LOAD KING

CUSTOM TRUCK ONE SOURCE™



OPERATOR'S MANUAL

LOAD KING

35/40-127 RS

REV D
JANUARY 2026

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WARNING: Operating, servicing and maintaining this equipment can expose you to chemical including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the Sate 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 expect 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.

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Introduction

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 services, 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.

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 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. Appropriate national consensus standards, industry standards, and safety-related manuals are included with the shipment of each **Load King** product as applicable. It is company policy to provide this information for the Owner or Operator of the equipment. It is expected that the Owner or Operator 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/Operator 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 avoid injuries 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. 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 in order to keep your machine operating at maximum efficiency. Use the suggested Inspection Checklist, refer to Checklist and Inspection form section "Suggested Hydraulic Crane Inspection Checklist". In addition, a maintenance log should be kept in conjunction with all maintenance performed on the machine.

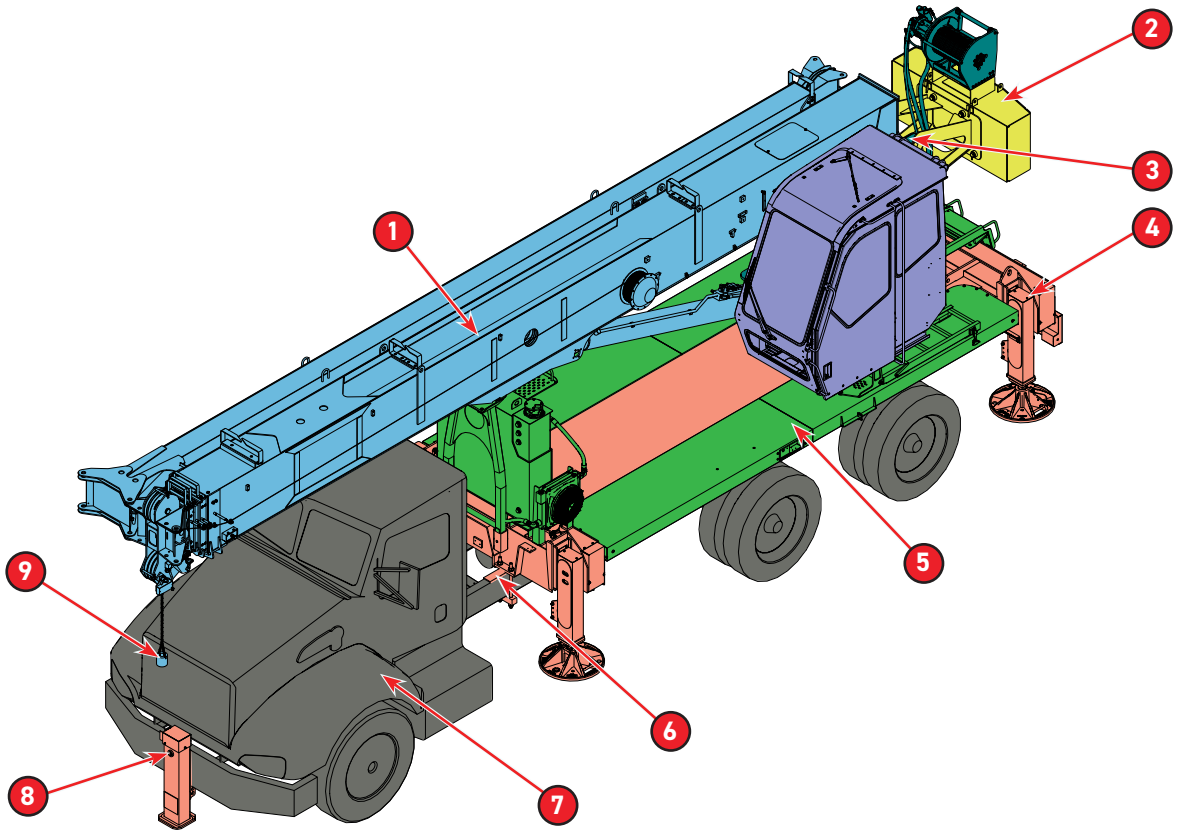
For any additional information regarding the care and operation of the machine, contact the **Load King** service representative. Include the machine model and serial number in all communication to aid service personnel in providing the correct information.

The information, specifications, and illustrations in this publication are based on the information in effect at the time of approval for printing. **Load King** reserves 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.	BOOM	The telescopic boom with hydraulic winch, lift cylinder, hook block assembly, and jib arrangement.
2.	COUNTERWEIGHT	Counterweight only applicable on 40-127 RS
3.	TURRET	The turret weldment and swing mechanism.
4.	OUTRIGGERS	The beams, cylinders, floats, boxes, and hydraulic control system.
5.	DECK	The deck of the Boom Truck.
6.	SUBFRAME	The frame of the crane that is mounted to the truck chassis and supports the deck and superstructure.
7.	TRUCK	The vehicle on which all boom and operator structures are mounted.
8.	FRONT STABILIZER	Front stabilizer must be used when working off the front of the truck crane.
9.	ATB	Anti-Two Block.



Standards

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 addendum, which are sent by American Society for Mechanical Engineers (ASME) to the original purchasers of the standard. **Load King** recommends that you purchase and refer to the following standards:

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

These standards may be purchased by:

Mail:	American Society of Mechanical Engineers Customer Service Department 22 Law Drive Fairfield, New Jersey 07004
Phone:	800.843.2763
Internet:	www.asme.org

Copyright

This manual is intended for use by personnel responsible for operation, maintenance, repair and supervision activities involving the machine described within.

This manual is copyrighted. It shall not, either in whole or in part, be reproduced, transmitted, or used for the purpose of competition without our prior written consent.

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 service bulletins are used by **Load King** to communicate important safety and product information to dealers and machine owners. The information contained in these service bulletins is tied to specific machines using the machine's model number and PIN/serial number. Distribution of service bulletins is based on the most current owner on record, along with the associated dealer; so it is important to register the machine and keep contact information up to date. To ensure the safety of personnel and the reliable continued operation of your machine, it is essential to implement the actions indicated in all relevant service bulletins.

Contacting the Manufacturer

When it is necessary to contact the manufacturer, please be prepared to supply the model name, product identification number (PIN), and serial number of the 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 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

Product Information Number

Transfer of Machine Ownership

Taking a few minutes to update owner information will ensure that you receive important safety, maintenance and operating information that applies to your machine.

Please register your machine by visiting us on the web at www.loadkingmfg.com or calling us toll free at 833-571-1466.

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**.

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) two years (24 months), or (ii) 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. NOTHWITHSTANDING 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.

Specifications

The **Load King** 35/40-127 RS (Riding Seat) Boom truck is equipped with a 127 ft. proportional telescopic keeled boom. The 35/40-127RS features a maximum lifting capacity of 35 and 40 tons (70,000 and 80,000 lbs respectively) and a comfortable riding seat for Operators.



Features

35 U.S. tons (35-127) or 40 U.S tons (40-127) @ 10 ft. Lifiting Capacity

127 ft. Full Power Main Boom

360 Degrees of Continuous Swing Rotation, with Static/Free Swing Functionality

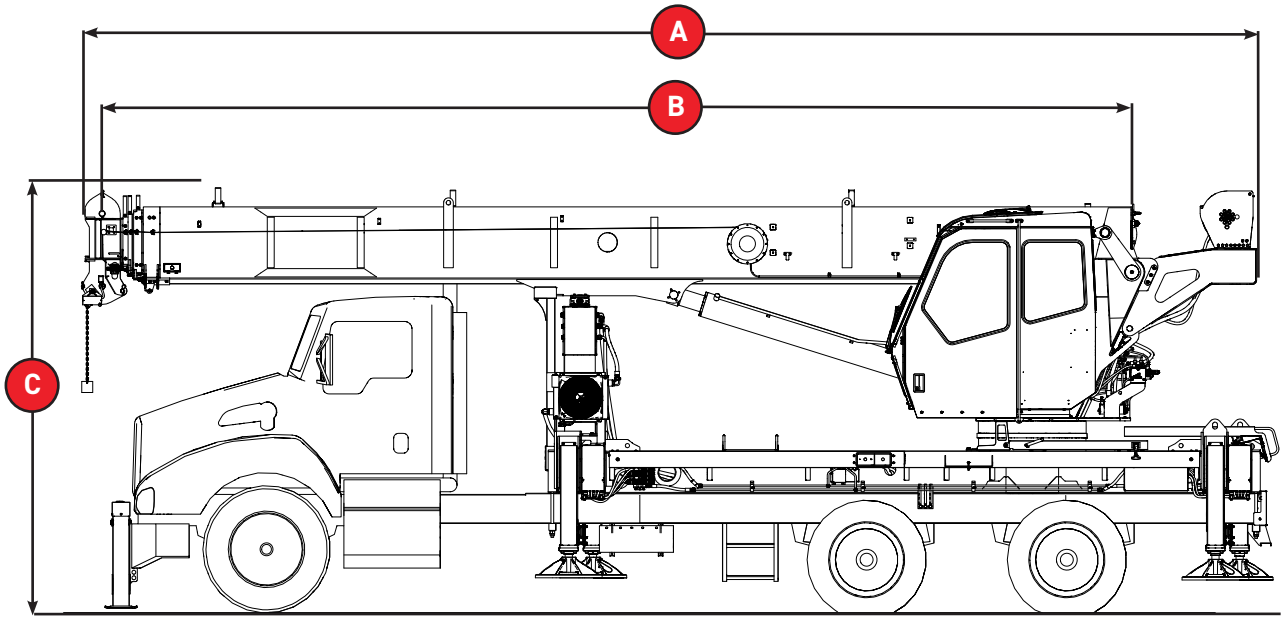
31-55 ft. Optional Two-Piece, One Stage or Two Stage Jib

192 ft. Maximum Tip Height Configurations with Jib Attached

All-Steel Box Construction for Subframe Centerstructure (Torsion Box)

Electronic Load Moment Indicator (LMI)

Crane Measurements for 35-127 RS

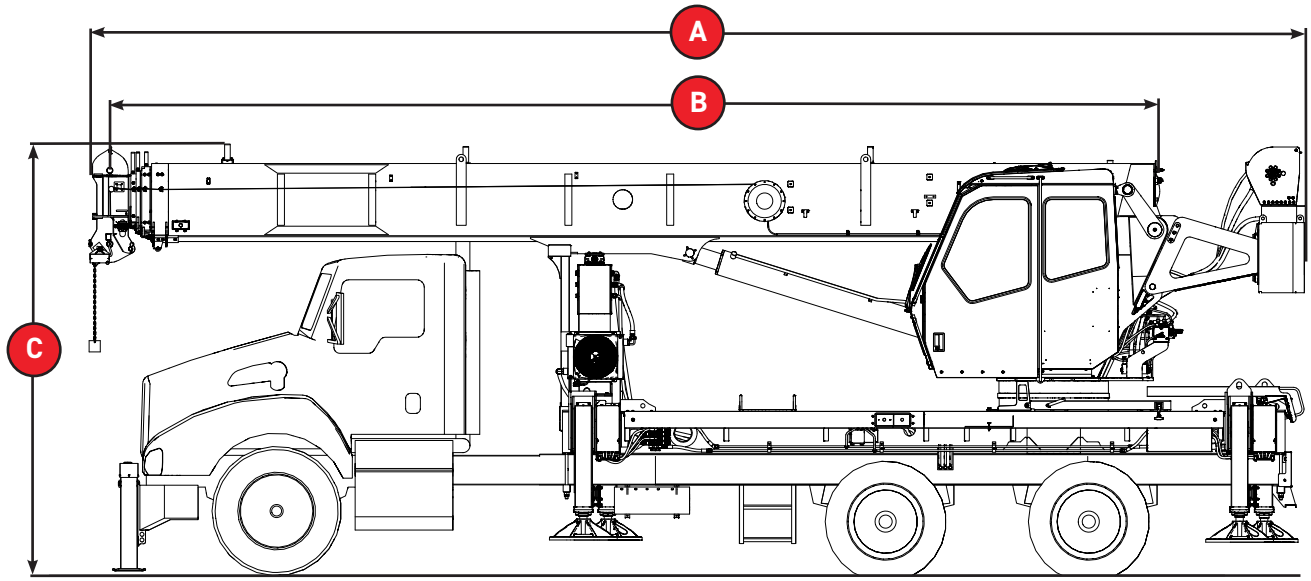


35-127 RS

Reference Letter	Dimensions
A	35'-9"
B	31' (Retracted)
	127' (Extended)
C	12'-9"

All dimensions listed are approximate, depending on the full dimensions of the chassis on which the crane body is mounted. If exact dimensions are required, contact your **Load King** service representative.

Crane Measurements for 40-127 RS



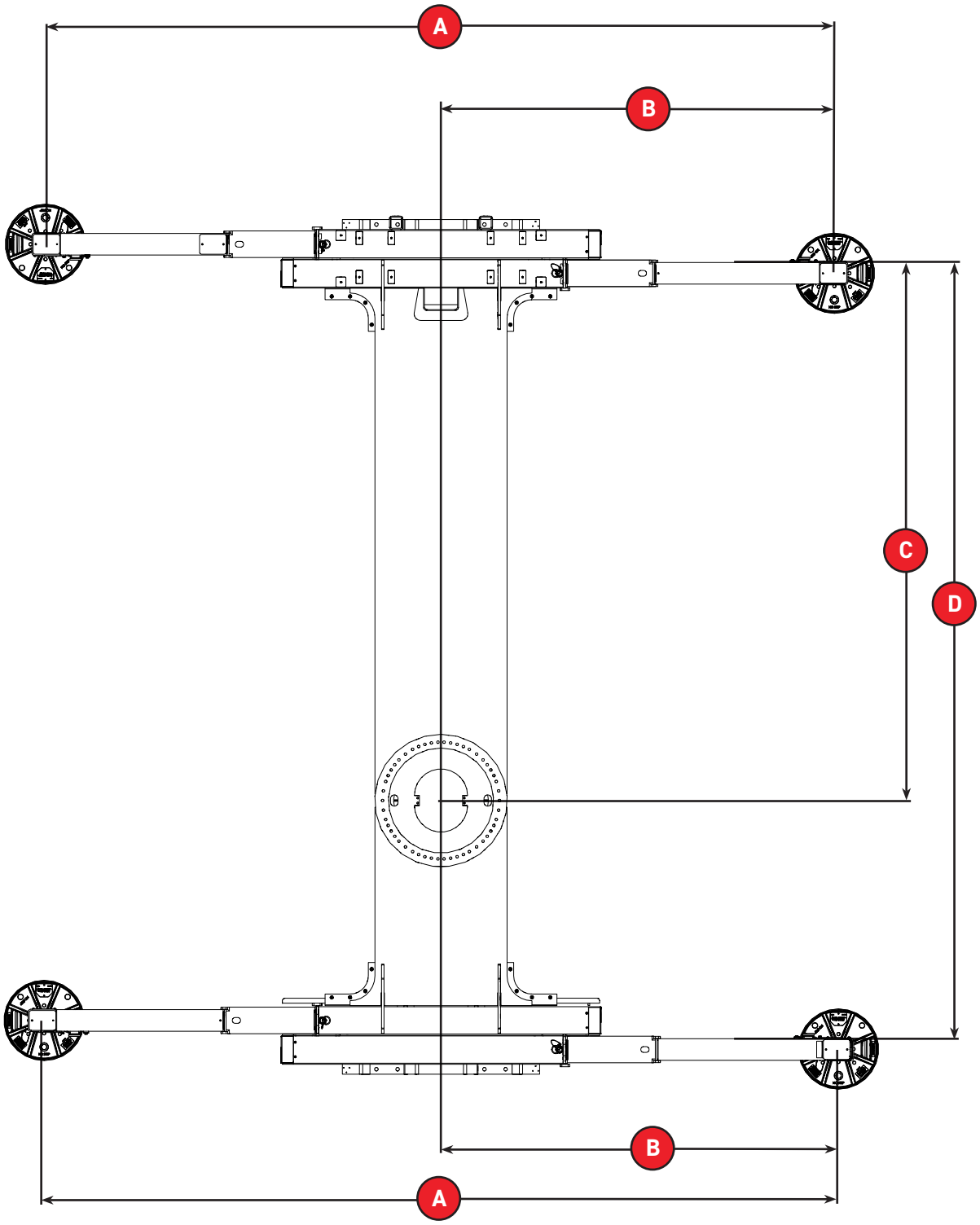
40-127 RS

Reference Letter	Dimensions
A	36'-2"
B	31' (Retracted)
	127' (Extended)
C	12'-9"

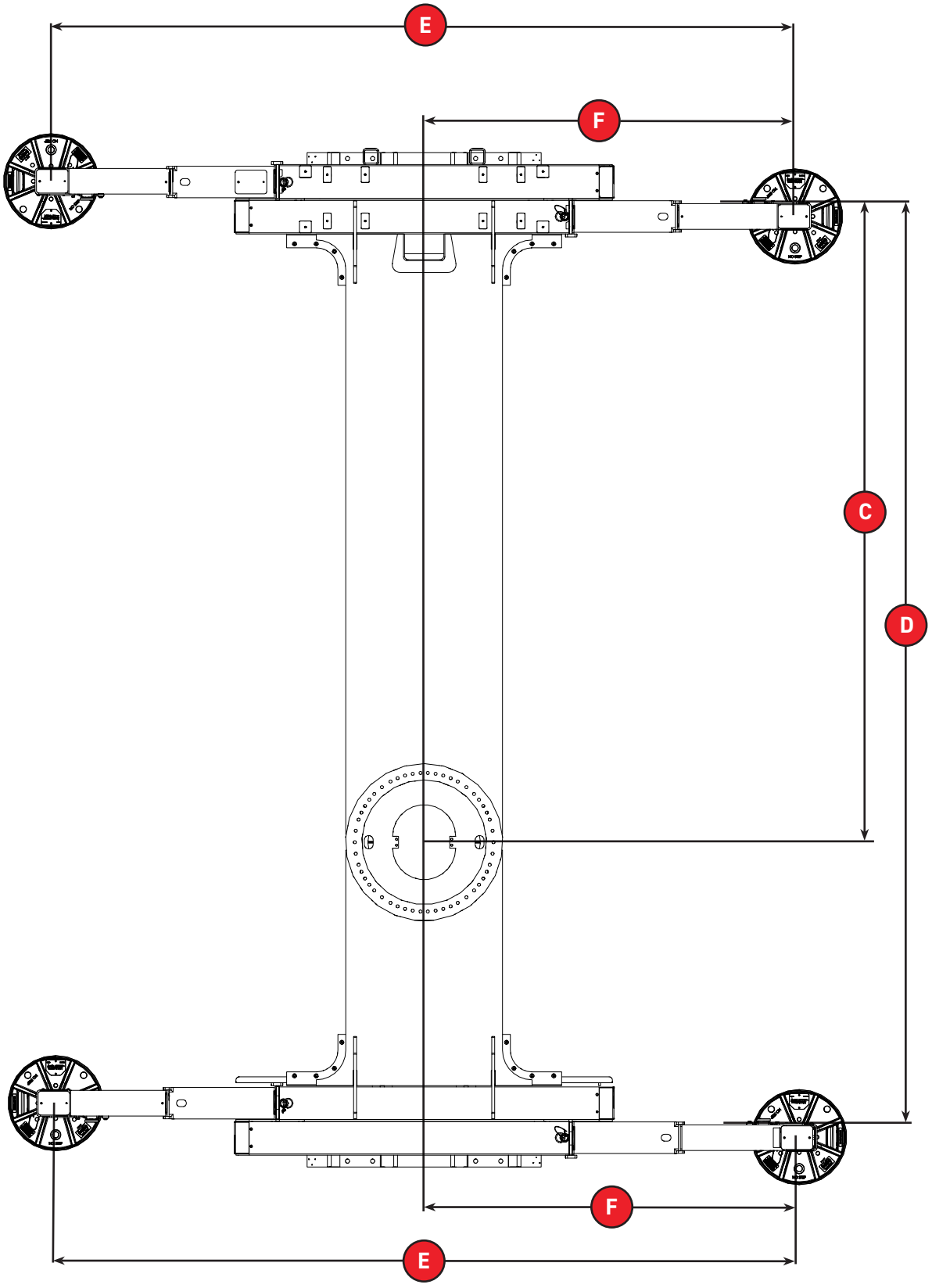
All dimensions listed are approximate, depending on the full dimensions of the chassis on which the crane body is mounted. If exact dimensions are required, contact your **Load King** service representative.

Outrigger Position

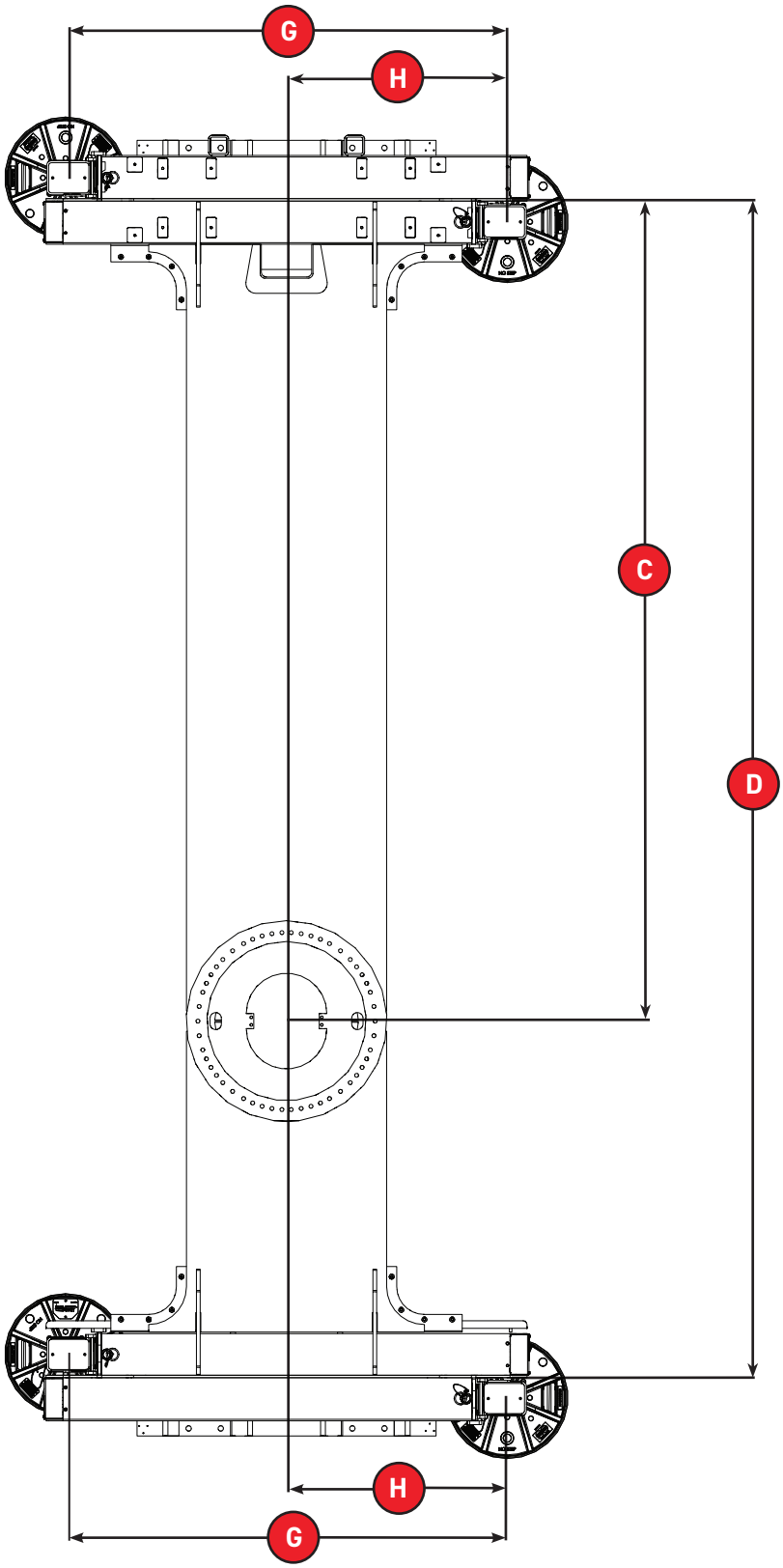
Outrigger Extend Position



Outrigger Mid Position



Outrigger Fully Retracted Position



35/40-127 RS Outriggers

Reference Letter	Dimensions
A	24'
B	12'
C	13'-7"
D	19'-6"
E	15'-8"
F	7'-11"
G	7'-4"
H	3'-8"

All dimensions listed are approximate, depending on the full dimensions of the chassis on which the crane body is mounted. If exact dimensions are required, contact your **Load King** service representative.

Hydraulic Pumps and Function Speeds

The pumps used on the **Load King** 35/40-127 RS Series Boom Truck are fixed/positive displacement of the rotary vane type. To produce the proper amount of flow to run the hydraulic functions at full speed, the pump shaft must be turning at 2,300 RPM.

The required engine speed is very important when testing the unit speeds, and checking or handling maximum loads. Keep in mind that the pump and engine speeds are not the same. For instance, if the truck transmission is equipped with a 115% PTO, the required engine speed to achieve the desired pump RPM would be approximately 2,000 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 charts below will help accurately test the flow of the pump, as well as determine the proper speed of the functions of the unit.

System Flows

GPM @ 1,200 RPM	GPM @ 2,300 RPM	Function
39.2 GPM	75.0 GPM	Boom/Winch/HVAC
75 GPM	14.4 GPM	Swing

Function Speeds

The following chart is a list of the speeds you can expect from the RS Boom Truck. All speeds are noted as being one (1) complete cycle. For instance, the swing time is for one 360° rotation, (stop to stop) at the full 2,300 RPM - and all times are in seconds.

Function	Approximate Duration
SWING 360°	30 seconds
EXTEND	110 seconds
RETRACT	55 seconds
BOOM UP	44 seconds
BOOM DOWN	44 seconds
WINCH SPEED (Low)	194 FPM
WINCH SPEED (High)	388 FPM



Winch speeds based on 2,300 pump RPM and 3rd wrap on the winch drum with full load. Speeds will be higher with lower loads.

Safety

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:

- Comply with OSHA, federal, state, and local regulations.
- Read, understand, and follow the instructions in this and other manuals supplied with this machine.
- Follow safe work practices.
- 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.

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 owners purchase and refer to the following standards.

ANSI/ASME B30.5 - Mobile and 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

Safety Definitions Used in This Manual

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

Signal Word	Symbol	Explanation
DANGER		Danger indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING		Warning indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION		Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
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.

Safety Sign Maintenance

- Keep Operator's 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.
- Replace any missing or damaged safety signs or decals.

Safety Guidelines

	These safety rules must be followed. All personnel are required to read and understand the Operator's Manual as there are instructions which are 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 – Boots designed to protect the user's feet from various types of injury such as cuts, puncture wounds, or crushed toes.

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

- Safe operations must always be the Operator's most important concern.
- This crane must only be operated by trained personnel, who have demonstrated their ability to do so safely.
- Comply with the requirements of current Occupational Safety and Health Administration (OSHA) standards, the current ASME B30.5 (latest edition).
- Read and understand all safety signs and warnings.
- Read and understand the Load Rating Charts.
- By understanding the Load Rating Charts, the Operator can determine what the crane can safely lift before attempting the actual lift.
- The Operator must understand crane signals and take signals only from designated signal persons; however, the Operator must obey the stop signal from anyone.

Operator's Responsibilities

- Read and understand the Operator's Manual.
- Ensure the machine is in proper order and that all operational aids and warning signals are functional before operating.
- Keep the machine clean, including all instrumentation, windows, lights, and other glazed surfaces.
- Remove all oil, grease, mud, ice, and snow from walking surfaces.
- Store all tools, rigging, and other necessary items in the toolbox.
- Do not lift a load without referring to the Load Rating Charts manual located in the Operator's cab.
- Know the load to be lifted.
- Be alert, physically fit, and free from the influences of alcohol, drugs, or medications that might affect the Operator's eyesight, hearing, or reactions.
- Keep people, equipment, and material outside of the work area.
- 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.
- 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.
- Be aware of the location of other machinery, vehicles, personnel, and other obstacles in the work area.
- Do not allow personnel on the machine platform while the machine is in operation.

- Make sure everyone is clear of the work area before moving the hook, boom, load, or outriggers.
- Start and stop movements smoothly and swing at speeds that will keep the load under control.
- Keep at least three full wraps of wire rope on the winch drum when operating.
- Use tag lines to keep loads under control when feasible.
- Keep the load as close to the ground as possible.
- Use shortest boom length required to complete job.
- Do not leave a running machine unattended or load suspended.
- Use the outriggers in accordance with requirements of the Load Rating Chart and Operator's Manuals.

Signal Person's Responsibilities

- Standard crane signals must be used and understood.
- Assist the Operator in safe and efficient operation of the crane, without endangering people or property.
- Have a clear understanding of each lift to be made.
- Signal persons must place themselves where they can be clearly seen, where they can safely observe the entire operation, and out of harm's way should something unexpected happen.

Responsibilities of All Crew Members

- Unsafe conditions and/or practices must be corrected.
- Obey all warning signs.
- Watch out for their own safety and the safety of others.
- Know and understand proper machine erection and rigging procedures.
- Alert the Operator and signal person to hazards, i.e., power lines, unstable ground.

Management Responsibilities

- Operators must be competent, physically fit, and licensed if required.
- The Operator, signal persons, and riggers must be trained on correct crane operations and usage.
- The Operator and signal persons must know the standard crane signals.
- The job site must have a supervisor present that is responsible for site safety.
- Crew members must be given specific safety responsibilities and be instructed to report any unsafe conditions to the site supervisor.
- Supply the weight and the characteristics of all loads to be lifted to the Operator.
- 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

- Have a clear understanding of the work to be done.
- Consider all hazards at the jobsite.
- Know what crew members are needed to complete the job.
- Assign job responsibilities.
- Appoint a competent signal person.
- Establish how the signal person will communicate with the Operator.
- Know the weight and the characteristics of the loads to be lifted.
- Utilize rigging and other equipment to complete the job safely.
- Establish how equipment can be safely transported to the job site.
- Determine how the load will be rigged.
- Determine the lift radius, boom angle, and the rated lifting capacity of the crane.
- Pre-plan the course of each lift to determine the best route to reach the load's target destination.
- Identify the location of gas lines, power lines, or other structures and determine if the crane or structures needs to be moved.
- Ensure that the supporting surface is strong enough to support the machine and load.
- Establish special safety precautions, if necessary.
- Consider the weather conditions.
- Keep unnecessary people and equipment away from the work area.
- Position the machine to use shortest boom and radius possible.

Operator Prelift Check

- Check the machine logbook, to see if periodic maintenance and inspections have been performed.
- Ensure that necessary repairs have been completed.
- Inspect wire rope for damage such as kinks, broken wires, or crushed sections.
- Ensure that no unauthorized field modifications have been made to the crane.
- Check for air and hydraulic oil leaks.
- Check that all controls are in the neutral position before starting engine.
- After starting the engine, check all gauges and indicators for proper readings.
- Test all controls in the cab or control station, such as swing, boom extend/retract/up/down, outriggers extend/retract and throttle.
- Check brakes and clutches.
- 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:

- Boom angle indicator
- Backup alarms
- ATB devices
- Overload protection, load indicators, and Load Moment indicator (LMI)

Operation Overload Protection

- Know the weight and characteristics of all loads to be lifted.
- Place the boom lifting point directly above the load when lifting.
- 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.
- Know the weight of the hook and rigging, the boom and/or jib length, parts of line and the work area.
- Use next lower rated capacity when working at boom lengths or radius within the range on the rated lifting capacity chart.
- Do not lift a load without knowing whether it is within the rated capacity.
- Do not operate with anything other than recommended counterweight. Unauthorized reduction or additions of counterweights constitute a safety hazard.
- Do not lift loads if winds create a hazard. Lower the boom if necessary. Refer to the Load Rating Chart and the Operator's Manual for possible restrictions.
- Avoid side-loading the boom.
- Do not allow the load or any other object to strike the boom.
- Loads shall be freely suspended.
- Do not use the LMI to weigh the load.

Operation Setup

When preparing the crane for operation, ensure that the load-bearing ground surface is strong enough to support the crane, including the load to be lifted.

Ensure that the crane is level for all operations. Check frequently, and re-level the crane if necessary.

	Ensure that personnel and the public maintain a safe distance from rotating cranes. Place barricades to restrict access to the crane area. Verify that all areas are clear prior to swinging.

Power Line Safety

- 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).
- Use a signal person when working around power lines as established by the utility Owner/Operator or registered professional engineer. This should be someone who is a qualified person with respect to electrical power transmission and distribution per OSHA regulation 1926.1408 and 1926.1409.
- Do not remove materials from under power lines with a crane if the boom or other components of the crane will come into contact with the power lines.
- 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. For further clarification, see the following table:

Maintain Required Clearance from Power Lines	
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	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. (1.37 m)
Greater than 1000 kV	Determine specified clearance after consultation with utility Owner/Operator.
Before operating the machine, contact the electric power line owner to disconnect, move, or insulate power lines.	

- If contact with power lines occurs, stay on the crane until the boom is cleared or until the electrical current is turned off.
- If contact with power lines occurs, keep all personnel away from the crane. If you must leave the crane, jump with both feet together, completely clearing the machine.

Travel

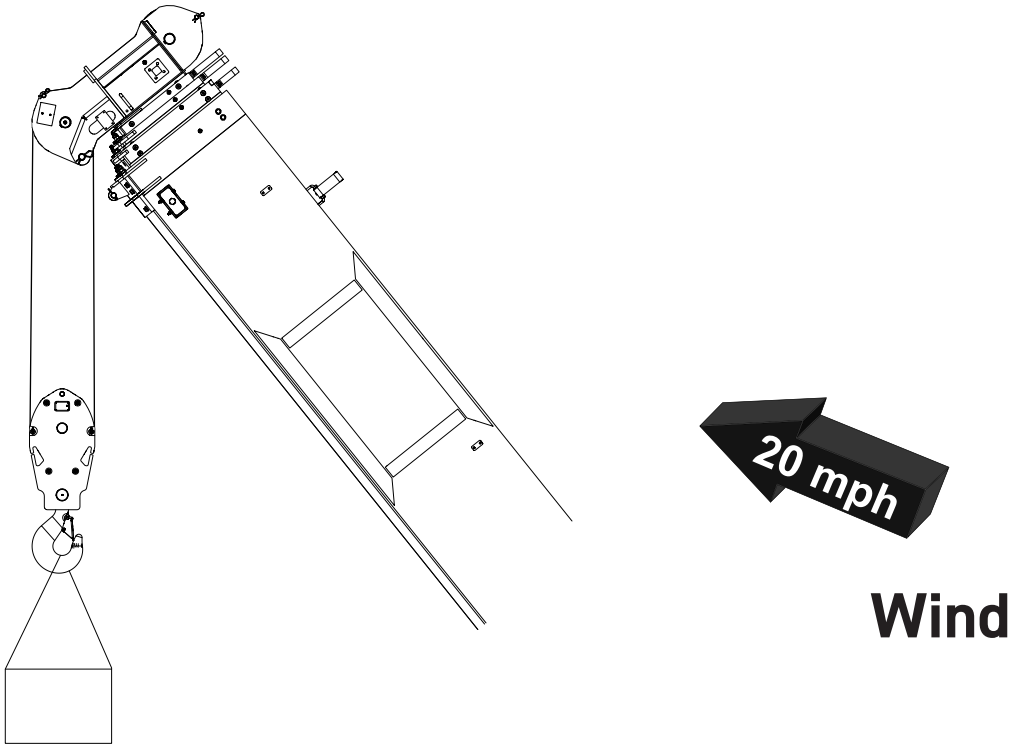
- Care must be taken when the crane is driven, whether on or off the job site.
- Pre-plan the path of travel to determine the best route to the destination.
- A signal person shall be utilized when the Operator's vision is blocked or obstructed during traveling operations.
- Maintain awareness of people, power lines, low or narrow clearance, bridge or road load limits, steep hills, or uneven terrain.
- Place the boom in the stowed position.
- Inflate the tires to the specified pressure.
- Drive slowly and avoid sudden stops and starts.
- Use the seat belt during all transit and travel.
- Ensure that ground level surfaces can support the weight of the machine and any stored load.
- Set the parking brake when parking the machine.

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 weather forecast and monitor wind speed conditions near the job site. When wind speed exceeds 20 mph (32 km/h), derating of the crane's lifting capacity is required. See the Operating Instruction section of the crane's Load Ratings Charts.



Maximum Operational Wind Speed Before Derating of Lifting Capacity is Required.

	Pay attention to the wind speed values in table below in relation to the information in the Operating Instruction section of the Load Ratings Charts. Any governmental regulations applicable to the job site must also be observed.

Wind Force		Wind Speed		Observable Effect on Nature to Estimate Wind Speed
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 not attempt the following procedures:

- Entering the Operator's cab or attempting to climb onto the carrier, superstructure, or boom assembly.
- If on the machine, do not try to get off the machine.

If personnel are in the Operator's cab during an electrical storm, they should stay in the cab. If personnel are on the ground during a storm, they should avoid 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. The boom and rigging should be stowed if the crane's operations are interrupted and may be left unsupervised.

The following instructions are valid for every mobile crane, regardless of type, configuration, the rigging mode or 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, and jib angle.
- The engine 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.
- The transmission gear shall be set to neutral.
- The wheels shall be secured with chocks, the slew brake applied, and the main boom secured.

An urgent situation may arise such that the crane must be left unattended while the boom is in an extended or telescoping position. Should this occur, jobsite conditions may not allow the boom and jib to be fully lowered to the ground. Under these conditions, a qualified Operator must determine an appropriate configuration in which the crane may be safely left unattended. This qualified Operator must be familiar with all aspects of the situation, including the job site configuration, the limitations present, and other pertinent considerations. The following instructions must also be followed:

- Create an emergency action plan that includes instructions on how to safely stow the crane. The plan must take into consideration the amount of space needed around the crane to dismantle or lower the boom, jib, or other equipment. This plan should take into account natural disasters (e.g., tornado, flood, fire) as well as industrial accidents, chemical exposure, public acts of violence, or other incidents as listed at the beginning of this document.
- The crane shall not be left with 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 shall not create hazards to 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)
    - Swing brake locking mechanism

	Slight movement of hydraulic cylinders can also be due to changing ambient temperature or oil temperature (e.g., due to sun warming or hydraulic oil cooling).

- The 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, or lightning, 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 defined 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 defined values with the boom in the up position, the crane should be secured as best it can and all personnel 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 jib deployment and stowage (assembly and disassembly) according to the wind speed charts.

