUR.

Emergency Rotation

The **80-160** is equipped with a spring applied, hydraulic released brake. If hydraulic pressure is not available from the machine, a hand pump or other means of supplying **400 psi** must be provided to swing the crane in emergency situations.

1. Make sure crane is on level surface and use emergency retraction procedures to fully retract the boom.
2. Use emergency lowering procedures to lower the boom about 1 foot above the boom rest. Attach a tag line to the boom.
3. To release the friction swing brake and allow the vertical self alignment of the boom end over the load being lifted, press the rocker switch item (45) in the upper right side of console to unlock.
4. Switch the swing lock item (46) to "OFF" in operator's cab.
5. Use another vehicle to connect with straps to hook block and apply side pull to rotate crane boom into position over boom rack.
6. Actuate Swing Lock Switch to "ON".



ONCE BOOM IS IN BOOM REST, USE STRAPS TO SECURE BOOM INTO BOOM REST FOR ROADING. IF HOOK BLOCK OR LOAD BALL CANNOT BE SECURED TO TIEDOWN POINT, REMOVE IT AND SECURE ANY LOOSE WINCH CABLES.

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Disassembly

Side Stow Jib Stowage

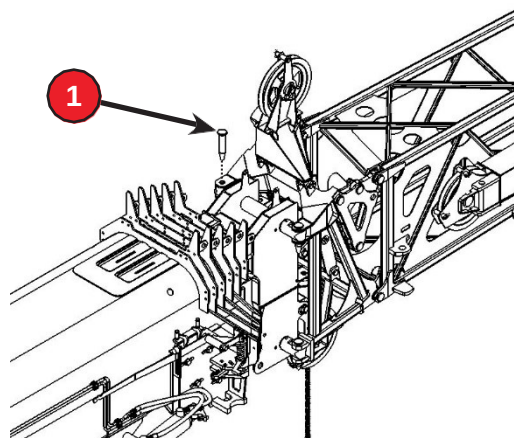


Before stowing the jib, ensure that no personnel or obstacles are in the swing path of the jib.

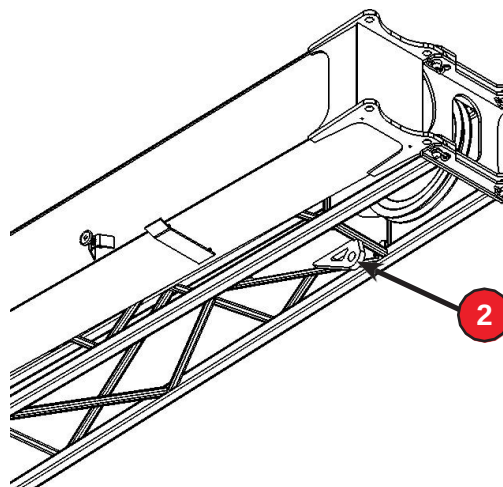
Retract the boom fully before stowage the jib. The jib cannot be mounted/stowed if the boom is extended even slightly.

Procedure for Jib Stowage

1. If the jib offset angle is other than 0°, change its offset to 0° before do this procedure, refer to the “Changing the Jib Offset Angle” section.
2. Set the crane on fully extended outriggers in a location where enough space available for mounting the jib.
3. Attach a guide rope to the eye on the bottom tip of the jib.
4. Remove the 4th pin (1) and then Winch down using jib remote control.

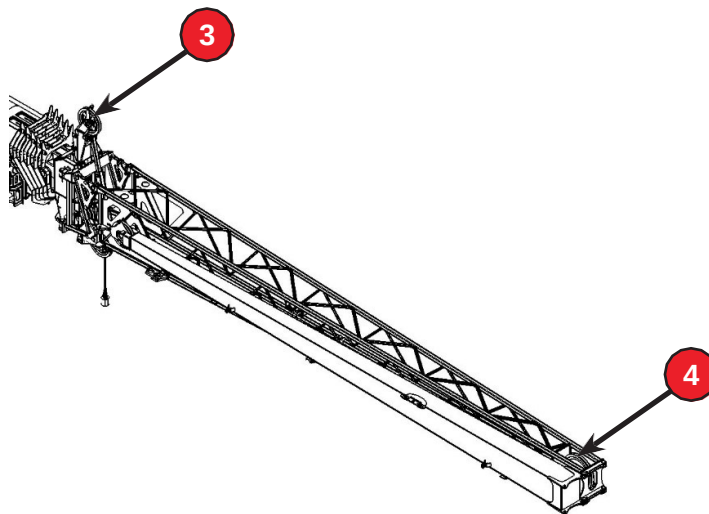


5. Remove the winch line and socket to jib base dead-end (2).

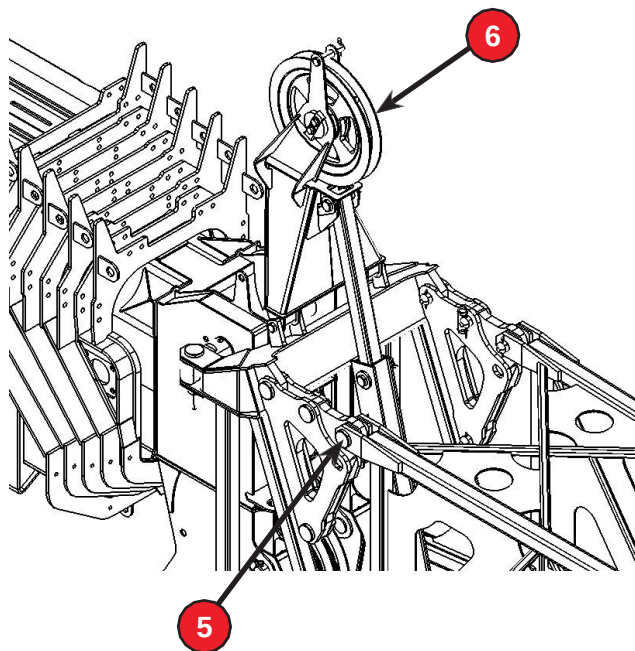


80-160 Disassembly

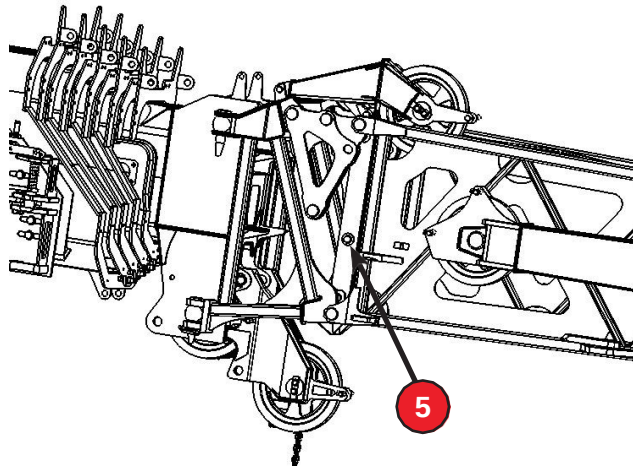
6. Remove the cable from the guide sheave (3) and sheave (4) at end of jib base section.



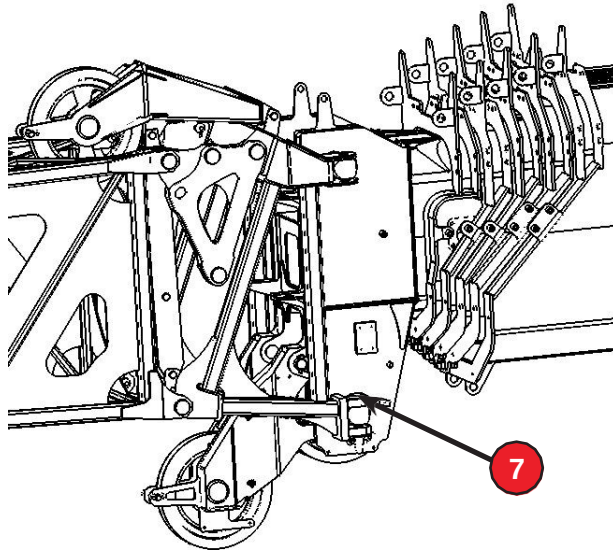
7. Remove the pin (5) from the upper hole and flip down the guide sheave (6).



8. Install the pin (5) in the guide sheave kickstand.

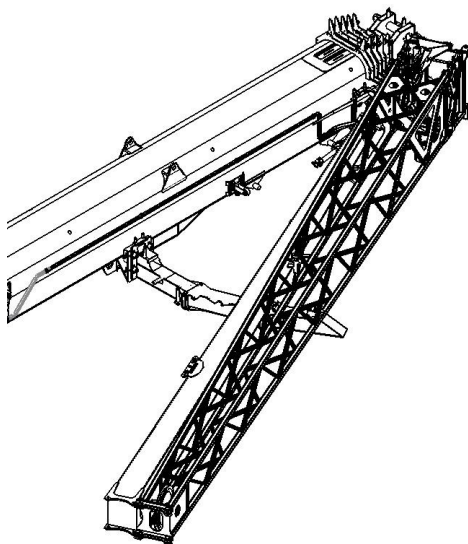


9. Remove the lower left-hand pin (7).

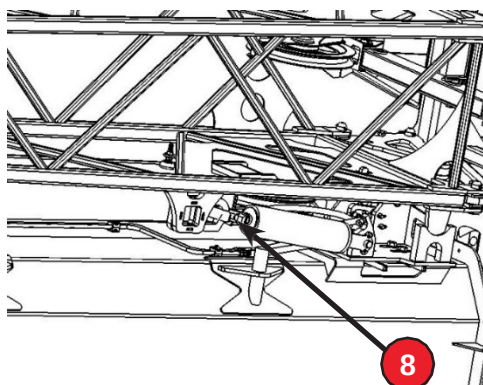


80-160 Disassembly

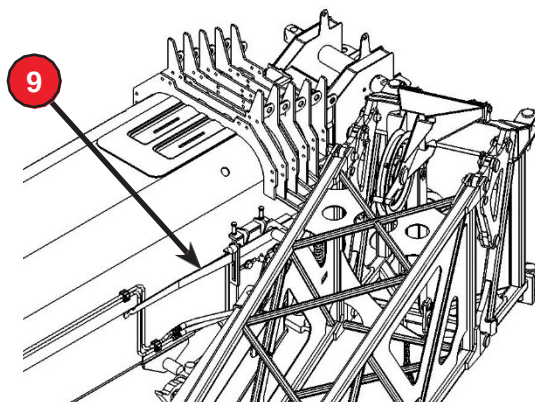
10. Swing the jib with guide rope until the jib come and rest on the tri-fold ramp.



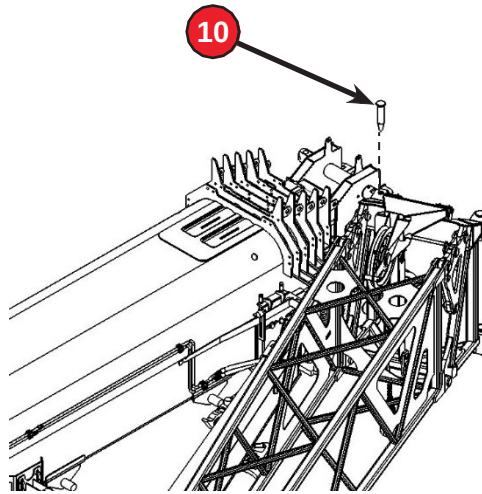
11. Engage the jib deployment cylinder with the jib deployment cylinder hook. Use jib deployment cylinder (8) to pull the jib inwards of the ramp.



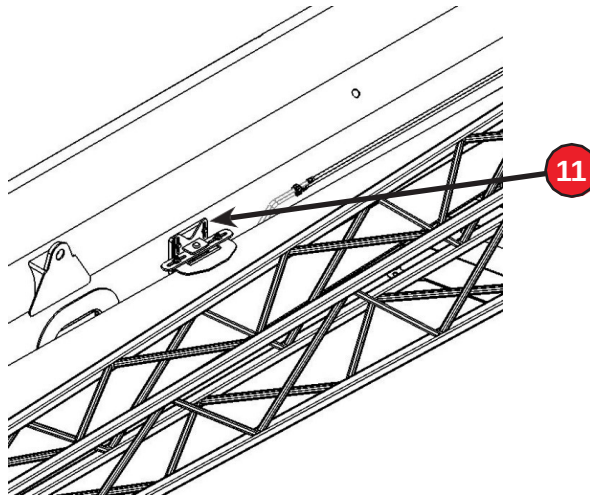
12. Push the lever (9) to engage the secondary pivot pin with jib.



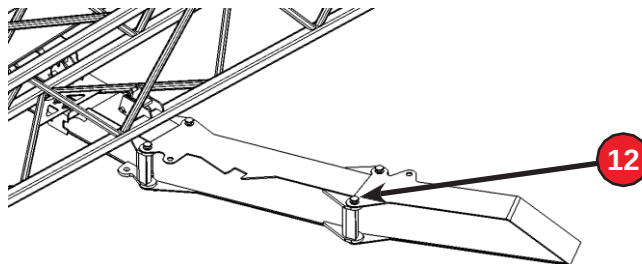
13. Remove the pins (10) from the both upper and lower mounting holes.



14. Retract the jib deployment cylinder (8) fully using the jib remote control. Make sure that the jib should lock on the storage bracket (11) properly.



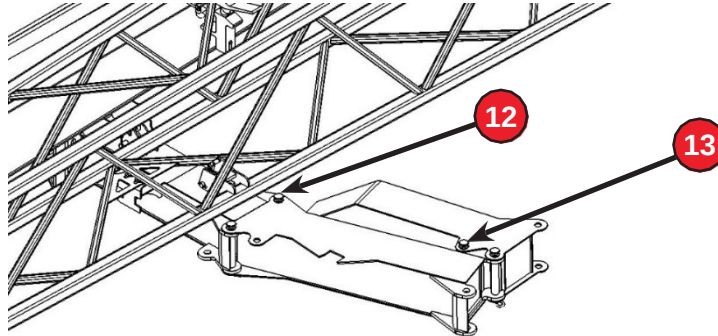
15. Remove the pin (12) from the tri-fold ramp and fold the 1st folding section to counterclockwise.



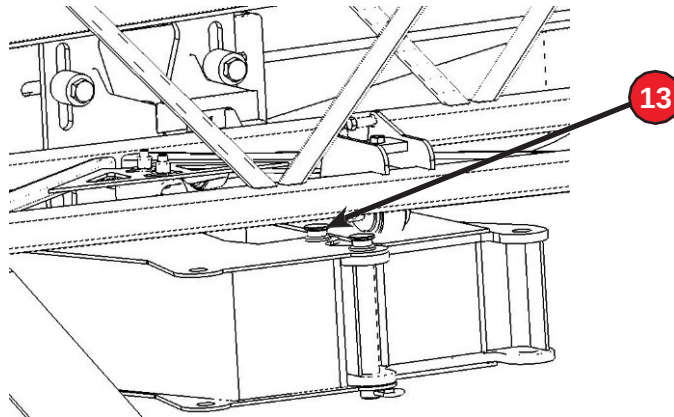
80-160

Disassembly

16. Install the pin (12) on the locking hole to lock the 1st folding section with middle folding section of the ramp. Remove pin (13) and fold the middle folding section of the ramp to clockwise.



17. Install pin (13) on the locking hole to lock the middle folding section of the ramp.



18. Remove the guiderope.

Transporting the Crane



The boom must be stowed in the boom rack before transporting the crane.

Restrain the boom extend sections by snugging the hook block against the boom head, or secure the boom head back to the base section of the boom with chains or cable when transporting the crane on a semitrailer. An extended(ing) boom can cause substantial damage. The hydraulic system will not hold the sections against the hard breaking jolts while the crane is being transported.

- Carry the boom over the front only.
- Lock the swing brake and swing lock.
- Secure the hook block or ball to the bumper loop or raise the hook block or ball close to the boom head sheaves before moving.

The outrigger pins need insertion to retain beams in retracted position.

- Make sure all (4) four outriggers are completely swung inboard and beams retracted and locked per instruction on item 1, before moving the crane.



1. **Outrigger Beam Lock Pin** - shown in (locked) position, lift bolt, rotate pin clockwise until bolt drops into slot lowest position which will prevent beam from extending. Never drive crane without locking all (4) four pins.

Instructions for Loading and Unloading

LOADING EQUIPMENT



Prior to operation, read and understand the manuals provided with this equipment. Also read and follow all general safety rules.

PREPARE TRAILER

Assure that any ramps are in position or trailer is otherwise prepared for loading and path of travel is clear for loading. All other necessary preparations of trailer must be performed.

PRE-START INSPECTION

Complete Pre-Start Inspection of machine as described in [Pre-Start Inspection on page 131.](#)

STARTING THE ENGINE

At ambient temperatures over 32° F on Cummins engines, follow the starting procedure below:

1. Put the parking brake switch in the “ON” position.
2. Turn the ignition switch to the “ON” position. Wait to start light goes off.
3. Turn the ignition switch to the “START” position to start the engine.

Release the ignition switch key as soon as the engine starts.

PRE-MOVE CHECK LIST

Perform Pre-Move Checklist as described in [Vehicular Operation on page 188.](#)

SECURE EQUIPMENT

Perform all necessary procedures to assure that machine is blocked and chained in position to trailer to eliminate any possible movement.

UNLOADING

EQUIPMENT PREPARE

TRAILER

Assure that any ramps are in position or trailer is otherwise prepared for unloading and path of travel is clear for unloading.

PRE-MOVE CHECK LIST

Perform Pre-Move Checklist as described in [Vehicular Operation on page 188.](#)

Maintenance Introduction

A regular program of periodic preventive maintenance is essential to prolong crane operating life, maximize efficient service and minimize downtime. This section details a series of checks and procedures which are to be performed at daily, weekly, monthly and semiannual intervals. These intervals are stated both in terms of calendar periods and hours of operation.

The checks prescribed for longer intervals include all the checks required for the shorter intervals. Thus, the weekly check includes all items in the daily check, the monthly check includes weekly and daily checks, and so on through the semi-annual check, which includes the quarterly, monthly, weekly and daily checks.

A convenient check chart provides a means of recording preventive maintenance performed and serves as a tool detecting problem areas and reanalyzing maintenance requirements. The items in each check interval on the check chart are grouped under their respective headings and covered in detail over the course of Section 6.

This maintenance schedule is a guide which ensures that basic preventive maintenance requirements will be met under average operating conditions. Conditions which impose greater wear, loads or strain on the crane may dictate reduced check intervals. Before altering the maintenance schedule, reevaluate crane operation and review the crane maintenance records. Consider all factors involved and develop a revised schedule adequate to meet routine maintenance requirements.

As a part of each periodic check, refer to the engine manufacturer's manual for engine maintenance requirements. When servicing the engine, the engine manufacturer's recommendations take precedence over those in this manual, should any discrepancy be noted.

Cold Weather Package Specification

The standard Load King Stinger series of cranes can operate in temperatures down to -25C (-12F). For operating below this temperature a Cold Weather Package option would be required. With this package the crane can operate to -40C (-40F). To operate in these extreme weather conditions, proper start up and recommended operating procedures must be followed.

The following Cold Weather Package option must be installed as listed in chart below:



Fluids and lubricants must be compatible with the expected temperature environment. Refer to chart of recommended fluids for expected temperatures. Hydraulic and transmission systems must be drained and purged of old fluids to allow the maximum exchange for new fluids. Other fluids/lubricants can be exchanged by draining old fluids/refilling with recommended fluids or by applying recommended greases. Use of improper fluids for ambient conditions can damage equipment.

COLD WEATHER PACKAGE COMPONENTS

Description	SPEC. NO.	Load King Part No.
Main & Aux. Winch, Swing Drive	Mobil Gear SHC 150 or Shell OMALA HD 150	T118485
Hydraulic Oil-see data sheet	Petro-Canada Hydrex Extreme or Shell Tellus Arctic 32	T117487
Hydraulic Tank Heater	120V or 240V	1223-1028
Grease (upper structure & outriggers)	Mobilith SHC 220 Schaeffer 274 Moly EP Shell Alvania EP Arctic Moly O	T118484

1. Engine Oil-contact your local carrier truck supplier.
2. Gear Oil-Front & Rear Axles-contact your carrier truck supplier.
3. Transmission Fluid-contact your carrier truck supplier.
4. Coolant Fluid-contact your carrier truck supplier.
5. Grease (Carrier Chassis)-contact your carrier truck supplier.
6. Battery Blanket-contact your carrier truck supplier.
7. Engine Oil Pan Heater-contact your carrier truck supplier.
8. Fuel Pre-heater-contact your carrier truck supplier.

Cold Weather Package Recommendations

For the operation and maintenance of your crane in cold weather, the information will cover from 0° C (32° F) to -40° C (-40° F). When you operate your crane in temperatures above 0° C (32° F), refer to your Load King Operator's & Shop Manuals.

Make sure you read and understand the information in [Cold Weather Package Specifications on page 216](#) on the Cold Weather Package requirements for operations to -40°C (-40°F). If your crane does not have this package installed, use the information in this document as a guide to properly setup, operate and maintain your crane at these cold temperatures. Use of the fluids recommended and installation of the specific heaters can be ordered from your Load King Parts Department.

Install the correct lubricant in each area of the crane, engine, hydraulic tank, fuel, axles, bearings, bushings, winches, swing drives and steering fluid.

All batteries should be fully charged and electric blanket plugged in to correct voltage source.

Fill the fuel tank at the end of each shift.

Check the air cleaner and air intake daily. Keep any snow clear of the air intake.

When driving, your hydraulic steering gearbox can be slow to react to your steering wheel movement due to the low temperatures, even with the lower viscosity oils.

If the engine is started, run the engine until the engine reaches operating temperature. Achieving operating temperature will help prevent the intake valves and exhaust valves from sticking.

The cooling system and the lubrication system for the engine do not lose heat immediately upon shutdown. The transmission and the hydraulic system lose heat more rapidly because of the exposed areas. Gear cases cool rapidly, since the gear cases do not operate as warm as other components. Thus, the engine can be restarted after shutdown for a couple of hours but the other systems will require exercising (cycling) upon starting.

Fluid Recommendations

Before attempting to start the engine, make sure that the oil in the engine, the oil in the transmission and oil in the hydraulic system are fluid enough to flow. Check the oil by removing the dipstick. If the oil will drip from the dipstick, then the oil is fluid enough to start the engine. Do not use oil that has been diluted with kerosene. Kerosene will evaporate in the engine. This will cause the oil to thicken. Kerosene will cause swelling and softening of the silicone seals.

If the viscosity of the oil is changed for colder weather, also change the filter element. If the filter is not changed, the filter element and the filter housing can become a solid mass. Drain all hydraulic cylinders and lines. After you change the oil per recommendations in Cold Weather Package Specifications on page 226, operate the equipment in order to circulate the thinner oil.

The number of acceptable lubricants is limited in arctic conditions and deviations of these lubricants must be approved by Load King Service Department.

80-160 Maintenance

Starting Recommendations

Check the air cleaner daily before starting the machine. If you operate the machine in heavy snow, attach a burlap sack loosely to the pre-cleaner. Keep the burlap sack away from heated parts.

In order to assist in warm-up, block the radiator. Blocking the radiator will restrict air from the fan.

Before entering the operators cab, inspect the condition of the following parts: hydraulic hoses, tires, and fan drive belts. Inspect for cuts, cracks and worn spots and connections. Running the engine at idle will keep the engine compartment warm. The compartment for the transmission will also be kept warm. However, running the engine will not keep the hydraulic system warm.

The outer wrapper on hydraulic hoses can crack when flexing occurs at cold temperatures. This does not mean the hoses have failed. The hoses will still carry oil under pressure.

Normal machine operation will condition the hoses if arctic fluids have been installed in your crane. However, the arctic fluids must be put into the system before the cold weather begins.

Check the machine in order to be sure that the voltage of the battery heater blanket, engine coolant heater and engine block heater matches the power source. (See list in [Cold Weather Package Specifications on page 216](#).)

To avoid valve damage, always run the engine until the coolant temperature is at least 82°C (180°F).

After the engine is warm, proceed with warming up the other systems. Start with the hydraulics. Run the engine at less than 1/3 throttle, and slowly move the boom hoist joystick control to lift the attachment in sequence of raising, lowering, extending and retracting the boom. Extend the travel of the cylinders during each cycle. Perform this operation for all hydraulic circuits such as winch raise/lower, swing left/right, outrigger raise/lower jack cylinders, beams extend/retract.

Exercise the transmission and power train. Engage the parking brake or apply the brake. Run the engine slightly above LOW IDLE. Alternate shifting the transmission from forward to reverse. Repeat several times-1st gear forward low to 1st gear reverse low to 1st gear forward low.

Release the brake. Move the crane forward and backward for several meters (feet). Continue this method for several minutes.

Only operate the crane under light loads until the systems reach normal operating temperatures.

Block the radiator to decrease the warm up time of the engine and compartment area. If temperatures are extremely cold, use a canvas over the engine compartment and a space heater. This will aid in starting the engine. Use of a canvas over the hydraulic components will improve initial warming of the components.

Parking Recommendations

Always park the crane in the proper area. Park the machine on wooden planks. The planks will keep the tires from freezing to the ground.

Battery Recommendations

The temperature of the batteries affects the battery's cranking power. When the battery is too cold, the battery will not crank the engine, even though the engine is warm. Batteries may be stored in a warm environment or use of the Battery Blanket is recommended. Keeping the battery warm by use of the "Battery Blanket", specified in [Cold Weather Package Specifications on page 216](#), will maintain the battery's cranking power.



NOTE: *Make sure your battery blanket voltage matches your source voltage.*

Whenever an engine is being operated in cold weather, use a battery charger to keep the batteries charged. A full charge prevents the batteries from freezing.

Be sure to keep your batteries charged to a correct specific gravity of 1.250 or above.

Tire Inflation Recommendations

Make sure your tires that are inflated to the correct pressures for the cold temperatures. If tires are below the recommended pressure they will have a shortened life. A tire that is inflated to the correct pressure in a 18°C to 21° C (64°F to 70°F) shop area will have a lower tire pressure in freezing conditions.

Load King recommends the use of dry nitrogen gas to inflate the tires for cold conditions. When nitrogen gas (N₂) is used, there will not be a build up of ice crystals around valve stem which could hold the valve open.

Tire inflation should be done in a heated shop area. The tire bead will seat better when the tire bead is warm. The initial tire pressure should be 15% to 20% higher than the operating pressure in order to seat the bead against the rim. Deflate the tires to operating pressure before operating the crane. The contact surface of the tires will become flat in cold weather when a machine is parked. To return the tire to a normal shape, move the machine gradually.

80-160 Maintenance

Inflation Adjustments Needed to Compensate for Lower Outside Temperatures

Desired Cold Inflation Pressure (psi)	Difference Between Shop and Outside Temperature (°F)								
	30	40	50	60	70	80	90	100	110
30	33	34	35	36	37	38	39	41	42
35	38	39	40	41	43	44	45	47	48
40	43	45	46	47	48	50	51	53	55
45	49	50	51	53	54	56	57	59	61
50	54	55	57	58	60	62	63	65	67
55	59	61	62	64	66	68	69	71	73
60	65	66	68	70	72	73	75	78	80
65	70	72	73	75	77	79	82	84	86
70	75	77	79	81	83	85	88	90	92
75	80	82	84	87	89	91	94	96	99
80	86	88	90	92	95	97	100	102	105
85	91	93	96	98	100	103	106	108	111
90	96	99	101	104	106	109	112	115	116
95	102	104	107	109	112	115	118	121	124
100	107	109	112	115	118	121	124	127	130
105	112	115	118	120	123	127	130	133	137
110	118	120	123	126	129	132	136	139	143

Additional Cold Weather Operation Issues

Contact your **Load King** Service Representative or Cummins Engine Service Representative if you have any questions regarding extreme environment operation or service of your crane.

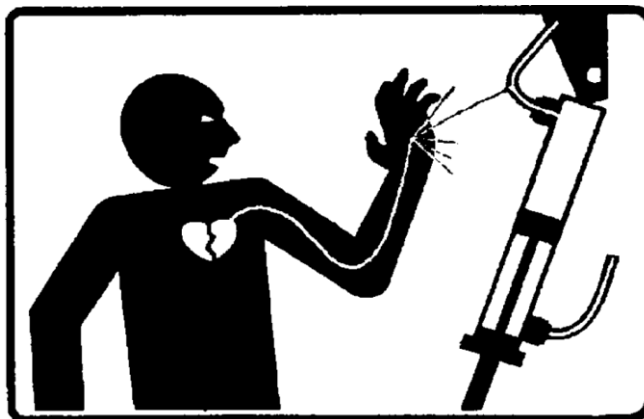
Safety Practices

1. Ensure parking brake is applied prior to performing any repairs.
2. Lower all loads to the ground so load line is slack.
3. Move all controls to neutral position.
4. Disengage the PTO and turn off ENGINE
5. Attach a caution sign to the start controls warning personnel that the unit is being serviced.
6. DO NOT stick hands or tools into any hole in boom sections while power is on or boom sections are moving.
7. DO NOT perform maintenance, adjustment, or repair procedure unless authorized to do so. Make sure all applicable instructions have been read and are understood thoroughly.
8. DO NOT check for hydraulic leaks with hands. Oil under pressure can penetrate human skin causing serious injury. Oil under pressure can be nearly invisible; Check for hydraulic leaks with a piece of cardboard or wood.



DO NOT GO NEAR LEAKS

1. High pressure oil easily punctures skin causing serious injury, gangrene or death.
2. If injured, seek emergency medical help. Immediate surgery is required to remove oil.
3. Do not use finger or skin to check for leaks.
4. Lower load or relieve hydraulic pressure before loosening fitting.



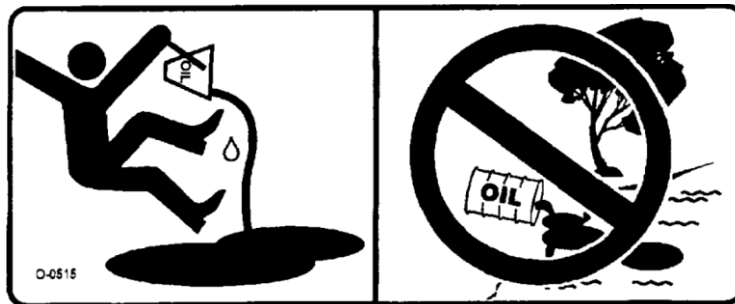
9. Hydraulic oil is flammable; DO NOT check inside hydraulic tank with an open flame.

80-160 Maintenance



DO NOT SPILL OR DUMP OIL

1. Keep open flame away.
2. Injury could result if not cleaned up.
3. Oil is a regulated/hazardous waste.
4. Capture oil when repairing or draining systems.
5. Disposal must conform to state/federal regulations.
6. Do not overfill containers or reservoirs.



10. DO NOT alter specified flow and pressure settings. Higher than specified flows and pressures can cause damage to crane and hydraulic components. Lower than specified flows and pressures can result in loss of power.
11. DO NOT weld or have open flame close to hydraulic lines and components without first placing a protective cover over them.
12. DO NOT remove cylinders until working parts are resting on the ground or are securely blocked from movement.
13. Components are heavy. DO NOT attempt to lift them by hand; use a hoist, jacks, or blocking
14. This Boom Truck has a step and two grab handles on either side for climbing onto and off of the platform. Crane owner/user shall provide sturdy ladders for personnel to gain access to components which cannot be reached from either the platform or from the top of the flatbed. DO NOT allow personnel to climb onto turntable, winch, or the top of the boom. Use a sturdy ladder to gain access to these locations.

General Work Practices

The following points are effective work practices that make the job go smoother and provide for the best quality in the repair of the crane.

1. Before disconnecting wires, hoses or tubes, tag them for proper identification at reassembly.
2. Before removing a component (pump, motor, valve, etc.), match mark its mounting position in relation to the adjacent component
3. Before disassembling any multiple section component (pump, motor, valve, etc.), mark the position of each section in relation with the other.
4. Before removing shims, tie them together and identify the location.

Storing Components

1. Store new components (valves, pumps, motors, cylinders, hoses, tubes, fittings) in a clean, dry indoor location.
2. DO NOT unpack components or remove port plugs until the components are needed.
3. Once unpacked, carefully inspect each component for damage that may have occurred during shipping. Remove all shipping material from the ports of the components before installing them.
4. Fittings, hoses and tubes that are not equipped with shipping caps or plugs must be carefully cleaned before they are used. Flush the fittings, hoses and tubes with clean hydraulic oil then seal all openings until assembly.



DO NOT USE RAGS TO PLUG OPENINGS. USE CLEAN PLASTIC OR METAL PLUGS AND CAPS.