Potential Hazards Presented by an Unattended Crane

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

- Storms or bad weather; including, but not limited to lightning, wind, rain or flooding.
- Ground giving way due to severe rain, landslides or washout. If the crane was parked and/or supported on icy ground, the ice may melt under the wheels or outrigger supports.
- Slow retraction of the crane's hydraulic cylinders (e.g., outrigger support cylinders, lift cylinders, and/or telescoping cylinders on unpinned telescoping systems) due to changes in ambient temperature, oil temperature, or leakage.
- Vandalism

Any of the hazards listed 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 Load Moment Indicator (LMI) 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

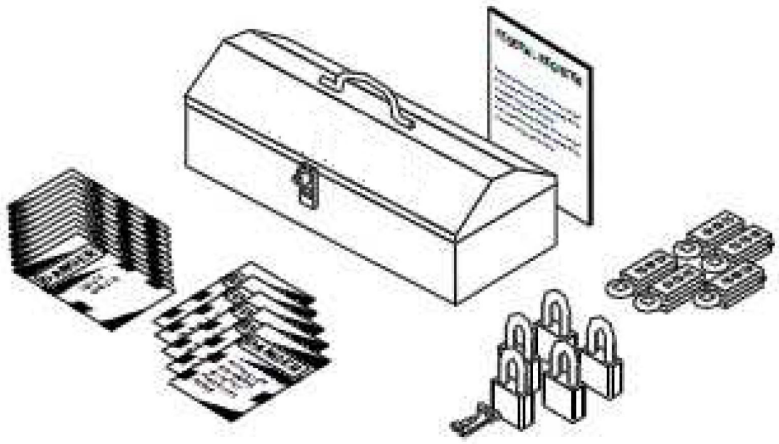
1. _____ Is the load fully on the ground and unhooked from the crane?
2. _____ Is the telescopic boom retracted completely?
3. _____ Is the work-site crane boom all the way down and disassembled if necessary?
4. _____ Is the parking brake on the crane chassis engaged?
5. _____ Is the crane engine off 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 engaged?
11. _____ Are the controls in neutral?

Lock Out and Tag Out

Occupational Health and Safety Code of Federal Regulations number 1910.147 requires that employers establish and follow a Lock Out and 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 confirm that their Lock Out and Tag Out procedures are being followed. They must monitor and update their program on an ongoing basis. Employees are responsible for ensuring that equipment is locked out and tagged out in accordance with the employer's policy.

The contents of a typical Lock Out and Tag Out kit are illustrated in the figure below:



Typical Lock Out and Tag Out Kit

What is Lock Out and Tag Out?

Lock Out and Tag Out is a procedure that is 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 and Tag Out also protects personnel from energy stored in devices such as springs, accumulators, batteries, or hydraulic systems.

How to Lock Out and 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 and Tag Out Required?

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

Who Must Apply a Lock and 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 their 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.

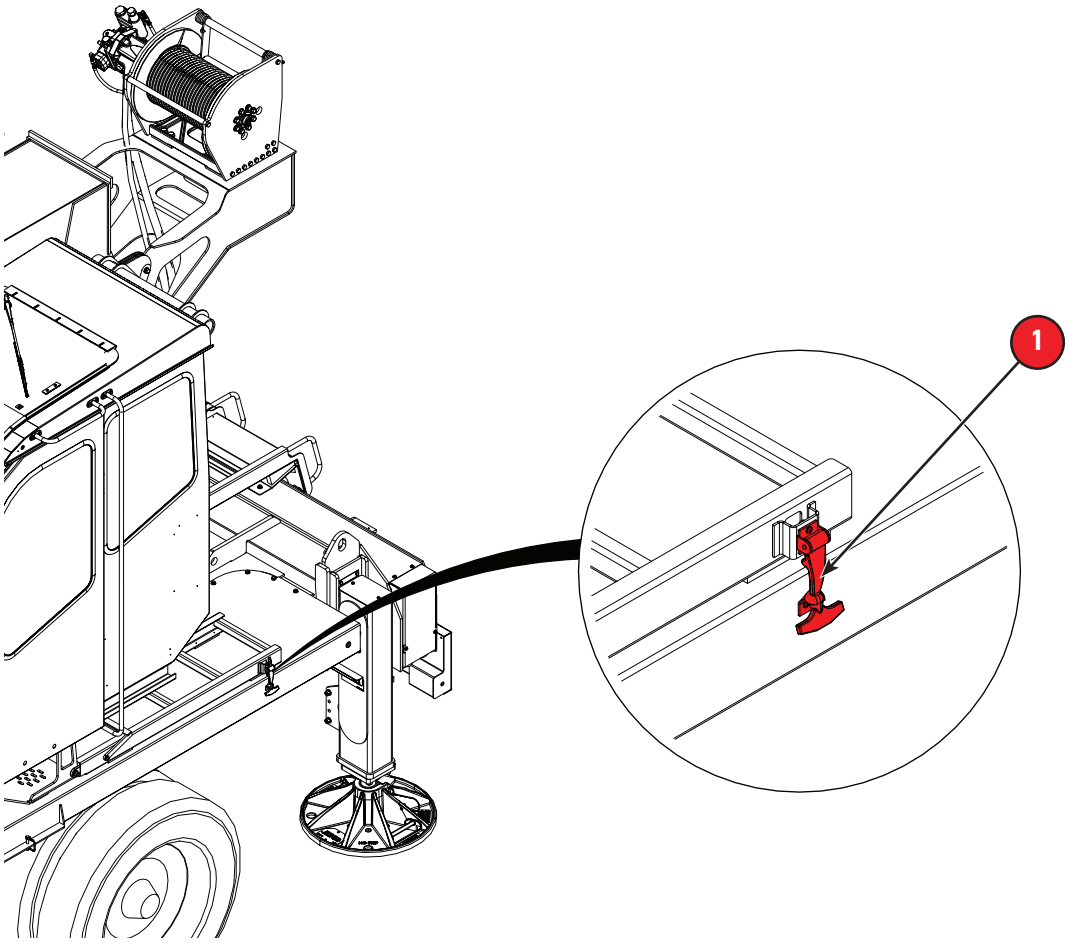
The Lock Out and Tag Out rules laid out here are generic. To get instructions for your particular workplace, consult your employer's Lock Out and Tag Out procedure.

Access/Egress Safety

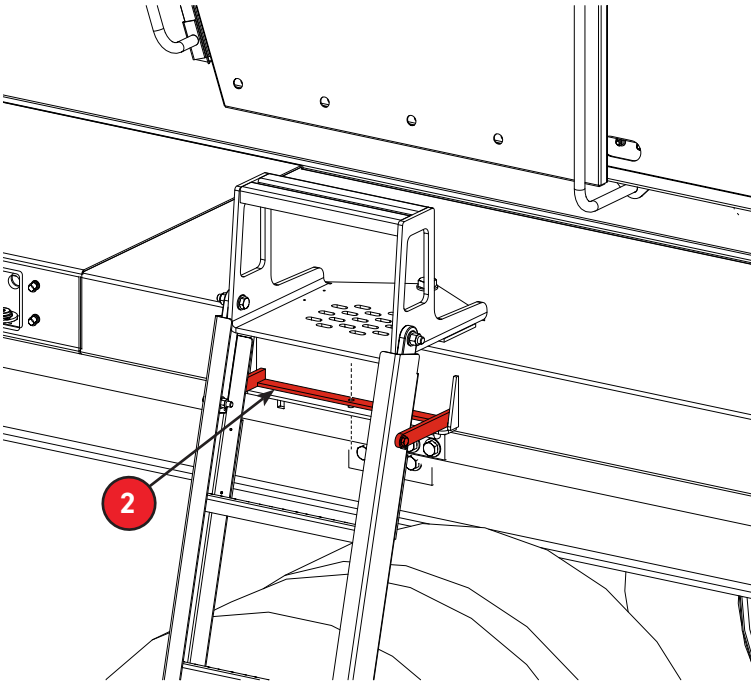
Access and egress from the crane Operator's cab must always be accomplished using a three-point system. Either two feet and a hand, or two hands and a foot should be in contact with the crane while moving from the ground into the Operator's cab, or moving from the Operator's cab to the ground. **Load King** provides a number of steps, ladders, and handrails allowing three-point access to all areas of the crane in a safe manner.

⚠	Access to and from areas of the crane that are not accessible through the provided three-point access devices should only be attempted using OSHA approved access devices (ladders, lifting platforms, scaffolds, or stands) providing three-point access capability.

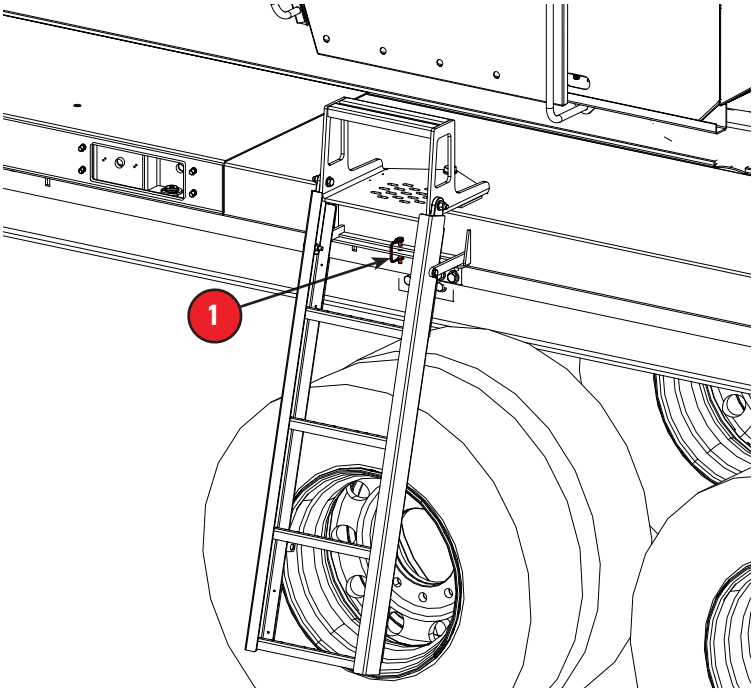
Operator's Cab Access/Egress Procedure



1. Remove the lock pin (1) from cab ladder retainer to deploy the ladder.
2. Pull the ladder outside from its parked position and set it properly for climbing to get access for the Operator's cab.

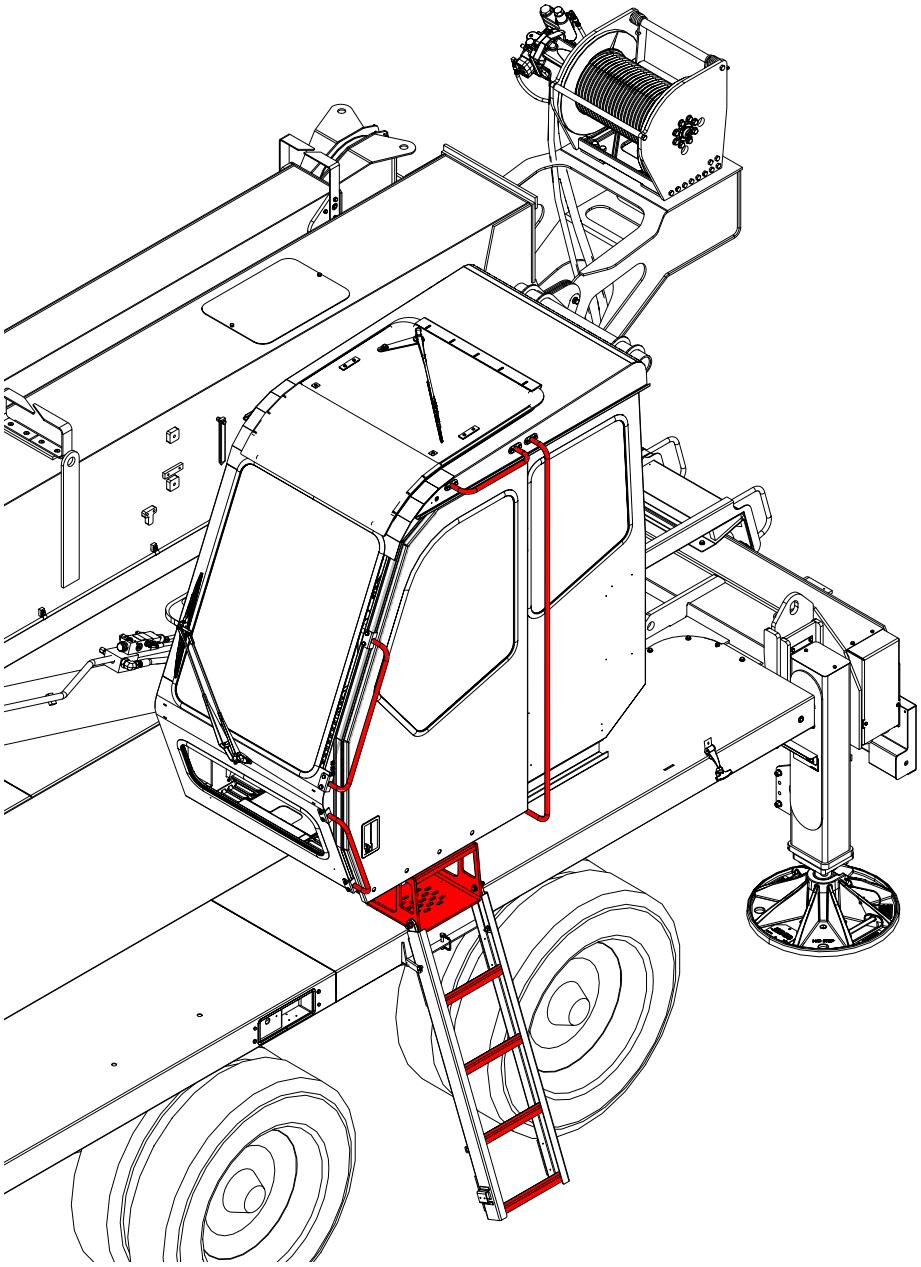


3. Align the ladder strut weldment (2) hole with the gusset, ladder rest hole.



4. Put the lock pin (1) into the ladder strut weldment hole and gusset, ladder rest hole to secure the ladder.
5. Reverse this procedure to store ladder assembly before traveling.

	Use three (3) points of contact when entering cab.



Operator's Cab Steps and Grab Handles with Ladder Deployed

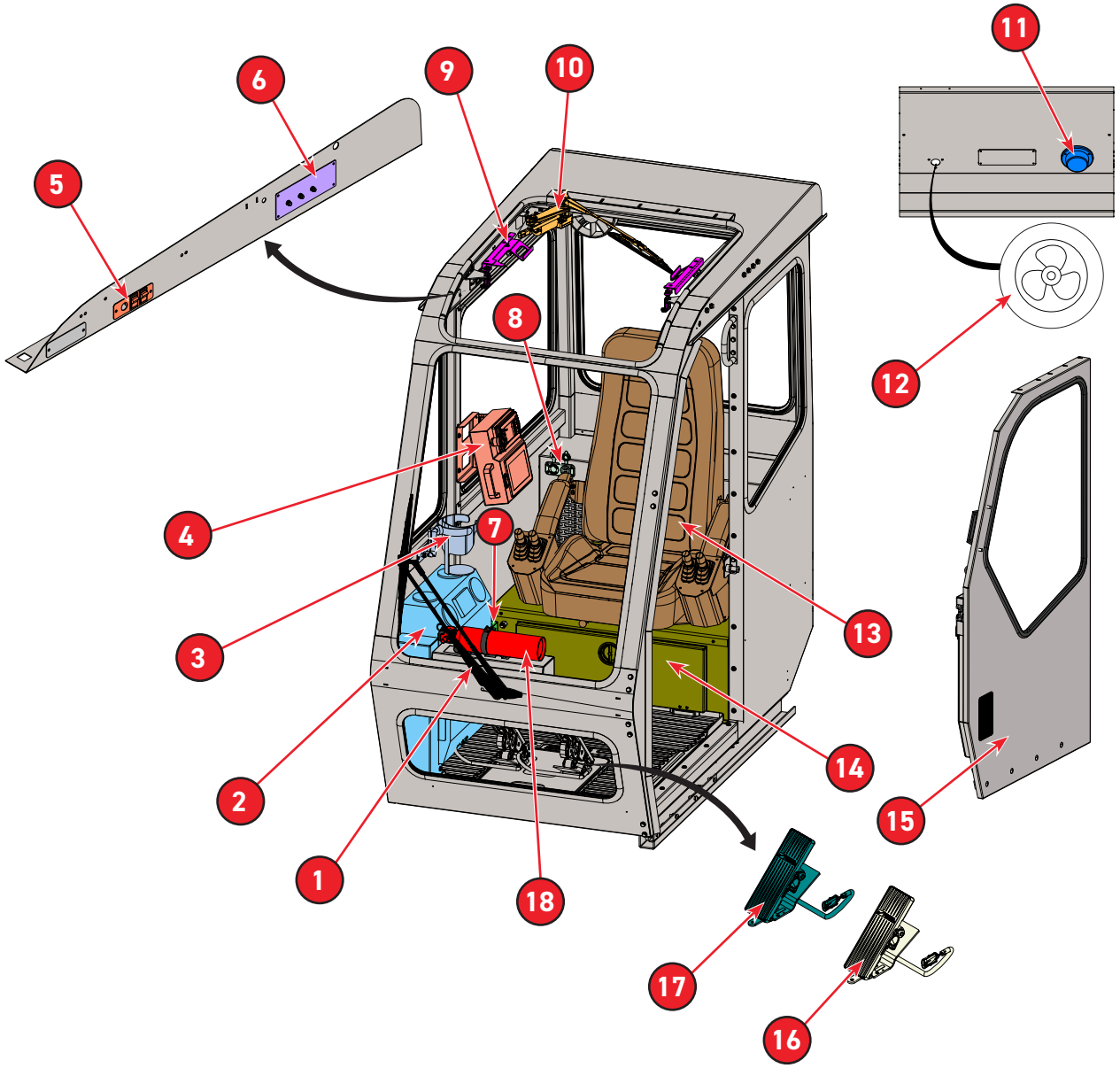
Personal Safety

Slip and Fall Prevention

- Wait until the machine has stopped before getting on or off the equipment.
- Do not use controls or steering wheel as hand holds.
- Keep the machine clean and dry. Remove all oil, grease, mud, ice, and snow from walking surfaces.
- Store all tools, rigging, and other items in the toolbox or other appropriate storage.
- Replace all broken ladders or other access system components.
- Keep non-slip surfaces in good condition.
- Do not jump off the machine. Instead, use the hand holds and steps designed for entering and exiting the machine. Face the machine and use three (3) points of contact to ensure personal safety.

Description of Machine and Controls

Controls in the Cab

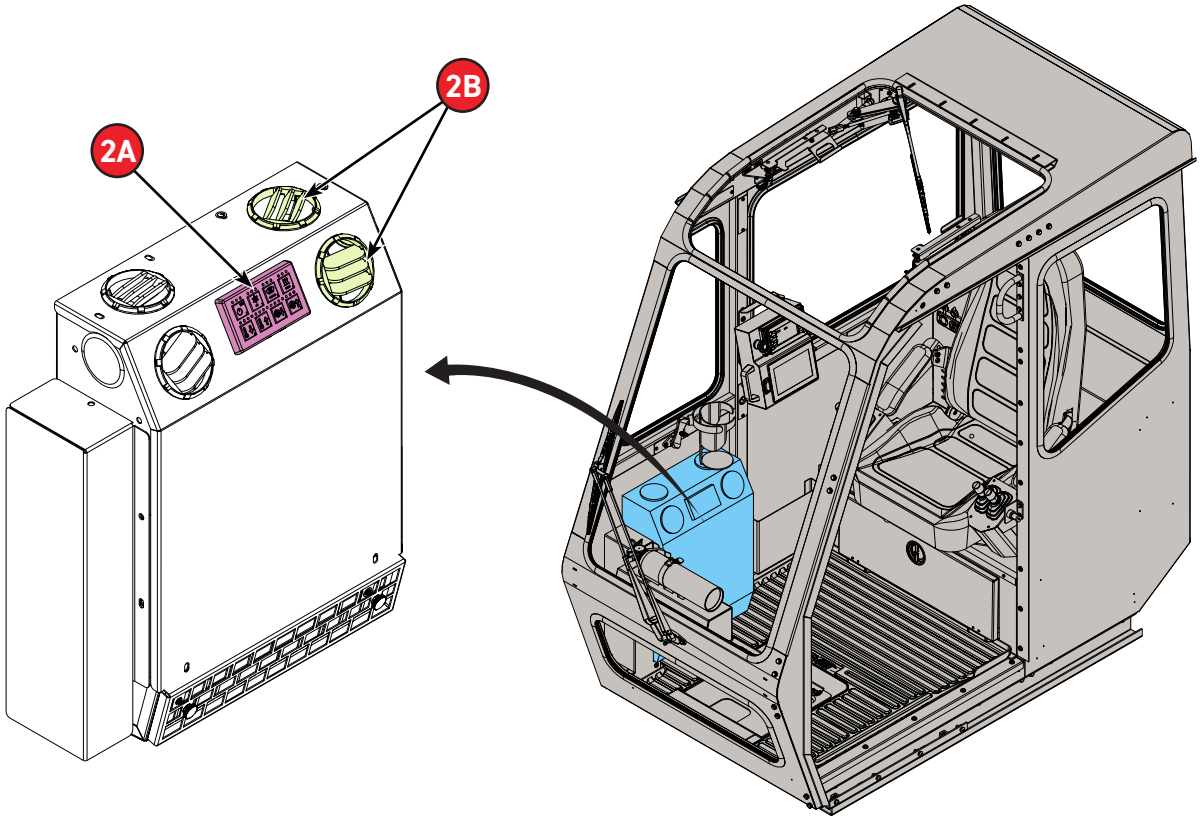


1	Windshield Wiper	10	Roof Wiper
2	HVAC Unit	11	Light
3	Bottle/Drink Holder	12	Fan
4	Control Console Assembly	13	Operator's Seat Controls
5	Wiper Switch Panel	14	Storage Box
6	Circuit Breaker Reset Panel	15	Sliding Door
7	Load Chart Storage Compartment	16	Pedal, Throttle
8	Dual USB Charge Ports	17	Pedal, Swing Brake
9	Roof Hatch Lock Handle	18	Fire Extinguisher

1. **Windshield Wiper**

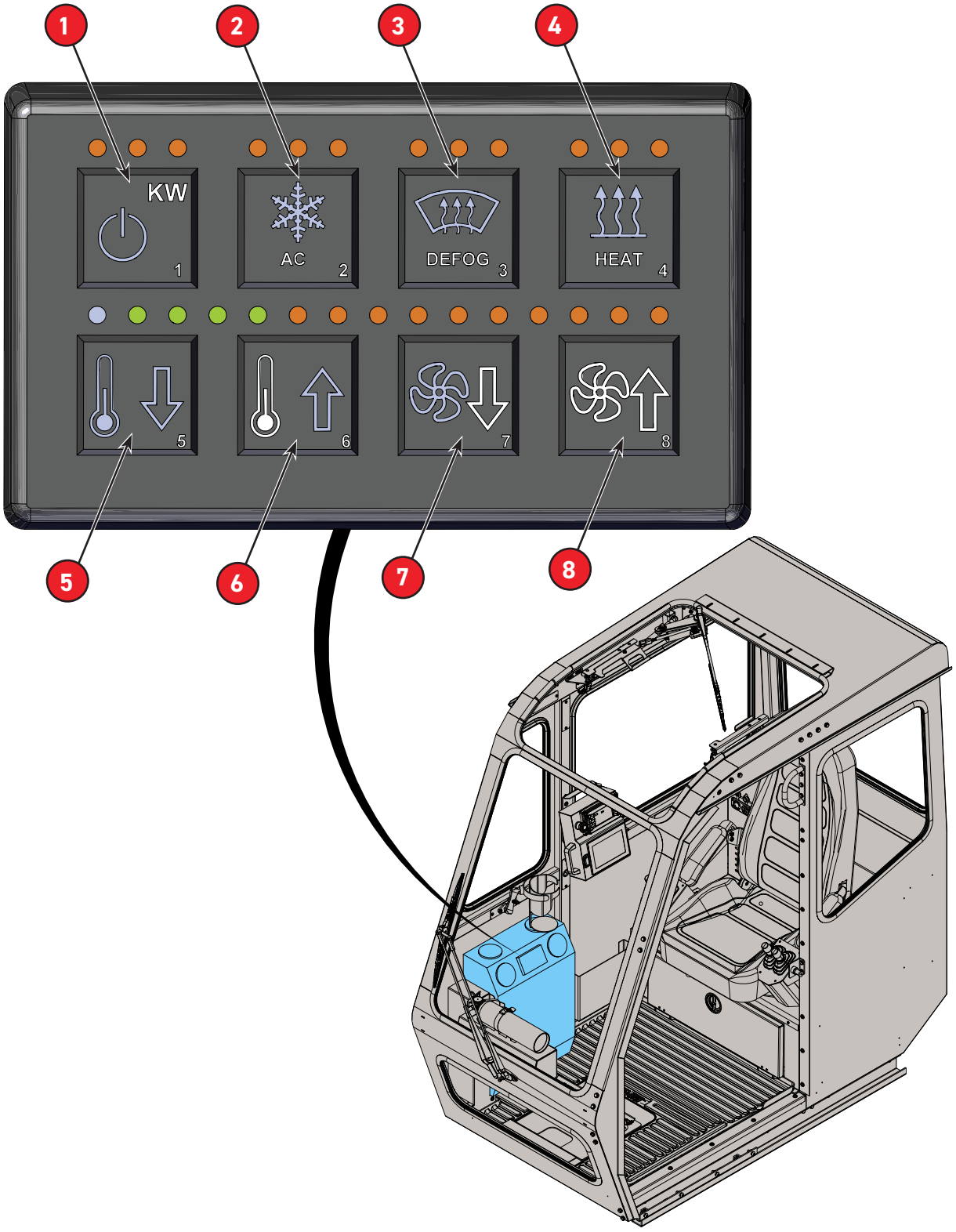


2. **HVAC Vent**



2A	HVAC Panel
2B	HVAC Vents

2A. **HVAC Panel**



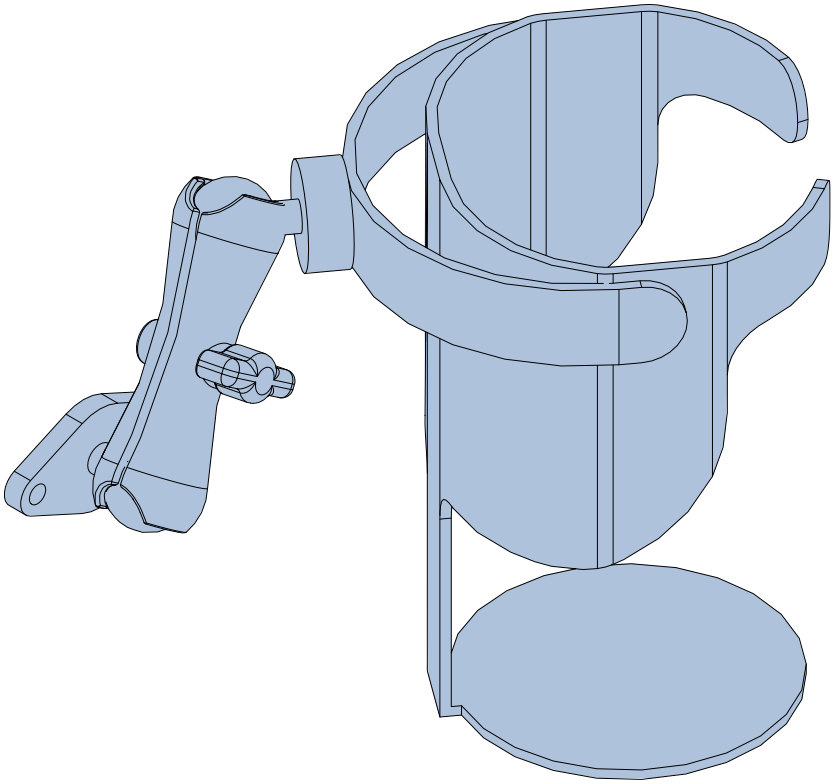
HVAC Control Panel

Button No.	Function
1	KW - Turns the KenWay AC and Heater system **On/Off**.
2	AC - Turns AC Mode **On/Off**.
3	DEFOG - Turns Defog Mode **On/Off**.
4	HEAT - Turns Heat Mode **On/Off**. It may take several minutes for the cab to reach the desired temperature level.
5	Cab Temperature Decrease.
6	Cab Temperature Increase.
7	Fan Speed Decrease - The control has three fan speeds.
8	Fan Speed Increase - The control has three fan speeds.

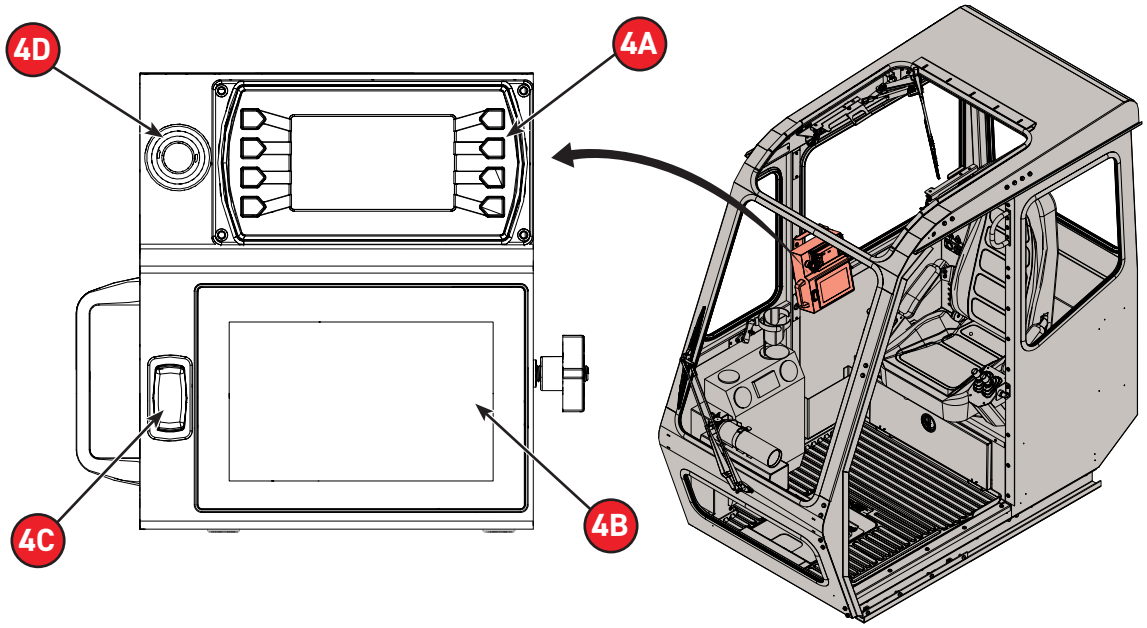
Pressing the button for AC, Heat, or Defrost modes will activate the respective mode, and deactivate the previous mode. Pressing the button a second time will deactivate the mode, leaving the fan running (Fan Only Mode).

	Changes to the cab temperature set point can only occur while in AC, Heat, or Defog modes. Changes to the cab set point are locked into memory after 5 seconds. Rapid mode changes may not recall the last temperature or fan speed and may need to be reentered.

3. **Bottle/Drink Holder**



4. **Console Assembly W-Bracket**



4A	Display, Greer Insight
4B	Display Touch Screen IQAN 7" (Control Screens)
4C	Crane Power Switch
4D	Emergency Stop - Push to stop engine in case of emergency.

For Item 4A, Refer to Operation manual for "Greer LMI System With MG6 Computer & Insight Display For **Load King**."

4B. **Display Touch Screen IQAN 7" (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	6	Diagnostics
2	Outrigger Controls	7	Lifting Screen
3	Hydraulic Information	8	Engine Information
4	Unit Information	9	Belly Pack
5	Tools Menu	10	Manuals

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

1. **Cab Controls**



Cab Control Screen

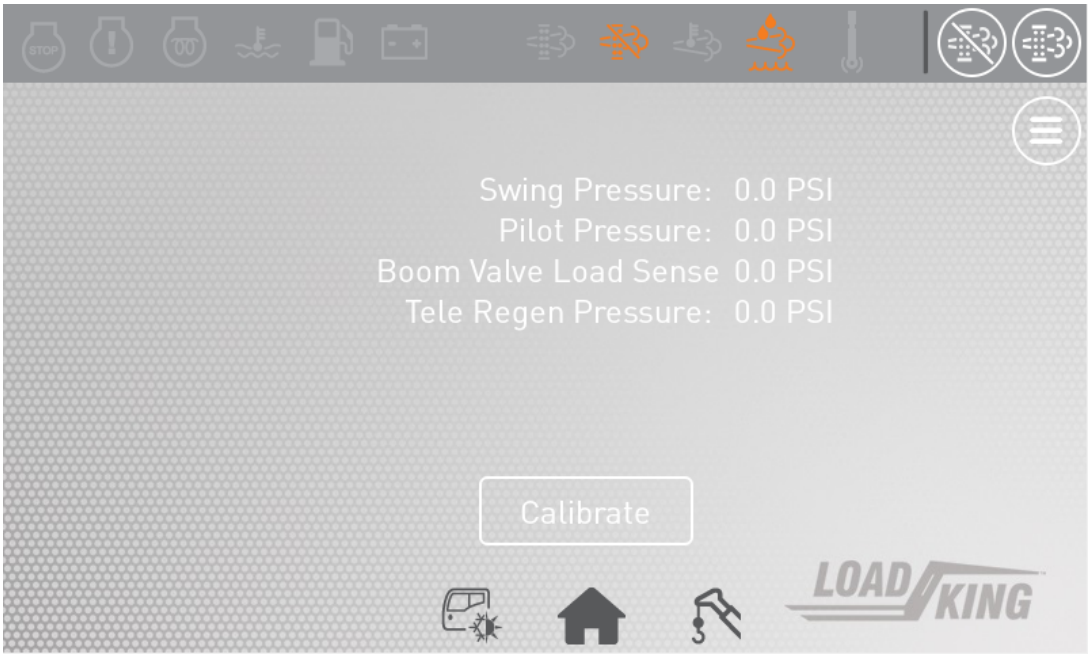
1	Cab Lights	6	Air Conditioning
2	Lights	7	Fan Speed Decrease
3	Power	8	Fan Speed Increase
4	Heat	9	Temperature Decrease
5	Defrost	10	Temperature Increase