Cleanliness

1. When removing a component from the crane, thoroughly clean the area around it to prevent dirt from entering the mating component or the hydraulic system. Cover all openings with plastic to prevent dirt and water from entering.
2. Carefully clean the area around fittings before disconnecting hoses and tubes and the mating ports of all components to prevent dirt and water from entering.
3. Use tools that are clean and in proper working condition.
4. Clean metal parts in nonflammable safety solvent. Clean rubber parts in warm soap and water. Lubricate all parts with clean oil at assembly, unless otherwise instructed.

80-160

Maintenance

Operator Observation

As the operator, it is your responsibility to observe and report any unusual sounds, odors, or other signs of abnormal performance that could indicate trouble ahead. On a routine basis the following items should be checked before starting or while operating the crane.

Visual Inspection - Check complete machine for any unusual condition.

Check for any leaks or damage to the hydraulic system.

Check in the engine compartment:

- Belts for tension and wear
- Coolant level
- Oil level
- Transmission oil level
- Air cleaner sight gauge
- Air intake
- Muffler and exhaust
- DEF fluid level

Check battery box - For battery condition

Crane boom - Check for:

- Hook block for wear or damage
- Two block system for proper function
- Cable and cable spooling on winch
- Cylinder pin connections for wear

Check tires, axles, and drive lines, for wear or damage.

Check in the cab for:

- Instruments functioning properly
- Control operation
- Glass for good visibility
- Safety equipment is ready for use
- All lights work properly
- Cleanliness - Free from mud and debris.

Maintenance Checks and Lubrication

The following are the recommended maintenance instructions for the Load King Boom Truck. The outrigger hinge points do not require lubrication either. The MASTER LUBE CHART above shows the proper lubricants to use and the frequency of lubrication.

DAILY OPERATOR CHECKS

A regular schedule of maintenance is essential to keep your unit at peak operating efficiency. Operators responsible for the care of the unit should be familiar with the daily and weekly maintenance schedules and what to look for. Below are the items to check to ensure the unit is in proper and safe operating condition, and recommended intervals of care.

CHECKING THE TRUCK

Proper operation of the crane is dependent on the condition of the truck, so the following checks should be done daily:

1. Set parking brake, start engine, put transmission in neutral and engage PTO. Allow the hydraulic system to warm up slightly. Check for any sign of oil leaks or damaged hoses.
2. Extend all four outriggers to a firm surface, raise truck to just clear tires from ground, and shut the engine off. This is an opportunity to ensure the outrigger holding cartridges are not leaking under load.
3. Check the lights for proper operation.
4. Check engine fluids. Maintain oil and water levels above the add mark.

Do additional checks per truck operator's manual.

DAILY CHECKS

Before daily operation begins, the crane should be run and checked for the following:

1. Set parking brake, start engine, put transmission in neutral and engage PTO. Allow the hydraulic system to warm up slightly. Check for any sign of oil leaks or damaged hoses.
2. Extend all four outriggers to a firm surface, raise truck to just clear tires from ground, and shut the engine off. This is an opportunity to ensure the outrigger holding cartridges are not leaking under load.
3. Check all controls for any signs of sticking and proper operation of functions. With boom elevated and extended, shut off engine and check for signs of boom drift.
4. Check to make certain that the load line is properly spooled on the winch drum and that it is not damaged.
5. Check all Operator Aids for proper operation (ATB, Rated Capacity Indicator System and Holding Valves).
6. Do daily lubrication.
7. Check that the downhaul weight (load block or ball) is properly secured to the loadline and the hook safety latch is in proper operating condition.

WEEKLY CHECKS

The following weekly checks should be performed in addition to the daily checks:

1. Check mechanical linkages for signs of wear or binding. Lubricate as necessary with 10 weight motor oil.
2. With all boom sections retracted, move boom side to side and check for missing wear pads between boom sections and excess clearance or looseness in rotation gearbox (more than 2"-4" of play side to side at boom tip).
3. If machine is salt covered, wash weekly to prevent rust and corrosion.
4. Do weekly lubrication.

MONTHLY OPERATIONAL CHECKS

The following checks should be performed monthly in addition to the daily and weekly checks:

1. Check oil level in the rotation gearbox. It should be filled with HD-80W90 to the fill plug. At this time a shot of grease should be added to the grease zerk on the upper bearing. (Caution: Do not overgrease this bearing!)
2. Check for excessive movement in the rotation gear mechanism. If over 4" of movement (side to side) is detected by moving the boom tip back and forth when fully retracted, it would be considered excessive.
3. Inspect all crane mounting bolts for signs of looseness or breakage. Replace or retorque where necessary. (see [Torque Specs - SAE & Metric on page 361](#)).
4. Extend all boom sections and check for physical defects, cracks and signs of overstress. Check the boom while extending to make sure it is properly sequencing. With the boom fully extended, check for excessive droop. Check to make certain all boom wear pads are in place and tight, and no excessive slop between boom sections is detected.
5. Check that all boom and outrigger pins are properly secured and make certain that keepers and snap rings are present and properly installed.
6. Inspect load line for signs of kinking, crushing, cutting, or other damage.
7. Inspect weldments for signs of cracks at weld joints on all structural members.
8. Change hydraulic oil filter.

90-Day Maintenance Items

The following maintenance procedures should be done every 90 days in addition to the daily, weekly, and monthly checks:

1. Check and reset the rotation gear backlash.
2. Torque rotation gear mounting bolts. (See [Torque Specs - SAE & Metric on page 361](#)).
3. Run the unit long enough to get the hydraulic system fully warmed up and inspect thoroughly for signs of leakage due to worn hoses or loose fittings. Correct as necessary.
4. Check the load block and the downhaul weight for signs of overloading, spread side plates, elongated holes, bent tie bolts or cracks.
5. Deformation - any visibly apparent bend or twist from the plane of the unbent hook, throat opening - any distortion causing an increase in throat opening of 5% not to exceed 1/4" (6 mm).
6. Check all placards and load charts to ensure they are legible. If any placards are damaged or missing, they must be replaced.
7. Inspect all electrical wiring and operator aids (ATB, Rated Capacity Indicator System, holding valves) for proper functioning and signs of deterioration.
8. Replace hydraulic tank breather.

Semi-Annual Maintenance Items

The following checks should be done semi-annually in addition to the daily, weekly, and monthly checks:

1. Torque the mainframe mounting bolts. (See [Torque Specs - SAE & Metric on page 361](#)).
2. Check Hydraulic system pressures and adjust as necessary.
3. Inspect all visible wear pads for excessive wear or looseness.



ALL MAINTENANCE AND INSPECTION INTERVALS ARE BASED ON NORMAL USE. EXCESSIVELY HIGH DUTY CYCLE OR DUSTY, DIRTY ENVIRONMENTS WILL REQUIRE MORE FREQUENT MAINTENANCE INTERVALS. A UNIT THAT IS SUBJECTED TO PARTICULARLY ROUGH TREATMENT, OR IS FREQUENTLY OVERLOADED IS SUBJECT TO PREMATURE FAILURE.

Machine Maintenance Checklist

DAILY CHECK (8 HOURS)

- | | |
|---|---|
| ☐ Perform Daily Lubrication | ☐ Check Boom Front Slider Pads |
| ☐ Check Hydraulic Reservoir Fluid Level | ☐ Drain Air Tanks |
| ☐ Fill Fuel Tank | ☐ Check Wire Rope and Related Components |
| ☐ Check Engine Oil Level | ☐ Check Air Cleaner |
| ☐ Check Coolant Level | ☐ Check Controls |
| ☐ Check Hydraulic Cylinder Mounting Bushings and Pins | ☐ Check Instruments, Gauges, Lights, & Safety Equipment |
| ☐ Check Hydraulic Components & Hoses (See Hydraulic Hose topic in Maintenance section) | ☐ Make Overall Visual Inspection |
| ☐ Check Transmission Oil Level | ☐ Check ATB System |
| ☐ Check Boom Chains and Ends | ☐ Check Engine Manufacturer's Manual for Additional Maintenance Requirements |
| ☐ Drain Fuel Filters or Water Separator | ☐ Ensure Swing Brake is able to Hold Against Full Torque of Swing Motor |
| ☐ Check DEF (Urea) Fluid Level in Reservoir | ☐ Drain Water from Air Tanks |

WEEKLY CHECK (40 HOURS)

- | | |
|--|---|
| ☐ Perform the Daily Check | ☐ Check Torque on Wheel Lug Nuts |
| ☐ Perform Weekly Lubrication | ☐ Check Hydraulic Cylinders and Rods |
| ☐ Check Swing Reducer Oil Level | ☐ Make Thorough Inspection of Wire Rope |
| ☐ Check Axle Oil Level (after initial change) | ☐ Visually Inspect all Structural Members and Welds for Cracks, Alignment and Wear |
| ☐ Check Battery Condition | ☐ Check Boom for Wear, Cracked Welds, Alignment And Missing or Illegible Decals |
| ☐ Check Tire Pressure and Condition | ☐ Check Engine Manufacturer's Manual for Additional Maintenance Requirements |
| ☐ Check Air System Safety Valve | ☐ Clean Machine Weekly If Salt Covered to Prevent Rust and Corrosion |

80-160 Maintenance

MONTHLY CHECK (100 - 200 HOURS)

- ☐ Perform Daily and Weekly Checks
- ☐ Perform Monthly Lubrication
- ☐ Check Engine Belts
- ☐ Check Hydraulic Reservoir for Moisture
- ☐ See Engine Maintenance Section
- ☐ Check all Slider Pads
- ☐ Have Hydraulic Oil Sample Analyzed
- ☐ Clean Radiator & Oil Cooler Exterior
- ☐ Check Engine Manufacturer's Manual for Additional Maintenance Requirements
- ☐ See Transmission Maintenance Section

QUARTERLY CHECK (250 HOURS)

- ☐ Perform Daily, Weekly and Monthly Checks
- ☐ Perform Quarterly Lubrication
- ☐ Drain Fuel Tank Of Water and Sediment If Necessary
- ☐ Check Brake Shoes for Wear Condition
- ☐ Change Transmission Oil and Shift Air Filter
- ☐ See Engine Maintenance Section
- ☐ Change Hydraulic Return Line Filters
- ☐ Replenish Cooling System Corrosion Inhibitor (refer to engine manufactures manual)
- ☐ Check Engine Manufacturer's Manual for Additional Maintenance Requirements
- ☐ Lubricate Valve Disconnects
- ☐ Clean and Wax all Exterior Painted Surfaces
- ☐ See Transmission Maintenance Section

SEMI. ANNUAL CHECK (1000 HOURS)

- ☐ Perform Daily, Weekly, Monthly and Quarterly Checks
- ☐ Perform Semiannual Lubrication
- ☐ Clean Crankcase Breather
- ☐ Check Hydraulic Reservoir Relief Valve
- ☐ Clean Hydraulic Reservoir Intake Suction Filter
- ☐ Check Air Dryer Desiccant for Signs of Oil Accumulation
- ☐ See Transmission Maintenance Section
- ☐ Change Power Steering Filter Element-(T300-1 only)
- ☐ Check Hydraulic Relief Valve Pressure Settings
- ☐ Torque Swing Bearing Bolts (725 ft. lbs.) according to tightening sequence.
- ☐ Check Engine Manufacturer's Manual for Additional Maintenance Requirements
- ☐ Check all Adjustments Specified in the "Service and Adjustments" Section of this Manual and any Vendor Manuals Supplied
- ☐ See Engine Maintenance Section

ANNUAL CHECK (1500 - 2000 HOURS)

___ Perform
Daily, Weekly, Monthly, Quartly and
Semiannual Checks

___ Perform Annual Lubrication

___ Disassemble Winch and Inspect

___ Drain and Clean Hydraulic Reservoir

___ See Engine Maintenance Section

___ Change Hydraulic Fluid (unless checked by
oil analysis).

___ Drain and Refill the Winch Lubricant

___ Change Axle Oil

___ See Transmission Maintenance Section

___ Hydraulic Hoses (See Hydraulic Hose topic in
Maintenance section)

Hydraulic Hoses

The service life of a hose used on a mobile crane may significantly vary from the indicated lifetime of the hose from the manufacturer. The service life is influenced by a number of factors such as environment (temperature, humidity, corrosive air...) and use, duty cycles, bending cycles, abrasion, fluid etc. External unfavorable factors like heat, repeated bending under pressure etc. can reduce the lifetime significantly whereas other circumstances could allow a service life that may exceed a given period.

Inspection of Hydraulic Hoses

A daily visual check of the crane by the operator or a competent service person before starting operation shall include an inspection of the hydraulic hoses as far as possible; any traces of hydraulic oil on the crane or beneath a parked mobile crane shall lead to further investigation. The daily check might indicate irregularities and / or leakages in the hydraulic system that should be taken care of immediately. In addition to these daily checks, **Load King** recommends annual inspections of all hose assemblies as a part of the maintenance of the crane. Older cranes may require more frequent inspections.

Inspection Criteria:

Hydraulic hoses should be replaced if any of the following criteria are true:

- Damage on outside surface (cover) of the hose (e.g. crack, cuts, any abrasion that exposes the hose braid (reinforcement)).
- Embrittlement due to the aging of the outer surface (cracking appearing).
- Deformation that does not correspond to the original routing and shape of the hose. This criteria shall be checked in both non-pressurized and pressurized conditions and / or when bending (e.g. check for separation of hose layers, formation of blowholes, crushed points, kinks, torsioning).
- Leakage.
- Damage or deformation of hose fittings (sealing functionality affected).
- Movement between hose bulk and hose assembly (e.g. hose creeping out of fitting).
- Corrosion on a fitting that can affect the strength or function of the fitting.

Recommended Hydraulic Hose Maintenance & Replacement Schedule:

Task	Minimum Maintenance
Checking the hose lines	Annually
Recommended replacement of hose lines	Every 6 years

Recommendations for the replacement of hydraulic hose assemblies:

If replacement of hydraulic hose assemblies is required, it is recommended to use original spare parts from the OEM or hose assemblies according to the OEM specification which includes the fittings, bulk hose material and manufacturing process.

Filters and Maintenance

DETERMINING THE CONDITION OF THE OIL

The only definite way to assure that all accumulated contaminants which will wear the pump, motors, and cylinders are removed from the hydraulic system is to drain the old oil and replace it with new. If oil did not break down or could be kept lean permanently, changing would not be necessary. The easiest way to determine the condition of oil is to obtain a sample from the system and make a visual examination.

Drain some oil from the reservoir into a clean glass container. If it has a burnt or rancid smell, or is cloudy or dark in color, the oil needs to be changed. If water appears in the bottom of the glass after it has stood awhile there may be either an opening for water to enter into the system, or the unit has been operating under conditions causing condensation. A good example of condensation from extreme temperature changes is when the unit is parked in a warm garage after being out in the cold all day.

The entry and sustained presence of water, solvents, and abrasive dirt will adversely affect the proper condition of the oil. This can cause premature breakdown of viscosity, antifoam, lubrication, and anti-rust characteristics of the oil. High operating temperatures and water will cause an increase in the oil's oxidation rate. As the oil oxidizes, sludge and varnish forming materials will be deposited in the pumps, valves, cylinders, and lines; thus increasing the rate of wear on the components.

If the oil shows that water is present, or if any other contaminants are suspected, the oil should be changed. Whenever the oil is changed, a new oil filter should always be used.

Oil contamination can also be tested for contaminate size and content, this may help in diagnosing an issue.

If the oil is drained from the unit and replaced with new oil, the unit must be run for a total of 10 hours after the change before another sample is taken for testing. This will acclimate the oil to the unit and give more conclusive results during testing.

SELECTING THE OIL

When buying oil, remember there is no other single factor more important to the unit's life and economic operation than the quality of the oil used. Protect the oil from losing its proper condition by rigidly following the inspection schedules and servicing of filters.

Our equipment has been quality engineered for quality oils. The finely machined cylinder and valve components cannot be expected to withstand abuse due to improper care of the hydraulic system. The most economical operation of the hydraulic system results from the use of a premium quality oil and conscientious preventative maintenance in accordance with this manual.

Load King recommends the following oil, because of its quality and availability.

Your **Load King** Crane will have been filled with Shell Tellus S2 V 46 hydraulic oil unless otherwise specified. Different manufacturer's use chemical formulations which may not be compatible. Therefore, at a minimum, you must verify that any makeup oil added is compatible with the oil already in the system. When changing oil, if a different brand is used, the system should be flushed by cycling all cylinders at least once to their limits to insure that as much as possible of the old oil has been removed from the system.



NOTE: *Observe all oil handling hazards. Used oil should be recycled or reclaimed. Remember, oil is not a disposable resource and it is your responsibility to maintain sound environmental practices in regards to used oil and other fluids.*



IMPROPER OR INADEQUATE MAINTENANCE OF THE HYDRAULIC OIL OR OIL FILTER WILL RESULT IN PREMATURE WEAR TO VALVES, CYLINDERS, MOTORS, ETC.

Diesel Exhaust Fluid Specification

For engines using Selective Catalytic Reduction (SCR) operating in the United States and Canada, it is also strongly recommended that the Diesel Exhaust Fluid (DEF) used be certified by the American Petroleum Institute (API). This would be indicated by a symbol on the container/dispensing system showing adherence to the API Diesel Exhaust Fluid Certification Program.

The following are common names used for Diesel Exhaust Fluid (DEF):

- Urea
- AUS 32 (Aqueous Urea Solution 32)
- NOx Reduction Agent
- Catalyst Solution
- DEF

Regardless of what the Diesel Exhaust Fluid is called, the Diesel Exhaust Fluid must meet the specifications outlined here.



Under Left Side of Vehicle

1	Diesel Exhaust Fluid (DEF) Fill Location	2	Battery Box
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Storage

NOTE: The following information is for reference and is to be used as a guideline only. There are many factors that determine Diesel Exhaust Fluid (DEF) shelf life, with temperature and duration being two of the major determining contributors. If in doubt, check the concentration of the Diesel Exhaust Fluid (DEF), refer to the Test step of this procedure, or replace the fluid with known quality Diesel Exhaust Fluid.

Diesel Exhaust Fluid has a limited shelf life, both in the vehicle's diesel exhaust fluid tank and in storage/bulk/transportation containers.

The following conditions are ideal for maintaining DEF quality and shelf life during prolonged transportation and storage:

- Storage temperature between 23°F and 77°F (-5°C and 25°C)
- Store in sealed containers to avoid contamination
- Avoid direct sunlight

In these conditions, DEF has a minimum expected shelf life of 18 months. If stored at higher temperatures for extended periods of time, the shelf life will be reduced by approximately 6 months for every 5°C (9°F) above the highest temperature in the recommended storage temperature range.

Long term storage in a vehicle (in excess of 6 months) is not recommended. If long term storage is necessary, periodic testing of the Diesel Exhaust Fluid is recommended to be performed to ensure the concentration does not fall out of specification. Follow the Test step of this procedure.

80-160

Maintenance



NOTE: To assist in preventing Diesel Exhaust Fluid from deteriorating when stored in the vehicle's DEF tank, locate and plug the tank's venting to seal the tank exposure to the atmosphere.

Handling

Diesel Exhaust Fluid is not harmful to handle, but can be corrosive to certain materials, over time. Metals that may be affected include carbon steels, iron, zinc, nickel, copper, aluminum and magnesium.

- Make sure to only use approved containers to transport and store Diesel Exhaust Fluid. Containers made of polyethylene and polypropylene are recommended.
- If Diesel Exhaust Fluid is spilled, rinse and clean immediately with water.
- Avoid prolonged contact with skin. In case of contact, wash with immediately with soap and water. If not washed immediately, when the diesel exhaust fluid dries, a white film will be left that can be more difficult to wash off.



NOTE: Spilled Diesel Exhaust Fluid if left to dry or wiped away with a cloth only will leave a white residue. Failure to clean the spilled Diesel Exhaust Fluid may result in an incorrectly diagnosed leak of the Diesel Exhaust Fluid Dosing system.

Before using containers, funnels, etc. that will be used to dispense, handle or store Diesel Exhaust Fluid, make sure to wash thoroughly to remove any contaminants and then rinse with distilled water.



NOTE: Do not use tap water to rinse components that will be used to deliver diesel exhaust fluid. Tap water will contaminate the Diesel Exhaust Fluid. If distilled water is not available, rinse with tap water and then rinse with Diesel Exhaust Fluid.

Disposal

If disposing of Diesel Exhaust Fluid (DEF), always check with the local authority regulations on the proper disposal process and requirements.

Contamination / Incorrect Fluid



Never add water, or any other fluid not specified, to the Diesel Exhaust Fluid (DEF) tank. The aftertreatment system may be damaged.

In the event that the incorrect fluid is added to the Diesel Exhaust Fluid tank, such as, but not limited to:

- Water
- Diesel Fluid
- Hydraulic Fluid
- Coolant
- Windshield Washer Fluid

Contact a local authorized repair location for the truck manufacturer to determine the appropriate repair direction.

If only water has been added to the Diesel Exhaust Fluid (DEF) tank, drain the Diesel Exhaust Fluid (DEF) tank, flush with distilled water and refill with new and/or known good Diesel Exhaust Fluid (DEF) . Check the Diesel Exhaust Fluid (DEF) concentration after completing the refill.

Freezing



Do NOT add any chemicals/additives to the Diesel Exhaust Fluid in an effort to prevent freezing. If chemicals/additives are added to the Diesel Exhaust Fluid, the after treatment system may be damaged.

Diesel Exhaust Fluid will freeze around -11°C (12°F). The diesel exhaust fluid system on the vehicle is designed to accommodate this and does not require any intervention by the vehicle operator.

The Owners and/or Operation and Maintenance Manual provided by the vehicle manufacturer will provide information on proper cold weather set-up for your engine/vehicle.

TIRES

MAINTENANCE CHECK

As a part of the WEEKLY MAINTENANCE CHECK inspect the tires and rims for damage. Cuts, bruises, snags, punctures, and abrasions should be repaired before they can cause tire failure. Bent, cracked, or loose rims should be repaired or replaced.

Check tire valve condition and make sure each valve has a cap.

TIRE PRESSURES

Always maintain the recommended tire inflation pressures in all tires.

When driving, some increase in tire pressures can be expected due to heat generated by friction. Overspeeds may also produce increased pressures. In such circumstances, **NEVER BLEED THE TIRES**. Instead, slow down or stop until the tires cool.



The energy stored in a tire and rim assembly under pressure makes changing truck and off-road tires hazardous. Special procedures must be followed and special tools must be used if tires are to be changed safely. Whenever possible, let your tire service company handle this job. If you must change a tire, follow the step-by-step instructions detailed in a tire repair manual. Should low pressures make it necessary to add air, never stand beside the tire. Instead, use an extension hose long enough to permit you to stand behind the tire tread. Always use a tire cage or equivalent protection when adding air.

Inflation pressure should be checked when tires are cool, using an accurate tire pressure gauge. Check pressures at regular intervals.

Bleeding the air from hot tires is dangerous and should not be attempted. While the pressure will be reduced, an increase in temperature of the tire will take place as soon as driving is resumed and tire failure will result.

UNDERINFLATION

Too little air pressure increases deflection, causes the tread to wipe and scuff over the road, results in extra strain on the tire, and increases the chance for bruising.

PROPER INFLATION

Maintaining the proper air pressure provides maximum road contact and results in increased tire life.

OVERINFLATION

Overinflation reduces tire deflection and tire contact area, causing the tire to ride on the crown, and results in rapid wear in the center of the tread.

TIRE MATCHING

Unmatched tires on tandem drive units will cause tire wear and scuffing and possible damage to the drive units. Consequently, we recommend the tires be matched to within 1/8" of the same rolling radius; 3/4" of the same rolling circumference.

Tandem units-IMPORTANT:

The four largest tires should never be installed on one driving axle or the four smallest tires on the other driving axle. Such tire mounting will cause an inter-axle "fight", unusually high axle lubricant breakdown, and possible costly axle service.

In addition to matching individual tire rolling radius or rolling circumference, we recommend matching, as nearly as possible, the total tire circumference of one driving axle to the total circumference of the other driving axle. This will usually result in satisfactory tandem axle lubricant temperatures that lengthen drive unit service with higher tire mileage.

Tire Maintenance

MAINTENANCE CHECK

As a part of the WEEKLY MAINTENANCE, inspect the tires and rims for damage. Cuts and bruises, snags, punctures, and abrasions should be repaired before they can cause tire failure. Bent, cracked or loose rims should be repaired or replaced.

Check tire valve condition and make sure each valve has a cap.

TIRE PRESSURES

Always maintain the recommended tire inflation pressures in all tires provided by the crane carrier manufacturer.

When driving, some increase in tire pressures can be expected due to heat generated by friction. Overspeeds may also produce increased tire pressures. In such circumstances, NEVER BLEED THE TIRES. Instead slow down or stop until the tires cool.

Inflation pressure should be checked when tires are cool, using an accurate tire pressure gauge. Check pressures at regular intervals.

Bleeding the air from hot tires is dangerous and should not be attempted. While the pressure will be reduced, an increase in temperature of the tire will take place as soon as driving is resumed and tire failure will result.

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Maintaining the proper air pressure provides maximum road contact and results in increased tire life.

OVER INFLATION

Overinflation reduces tire deflection and tire contact area, causing the tire to ride on the crown, and results in rapid wear in the center of the tread.

SAFETY PRECAUTIONS FOR MOUNTING OR DEMOUNTING RIMS AND WHEELS

DO'S AND DON'TS

DO

1. Deflate tires completely prior to demounting by removing the valve core.
2. Replace bent, cracked, worn, corroded, or damaged parts.
3. Inflate tires in a safety cage.
4. Inspect wheel nuts periodically for excessive wear, corrosion, proper centering and nut torque.

DON'T

1. Do not use loads or inflation pressures exceeding the manufacturer's recommendations.
2. Don't re-inflate a tire that has been run flat or seriously underinflated without first demounting and inspecting the tire and rim assembly.



Tire and rim servicing can be dangerous and must be done only by trained personnel using proper tools and procedures. Failure to read and comply with all procedures may result in serious injury or death to you or others.

80-160 Maintenance



Re-inflation of any type of tire and rim assembly that has been operated in a run flat or under inflated condition (80% or less of recommended operating pressure) can result in serious injury or death. The tire may be damaged on the inside and can explode while you are adding air. The rim parts may be worn, damaged or dislodged and can explosively separate.



The energy stored in a tire and rim assembly under pressure makes changing truck and off-road tires hazardous. Death or personal injury can occur while handling or maintaining these tires. Special procedures must be followed and special tools must be used if tires are to be changed safely. Whenever possible, let your service company handle this job. If you must change a tire, follow the step by step instructions detailed in a tire repair manual. Should low pressures make it necessary to add air, never stand beside the tire tread. Instead use an extension hose long enough to permit you to stand behind the tire tread. Always use a tire cage or equivalent protection when adding air.



Use of starting fluid, ether, or gasoline or any other flammable material to lubricate, seal or seat the beads of a tubeless tire can cause the tire to explode or can cause the explosive separation of the tire/rim assembly resulting in serious injury or death. The use of any flammable material during tire servicing is absolutely prohibited.



Any inflated tire mounted on a rim contains explosive energy. The use of damaged, mismatched or improperly assembled tire/rim parts can cause the assembly to burst apart with explosive force. If you are struck by an exploding tire, rim part or the air blast, you can be seriously injured or killed.



Re-assembly and inflation of mismatched parts can result in serious injury or death. Just because parts come in together does not mean that they belong together. Check for proper matching of all rim parts before putting any parts together.



Mismatching tire and rim diameters is dangerous. A mismatched tire and rim assembly may explode and can result in serious injury or death. This warning applies to any combination of mismatched components, such as 18" and 18.5" tires. Never assemble a tire and rim unless you have positively identified and correctly matched the parts.

Aluminum Decking & Fender Maintenance Procedure

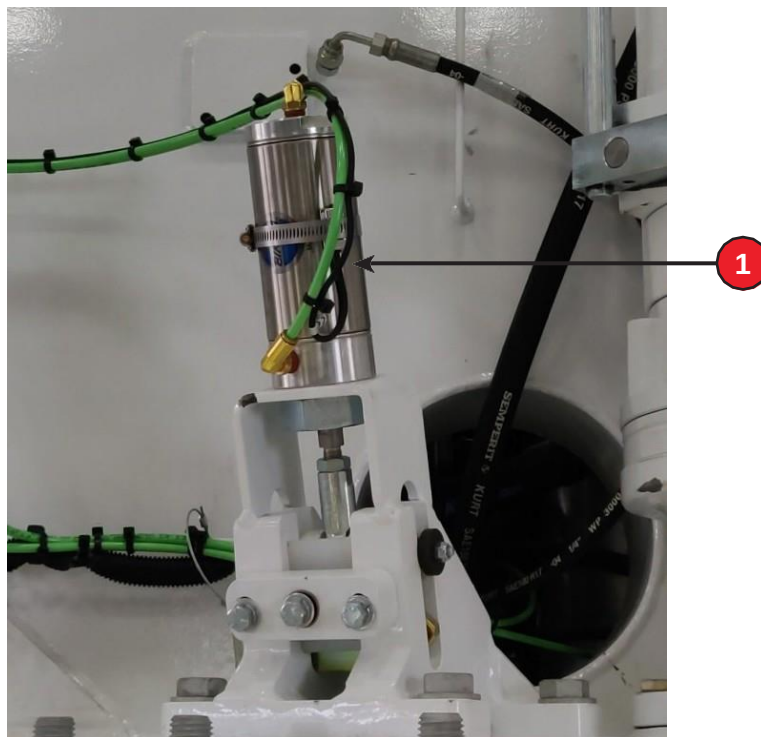
Salt spray, road salts, lime dust, battery acid, or mildly corrosive liquid can cause a condition called oxidation or even etching of the aluminum, which discolors the surface. A number of methods are used to stop the corroding affects of the surface. All metals will corrode in the presence of salts. Though aluminum does not exhibit rusting like steel does, it will develop a chalky film and pitting in the metal surface when exposed to salt for a long periods. A neutral soap and water wash will help remove the oxidized film. If the oxidation has built up for a long time, a buffing wheel will help remove it from the surface. To stop the corrosive affects, however, you must apply a protective coating to the aluminum and keep the coating maintained over time.

Preventing Salt Damage

To prevent corrosion of aluminum from salts or other materials listed, inspect the material regularly and repair any damage to the surface as soon as possible. Avoid using acid cleaners on the aluminum and do not use abrasive compounds or materials that will scratch the surface. Damage to the coating will allow salt to penetrate the metal surface.

1. Use a power washer with soapy water and wash just as you would a car or truck. Rinse the decking and fenders thoroughly and allow it to air dry.
2. Apply a metal cleaner such as **Mequiar's Hot Rim Mag & Aluminum Cleaner** which will remove any chalking or hazing.
3. If desired, apply two coats of wax, buffing the wax between each coat. With a cotton cloth or rag, apply to a 3-foot section and buff off the polish. Repeat this process over all the metal surfaces. This will protect the finish and hep preserve the durability of your decking.

Swing Lock Maintenance



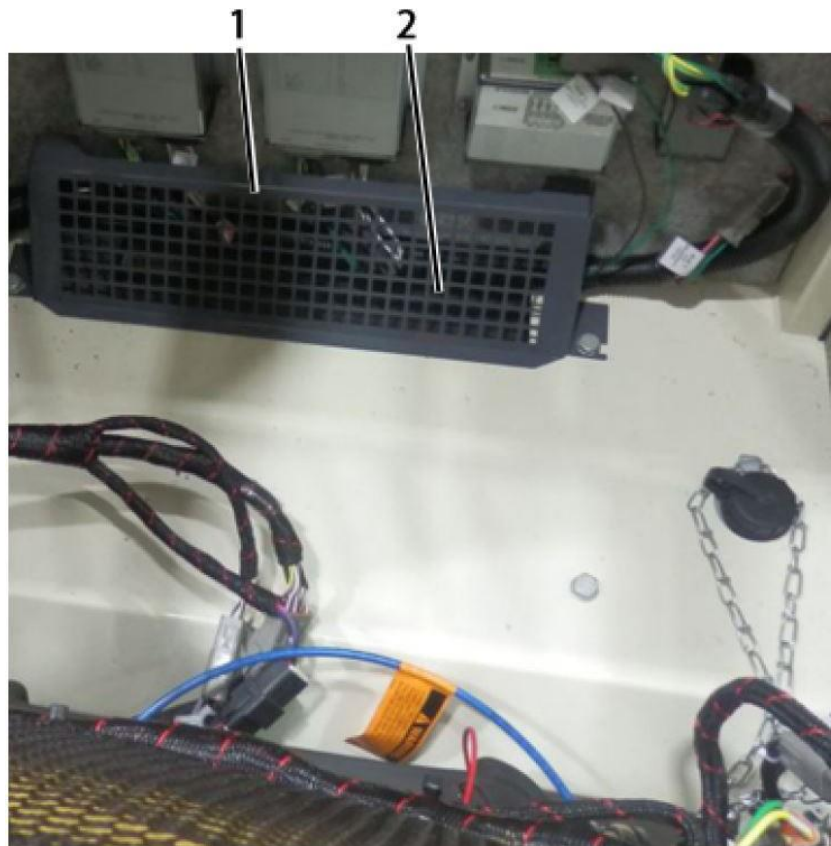
Daily check operation of Swing Lock air cylinder (1) and pin engagement. If cylinder stroke is not fully extending or retracting, check air pressure to cylinder extend and retract port and electrical connector at cylinder. See switch no. (46) in the upper RH controls of the operator's cab for locking and unlocking actuation of the air cylinder.

HVAC

MONTHLY SIGHT CHECK - OPERATOR'S

The following checks must be carried out monthly by the operator.

1. **State of heating hoses and refrigerant hoses** - Check of the connections, leak checks and routing of the hoses and fittings. The hose clamping are to be tightened if necessary.
2. **Electric** - Check electric connections are mated and retained.
3. **State of the Evaporator** - Heat Exchanger
 - Clean contaminated evaporator. The cleaning is carried out by blow-out or spraying (do not use a high pressure cleaner).
 - Fins that were pushed down by external influences can be adjusted.
 - Check thermostat tracer on leaks and position.
4. **Filter - Recirculation** - Check foam filter (2) located behind the operators seat by removing protective grill (1) and check for contaminations and clean with air pressure or change filter.
 - Do not let filter get in contact with water.



5. **Fresh Air Intakes** - Check air inlet louvers on rear of unit for contamination and clean if necessary.

80-160

Maintenance

6. **Fresh Air Intake Filter** - Check fresh air intake paper filter at rear of unit and clean if necessary. Do not use high pressure air on filter or allow water to contact filter.
7. **Condensation Drain Tube** - Check to make sure tube is not clogged located at bottom of unit.

EVERY 6 MONTH - AUTHORIZED WORK - SHOP

The complete unit has to be checked twice a year through a well informed personnel of an authorized workshop.

1. **Check of the cooling circuit on refrigerant filling quantity** - Renew contaminated refrigerant and oil.
2. **State of heating hoses and refrigerant hoses** - Check the connections, leak control and laying of the hoses and fittings. The hose connections are to be tightened if necessary. Change hoses if material is worn.

Fault Diagnostics

Fault	Cause	Remedy
Blower will not work	Fuse defective or loose	If the fuse correctly seated? If necessary insert correctly. Renew defective fuses. If a new defect occurs within a short time this indicates a possible short-circuit. Examine blowers for a blockage or another type of defect and rectify the cause.
	Interruption of line	Test the lines on loose contacts or breaks
	Blower motor defective	Exchange blower
	4-speed blower switch defective	Test switch, change operation element
Blower cannot be switched off	Short-circuit in cable or blower	Rectify short-circuit, if necessary install new cable (s) and / or switch.
Blower only operates at reduced power	Contacts contaminated	Clean plug contacts. Proceed carefully to avoid
	Blower switch is defective	Exchange switch
	Connecting plug has become loose	Check plug connection of unit for proper seating. If not assemble it correctly.

Fault	Cause	Remedy
No or insufficient heating power	Oil supply temperature to low	Wait until the engine is warm
	Heat exchanger fins contaminated	Check heat exchanger and clean it if necessary
	Filter contaminated	Clean or change filter
		Heat exchanger does not have oil flowing through it.
Air flap no more adjustable	Foreign body blocks flap	Check flap, remove foreign body
	Flap bearing defective	Check and exchange flap bearing, if necessary.
	Servo motor defective	Change servo motor
	Operation element defective	Change operation element
Compressor does not work	Interruption in the magnetic coil of the compressor	Check current flow to the clutch
	V-belt loose or torn	Adjust belt tension, change belt
	V-belt slides or does not turn on the v-belt even though coupled.	Check, repair, change compressor
	Compressor clutch slides	Repair clutch or change compressor
	Control unit defective	Check control unit and change if necessary
Evaporator flooded	Expansion valve is stuck in open position and / or clings	Change expansion valve
Evaporator icy	Thermostat tracer in the wrong position	Tracer must be newly positioned
	Expansion valve or thermostat defective	Renew expansion valve or thermostat or receiver drier
Evaporator clogged	Cooling ribs contaminated	Clean evaporator
Loss of refrigerant	Interruption of the refrigerant pipe	Check all pipes for leaks through external influences or chafing
	Leak within the unit	Evacuation, filling, leakage check and repair to be made

80-160 Maintenance

Fault	Cause	Remedy
Cooling performance insufficient	air flow too low because filter is contaminated	Clean or change filter pay attention to the air flow direction
	Blower flow impeded	Check air ducts and outputs for blockages, eliminate fault
	External air / recirculation air flap position on external air at high external air temperatures	Set position to recirculating air
	Too little refrigerant in system	Carry out leak test, top off system (service filter)
	Moisture in system	Empty air cond. unit, exchange receiver drier, evacuate and fill new (service filter)
Unit cools with interruptions	Power interruption, earth connection faulty or loose contacts in the compressor's solenoid coil	Check lines, repair or renew as necessary
Unit making a lot of noise	V-belts loose or excessively worn	Increase tension of V-belts or renew
	Clutch noisy	Repair clutch
	Retainer of refrigerant compressor loose or inside parts defective	Repair retainer, renew refrigerant compressor
	Excessive wear of blower motor	Renew blower
	Refrigerant system overfilled	Extract refrigerant until high pressure display is normal
	Too little refrigerant in system	Carry out leak test, top off system

MAINTENANCE WORK ON THE REFRIGERATION CIRCUIT

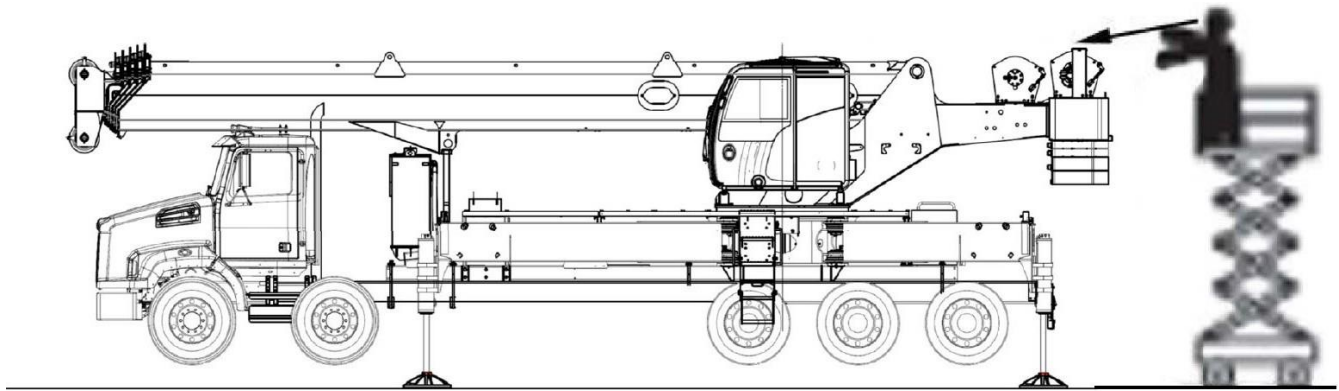
- ▶ The unit must always be emptied before any work is carried out on the refrigeration circuit. This may only be done by a specialist in HVAC systems.
- ▶ Only refrigerant R134a must be used with 260 cc Sanden SP-15 refrigerant oil.
- ▶ No fluorescent additives may be added to the refrigerant.
- ▶ Never heat up refrigerant bottles with a naked flame.
- ▶ Do not discharge refrigerant to the environment.
- ▶ Liquid refrigerant must not come into contact with the skin.
- ▶ Safety glasses must be worn when handling refrigerant.
- ▶ The unit is under **no circumstances** to be rinsed with compressed air.

Wire rope andreeving

MAINTENANCE

All wire ropes in active service should be inspected DAILY along with spooling, sheaves, wedge sockets, and any other wire rope fittings for damage. Once WEEKLY a through wire rope inspection should be made by a competent inspector. A record should be kept of the inspections using the form [WIRE ROPE INSPECTION RECORD on page 149](#).

Use appropriate personnel lifting devices or ladder in order to inspect the ropes on the winches.



Refer to Wire Rope Users Manual, section 9 and ANSI Standard B30.5 for guidelines covering the inspection, maintenance, repair, and replacement of wire rope. Worn, kinked, birdcaged, fatigued or otherwise damaged wire rope must be removed immediately. Wire rope when properly installed, lubricated and employed, will give many hours of satisfactory use. Whereas, a new piece of wire rope can be immediately ruined if misused.

Replace or repair any items found to be in unsatisfactory condition.

CRUSHED ROPE - REMOVE AT ONCE!



KINKED ROPE - REMOVE AT ONCE



BIRD CAGING - REMOVE AT ONCE



In addition to damage such as kinking, crushing and broken wires, factors such as corrosion, abrasion, pitting, peening and scrubbing of the outside wires, reduction of rope diameter, the condition of other components and proper lubrication are considered. Refer to **CABLE LUBRICATION METHODS** for wire rope lubricating procedures.

Before installing a new or replacement rope, make certain the rope to be used is the proper type and size. The wrong rope will not function properly and may even be dangerous.



Load King permits the use of rotation resistant wire rope. Other types are not approved. When rotation resistant rope is used, the working load shall not exceed 1/5th (20%) of the rated breaking strength. The retirement criteria shall be as follows: two broken wires in six rope diameters or four broken wires in thirty rope diameters.

Lubrication

Lubrication Introduction

A regular program of periodic preventive maintenance is essential to prolong crane operating life, maximize efficient service and minimize downtime. This section details a series of checks and procedures which are to be performed at daily, weekly, monthly and semiannual intervals. These intervals are stated both in terms of calendar periods and hours of operation.

The checks prescribed for longer intervals include all the checks required for the shorter intervals. Thus, the weekly check includes all items in the daily check, the monthly check includes weekly and daily checks, and so on through the semi-annual check, which includes the quarterly, monthly, weekly and daily checks.

A convenient check chart provides a means of recording preventive maintenance performed and serves as a tool detecting problem areas and reanalyzing maintenance requirements. The items in each check interval on the check chart are grouped under their respective headings and covered in detail over the course of Section 6.

This maintenance schedule is a guide which ensures that basic preventive maintenance requirements will be met under average operating conditions. Conditions which impose greater wear, loads or strain on the crane may dictate reduced check intervals. Before altering the maintenance schedule, reevaluate crane operation and review the crane maintenance records. Consider all factors involved and develop a revised schedule adequate to meet routine maintenance requirements.

As a part of each periodic check, refer to the engine manufacturer's manual for engine maintenance requirements. When servicing the engine, the engine manufacturer's recommendations take precedence over those in this manual, should any discrepancy be noted.

OPERATOR OBSERVATION

As the operator, it is your responsibility to observe and report any unusual sounds, odors, or other signs of abnormal performance that could indicate trouble ahead. On a routine basis the following items should be checked before starting or while operating the crane.

Visual Inspection - Check complete machine for any unusual condition.

Check for any leaks or damage to the hydraulic system.

Check in the engine compartment:

- * Belts for tension and wear
- * Coolant level
- * Oil level
- * Transmission oil level
- * Air cleaner sightgauge
- * Air intake
- * Muffler and exhaust

80-160

Maintenance

Check battery box - For battery condition

Crane boom - Check for:

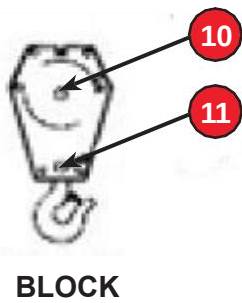
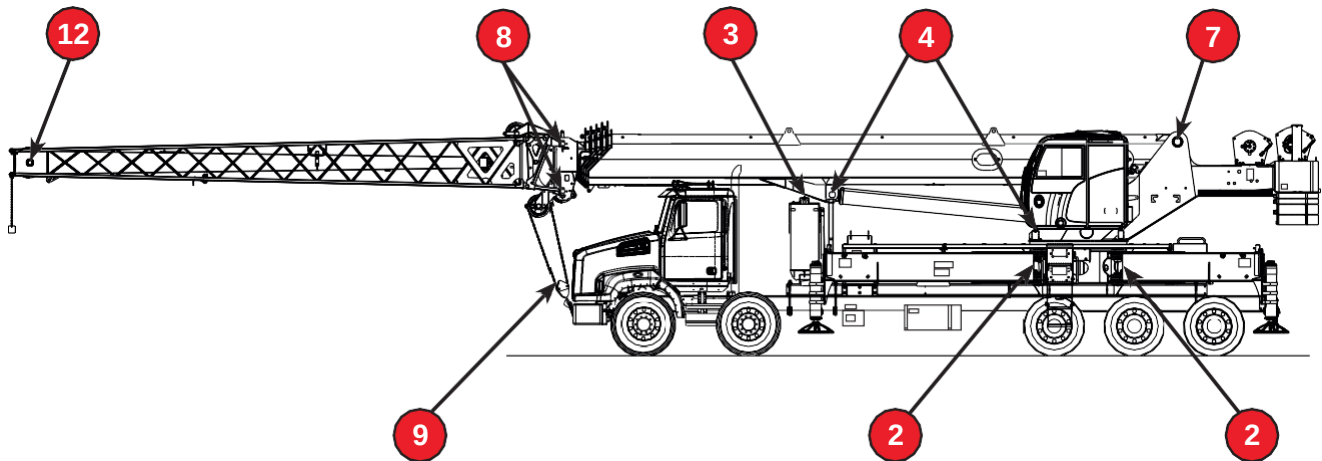
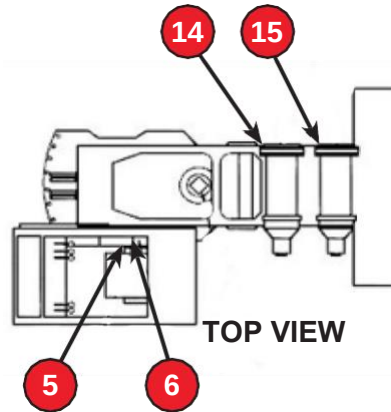
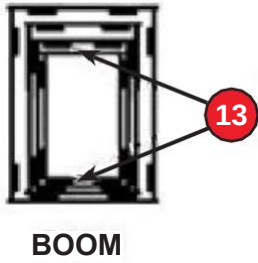
- * Hook block for wear or damage
- * Two block system for proper function
- * Cable and cable spooling on winch
- * Cylinder pin connections for wear

Check tires, axles, and drive lines, for wear or damage.

Check in the cab for:

- * Instruments functioning properly
- * Control operation
- * Glass for good visibility
- * Safety equipment is ready for use
- * All lights work properly
- * Cleanliness - Free from mud and debris.

Master Lubrication Chart



80-160 Maintenance

DAILY (8 HOURS) WEEKLY (40 HOURS) TWO WEEKS (80-100 HOURS) THREE MONTHS (250 HOURS) FOUR MONTHS (500 HOURS) SIX MONTHS (1000 HOURS) YEARLY (1500-2000 HOURS)							REF	DESCRIPTION	QUANTITY	NO.	LUBRICANT
							1				
	LUB						2	OUTRIGGER LEG PIVOT ARMS 	AS REQ'D	8	MPG
CHK	INITIAL 		INITIAL 			D/R	3	HYDRAULIC RESERVOIR 	HO - SEE TABLE 2 - KEEP OIL LEVEL BETWEEN MARKS ON INDICATOR TUBE		
	LUB						4	BOOM CYLINDER BUSHINGS 	PURGE	2	MPG
LUB							5	TURANTABLE GEAR, PINION * 	20 SHOTS	1	CG (MPG BELOW 32° F)
		LUB					6	TURANTABLE BEARING RACE * 	AS REQ'D	1	MPG BELOW 32°F: EP-1 ABOVE 32°F: EP-2
	LUB						7	BOOM PIVOT PIN 	PURGE	2	MPG
	LUB						8	BOOM TIP SHEAVES 	PURGE	5	MPG
	LUB						9	HOOK BALL 	PURGE	1	MPG
	LUB						10	HOOK BLOCK SHEAVES 	PURGE	7	MPG
	LUB						11	HOOK BLOCK TRUNNION 	PURGE	1	MPG
	LUB						12	JIB SHEAVE 	PURGE	1	MPG
	LUB						13	BOOM SLIDE PADS 	AS REQ'D	24*	MPG
			* CHK		D/R		14	WINCH PLANETARY GEAR 	FILL PLUG LEVEL*	1	TEXACO MEROPA 150 OR EQUIV. AGMA No. 4EP GEAR OIL
			* CHK		D/R		15	AUX. WINCH PLANETARY GEAR 	FILL PLUG LEVEL*	1	TEXACO MEROPA 150 OR EQUIV. AGMA No. 4EP GEAR OIL
		LUB					16	LUBRICATE PTO SHAFT *	AS REQ'D	-	MPG
					CHK		*	CHECK TORQUE ON BOLTS *	AS REQ'D	-	N/A

TABLE 1

LEGEND:

CHK ...CHECK
 LUB.....LUBRICATE
.....CHANGE FILTER
 D/R.....DRAIN & REFILL

*REFER TO OPERATORS MANUAL

TABLE 2

SPECIFIED LUBRICANTS		
MPG	MULTI-PURPOSE GREASE	EP-2
GG	OPEN GEAR GREASE	Grade B
GL-1	GEAR LUBRICANT, REGULAR	STRAIGHT MINERAL OIL SAE 80W-90
GL-5	GEAR LUBRICANT, EP	SAE 90 (M11-L-21058)
HO	GEAR LUBRICANT, EP	
	HYDRAULIC OIL	*Lubrication Spec. 805
*REFER TO OPERATOR'S MANUAL FOR COMPLETE LISTING OF RECOMMENDED OILS FOR APPLICABLE TEMPERATURE RANGES AND FOR DRAIN/REFILL PROCEDURES.		

NOTE:

 Reduce all lubrication intervals under severe operating conditions. Refer to Operator's Manual for drain/refill procedures and additional information. Check outrigger beams daily and remove excess dirt.

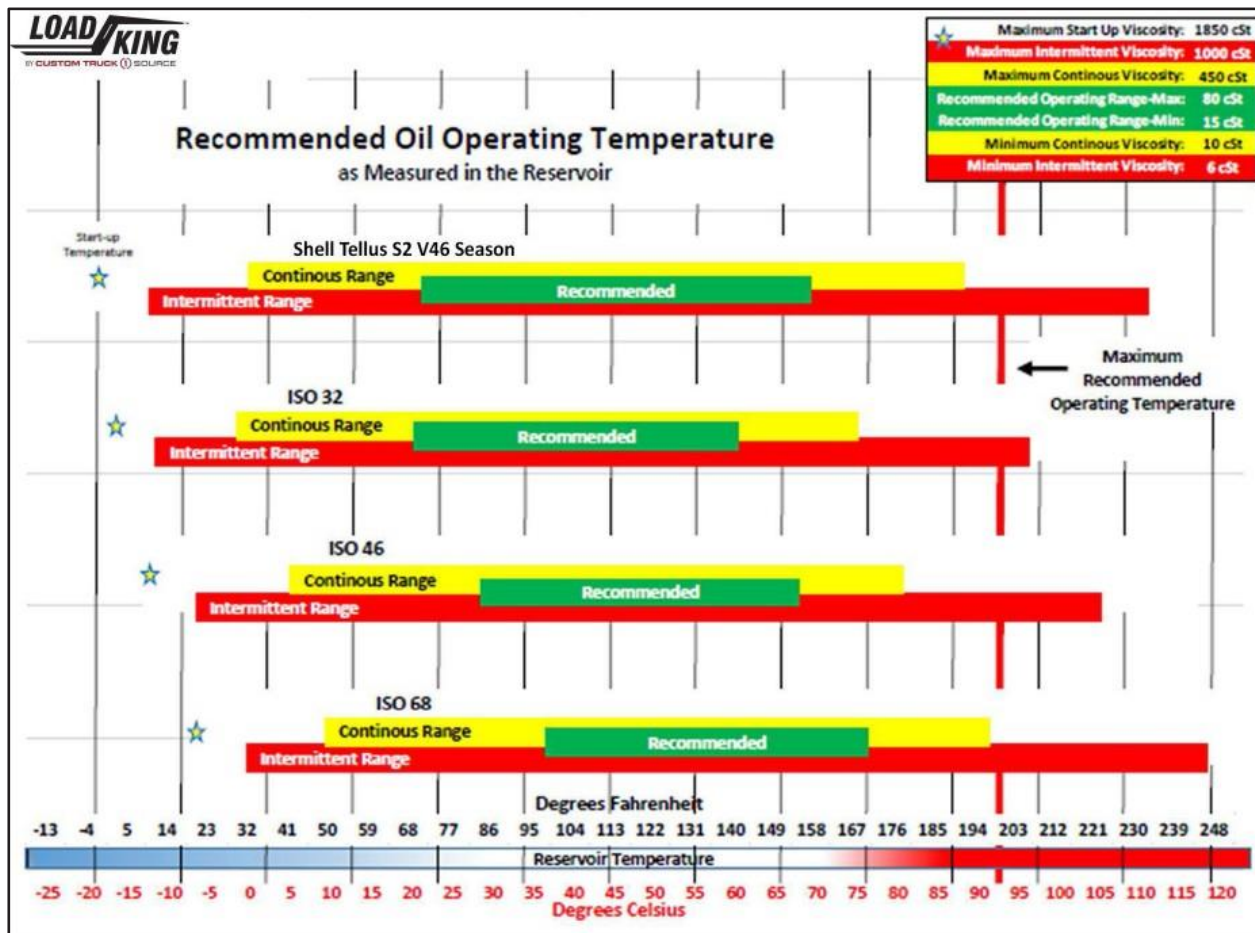
2. See Chassis Manufacture's Maintenance Manual for lubricants.

Hydraulic Oil Requirements

The hydraulic system is filled with a Shell Tellus S2 V 46 premium hydraulic oil. This hydraulic oil is recommended for a broad range of operating temperatures but the end user is ultimately responsible for determining if the oil is appropriate for their specific operating conditions or if another hydraulic oil is required. To ensure the longest life for this piece of equipment, it is critical to maintain the hydraulic oil at the proper level, to keep the hydraulic fluid clean (see Hydraulic Maintenance section), and to avoid overheating the oil.

The oil for the hydraulic system performs multiple functions. While the hydraulic oil must transmit power and provide superior lubrication under high pressure, there are other properties that are critical to the oil and the performance of the equipment. These include, but are not limited to, wear protection, oil oxidation, rust and corrosion protection and foaming. To guide in the selection of the proper oil, refer to the [Oil Viscosity Selection Chart](#) on page 260 and the listings of [Typical Qualified Hydraulic Oils](#) on page 261 below.

Oil Viscosity Selection Chart



Oil Viscosity Selection Chart Color Legend

GREEN	Recommended - Component Manufacturer's Optimal Range
YELLOW	Continuous - Component Manufacturer's Limits for Continunous Operation
RED	Intermittent - Limited Operation Range

The factory-filled hydraulic oil is recommended for most operating conditions and for a wide range of oil operating temperatures as measured in the reservoir. Under certain operating temperatures and conditions (duty cycles), it may be advisable to use another fluid in order to maintain the oil viscosity in the recommended range (see [Oil Viscosity Selection Chart on page 260](#)). For startup temperatures lower than what is indicated in the chart, follow the warm up procedures in the operating manual to increase the fluid temperature and decrease potential damage. Additionally, these machines should not be operated with hydraulic reservoir temperatures in excess of 200°F (93°C). These high temperatures cause degradation of the hydraulic fluid and rubber components such as hoses and seals.

If overheating occurs, discontinue operation and:

1. Check the hydraulic fluid level.
2. Check the oil cooler for plugs or restricted air flow.
3. Check that the oil viscosity matches that recommended for the operating temperature.
4. Check pressure settings – Is a pump failing or a relief set to low?
5. Reduce the duty cycle of the machine.
6. Consult an Authorized **Load King** Dealer.

The following hydraulic oils are not recommended:

- Engine Oils
- Transaulic Oils
- Zinc-Free Hydraulic Oils
- Transmission Fluids

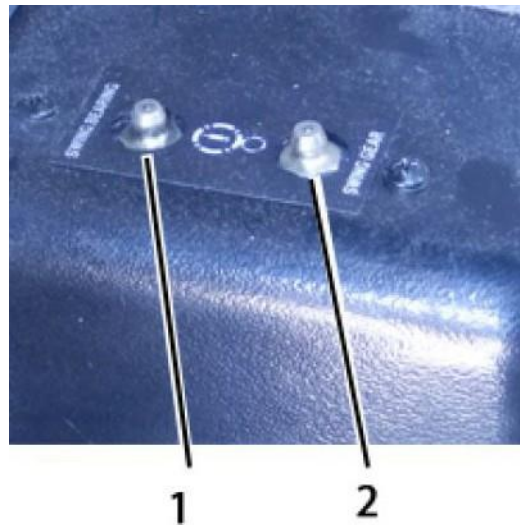
Typical Qualified Hydraulic Oils

OIL COMPANY	ISO	BRAND NAME	OIL COMPANY	ISO	BRAND NAME
Conoco		Conoco DN 600 (Arctic)	Northland Products (USA)	32	Talar 150
		Conoco Super Hyd. 5W-20 (Multi-Viscosity)		46	Talar 215
	32	Conoco Super Hyd. 32		68	Talar 315
	46	Conoco Super Hyd. 46			Talar All-Season Premium (Multiviscosity)
Exxon Co. (USA)	68	Conoco Super Hyd. 68	Pennzoil Products Co. (USA)	32	Talar Extreme 32
					Talar Extreme HTA
				68	
Imperial Oil Limited (Canada)	32	Nuto-H 32			AWX Multi-Viscosity
	46	Nuto-H 46		32	AW 32 Hyd. Fluids
	68	Nuto-H 68		46	AW 46 Hyd. Fluids
Kendall Refining Co. (USA)			Shell Co. (USA)	68	AW 68 Hyd. Fluids
	23				Tellus 23
	32	Kenoil R & O AW 32		32	Tellus 32
	46	Kenoil R & O AW 46		46	Tellus 46 (XSL 9101)
	68	Kenoil R & O AW 68		68	Tellus 68

80-160
Maintenance

OIL COMPANY	ISO	BRAND NAME	OIL COMPANY	ISO	BRAND NAME
Mobil Oil Corp.	32	Nuto-H 32	Texaco Inc. (USA)		Rando Oil HDA2 (5w-20)
	46	Nuto-H 46		32	Rando Oil HD 32
	68	Nuto-H 68		46	Rando Oil HD 46
				68	Rando Oil HD 68

Turntable and Swing Pinion



1. Swing Bearing Grease Port
2. Swing Gear Grease Port

Lubricate every 100 operating hours as follows:

Inject grease as recommended below through both grease zerks item (1) and (2) located in the operator's cab on the right console forward of the cup holder. Machine is to be slowly rotated at least two complete revolutions while injecting grease. When complete rotation is impractical, inject grease through each fitting and rotate machine back and forth as far as possible as each fitting is greased.

Under extremely dirty or dusty conditions, sufficient grease should be added to flush out contaminated grease. Under less severe conditions, add grease until it appears at the bottom seal.

While swinging the machine, apply gear grease to the external ring gear with sufficient frequency to insure that the teeth remain coated.

80-160 Maintenance

Some lubricants recommended by the manufacturer are:

	MOBIL	TEXACO	SUNOCO	AMOCO	EXON
RACE	Mobilux EP1	Mutifak EP1	Prestige 742EP	Amolith EP1	Beacon EP1
GEAR	Mobilux EP1	Mutifak EP1	Prestige 742EP	Amolith EP1	Beacon EP1



NOTE: *Other manufacturers' lubricants of the same quality are suitable.*

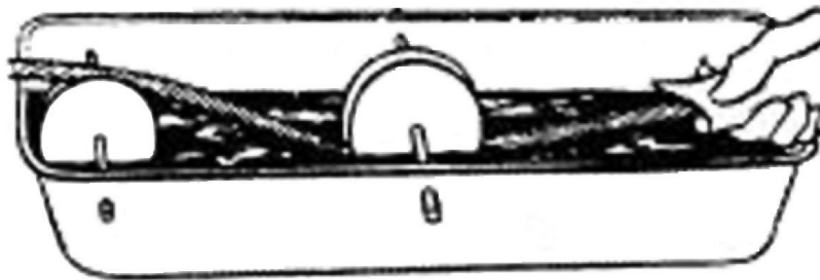
Cable Lubrication Methods

GENERAL

We are covering the more commonly used methods of lubricating cable (wire rope). For special cable lubrication problems consult the cable manufacturer.

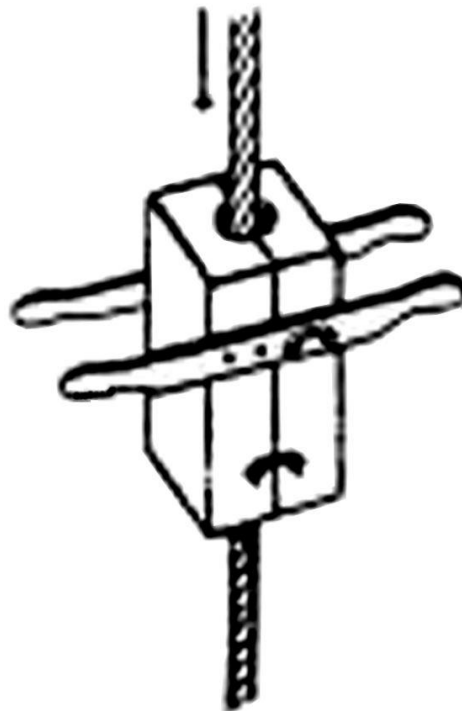
HOT APPLICATION

A heated bath is placed in the path of the wire rope, and the rope is passed through the hot lubrication over sheaves and a center guide wheel. Hot oils or greases have excellent penetrating qualities and upon cooling have high adhesive and film strength around each wire.



CONTINUOUS BATH

Run an operating rope through a specially constructed casing that has been packed with swabbing and loaded with lubricant. This affords continuous lubrication.



80-160 Maintenance

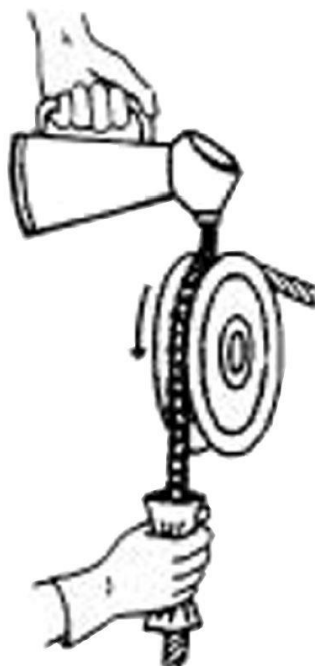
DRIPPING

A container can be placed above the sheave, so that the rope can be lubricated by opening a spigot. Sheaves are the best location for lubricating operating wire ropes, because the wires and strands open somewhat as they bend along the groove.



POURING

Lubricant can be poured on. The rope should be lightly loaded and run slowly while being lubricated.



SWABBING AND PAINTING

Lubricant can be swabbed on with rags, or painted on with a brush. Both are quick methods which can be made part of the operating routine.



SPRAYING

A light lubricant containing solvents can be applied to a wire rope by a properly directed spray nozzle.

AEROSOL SPRAYING

Installations requiring only small amounts of lubricants, or only occasional applications, may find the new aerosol cans of lubricant useful. They are available from several lubricant manufacturers.



Boom Lubrication

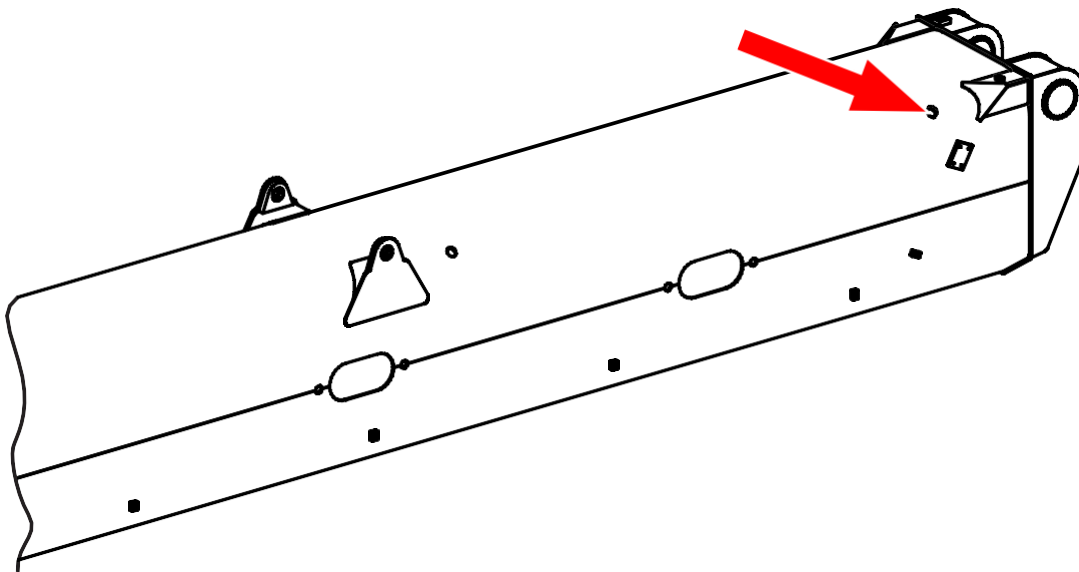
6 SECTION BOOM

1. Fully extend the front & rear outriggers, and level the retracted boom over the front of the machine.
2. This procedure will require (2) people; one to operate the boom to position the grease zerks in the access holes and the other person to grease the boom and signal the operator when the zerks are aligned with the holes. A stable working platform is required for this procedure.