2. **Outrigger Controls**



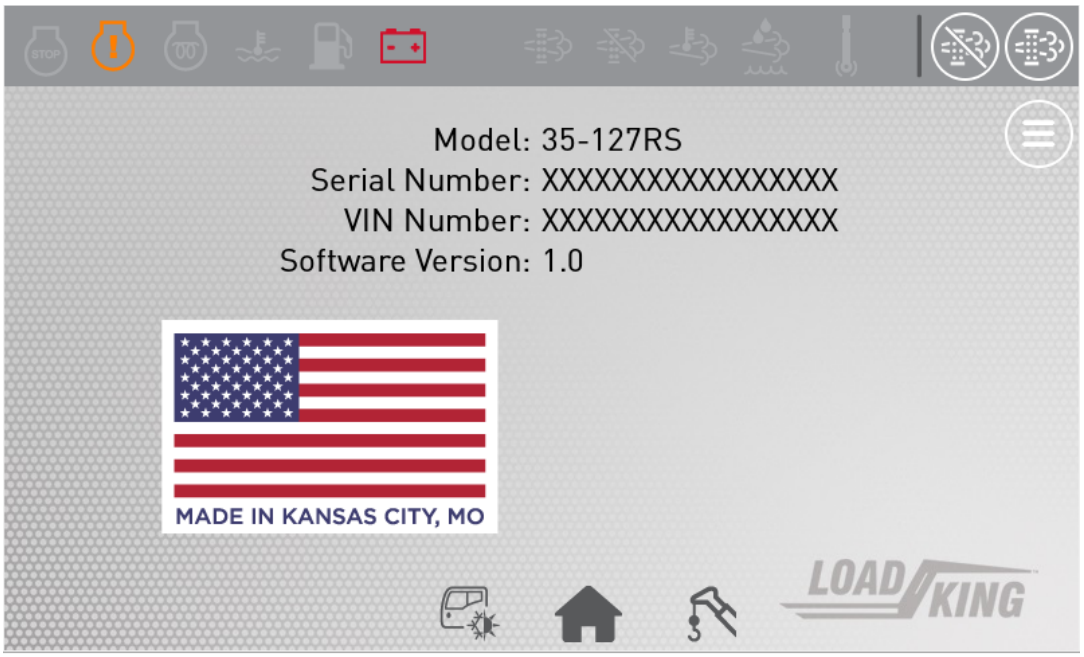
Outrigger Control Screen

3. **Hydraulic Information**



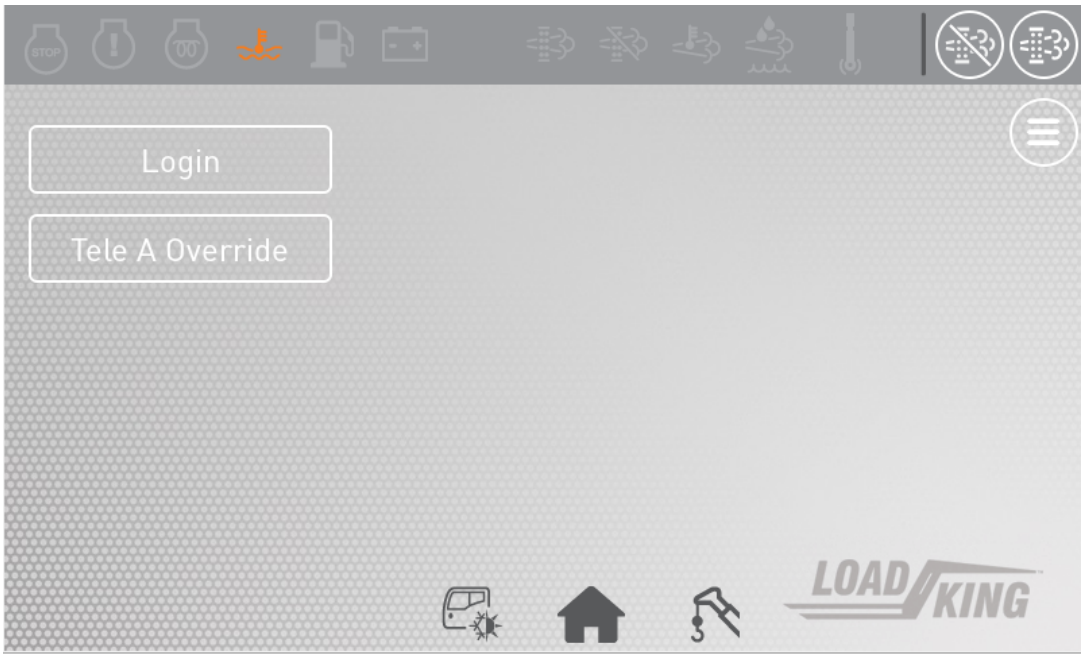
Hydraulic Information Screen

4. **Unit Information**



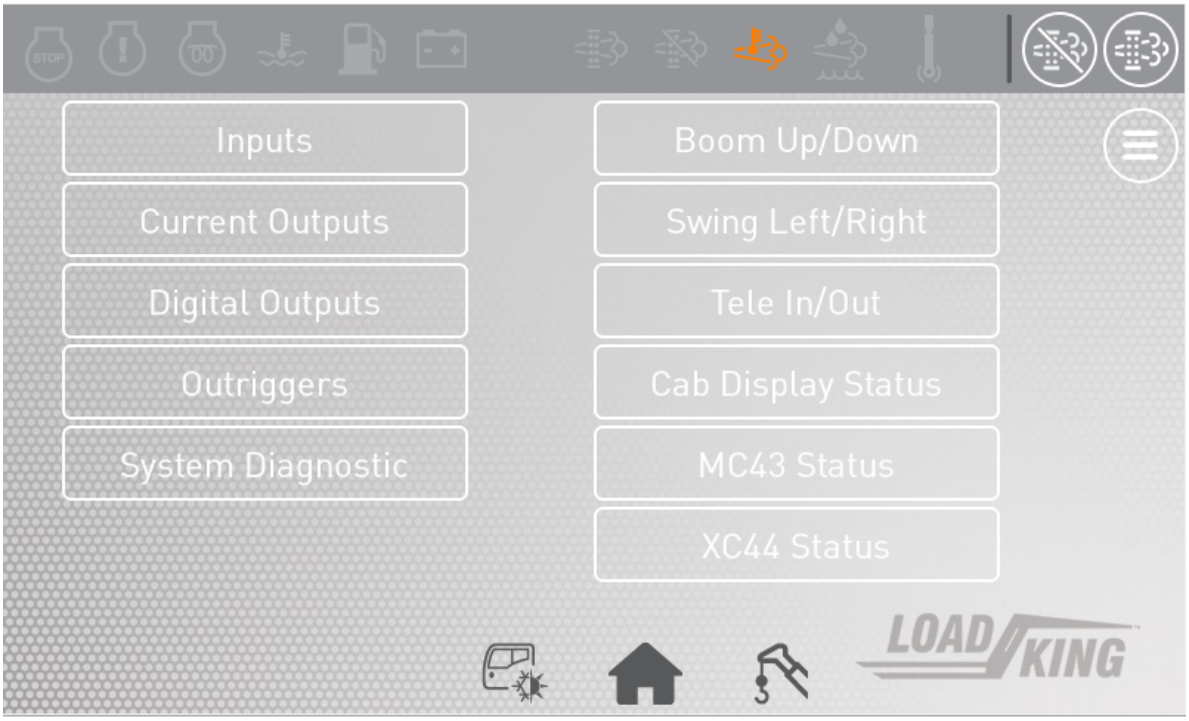
Unit Information Screen

5. **Tools Menu**



Tools Menu Screen

6. **Diagnostics**



Diagnostics Control Screen

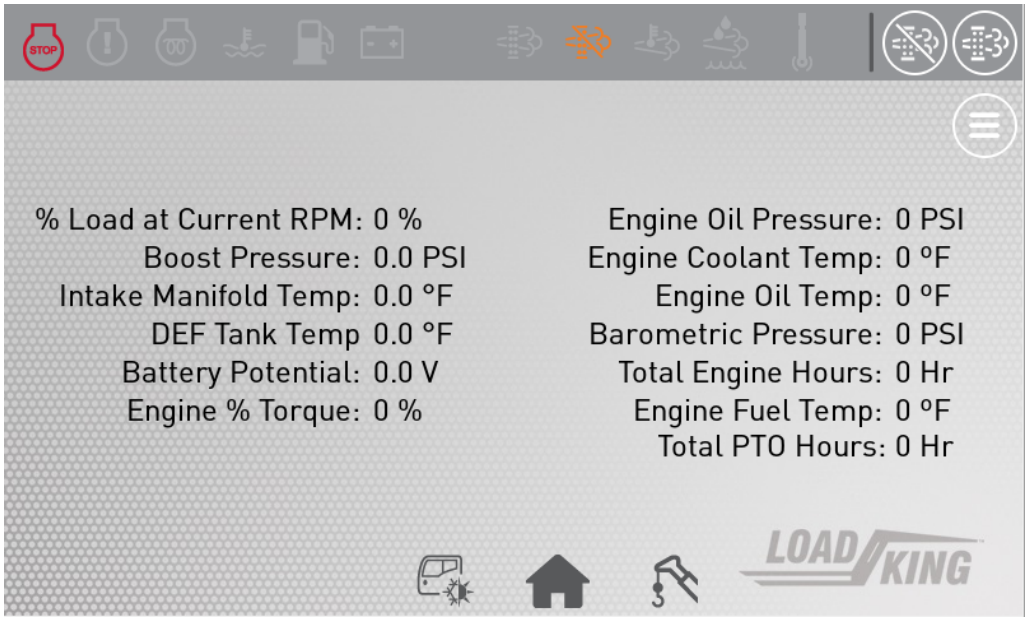
7. **Lifting Screen**



Lifting Control Screen

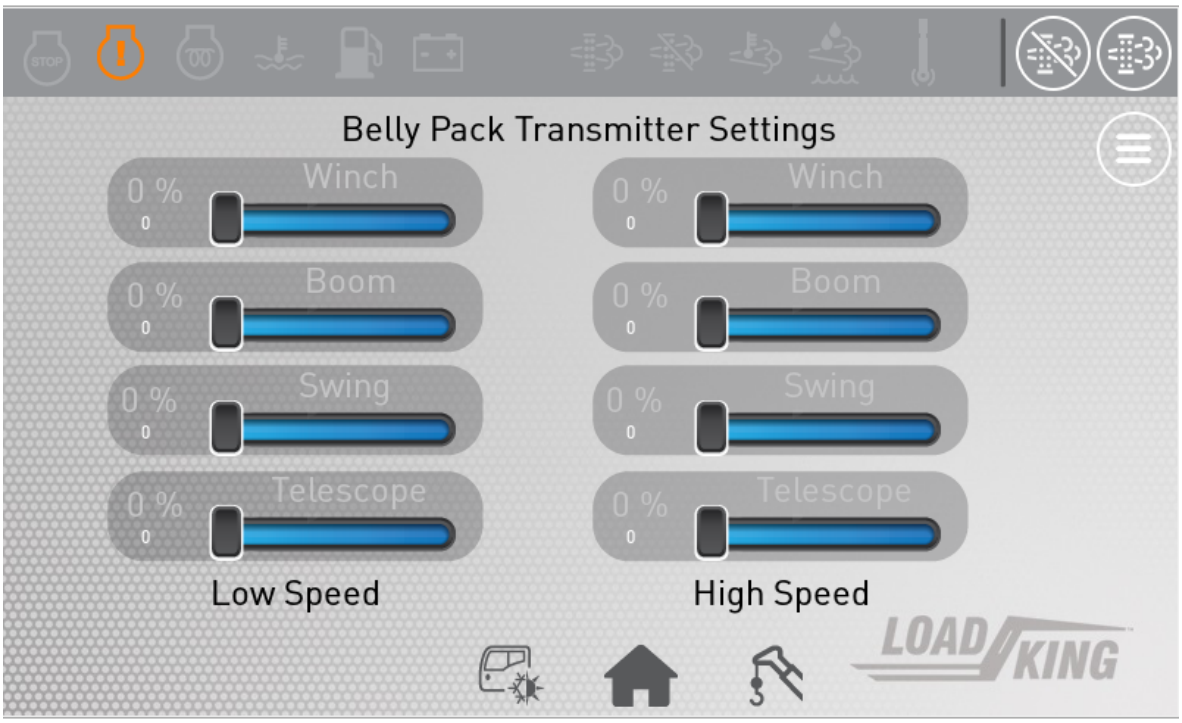
1	Horn	6	Boom Extend/Retract (Fast Mode)
2	Cab Tilt Raise	7	Remote Control Enable
3	Cab Tilt Lower	8	Tools Menu and Hydraulic Information
4	Winch Rope Extend/Retract (Fast Mode)	9	Acceleration lock
5	Thermal Indicator	10	Engine Start

8. **Engine Information**



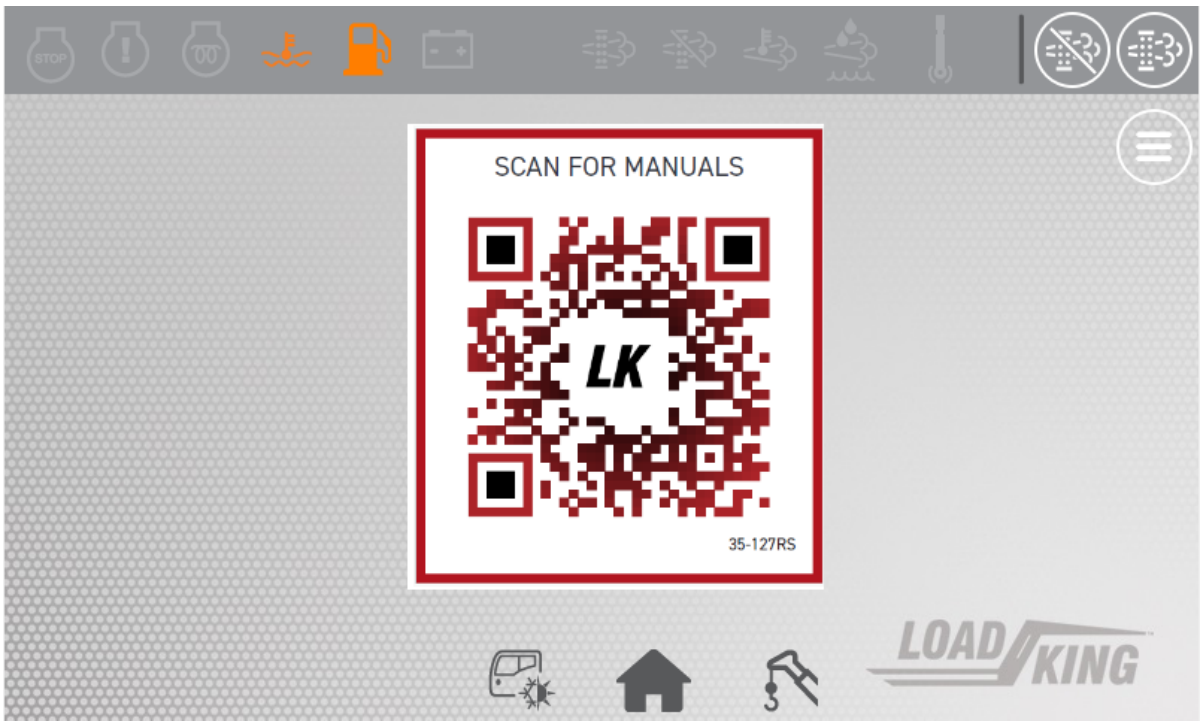
Engine Information Screen

9. **Belly Pack**



Belly Pack Information Screen

10. **Manuals**



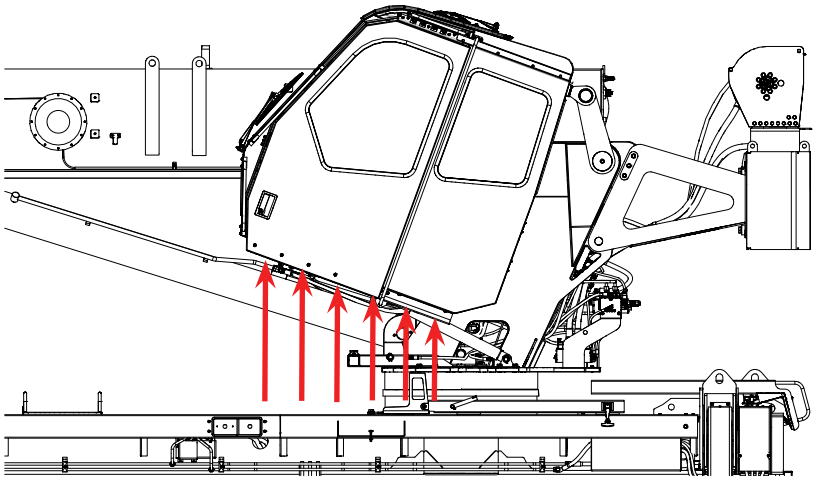
Manual Information Screen

Cab Tilt Switch

Hold down the cab tilt raise switch to tilt the cab from 0° to 20°. Hold down the cab tilt lower switch to reset the cab's tilt angle to 0°.

⚠	Do not activate cab tilt switch while swinging the upper structure. If the cab tilt function is activated while the boom is swinging, the swing may become jerky and load handling will be difficult to control.

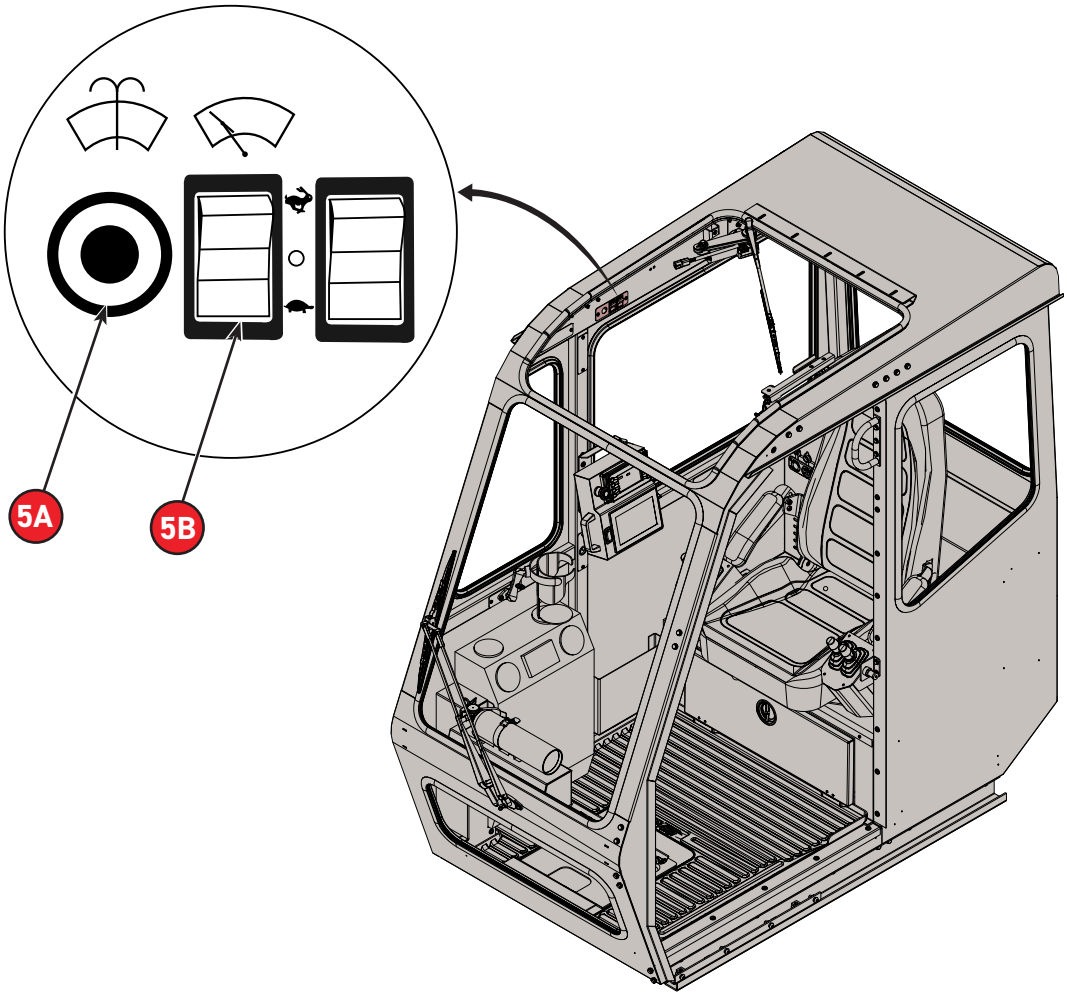




Keep Clear of This Area During Cab Tilting

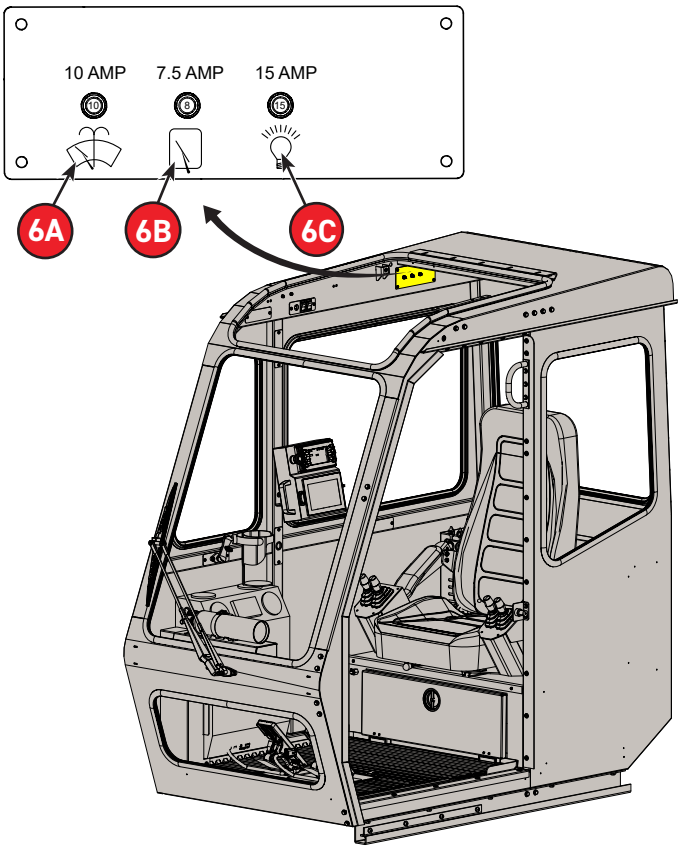
⚠	Keep hands and feet clear of Operator's cab exterior area during tilting. Sound horn before tilting cab to make personnel aware of cab movement.

5. **Wiper Switch Panel**



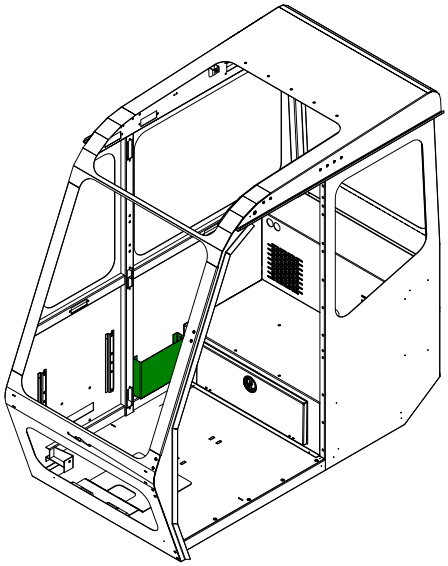
5A	Windshield Washer
5B	Windshield Wiper

6. **Circuit Breaker Reset Panel**

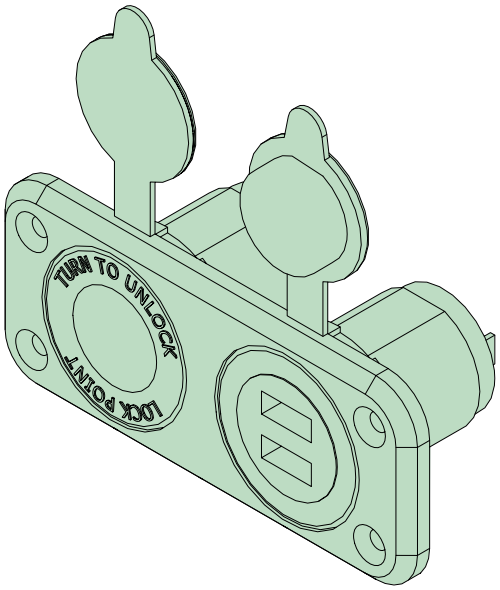


6A	Windshield Washer and Wiper Fuse Reset
6B	Wiper Fuse Reset
6C	Interior Light Fuse Reset

7. **Load Chart Storage Compartment**

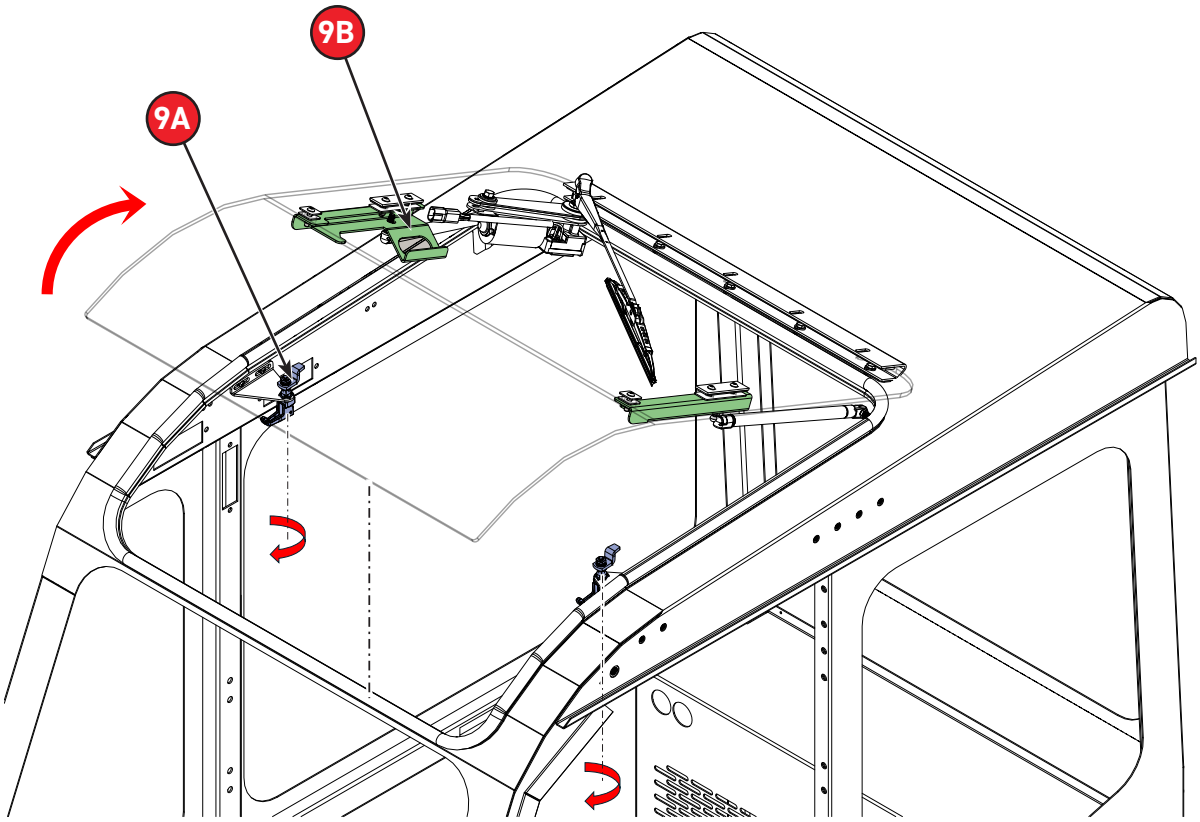


8. **Dual USB Charge Ports**



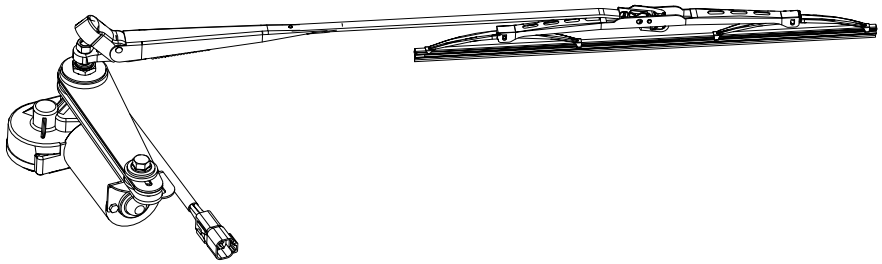
9. **Roof Hatch Lock Handle**

Retain control of both raise/lower handles (9A) when unlatching until hatch is fully open. Pull down on both handles when closing hatch and rotating lock handles. Keep head clear when pulling the hatch down .



9A	Top Glass Lock
9B	Raise/Lower Handle

10. **Roof Wiper**



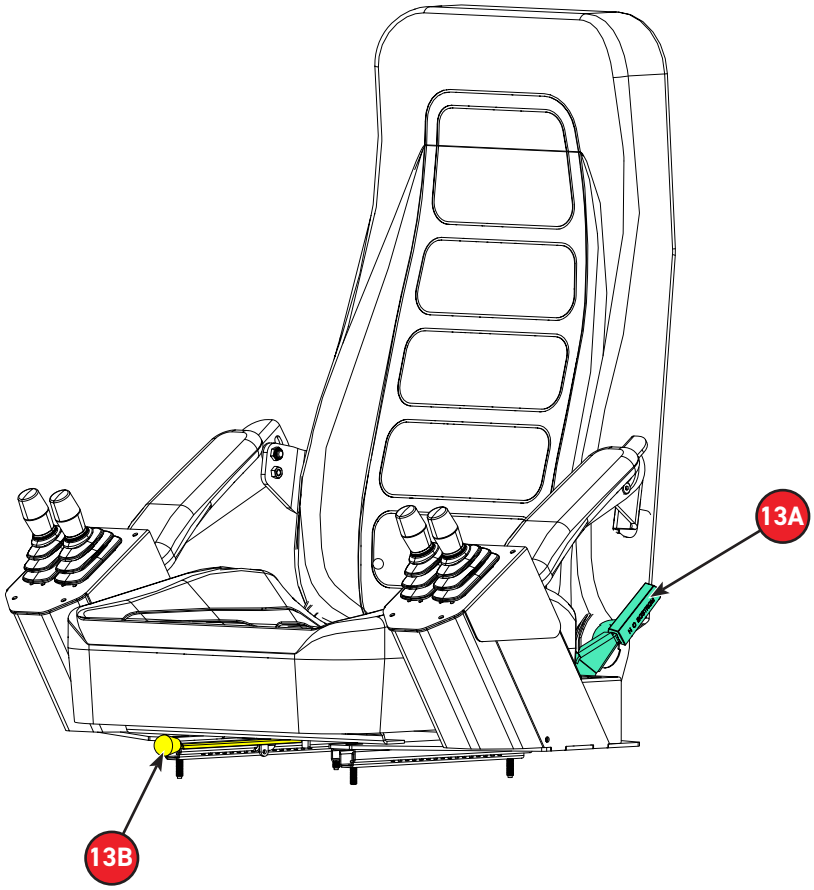
11. **Light**



12. **Fan**

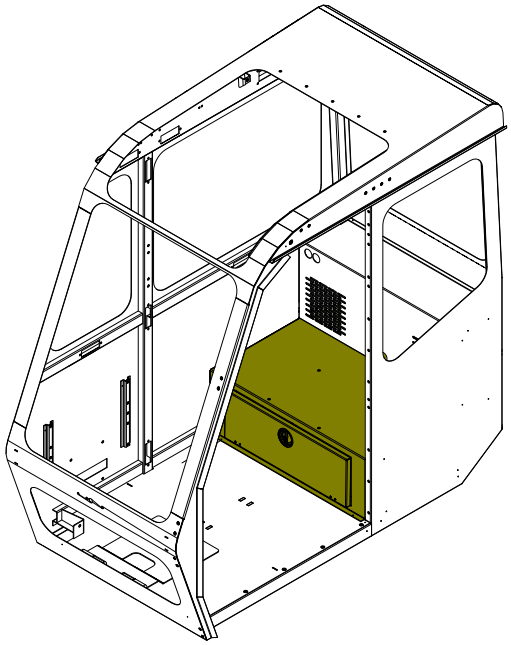


13. **Operator's Seat Controls**

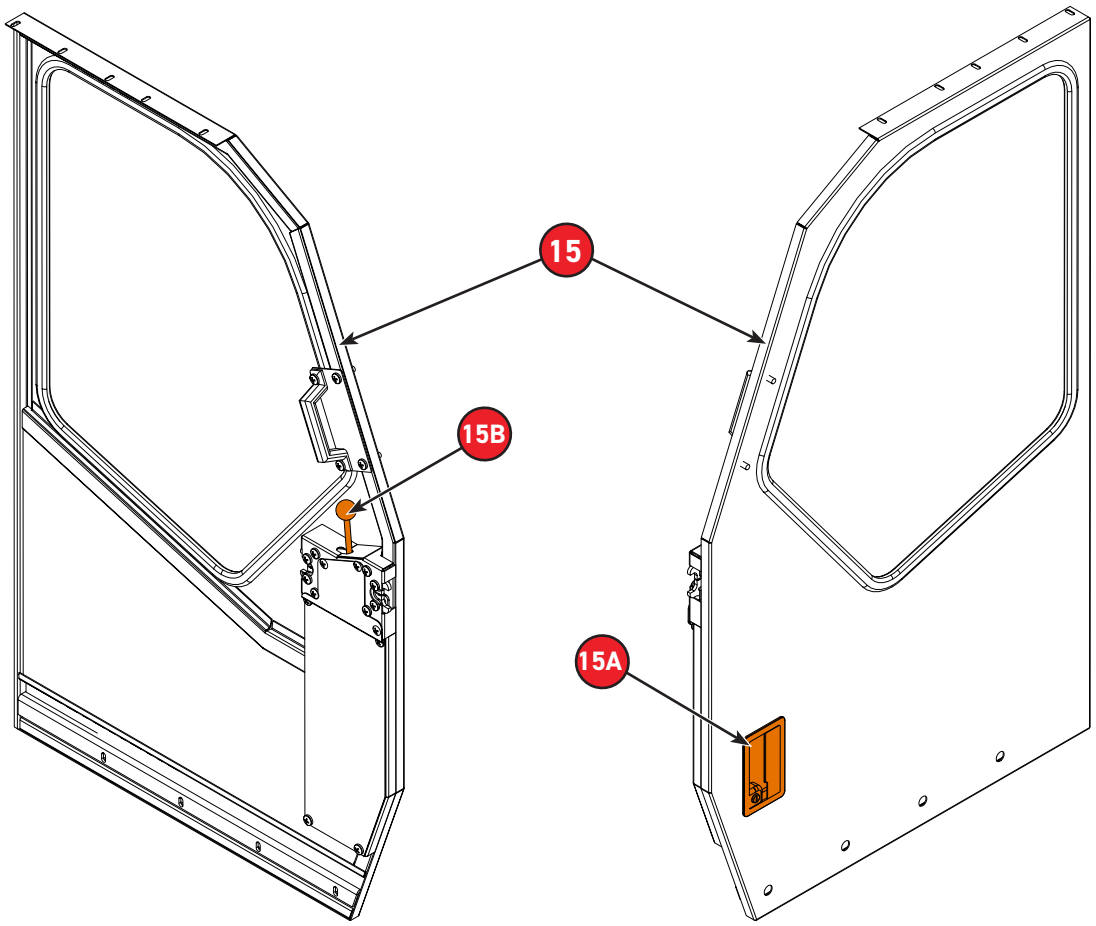


13A	Backrest Tilt (Forward/Back)
13B	Seat Slide Release

14. **Stowrage Box**

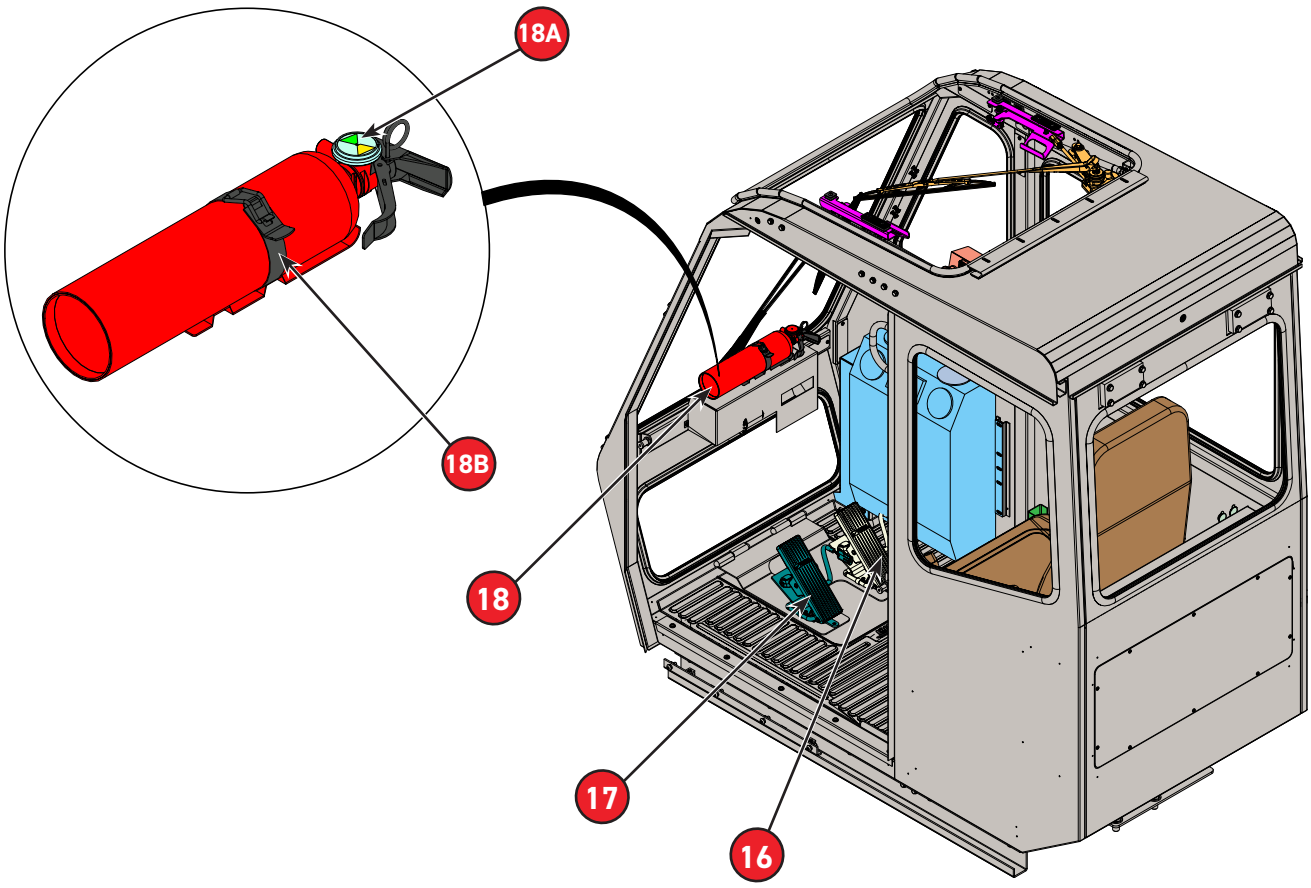


15. **Sliding Door**



15A **Door Release Handle** - Unlocks the cab door and allows entering.

15B **Door Open Release Knob** - Unlocks the cab door and allows exiting the cab.

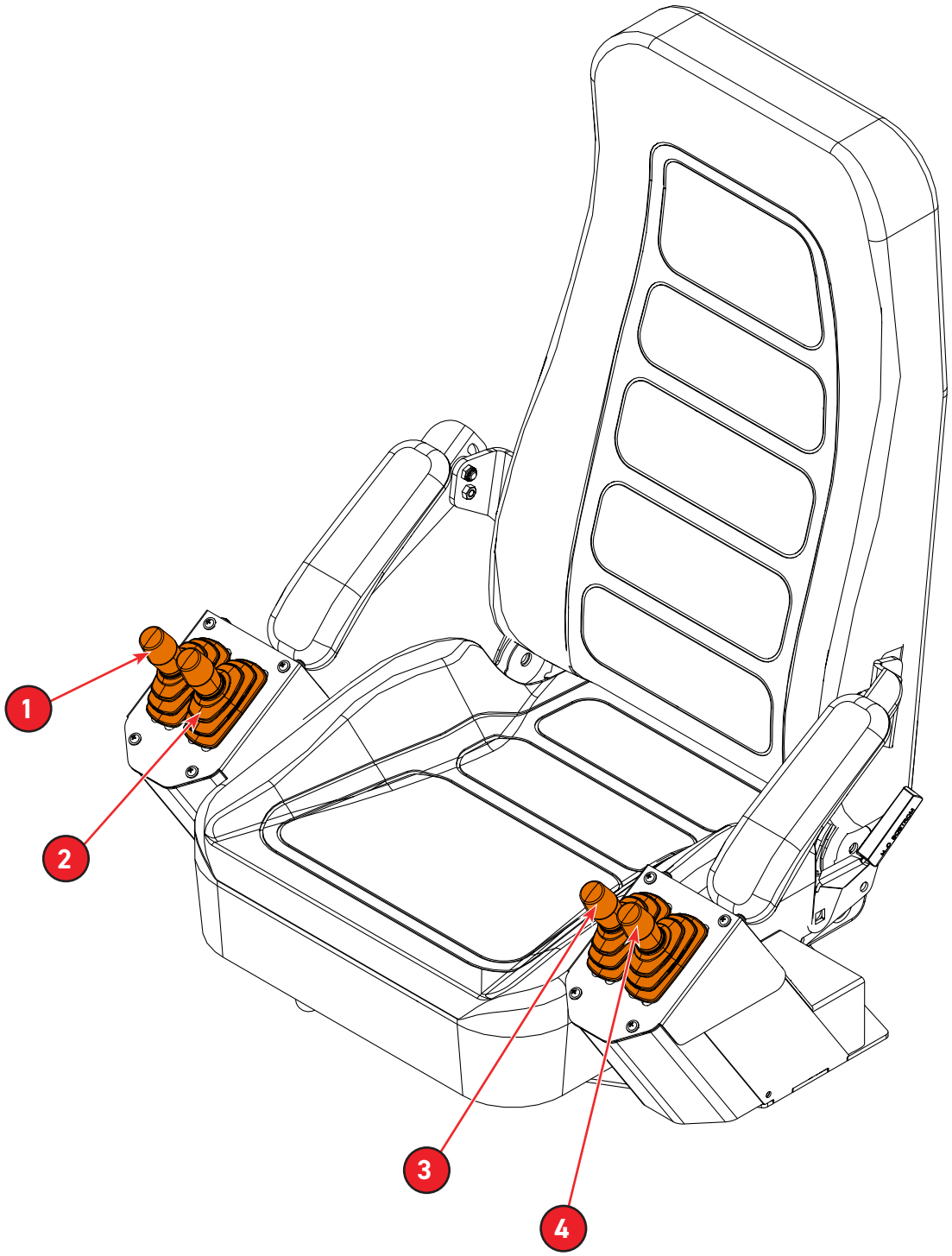


16. **Pedal, Throttle** - Depress to increase the engine's RPMs.
17. **Pedal, Swing Brake** - Apply swing brake with the foot pedal.
18. **Fire Extinguisher** - The fire extinguisher is mounted inside the Operator's cab**.**

18A **Gauge** - Check the gauge daily to verify that the charge-level needle is in the green zone.