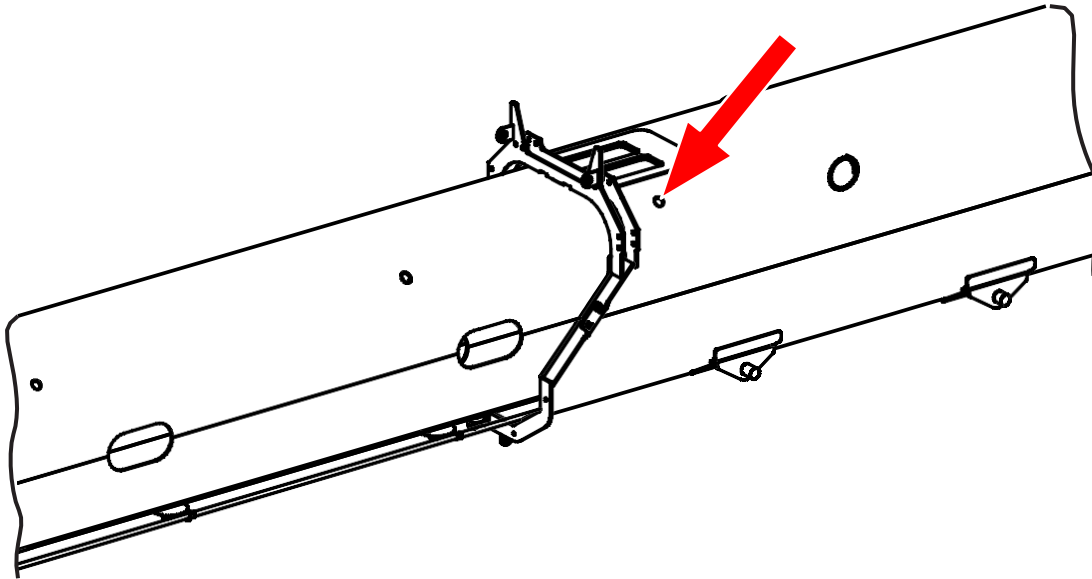


NOTE: All lubrication operations in this procedure specify the use of **Berulub PAL1 Grease (Bechum)** or **Northland MolyTac II Grease Lithium Complex**. Do not intermix the above products due to their chemical compositions.

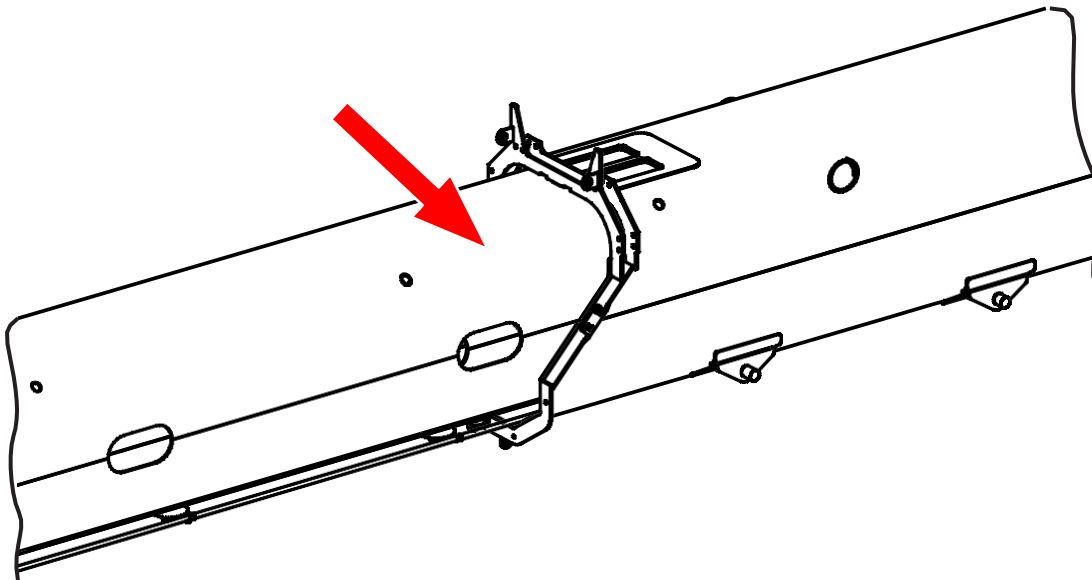
3. Using the grease compound as specified above, lubricate the upper rear wear pads of the boom that ride on the inside top plate of the base section. Use a grease gun with a flexible hose and insert through the small holes along the side of the base boom as they line up with the zerk as shown in the following figure.



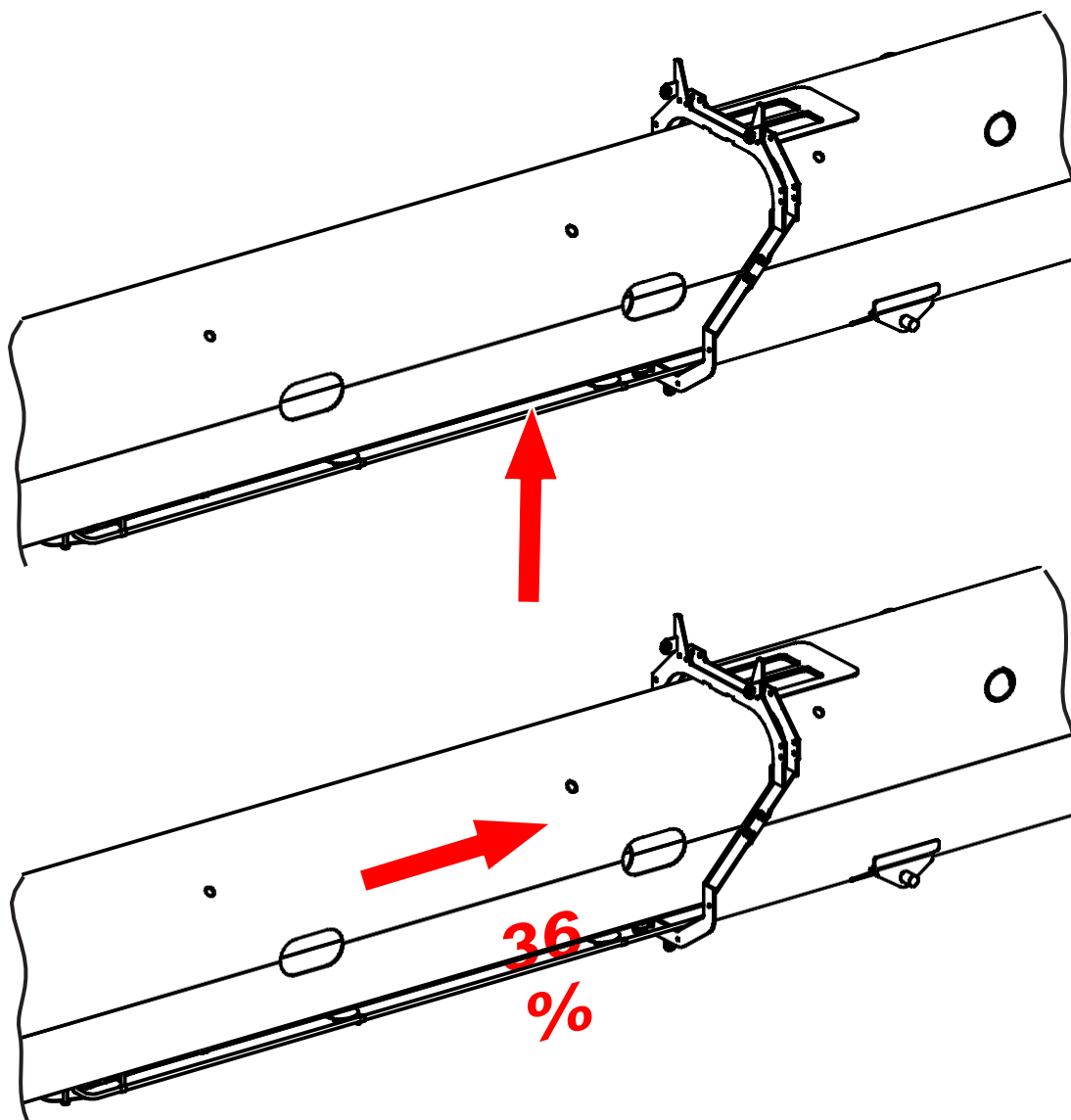
4. With a person on an elevated platform, have the crane operator slowly extend the boom until the 1st access hole in the base boom section lines up with the zerk in the second section. Grease the zerk on each side of the base boom (10) shots.
5. Repeat previous step for each of the access holes going forward on the base boom as the second section is extended approximately (3) FT. each time. The last hole in the base boom will line up with the zerk when the second section is fully extended as shown in figure below.



6. Extend the second section to line up the 1st zerk hole in second section of boom with zerk in 3rd section. Grease the zerk on each side of the 2nd section (10) shots as shown.



7. Repeat previous step for each access hole going forward in the second section as the 3rd section is extended. Line up the zerk and apply the grease.
8. With the 2nd section fully extended use a roller or brush to grease the bottom and both sides of boom on surfaces where wear pad contact is seen as shown below.

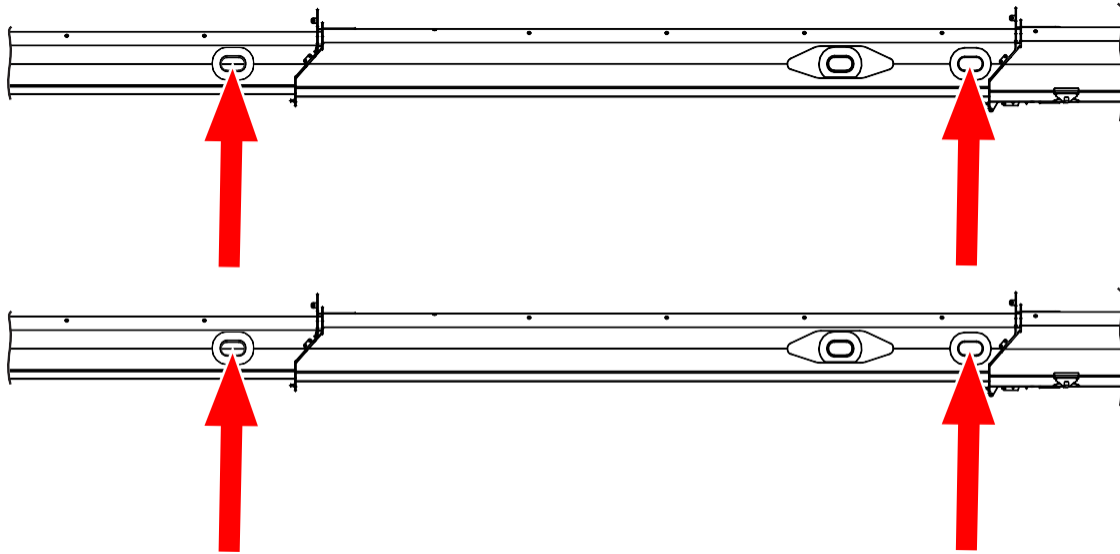


9. Fully extend the boom, one cylinder extends section 2 and the other cylinder extends section 3, 4, 5 and 6.
10. Grease the bottom and both sides of boom sections 3, 4, 5 & 6 on surfaces (similar to step 9) where wear pad contact can be seen.



DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND THE PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF THE OOM IS TELESCOPED WHILE HANDS OR TOOLS ARE IN THE HOLES.

11. Internal access to the boom sections via the large port holes is now possible on the 2, 3, 4, 5 & 6 sections as shown.



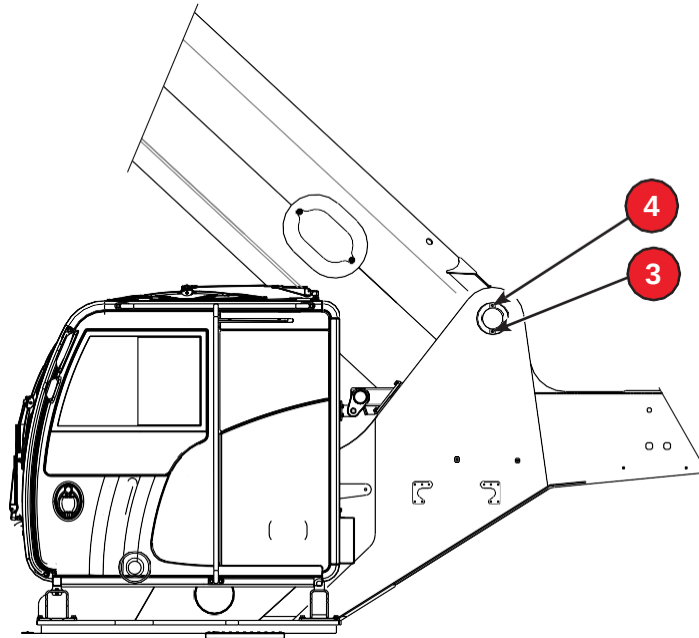
12. Using a roller that is 3"-3 1/2" wide, roll grease on top and bottom of each section where you see, thru each port hole, that the wear pads have made contact with the metal surfaces, as shown.



13. No greasing of the 6th (tip section) is required. Cycle boom in and out a few times to distribute the grease evenly between wear pads before starting normal crane operation.

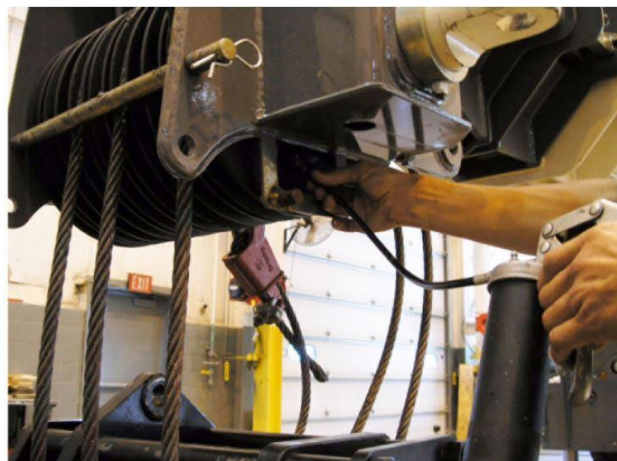
80-160 Maintenance

14. To lubricate the Base Boom Pins, locate the (2) zerks - items 3 & 4 on each Base Boom Pin as shown in photo below. Lubricate until grease starts extruding from the end of tube. Repeat on other side of boom.



THE ENGINE MUST BE TURNED OFF BEFORE ATTEMPTING SHEAVE LUBRICATION. SERIOUS INJURY MAY OCCUR IF ATTEMPTING LUBRICATION WITH THE ENGINE ON.

15. To lubricate Boom Head Sheaves, set outriggers, retract and lower boom, and place hook block on the ground. Shut down engine. All sheaves require lubrication. The top set of sheaves (shown in left photo below) have (1) zerk per sheave, and require (3) three to (4) shots of grease per sheave. Lower sheaves (7) (shown in right photo below) each have (1) zerk which can be accessed by aligning web holes to get to the inboard sheaves.



BOOM LUBRICATION & WEAR PADS INSPECTION RECORD

PLACE OF INSPECTION		DATE
DESCRIPTION OF CRANE		
Make	Model	Serial #
Boom Length & Jib Length		
DATE OF LAST BOOM LUBRICATION INSPECTION		
HOURS AND TIME OF SERVICE SINCE LAST INSPECTION		

RESULTS OF INSPECTION

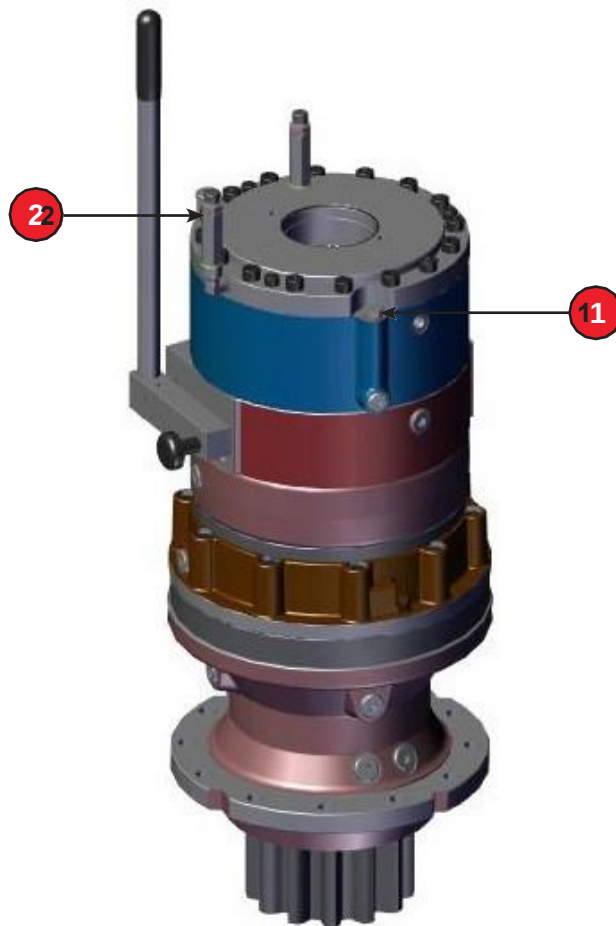
Wear Pads	Location of Pads	Conditions Noted	Recommendations

INSPECTOR: _____

80-160 Maintenance

Swing Reducers

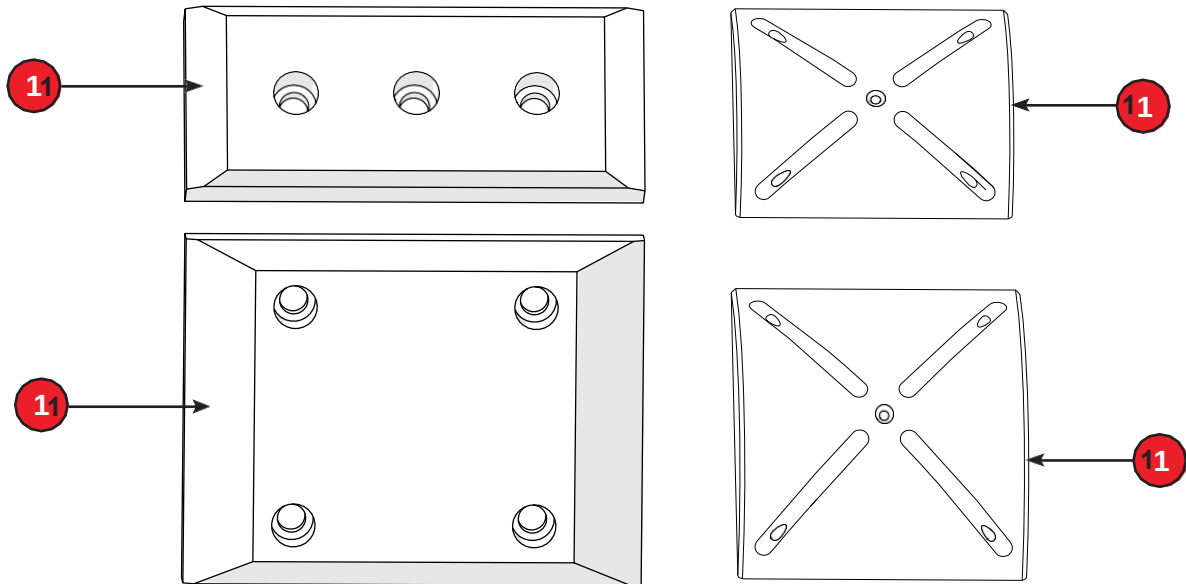
1. On a WEEKLY basis, check the swing reducers oil level and add oil as needed to maintain the top level when item (1) plug is removed. Recommended lubricant is AGMA #4EP Gear Oil or equivalent.
2. Keep case breather item (2) clear of dirt and debris.
3. All swing drive gearboxes from Load King are shipped with an additive to the gear oil of 5 oz (148 ml) of ethylene glycol for cold weather protection. If gear oil in the unit is changed, Load King recommends the same amount of ethylene glycol is added to prevent freeze up of unit due to internal condensation.



1	Fill Port
2	Case Breather

Slider Pads

The front bottom slider pad should be checked daily for wear. The remainder of the slider pads should be checked monthly for wear.



All the slider pads contain a chamfer (1) on the wearing surface. When this chamfer (1) is worn off, the slider pad must be replaced.

With boom extended brush grease on areas of boom where wear pads contact is evident. The inside of the top plate of all sections except the tip section also require grease. This can be applied through the holes in the side plates and “piled” on top of the next section out just in front of the top rear pads on that section so that extending the boom to the next hole smears the grease onto the inside of the top plate. Remember to do both sides.

Grease intervals vary and should be more frequent if noise or jerking of the boom is evident.

Swing System Maintenance

Swing Bearing Bolting Procedure

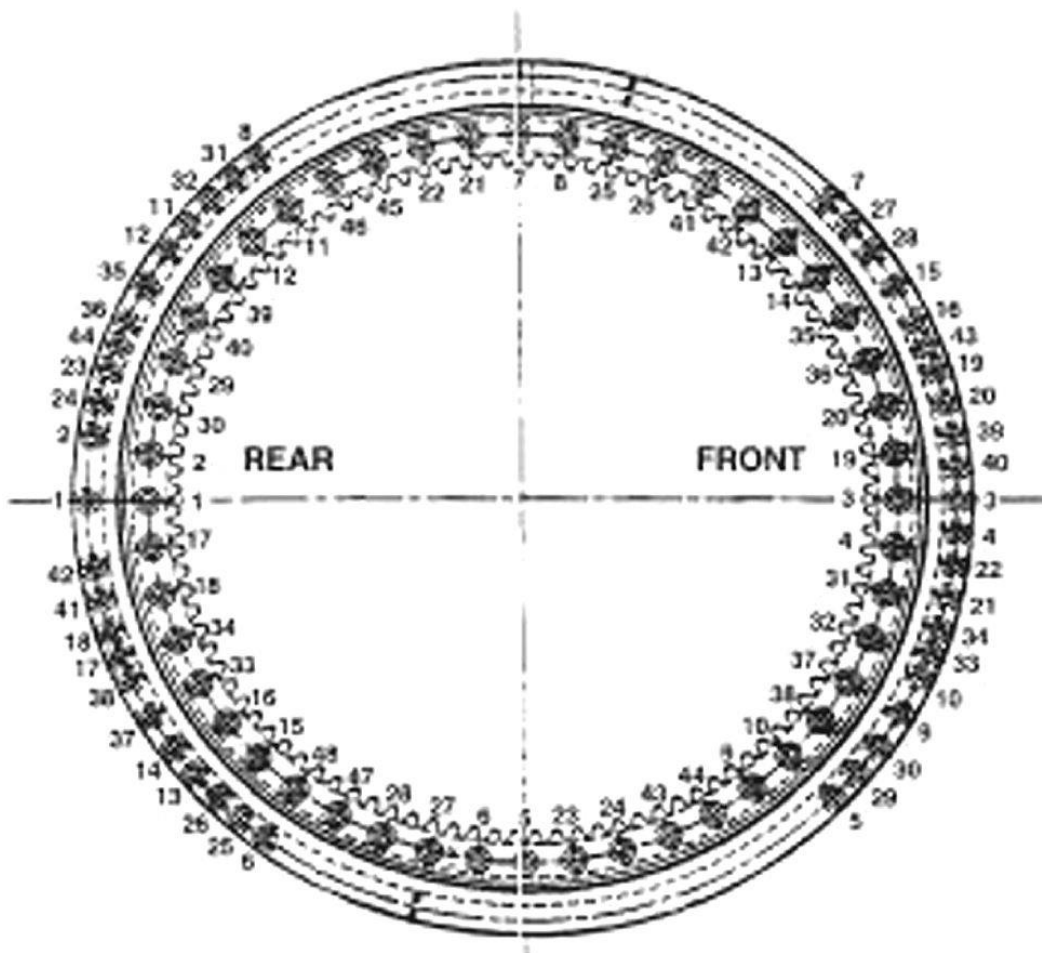
MAINTENANCE CHECK

It is very important to perform periodic swing bearing bolt checks. The bolts **MUST BE KEPT TORQUE TIGHTENED** to a rating as indicated in chart below. After the first day, and again after the initial 40 hours of machine operation, check and tighten the bolts. If additional torque is required after the first 8 or 40 hours, then recheck each 8 or 40 hours until all bolts are found properly torqued. Thereafter, checks should be performed quarterly.

MODEL	4:1 TORQUE MULTIPLIER	NO TORQUE MULTIPLIER
80-160	DRY: 245 FT. LBS. (332 NM)	DRY: 980 FT. LBS. (1329 NM)

Bolt torques are checked by applying the stated torque while observing to determine if the bolt “breaks loose”. If it is tightened (turned) by this procedure then it has loosened and all (26) bolts must be retorqued. Refer to the sequence illustrated below.

RING GEAR BOLTING SEQUENCE - (shown below).



SWING BEARING TORQUE PROCEDURE

A number of causes can reduce tension in the bolts when torquing and after use. These include rust on the threads, damaged or rough threads on bolts or nuts, shanks of bolts which hang up on holes, etc. All of these causes have a tendency to absorb the torque when bolts are being tightened.

All the fasteners inside the upperstructure and the four outside must be checked. This includes a total of sixtyfour (64) capscrews to be checked. If ANY are found to have loosened, ALL sixty-four (64) must be retorqued.

Remember, it is important to perform periodic checks of the swing bearing bolts. The bolt **MUST BE KEPT TORQUE TIGHTENED**.

The following equipment is required for checking swing bearing bolt torque:

DESCRIPTION

- (1) 3/4 drive ratchet head torque wrench with 200 lb. capacity
- (1) 16" extension - 3/4 drive.
- (1) 8" extension - 3/4 drive
- (1) 7/8" 12 pt. socket - 3/4 drive.
- (1) special wrench pn. 706F8697.
- (1) 4 to 1 torque multiplier.
- (1) 1" 12 pt. socket-3/4 drive.

Winch Lubrication

RECOMMENDED PLANETARY GEAR OIL

Field experience, supported by engineering endurance tests, indicates the use of the proper gear oil and a program of regular preventative maintenance will help provide extended gear train life and reliable hoist brake performance. The information below is intended to assist in determining which lubricant is best suited to your application.

Please refer to the winch manufacturer's documentation (included with your manual pack) for specific recommendations and specifications of the proper oil to use in your winch.



FAILURE TO USE THE PROPER TYPE AND VISCOSITY OF PLANETARY GEAR OIL MAY CONTRIBUTE TO INTERMITTENT BRAKE CLUTCH SLIPPAGE WHICH COULD RESULT IN PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH

SOME GEAR LUBRICANTS CONTAIN LARGE AMOUNTS OF EP (EXTREME PRESSURE) AND ANTI-FRICTION ADDITIVES WHICH MAY CONTRIBUTE TO BRAKE CLUTCH SLIPPAGE OR DAMAGE TO BRAKE FRICTION DISCS OR SEALS. OIL VISCOSITY WITH REGARD TO AMBIENT TEMPERATURE IS ALSO CRITICAL TO RELIABLE BRAKE CLUTCH OPERATION. TESTS INDICATE THAT EXCESSIVELY HEAVY OR THICK GEAR OIL MAY CONTRIBUTE TO INTERMITTENT BRAKE CLUTCH SLIPPAGE. MAKE CERTAIN THAT THE GEAR OIL VISCOSITY USED IN YOUR HOIST IS CORRECT FOR YOUR PREVAILING AMBIENT TEMPERATURE.

Unless otherwise specified, it is recommended that the gear oil be changed after the first (100) hours or two (2) months of machine operation, then every one thousand (1,000) hours or six (6) months, whichever occurs first. The gear oil should also be changed whenever the ambient temperature changes significantly and an oil from a different temperature range would be more appropriate.

A warm-up procedure is recommended at each startup and is essential at ambient temperatures below +40°F (4°C).

The prime mover should be run at its lowest recommended RPM with the hydraulic hoist control valve in neutral allowing sufficient time to warm up the system. The hoist should then be operated at low speeds. Raise and lower, several times to prime all lines with warm hydraulic oil and to circulate gear lubricant through the planetary gear sets.



Failure to properly warm up the hoist, particularly under low ambient temperature conditions, may result in temporary brake slippage due to high back pressures attempting to release the brake, which could result in property damage, severe personal injury or death.

Wire Rope Lubrication

New wire rope is lubricated during manufacturing, but this lubrication is only adequate for initial storage and the early stage of operation. To prevent the damaging effects of corrosion and to reduce wear, the wire rope must be lubricated at regular intervals.

The lubrication interval and the type of lubricant to be used depend on the type of wire rope, the severity of duty, and the type of corrosive elements the wire rope is subjected to. General guidelines are printed in your maintenance manual. Contact the nearest wire rope dealer for specific lubrication recommendations.

The wire rope must be properly protected at all times; therefore, the gaps between the strands and wires must be filled with lubricant to provide a complete seal. Refer to maintenance manual for proper lubrication methods.

Drive Shaft Maintenance



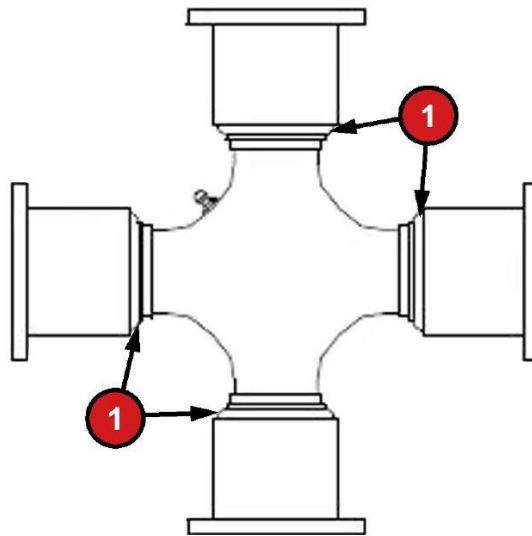
Rotating shafts can be dangerous. You can snag clothes, skin, hair, hands, etc. This can cause serious injury or death. Do not work on a shaft (with or without a guard) when the engine is running.

UNIVERSAL JOINTS

To insure proper lubrication of the bearing assemblies, it is essential to add lubricant until it appears at all journal cross bearing seals (1). This assures removal of dirt particles and other contaminants that may find their way into the bearings and indicates to the mechanic that the bearings are fully lubricated.



Do not assume that bearing cavities have been filled with new lubricant unless flow is noticed around all four bearing seals! (1).



If all the seals do not “pop” when being lubed, move the drive shaft laterally in all four directions and pull or push on the drive shaft in the direction opposite to the journal cross seal not relieving while lube gun pressure is being applied to the alemite fitting.

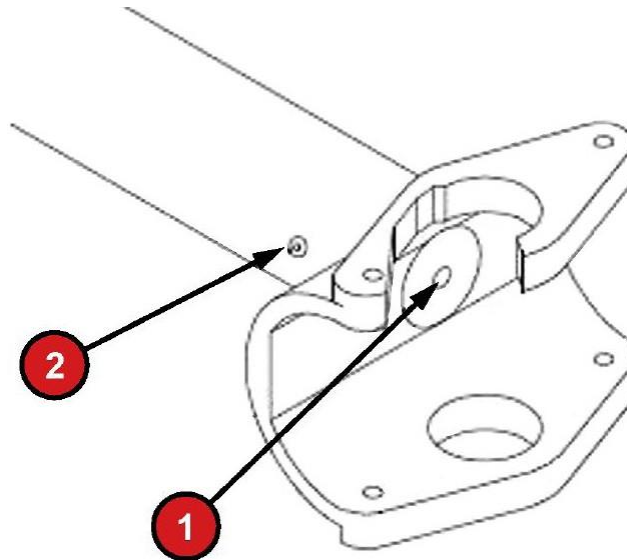
It is recommended that all universal joints be relubed after installation of the drive shaft prior to putting a vehicle in service.

JOURNAL AND BEARING KITS

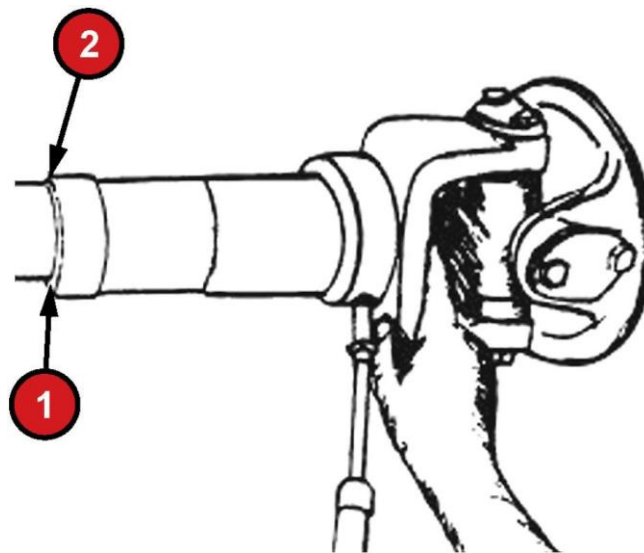
It is necessary to completely lubricate each replacement kit prior to assembly into the drive shaft yokes. Each journal cross lube reservoir should be fully packed with a recommended grease and each bearing assembly should also be wiped with the same grease; filling all the cavities between the rollers and applying a liberal grease coating on the bottom of each race. After the kits are installed into the drive shaft yokes and prior to placing into service, they should be relubed, through the zerks, using the same grease.

SLIDING SPLINE SECTIONS

Steel drive shaft splines should be lubricated with good extreme pressure (EP) grease as recommended by lubricant manufacturers. Extreme pressure grease satisfying NLFI Grade 1 has been adapted by the factory. Relube spline at the intervals prescribed below. Apply grease gun pressure to lubrication zerk (2) until lubricant appears at pressure relief hole (1) in welch plug at the sleeve yoke end of spline.



Cover pressure relief hole with finger and continue to apply pressure until grease (1) appears at sleeve yoke seal (2). This insures complete lubrication of spline.



LUBRICANTS

A high quality extreme pressure (EP) grease recommended by lubrication manufacturers for universal joints should be used. Lithium soap base greases meeting National Lubricating Grease Institute (NLGI) Grade 1 and Grade 2 specifications are preferred. The use of greases which tend to separate and cake should be avoided.

Lubrication cycles for drive shaft universal joints and slip splines will vary with service requirements and operating conditions.

OPERATING CONDITION	RE-LUBE CYCLE	
	Miles	Hours
NORMAL	6000-8000	150-200
* SEVERE	2000-3000	50-75

* For applications where conditions such as high speeds, high ambient temperatures or high angles are present.

Brake System Maintenance

REAR BRAKES

Using a pressure gun, lubricate the brackets and slack adjusters. An application of lubricant should be applied to the grease fittings each time (weekly) a general lubrication of chassis components is required.

Grease should be supplied to the bracket until it begins to squirt out around the camshaft adjacent to the slack adjuster. The slack adjuster should be filled until grease becomes visible around the camshaft.



NOTE: *Camshaft brackets with metal plugs instead of grease fittings are fitted with special seals and packed with extended lubrication interval chassis grease.*

80-160 Maintenance

Air System Maintenance

Inadequate delivery pressure or defective component operations can generally be traced to leakage, blocked lines, or the build up of moisture and sediment in the system. A regular program of periodic maintenance is an essential part of air system operation. The materials presented here are listed in accordance with the MAINTENANCE CHECK LIST in Section 4. Consideration of severe working conditions may dictate a revision in scheduling periodic checks.

DAILY:

AIR TANKS

There are four (4) air storage tanks in the air system, all having a Bleed Valve on the bottom of each tank. Open the air Bleed Valves at least once daily to blow out moisture and accumulated sediment. All tanks are located under the carrier frame, and have a “pull cable” to release the air pressure from the Bleed Valve as shown below.



1	Bleed Valve
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Hydraulic System Maintenance

MAINTENANCE CHECKS

A regular program of periodic maintenance is an essential part of continued hydraulic system operation. Allowing accumulations of moisture and sediment to build-up in the system will damage hydraulic valves, pumps and motors. The presence of leaking connections or damaged components effect the efficiency of operation and are dangerous. The materials presented here are listed in accordance with the MAINTENANCE CHECK LIST. Consideration of severe working conditions may dictate a revision in scheduling periodic checks.

DAILY:

HYDRAULIC FLUID LEVEL

The hydraulic reservoir, fluid level indicator, and filler cap are on the right side of the machine.



Hydraulic Oil Fluid Level Gauge - on right side of tank

MODEL	HYDRAULIC TANK CAPACITY
80-160	165 GAL. (625 Liters)

Retract all cylinders to return the maximum amount of oil to the reservoir and note the oil level in the indicator tube. The fluid level should be kept between the indicator marks. The top mark indicates system capacity with all cylinders retracted. Fluid capacity varies with each model as indicated above.

Do not overfill.

Refer to HYDRAULIC OIL REQUIREMENTS for hydraulic oils meeting the manufacturer's specifications. Do not use oils which have detergent additives.

80-160

Maintenance

HYDRAULIC CYLINDERS

Check the cylinder mounting brackets, bushings, and pins for wear, alignment, tightness, and damage. If misalignment or excessive play or wear are detected, replace the defective pin or bushing. Check the rod eye welds for cracks and breaks and have damaged welds repaired.

HYDRAULIC COMPONENTS

Check the hydraulic valves, motors, pumps, hoses, tubes and connections for excess dirt, oil and grease. Clean these items if necessary and check for leaks and damage. Tighten leaky connections and repair any damaged components.

WEEKLY:

RETURN LINE FILTER

Change the hydraulic reservoir return line filters after the first 40 hours of the break-in period; thereafter, follow the quarterly check recommendation.

MONTHLY:

HYDRAULIC RESERVOIR

Drain any accumulated moisture from the hydraulic reservoir by parking the machine on a slight incline and loosen the pipe plug in the bottom of the reservoir.

HYDRAULIC OIL

Visually check the condition of the hydraulic oil once each month. Thickening of the oil or a change in its appearance, such as darkening, may serve as a rough indicator of when an oil change is needed. Periodic testing of the oil is the safest, most accurate method of determining the condition of the oil. An oil supplier can be consulted for assistance in testing the oil.

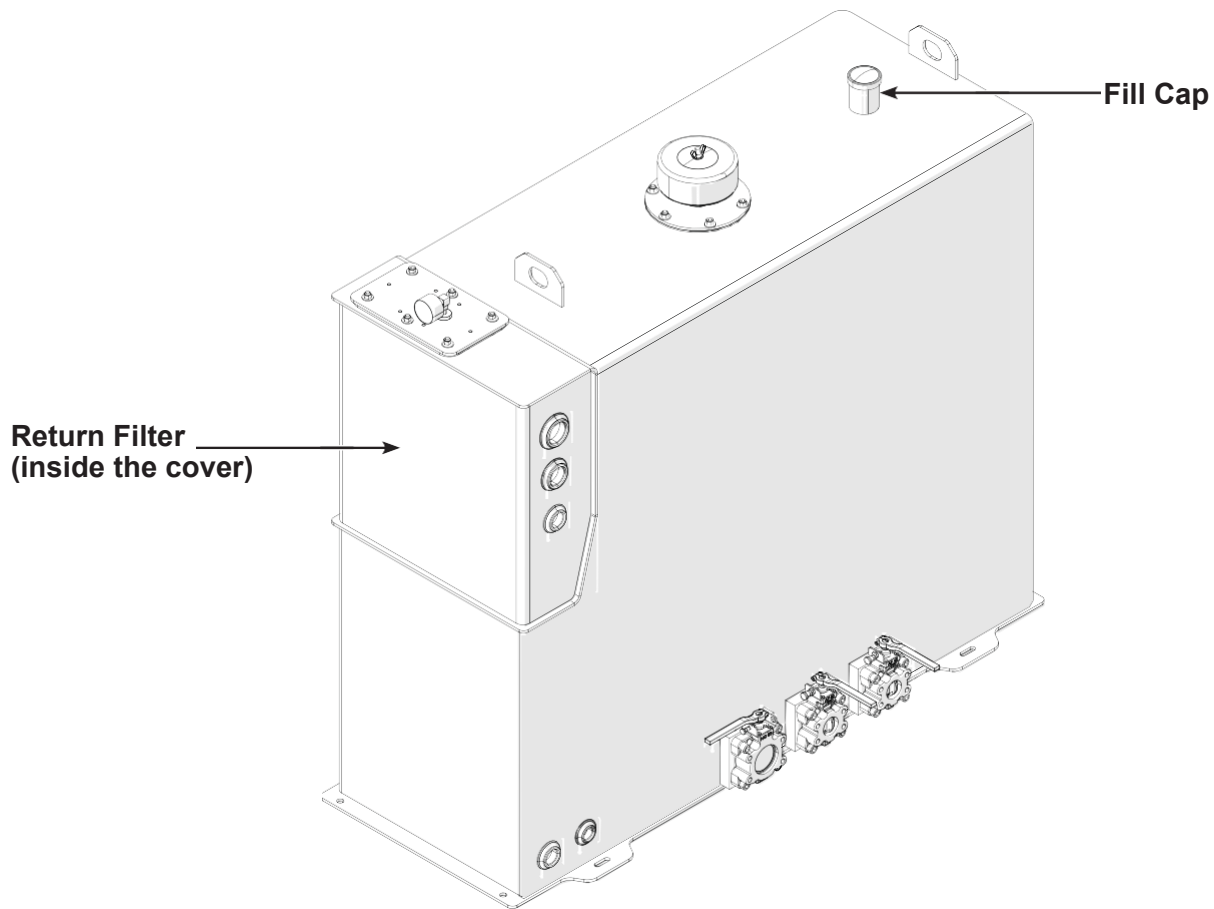
Change the oil whenever testing and/or inspection reveals the oil to be unsuitable for safe and efficient operation or yearly.

QUARTERLY:

HYDRAULIC FILTER

Remove and replace the hydraulic reservoir return line filters. Access is gained by removing the cover plate on the right-hand deck plate.

When replacing the filters, clean the spring and bypass valves. Inspect the "O" ring for damage and replace if necessary.



Before discarding the old filter element, examine the type of material trapped in it. This may indicate which, if any, hydraulic system components are deteriorating.

1000 HOURS:

HYDRAULIC RESERVOIR

Drain and clean the hydraulic reservoir. Change the hydraulic oil.

80-160

Maintenance

A change interval cannot be established which would apply to all oils and all operating conditions of temperature and cleanliness. However, a reputable brand of turbine grade oil can be expected to deliver 1000 hours of service under average operating conditions. Although conditions may necessitate shorter change intervals, do not use hydraulic oil for more than 1000 hours, unless oil analysis is used.

Whenever a visual inspection, chemical test or light test indicates that an oil change is necessary, proceed as follows:

1. Warm the oil prior to draining but avoid draining immediately after prolonged continuous use to reduce the danger of being burned by hot oil.
2. Retract all cylinders to return the maximum amount of oil to the reservoir. Loosen the top covers and remove the drain plug at the bottom of the reservoir. Allow sufficient time for the reservoir to drain thoroughly.
3. Remove the return filters, clean spring, and bypass valves and inspect cover "O" ring for damage and deterioration. Replace "O" ring if necessary.
4. Remove and clean the intake suction filter. This permanent screen-type filter is located inside the reservoir on the intake to the pump manifold. Access to this filter is gained by removing the cover with the filter holding device from the top of the reservoir. Remove the "O" ring from the filter and inspect the "O" ring for damage and deterioration. If it is damaged or deteriorated at all, replace the "O" ring. Clean the filter by immersing it in a non-caustic cleaning solvent. Rub the screen with a soft brush to dislodge accumulated foreign matter.



KEEP THE COVER PLATES ON THE RESERVOIR TO PREVENT ANY CONTAMINANTS FROM ENTERING.

5. Clean the reservoir by either steam cleaning or flushing with diesel fuel. If steam is used, steam clean the reservoir thoroughly and allow it to drain and dry completely.

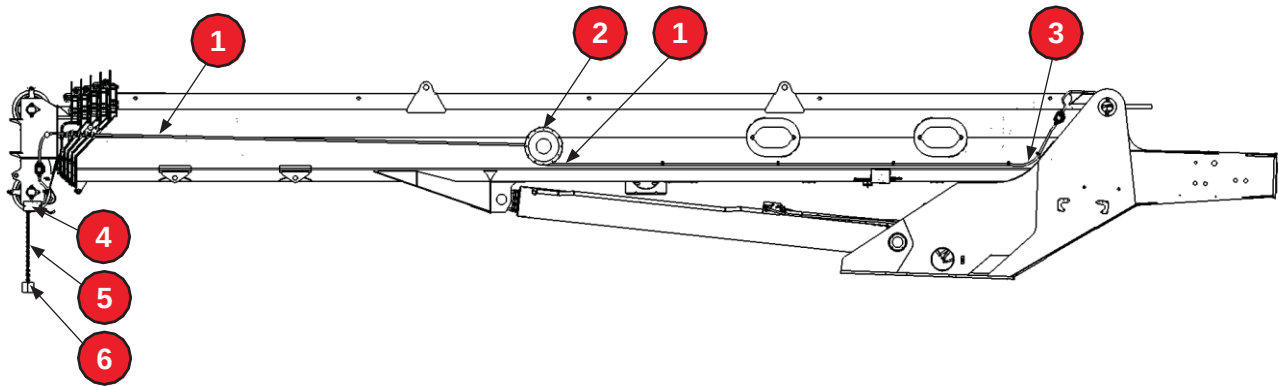
If diesel fuel is used to clean the reservoir, replace the drain plug and admit about ten gallons of fuel to the reservoir, preferably under pressure. Allow the fuel to remain in the reservoir long enough to thoroughly clean it. The suction filter may be conveniently cleaned at this time. Remove the drain plug, drain out the fuel and dry out the reservoir.
6. Replace the suction screen and reinstall the cover and filter hold down device.
7. Install a new return line filter. Reinstall the spring, bypass filter and cover.
8. Refill the system with new hydraulic oil as recommended in **HYDRAULIC OIL REQUIREMENTS**.

Anti-Two-Block System

MAINTENANCE

This crane is equipped with an ATB system for both main boom head and jib which sounds a horn (when in the “on” position) and lights a light when a two-blocking condition is imminent. The system will also electrically disconnect the circuit for winching up or extending the boom in the event of an imminent 2-block condition. Verify that the two-blocking system is functioning properly by performing the following procedure.

Check ATB switch(es) and freedom of chain-hung counterweight (item 6) as shown on main boom head in graphic below or in similar application on jib. Check the plug and socket connection at boom head and on jib, if erected and reeved, for connection. The jib connector must be plugged into the boom head receptacle. Check system indication and shut-off, by manually lifting chain hung counterweight(s). A warning light should come on, horn, if in “on” position, should sound, and shut-off system should disconnect controls. Check entire length of cable and cable reel for evidence of damage. Check spring loaded cable reel. Ensure it has spring tension and is free to rotate. Check cab control unit. If the crane is equipped with control linkage disconnect, perform the following checks, also.



1	2-Block Wire	4	2-Block Switch
2	2-Block Reel	5	2-Block Chain
3	2-Block Wire (to collector ring)	6	2-Block Weight

1. With the engine ignition key in the “off” position, check that free action (no selfcentering) occurs on the boom lowering pedal, the boom telescope lever- extended direction, and the winch lever (S) - raising direction.
2. With the engine ignition key in the “on” position, check to be sure that these controls latch (remain in the neutral position) and provide a normal centering action.



NOTE: This may require lowering the hook block away from the trip mechanism at the boom head to enable the “latching” of controls.

80-160 Maintenance



THROTTLE CONTROL

The throttle control consists of cables and clevis ends. Adjustment is dependent on cable travel and the adjusted length of the clevis rods. Adjustment is not required as long as the full range of engine rpm is available in response to control input.



INTERAXLE DIFFERENTIAL LOCK

No adjustments are possible. In the event of malfunction, check for air supply.

Storage

Storage

Machines being placed in storage must be adequately protected from deterioration during the period of idleness. This will ensure that they can be restored to active service with a minimum effort.

Before removing this hydraulic crane from service for extended periods, it should be prepared for storage as prescribed in the following paragraphs. In general, three (3) major components must undergo preparation. These are the Machine Proper, the Engine and the Transmission. The specific procedure to be followed depends upon the expected period of storage.

SHORT TERM STORAGE - 30 DAYS OR LESS

The MACHINE should be thoroughly cleaned, lubricated in accordance with Section 4, and painted surfaces retouched where the paint has deteriorated. exposed portions of all hydraulic cylinders should be coated with multipurpose grease. Coat unpainted metal surfaces with multipurpose grease after removing any rust accumulations.

LONG TERM STORAGE - 30 DAYS OR MORE

Long term storage requires greater preparation than short term storage and must be undertaken with greater care.

The MACHINE should be prepared as follows:

1. Perform the short term machine storage preparation, making certain that all points with grease fittings are liberally lubricated.
2. Drain and refill the swing reducer, winch(es), axle differentials, planetary hubs and the hydraulic reservoir. Refer to page Group 4 when servicing the reservoir.
3. Distribute the new hydraulic fluid to all parts of the system by operating all functions.
4. Clean and tape the battery cables after removing and storing the battery.
5. Coat the external ring gear of the swing bearing with open gear lubricant.
6. Block wheels so any rubber tires are not in contact with concrete. Cover tires if exposed to sunlight.
7. Fill the hydraulic reservoir to the top AFTER THE MACHINE IS PARKED IN ITS STORAGE SPOT.
8. Coat wire rope with lubricant.
9. Coat exposed cylinder rods with grease.

Machine Storage

Machines being placed in storage must be adequately protected from deterioration during the period of idleness. This will ensure that they can be restored to active service with a minimum effort.

Before removing this hydraulic crane from service for extended periods, it should be prepared for storage as prescribed in the following paragraphs. In general, three (3) major components must undergo preparation. These are the Machine Proper, the Engine and the Transmission. The specific procedure to be followed depends upon the expected period of storage.

SHORT TERM STORAGE - 30 DAYS OR LESS

Short term storage requires minimal preparation.

The **MACHINE** should be thoroughly cleaned, lubricated in accordance with Section 4, and painted surfaces retouched where the paint has deteriorated. exposed portions of all hydraulic cylinders should be coated with multipurpose grease. Coat unpainted metal surfaces with multipurpose grease after removing any rust accumulations.

The **ENGINE** should be prepared as prescribed in the topic "Engine Storage".

The **TRANSMISSION** should be prepared as prescribed in the topic "Transmission Storage".

LONG TERM STORAGE - 30 DAYS OR MORE

Long term storage requires greater preparation than short term storage and must be undertaken with greater care.

The **MACHINE** should be prepared as follows:

1. Perform the short term machine storage preparation, making certain that all points with grease fittings are liberally lubricated.
2. Drain and refill the swing reducer, winch(es), axle differentials, planetary hubs and the hydraulic reservoir. Refer to page 4-19 when servicing the reservoir.
3. Distribute the new hydraulic fluid to all parts of the system by operating all functions.
4. Clean and tape the battery cables after removing and storing the battery.
5. Coat the external ring gear of the swing bearing with MPG grease.
6. Fill the hydraulic reservoir to the top AFTER THE MACHINE IS PARKED IN ITS STORAGE SPOT.
7. Coat wire rope with lubricant.
8. Coat exposed cylinder rods with "CRC SP-400 Corrosion Inhibitor". This can be removed with "CRC HD Degreaser".

The **ENGINE** should be prepared as prescribed in the topic "Engine Storage".

The **TRANSMISSION** should be prepared as prescribed in the topic "Transmission Storage."

Chrome Cylinder Rod Storage

Hard chrome plating is primarily applied to steel cylinder rods for its wear resistant properties, although it does provide considerable corrosion resistance as well. Once the chrome-plated rod is assembled into a cylinder and put into service, the hydraulic fluid on the surface of the rod provides all the corrosion resistance required for the rod during its life cycle. As a cylinder cycles, hydraulic fluid is driven into any surface cracks that exist in the chrome plate. When these cracks are filled with hydraulic fluid, moisture or corrosive fluids can not penetrate the cracks. However, some machining and cleaning operations can negatively impact the future corrosion resistance of chrome-plated shafting. For example, additives such as chlorine, sulfur, and sodium found in Extreme Pressure (EP) coolants and some washing solutions are known rust accelerates and can strip chrome plating from the base metal. Cleaning processes, such as phosphate washing are also known to be detrimental to the corrosion resistance of hard chrome plated shafting.

If the rod is not periodically cycled and is subject to a corrosive environment, moisture and oxygen can work its way down through the chrome layer and begin to corrode the base metal. Brand new equipment may be stored outside for a considerable period of time at the equipment dealership before it is sold. During these times, a protective barrier must be applied to the exposed cylinder rod. This protective barrier will preserve the integrity of the chrome plating by preventing the elements of corrosion from getting to the metal substrate.

Cylinders should be stored in the retracted position, if at all possible. The steps outline below cover the procedures to be followed for Protecting New Equipment from corrosion if it must be stored in the extended position:

1. Position the equipment as it will be stored and identify all the exposed portions of the chrome plated cylinder rods.
2. Clean any dirt and dust from the exposed portions of the cylinder rods using a dry cloth or a cloth which has been dampened with an appropriate solvent. Do not use caustics or acids.
3. Apply a thin coating of 1" Ferro-Kote 5856-BF¹ to the exposed surfaces of the chrome plated cylinder rods. The Ferro-Kote may be thinned using a 40% Kerosene or No. 1 fuel oil mixture.
4. Inspect the cylinder rod surfaces and reapply at three to six month intervals.
5. If the equipment is to be moved and then stored again for an extended period of time or if the cylinder is cycled, steps 1 through 4 should be repeated for all cylinder rods that were exposed.

For the protection of Older Equipment that is to be stored, the procedure outlined above can be used, but greater attention to cleaning the exposed portions of each cylinder rod is required. Solvent applied with plastic or copper wool can be used, but abrasives such as sandpaper should never be used to clean the exposed surfaces of the cylinder rod. If surface damage to the chrome plate is discovered, the frequency of corrosion barrier applications should be increased.

¹ Ferro-Kote 5856-BF is a product of Quaker Chemical Company, Conshohocken, PA 19428



NOTE: Caution must be used when cleaning equipment in service with high pressure washes. Soaps or chemicals containing chlorines or other corrosive elements should be avoided. Cylinders should be cleaned in a retracted position as not to expose rods to the chemicals. Cylinders should be cycled immediately following the wash. If rods are to be stored in the extended position, refer to steps 1-4 above.

Restoration to Service

Remove the MACHINE from storage via the following procedure:

1. Remove preservative lubricants from all surfaces.
2. Check all fluid levels, adding or draining as required.
3. Lubricate the machine according to Group 4, making certain that all points with grease fittings are lubricated.
4. Make a thorough visual inspection of the entire machine, placing special emphasis on the condition of all hydraulic hoses.

Specifications



Wire Rope Specifications

MAIN WINCH

STD. - 3/4" 6X19 OR 6X37 IPS, IWRC

PREFORMED RIGHT REG. LAY WIRE

ROPE WEIGHT 1.04 LBS/FT

MINIMUM BREAKING STRENGTH - 29.4 TONS

OPT. - 3/4" ROTATION RESISTANT

34 X 7 COMPACTED STRAND, GRADE 2160

WEIGHT 1.24 LBS/FT

MINIMUM BREAKING STRENGTH - 36.0 TONS

AUXILIARY WINCH

STD. - 3/4" 6X19 OR 6X37 IPS, IWRC

PREFORMED RIGHT REG. LAY WIRE ROPE

WEIGHT 1.04 LBS/FT

MINIMUM BREAKING STRENGTH - 29.4 TONS

OPT. - 3/4" ROTATION RESISTANT

34 X 7 COMPACTED STRAND, GRADE 2160

WEIGHT 1.24 LBS/FT

MINIMUM BREAKING STRENGTH - 36.0 TONS

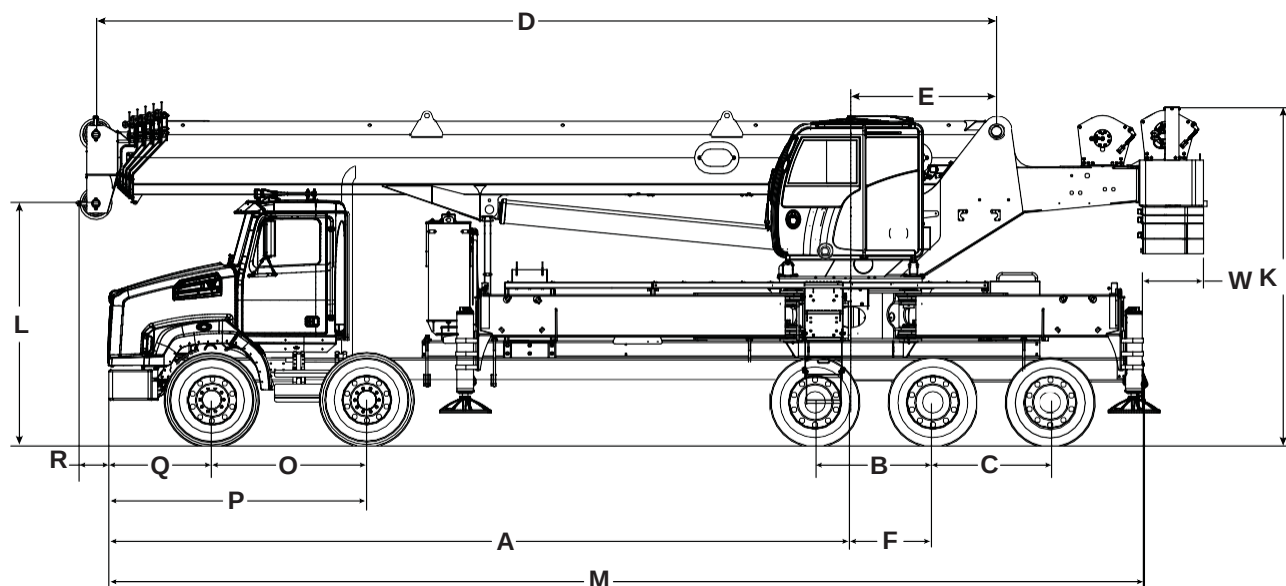


Load King permits the use of rotation resistant wire rope. Other types are not approved. When rotation resistant rope is used, the working load shall not exceed 1/5th (20%) of the rated breaking strength. The retirement criteria shall be as follows: two broken wires in six rope diameters or four broken wires in thirty rope diameters.

80-160 Specifications

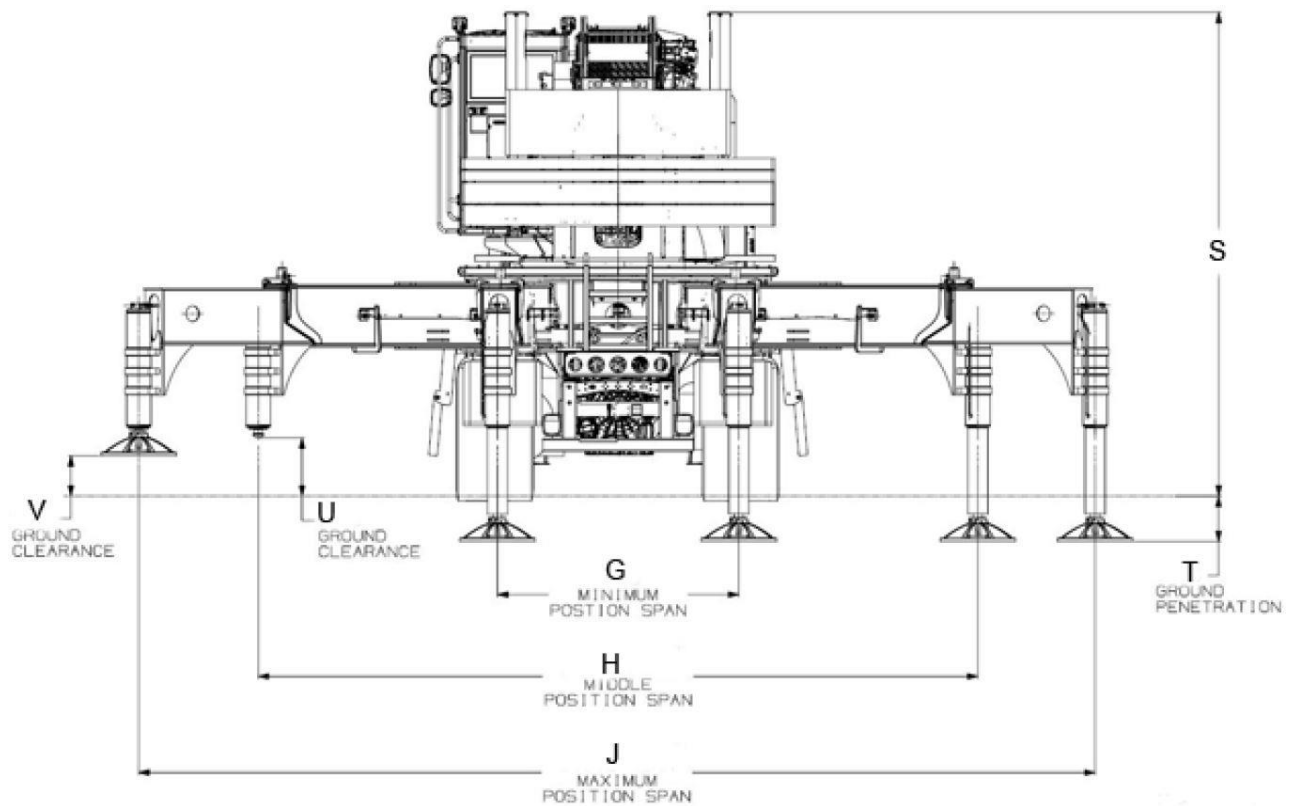
Vehicle Dimensions

80-160

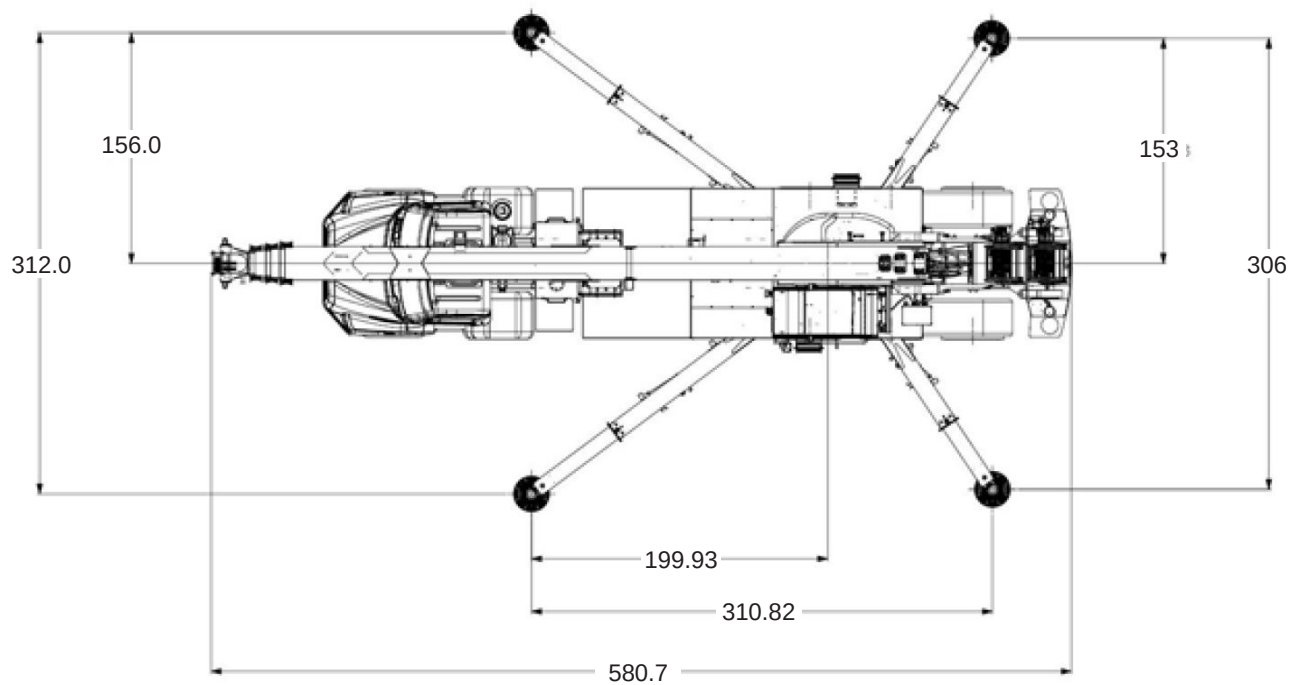


DIM. (in.)	FREIGHTLINER	KENWORTH	WESTERN STAR
A	336.0	336.0	336.0
B	55.0	55.0	55.0
C	55.0	55.0	55.0
D	474.9	474.9	474.9
E	68.0	68.0	68.0
F	42.0	42.0	42.0
G	74.89	74.89	74.89
H	237.3 (Front)	237.3 (Front)	237.3 (Front)
	229.8 (Rear)	229.8 (Rear)	229.8 (Rear)
J	312.0 (Front)	312.0 (Front)	312.0 (Front)
	306.0 (Rear)	306.0 (Rear)	306.0 (Rear)
K	161.0		
L	114.0		
M	507.19		
O	88.0	88.0	88.0
P	135.9		
Q	47.9		

DIM. (in.)	FREIGHTLINER	KENWORTH	WESTERN STAR
R	35.94		
S	161.0		
T	14.5		
U	18.6		
V	12.9		
W	27.87	27.87	27.87



80-160 Specifications



NOTE: For dimensions not listed, contact **Load King Engineering Department- Boom Truck group.**

Pumps and Function Speeds

The pumps used on the Load King 80-160 Series of cranes are one (1) variable displacement piston pump, and two (2) gear pump. To produce the proper amount of flow to run the functions at full speed, the engine with run @1650 RPM with an Allison 4500 Auto Transmission.