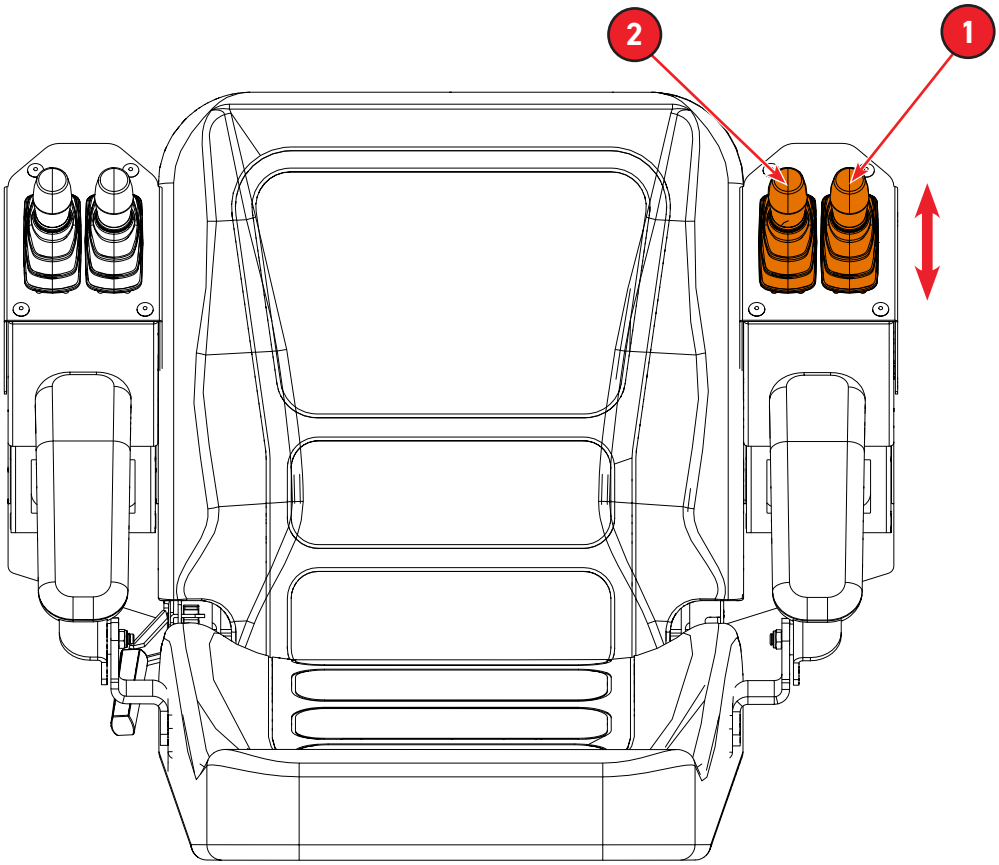
18B **Release Latch** - Lift this latch to release the extinguisher from the mounting bracket.

Boom and Winch Controls



1	Boom Control
2	Winch Control
3	Boom Telescope Control
4	Swing Control

Right Hand (RH) Joystick Control Levers



1. Push the joystick control lever forward (BOOM DOWN) to lower the boom. The boom lowering speed is proportional to the throttle setting and movement of the joystick.

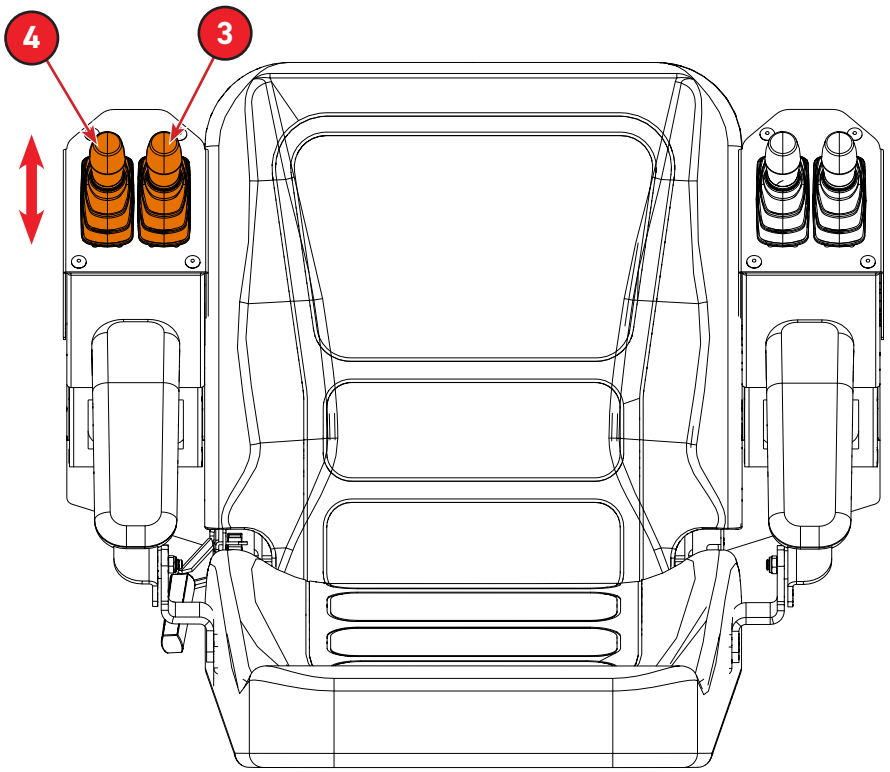
   Pull the joystick control lever back (BOOM UP) to raise the boom. The boom raising speed is proportional to the throttle setting and movement of the joystick.

2. Push the joystick control lever forward (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 control lever (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.

	Controls must be used together to achieve combinations of movements. For instance, the boom extension and loadline (hoist) must be used together to maintain clearance between boom tip and downhaul weight.

Left Hand (LH) Joystick Control Levers



3. Push the joystick control lever forward to extend the boom sections. The speed of the boom extend is proportional to the throttle setting and movement of the switch.

   Pull the joystick control lever back to retract the boom sections. The speed of the boom retract is proportional to the throttle setting and movement of the switch.

4. Push the joystick control lever forward to turn the turret clockwise. The swing speed is proportional to the throttle setting and movement of the joystick.

   Pull the joystick control lever back to turn the turret counterclockwise. The swing speed is proportional to the throttle setting and movement of the joystick.

	Controls must be used together to achieve combinations of movements. For instance, the boom extension and loadline (hoist) must be used together to maintain clearance between boom tip and downhaul weight.

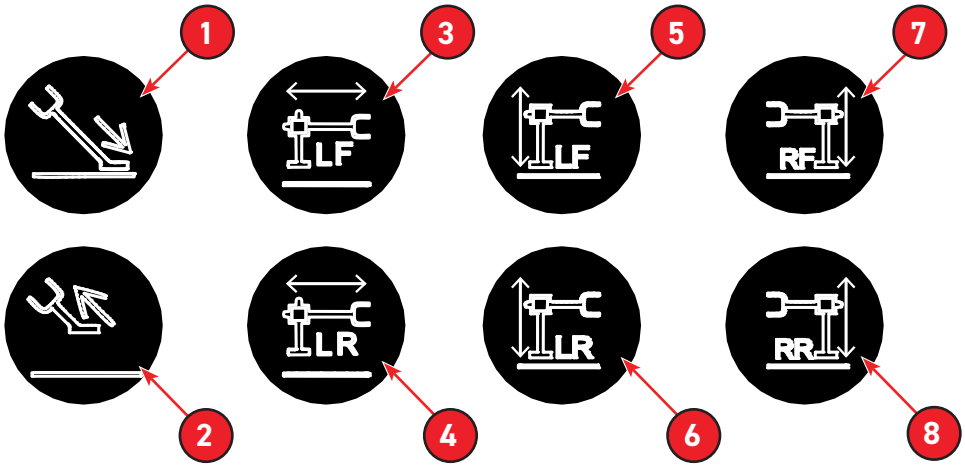
The winch has two speeds. To engage high speed winch mode, press the button on the dash. The light on the button indicates the winch is in high speed mode. Do not change the winch speed while it is running, as damage to the winch will result. Line pull capacity is decreased while using high speed.

	Frequent use of combined flow 2-speed winch will cause hydraulic oil to overheat. Functions may stop and hydraulic components may be damaged.

Carrier Controls and Instruments

Outrigger Control Box-Carrier Frame

Outrigger functions are controlled at the control station located on either side of bed decking or in the Operator Cab. The bedside keypads will only allow horizontal movement on the side that the keypad is located. The crane cab controls will allow any outrigger operation, on both sides of the crane. This is a safety feature to ensure that outriggers are not moved in areas where the Operator cannot see the outrigger beams.



Drivers Bedside Control Shown

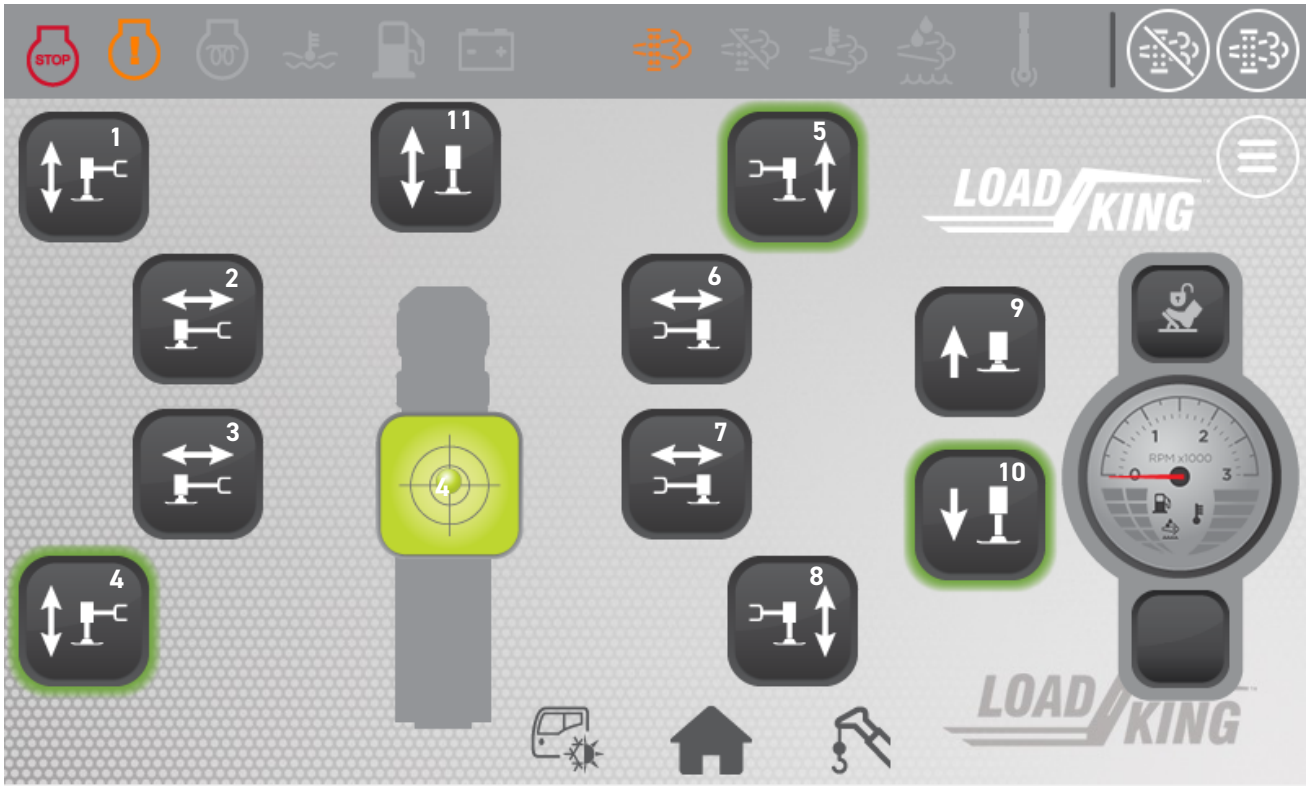
1. Extend Switch: This switch is used to extend the outrigger function. When activated, the backlight is green.	5. Front Left Jack Switch: This switch is used to extend/retract the jack.
2. Retract Switch: This switch is used to retract the outrigger function. When activated, the backlight is blue.	6. Rear Left Jack Switch: This switch is used to extend/retract the jack.
3. Front Beam In/Out Switch: This switch is used to move the beam in/out.	7. Front Right Jack Switch: This switch is used to extend/retract the jack.
4. Rear Beam In/Out Switch: This switch is used to move the beam in/out.	8. Rear Right Jack Switch: This switch is used to extend/retract the jack.

	The out and down horizontal outrigger beams are equipped with a manual stow latch pin that must be disengaged before the horizontal outrigger beams can be extended. Re engage stow latch pins before travel.

	Do not operate outriggers without determining clearance from obstructions or personnel.

To activate the outrigger controls, first press either the Extend Switch (1) or Retract Switch (2). The respective switch will illuminate and an alarm will sound as a warning to all personnel in the area. While the alarm is sounding, it is then possible to engage one of the switches for extending/retracting the horizontal beams (3 and 4), or raising/lowering the outrigger jacks (5 through 8). The alarm will continue to sound while the extend/retract function is still active., but will shut off automatically if a extend/retract or raise/lower function is not engaged (within 10-15 seconds).

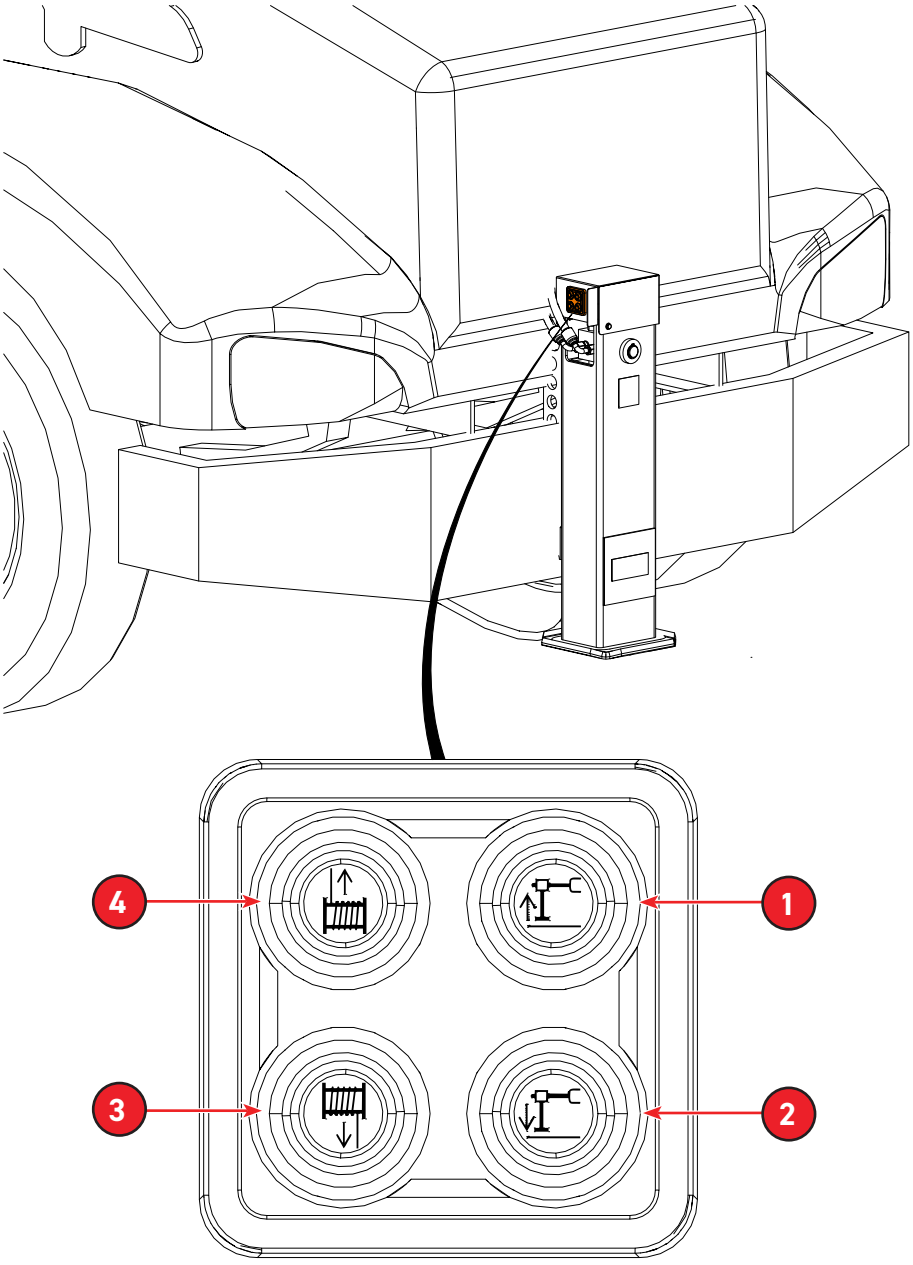
Outrigger Controls Screen



1	Front Left Jack	7	Rear Right Beam Swing Out/In
2	Front Left Beam Swing Out/In	8	Rear Right Jack
3	Rear Left Beam Swing Out/In	9	Retract Function
4	Rear Left Jack	10	Extend Function
5	Front Right Jack	11	Front Stabilizer Jack
6	Front Right Beam Swing Out/In		

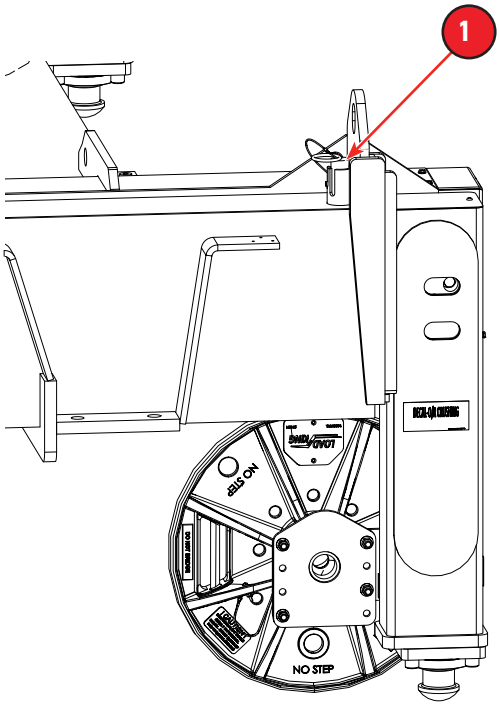
Front Stabilizer

Front stabilizer must be used in any setup configuration of the crane.



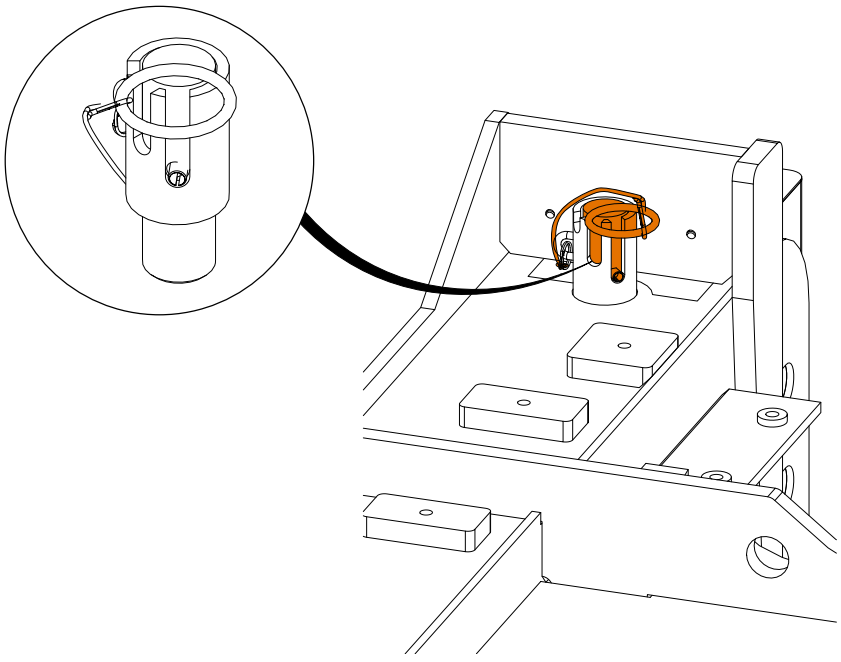
1	Front Jack Up
2	Front Jack Down
3	Winch Down
4	Winch Up

Outrigger Stow Pin

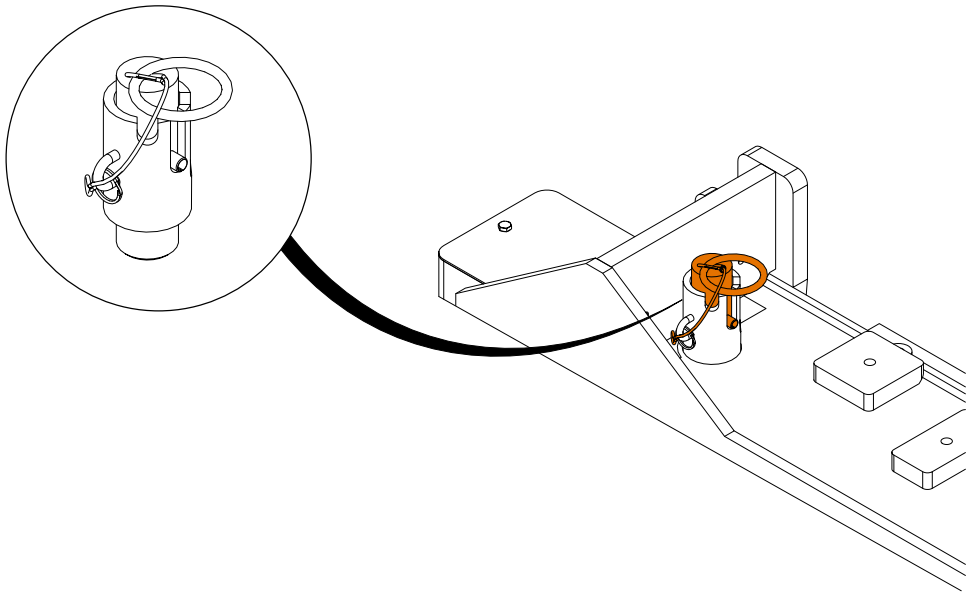


1	Outrigger Lock Pin

Engage pin at end of each beam before driving the Boom Truck to prevent horizontal movement.

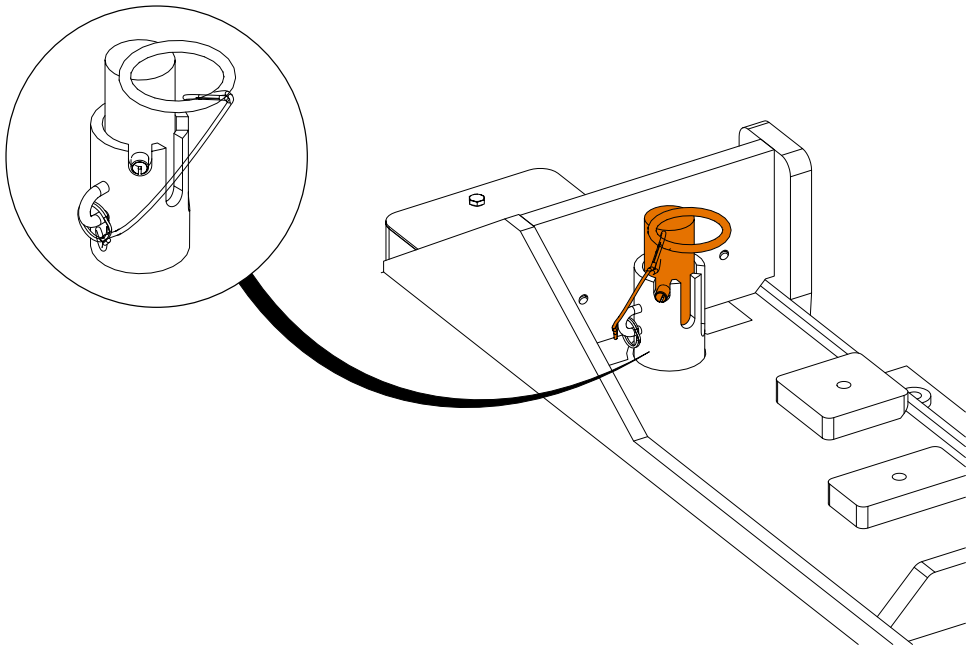


Travel or Retracted



Mid-Span

Disengage pin at end of each beam before extending. Damage to pin and horizontal beam housing may occur if beams are extended without first releasing the stow pin.

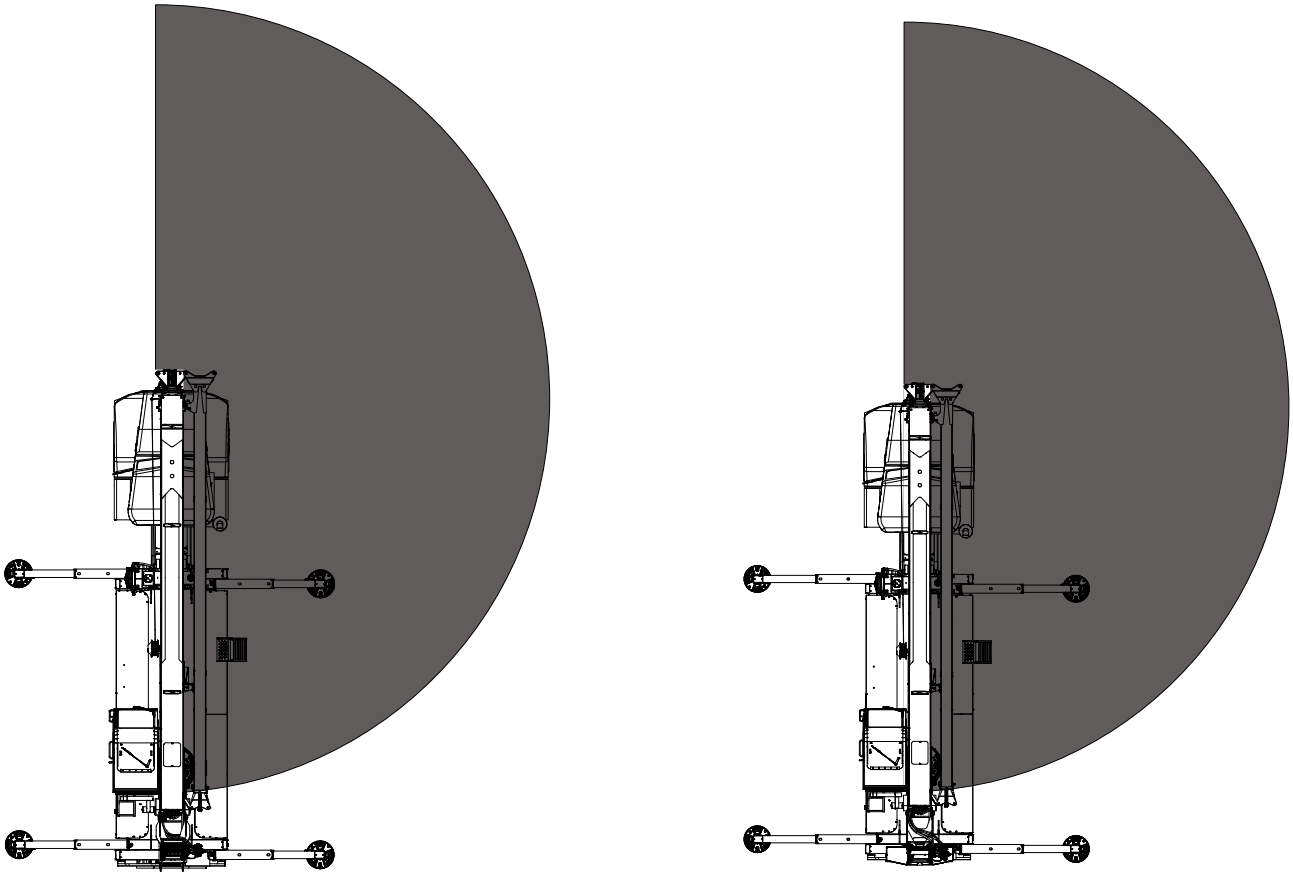


Full Span or Disengaged

Side-Stow Jib

The optional jib extensions are available to provide additional boom reach. The jib option is a side-stow jib with a four-plate tubular design and a telescopic stinger. This optional jib extension is pinned directly to the boom tip section. When not in use, the jib can be unpinned from the boom head and stowed on the mounting brackets on the right side of the boom base section. Refer to Jib Deployment and Stowage for the respective procedures for the usage of the jib.

Jib can be deployed or stowed at any quadrant. The depiction below references the amount of swing arc needed.



35-127RS **40-127RS**

Jib Swing Arc

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

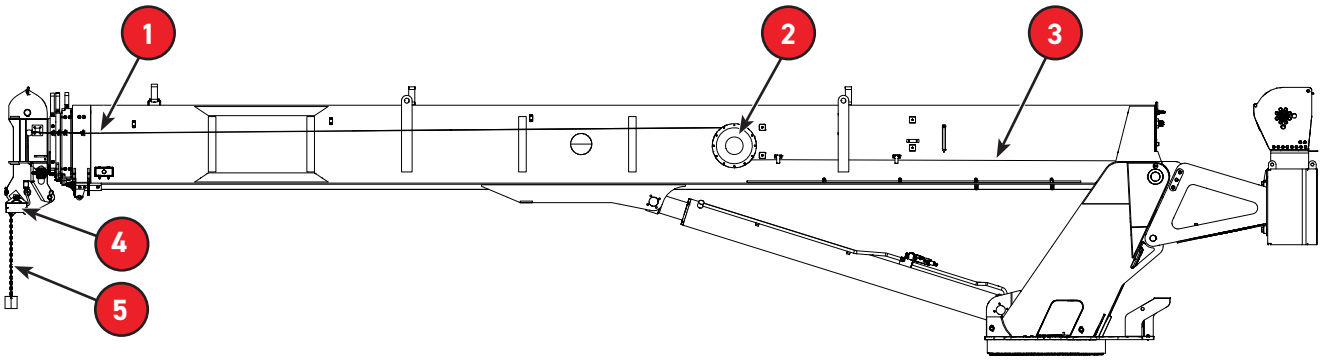
Load Moment Indicator and ATB

Load Moment Indicator System (LMI)

The **Load King** RS Boom Truck is equipped with the Greer Insight Load Moment Indicator System. The Operator is provided with a continuous readout of load moment, approach to overload, and two-block condition. Refer to the Greer Operation manual, for proper maintenance and setup of unit.

	The Greer Insight LMI is designed as an Operators aid only. Refer to the crane's load chart for proper operating capacity and range.

ATB Components



ATB Components

1. External LMI Wire (Standard)	4. ATB Switch, Heavy Duty
2. Reel, LMI	5. CTWT with Chain
3. LMI Wire (Optional - Wireless ATB)	

Anti-Two-Block Switch (ATB)

An ATB switch is mounted on the left side of the boom tip. The switch is normally open without any weight. 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 signal the LMI of a good ATB condition. 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 signal to the LMI, and initiating Function Kick Outs (FKO).

Cable Reel

The Anti-Two-Block (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 wireless ATB system.

Routing sheaves are mounted at the rear of the base boom on units equipped with wireless ATB. Ensure sheaves are free to turn smoothly. Rough or sticking sheaves may damage ATB cable.

Function Kick-Out (FKO)

This is controlled using logic in the Greer system and the LK control module. Signals from the Greer system are used to enable or disable function controls.

- Boom Down
- Extend Telescope
- Winch Up

Power Take-Off (PTO)

There are several styles of PTOs used on various equipment. Refer to the following pages for operation of the PTO.

To Engage PTO

1. Set parking brake.
2. Shift transmission to neutral (engage clutch prior to shifting for manual transmissions).
3. There may be an indicator light on the dash, depending on truck chassis model, that will illuminate when the PTO is engaged.



1	PTO Engage Switch

⚠	Disengage PTO before driving truck. Failure to do so will cause damage to the transmission and hydraulic pump. Throttle control is disabled while PTO is engaged as a protective measure.

To Disengage PTO to Travel

1. Stow boom in boom rest.
2. Stow outriggers.
3. Disengage PTO on the dash of the cab. The indicator light on the dash (if available) will go out when PTO is disengaged.
4. Shift transmission into gear (engage clutch prior to shifting for manual transmissions).
5. Release parking brake (if necessary).

Operating Instructions

Job Site

Job Site Setup Procedure

1. Position the vehicle on solid, level ground. Fully engage the parking brake and place the transmission in neutral.
2. Refer to the Power Take-Off section of the Operator's Manual for PTO engagement due to the differences in activation, transmission types, and PTO locations.
3. When the pump PTO is engaged, it allows the hydraulic oil to warm up to prevent pump damage. Never drive a vehicle with the pump PTO engaged.
4. Check the hydraulic system filter indicator to confirm that the filter is functioning properly.
5. Select crane power switch on truck dash.
6. Extend all outriggers to firm contact with solid, level surface and level the vehicle. Raise the crane enough to lift the tires slightly off the ground.
7. The Front Bumper Outrigger must be raised last and retracted first, and it is required with all crane configurations.
8. Always pay out winch line before extending the boom.

	Maintain an appropriate winch payout. Failure to do so will result in the load block contacting the Anti-Two-Block (ATB) switch, which will shut down the boom extend function or damage the crane.

9. Always know the operating radius (the distance from the centerline of rotation to the load hook), and the actual weight of load being lifted. The load radius may vary at different rotation positions. Due to chassis twist.

Outrigger Position

Before conducting any boom operation, the Operator must extend all outriggers on a firm and level surface. There are other conditions that may require the Operator to restrict operations, such as, but not limited to the following:

- Loose or sandy soil
- Crusty or frosty surfaces with soft soil underneath
- Icy or slick pavement
- Sloping surfaces

In some areas, the Operator may be able to level the crane with the use of pads or blocks (cribbing). These pads must be of adequate material to support the outrigger without collapsing. Extend all outriggers and outrigger jack cylinders, then extend the front bumper outrigger last.

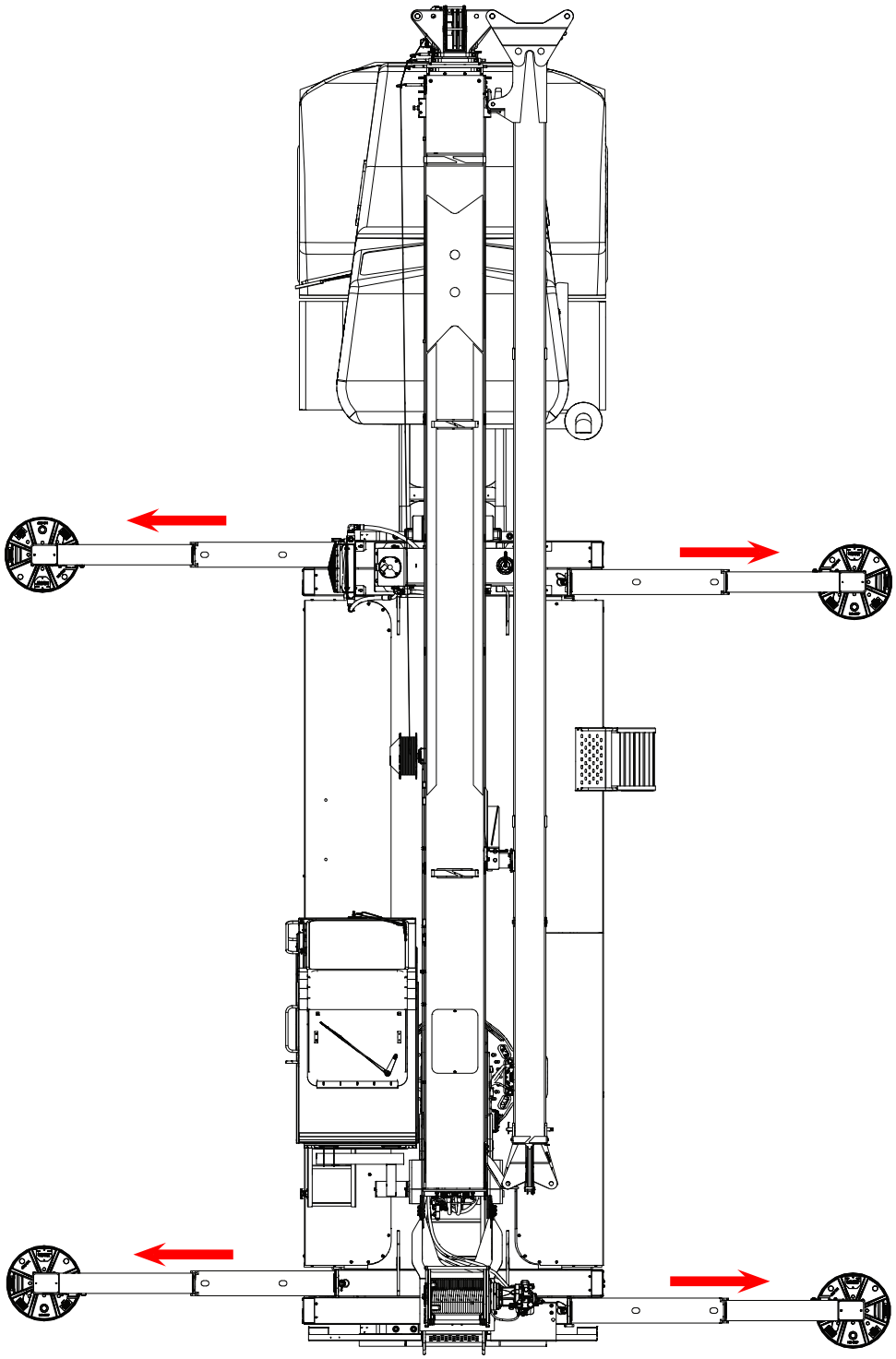
	To prevent structural damage to the carrier chassis, the front bumper stabilizer must be extended last and retracted first.
	Observe caution notes on outrigger movement whenever setting up or stowing outriggers.