The required speed for the pump is very important when testing the unit speeds and checking or handling maximum loads. Remember also that pump speed and engine speed are not always the same. For instance, if the truck transmission is equipped with a PTO, the required engine speed to achieve the desired pump RPM would be approximately 1,650 RPM. It is very important that you know what the ratio of the PTO is on the unit being serviced.

When involved in troubleshooting a unit that is believed to have slow functions, it is important to know the pump is receiving the proper RPM and how much flow to expect from the pump. The following charts will allow you to accurately test the flow of the pump, as well as determine what is the proper speed of the functions on the unit. Oil temperature below 140 degrees F. may result in slower functions.

3 PUMPS SYSTEM FLOWS - 80-160

PUMP FLOW @ PUMP RPM	FUNCTION
81 GPM @ 2200	WINCH & BOOM
21 GPM @ 2200	SWING & OUTRIGGERS
21 GPM @ 2200	HVAC

FUNCTION SPEEDS

The following chart is a list of the speeds you can expect from the Load King Stinger Boom Truck which are an approximate value. All speeds are one complete cycle. For instance, the swing time is for one complete 360° rotation.

MODEL	80-160
SWING-360	26 Sec.
BOOM-EXTEND	97 Sec.
BOOM-RETRACT	79 Sec.
BOOM-RAISE	60 Sec.
BOOM-LOWER	50 Sec.
COUNTERWEIGHT-RAISE	22 Sec.
COUNTERWEIGHT-LOWER	29 Sec.
WINCH-(Normal Speed)	249 FPM (3rd Layer)
WINCH-(Hi Speed)	442 FPM (3rd Layer)

OUTRIGGER SWING (Times denote activating two cylinders at one time)	10 Sec.-Ext.	12 Sec.-Retract
OUTRIGGER BEAM (Times denote activating two cylinders at onetime)	9 Sec.-Ext.	13 Sec.-Retract
OUTRIGGER JACK (Times denote activating two cylinders at one time)	16 Sec.-Ext.	24 Sec.-Retract

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Introduction

A regular program of periodic preventive maintenance is essential to prolong crane operating life, maximize efficient service and minimize downtime. This section details a series of checks and procedures which are to be performed at daily, weekly, monthly and semi annual intervals. These intervals are stated both in terms of calendar periods and hours of operation.

The checks prescribed for longer intervals include all the checks required for the shorter intervals. Thus, the weekly check includes all items in the daily check, the monthly check includes weekly and daily checks, and so on through the semi-annual check, which includes the quarterly, monthly, weekly and daily checks.

A convenient check chart provides a means of recording preventive maintenance performed and serves as a tool for detecting problem areas and reanalyzing maintenance requirements. The items in each check

interval, on the check chart, are grouped under their respective headings and covered in detail over the course of Section 6.

This maintenance schedule is a guide which ensures that basic preventive maintenance requirements will be met under average operating conditions. Conditions which impose greater wear, loads or strain on the crane may dictate reduced check intervals. Before altering the maintenance schedule, reevaluate crane operation and review the crane maintenance records. Consider all factors involved and develop a revised schedule adequate to meet routine maintenance requirements.

As a part of each periodic check, refer to the engine manufacturer's manual for engine maintenance requirements. When servicing the engine, the engine manufacturer's recommendations take precedence over those in this manual, should any discrepancy be noted.

OPERATOR OBSERVATION

As the operator, it is your responsibility to observe and report any unusual sounds, odors, or other signs of abnormal performance that could indicate trouble ahead. On a routine basis the following items should be checked before starting or while operating the crane.

Visual Inspection - Check complete machine for any unusual condition.

Check for any leaks or damage to the hydraulic system.

Check in the engine compartment:

- Belts for tension and wear
- Coolant level
- Oil level
- Transmission oil level
- Air cleaner sight gauge
- Air intake
- Muffler and exhaust

80-160

Troubleshooting

Check battery box - For battery condition

Crane boom - Check for:

- Hook block for wear or damage
- Two block system for proper function
- Cable and cable spooling on winch
- Cylinder pin connections for wear

Check tires, axles, and drive lines, for wear or damage.

Check in the cab for:

- Instruments functioning properly
- Control operation
- Glass for good visibility
- Safety equipment is ready for use
- All lights work properly
- Cleanliness - Free from mud and debris.

General Procedure

1. **KNOW THE SYSTEM** Study this manual and learn what makes the machine “tick”, how it should behave, sound and smell.
2. **OPERATE THE MACHINE** Test operate all machine functions. Note all abnormal sounds, odors and movements. Always proceed in the most logical order to determine the cause.
3. **INSPECT THE MACHINE** Look for leaks, listen for the source of abnormal sounds, detect the origin of unusual odors. Check the condition of the oil and filters.
4. **LIST THE POSSIBLE CAUSES** Use your best judgment in listing all possible causes of the failure.
5. **REACH A CONCLUSION** Review your list of possible causes and decide which are the most likely to cause the failure. Consider the most obvious first.
6. **TEST YOUR CONCLUSION** Test your conclusions, in order of obviousness, until the source of the failure is found. The machine can then be repaired at minimal cost and downtime. Make the repair. Recheck to ensure that nothing has been overlooked. Functionally test the repaired part in the system.
7. **REVIEW MAINTENANCE PROCEDURES** Prevent recurrences of all premature failures by regularly checking the filters, temperature, adjustments and lubrication. Make daily inspections.



NOTE: *Your safety and that of others is always the number one consideration when working around cranes. Safety is a matter of thoroughly understanding the job to be done and the application of good common sense. It is not just a matter of “do’s” and “don’ts”. Stay clear of all moving parts.*

Hydraulics - General

Before any troubleshooting is attempted, become fully acquainted with the following two (2) basic fundamental facts of a hydraulic system:

1. **SPEED** The speed of a hydraulic function is directly related to the system flow. A reduction in speed of a cylinder or motor is caused by an insufficient quantity of oil being delivered to the component.
2. **POWER** The power or force of a hydraulic function is related to pressure.

If an understanding of the differences between speed and power of a hydraulic system is understood correctly, then accurate troubleshooting can be accomplished in a minimum amount of time.



NEVER resort to increasing the valve relief pressure in an attempt to cure the ills of the system. Fully diagnose the problem.

Hydraulic components are precision units and their continued smooth operation depends on proper care. Therefore, do not neglect hydraulic systems. Keep them clean and change the oil and oil filter at established intervals.

If, in spite of these precautions, improper operation does occur, the cause can generally be traced to one of the following:

1. Use of the wrong viscosity or type of oil.
2. Insufficient fluid in the system.
3. Presence of air in the system.
4. Mechanical damage or structural failure.
5. Internal or external leakage.
6. Dirt, decomposed packing, water, sludge, rust, etc., in the system.
7. Improper adjustments.
8. Oil cooler plugged, dirty or leaking.

Whenever hydraulic, fuel, lubricating oil lines, or air lines are to be disconnected, clean the adjacent area as well as the point of disconnect. As soon disconnected, cap, plug or tape each line or opening to prevent the entry of foreign material. The same recommendations for cleaning and covering apply when access covers or inspection plates are removed.

Clean and inspect all parts. Be sure all passages and holes are open. Cover all parts to keep them clean. Be sure parts are clean when they are installed. Leave new parts in their containers until ready for assembly.

Clean the preservative compound from all machined surfaces of new parts before installing them.

Operator Controls

WITH THE ELECTRICALLY CONTROLLED VALVES on the outriggers, two (2) spools must be checked.

The extend and retract valves are in the diverter valve. The function valves are in 2 sectional valves - one for the front outriggers and one for the rear outriggers.

To operate an outrigger cylinder, the extend valve or the retract valve plus a function valve must shifted by the solenoids. If pressure is not detected at the pressure tap on the diverter valve, see the electrical trouble shooting section for verifying the operation of the solenoids.

80-160

Troubleshooting

Swing Circuit

SWING COMPLETELY INOPERATIVE

CAUSE	REMEDY
Mechanical swing lock applied, if equipped	Disengage the swing lock
Swing brake applied	Disengage the swing brake
Spring brake stuck in applied position	Disassemble swing brake and free-up unit
Swing valve main relief valve stuck in open position	See section on "Relief Valves"
Swing motor leaks excessively internally	See section of "Fluid Motor"
Mechanical fault in swing reducer gear box	Repair swing reducer or replace swing
or swing bearing	bearing
Hose plugged or liner collapsed	Replace hose
Rotary manifold leaking internally	Reseal rotary manifold
Swing pump faulty	See section on "Pumps"

SWING MOTION SLUGGISH

CAUSE	REMEDY
Main relief valve stuck in open position	Replace
Faulty swing pump	Repair or replace swing pump
Swing motor leaks excessively, internally	Replace or reseal motor
Excessive leakage around swing control valve spool	Replace or replace control valve

SWING MOTION ERRATIC

CAUSE	REMEDY
Brake not releasing completely	Check operation of swing brake and/or swing lock
Low hydraulic oil level	Add oil as required
Swing bearing not lubricated properly	Lubricate swing bearing
Main relief malfunctioning	See section on "Relief Valves"

Boom Hoist Circuit

BOOM DRIFTS DOWN

CAUSE	REMEDY
Hold valve not seating properly	Replace hold valve
Hoist cylinder by-passing	See section on "Cylinder Leakage"

BOOM HOIST ONLY - INOPERATIVE OR ERRATIC

CAUSE	REMEDY
Boom will drift down	Repair or replace hold valve
Boom won't lower	Repair, replace, or backflush hold valve
Boom hoist cylinder binding	Repair or replace
Load is too great	Consult capacity chart, check RCI
Piston packings damaged	Replace packings
Low oil level	Add oil as required
Hose plugged or liner collapsed	Replace hose
Air in cylinder	Bleed cylinder

BOOM DROPS SLIGHTLY AS RAISE CONTROL IS RELEASED

CAUSE	REMEDY
Air in cylinder	Bleed cylinder
Boom hoist hold valve free flow check not seating properly	Replace hold valve

BOOM HOIST AND TELESCOPE INOPERATIVE OR ERRATIC

CAUSE	REMEDY
Pump disconnect not engaged	Engage pump disconnect
Main relief valve malfunctioning	See section on "Relief Valves"
Low oil level	Add oil as required.
Rotary manifold leaking internally	Reset rotary manifold
Piston pump faulty	See section on "Pumps"

Telescope Circuit

TELESCOPE FUNCTION ONLY - WILL NOT OPERATE

CAUSE	REMEDY
Load too great	Move lever to first position, not "high speed". Reduce load or set boom length before lifting load
Both port relief valves sticking	See section on "Relief Valves"
Hose plugged or liner collapsed	Replace hose

BOOM EXTENSION JERKY OR ERRATIC

CAUSE	REMEDY
Inadequate grease on boom pad surfaces	Lubricate boom where pads contact boom
Wear pads damaged	Replace wear pads
Wear pads shimmed to boom too tight	Reshim wear pads
Faulty counter balance valve	Replace counter balance valve
Loose chain system	Adjust chains as required

TELESCOPE CYLINDER EXTENDS BUT WILL NOT RETRACT

CAUSE	REMEDY
Port relief valve sticking	See section on "Relief Valves"
Hold valve malfunctioning	Repair or replace
Internal leakage in cylinder	See section on "Cylinder Leakage"
Extend valve malfunctioning	Repair or replace

BOOM SECTIONS RETRACT UNDER LOAD

CAUSE	REMEDY
"O" ring around hold valve damaged	Replace "O" rings
Hold valve not seating properly	Repair or replace
Telescope cylinder by-passing	See section on "Cylinder Leakage"

Winch Circuit

WINCH WILL NOT DEVELOP MAXIMUM LINE PULL

CAUSE	REMEDY
Main relief valve is set too low	Readjust the main relief
Main relief valve is sticking	See section on "Relief Valves"
Winch motor worn excessively or damaged	See section on "Fluid Motor"
Piston pump worn excessively or damaged	See section on "Pumps"
Rotary manifold leaking internally	Reseal rotary manifold
Low oil level	Add oil as required

WINCH WILL LOWER BUT WILL NOT RAISE

CAUSE	REMEDY
The sprag clutch is assembled backwards	Be certain that the winch is assembled properly
Insufficient parts of line for the load being lifted	See the reeving diagram on the capacity chart

WINCH WILL RAISE BUT WILL NOT LOWER

CAUSE	REMEDY
The winch hold valve is mounted on the winch motor incorrectly	Be certain that the winch is assembled properly
The winch hold valve spool is sticking	Repair or replace
The winch brake is not releasing	Be certain that the brake release line is open. If necessary, disassemble and inspect the brake components
Winch brake piston "O" ring damaged	Replace "O" ring

WINCH WILL NOT HOLD LOAD (LOAD DRIFTS DOWN)

CAUSE	REMEDY
System back pressure too high	Warm oil: check for restriction in down stream flow
The over-running sprag on the brake is broken	Inspect and replace, if necessary
The automatic brake is not applying	Be certain that the winch brake release line is not plugged and no foreign objects are in the brake assembly
The winch brake friction plates are worn	Replace friction plates

80-160

Troubleshooting

WINCH CHATTERS WHEN LOWERING

CAUSE	REMEDY
The winch hold valve is set wrong or is malfunctioning	Check the hold valve setting. If the winch continues to chatter, the holding valve is sticking. Inspect it for worn or damaged seals or contamination

Outrigger Circuit

ALL OUTRIGGERS INOPERATIVE

CAUSE	REMEDY
Electrical malfunction	See section on "Electrical Controls"
Outrigger relief valve malfunctioning	See section on "Relief Valves"
Outrigger diverter valve malfunctioning	Repair or replace
Line to or from pump plugged or liner collapsed	Clear blockage or replace hose
Low oil level	Add oil as required
Gear pump worn or damaged	See section on "Pumps"

INDIVIDUAL OUTRIGGER INOPERATIVE

CAUSE	REMEDY
Electrical malfunction	See section on "Electrical Controls"
Cylinder leaking internally	See section on "Cylinders"
Hold valve on jack cylinder not operating	Repair or replace
Line plugged or collapsed between outrigger valve and cylinder	Replace hose
Beam wedged in extended position	Extend jack far enough to pick up end of beam and retract. Replace slider pad block on top of outrigger box to pick up end of beams

OUTRIGGERS WILL NOT LIFT MACHINE

CAUSE	REMEDY
Outrigger relief valve malfunctioning	See section on "Relief Valves"
Outrigger diverter valve malfunctioning	Repair or replace
Outrigger pump worn or damaged	See section on "Pumps"
Cylinder by-passing	See section on "Cylinders"

JACK CYLINDER DRIFTS DOWN (OUT & DOWN)

CAUSE	REMEDY
Hold valve on top of cylinder malfunctioning	Replace cartridge
Thermal relief cartridge mounted in wrong end	Check for proper assembly
Cylinder by-passing	See section on "Cylinders"

80-160

Troubleshooting

Swing Pumps Circuit

FAILURE OF PUMP TO DELIVER FLUID

CAUSE	REMEDY
Pumps not engaged	Engage pumps
Low fluid level in reservoir	Add recommended oil and check level
Oil intake suction filter plugged	Clean filter
Air leak in suction line, preventing priming or causing noise and irregular action of control circuit	Repair leaks
Oil viscosity too heavy to pick up prime	Use lighter viscosity oil. Follow recommendation for temperatures encountered
Broken pump shaft or parts broken inside pump	Contact your local distributor; if necessary, refer to the manufacturer's manual for the correct instructions in pump disassembly and repair

NO PRESSURE IN SYSTEM

CAUSE	REMEDY
Pumps not engaged	Engage pumps
Pump not delivering oil for any of the reasons listed previously	Follow remedies given previously
Relief valve not functioning due to:	
Valve setting not high enough	Increase pressure setting of valves
Valve leaking	Check seat for score marks and reseal
Spring in relief valve broken	Replace spring and readjust valve
Internal leakage in control valves or cylinders	To determine location, progressively block off various parts of circuit. When trouble is located, repair. (Do not block between pump and relief valve)
Relief valve not functioning due to:	
Cold fluid	Warm up system. Work with oil at recommended operating temperature range. See Operation section)
Air leak or restriction at inlet line	Repair or clean
Internal parts of pump are worn excessively	Replace pump

PUMP MAKING NOISE

CAUSE	REMEDY
Pump disconnect not engaged	Shut engine off and engage pump disconnect
Partially clogged intake line, intake filter or restricted intake pipe	Clean out intake filter screen or eliminate restriction. Be sure suction line is completely open
Air leaks:	
At pump intake pipe joints	Test by pouring oil on joints while listening for change in sound of operation. Tighten as required
Air drawn in through inlet opening	Check and add oil to reservoir if necessary
Air bubbles in oil	Use hydraulic oil containing a foam depressant
Too high oil viscosity	Work only with oil at recommended operation temperature
Oil intake suction filter plugged	Clean filter
Rag, paper, etc., pulled into suction line or pump	Remove
Worn or broken parts	Replace

EXTERNAL OIL LEAKAGE AROUND PUMP

CAUSE	REMEDY
Shaft seal worn causing oil to leak into gear drive housing	Replace
Loose fitting on pump intake or discharge	Keep all joints tight
Damaged "O" ring seals between pump sections	Replace
Damaged "O" rings at fittings	Replace

EXCESSIVE WEAR

CAUSE	REMEDY
Abrasive matter in the hydraulic oil being circulated through the pump	Clean suction filter and replace return filter. Drain & flush system as necessary
Viscosity of oil too low at working conditions 1	Check oil recommendation
Sustained high pressure above maximum pump rating	Check relief valve setting
Air recirculation causing chatter in system	Check for air being drawn into system. Use hydraulic oil with a foam depressant

80-160
Troubleshooting

BREAKAGE OF PARTS INSIDE PUMP HOUSING

CAUSE	REMEDY
Excessive pressure above maximum pump rating	Check relief valve setting
Seizure due to lack of oil	Check reservoir level, oil filter and possibility of restriction in suction line more often
Solid matter being wedged in pump	Check suction line filter, drain and flush system as necessary

Swing Circuit Control Valves

STICKING PLUNGERS

CAUSE	REMEDY
Excessively high oil temperature	See section on "Excessive Heating of Oil in System"
Dirt in oil	Change oil. Clean system.
Fittings too tight	Check torque
Valve warped from mounting	Loosen valve mounting bolts and check
Excessively high flow in valve	Check to see if hoses from pump are not crossed or reversed
Linkage binding	Free up linkage
Plunger damaged	Replace valve
Return spring damaged	Replace faulty parts
Spring or detent cap binding	Loosen cap, re-center and re-tighten
Valve not at thermal equilibrium	Let system warm up

LEAKING SEALS

CAUSE	REMEDY
Paint on or under seal	Remove and clean
Excessive back pressure	Open or enlarge line to reservoir
Dirt under seal	Remove and clean
Scored plunger	Replace valve
Loose seal plates	Clean and tighten
Cut or scored seal	Replace faulty parts

UNABLE TO MOVE PLUNGER IN OR OUT

CAUSE	REMEDY
Water frozen in plunger caps	Remove caps to clean out
Dirt in valve	Clean and flush out
Plunger cap full of oil	Replace seals
Bind in linkage	Free up linkage

LOAD DROPS WHEN PLUNGER MOVED FROM NEUTRAL

CAUSE	REMEDY
Dirt in check valve	Disassemble and clean
Scored check valve poppet or seat	Replace poppet or lap poppet to seat

80-160

Troubleshooting

POOR HYDRAULIC SYSTEM PERFORMANCE OR FAILURE

CAUSE	REMEDY
Dirt in relief valve	Disassemble and clean
Relief valve defective	See section on "Relief Valves"
Load too heavy	Check line pressure
Internal valve crack	Replace valve
Plunger not at full stroke	Check movement and linkage

Swing Circuit Control Valves

CAN'T GET PRESSURE

CAUSE	REMEDY
Poppet stuck open or dirt under seal	Check for foreign matter between poppets and their mating members. Members must slide freely

ERRATIC PRESSURE

CAUSE	REMEDY
Poppet seal damaged	Replace damaged parts. Clean dirt and remove surface marks for free movement

PRESSURE SETTING NOT CORRECT

CAUSE	REMEDY
Wear due to dirt. Lock nut adj. screw loose	See section on "Valve Adjustments"

LEAK

CAUSE	REMEDY
Damaged seats, worn "O" rings, parts sticking due to dirt	Replace worn or damaged parts. Inspect for free movement of components. Check seats for scratches, nicks, or other marks

80-160

Troubleshooting

Fluid Motor

MOTOR WILL NOT TURN

CAUSE	REMEDY
Pumps not engaged	Engage pumps
No oil	Fill reservoir to proper oil level
Pump broken	Replace pump
Relief valve stuck open or set too low	Clean and free relief valve spool and adjust to proper setting
Work load jammed or stuck	Remove obstruction from work load
Large contaminating foreign bodies in fluid	Flush hydraulic system completely. Use new oil and install new filters

SLOW OPERATION

CAUSE	REMEDY
Wrong oil viscosity	Use proper viscosity oil
Rotary manifold leaking	Reseal rotary manifold
Worn pump	Repair or replace pump
Extremely high fluid temperatures causing pump and motor to slip (temperature increases as pump and motor wear)	Add heat exchangers
Relief setting too low	Set relief valve for proper psi

MOTOR TURNS IN WRONG DIRECTION

CAUSE	REMEDY
Hose connections wrong	Reverse connections
Wrong timing	Re-time motor

ERRATIC MOTOR OPERATION

CAUSE	REMEDY
Relief valve pressure set too low	Adjust relief valve setting
Low oil level in reservoir permitting air to enter system	Fill reservoir to proper level
Air being "sucked in" on inlet side of pump	Tighten fitting(s) on pump inlet side

LEAK AT SHAFT

CAUSE	REMEDY
Worn or cut shaft seal	Replace shaft seal

LEAK BETWEEN HOUSING AND WEAR PLATE OR BETWEEN WEAR PLATE AND GEROLER ASSEMBLY

CAUSE	REMEDY
Motor housing bolts loose	Clean mating surfaces and tighten nuts to appropriate value
Pinched "O" ring seal	Replace

LEAK AT OIL PORTS

CAUSE	REMEDY
Damaged seal or "O" ring	Replace "O" ring or seal
Poor fittings	Replace fittings carefully
Damaged threads	Replace housing

Cylinders

CYLINDER STICKING OR BINDING

CAUSE	REMEDY
Damaged parts	Repair or replace
Dirt or contamination	Check oil condition. Check filters. Clean or replace filter elements. Change oil if condition requires it
Loose parts	Tighten cylinder rod eyes, if loose. Check cylinder heads and tighten, if loose.
Misalignment	Check mounting pins and bushings. Tighten rod eyes

ERRATIC ACTION OF CYLINDERS

CAUSE	REMEDY
Air in system:	
Oil level is too low	Add or change
Air leak	Locate and correct
Foaming in reservoir	Use hydraulic oil containing a foam depressant
Internal leakage	See "Cylinder Leakage"
Main Relief pressure too low or valve sticking	See section on "Relief Valve"

Cylinder Leakage

Hydraulic cylinders may retract due to the cooling of the oil in cylinder. Oil shrinks approximately 1% per 25°F of cooling, or as an example, if a cylinder is extended 100" and cools 100°F, it will shrink 4".

TELESCOPE CYLINDER

If excessive leak-down is encountered, check items in the following sequence:

1. With boom offside and horizontal, extend the boom approximately 6 ft. per section. Mark the first telescoping section at the end of the base section.
2. Elevate the boom to maximum angle and suspend a load on the hook. (7 tons on a 2- part line would approximate manufacturer's inspection procedures.)
3. With engine shut off, hold or tie the thumb wheel on the joystick in the full "extend" position for approximately 15 minutes.
4. Return the telescope thumbwheel joystick to neutral, start engine, ground the load, and return the boom to horizontal. Re-mark the boom section as in (1). Measure the distance between marks to determine leak-down of the cylinder.

The manufacturer's allowable drift specification for production machines is as follows:

With 14,300 lb. hook load, 2-part hoist line, boom extended about 6 ft. per section at maximum boom angle, and 160 degree F. hydraulic oil temperature, the leak-down per cylinder is not to exceed 3/4 inch in a 15-minute period.

IDENTIFY A DEFECTIVE HOLD VALVE in the cylinder which drifts excessively by interchanging the hold valve cartridge with one removed from a cylinder that is not drifting, or by replacement with a new cartridge. Before installing the cartridge, visually inspect the external "O" rings and backup washers. Retest per the procedure above to determine if hold was defective.

An alternate method to test the hold valve would be to disconnect the two hoses coming from the valve bank and then elevate the boom . If oil continues to flow slowly from the extend line then it is a hold problem. If oil continues to flow from retract, then it is faulty or leaking by piston in cylinder.



NOTE: *With hollow rod telescope cylinders you can drain in excess of 40 gallons of oil from the rod. If the boom comes in while doing this test, then the cylinder is faulty or leaking by the piston in the cylinder.*

IF THE HOLD VALVE IS NOT FOUND DEFECTIVE, the cylinder must be removed from the boom assembly for repacking and checking. Prior to reassembly of the cylinder, conduct an air test on the piston rod by blocking the retract ports on the rod near the piston end. Slip a plastic bag over piston end of rod and retain and seal with rubber band. Apply and hold a slight amount of air pressure at the retract port of the rod. (Port stamped with "R") Expansion of the plastic bag indicates a defective rod weldment or seals on the port tube in the rod.

WHEN REASSEMBLING THE CYLINDER, care should be taken to keep the piston rod assembly parallel in all planes with the cylinder barrel as the piston enters and is pushed down the barrel prior to gland engagement.



NOTE: *An external leak from telescope cylinders or hydraulic line within the boom assembly does not cause leak-down without also having one or more of the above conditions present.*

80-160

Troubleshooting

BOOM LIFT CYLINDER

The suggested procedure for identifying the specific cause of leak-down should be performed in the following sequence:

ELEVATE THE BOOM TO NEAR MAXIMUM ANGLE, not completely extended, with a boom length sufficient to winch up a convenient payload approximately one (1) foot from ground level. Shut off engine.

DISCONNECT THE EXTEND HOSE, PILOT DRAIN HOSE, AND THE SMALL PILOT LINE HOSE at the holding valve ports and cap the pilot line hose and drain hose ends.

IF HYDRAULIC OIL CONTINUES TO RUN after the initial draining from either port of the hold valve as the hoist cylinder continues to leak-down, the cause is within the hold valve.

IF CYLINDER LEAK-DOWN OCCURS with no oil leak from the hold valve ports, the cause is within the cylinder.

OUTRIGGER JACK CYLINDER

The suggested procedure for identifying the specific cause of leak-down is similar to the boom lift cylinder procedure:

SET THE OUTRIGGERS.

ELEVATE THE BOOM TO NEAR MAXIMUM ANGLE, not completely extended, with a boom length sufficient to winch up a convenient payload approximately one (1) foot from ground level. Shut off engine and remove pressure from the hydraulic reservoir by loosening the filler cap.

DISCONNECT THE EXTEND HOSE FROM THE HOLD VALVE. This is a hose farthest away from the port tube and should have an "E" stamped next to it.

IF HYDRAULIC OIL CONTINUES TO RUN after the initial draining from the port of the hold valve as the jack cylinder continues to leak-down, the cause is within the hold valve.

IF CYLINDER LEAK-DOWN OCCURS with no oil leak from the hold valve port, the cause is within the cylinder.

DO NOT START THE ENGINE UNTIL THE HOSES HAVE BEEN RECONNECTED. The control valve spool is open-center to reservoir in the neutral position and return line oil would be pumped out.

Excessive Heating of Oil In System

HEATING CAUSED BY POWER UNIT (RESERVOIR, PUMP, RELIEFVALVE, AND COOLERS)

CAUSE	REMEDY
Relief valve set at a higher or lower pressure than specified. Excess oil dissipated through increased slippage in various parts, or through relief valve	Reset relief valve to recommended pressure
Internal oil leakage due to wear	Repair or replace faulty component
Viscosity of oil too high or too low	Follow recommendations for correct viscosity grade to be used
Pumps assembled after overhaul may be assembled too tightly. This reduces clearances and increases rubbing friction	Follow instructions when reassembling
Leaking relief valves	Repair
Improper functioning of oil cooler	Inspect cooler and see that it is working properly
Improper machine operation	Return control to neutral when stalled, cylinder at end of stroke, etc.

HEATING BECAUSE OF CONDITIONS IN SYSTEM

CAUSE	REMEDY
Restricted lines	If lines are crimped, replace; if partially plugged for any reason, remove obstruction
Internal leaks	Locate leaks and correct
Low oil level	Check oil level and fill if necessary

80-160

Troubleshooting

Electrical Controls

ELECTRICAL FAILURE

CAUSE	REMEDY
Rocker switch sticking	Remove switch, check if hole is too tight. Cut out decal or file hole larger
Tripped circuit breakers	Reset breaker
Disconnected or broken wires	Replace or repair
Open circuit	Check with test light. Repair or replace
Low voltage	Check wires and grounds
Poor engine solenoid connection	Clean and tighten
Defective solenoid	Replace
Solenoid failure	Replace
Poor ground connections	Clean and tighten connections

Two-Block System

PANEL LIGHT & HORN WILL NOT COME ON WITH BOOM SWITCH WEIGHT LIFTED (IF EQUIPPED WITH DISCONNECTS, CONTROLS WILL NOT ENGAGE)

CAUSE	REMEDY
Burned out fuse	Check and replace fuse (8 amp only).
Broken wire	Check voltage in control panel between terminals #0 and #37. If 0 volts, check between ignition post of ignition switch and ground. If 12 volts available, wire to control panel is bad. Correct.

HORN WORKS, BUT NO LIGHT WITH SWITCH WEIGHT LIFTED (AND IF EQUIPPED W/ DISCONNECTS, CONTROLS WILL ENGAGE)

CAUSE	REMEDY
Light bulb burned out	Replace bulb

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General Service Information

Machine productivity, longevity and low cost performance depend on periodic maintenance, troubleshooting and proper service and adjustment procedures.

As the operator, it is your responsibility to detect any unusual sounds, odors or other signs of abnormal performance that could indicate trouble ahead.

By detecting any malfunctions in their early stages, you can save yourself unnecessary downtime and your employer a lot of money! Therefore, it is also your responsibility to use good judgement in detecting potential problems in the early stages and repairing them quickly. If you don't, one problem may lead to another.

Before attempting to make a repair, ask yourself IF you have the RIGHT TOOLS, IF you have the PROPER TEST EQUIPMENT and IF you can accurately DIAGNOSE the cause of the malfunction.

If you can't answer YES to all three questions, rely on your distributor serviceman. He has the tools, testing equipment and service knowledge to pinpoint the problem in minutes instead of the hours consumed in hit - or - miss methods. TIME IS MONEY! He will save it for you.

If you decide to attempt a repair yourself, follow a logical TROUBLE-SHOOTING PROCEDURE. Don't simply replace parts until the trouble is found.

Once the cause of a problem or malfunction has been diagnosed, take the corrective action specified in this manual. Follow the procedures given for the specific problem. If the difficulty is not covered, consult your Distributor Serviceman.



NOTE: A time table styled check list for periodic maintenance requirements is given in Section 4. Maintenance check procedures are found under each of the respective subject headings.



When performing maintenance on a vehicle ALWAYS PLACE THE SHIFT LEVER IN THE NEUTRAL POSITION, set the parking brakes, block the vehicle's wheels, and NEVER work under, in front of, or in back of a vehicle when the engine is running.

The methods used to remove assemblies, guards, cab panels, etc. is left to the discretion of the customer dependent on the type of overhaul equipment and maintenance personnel at hand.

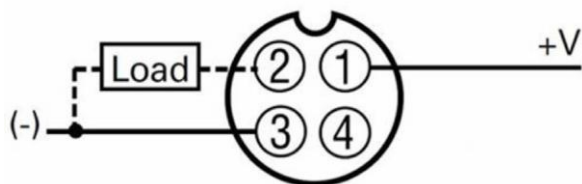
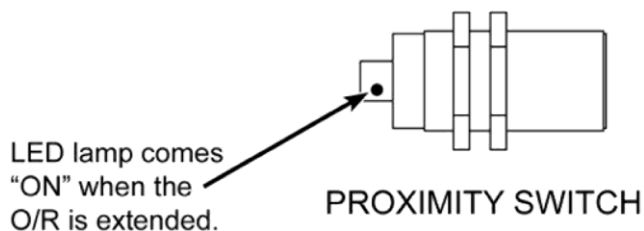
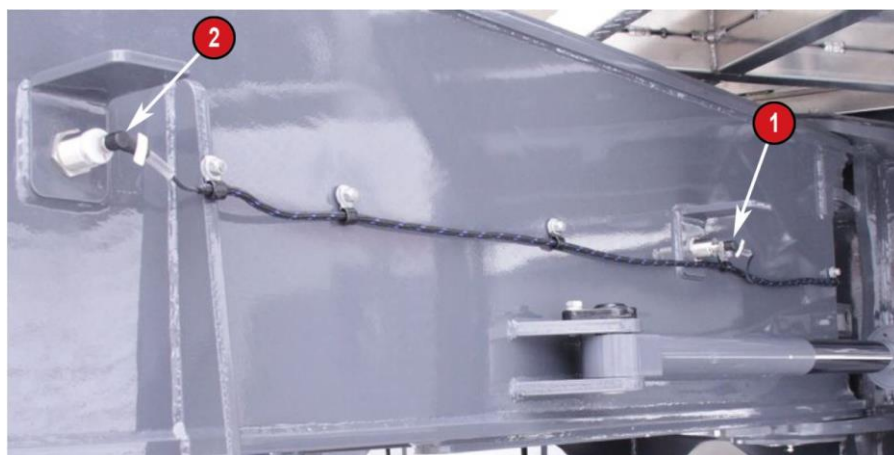
Keep parts in order when large components are disassembled, particularly so when it has a great number of similar parts. Loosely reassemble assemblies whenever possible to prevent small parts from being lost. Keep subassembly parts together, but be careful not to get right and left hand parts mixed up.

When an assembly is removed to correct only one difficulty, it is good practice to recondition the whole assembly at the time thus avoiding repetition of work at a later date.

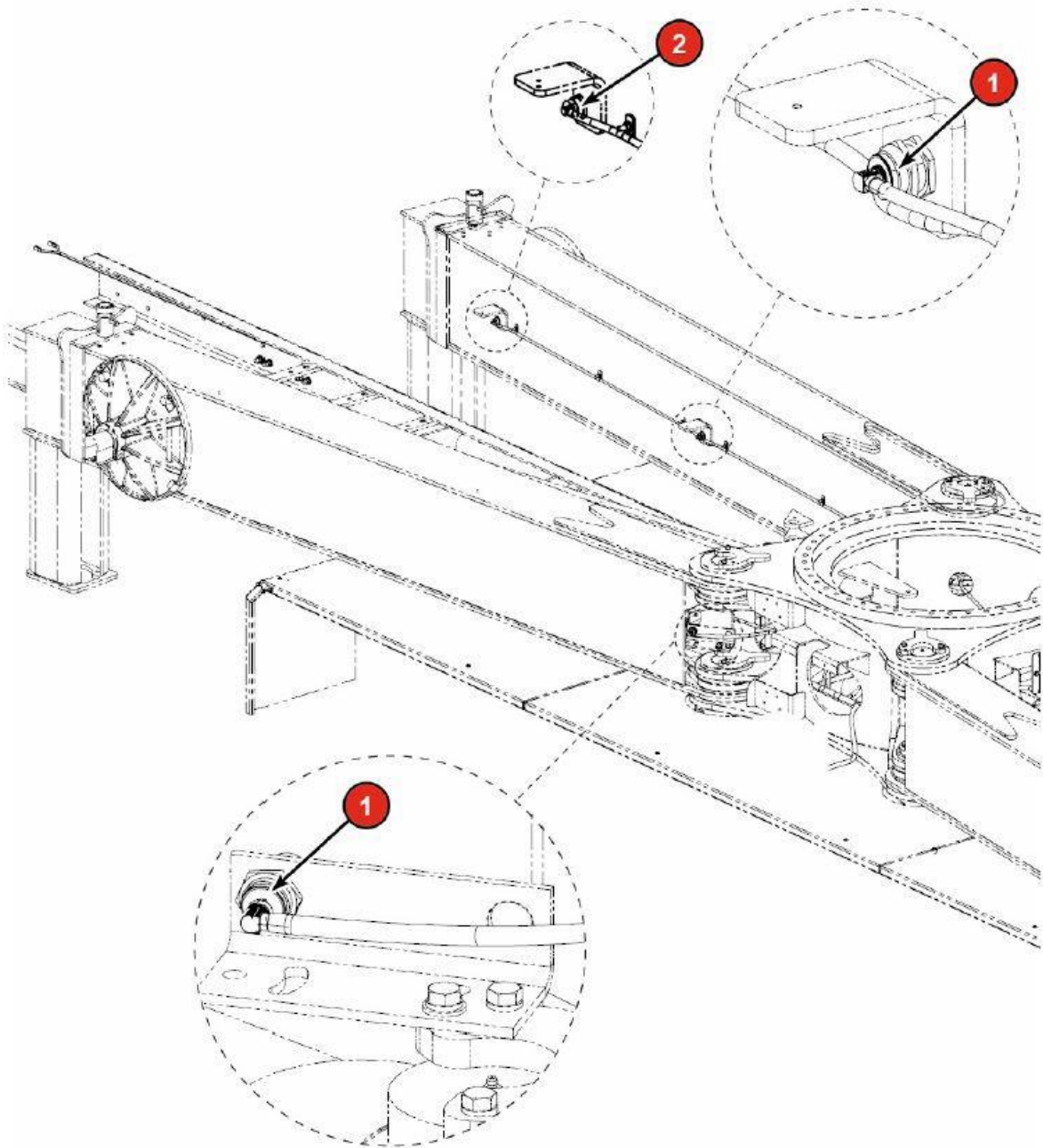
Bolts and nuts should be placed into their respective holes when removing guards, cases, etc. so that proper bolt will be on hand when reassembling these parts.

Outrigger Position Sensors

If your crane is equipped with Outrigger Position Sensors-each outrigger beam will contain (2) two proximity sensors for determining the location of outrigger beams at retracted position and full extension. Also, there will be a (1) one proximity sensor located at the pivot pin area of each beam swing cylinder. This sensor detects full beam swing out position. Each sensor has an air gap to maintain to operate properly and send signals to the Rated Capacity Limiter (RCL). Visually inspect sensors for damage, the condition of related wiring harness connections and dirt / debris that could inhibit the sensor signal or proper air gap.



SENSOR CHARACTERISTICS & SETTING	
OUTPUT TYPE	NORMALLY CLOSED
SENSING RANGE	15 MM
MINIMUM OPERATING VOLTAGE	6 VDC
MAXIMUM OPERATING VOLTAGE	48 VOLTS
MINIMUM OPERATING TEMPERATURE	-40C
MAXIMUM OPERATING TEMPERATURE	+70C
MINIMUM LOAD CURRENT	200 MA
AIR GAP SETTING	0.12" (3.2 mm)



1. Proximity Sensor - Outrigger Swing & Outrigger Beam (Retracted)
2. Proximity Sensor - Outrigger Beam (Extend)

General Work Practices

The following points are effective work practices that make the job go smoother and provide for the best quality in the repair of the crane.

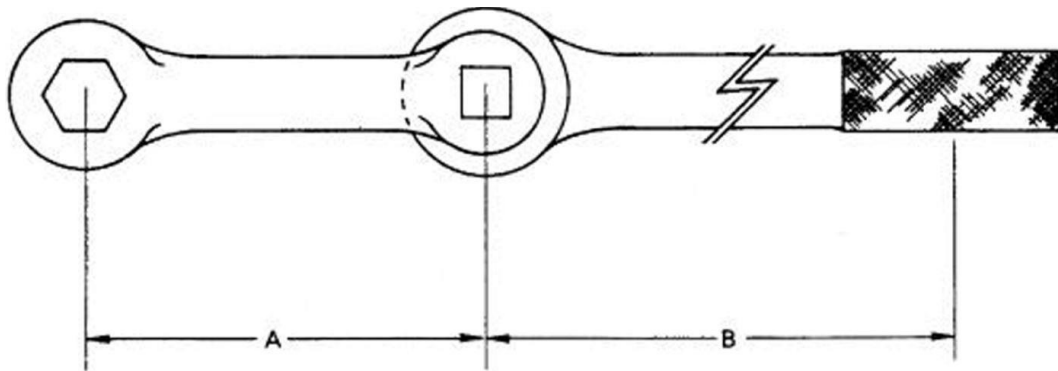
1. Before disconnecting wires, hoses or tubes, tag them for proper identification at reassembly.
2. Before removing a component (pump, motor, valve, etc.), match mark its mounting position in relation to the adjacent component
3. Before disassembling any multiple section component (pump, motor, valve, etc.), mark the position of each section in relation with the other.
4. Before removing shims, tie them together and identify the location.

Torque Wrench Extensions

In some applications, a standard torque wrench and socket cannot be fitted to the bolt(s) to be tightened because of restricted access. In other instances, the torque value specified cannot be obtained because sufficient force cannot be applied to the standard length wrench. Both of these problems may be solved by the use of appropriate torque wrench extensions - either commercially made or fabricated by the user.

When using an extension, it must be remembered that the wrench torque (the actual torque reading or setting of the wrench) and the wrench force (the force applied to the wrench) must be adjusted to compensate for the added length and produce the desired bolt torque.

Refer to the illustration and formula below when calculating the proper adjusted values for wrench torque, wrench force, and bolt torque.



NOTE: Torque wrench setting at length "B" would be same as torque specified for capscrews not requiring use of adapter.

FORMULA

$$\text{Torque wrench setting (TWS)} = \frac{(600 \text{ ft. lb.}) \text{ times ("B")}}{("B") \text{ plus ("A")}}$$

EXAMPLE

(Assuming "B" = 43")

(Assuming "A" = 10.25")

$$\text{TWS} = \frac{(600 \text{ ft. lb.}) \times 43"}{43" + 10.25"} =$$

$$\frac{25.800}{53.25} =$$

485 ft. lb.

Welding Instructions



When doing repair welding on your unit take precaution attaching your ground to the component being repaired. This will reduce the chance of arcing through a bearing, cylinder, etc., damaging the component. Paint should be removed from the surface to be used as the “ground” (earth).



Use necessary precaution when welding around fuel tanks, oil reservoir, batteries, tubing and pressure systems.



When welding close to glass, cylinder rods, or any polished surface, provide adequate protection from splatter.



Never weld when the engine is running. Always disconnect the battery cables and applicable grounds before welding.



Do not weld on wet surfaces since this will cause hydrogen embrittlement of the weld.



Always have a fire extinguisher on hand in case of fire. Adequate ventilation and dry area are necessary. Protective clothing should be used and all persons in the welding area should have protection for their eyes. Follow instructions for welding and cutting on paint.

AWS CLASS E7018

Low hydrogen rod for normal repairs on low alloy to medium carbon steel. All position welding, good penetration, and crack resisting up to 80,000 yield. Also suitable for repair of previous intershield welds.

AWS CLASS E11018G

Low hydrogen rod for repair on high strength alloy steel such as T-1, 80,000 to 100,000 yield. All position welding, good penetration, and high tensile strength up to 110,000.



NOTE: Low hydrogen rod E7018 must be used within four (4) hours upon removal from a freshly opened container or from a storage oven.

Low hydrogen rod E11018G must be used within 1/2 hour upon removal from its container or from a storage oven.



All welding procedures and welding operator qualifications shall be in accordance with ISO5817-C when welding on load sustaining members. Refer to ISO2553 for interpretation of welded joints symbols on drawings.



Special Considerations for Welding Painted Surfaces

When welding or cutting steel coated with a certain paint system, the worker is exposed to decomposition products (metal fumes, gases or vapors, particulate) which vary depending on the type of process being used to weld or cut, the nature of the base metal, and the type of coating system. The following control procedures should be utilized when one is welding or cutting coated steel:

- Use a power brush or grinding wheel to strip the coating from the steel in the vicinity where the cut or weld is to be made. Remove the paint far enough from the weld to prevent any remaining paint from becoming heated and bubbling. If this happens, continue to brush or grind the paint away.
- A toxic dust respirator and eye protection should be used while stripping the paint.
- Welder should be outfitted with a fresh air supplied respirator and other personal protective equipment required for welding.
- Other employees should be removed from the area or told to stand back a minimum of 10 feet from the welder. Do not be in direct line with the weld fumes.
- Use a local exhaust hood to remove fumes during the welding or cutting operation if one is available.

Hydraulic System

Pressure Settings-Pumps & Valves

Setting hydraulic pressure is a complex operation and should be performed only after satisfying the following conditions.

1. Warm the hydraulic oil to greater than 80° F.
2. Always check pressure settings at maximum engine speed in PTO mode.
3. Be certain to calibrate the pressure gauge used. Gauge calibration can be lost if the gauge is subjected to pulsating pressure for a few seconds. The gauge must have a proper snubber to read center of pump pressure ripple or erroneous readings will result.

MAINTENANCE CHECKS

All the relief valve maintenance checks are conducted on a SEMI-ANNUAL BASIS. Check the relief valves and make the necessary adjustments by the following procedures.

The relief valves used on this hydraulic crane have a screw type adjustment. If it is determined that the valve is out of adjustment, follow this general adjustment procedure.

PUMP ADJUSTMENT

1. Check / Adjust Standby Pressure

BOOM HOIST & WINCH MAIN PRESSURE SETTING PROCEDURE

Check the boom relief settings as follows:

1. Operate the boom over relief to warm the oil if necessary.
2. Attach a calibrated pressure gauge to test port on the inlet pressure port at the valve bank.
3. Raise the boom completely and continue to boom up with the engine running at full governed rpm. The gauge reading at location (3) should be 4500 psi. If necessary, adjust item (6) Load Sense (LS) pressure adjustment screw. (See chart below).

4. Lower boom completely and continue to boom down with the engine running at full governed rpm. The gauge reading at location (3) should be 725 psi. If necessary, adjust item (6) Load Sense (LS) pressure adjustment screw. (See chart below).

EXTEND / RETRACT RELIEFS

The initial range has been preset. If adjustment is necessary, it is accomplished by loosening the jam nut and either turning the adjustment screw (1) or (7). In to increase pressure or backing it off to lower pressure. Retighten the jam nut when the desired pressure is obtained.

Set **EXTEND** pressure by the following procedure:

1. Extend the boom completely and continue to extend the boom over relief with the engine running at full governed rpm. Initially, set the extend port relief valve item (7) to obtain a reading of 3500 psi.

Set **RETRACT** pressure by the following procedure:

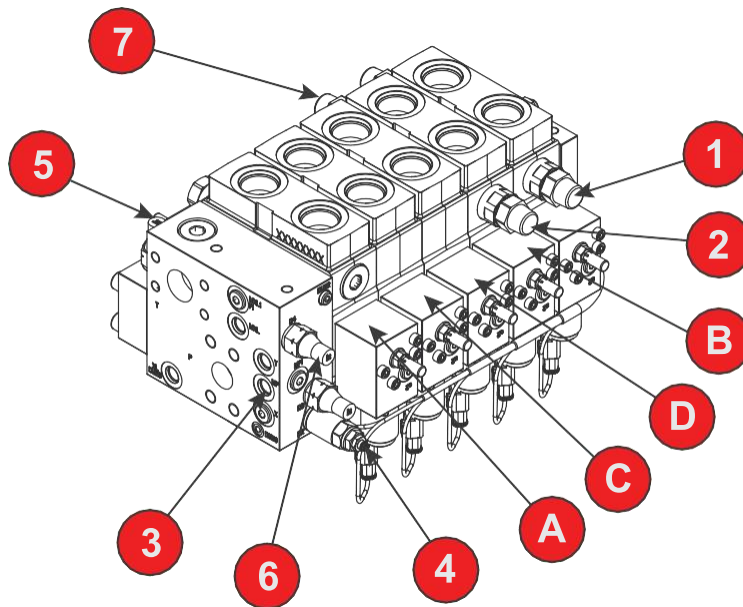
2. Retract the boom completely and continue to retract over relief with the engine running at full governed rpm. Initially, set the retract port relief valve item (1) to obtain a reading of 3500 psi.

80-160 Pressure Settings					
Piston Pumps & Boom Valve					
Description	Type	Bar	PSI	Comments	Notes
Piston Pump	Standby Pressure (Margin)	28	406	Main Boom Functions	Set pressure to 406 psi (28 bar). Measure pressure at MP or MP1 in boom valve inlet section.
Boom Valve	Load Sense (LS)	310	4500		The LS adjustment is on the inlet section of the boom valve. Measure pressure at MXL or MXL1 in boom valve inlet section.
System Pressure Check	System Pressure	317	4600	Maximum System Pressure	This reading is the result of LS pressure plus margin and is read at MP or MP1 on the boom valve inlet section. The max reading equals the compensator setting.
Piston Pump	Pressure Compensator (PC)	317	4600		The larger adjusting screw on the pump sets the compensator pressure limit. Read at MP or MP1

80-160
Service / Parts

Description	Type	Bar	PSI	Comments	Notes
Boom Valve	Main Relief	324	4700	Clipper Relief	Must increase the PC setting on the pump and the LS pressure to set check) the main relief setting. The main relief setting is located on the inlet section of the boom valve. Once the main relief has been set, return the PC to the proper setting and then set the LS pressure (LS + Margin = System Pressure).
Boom Valve	Tele-Extend	241	3500	Limits Boom Extend Pressure	Check pressure by fully extending boom until 2 tele cylinder is bottomed out.
Boom Valve	Tele-Retract	241	3500	Limits Boom Retract Pressure	Check pressure by fully retracting boom until cylinder is bottomed out.
Boom Valve	Boom Down	50	725	Limits Boom Down Pressure	Check pressure by lowering boom until cylinder is bottomed out.
Diverter Valve	Outriggers Swing	172 200	2500 2900		To set the Outrigger relief pressure setting, requires the outrigger jack or beam to be fully extended or retracted at full engine RPM. Check swing relief by tilting cab up.

Boom Valve Functions & Adjustments		
ITEM	FUNCTION	Notes
A	Hoist	Valve Section
B	Telescope	Valve Section
C	Main Winch	Valve Section
D	Aux Winch	Valve Section
1	Relief Valve	Telescope In Circuit - Limits pressure for port (B) Retract
2	Relief Valve	Boom Down Circuit - Limits pressure for port (B) Retract
3	Pump Pressure	Gauge port to measure pump pressure
4	Pilot Pressure	Set to 435 psi (30 bar) (requires installation of a pressure tap, and only adjusted or checked by Load King Authorized Service)
5	Main Relief	See Main Relief setting of Boom Valve Pressure Settings chart
6	Load Sense Pressure Adjustment	See Load Sense (LS) settings of Boom Valve Pressure Settings chart
7	Relief Valve	Telescope (A) Circuit - Extend



BOOM VALVE - Fig. 1



NOTE: To check pump and load sense pressure, go to the Hydraulic Information control screen which can be accessed from the Home Screen (see page 115)

SWING RELIEF

Check the swing relief using the following procedure:



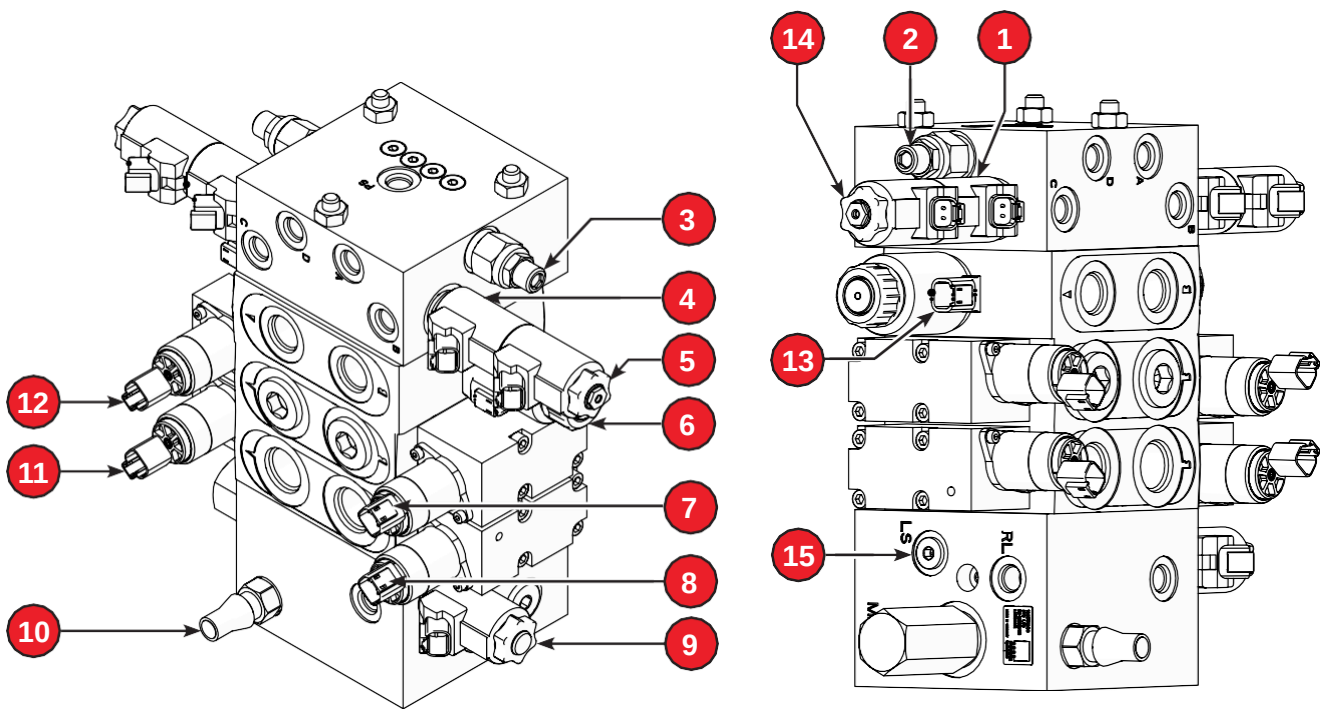
NOTE: Prior to checking the swing relief valve pressure setting the main Diverter Valve relief must be set to the proper pressure of 3500 psi.

1. Operate the machine to warm the oil if necessary.
2. Attach a calibrated pressure gauge in test port item (15) of the **SWING VALVE - Fig 2.**



NOTE: Test port item (15) is located on the Swing Relief Valve which is mounted inside the superstructure just to the left of the swing reduction unit. The relief valve is set to 2900 psi with cab tilt bottomed out.

3. Lower the cab tilt by actuating rocker switch located on your RH armrest until the cab tilt hydraulic cylinder bottoms out. Continue to lower the cab tilt and read the pressure on the gauge at item (15) of **SWING VALVE - Fig 2.**



SWING VALVE - Fig. 2

NO.	FUNCTION	PRESSURE SETTING (PSI)
1	Cab Tilt Up	N/A
2	Cab Tilt Counter Balance	1000 psi (70 bar)
3	Counterweight Counter Balance	2900 psi (200 bar)
4	Counterweight Lift	N/A
5	Counterweight Lower	N/A
6	Jib B	N/A
7	Swing Brake B	N/A
8	Swing B	N/A
9	Park Brake	N/A
10	Load Sense Relief Valve	2900 psi (200 bar)
11	Swing A	N/A
12	Swing Brake A	N/A
13	Jib A	N/A
14	Cab Tilt Down	N/A
15	LS Port	N/A

SWING MAXIMUM OPERATING PRESSURE ADJUSTMENT

Relief pressure for the whole swing valve and all swing valve functions is 2900 psi and set by adjusting item 10 with a gauge in LS port of the swing valve and bottoming out cab tilt.

OUTRIGGER RELIEF ADJUSTMENT

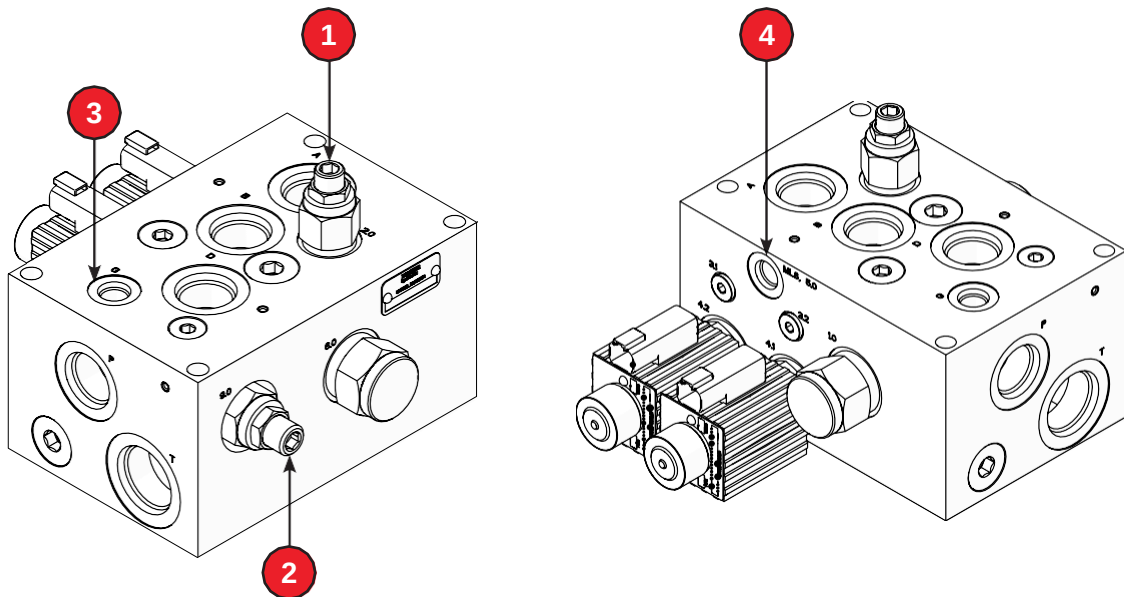
Use the 5000 psi test gauge and check as follows:

Install gauge in MLS port of diverter valve and set outrigger relief valve to 2500 psi.

MAIN RELIEF IN DIVERTER VALVE ADJUSTMENT

Use the 5000 psi test gauge and check as follows:

1. If main relief in diverter valve needs to be adjusted, proceed as follows:
2. Attach the gauge at the quick disconnect in the diverter valve at G port (3), located on the L.H. side of the front outrigger box.
3. Start engine and run at full throttle.
4. The maximum operating pressure on the **SWING VALVE - Fig 2** item (2) is set at 2900 psi. This pressure must be increased above 3500 psi to set the Main Relief (2) on the **DIVERTER VALVE - Fig 3**.
5. Move cab tilt up to read maximum pressure setting.
6. If necessary, adjust the Main Relief on the **DIVERTER VALVE - Fig 3** item (2) to 3500 psi.
7. Re-set the maximum operating pressure on the **SWING VALVE - Fig 2** item (10) to 2900 psi.



DIVERTER VALVE - Fig. 3

1. Outrigger Relief valve (preset to 2500 psi)
2. Main Relief (pre-set to 3500 psi)

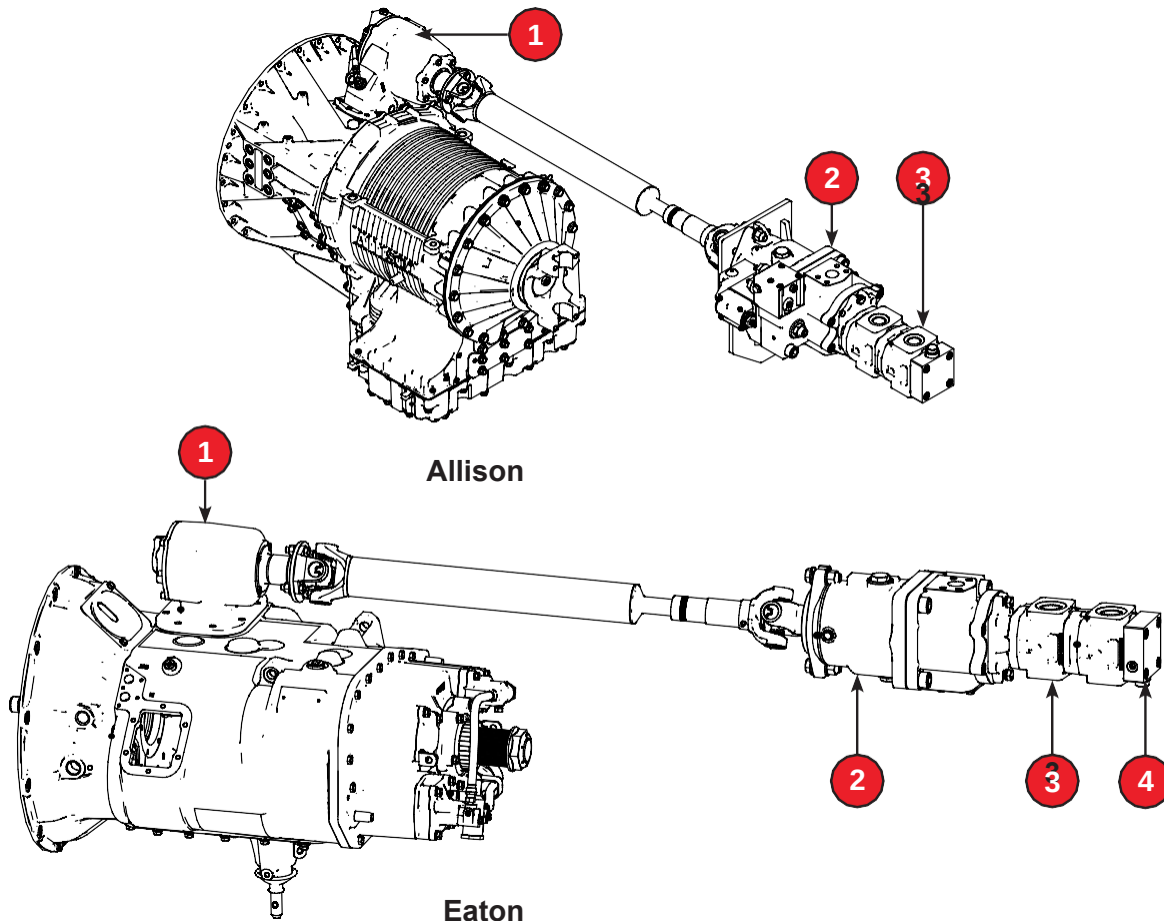


NOTE: MLS (4) is gauge port for outrigger pressure G (3) is gauge port for pump pressure.

Pumps

GENERAL INSTRUCTIONS

This machine is equipped with a tandem pump to which is “piggybacked” on a single pump.



1. PTO
2. PISTON PUMP - HYDRAULICS (BOOM FUNCTIONS)
3. GEAR PUMP - OUTRIGGERS & SWING
4. GEAR PUMP - HVAC

In the event of pump failure, we strongly recommend that you contact your local distributor. However, should you decide to facilitate the repair of these units - CONSULT THE MANUFACTURER'S REPAIR MANUAL - read all of the steps used in disassembly and all of the steps used in building up the unit. It is important to airblast all parts and wipe them with a clean, lintless cloth before assembly.

Dirt is the enemy of any hydraulic system. The first requirement of good maintenance of hydraulic equipment is cleanliness. MAKE SURE YOU DISASSEMBLE AND ASSEMBLE YOUR HYDRAULIC EQUIPMENT IN A CLEAN AREA.

USE CAUTION IN GRIPPING ALL PARTS IN THE VISE TO AVOID DAMAGING MACHINED SURFACES.

A pump must be driven in the direction of rotation for which it was built; otherwise, pressure will blow the shaft seal. Check for proper direction of rotation before turning the pump.