Outrigger Warning Alarm

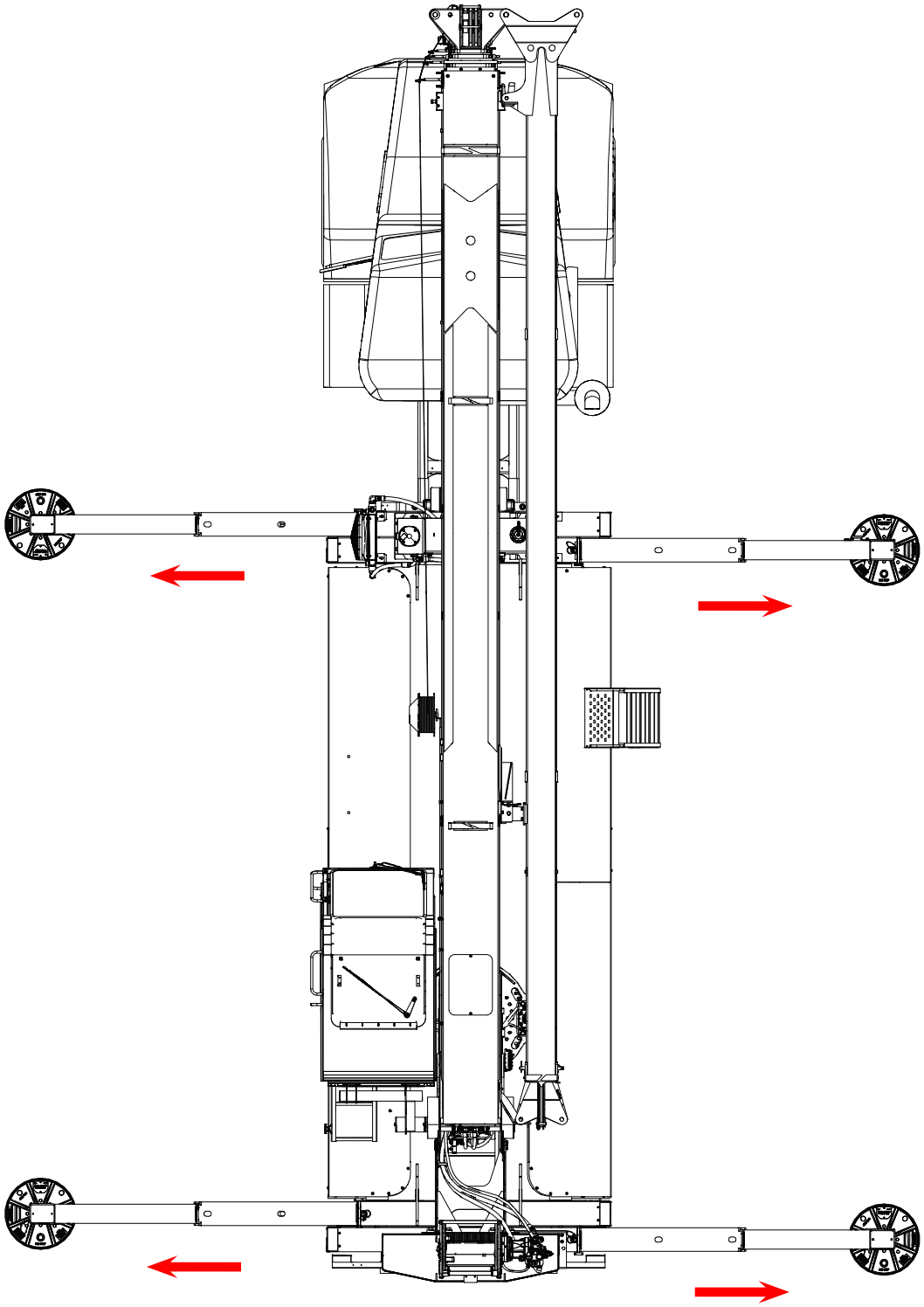
The outrigger warning alarm will sound an audible signal whenever any outrigger is moving.

Work Site Position

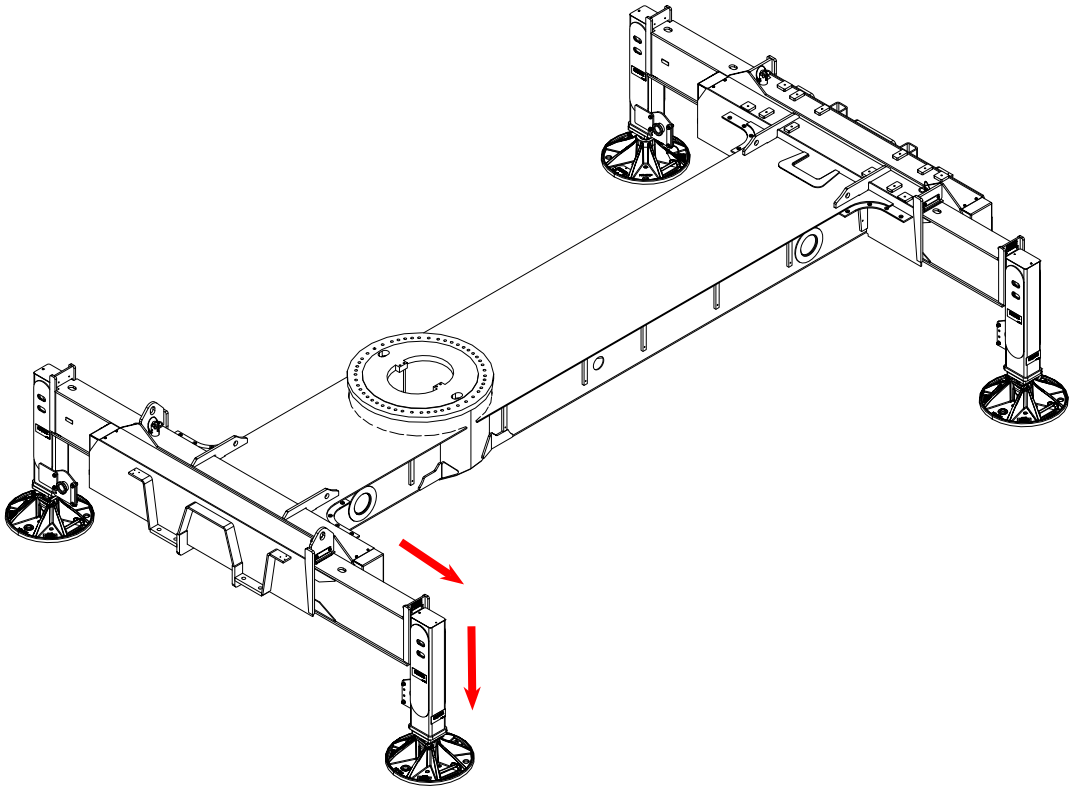
The best possible work site should always be sought when the Operator is positioning the crane. An ideal location is where the ground is firm, level, and dry. The crane should be situated in close proximity to the work area. The site should be free of overhead obstructions. Maintain safe clearances from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



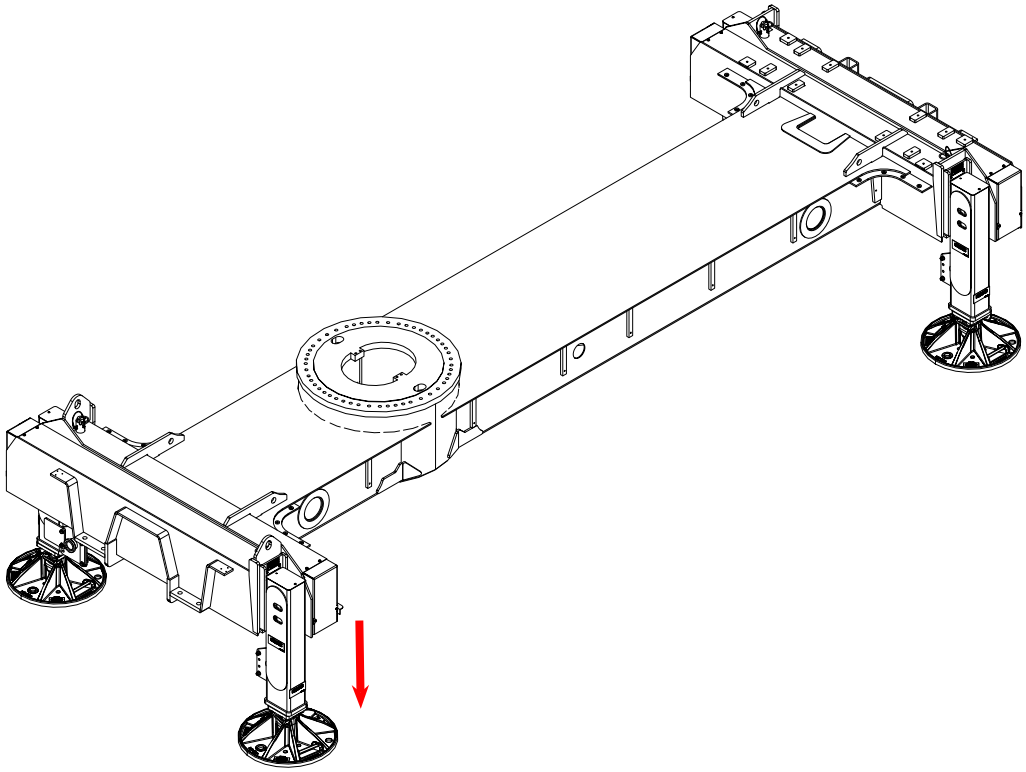
35-127 RS



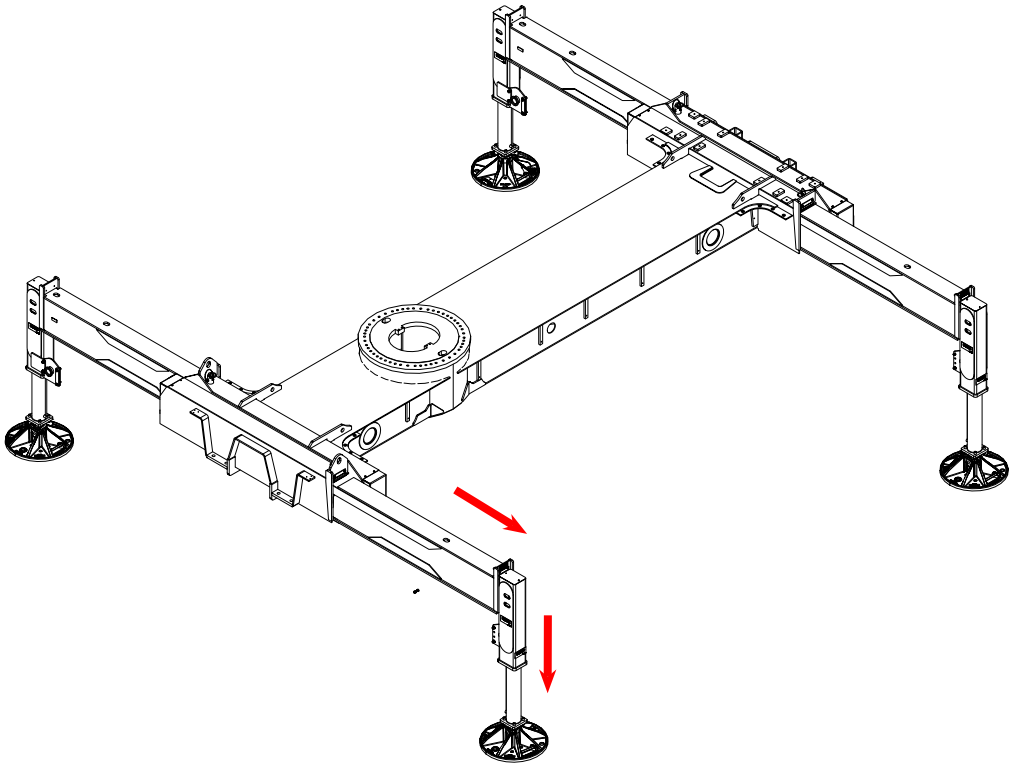
40-127 RS



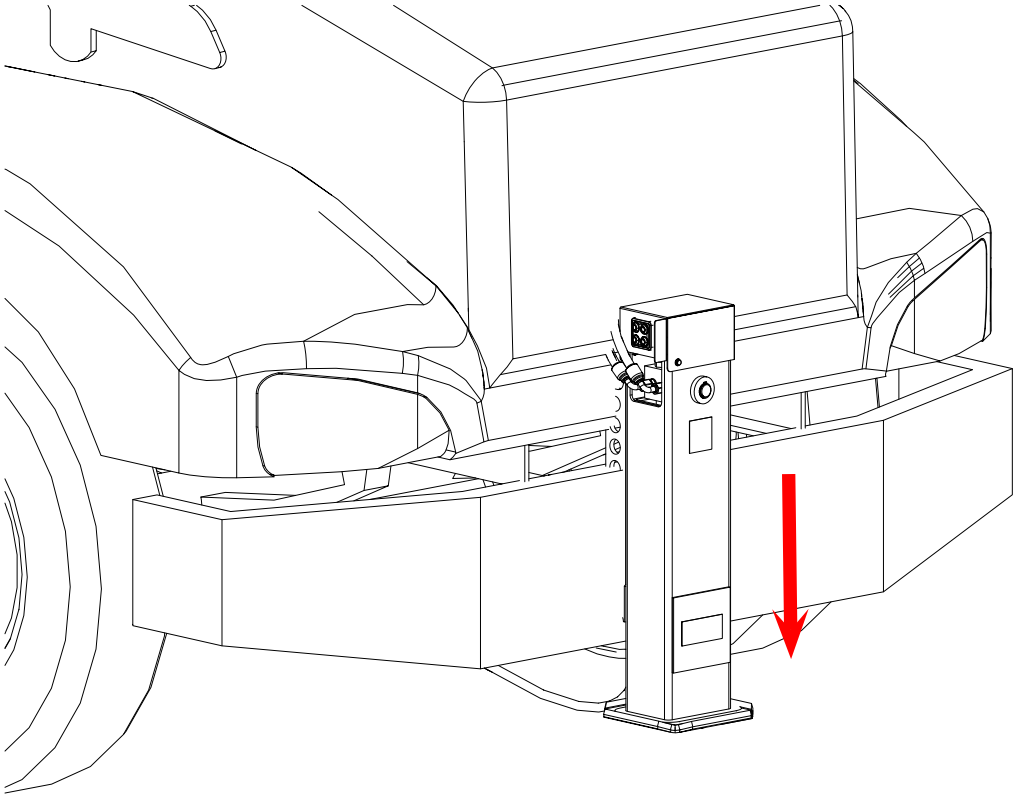
Mid Span



Zero Span



Full Span



Front Stabilizer

Cold Weather Operation

While operating in cold weather temperatures 32° F (0° C) or below, the Operator must allow the hydraulic oil to warm up to operating temperature as indicated through the control panel interface. This can be accomplished by allowing the hydraulic pump to run under no load for ten minutes at low engine speed. Further, actuate all the controls slowly until controls move smoothly and easily. In extreme cold conditions (temperatures -40°F (-40°C) or below), 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, refer to the sections Cold Weather Recommendations and Cold Weather Package Specifications.

	Failure to allow the hydraulic oil to warm up may cause damage to the pump and delay the response time of function controls.

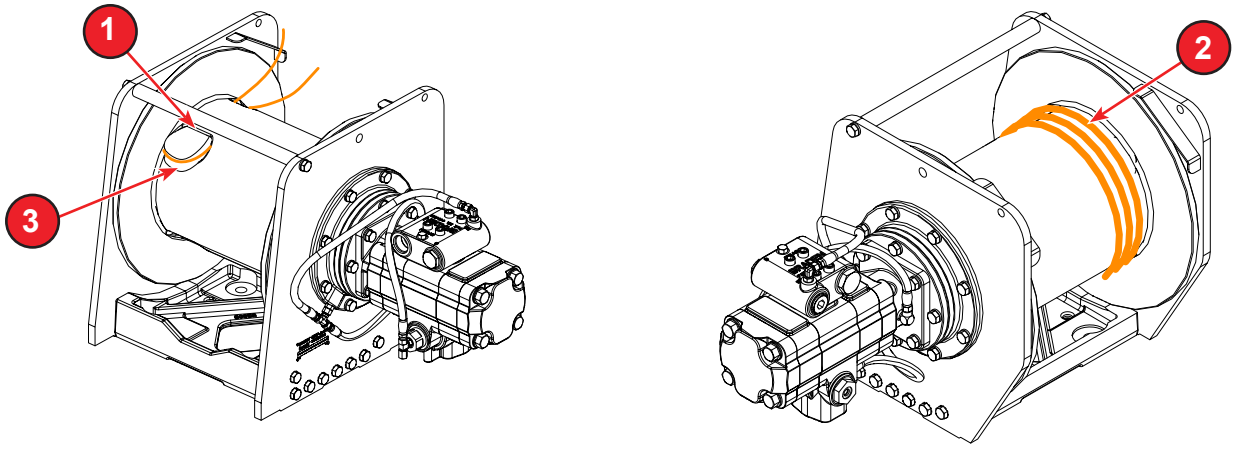
General Operational Issues

Winching Best Practices

1. Always operate controls to lower the load line while extending the boom. This will maintain clearance between the boom tip and the downhaul weight.
2. Ensure that the load line is not twisted or kinked, and that the load line is properly seated on the drum and in sheaves.
3. When raising or lowering the winch, meter all controls and apply power smoothly; do not make sudden starts or stops.
4. When hoisting a load, raise it a few inches and allow the controls to return to neutral to determine if the winch brake and boom holding valves are working properly.
5. Do not make side pulls with the boom. This type of loading can damage the boom and the rotation mechanism. Do not raise or lower a load in such a manner that would cause side loading.
6. When lifting a load, make sure that three (3) full wraps of rope remain on the winch drum at all times. Maintain tension on the load line at all times to prevent the rope from becoming twisted or kinked, and to keep the cable properly seated on the drum and sheaves. When lifting loads that exceed the single part line limitation shown on your maximum load chart, refer to the chart's instructions on how to multipart the load line.

⚠	When using a multipart load line, boom extension must be limited to maintain three (3) full wraps on the winch drum.

7. It is imperative to ensure the proper maintenance of the wire rope load line on the **Load King** Boom Truck. 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. Both the load line loop and the drum wedge must be properly seated inside the winch drum before winding the load line on to the winch drum. Refer to the Maintenance and Service section.



1. Load Line
2. Three Wraps Minimum
3. Drum Wedge

Safety Devices

The safety devices on the **Load King** Boom Truck are described below. These devices help to maintain control of a load in case of power or hydraulic line failure. It is important to understand the function and operation of these devices so that a continual check on their performance can be made.

	Stop all operations and contact your authorized **Load King** dealer if any of these devices fail to function.

Boom Lift Cylinder Holding Valve

A single-acting holding valve is cartridge-mounted in the cylinder base. This valve holds the boom in extended or elevated positions. If the crane experiences a power failure, a hydraulic pressure line failure, or the boom fails to hold its position ("creeps down"), STOP ALL OPERATIONS IMMEDIATELY and contact your authorized **Load King** dealer.

	Under no circumstances should the cartridge be removed or attempted to be removed from the lift cylinder base unless an authorized maintenance person is present and the boom is properly supported. If not properly supported, a boom could fall, resulting in property damage, serious injury, or death.

Extension Cylinder Holding Valve

A holding valve is mounted to the cylinder rod end (boom base). This 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** Cranes dealer.

Outrigger Cylinder Holding Valve

All vertical outriggers are equipped with internal cartridge-type lock valves. If outriggers fail to hold their position ("creep up") under load, or fail to remain retracted ("creep down") while the vehicle is in motion, consult your authorized **Load King** dealer.

Winch Safety Brake

To verify that the brake is functioning, set the outriggers, raise a load a few feet, and release the control handle. If the load does not maintain its position ("creeps down"), consult your authorized **Load King** dealer.

Swing Drive Static Brake (Rotation Gearbox)

The rotation gear drive has a spring-applied hydraulic release brake. To verify that the swing drive static brake is functioning, set the outriggers, verify the Free Swing feature is locked; then swing the boom and release the control handle. If the boom continues to swing, consult your authorized **Load King** dealer.

Swing Drive Free Swing Brake (Rotation Gearbox)

To test the swing drive brake in Free Swing mode, set the outriggers and unlock the Free Swing feature. Swing the crane and depress the swing brake pedal after releasing the control handle. If the boom continues to swing, consult your authorized **Load King** dealer.

Training and Operator Qualifications

It is extremely important that the Operator has a thorough knowledge of all the operating characteristics of the crane. Crane operation shall be limited to personnel with the following minimum qualifications:

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

Operators and trainees will meet the following qualifications:

- An Operator shall be unhindered by drugs or alcohol, and physically capable of operating the unit.
- Demonstrate ability to read and comprehend all placards, decals, Operator's manuals, codes, and other information pertinent to correct and safe crane operation.
- An Operator shall demonstrate the ability to operate the specific type of equipment or provide satisfactory evidence of qualifications and experience to do so.
- The Operator shall be responsible for all maintenance requirements of the crane that they operate, as well as trainees under the Operator's supervision.
- If an Operator becomes physically or mentally impaired, 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. The system then automatically interrupts any boom operations which could bring the load block into contact with the boom tip. A warning horn will sound to alert the Operator to the two-block condition.

Those boom functions that could be used to move the load block away from the boom tip will continue to function.

Do not rely on the ATB device as a winch hoist stop.

Load Moment Indicator (LMI) Greer Insight

The Load Moment Indicator (LMI) system is designed to provide the Operator with information on the load they are lifting and also helps 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 LMI system, retract the boom, elevate the boom, or lower the winch.

If the LMI system must be overridden for any reason, the Cancel Alarm button on the face of the LMI display unit should be depressed for five (5) seconds. At this point, the system is overridden until the overload or ATB condition is removed or the override times out (up to 120 seconds). For more information on LMI system, refer to the Description of Machine and Controls section “Load Moment Indicator System”.

	Abuse or misuse of the ATB/LMI override may result in property damage, serious injury, or death.

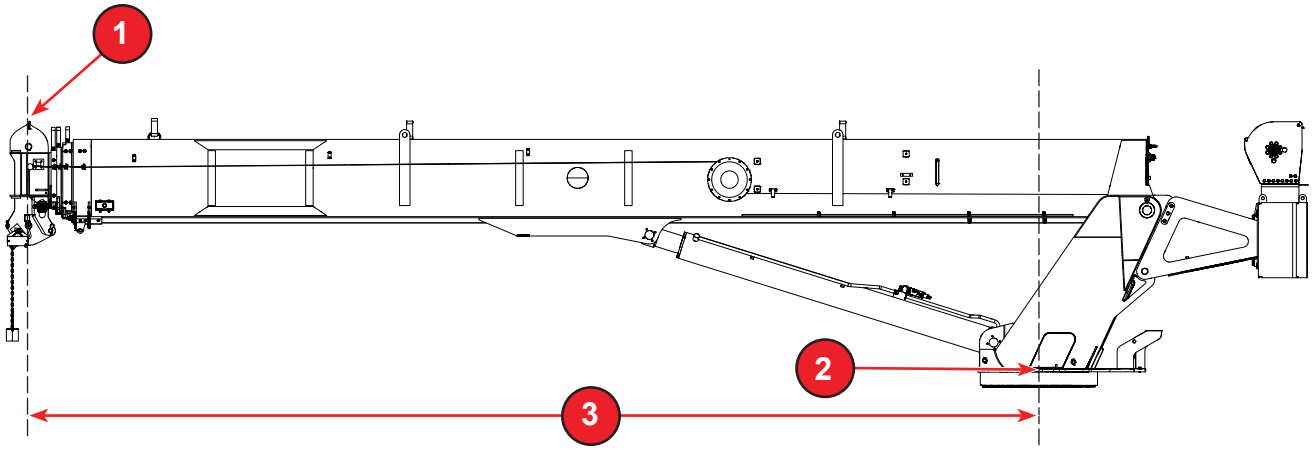
	The load-indicating equipment on this crane is only intended to aid in safe operation. Do not rely on electronic load/radius indicators to replace the use of capacity charts and proper operating procedures.

Load Handling Operations

Before moving a load, the Operator must study the capacity placards carefully and adhere to the load capacities and radii of the 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. Sudden starts and stops impose undue shock loads on the equipment. This is especially true when handling heavy loads and in extreme cold temperatures in excess of -40° F (-40° C). The front bumper mounted stabilizer must be used to lift in all outriggers configurations.

Maximum Load and Boom Angle Charts

Operating Radius



1. Center line of load
2. Center line of bearing
3. Load radius

Using the Maximum Capacity Load Chart

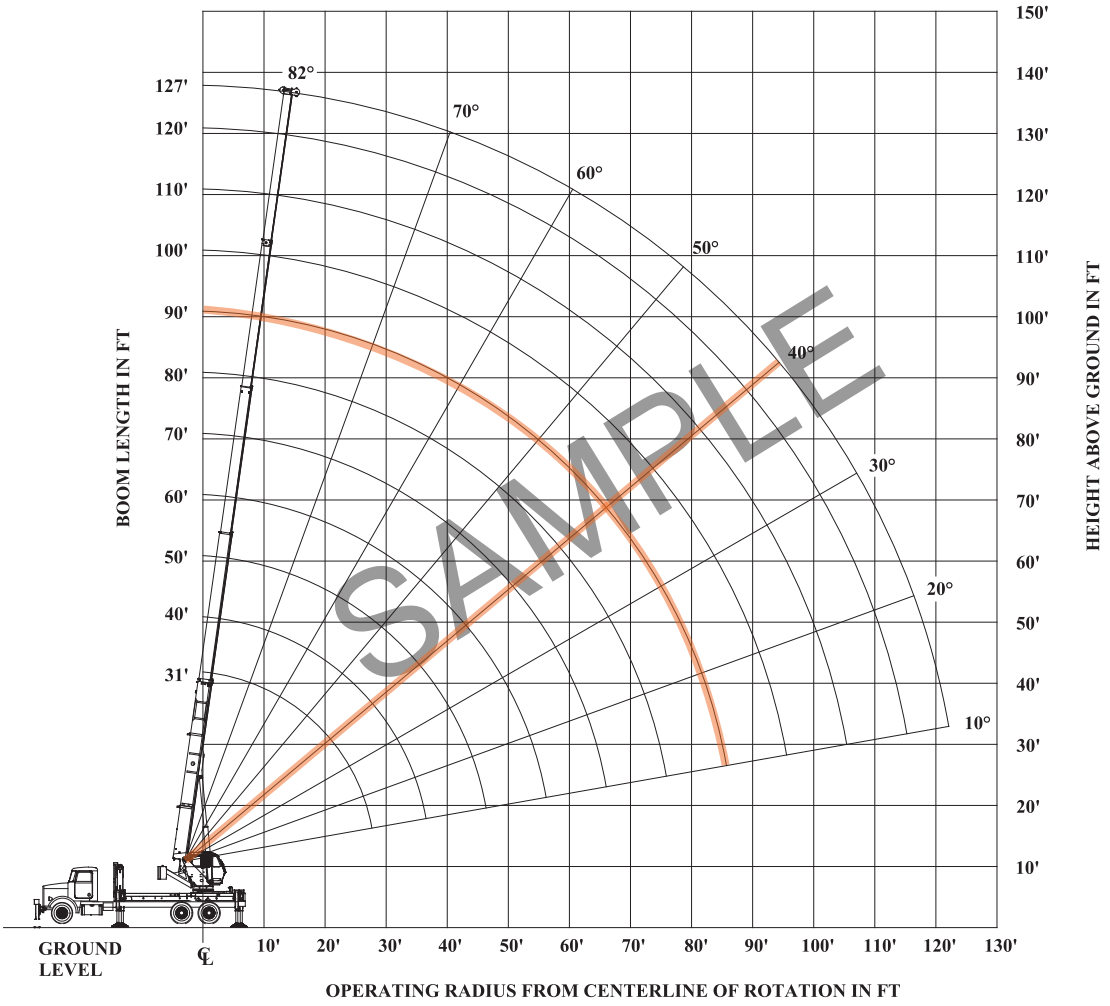
⚠	360° operation requires the use of the standard front bumper outrigger.

The maximum capacity load charts shown are located in the load chart book in the cab. Their purpose is to show the Operator the load capacities at various radii and boom angles.

The boom extension corresponds with the reading from the boom angle placard. By reading the boom angle from the boom angle placard, the operator can determine the approximate operating radius and by using the maximum load that can be lifted if that radius is maintained.

The following is an example of how to use the load chart (Sample load chart below):

1. Assume the boom is extended 86'. (86' Boom Extension).
2. Using the boom angle indicator as a guide, the boom has been raised to 40° elevation.
3. Using the range diagram section of the maximum load chart, find the 40° angle line and follow it to the 90' arc. If the extension is not exact to noted boom length on the range diagram, always default to the next larger stated boom length. Then follow the vertical line down; the operating radius is approximately 65'.



4. Using the load rating section of the load chart, go across the top of the chart (boom length) to the 90' column and go down (operating radius) to 65'. The number at the intersection is the maximum load that can be lifted (i.e., 3,850 lbs.).Since the boom will deflect as it is loaded, the boom angle will have to be increased to maintain a loaded boom radius of 65'. If the boom is not raised up above 65° before lifting the load - the load will swing out, increasing the operating radius. This may cause an overload condition if at maximum capacity.

Operating Boom Length

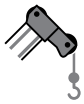
Operating Radius	31	40	50	60	70	80	90	100	110	120	127
5	80,000	43,000	42,650								
10	51,300	43,000	42,650	44,850	43,650						
12	45,350	42,650	40,600	39,100	37,950	37,000					
15	38,750	36,250	34,300	32,900	31,800	30,850	30,100				
20	30,050	29,100	27,350	26,050	25,000	24,200	23,450	22,600	20,400		
25	20,900	21,650	22,100	21,600	20,600	19,850	19,150	18,600	17,650	15,700	10,000
30		15,900	16,350	16,550	16,650	16,750	16,150	15,600	15,100	14,200	10,000
35		12,100	12,550	12,800	12,900	13,000	13,000	13,000	12,950	12,500	10,000
40			9,850	10,100	10,250	10,350	10,350	10,350	10,350	10,300	10,000
45			7,850	8,100	8,250	8,350	8,400	8,400	8,400	8,350	8,300
50				6,550	6,750	6,850	6,900	6,900	6,900	6,850	6,850
55				5,300	5,500	5,600	5,650	5,700	5,700	5,700	5,650
60					4,500	4,600	4,700	4,700	4,700	4,700	4,700
65					3,650	3,800	3,850	3,900	3,900	3,900	3,900
70						3,100	3,150	3,200	3,200	3,100	3,200
75						2,500	2,550	2,600	2,650	2,650	2,650
80							2,050	2,100	2,150	2,150	2,150
85							1,600	1,650	1,700	1,700	1,700
90								1,250	1,300	1,300	1,300
95								900	950	1,000	1,000
100									650	650	700

SAMPLE


Outriggers Fully Extended



Fixed Counterweight


Lifting over boom head main fall

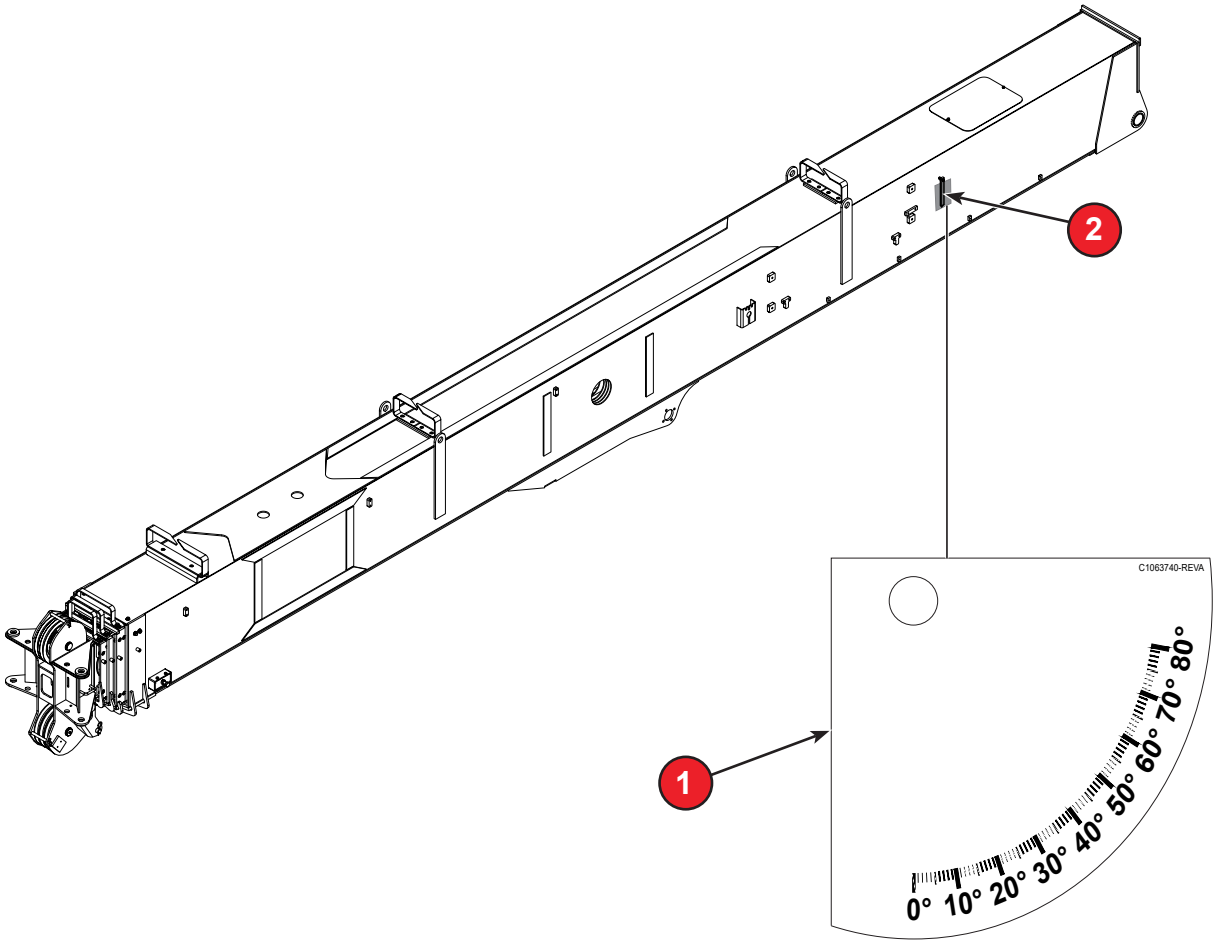

Jib is stowed on side of boom

	In an occurrence where the operating radius is between those listed on the chart, use the next longest boom radii listed.
	It is important the Operator knows the weight of any material they to handle. This can be determined by use of a dynamometer or scales.

The maximum load chart shows the maximum lifted load. Maximum load is the weight of the material being handled plus such load handling equipment 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 can be lifted.

	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 crane's 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.

Boom Angle Placards



The boom angle placard (1) provides the Operator with information about the safe operating limits of the crane's boom. The placard is located on the boom itself, so that the Operator can easily see the placard while operating the crane. The boom angle indicator (2) will always point directly down, showing on the boom angle placard the elevation angle that the boom has been raised. If the boom is outside of the limits shown on the placard, the Operator must immediately adjust the boom to bring it back within the safe operating range before continuing operations.

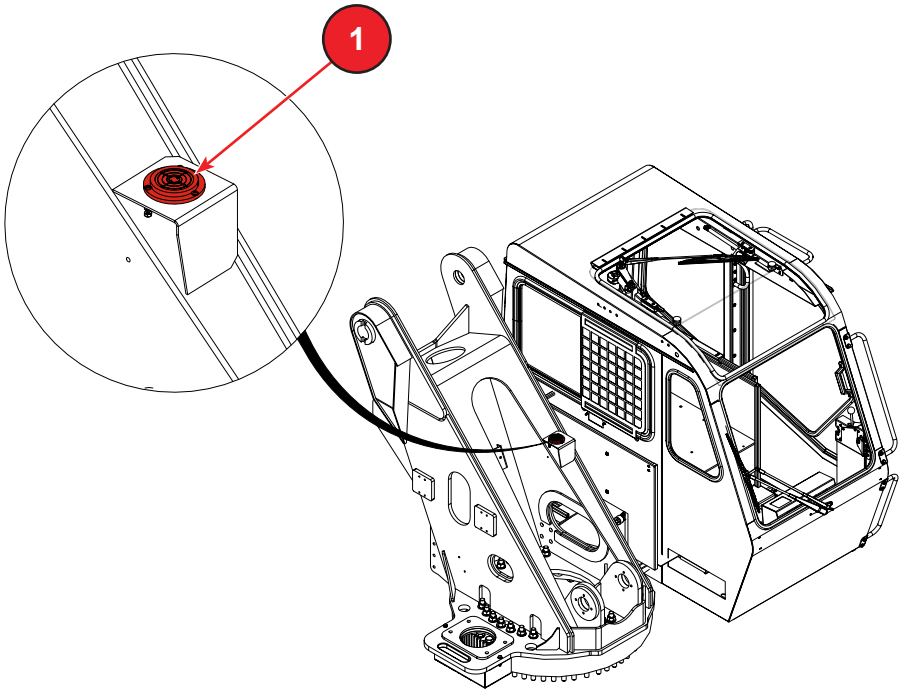
⚠	It is important to operate the boom within the range shown on the boom angle placards to ensure the safe and efficient operation of the crane. Failure to do so can result in damage to the crane or injuries to the Operator and others in the work area.

Initiating Operation

1. Position the unit at the job site in such a manner as to ensure all work operations can be performed without repositioning the truck, refer to Operating Instructions section "Work Site Position". Maximum, load weight, radius, and maximum load rating must always be strictly followed.
2. Set the parking brake.
3. Set the transmission to neutral and engage the PTO.
4. Select crane power switch on truck dash
5. Outriggers can be controlled and set from the upper Operator's cab or from either side of the truck. Refer to Description of Machine and Controls section "Carrier Controls and Instruments" or Operating Instructions section "Outrigger Positioning".

⚠	The unit is equipped with a front bumper mounted outrigger. To prevent structural damage, the front bumper outrigger must be extended last when setting up, and retracted first when stowing outriggers.

6. Extend all outriggers to make firm contact with the ground, refer to Operating Instructions section "Outrigger Positioning". Provide outrigger pads if terrain is soft or if outriggers tend to sink into the ground. Use the master bubble level on the superstructure to properly level the machine. While operating the crane, ensure that the proper level condition is maintained at all times.