Rotation System

Inspection of Rotation Bearing Clearance

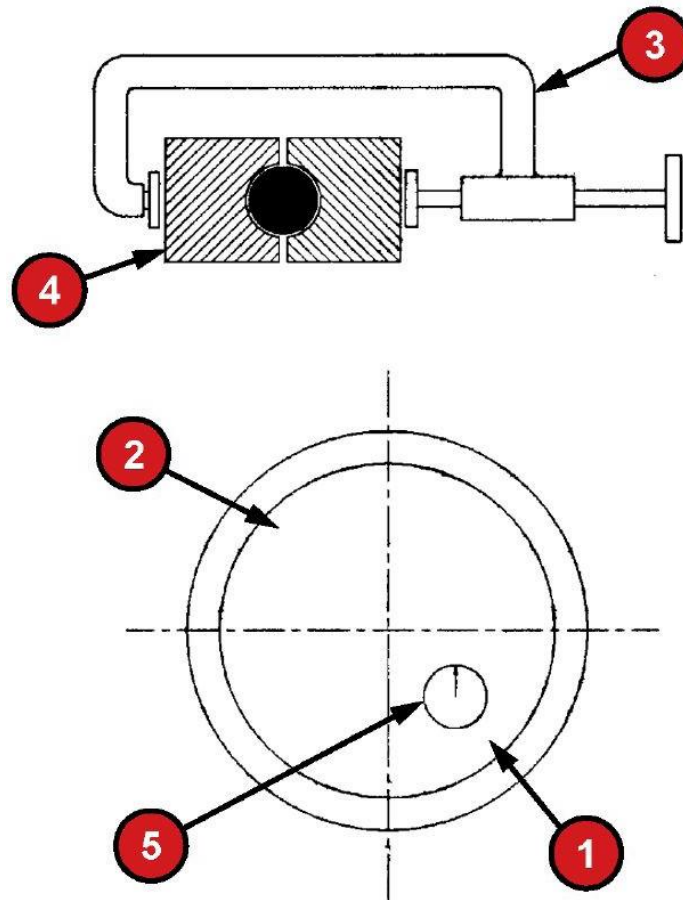
1. It is not feasible to make an analysis of the condition of the rotation gear while it is on the unit. There are too many variables involved for this to be accurate.
2. A bearing may cause a problem in the operation of the Boom Truck or the confidence of the operator long before it would be deemed structurally unsafe.

To properly check the radial clearance of the rotation gear, it must first be removed from the Boom Truck and placed on a heavy flat table. Remove all dirt and grease from the outside of the gear and secure it to the table with clamps, assuring that the inner raceway rotates freely after clamping it to the table.

As shown in the figure below, attach a large “C” clamp in position #1, and tighten just enough to take all the slack out of the raceway. Install a dial indicator as close to position #1 as possible, and set it to “0”.

As shown in the figure below, attach a large “C” clamp in position #1, and tighten just enough to take all the slack out of the raceway. Install a dial indicator as close to position #1 as possible, and set it to “0”.

Remove the “C” clamp and attach at clamp location #2 and again tighten just enough to take up the slack in the two raceways. Look at the dial indicator, noting the amount of change in the reading. This measurement is the radial clearance of the bearing. The following bearing clearances should be observed.



Radial Clearance Check Procedure

1	"C" Clamp	4	Clamp Position #2
2	Rotation Gear	5	Dial Indicator
3	Clamp Position #1		

- Any new bearing being installed on a Load King Boom Truck should not have more than .004 - .007 radial clearance.
- Any bearing taken off a unit which has .030 - .050 radial clearance should be screened carefully for roughness while rotating. If excessively rough, the bearing should be disassembled and thoroughly inspected for damage in the raceways, and for rust or pitting.

Swing Reducer

MAINTENANCE CHECK

On a WEEKLY basis, check the swing reducer oil level.

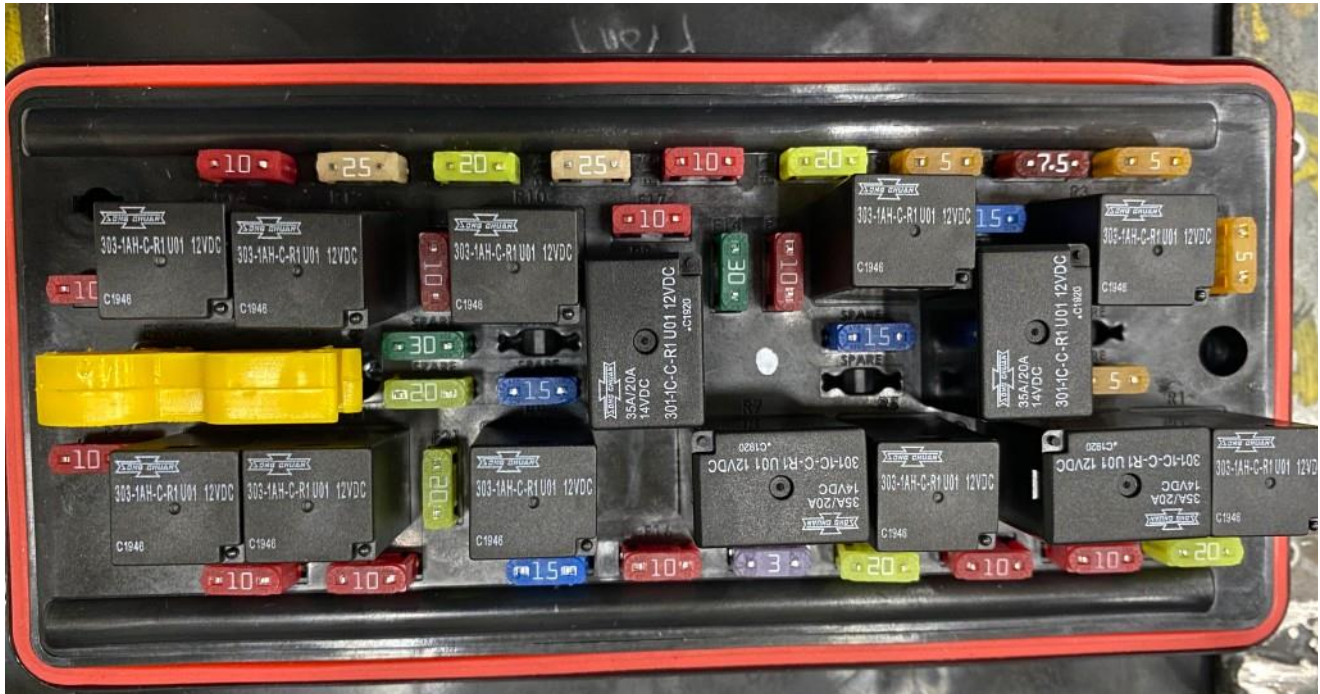
LUBRICATION

All swing drive gearboxes from **Load King** are shipped with an additive to the gear oil of 5 oz (148 ml) of ethylene glycol for cold weather protection. If the gear oil in the unit is changed, **Load King** recommends the same amount of ethylene glycol is added to prevent freeze up of unit due to internal condensation.

Electrical System

Fuse Block-Operator's Cab

Located above the RH console is the cab fuse block which requires periodic checking for fuse replacement if issue is detected in one of the circuits listed below in chart description.



Current Rating (A)	Housing Color
5	Brown
7.5	Dark Brown
10	Red
15	Blue
20	Yellow
25	White
30	Green

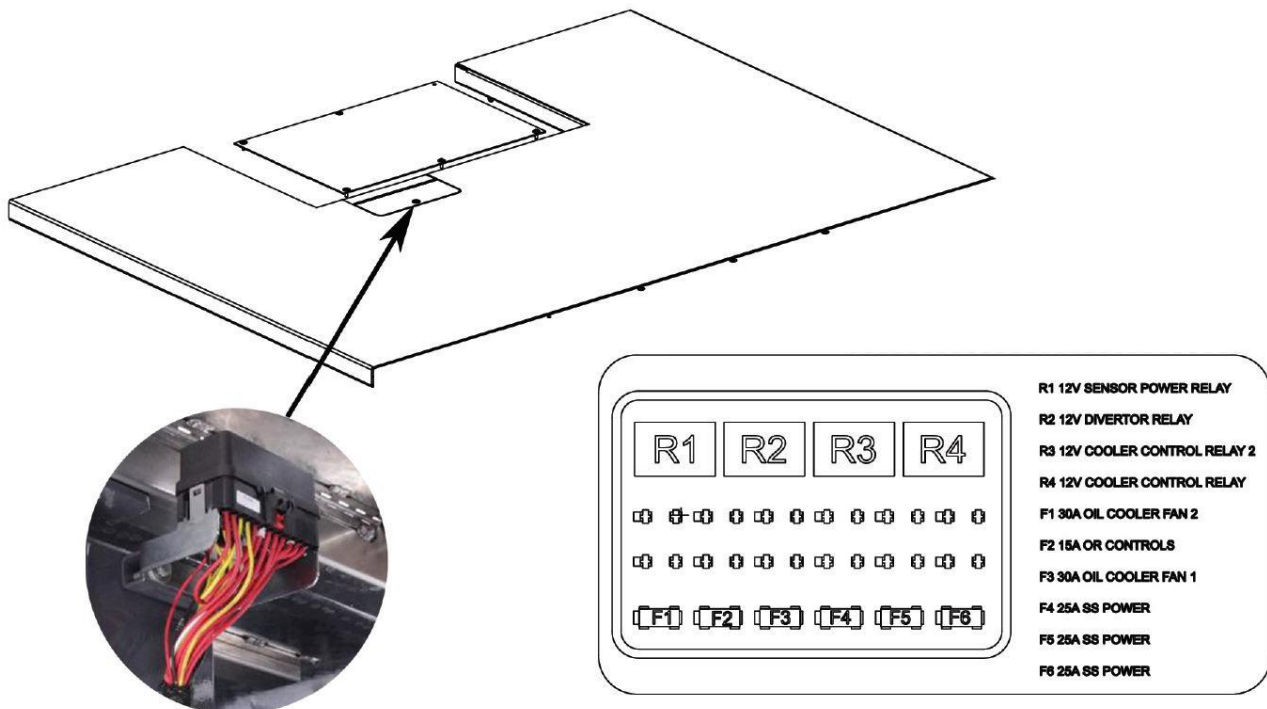
80-160
Service / Parts

Fuse No.	Rating in Amps	Function
1	20 A	SPOTLIGHT
2	5 A	ACC POWER TO LOWER
3	5 A	IGNITION TO LOWER
4	5 A	ROOF WASH PUMP
5	7.5 A	SEAT HEATER
6	15 A	ROOF WIPER
7	5A	FRONT WASH PUMP
8	20 A	FRONT CAB WORK LIGHTS
9	10 A	DEFROST ACTUATOR
10	3 A	DOMELIGHT
11	10 A	RADIO
12	30 A	HVAC BLOWER FAN
13	10 A	CONTROLS
14		SPARE
15	25A	FRONT WIPER LOW SPD
16	15 A	BEACON
17	20 A	UPPER CHASSIS CONTROLLER
18	20 A	POWER OUTLETS
19		SPARE
20	10 A	HORN
21	25 A	FRONT WIPER HIGH SPD
22		TOP CAB WORK LIGHTS
23	10 A	GREER RCL MODULE

Relay & FuseBlock-Chassis

Located near boom rack under decking access lid is a relay / fuse block which requires periodic checking for relay or fuse replacement if issue is detected in one of the circuits listed below in chart description.

ID	AMP RATING (Fuse)	DESCRIPTION
R1	RELAY - 12 VDC	SENSOR POWER RELAY
R2	RELAY - 12 VDC	DIVERTOR RELAY
R3	RELAY - 12 VDC	COOLER CONTROL RELAY 2
R4	RELAY - 12 VDC	COOLER CONTROL RELAY
F1	30A	OIL COOLER FAN 2
F2	15A	OUTRIGGER CONTROLS
F3	30A	OIL COOLER FAN 1
F3	25A	SS POWER
F5	25A	SS POWER
F6	25A	SS POWER



Electrical System Collector Ring

ELECTRICAL COLLECTOR RING

When troubleshooting the electrical system, always check the collector ring first to see that spring loaded brushes are centered in the bands. Keep free of any foreign material.

Keep the setscrews on the collector ring frame tight. Otherwise, the wire harness may wrap up as the machine is swung.

The cover should allow for free operation of the collector ring and the brake. If linkages bind, erratic operation may result. Check for unrestricted operation.

COLLECTOR RING MAINTENANCE AND SERVICE

If not revolved for some time, under some conditions, the ring will have a tendency to collect fine silt, or a salt atmosphere will cause corrosion. If this happens, the crane should be rotated through several revolutions, if possible. The cleaning action of the brushes should clean ring surfaces. If it does not, or it is not practical to revolve the machine, it may be necessary to use a standard non-residue solvent to clean the ring. Then lightly sand the brushes and rings with a fine grade of sandpaper and dust off with compressed air.

To replace a brush and arm assembly, remove the hex nuts and washers at the top of the brush stud along with the outboard bearing. This will allow the brush assemblies to be removed. Carefully remove the brushes without "over" stretching the brush springs and arrange in order of removal with spacers. Replace the damaged brush assembly and then reassemble the brushes and spacers in reverse the removal order. This will insure the correct spacing between electrically live parts. Be sure that all brushes are snapped in tight and making full contact with their corresponding brass ring. Also check that all springs are hooked correctly through the brush arm.



NOTE: *Special care should be exercised when handling or replacing the 7 1/2 Amp brush and arm assemblies. Because of their small size, they can be broken if forced up or down. In the correctly installed position, the possibility of breakage is minimal.*

The collector ring has a nylon bearing in the base of the assembly, eliminating the need for lubrication.

If it should become necessary to remove the collector ring from the machine, do so by loosening the socket screws at the base of the ring. This will allow the ring to be lifted off the mounting tube. When replacing it, make sure these set screw, are again tightened. (Recommended torque 45-55 in.-lbs.) If the set screws are not tight, the core can turn or be held by the brushes, and twist off the core leads or center harness.

COLLECTOR RING-15 CIRCUIT IDENTIFICATION CHART

CIRCUIT #	COLOR	WIRE TAG #	FUNCTION
1	RED	000TA	BATTERY
	RED	000TB	BATTERY
2	RED	000TC	BATTERY
	BLACK	000TD	BATTERY
3	RED	000TE	BATTERY
	RED	000TF	BATTERY
4	BLACK	016TB	GROUND
	BLACK	016TC	GROUND
5	WHITE	015TA	KEY START
6	RED	017TA	LOWER IGNITION
7	YELLOW	047TA	IGNITION SWITCH ACC
8	YELLOW	020TA	ENGINE STOP
9	WHITE	500TA	OUTRIGGER POSITION
10	WHITE	501TA	OUTRIGGER POSITION
11	YELLOW	075TA	MARKER LIGHT
12	YELLOW	J1939TA +	J1939 +
13	GREEN	J1939TA -	J1939 -
14	YELLOW	CAN_12	CAN HIGH
15	GREEN	CAN_12	CAN LOW
	RED	CABLE 04	POTENTIOMETER +V
	BLACK	CABLE 04	POTENTIOMETER -V
	WHITE	CABLE 04	POTENTIOMETER SIGNAL A
	GREEN	CABLE 04	POTENTIOMETER SIGNAL B
	SHIELD	SHIELD	POTENTIOMETER SHIELD

i **NOTE:** The above circuit chart applies to Load King Stinger 80-160 series cranes. The collector ring circuits are self-cleaning and if crane has been out of service for an long time period, by rotating the upper structure 360 degrees 10-20 times should clean off the copper brush circuits. The collector ring is not serviceable internally, thus if defective, broken terminals, brush circuits not functional, contact your Load King Parts Department for a complete replacement collector ring.

Maintenance -Free Battery Testing

VISUAL INSPECTION

CAUSE	REMEDY
Visible damage, terminal leakage, etc	Cannot be used. Replace

ELECTROLYTE LEVELS & STATE OF CHARGE NOTE: PROCEED DIRECTLY TO CAUSE THAT APPLIES

CAUSE	REMEDY
Level at top of plates. Water cannot be added	Replace
If there is an indicator and it shows low level	Replace
Level OK, unknown, or water can be added Stabilized voltage below 12.4 volts*	Add water if needed (if possible). Charge, then turn on high-beam head lamps (or 15 amp load for 15 seconds). Proceed to load test
If there is an indicator and it shows low charge	Charge, then turn on high-beam head lamps (or 15 amp load for 15 seconds). Proceed to load test
Stabilized voltage above 12.4 volts* or indicator indicates charged	Perform load test

LOAD TEST

Perform load test using the following procedure:

1. Connect voltmeter and ampere load equal to 1/2 cold cranking amperes @ 0°F (-18°C) rating of battery for 15 seconds.
2. Observe voltage at 15 seconds with load on.
3. Refer to voltage chart

If the voltage remains below the voltage chart levels, replace battery. If the voltage is equal to or above chart values, return to service.

VOLTAGE CHART		
Estimated Electrolyte Temperature		Minimum Required Voltage Under 15 Second Load
70°F	21°C & above	9.6
60°F	16°C	9.5
50°F	10°C	9.4
40°F	4°C	9.3
30°F	-1°C	9.1
20°F	-7°C	8.9
10°F	-12°C	8.7
0°F	-18°C	8.5

If water can be added to a battery, a hydrometer reading of 1.225 @ 80°F (27°C) can be used instead of the 12.4 Voltage reading.



Battery Shelf -Under Left Side of Vehicle

1	DEF Tank Fill	2	Battery Box
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Appendix



Conversion Tables

DECIMAL AND METRIC EQUIVALENTS OF FRACTIONS OF AN INCH

Fractions of an Inch	Decimals of an inch	Millimeters
1/64	0.0156	0.397
1/32	0.0313	0.794
3/64	0.0469	1.191
1/16	0.0625	1.588
5/64	0.0781	1.985
3/32	0.0938	2.381
7/64	0.1094	2.778
1/8	0.1250	3.175
9/64	0.0406	3.572
5/32	0.1563	3.969
11/64	0.1719	4.366
3/16	0.1875	4.762
13/64	0.2031	5.159
7/32	0.2188	5.556
15/64	0.2344	5.953
1/4	0.2500	6.350
17/64	0.2656	6.747
9/32	0.2813	7.144
19/64	0.2969	7.541
5/16	0.3135	7.937
21/64	0.3281	8.334
11/32	0.3438	8.731
23/64	0.3594	9.128
3/8	0.3750	9.525
25/64	0.3906	9.922
13/32	0.4063	10.319
27/64	0.4219	10.716
7/16	0.4375	11.12
29/64	0.4531	11.509
15/32	0.4688	11.906
31/64	0.4844	12.303

80-160

Appendix

Fractions of an Inch	Decimals of an inch	Millimeters
1/2	0.5000	12.700
33/64	0.5156	13.097
17/32	0.5313	13.494
35/64	0.5469	13.891
9/16	0.5625	14.287
37/64	0.5781	14.684
19/32	0.5938	15.081
39/64	0.6094	15.478
5/8	0.6250	15.875
41/64	0.6406	16.272
21/32	0.6563	16.688
43/64	0.6719	17.085
11/16	0.6875	17.462
45/64	0.7031	17.859
23/32	0.7188	18.256
47/64	0.7344	18.653
3/4	0.7500	19.050
49/64	0.7656	19.447
25/32	0.7813	19.843
51/64	0.7969	20.240
13/16	0.8125	20.637
53/64	0.8281	21.034
27/32	0.8438	21.430
55/64	0.8594	21.827
7/8	0.8750	22.224
57/64	0.8906	22.621
29/32	0.9063	23.018
59/64	0.9219	23.415
15/16	0.9375	23.812
61/64	0.9531	24.209
31/32	0.9688	24.606
63/64	0.9844	25.003
1	1.0000	25.400

WEIGHTS AND MEASURES

LIQUID MEASURE (U.S.)

4 gills	=	1 pint
2 pints	=	1 quart
4 quarts	=	1 gallon
7.48 gallons	=	1 cu. ft.
240 gallons of water	=	1 Ton
340 gallons of gasoline	=	1 Ton

LIQUID MEASURE (METRIC)

1 litre	=	0.0353 cu. ft.
1 litre	=	0.2642 gallon
1 litre	=	61.023 cu. in.
1 litre	=	2.202 lbs. of water (62° F)
1 cu. foot	=	28.32 litres
1 gallon	=	3.785 litres
1 cu. inch	=	0.0164 litre

MEASURES OF WEIGHTS (U.S.)

16 ounces	=	1 pound
2000 pounds	=	1 short ton
2240 pounds	=	1 long ton
100 cu. feet	=	1 register ton
40 cu. feet	=	1 U.S. shipping ton

MEASURES OF WEIGHTS (METRIC)

1 gram	=	0.0353 ounce
1 kilogram	=	2.205 lbs.
1 ounce	=	28.35 grams
1 pound	=	0.454 kilogram
1 ton	=	0.907 metric ton

80-160

Appendix

CIRCULAR MEASURE

60 seconds	=	1 minute
60 minutes	=	1 degree
90 degrees	=	1 quadrant
360 degrees	=	1 circumference

ELECTRICAL UNITS

1 kilowatt	=	1.34 H.P.
1 horsepower	=	746 watts

SURVEYOR'S MEASURE

7.92 inches	=	1 link
100 links	=	66 feet or 4 rods or 1 chain
80 chains	=	1 mile

Average Weight of Materials

MATERIAL	KG/CU. METER	KG/CU. FOOT	1 CU. YARD
Ashes - Piled Dry	560.70	35	945
Brick Bats	881.10	55	1485
Cement - Portland	1505.88	94	2538
Charcoal	400.50	25	695
Cinders	881.10	55	1485
Clinker - Portland Cement	1361.70	85	2295
Clay - Dry, in Lumps	1009.26	63	1701
Clay - Compact, Natural Bed	1746.18	109	2943
Coal - Anthracite	897.12	56	1512
Coal - Bituminous R of M Piled	881.10	55	1485
Coal - Bituminous Slack, Piled	801.00	50	1350
Coke - Blast Furnace Size	432.54	27	729
Coke - Foundry Size	448.56	28	756
Concrete - Ready to Pour	2370.96	148	3996
Dolomite - Crushed Fine	1521.90	95	2565
Dolomite - Broken Lump	1521.90	95	2565
Earth - Loamy, Dry Loose	1201.50	75	2025
Earth - Dry, Packed	1521.90	95	2565
Earth - Wet (Mud)	1762.20	110	2970
Flue Dust - Blast Furnace	1842.30	115	3105
Flue Dust - Blast Furnace, Wet	2403.00	150	4050
Gypsum - Crushed to 3"	1521.90	95	2565
Gypsum - Calcined	961.20	60	1620
Gravel - Dry, Loose	1762.20	110	2970
Gravel - Dry, Packed	1810.26	113	3051
Gravel - Wet, Packed	1922.40	120	3240
Iron Ore - 60% Iron	4806.00	300	8100
Iron Ore - 50% Iron	4005.00	250	6750
Iron Ore - 40% Iron	3204.00	200	5400
Iron Punchings - Scrap	4325.40	270	7290
Iron Turnings - Scrap	2803.50	175	4725
Limestone - Run of Crushed	1521.90	95	2565
Limestone - Fines Out	1602.00	100	2700

80-160
Appendix

MATERIAL	KG/CU. METER	KG/CU. FOOT	1 CU. YARD
Limestone - 1 1/2 or 2 Graded	1361.70	85	2295
Limestone - Above 2 Graded	1281.60	80	2160
Phosphate, Acid (Fertilizer)	1361.70	85	2295
Phosphate, Rock	1281.60	80	2160
Pyrites	2167.70	135	3645
Salt	929.16	58	1566
Sand - Dry, Loose	1521.90	95	2565
Sand - Wet, Packed	1922.40	120	3240
Scale - Rolling Mill, Wet	2114.64	132	3564
Shale - Broken	1361.70	85	2295
Slag - Blast Furnace, Broken	2210.76	138	3726
Slag - Open Hearth, Crushed	1682.10	105	2835
Slag - Granulated, Dry	606.76	38	1026
Slag - Granulated, Wet	929.16	58	1566
Snow	528.66	33	891
Sulphur - Broken	528.66	60	1620
Timber - Green Cedar	592.74	37	999
Douglas Fir	606.76	38	1026
Hemlock	656.82	41	1107
Southern Pine	881.10	55	1485
Spruce	576.72	36	972
Redwood	801.00	50	1350
Zinc Ore - Broken	2403.00	150	4050

****For other lubricants consult supplier.**

Table 2. Metric Size Bolt Torque

		TENSILE STRESS AREA (SQ. mm)	PLAIN & ZINC PLATED FASTENERS																
SIZE	BOLT DIA. (mm)		CLASS 4.6 per ISO 898/1				CLASS 8.8 per ISO 898/1				CLASS 10.9 per ISO 898/1				CLASS 12.9 per ISO 898/1				
			PROOF STRENGTH (Mpa) S _p	MAX CLAMP LOAD (N) F _i	DRY K=20 N-m	OIL LUBED** K=15 N-m	PROOF STRENGTH (Mpa) S _p	MAX CLAMP LOAD (N) F _i	DRY K=20 N-m	OIL LUBED** K=15 N-m	PROOF STRENGTH (Mpa) S _p	MAX CLAMP LOAD (N) F _i	DRY K=20 N-m	OIL LUBED** K=15 N-m	PROOF STRENGTH (Mpa) S _p	MAX CLAMP LOAD (N) F _i	DRY K=20 N-m	LUBED K=15 N-m	TORQUE*
M3-0.5	3	5.03																	
M3-0.6	3.5	6.78																	
M4-0.7	4	8.78																	
M5-0.8	5	14.2		2396	2.4	1.8													
M6-1	6	20.1		3392	4.07	3.05													
M7-1	7	28.9		4877	6.83	5.12													
M8-1.25	8	36.6		6176	9.88	7.41													
M10-1.5	10	58		9787	19.6	14.7													
M12-1.75	12	84.3		14225	34.1	25.6													
M14-2	14	115		19406	54.3	40.8													
M16-2	16	157		26495	84.8	63.6													
M18-2.5	18	192		32400	117	87.5													
M20-2.5	20	245		41345	165	124													
M22-2.5	22	303		51130	225	169													
M24-3	24	353		59570	285	214													
M27-3	27	459		77456	418	314													
M30-3.5	30	561		94669	568	426													
M33-3.5	33	694		117113	773	580													
M36-4	36	817		137870	993	745													

*Acceptable manufacturing torque value range is +0% / -10% of listed torque.

**For other lubricants consult supplier.

California Proposition 65 Warning



Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.



WARNING: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Lead Warning - State of California



Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.



Battery posts, terminals, and related accesories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Greer Element VGA Operator's Manual

Your crane is set up with a Rated Capacity Limiter (RCL) Element VGA system. Completely read the attached manual in the Appendix section before attempting to operate the crane.

For Troubleshooting the system refer to your SHOP MANUAL-CD where you will find an ELEMENT VGA Troubleshooting manual.

80-160

Notes

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



Crane Limited Product Warranty

Load King LLC ("Load King") warrants to the original Buyer its new Products will be free, under normal use and service, of any defects in material or workmanship for a period of (i) three years (36 months), or (ii) 3,000 hours of operation, whichever event shall occur first.; provided, however, labor and travel are not covered by this warranty after the earlier of (i) 24 months or (iii) 2,000 hours of operation. In addition, the warranty period is five years (60 months) for structural crane weldments (boom section, jib, outrigger beam, subbase, frame, mounting anchors, mast, turntable). Each of those aforementioned periods shall commence at the date of initial installation or commission; provided, however, those periods, in the case of a distributor of Load King, shall commence no later than six (6) months after the date of shipment by Load King. Parts fitted during a warranty repair will take on the remaining warranty time period only. The foregoing warranties shall be honored provided that Load King receives written notice of the defect within thirty (30) days of its discovery, but in no event later than fifteen (15) days after the expiration of the applicable warranty period, and it has been established that (i) the Product has been maintained and operated within the limits of rated and normal usage and in strict compliance with Load King's operating and maintenance manuals, (ii) the defect did not result in any manner from the intentional or negligent action, inaction or abuse by Buyer or any third party, and (iii) in the case of structural warranty, all annual inspections have been completed by an authorized Load King service center. If it cannot be established that conditions (i), (ii) and (iii) above have been met, then this Warranty shall not cover the alleged defect.

If requested by Load King, the defective Product must be returned to Load King, or other location designated by Load King, for inspection. Load King reserves the right to review the Product's maintenance procedures to determine if any alleged defect is covered under this Warranty. Delivery inspection forms are required for warranty validation and processing.

Load King's obligation and liability under this Warranty is expressly limited to, at Load King's sole option, repairing or replacing, with new or remanufactured parts or components, any part, which appears to Load King upon inspection to have been defective in material or workmanship. Replacement parts will be provided to Buyer subject to Load King's current warranty claim handling processes. All Products replaced under this Warranty become the property of Load King.

Accessories, assemblies and components included in the Product, which are not manufactured by Load King, are subject to the warranty of their respective manufacturers. Load King does not provide any warranty and Load King specifically disclaims any liability relating to the boom-truck carriers; however, Purchaser may be entitled to the respective boom-truck carrier OEM's pass-through warranty (subject to any registration requirements).

This Warranty shall be null and void if parts (including wear parts) other than genuine Load King Parts are used in or attached to the Product or if serial numbers have been altered, defaced, or removed with respect to Load King's Products or if the Product has been altered without Load King's written agreement.

LOAD KING MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, AND MAKES NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

No employee or representative is authorized to modify this Warranty unless such modification is made in writing and signed by an authorized officer of Load King.

This warranty is continuous for the above stated periods, and "stopping and restarting" such periods ("stop and go") is not accepted by Load King.

Load King's obligation under this Warranty shall not include the items listed below as "Items not covered by this Warranty."

NO TRANSFERABILITY OF THIS WARRANTY: This Warranty is limited to Buyer or, if sold through a distributor of Load King, to the first End User of the Product, and is not assignable or otherwise transferable without the written agreement of Load King.

ITEMS NOT COVERED BY THIS WARRANTY

The following items are not covered under this Warranty (the following list is not exhaustive):

- Normal maintenance, adjustments, maintenance parts or wear parts, including without limitation wear pads, seals, gaskets, hoses, friction plates, glass, clutch and brake linings, filters, wire rope, exterior coatings, proper tightening of bolts, nuts and fittings, adding or replacing of fluids, filters, breathers, belts, nozzles, adjustments of any kind, service supplies such as hand cleaners, towels and lubricants, inspections, diagnostic time, travel time, or labor.
- Products sold by any individual, corporation, partnership or any other third party that is not authorized by Load King to distribute the Product.
- Damage or defect caused by, or other costs related to, work performed by personnel not authorized by Load King to service or repair the Product.
- Damage or defect caused by operation of the Product by personnel or users not authorized or instructed or trained to operate the Product.
- Costs including, without limitation, travel, freight and labor, resulting from shipment or transfer of the Product into or use in a region not covered by Load King's service network.
- Costs including, without limitation, travel, freight and labor, related to the disassembling and assembling of any equipment with respect to a defective Part integrated in such equipment not covered by Load King's warranty.
- Damage or defect resulting from improper storage, weathering, lack of use, demonstration use, or use for transportation of corrosive chemicals.
- Damage or defect resulting from operation of the Product after a failure, damage or defect noticeably occurred, or damage or defect caused by worn parts or fluids.
- Damage or defect caused by operation or storage of the Product under extreme weather or geographical conditions, including without limitation, fires, freezing, floods, other natural disasters and abnormal conditions of temperature, moisture, dirt or corrosive matter, without the written agreement of Load King.
- Damage or defect caused by non-compliance with Load King's campaign bulletins, product safety and service releases.
- Damage or defect caused by carrier handling. Any such claim for damage should be filed immediately with the respective carrier.
- Cost including, without limitation, travel, freight and labor, resulting from the lack of Buyer or the user of the Product to comply with their obligations under this Warranty.
- Damage or defect resulting from or costs related to acts of God.

THIS WARRANTY IS EXPRESSLY IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, REPRESENTATIONS AND CONDITIONS, EXPRESS OR IMPLIED AND ALL OTHER STATUTORY, CONTRACTUAL, TORTIOUS AND COMMON LAW OBLIGATIONS OR LIABILITY ON LOAD KING'S PART ARE HEREBY EXPRESSLY EXCLUDED TO THE MAXIMUM PERMITTED BY LAW. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY CONTAINED HEREIN. Load King neither assumes nor authorizes any other person to assume for Load King any other liability in connection with the sale of Load King's Product. In the event that any provision of this Warranty is held unenforceable for any reason, the remaining provisions shall remain in full force and effect.

IN THE EVENT OF ANY BREACH OF THE WARRANTY BY LOAD KING, LOAD KING'S LIABILITY SHALL BE LIMITED EXCLUSIVELY TO THE REMEDIES (AT LOAD KING'S SOLE OPTION) OF REPAIR OR REPLACEMENT OF ANY DEFECTIVE PRODUCT COVERED BY THE WARRANTY. NOTWITHSTANDING ANYTHING CONTAINED IN THIS WARRANTY TO THE CONTRARY, LOAD KING SHALL NOT BE LIABLE FOR AND SPECIFICALLY DISCLAIMS ALL INDIRECT, CONSEQUENTIAL, INCIDENTAL OR OTHER DAMAGES OR LOSSES WHETHER OR NOT ADVICES OF THE POSSIBILITY THEREOF. Nothing in this Section shall operate to exclude Load King's liability for death or personal injury when directly related to Load King's negligent act or omission.



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80-160 | Operator Manual