1. Bubble Level with Bumpers

7. If the outriggers were set using the side controls, the Operator can then occupy the Operator's cab; otherwise the Operator should maintain their position in the Operator's cab.
8. Bring the hydraulic oil up to its operating temperature, refer to Operating Instructions section "Cold Weather Operation".

9. Check all controls for proper operation. Controls should be metered during all operations to avoid abrupt starts and stops.

	Failure to meter the controls may cause high shock loads on the equipment. This can lead to structural failure or crane overturning and may result in serious injury or death.

Lifting the Load

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

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

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

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

Steps to Lifting a Load

1. Determine the total weight of the load.

	The total load includes the weight of the material being lifted as well as any material handling devices such as slings, yokes, personnel platforms, load blocks, or jib deducts.

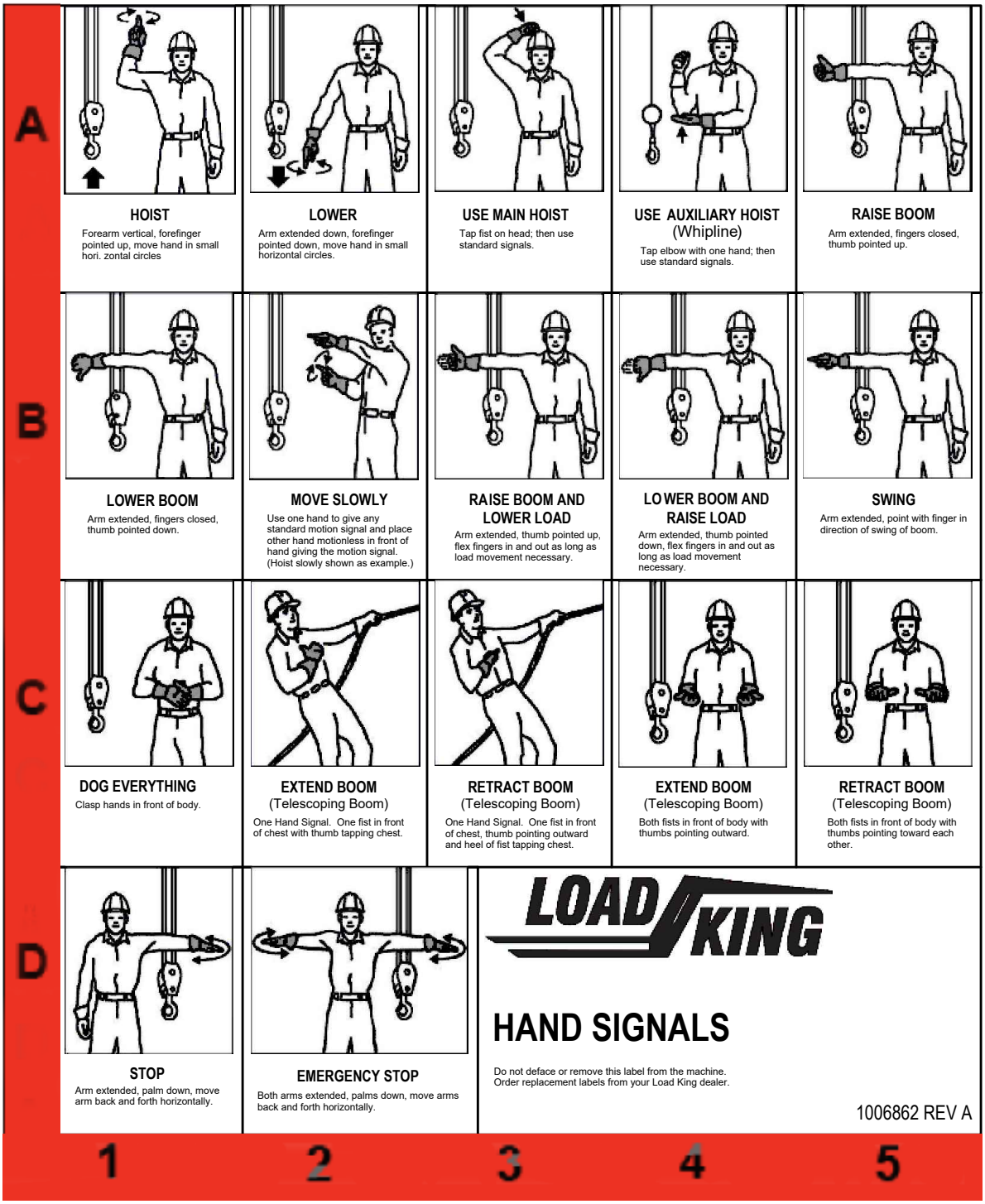
2. Consult the maximum load chart on the crane and determine the correct boom radius and parts of line required based on the load weight.
3. Check the Greer Insight configuration and ensure that it matches the actual crane configuration (including parts of the rigged line).
4. Rotate the boom tip until it is directly over the material to be lifted. .
5. Attach the load line to the material and begin operation. Maintain proper sling or chain usage and ensure that any load handling attachment used is of sufficient size and capacity for the load being lifted.

	The load moment indicator (LMI) system does not protect the crane when the boom is operated below horizontal

Observe the position of the boom and load at all times. The load moment indicator (LMI) system does not protect against shock loads or side-loading.

Hand Signals

Many crane functions require that the Operator has an assistant on the ground. This assistant has visibility of possible obstructions and/or hazards and communicates that to the Operator. Clear communication amongst the crew is essential. The following chart shows common standard hand signals and their definitions.



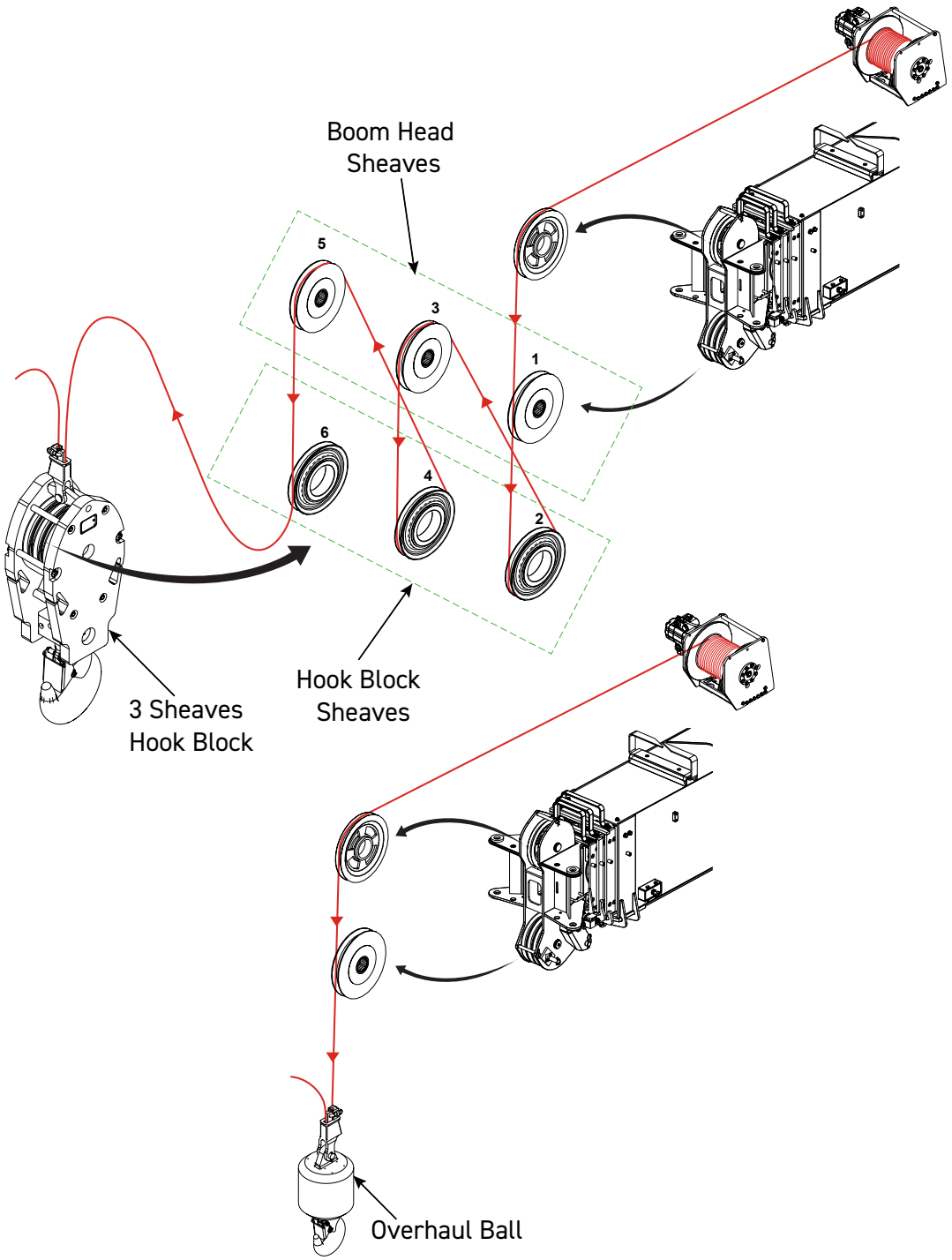
	DESCRIPTION OF MOVEMENT
A1	HOIST. Forearm vertical, forefinger pointed up, move hand in small horizontal circles.
A2	LOWER. Arm extended down, forefinger pointed down, move hand in small horizontal circles.
A3	USE MAIN HOIST. Tap fist on head; then use standard signals.
A4	USE AUXILIARY HOIST (Whipline). 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.

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Jib Deployment and Stowage

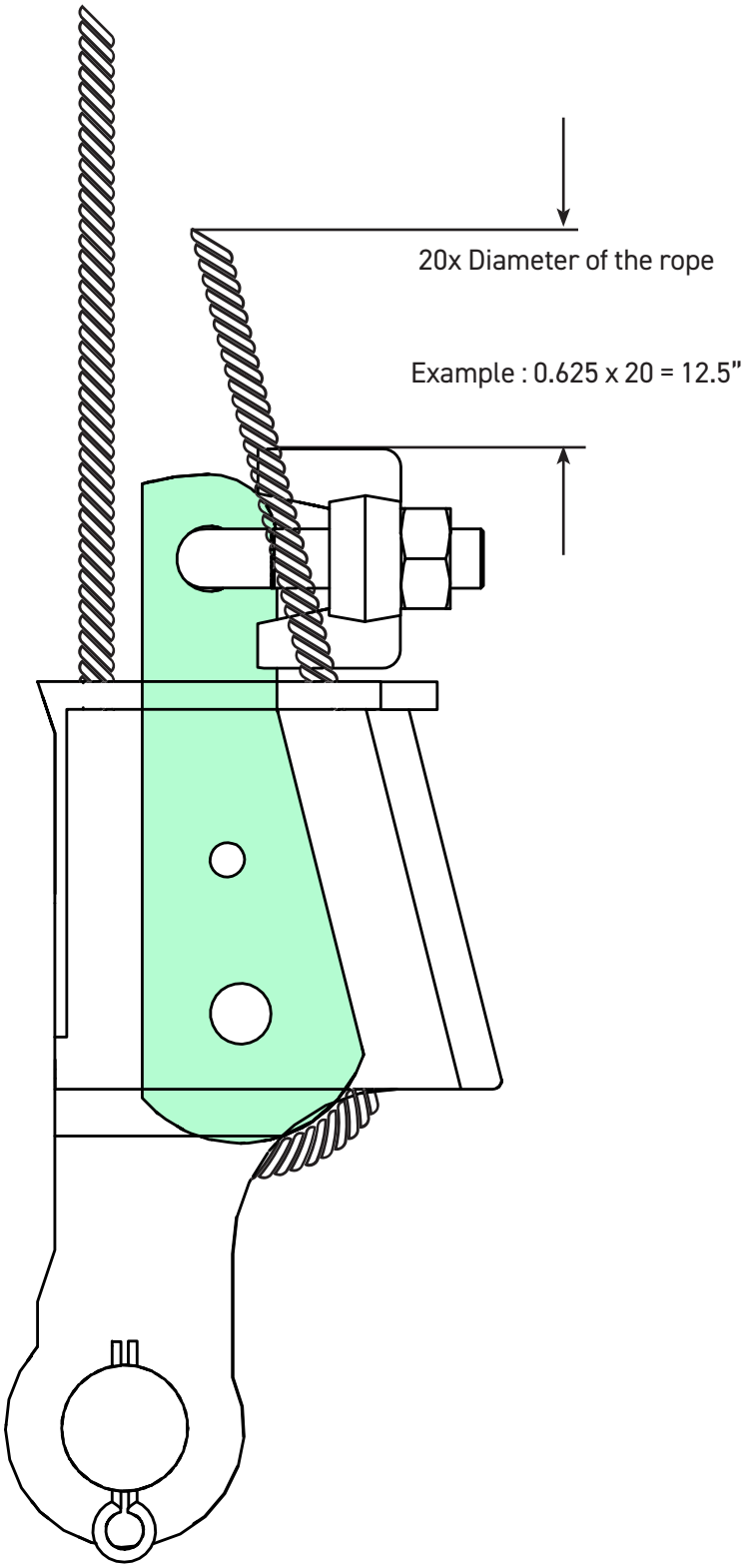
Wire Rope Reeving

Reeving diagram for the main hoist line are shown. The number of parts of line used will depend on the load to be lifted. Refer to the maximum load chart located on riding seat for the required reeving. Hoisting and lowering speeds will be reduced as the number of parts of line increase.



Reeving Diagram

Dead Ending Wire Rope in Socket



Terminator Wedge Assembly

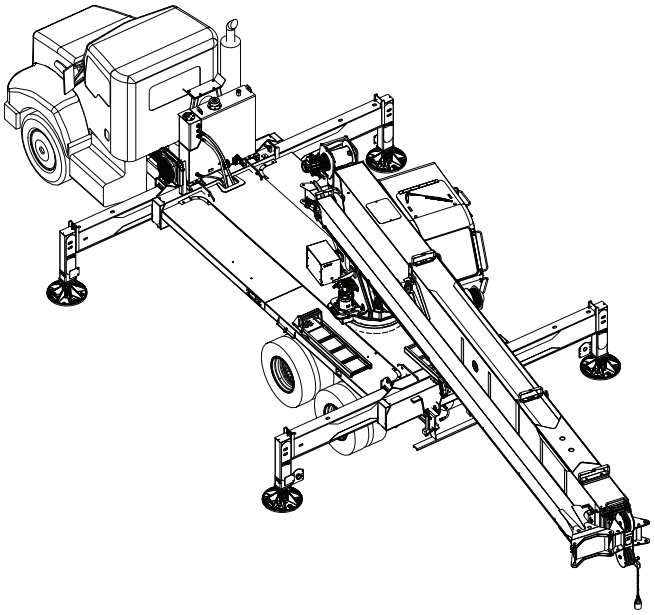
Jib Mounting

Some models are equipped with an optional side stow jib.

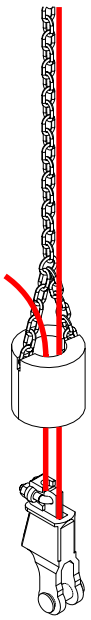
	Do not ride or climb on boom or jib. Serious injury or death could occur. Use a ladder or suitable platform to reach elevated pin locations.

Jib Installation Procedure

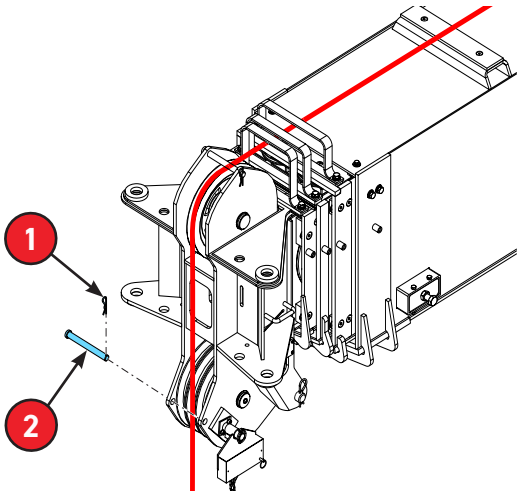
1. Starting with a fully leveled Boom Truck, fully retracted boom, fully extended front outrigger legs and fully extended rear outrigger legs. Rotate the boom to the rear of the truck, and lower until boom head can be reached from the ground.

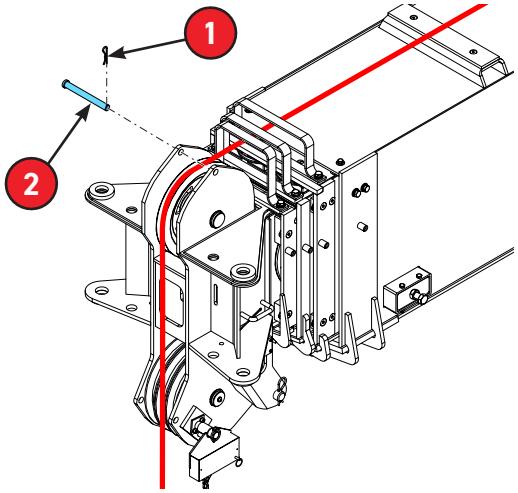


2. Remove the ATB weight and chain clevis from the ATB switch.

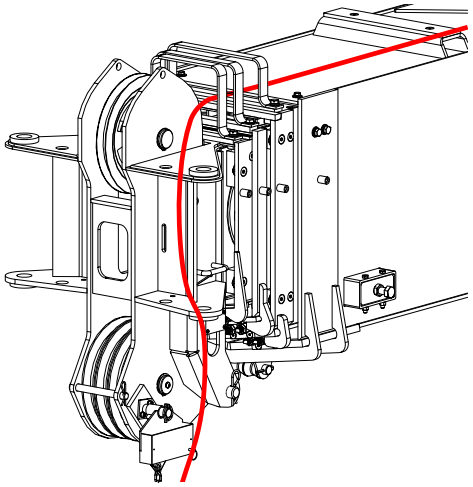


3. Remove bottom and top cotter pin (1) and cable retainer pin (2) from sheave head.

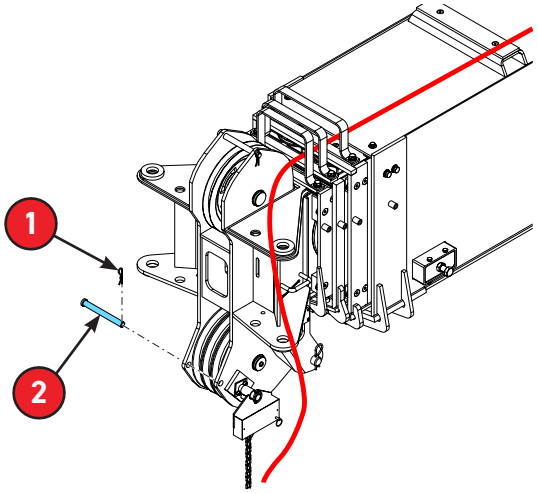




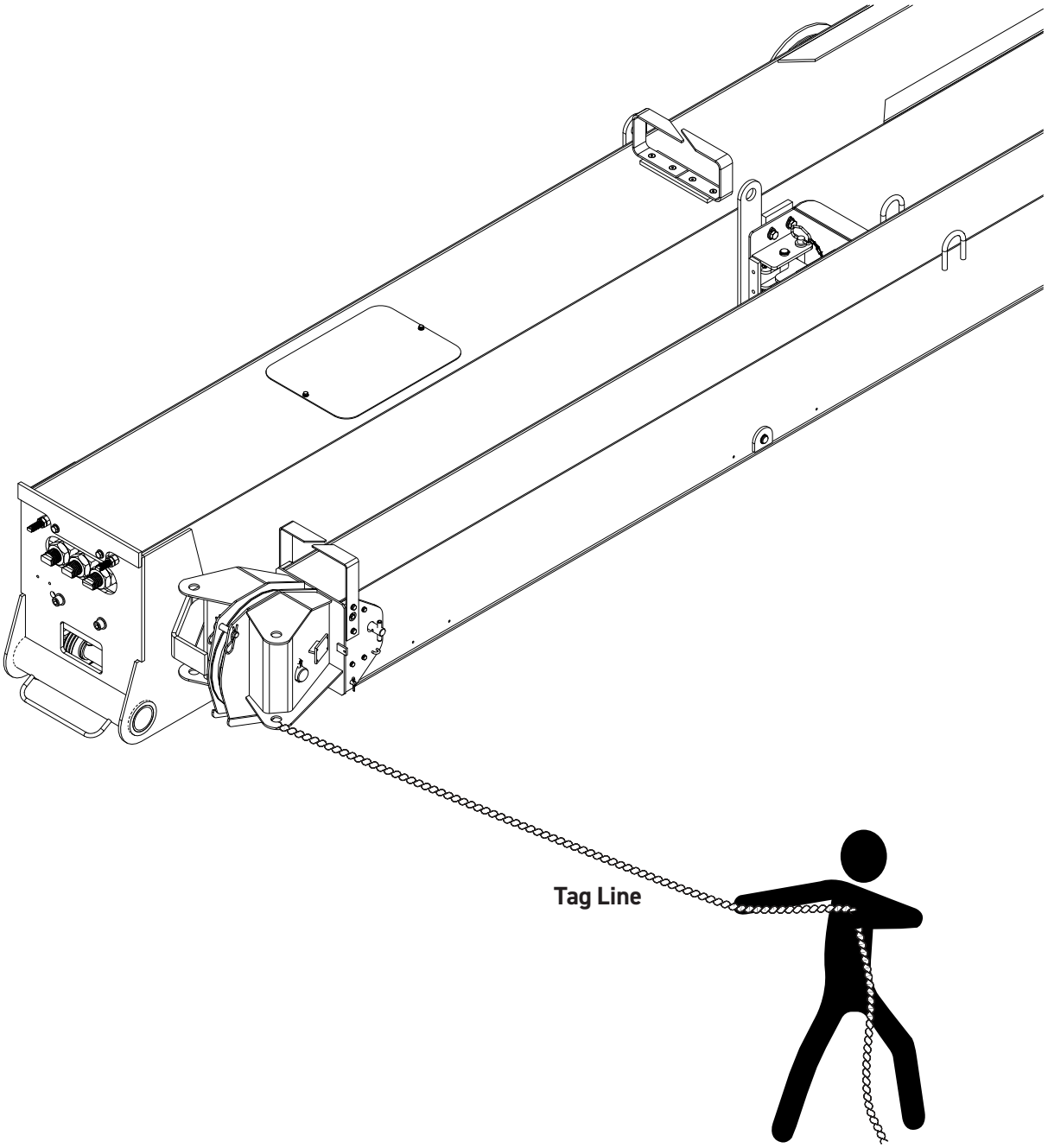
4. Remove load line from boom head sheave and allow it to hang off the side of the boom.



5. Reinstall bottom cable retainer pin (2) and cotter pin (1) in the sheave head.

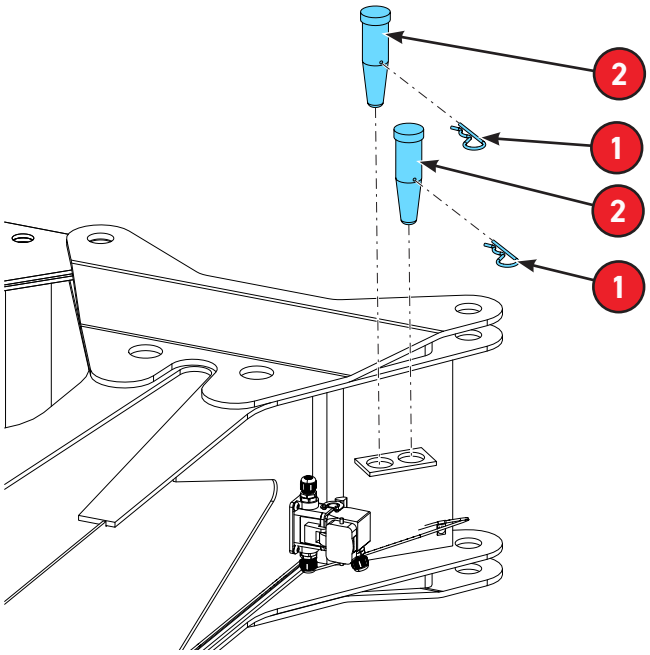


6. Fasten a tag line, approximately 15 feet long, to the end of the jib.

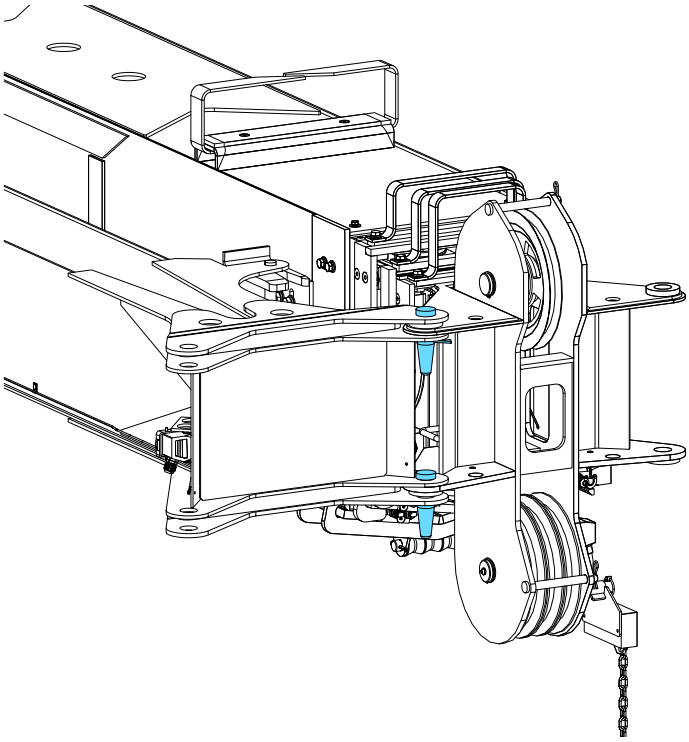


	Jib will swing uncontrolled if boom is not horizontal. There is a danger of bodily harm if the jib is not properly controlled.

7. Remove two pins (2) and cotter pins (1) from outer pin stow bracket.

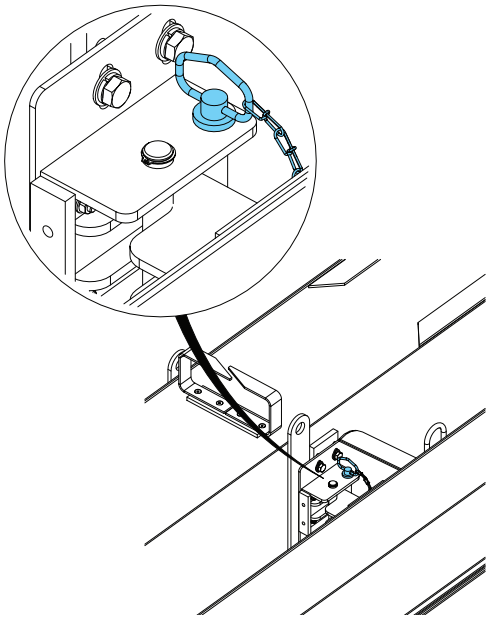


8. If holes in the jib do not line up with the holes in the boom head, readjust the boom head by slightly extending, then fully retracting the boom. Install two pins and cotter pins from pin stow bracket, to fasten jib in place on the right side of the boom.



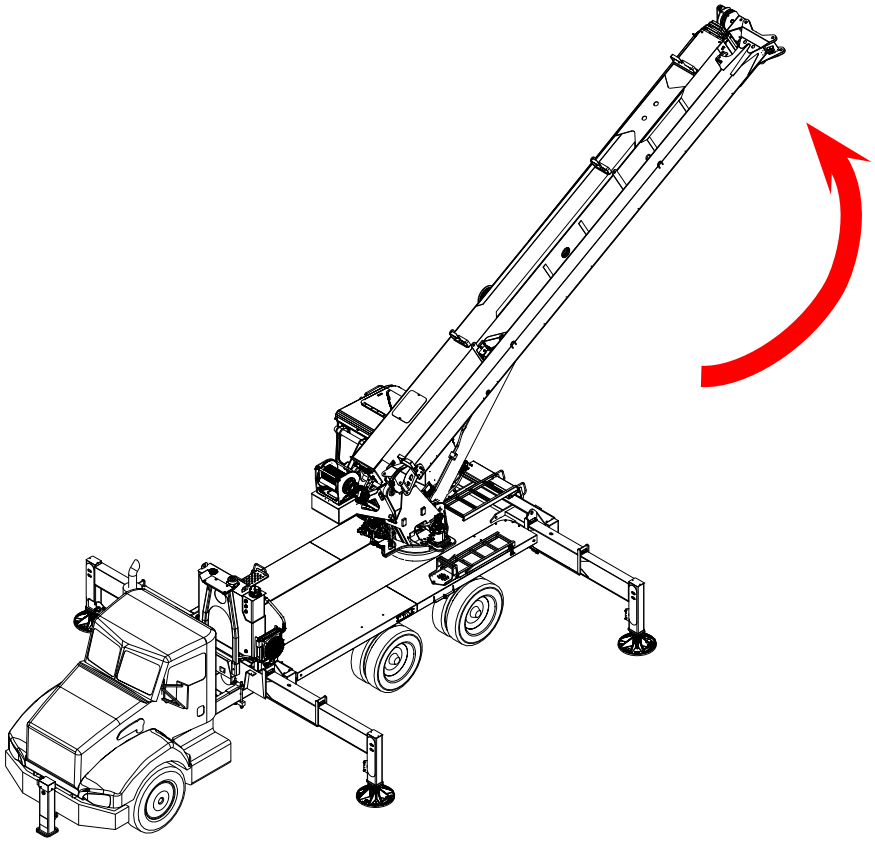
If any force is required to install any of the four jib pins, it should not be more than a few hits from a machine hammer.

9. Do not remove pin securing jib to the boom, at jib stow bracket until step 7 has been performed, otherwise jib will fall off the boom causing serious injury to personnel and property damage.

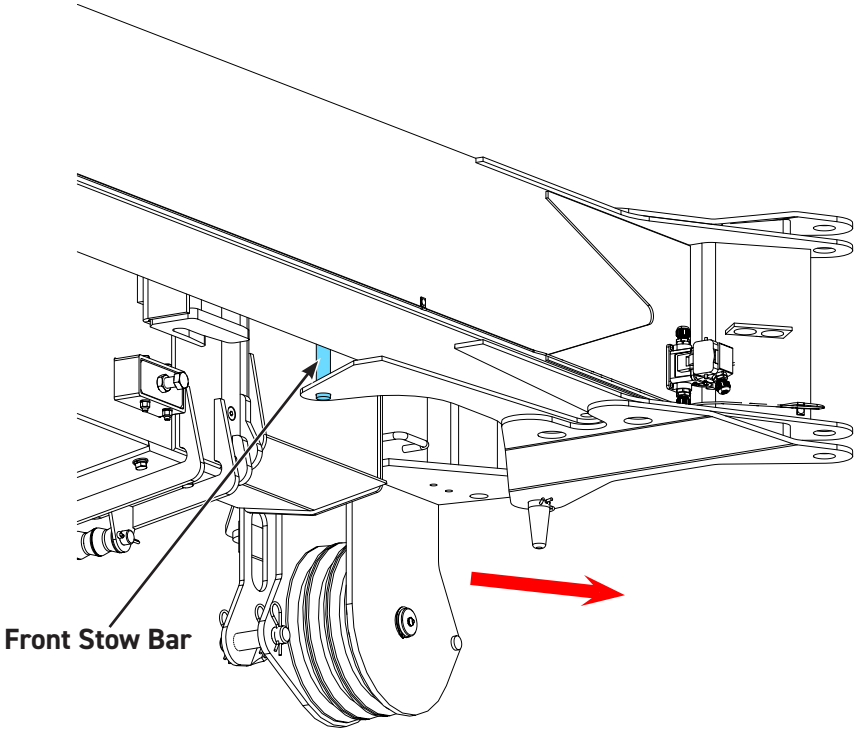


Confirm jib is pinned to boom head and then remove pin from jib pin stow bracket on boom. Do not remove pins until Step 8 has been completed.

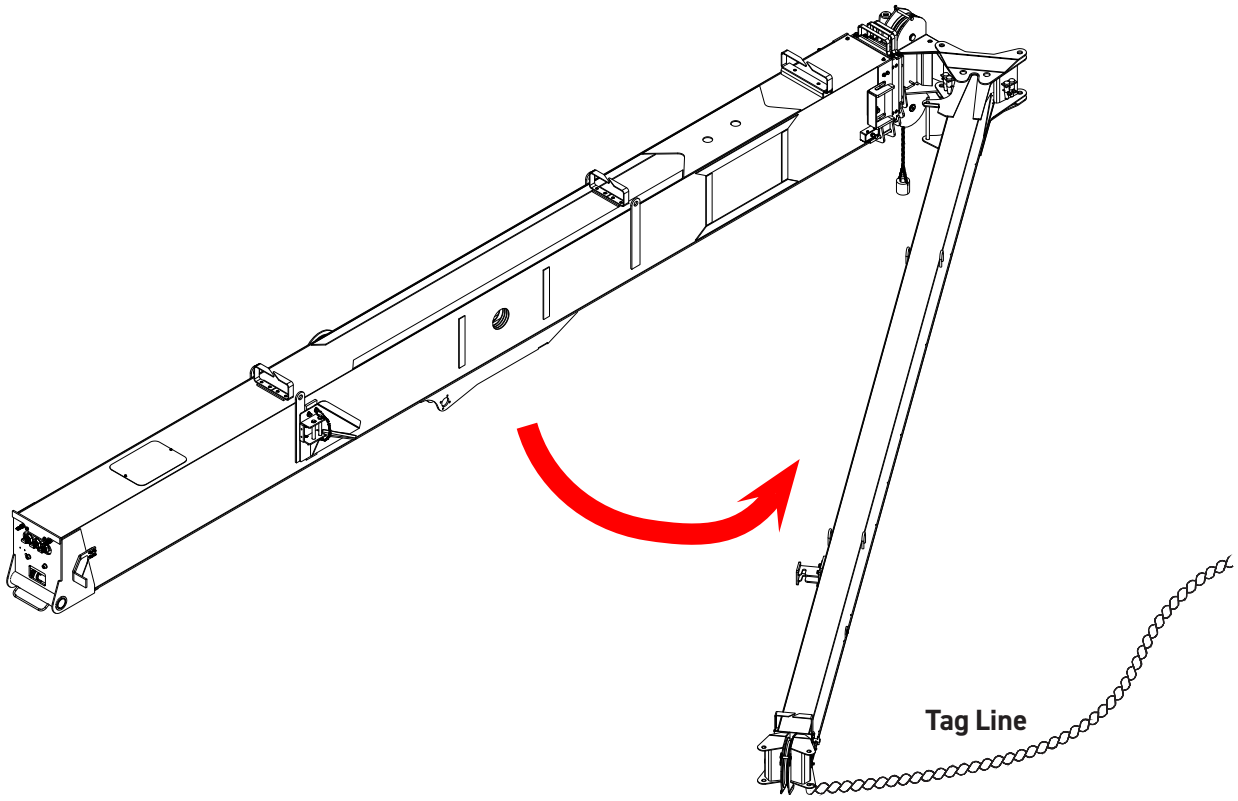
10. Raise boom to horizontal position.



11. Extend the boom untill the jib stow bar clears the front jib stow bracket at the boom head.



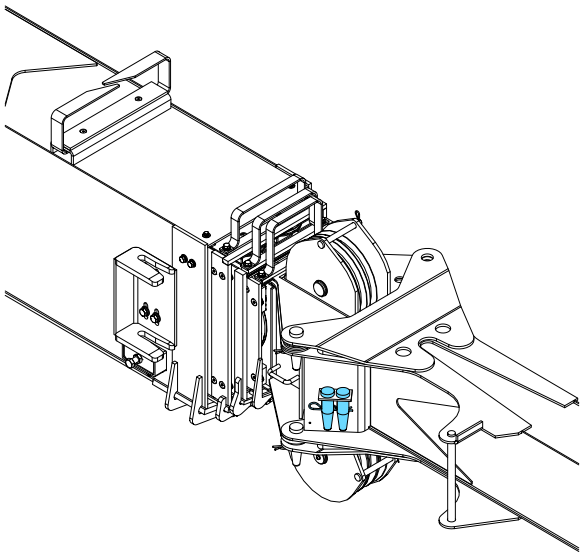
12. Swing jib away from boom with tag line. Control movement of the jib at all times to prevent injury and/or equipment damage.

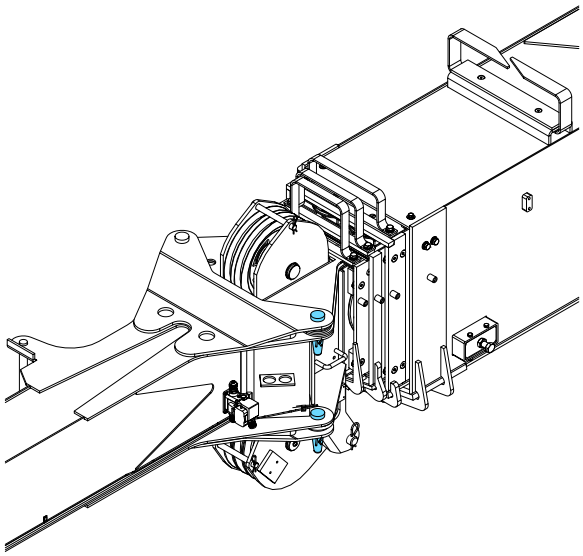


13. Swing jib into deployed position. If it is difficult to bring the jib around, it may be necessary to slightly lower the boom angle and re-attempt.
14. Due to the weight of the jib, most times it is difficult to get the final pin of the jib installed to the boom head. Proceed with installing the lower left side pin and retainer of the jib to boom head. Lower the boom so the jib head sheave can make contact with a wood block on the ground surface. This will require the boom to be extended to reach ground level.

	Avoid allowing the jib tip to come in contact with soft surfaces (i.e. dirt, sand or gravel) as material can become wedged between jib tip sheave and side plates.

15. Using the boom down function, apply downward pressure to the jib sheave head to assist in aligning the remaining left pin for installation.

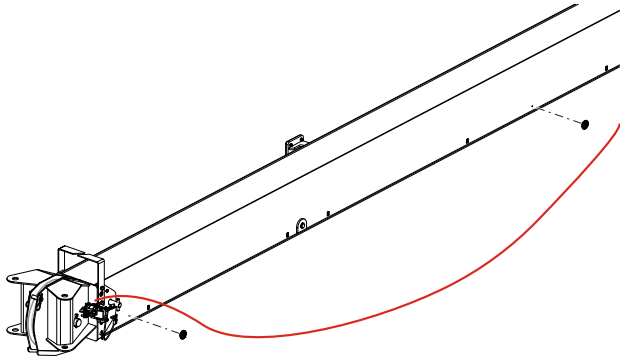




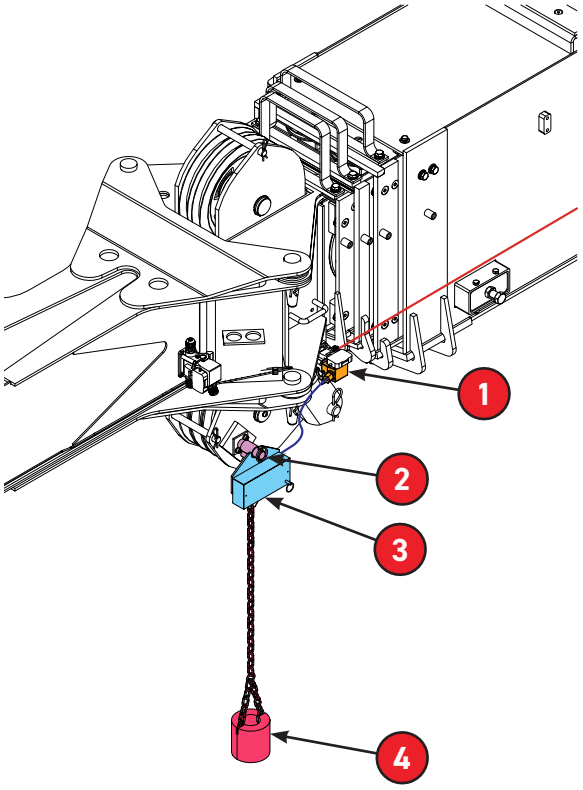
	If any force is required to install any of the four jib pins, it should not be more than a few hits from a hammer.

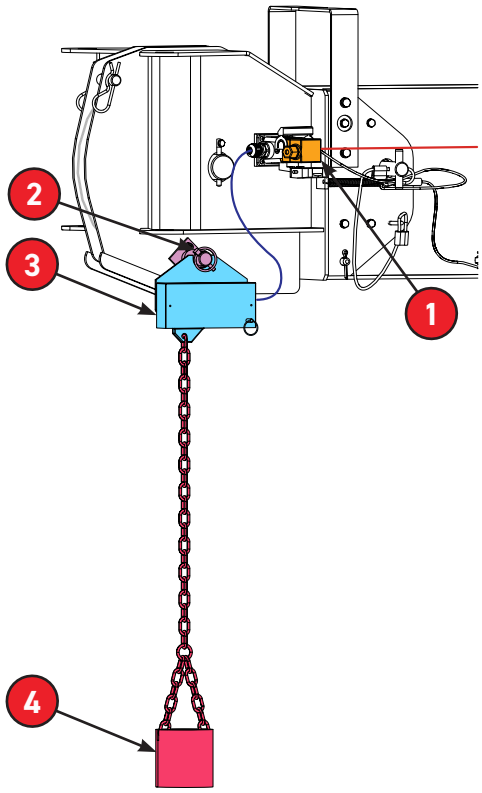
Extending Second Jib Stage

1. Unstow ATB cable from jib base section.



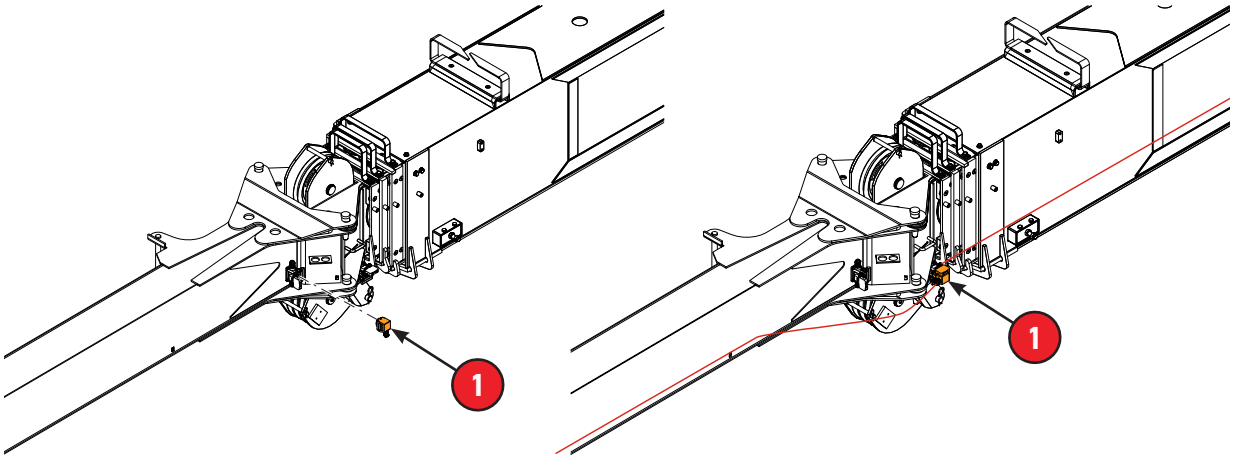
2. Remove ATB plug, bracket, ATB Switch and Counterweight with chain from the boom head (items 1-4 below). Reinstall on jib head.





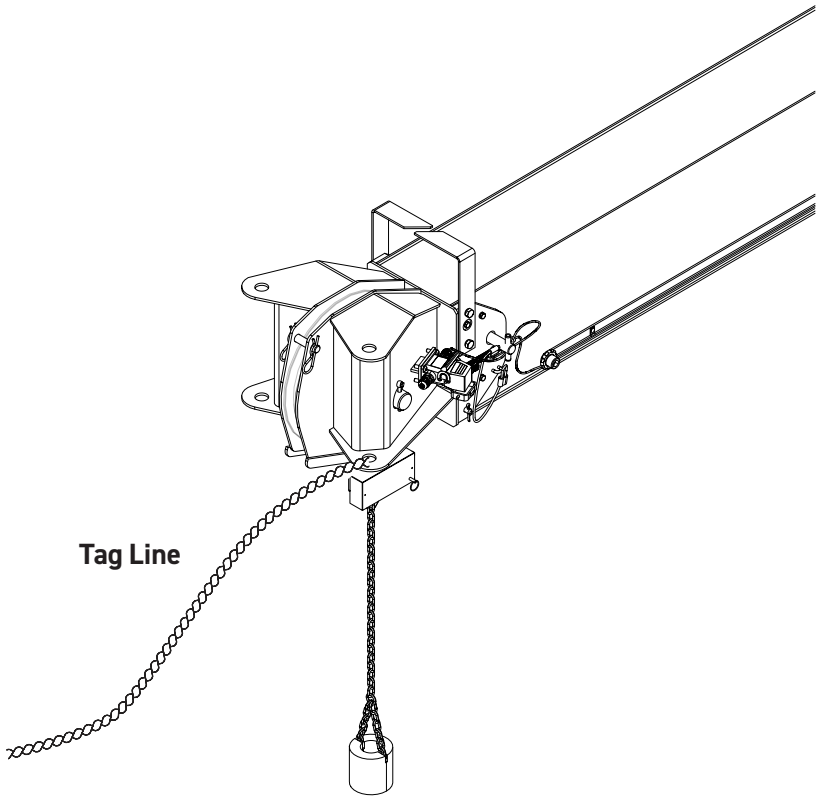
1	ATB Plug
2	Bracket, ATB Switch
3	ATB Switch, Heavy Duty
4	Counterweight with Chain

3. Remove ATB plug (1) from base of jib and install on the boom head ATB socket.

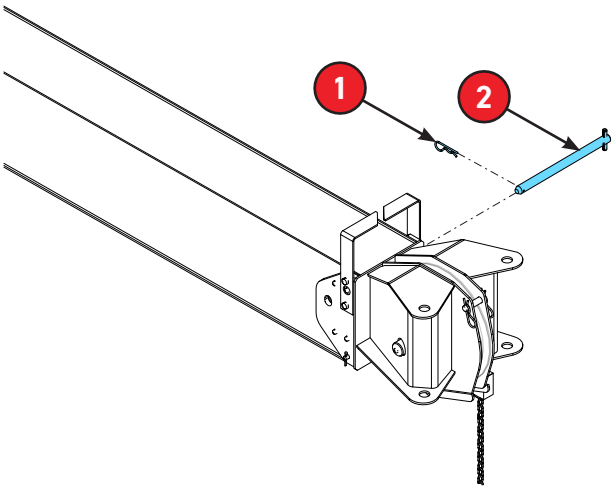


1	ATB Plug

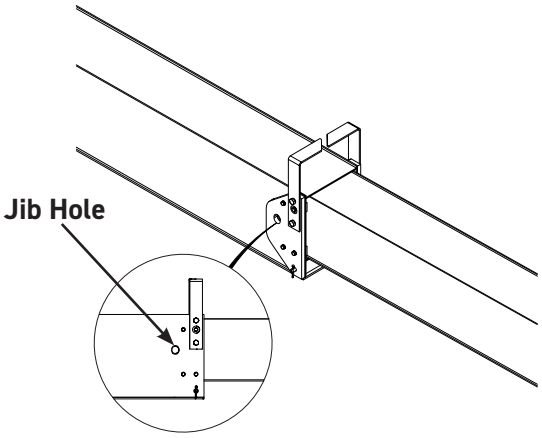
4. Raise boom to angle high enough to allow the jib to be extended without contacting the ground.
5. Fasten a tag line to the jib head.



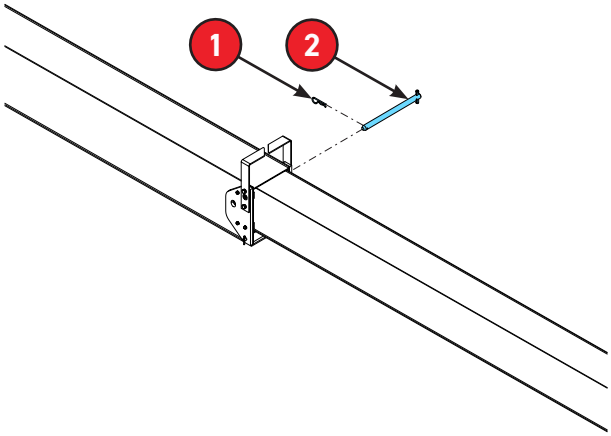
6. Remove cotter pin (1) and lock pin (2) from front of jib.



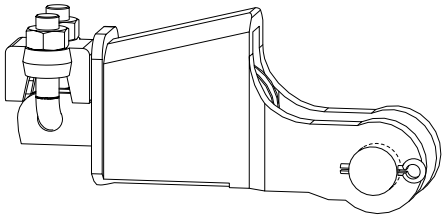
7. Pull second stage jib out until the base jib hole aligns with the second jib hole.

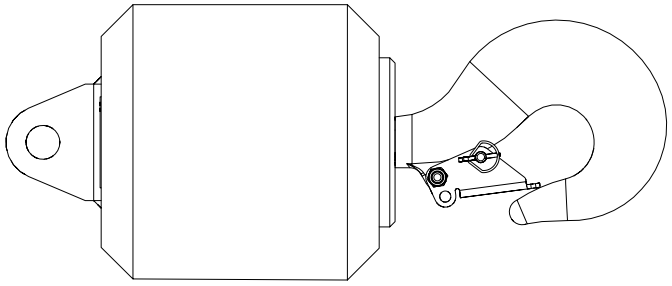


8. Insert lock pin (2) into extend position and secure with cotter pin (1).

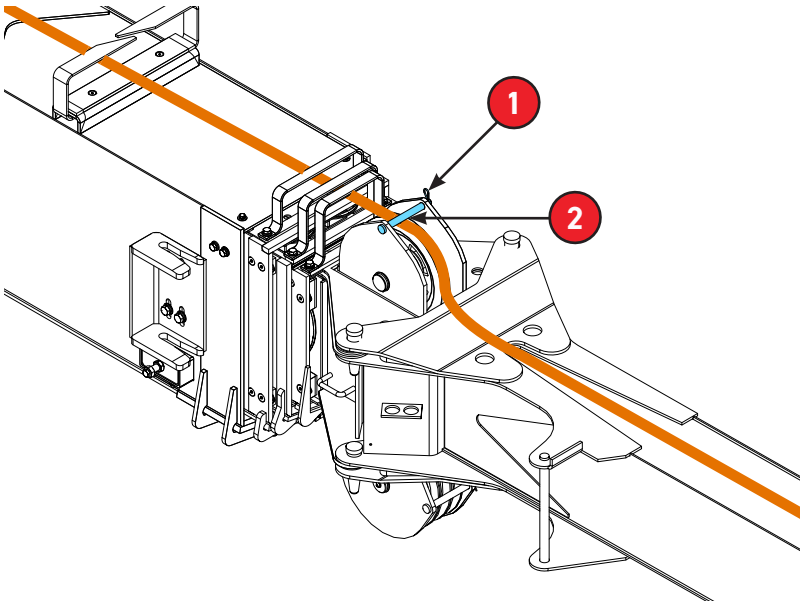


9. Remove ball or block from wire rope.

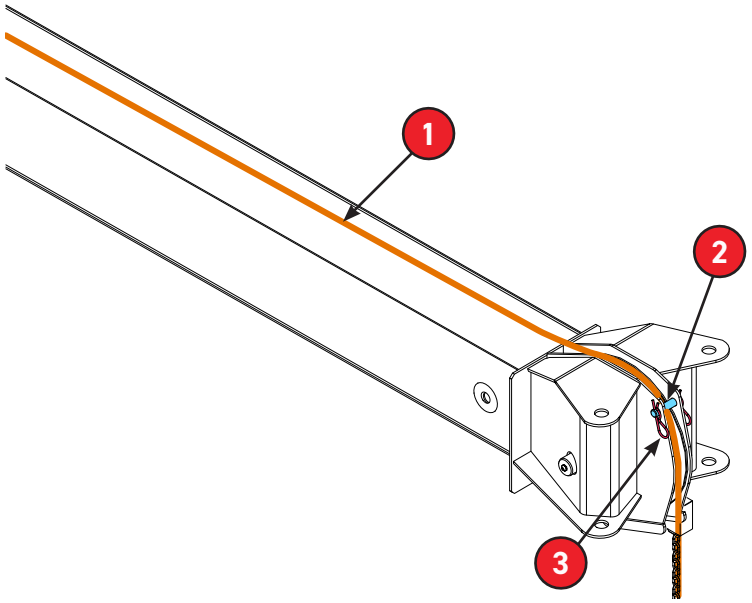




10. Winch out enough cable to reach over the sheave of the jib. Keep tension on rope or winch cable will unspool on winch drum.
11. Place wire rope over boom head sheave. If machine is equipped with a sheave retaining bracket, make sure the bracket slot is aligned with the guide pin so it is held upright. Install cable retainer pin (2) and cotter pin (1).

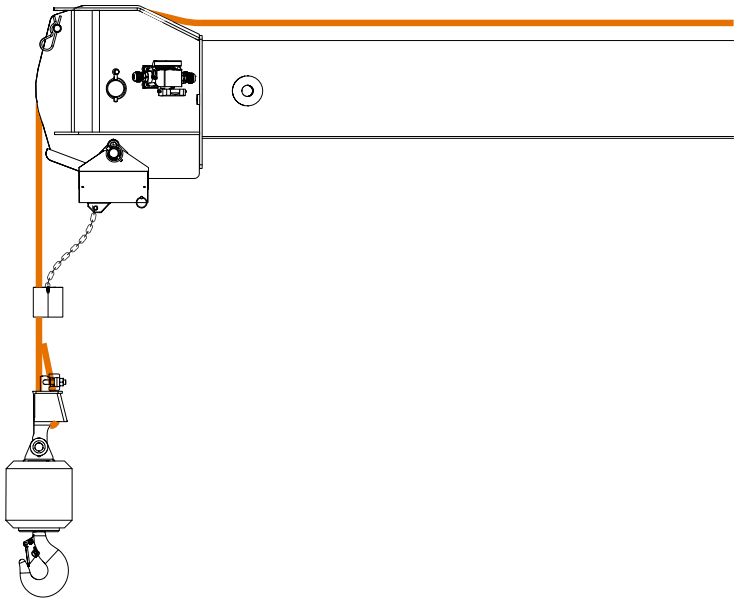


12. Route wire rope (1) through jib head and over jib sheave. Install sheave pin (2) and cotter pin (3).



1	Wire Rope
2	Sheave Pin
3	Cotter Pin

13. Attach ball or block to wire rope with bolt and cotter pin. Connect ATB weight and chain to switch and secure winch rope into weight.



14. Test ATB switch operation to verify all connections are correct.

Transportation

Driving the Boom Truck

The 35/40-127 RS Boom Truck has on-road and limited off-road capabilities. Consider the terrain type, road conditions, and any hazards likely to be encountered en route before moving the Boom Truck around the work site or between sites. Plan the move in advance and carry it out safely.

	The Load King Boom Truck is not a pick-and-carry crane. Never drive a truck with the boom extended, elevated, or with a load suspended from the load line hook.

	Before moving the Boom Truck from a stationary position, always secure the boom in the boom rest and fully retract all the outriggers.

On-Road Operation

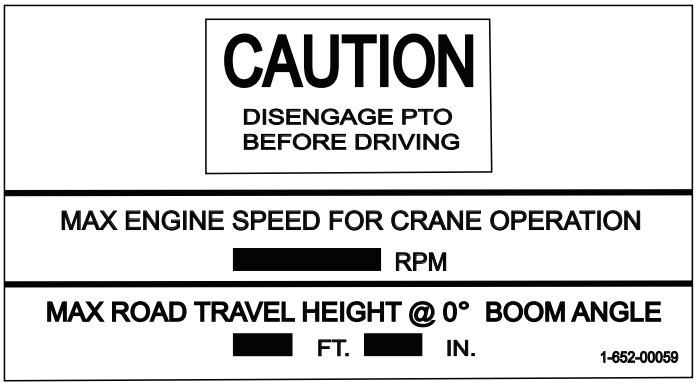
When driving on highways, the Boom Truck is subject to the same regulations that govern the operation of other heavy equipment on public roads. Adequate lighting, flares, flags and safety equipment should be on the Boom Truck at all times.

Off-Road Operation (Limited)

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

Crane Height Awareness

Whether repositioning the Boom Truck at the work site or preparing for road travel, the Operator must always be aware of the crane's maximum road height. A placard is attached to the dashboard inside the truck cab, displaying the height of the crane as manufactured and installed. Failure to observe overhead obstructions while moving the Boom Truck can result in severe personal injury as well as damage to the crane and truck.



	It is imperative for the Operator to know the crane's maximum road height and to be aware of all overhead obstructions. Failure to do so may result in severe damage to the crane/Boom Truck, death or serious injury to operating personnel.

Situational Awareness

When moving around a job site, it is critical that the crane Operator is aware of what is going on with the crane as well as other vehicles and personnel. While moving a Boom Truck around a job site, the crane Operator should abide by the following guidelines as well as use common sense.

- 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.
- The Operator must be careful on steep slopes to avoid tipping 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.

Turning/Driving in Reverse

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

	Risk of accidents is increased when driving 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 traveling, a guide, who is in communication with the driver at all times, must be used who can see those areas the driver cannot.
- An audible 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.
- The 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 Boom Truck

	Use all appropriate procedures to secure a parked Boom Truck. An inadequately-secured vehicle can roll away and cause damage such as but not limited to injury to persons, death to persons, and damage to property.

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 engaged when the crane is parked.
- The ground on which the crane is parked must be even and solid, with sufficient load-bearing capacity.

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

- The Boom Truck is parked on a slope.
- The Boom Truck is under repair or in need of repair, especially concerning any problems with the brake system.

Push-Starting the Boom Truck

The engine cannot be started by pushing or towing.

	It is imperative for the Operator to know the crane's maximum road height, 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.

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Inspection

Pre-Start Inspection

The following items should be checked each day before start-up and the beginning of operations. Refer to Checklist and Inspection Form section, "Daily Check".

	Warning light illuminates on dashboard if diesel exhaust fluid or Urea level is low.

Leakage

Check the ground beneath the machine for leaks. Refer to "Maintenance and Service" section.

Lubrication

Perform the daily lubrication as required for cylinder mounting pins and bushings. Refer to the Maintenance and Service section "Master Lubrication Chart ".

Lines and Blocks

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

Safety Equipment

Check the safety equipment, including but not limited to all lights, brakes, and hazard warning devices.

General Condition

Inspect the machine for wear, leakage, and damage.

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 the ATB switches and around the correct line of hoisting cable properly. Visually inspect all electrical connections, wires, and entire length of cable attached to the cable reel and connections, and ensure they are free from wear, damage and improper installation. Check the spring-loaded cable reel for proper tension and ensure that the reel is free to rotate. Verify proper operation of visual and audible warning devices by lifting each of the counter weights.

This crane is equipped with a disconnect system on the control linkages. Check this system prior to lifting loads. Hoist the hook block to the boom point so that there is contact between the block and the ATB counterweight. If all of the ATB functions are operating properly, winch hoisting will stop and the boom cannot be extended or lowered. If any of these functions continue, the disconnect system is functioning improperly and a complete system check is required. The boom raise, boom retract, and winch down functions remain active and will be unaffected by the ATB system.

	If the disconnect system malfunctions while performing the ATB disconnect test, the hook block may be drawn into the boom head, resulting in damage to the crane.

Crane Boom

Main Boom Inspection and Maintenance Procedure

TASK	Inspection and Maintenance Procedure						ACTION
	DAILY	50 Hrs	250 Hrs	1000 Hrs	1500 Hrs	4 Yrs	
Broken wire rope or cut strands.							Replace Wire Rope
Corrosion of wire rope.							Replace Wire Rope
Wire rope kinking, crushing, un-stranding, bird caging, main strand displacement, or core protrusion.							Replace Wire Rope
Check the sheaves for wear.	X						
Check the pins for cracks.	X						
Lubricate the wire ropes.	X						
Clean the wire ropes.	X						
Lubricate the hook block.		X					
Lubricate the slides.			X				
Lubricate the main boom head.			X				
Lubricate the sliding surfaces.			X				
Check the sheaves roller bearings or bushings and are properly lubricated.				X			
Check the wear pads, shims and wear pad fasteners.					X		Replace as needed
Check chains for adequate lubrication.					X		
Check for corrosion of fasteners.					X		
Visually inspect extension and retraction ropes.						X	Disassemble Boom
Check chains for wear.						X	Disassemble Boom
Check the cable anchors for corrosion or cracking.						X	Disassemble Boom
Clean the boom sections and remove internal grease and re-grease with the specified lubricant.						X	Disassemble Boom
Check the sheave pins for corrosion and wear.						X	Disassemble Boom

Structural Members and Welds

	Although boom disassembly is recommended for a full inspection of components, a weekly visual inspection is essential to find indications of wear, corrosion, cracks, or breakage. If the crane is used in a highly corrosive environment due to salts and chemicals, then increase the inspection and maintenance frequency to twice weekly.

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 inspection 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 beam welds.

Visually inspect all boom sections at least weekly or every fifty (50) hours, whichever occurs first. In preparation for the inspection, set the outriggers and rotate the upper structure of the crane 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 affected 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 the boom's original structural strength may be compromised.

Boom extension indicator decals are very important and should be in place at all times. Boom section failures can occur due to over-stressing within the rated capacity of the sections. If the sections are not equally extended, mark difference between the telescopic sections.

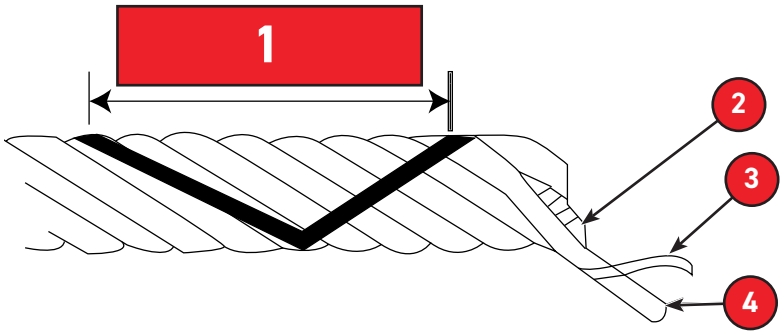
	If any indicator decals are missing or illegible (either triangle markers or boom length numbers), order the applicable items through your distributor.

Wire Rope Inspection

Safe operation of the **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 properly trained personnel.

OSHA and other agencies with 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 the particular 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. It is recommended to perform 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.

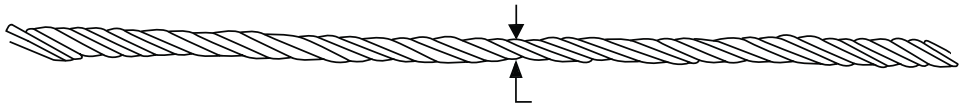


1.	One Rope Lay Length
2.	Core
3.	One Wire
4.	One Strand

1. Six broken wires in one rope lay, or three broken wires in one strand in one rope lay, is cause to remove the rope from service. One rope lay is the linear distance, measured along the rope, required by a strand to make one 360° turn around the axis as shown in the diagram above.
2. Wear of 1/3 of the original diameter of outside individual wires is cause to remove the rope from service.
3. Kinks, crushing, cuts, unstranding, or any other damage resulting in distortion of the rope structure are cause to remove the rope from service.
4. Heavy rusting, corrosion, pitting or any evidence of burning are cause to remove the rope from service.

5. Any reduction in rope diameters below nominal, for any reason, should be evaluated. The rope should be removed from the service if noticed reduction in diameter. Refer the table below:

1/64"	For rope diameters up to and including 5/16"
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"
3/32"	For rope diameters 1 1/4" through 1 1/2"



Reduction of Wire Rope Diameter

Wire Rope Tension Check

Run the rope through a break-in process to seat the rope and provide the necessary pre-tensioning before performing the tension check. The steps for periodic re-tensioning are as follows:

1. Lift 2% - 3% MBF load and hold off of ground.
2. Cycle completely several times.
3. Lift 20% - 50% of minimum working load.
4. Cycle completely several times.

Mobile Crane Load Test Inspection

General

As a worldwide crane manufacturer, **Load King** does not recommend carrying out regular overload tests on mobile cranes. In some countries national laws require overload tests (e.g., in accordance with information from the crane manufacturer). However, 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.

Every mobile crane is subject to a load test by the manufacturer within a final acceptance procedure before delivery. Testing is conducted with loads in differing configurations in accordance with certain scenarios. These scenarios involve the lowest safety reserves, relative to the crane's mechanical strength and stability. This includes an overload test with defined conditions and standards which can be applied accordingly.

Further acceptance tests with overloads during the crane's 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, or FEM) and does not provide for continuous operation. Therefore, the crane has 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 crane's service life. This can become a critical problem if the crane is tested with overload before every hoist operation.

Load King strictly prohibits an Operator from overloading 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 advises against regular overload tests. This includes avoiding tests in which the test load is attached via external equipment, without activating the bridging/override switch.

	Regular or more frequent overload tests cause decrease in service life of the crane. **Load King** recommends avoiding regular overload tests.

The following aspects must also be taken into consideration from the viewpoint of the Operator:

- Operational planning, where the Operator may encounter:
    - A higher floor elevation for loading than was planned
    - Difficult handling of the additional test load
    - A ban on executing any overload tests on-site in some fields of industry (e.g., petrochemical plants)
- Operational safety, where the Operator must:
    - Warn anyone in the vicinity that a test procedure is about to commence.
    - Inform other personnel that they should leave the area during the test if possible.

	Damage to load-bearing parts can cause an accident. After an overload test, conduct a thorough investigation to ensure the integrity 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 integrity of load-bearing components, **Load King** recommends a thorough investigation after an overload test, before carrying out hoist work. This investigation should consist a visual inspection along 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 a **Load King** service technician. This technician can determine whether the movement can be carried out safely or whether immediate repair/modification is required.

Load King Recommendations Regarding Load Tests

Checking the Crane Assembly

Checking the crane assembly (e.g., after reconfiguration) should include:

- A visual inspection of all assembled parts on the ground before initiating any boom operation
- A function check of the crane with or without 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

Load tests may be required by law after assembling the crane, or after changes in location. If such tests are required, do not exceed the permitted load of the crane beyond its capacity in the given configuration. 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.

	The conditions listed above do not apply after reconfiguration or repairs to load-bearing 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 carry out a load test for a given crane configuration with reduced loads (below the maximum capacity), but at a greater radius, up to the maximum radius (maximum load moment).

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Maintenance and Service

Introduction

Performing maintenance at regularly prescribed intervals is key to preserving the working longevity of a **Load King** Boom Truck (hereafter, referred to as "Boom Truck"). Some tasks must be done daily, and others must be done periodically throughout the weeks and months of the year.

The topics that follow organize the required checks and procedures by the intervals at which they should be completed. As per the maintenance inspection intervals.

The maintenance schedule helps accomplish the preventive maintenance requirements under average operating conditions. Average operating conditions such as high wear, loads, or strain on the crane may reduce the maintenance intervals. However, before altering the maintenance schedule, it is necessary to observe the Boom Truck's operation and review the maintenance records. It is also necessary to consider all factors involved, and develop a revised schedule adequate to meet the routine maintenance requirements.

	When conducting maintenance on the engine, always follow the engine manufacturer's guidance. The engine manufacturer's recommendations take precedence over those in this manual.

General Service Information

Periodic maintenance, troubleshooting, and proper service and adjustment procedures are essential for machine productivity, longevity, and low-cost performance. Maintenance takes place at scheduled intervals, whereas service is when there is a specific problem addressed.

It is the responsibility of the Operator to report 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 judgment in detecting potential problems in the early stages and repairing them quickly.

Before attempting to make a repair, ask the following questions:

1. Do you have the right tools?
2. Do you have the proper test equipment?
3. Can you accurately diagnose the cause of the malfunction?

If the answer to any of the questions above is "No," then please call your **Load King** Service Representative.

If you decide to attempt a repair yourself, follow a logical troubleshooting procedure. Avoid replacing parts until the problem is identified. (Reference the Troubleshooting Section).

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 issue is not resolved, consult your distributor serviceman.

	When performing maintenance or service on a vehicle, always place the shift lever in the neutral position. Engage the parking brake and place chocks on vehicle's wheels. Never work under, in front of, or behind a vehicle when the engine is running.

The methods used to remove assemblies, guards, or cab panels are 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 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 a single 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, or covers so that the proper bolt will be on hand when reassembling these parts.

During Maintenance - Safety Practices

Caution and situational awareness apply not only when operating the Boom Truck, but also when conducting its maintenance. The following considerations should remain forefront while engaged in maintenance work.

1. Apply the parking brake before undertaking any maintenance task.
2. Lower all loads to the ground and ensure the load line is slack.
3. Move all controls to neutral position.
4. Disengage the Power Take off Unit (PTO).
5. Turn off the engine.
6. Use appropriate locks and tags to prevent accidental operation during service. (See Lockout and Tagout Procedures).

	Do not insert hands or tools into any hole in boom sections while power is engaged or boom sections are moving.

	Do not perform maintenance, adjustments, or repair procedures unless authorized to do so. Make sure all applicable instructions have been read and are understood thoroughly.

During Maintenance - 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.

	When disconnecting hydraulic hoses, release pressure on hydraulic systems before disconnecting hoses. Before releasing hydraulic pressure or disconnecting hoses, ensure that booms and cylinders are properly supported.

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. When removing shims, tie them together and identify the location from which they were removed.

Operator Observation

It is the Operator's 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.

Crane boom - Check the following:

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

Check PTO, drive lines, pumps, and pump mountings for wear or damage.

Check in the Operator's 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

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.

Maintenance Task Lists

Maintenance Checks and Lubrication

The following are the recommended maintenance instructions for the **Load King** Boom Truck Cranes. The unit is equipped with special Teflon bushings at the lift cylinder and boom hinge pin points that do not require lubrication. It is recommended that an EP (Extreme Pressure) type grease be used where greasing is indicated. The Master Lubrication Chart shows the proper lubricants to use and the frequency of lubrication.

Daily Operator Checks

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

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; then put the transmission in neutral and engage the 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.
3. Check the lights for proper operation.
4. Check engine fluids. Maintain oil and water levels above the add mark.

Perform 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 the parking brake, start the engine, put the transmission in neutral, and engage the 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 that the outrigger holding cartridges are not leaking under load.
3. Check all controls for any signs of sticking and proper operation of functions. With the boom elevated and extended, shut off the engine.
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, Load Moment Indicator System, and holding valves).
6. Perform daily lubrication.
7. Check that the down haul weight (load block or ball) is properly secured to the load-line 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 according to the Master Lubrication Chart.
2. With all boom sections retracted, move the boom side-to-side to check for missing wear pads between boom sections, excess clearance, or looseness in the rotation gearbox. There should be no more than 2”-4” of play side-to-side at the boom tip.
3. If the machine is regularly in a salt-covered environment, wash the unit on a weekly basis to prevent rust and corrosion.
4. Perform 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 over grease this bearing!)
2. Inspect all crane mounting bolts for signs of looseness or breakage. Replace or re-torque mounting bolts where necessary. (See Torque Specs 1004909).
3. Extend all boom sections and check for physical defects, cracks and signs of over stress. 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.
4. Check that all boom and outrigger pins are properly secured. Make certain that keepers and snap rings are present and properly installed.
5. Inspect load line for signs of kinking, crushing, cutting, or other damage.
6. Inspect weldments for signs of cracks at weld joints on all structural members.

Quarterly Operational Checks

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

1. Check and reset the rotation gear backlash.
2. Torque rotation gear mounting bolts. (See Swing Bearing Bolting Procedure).
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 down-haul weight for signs of overloading, spread side plates, elongated holes, bent tie bolts or cracks.
5. Any hooks on the load blocks or downhaul weights having a throat spread 15% wider, or twisted from the normal configuration by 10° or more, should be replaced.
6. Check all decals, 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, Load Moment Indicator System, holding valves) for proper functioning and signs of deterioration.
8. Check the hydraulic tank breather filter for dirt and debris. If necessary, replace breather filter on the same schedule as changing the hydraulic oil and filter.

Semi-Annual Maintenance Items

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

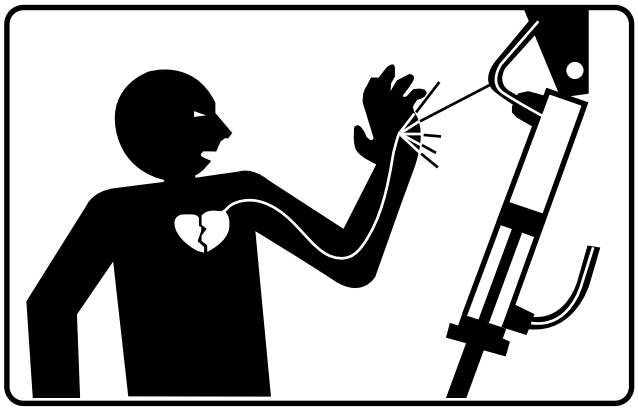
1. Torque the mainframe mounting bolts.
2. Check hydraulic system pressures and adjust as necessary.
3. Inspect all visible wear pads for excessive wear or looseness.

	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, harsh environmental conditions, or is frequently overloaded, is subject to premature failure.

Hydraulics System

Precautions During Maintenance

Do not check for hydraulic leaks with hands, fingers, or skin. Hydraulic fluid under pressure can penetrate skin up to 4" away from a pinhole leak.



Hydraulic fluid injection may result in, but is not limited to, the following conditions:

- Blood poisoning
- Bacterial infection
- Permanent damage to blood vessels, tendons, and nerves
- Compartment syndrome
- Necrotic tissue
- Amputation
- Death

	If anyone has skin contact with pressurized hydraulic fluid, seek immediate medical attention. Problems may not be instantly apparent, and may worsen with time. Surgery is often needed to remove dead tissue and to remove internalized hydraulic fluid.

	Oil under pressure easily penetrates human skin and can cause serious injury or death. Oil under pressure can be nearly invisible. Check for hydraulic leaks with a piece of cardboard or wood.

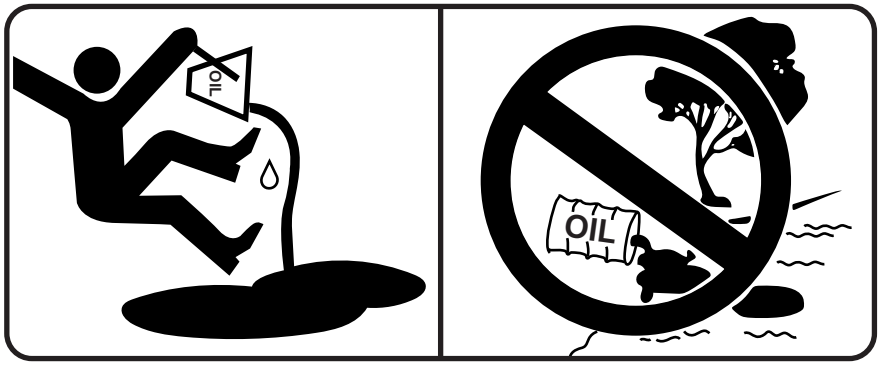
Do not open lines to bleed air from cylinders.

	Do not perform hydraulic inspections while the system is under pressure or a load is raised. Do not loosen or tighten hydraulic lines under pressure. Lower the load or relieve hydraulic pressure before loosening any hydraulic fittings.

	Hydraulic oil is flammable. Do not check inside a hydraulic tank with an open flame. Keep open flame away from hydraulic systems. Do not weld near hydraulic lines and components without placing a protective cover over the hydraulic system components.

Oil is a regulated hazardous waste. Do not spill or dump oil. Capture oil when repairing or draining systems. Oil disposal must conform to State and Federal regulations. Do not overfill hazardous waste containers or reservoirs.

⚠	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.



⚠	Do not spill or dump oil. Injury could result if not cleaned up.

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 (including, but not limited to, temperature, humidity, corrosive air) and conditions of use, duty cycles, bending cycles, abrasion, and fluid exposure. Unfavorable external factors like heat, extreme cold, repeated bending under pressure , and exceeding the minimum bend radius of the hose can reduce the lifetime significantly. 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 pressurized and non-pressurized conditions and/or when bending (e.g., check for separation of hose layers, formation of blowholes, crushed points, kinks, torsion).
- 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.

Fluids and Filter 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 clean 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 smells clean and is clear, it is probably in good condition. 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, anti-foam, 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 installed.

Oil contamination can also be tested for contaminate size and content; this may help in diagnosing an issue.

When 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.

Filtration

Adequate protection against oil contamination has been given to the system through filtration.

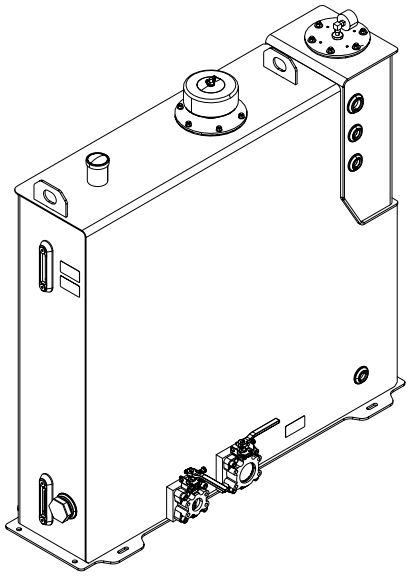
The **Load King** Stinger Boom Truck is equipped with a 10 micron filter to strain out particles down to 10 microns in size. (40 microns is as small as the eye can see).

All new equipment will experience some wear during initial operation. This should improve the operation of the new components after they have seated. This wear will introduce small metal particles into the system, most of which will be collected by the filter. After this breaking in process, it is mandatory that the first filter change occur. **Load King** recommends the filter on a new unit be changed after 100 hours of operation or 30 days of use, whichever comes first. The recommended interval of change after this initial break-in is every 90 days, or when the gauge on the filter indicates 25 PSI (RED ZONE) or above.

If the filter pressure rises above 25 PSI with the pump at 2,000 RPM it is a warning that the filter is in the bypass mode and filtration is not occurring.

	Bypass with cold oil is normal and acceptable.

The unit should always be allowed to gradually warm up (oil temperature above 60° F) before checking the filter bypass gauge.



The oil filter is mounted inside the reservoir. To change the return filter, shut off the power supply to the pump and access the filter through the plate on the top of the tank. Be careful to catch any oil spilled in a drain pan.

	Observe all oil handling hazards.

Used oil should be recycled or reclaimed. Remember, oil is not a disposable resource and it is 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.,

Selecting the Oil

When buying oil, 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.

This equipment has been 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 oil and preventative maintenance in accordance with this manual.

Recommended Oil	Ambient Temperature	Viscosity Index
Shell Tellus S2 V 46	Above 32°	143
Shell Tellus S2 V 32	Below 32°	143
Shell Tellus S2 V 22	Below 0°	142

This **Load King** Crane will have been filled with **Shell Tellus S2 V 46** hydraulic oil unless otherwise specified. **Load King** recommends this oil because of its quality and availability. Different manufacturer's use chemical formulations which may not be compatible. At a minimum, it must be verified that any makeup oil added is compatible with the oil already in the system. If a different brand is used when changing the oil, the system should be flushed by cycling all cylinders at least once to their limits. This will ensure that as much of the old oil as possible has been removed from the system.

	Observe all oil handling precautions. Used oil should be recycled or reclaimed. Remember, oil is not a disposable resource and it is the Owner's/Operator's responsibility to maintain sound environmental practices in regard 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, and other hydraulic system components.

Cold Weather, Extreme

The lowest safe operating temperature of a Boom Truck is not in excess of -12°F (-25°C). Operating the machinery in environments that are colder than the lowest safe operating threshold can damage parts, slow the flow of fluids, and delay response times. If the Boom Truck will be operating in temperatures outside these parameters, a Cold Weather Package (CWP) is required to allow the machinery to function and avoid service damage. Even with the CWP installed, proper start-up and operating procedures must still be carefully followed.

CWP Specifications

A CWP will bring the Boom Truck's operating temperature down to -40°F (-40°C).

CWP Package Components

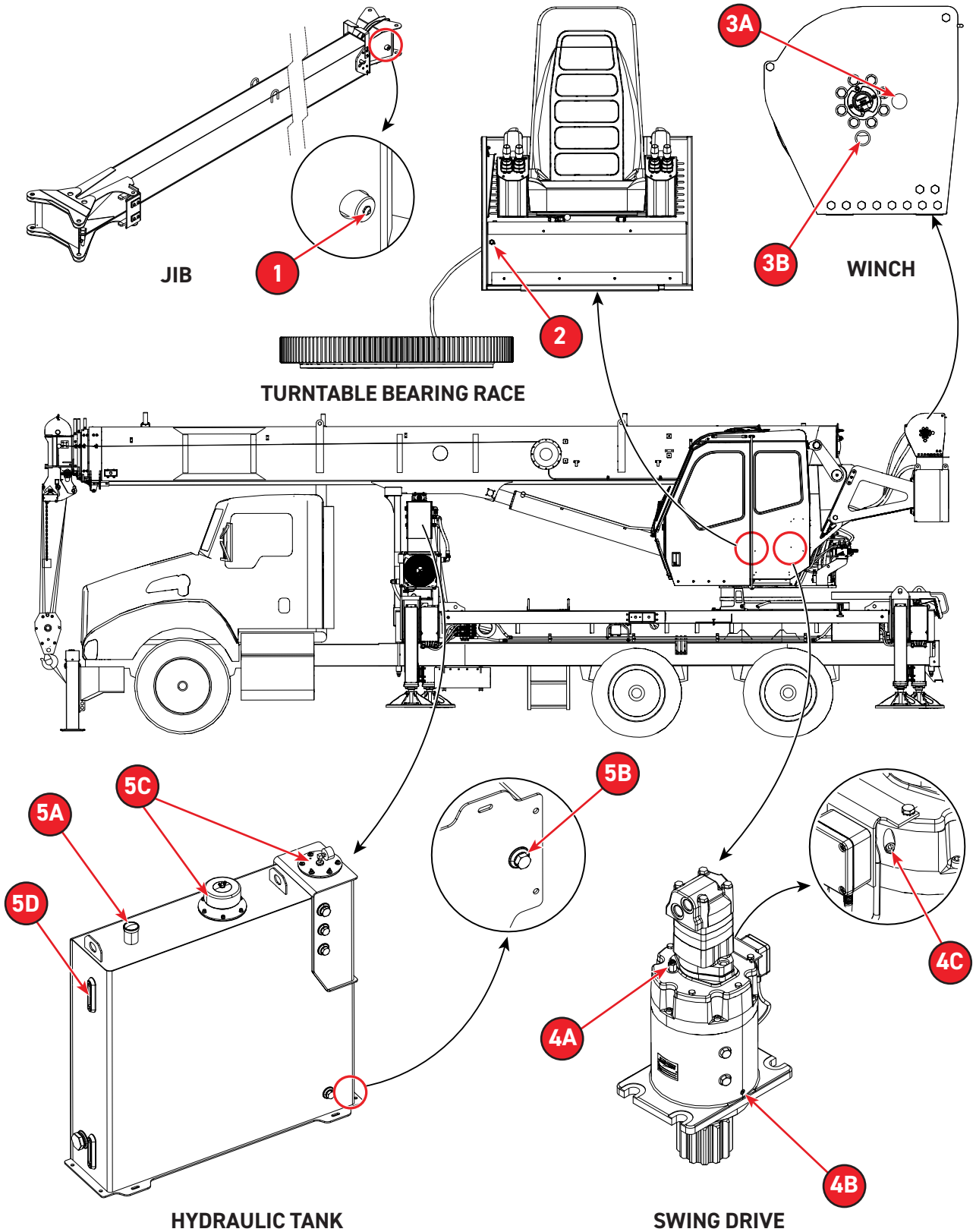
The following components of the Cold Weather Package must be installed as listed in the table below. There are a limited number of acceptable lubricants that are effective in extremely cold temperatures. Deviations from the listed approved lubricants must be approved by a **Load King** Service Department.

Description	Specification
Main & Aux. Winch, Swing Drive	Mobil Gear SHC 150 or Shell OMALA HD 150
Hydraulic Oil-see data sheet	Petro-Canada Hydrex Extreme or Shell Tellus Arctic 32
Hydraulic Tank Heater	Driven by coolant/anti-freeze from the truck chassis.
Grease (upper structure & outriggers)	Mobilith SHC 220 Schaeffer 274 Moly EP Shell Alvania EP Arctic Moly 0

Contact your carrier truck supplier for the following cold weather upgrades:

- Engine Oil
- Gear Oil-Front & Rear Axles
- Transmission Fluid
- Coolant Fluid
- Grease (Carrier Chassis)
- Battery Blanket
- Engine Blanket
- Engine Oil Pan Heater

Master Lubrication Chart



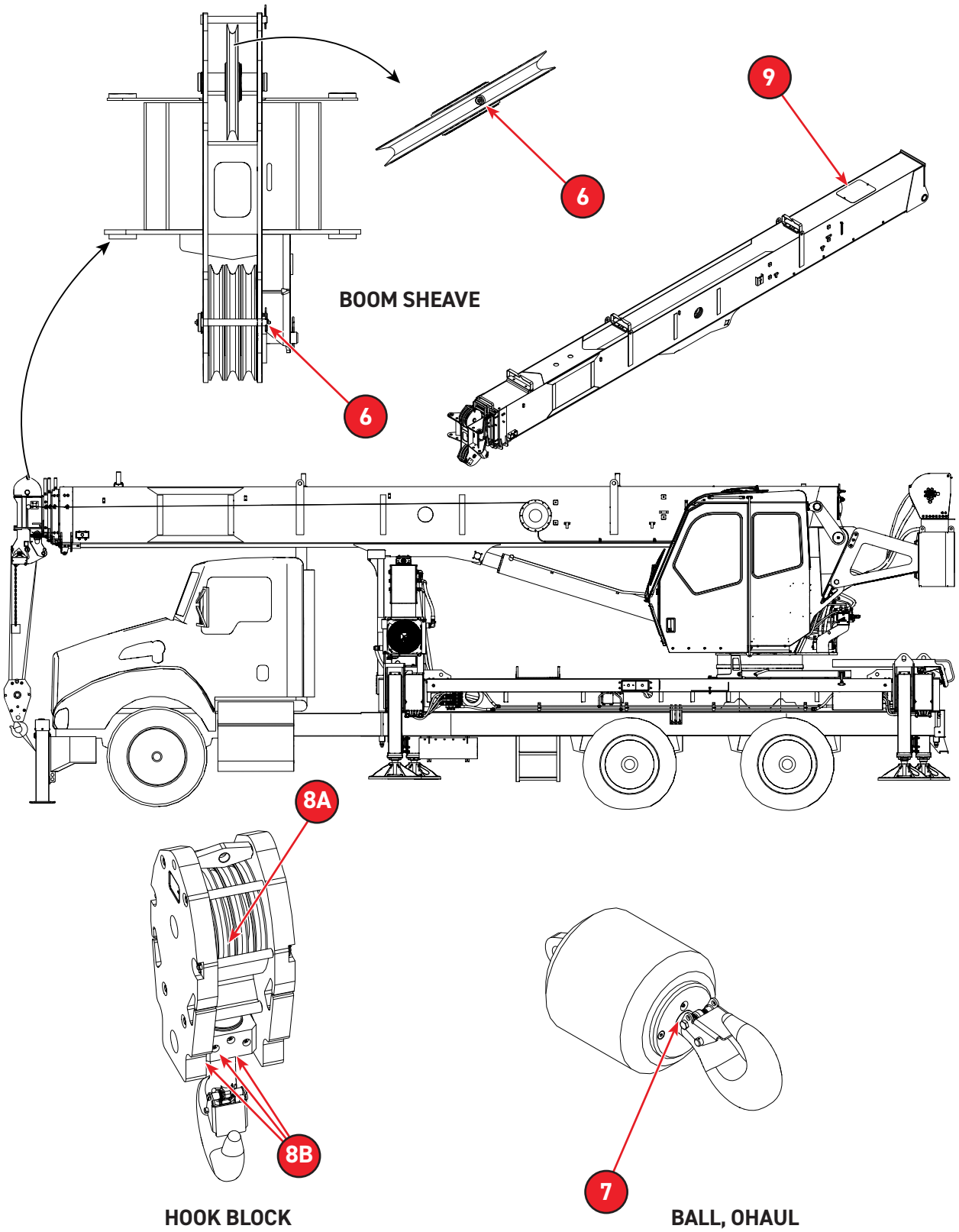

9
6
BOOM SHEAVE
6
8A
8B
7
HOOK BLOCK
BALL, OHAUL

TABLE 1

LEGEND:
CHK - CHECK
LUB - LUBRICATE
▦ - CHANGE FILTER
D/R - DRAIN & REFILL
* - ITEM NOT SHOWN

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	LUBE	NOTES
	LUB						1	JIB SHEAVE	AS REQ'D	A	
		LUB					2	TURNTABLE BEARING RACE	AS REQ'D	A	
CHK			CHK				3A	WINCH FILL PLUG	AS REQ'D	C	Check level. Oil should be at center of gauge. Fill proper level with specified gear oil.
					D/R		3B	WINCH DRAIN PLUG	-		
	LUB						4A	SWING GEARBOX FILL PLUG	AS REQ'D	B	Check level. Oil should be at center of gauge. Fill proper level with specified gear oil.
					D/R		4B	SWING GEARBOX DRAIN PLUG	-		
	LUB						4C	SWING GEARBOX OIL LEVEL	AS REQ'D		
CHK			▦				5A	HYDRAULIC TANK FILL PLUG	AS REQ'D	E	Check level. Fill proper level with hydraulic oil. (All cylinders retracted and boom in rest)
						D/R	5B	HYDRAULIC TANK DRAIN PLUG	-		
CHK							5C	HYDRAULIC TANK OIL FILTER	AS REQ'D		
CHK							5D	HYDRAULIC TANK SIGHT GAUGE	AS REQ'D		
	LUB						6	BOOM SHEAVES	AS REQ'D	A	
	LUB						7	BALL, OHAUL	AS REQ'D	A	
	LUB						8A	HOOK BLOCK SHEAVES	AS REQ'D	A	
	LUB						8B	HOOK BLOCK	AS REQ'D	A	
							9	ACCESS COVER	-	-	
	LUB						*	WIRE ROPE LUBRICATION	AS REQ'D	D	Clean rope Prior

SPECIFIED LUBRICANTS
A. PREMALUBE #1 HD MPG NLGI #1
B. MOBILUBE HD80W-90
C. MOBILGEAR 600XP150
D. ELASKON 30
E. MOBILGEAR SCH 150

Boom Wear Pad Greasing Procedure

Follow the capacity chart and instructions in the operator's manual during boom greasing. Set up crane on fully extended outriggers with tires clear of the ground and fully level. Position the superstructure with the boom over the front.

For top rear boom section wear pad lubrication:

With machine set and level on fully extended outriggers and boom at 0 degrees (horizontal):

1. Remove access covers at the top of boom sections to access the top wear pads
2. Extend the boom until the wear pads are visible within the access opening
3. Apply high quality extreme pressure grease to wear pad contact surfaces at the top of the boom sections
4. Repeat for the top rear wear pads at each boom section, estending or retracting as necessary to allow access to wear pad areas
5. Raise the boom to a 70-75 degree angle and extendand retract the boom several times to evenly spread the newly applied grease at each section
6. Make sure the grease is fully applied to wear pad contact areas and reapply to any areas that have not been covered and repeat as needed

For Boom side and bottom wear pad lubrication

It may be necessary to have ladders or other means of access available to safely complete the boom greasing procedure. The maximum amount the boom can be extended over the front at 0 degrees is 100 feet.

With the boom at a 0 degree boom angle (horizontal):

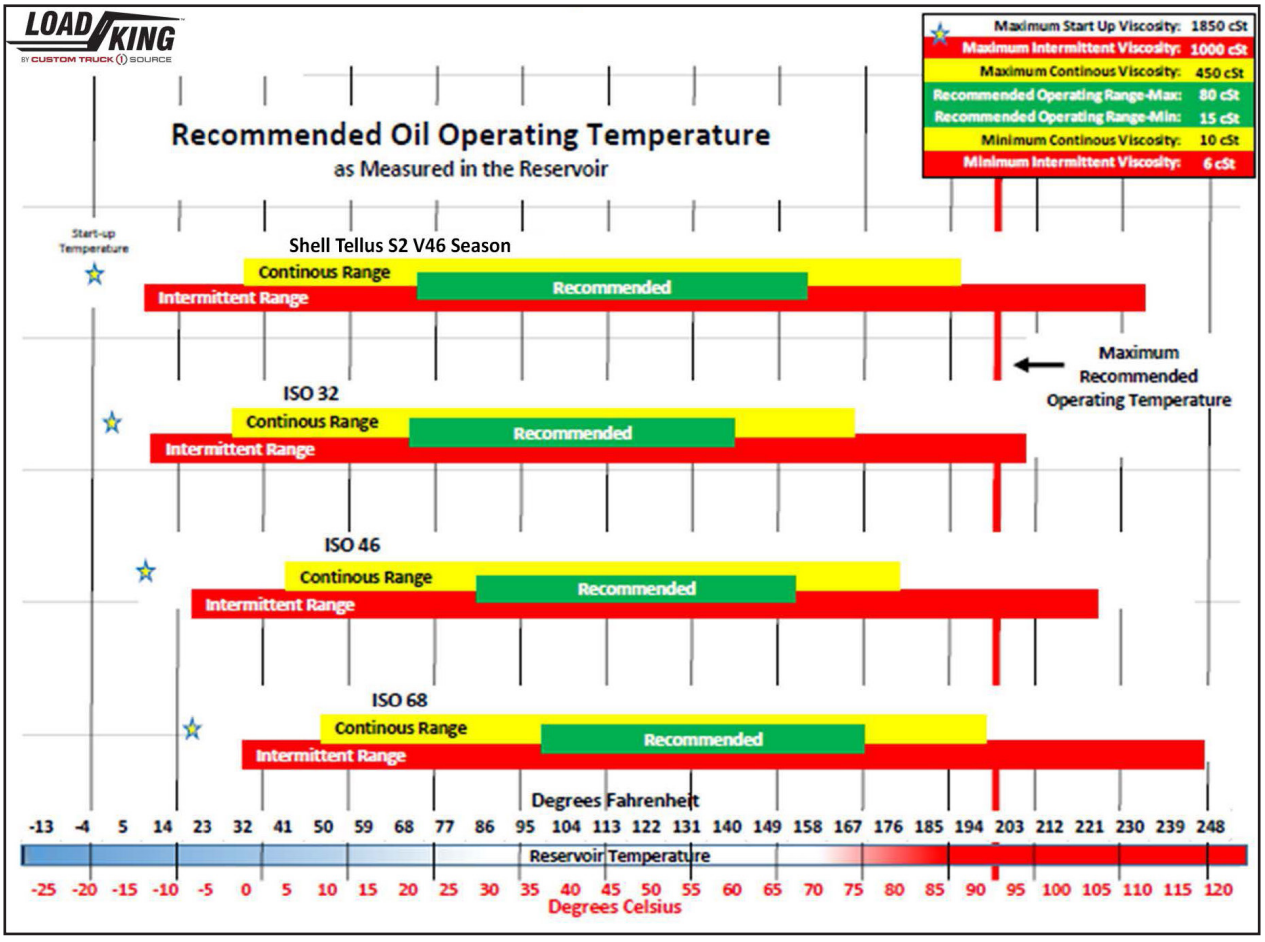
1. Apply high quality extreme pressure grease to the bottom and sides of section, 2, section 3, section 4, and section 5 where the wear pads make contact with the sides and bottoms of the sections
2. Retract the boom sufficently to be able to raise it to at least a 70-75 degree boom angle and extend and retract it to spread the grease across the wear pad contact areas
3. If there are areas that lack grease after extending and retracting, lower the boom and repeat the application process at any dry areas

Hydraulic Oil Requirements

The hydraulic system is filled with **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 sub-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 below and the listings of Typical Qualified Hydraulic Oils on the following pages.

Oil Viscosity Selection Chart



Oil Viscosity Selection Chart Color Legend

GREEN	Recommended - Component Manufacturer's Optimal Range
YELLOW	Continuous - Component Manufacturer's Limits for Continuous 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). 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 hydraulics 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:

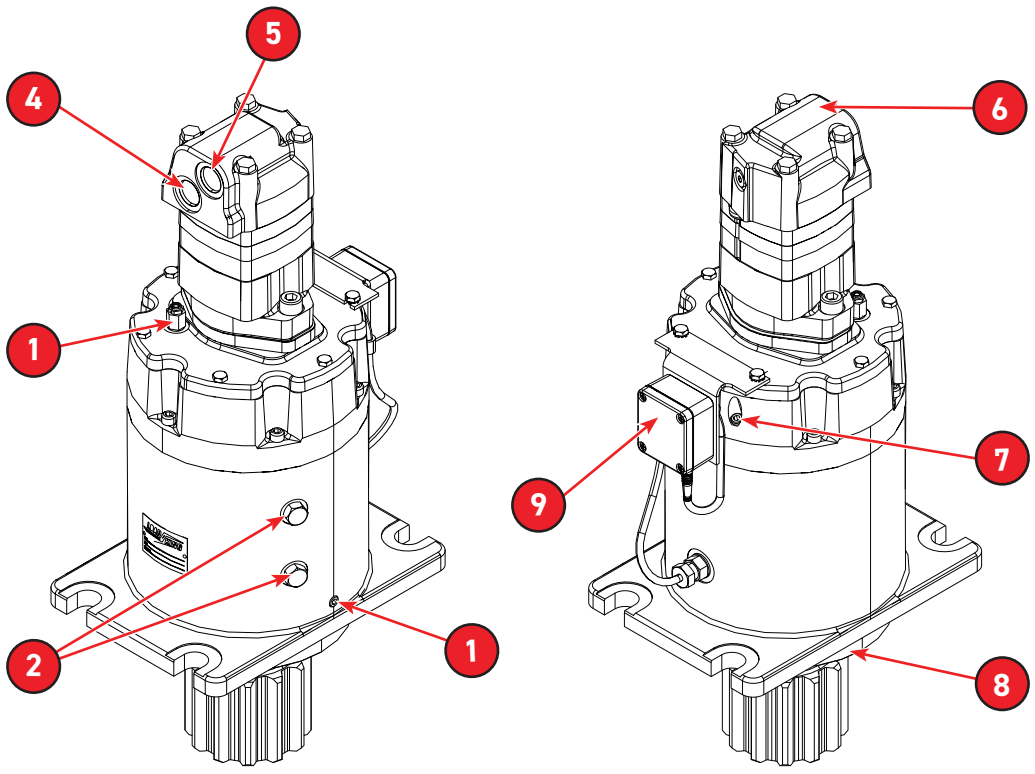
- Engine Oils
- Transaulic Oils
- Zinc-Free Hydraulic Oils
- Transmission Fluids

Typical Qualified Hydraulic Oils

Oil Company	ISO	Brand Name
Conoco		Conoco DN 600 (Arctic)
		Conoco Super Hyd. 5W-20 (Multi-Viscosity)
	32	Conoco Super Hyd. 32
	46	Conoco Super Hyd. 46
	68	Conoco Super Hyd. 68
Exxon Co. (USA)	32	Nuto-H 32
	46	Nuto-H 46
	68	Nuto-H 68
Imperial Oil Limited (Canada)	32	Nuto-H 32
	46	Nuto-H 46
	68	Nuto-H 68
Kendall Refining Co. (USA)	32	Kenoil R & O AW 32
	46	Kenoil R & O AW 46
	68	Kenoil R & O AW 68
Mobil Oil Corp.	32	DTE 24/DTE-13M
	46	DTE 25/DTE-15M
	68	DTE 26/DTE-16M8
Northland Products (USA)	32	Talamar 150
	46	Talamar 215
	68	Talamar 315
	46	Talamar All-Season Premium (Multiviscosity)
	32	Talamar Extreme 32
		Talamar Extreme HTA
	68	68
Pennzoil Products Co. (USA)		AWX Multi-Viscosity
	32	AW 32 Hyd. Fluids
	46	AW 46 Hyd. Fluids
	68	AW 68 Hyd. Fluids
Shell Co. (USA)	23	Tellus 23
	32	Tellus 32
	46	Tellus 46 (XSL 9101)
	68	Tellus 68
Texaco Inc. (USA)		Rando Oil HD A2 (5w-20)
	32	Rando Oil HD 32
	46	Rando Oil HD 46
	68	Rando Oil HD 68

Rotation Gearbox and Gear Teeth

1. The teeth of the rotation gear as well as the rotation gearbox pinion should be lubricated regularly with a good open coat lubricant (Texaco Texclad #3 or spray equivalent). The grease is purged from these teeth by the very nature of the application so close attention will produce longer tooth life. **Load King** recommends these teeth be lubricated once a week or more often in case of extremely heavy duty or dirty cycling applications.
2. The rotation gearbox used on the unit is a double planetary type. The gearbox is filled to the fill plug on the upper housing of the gearbox. The oil used in this gearbox should be an extreme pressure lubricant like Shell S2 G 150. It is advisable to check this fluid level about once a month, unless leakage around the gearbox is noted.
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.

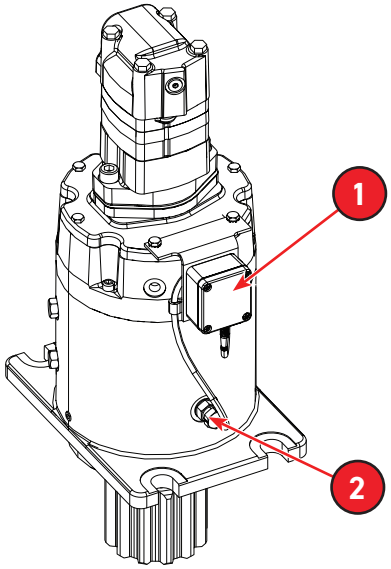


Swing Drive

1.	Oil Level Fill/Vent	6.	Motor 4.0 CID
2.	Plugs	7.	Oil Level
3.	Oil Drain	8.	Eccentric Ring
4.	Parking Brake Pressure OUT	9.	W.A.D Sensor
5.	Parking Brake Pressure IN		

Swing (WAD/ISS) Sensor Check & Replacement Procedure

Swing Gearbox & Motor



1.	Conditioning Box
2.	W.A.D Sensor

Operation into an unintended work zone may result if the Operator Programmable Alarms do not function as programmed and an Operator is relying on them to alert him/her when approaching the unintended work zone.

Precheck procedure to verify Swing Work Area Definition (WAD/ISS) Sensor if functioning properly:

1. Set the boom in the boom rest and align to the zero location as shown in Fig. 1. Record the current swing angle displayed on the LMI display.

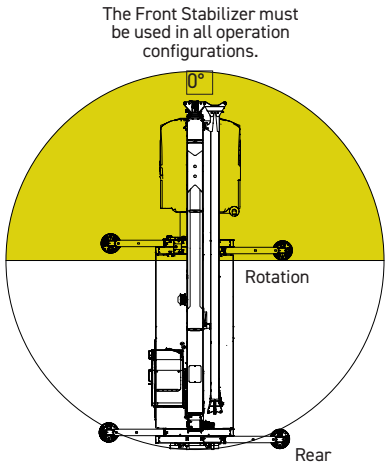


Fig 1

2. Raise the boom until the boom angle is approximately 40°.

3. Rotate the boom slowly and smoothly to the 90° position as shown in Fig. 2.

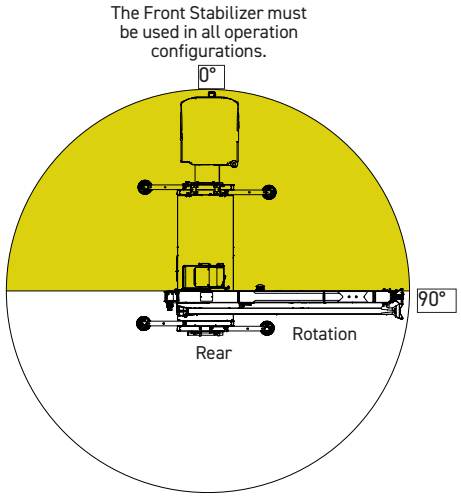


Fig 2

4. Swing the boom counterclockwise approximately 20° and stop abruptly.
5. Pause approximately 5 seconds.
6. Repeat steps 4 and 5 until the boom is at the 270° position as shown in Fig. 3. This completes one cycle.

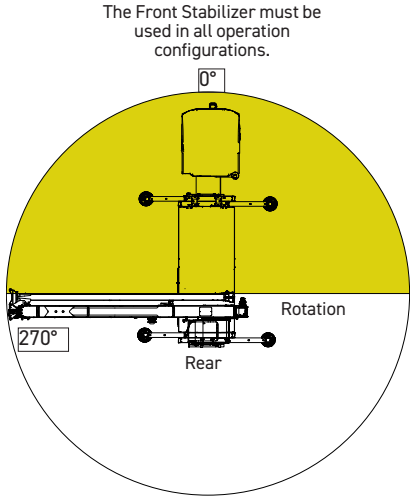


Fig 3

7. Repeat Steps 3 thru 6 nine times, for a total of ten cycles.
8. Set the boom in the boom rest and align to the zero location as shown in Fig. 1. Record the CURRENT SWING ANGLE displayed on the LMI display.
9. If the CURRENT SWING ANGLE readings recorded in steps 1 or 8 are zero, The WAD/ISS is functioning as intended.

If the CURRENT SWING ANGLE reading recorded in steps 1 or 8 is anything other than zero, the WAD/ISS is not functioning as intended. Proceed to instructions for zeroing the WAD sensor.

Until unit passes the test procedure, unit may only be operated with the LEFT SWING and RIGHT SWING on the LMI display set to the “OFF” position.

WAD Sensor Replacement Procedure

1. Set crane on outriggers. Select an open area without obstructions where the retracted boom can be rotated from the 0° position either right or left toward the 90° or 270° positions as shown in Fig. 4.

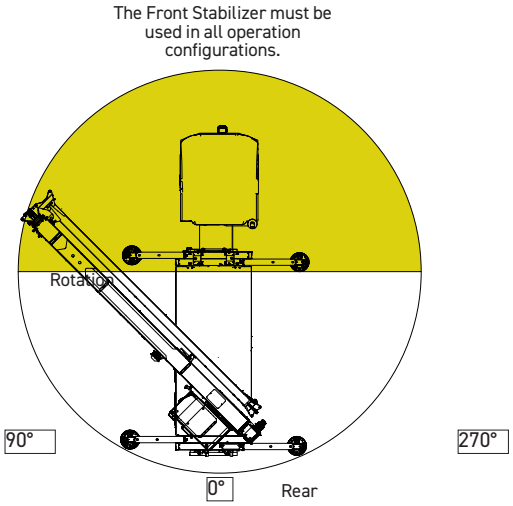


Fig 4

2. Place the boom in the boom rest (stowed position).
3. Turn off the power to the crane.
4. Manually unthread and disconnect the sensor cable from the conditioning box as shown in Fig. 5.

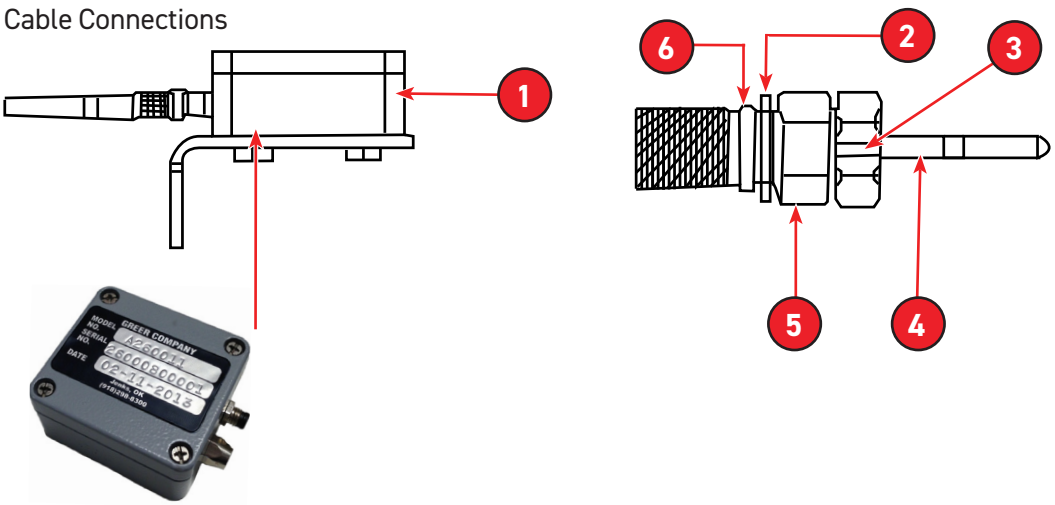
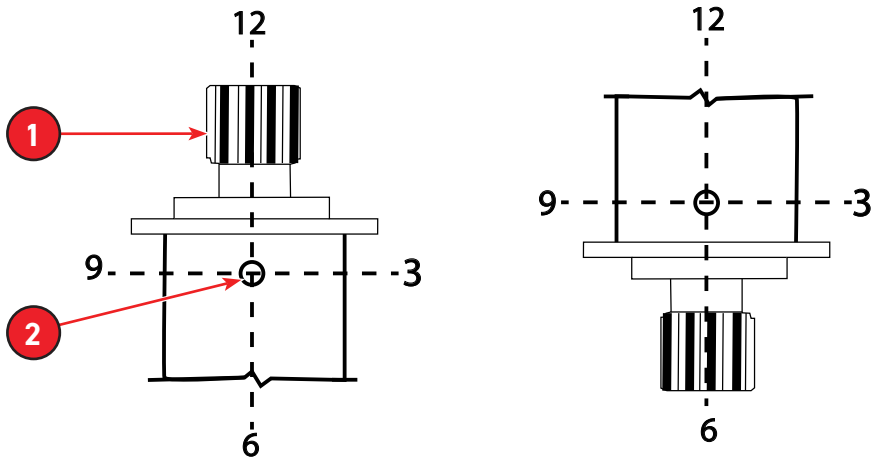


Fig 5 - Conditioning Box & Swing Sensor

1.	Conditioning Box
2.	Washer
3.	Index Notch
4.	Cable
5.	Retaining Nut
6.	O-Ring

5. Loosen the sensor retaining nut using a 3/4" open-end wrench.
6. Unthread and disconnect the sensor from the swing drive housing using a 3/4" opened wrench.
7. Mount dial indicator as shown in Fig. 6 using 1/2" diameter bell-type indicator tip.
8. Re-power the crane.
9. Raise boom out of boom rest to approximately 40°.
10. Rotate swing drive at least one full revolution of the output pinion gear while watching dial indicator to determine lowest reading on indicator. Note the lowest reading.
11. Rotate the swing drive to the position of the lowest reading.
12. Remove the dial indicator.
13. Install the new WAD Sensor, by inserting the threaded end of the sensor into the sensor port of the swing drive (see Fig. 6) by hand, thread it clockwise until the end of the sensor makes slight contact with the gear inside the swing drive housing. Do not force the sensor any past this point, as you may damage the sensor.



Pinion Up **Pinion Down**

Fig 6 - Swing Drive Port

1.	Swing Drive
2.	Sensor Port

14. Note the location of the index notch on the sensor. Rotate the sensor counterclockwise exactly 1/2 turn.
15. Note the position of the index notch on the sensor and continue to rotate counterclockwise until the index notch reaches the 'three o'clock' or 'nine o'clock' position, no more than 1 full turn from location of sensor at the end of Step 12.
16. Tighten the sensor retaining nut using 3/4" open-end wrench.
17. Manually insert the sensor cable into the conditioning box and thread clockwise.
18. Calibrate per Swing Sensor Setup instructions in the LMI manual.
19. Repeat the Precheck procedure Steps 1 thru 8.

Rotation Gear and Gearbox

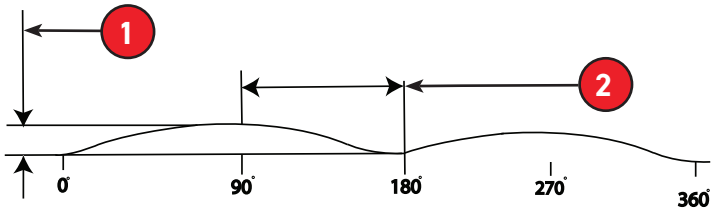
Removal/Installation of Rotation Gear and Gearbox

	The following instructions assume the boom has been removed from the turret.

1. Thoroughly steam clean unit in rotation gear area.
2. Remove the rotation gearbox from its mounting and lay it on the turret base. It is not necessary to disconnect the hydraulic lines when performing this step unless complete removal of the gearbox is desired.
3. Disconnect grease tubes from fittings on swing bearing, 2-places.
4. Remove Bolts holding the turret to the rotation bearing.
5. Remove the turret from the rotation bearing.
6. Remove rotation bearing mounting bolts.
7. Remove the rotation bearing from the turret

Initial Mounting Surface Error (Inches)

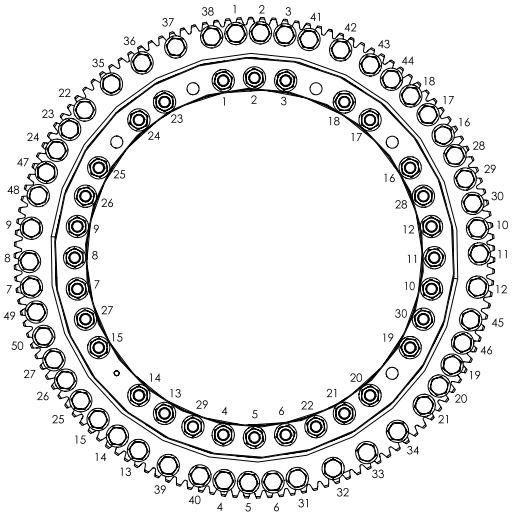
Raceway Diameter (Inches)	Single-Row Ball Bearings
Up to 40	0.006
40 to 60	0.0075
60 to 80	0.009
80 to 100	0.010
100 to 120	0.012
120 to 140	0.014
160 to 240	0.016



1. Mounting Surface Error (TIR)
2. Minimum Span

8. Assemble new bearing to turret using new bolts, hardened flat washers, and nuts. Tighten the nuts to 100 ft.lbs first, then tighten the nuts to 610 ft.lbs. (dry) or 450 ft.lbs (lubed). See bolt torque sequence chart next page.

Torquing Sequence For Rotation Gear



9. Lift the turret and rotation gear into position over the sub-frame. Mounting surfaces must be clean and flat.
10. Position the inner ring so the loading plug is 180° to the left of the rotation gearbox.

	Left corresponds to the Operator's left side when sitting at the controls.

11. Install new bolts, hardened flat washers, and nuts to fasten the inner ring to the pedestal (these bolts can be installed before installing bearing on turret). Do not torque the nuts until all the bolts are in place.

	Access slots are provided in the turret for installing the bolts in the inner ring.

12. Tighten the nuts for the inner ring to 100 ft.lbs. first then tighten the nuts to 610 ft.lbs. (dry) or 450 ft.lbs (lubed). Use the torque sequence shown above for even distribution.

	It will be necessary to rotate the turret to gain access to all of the bolts through the access slots. One person must hold the heads of the bolts with a 1/2 inch hex socket wrench while another person tightens the nuts from inside the turret.

13. Reinstall the rotation gearbox so the mounting bolts are loose. Follow the procedure below to adjust gear backlash.

	Coat rotation gearbox pilot and mainframe pilot bore with anti-seize compound to prevent rust and binding of the eccentric ring.

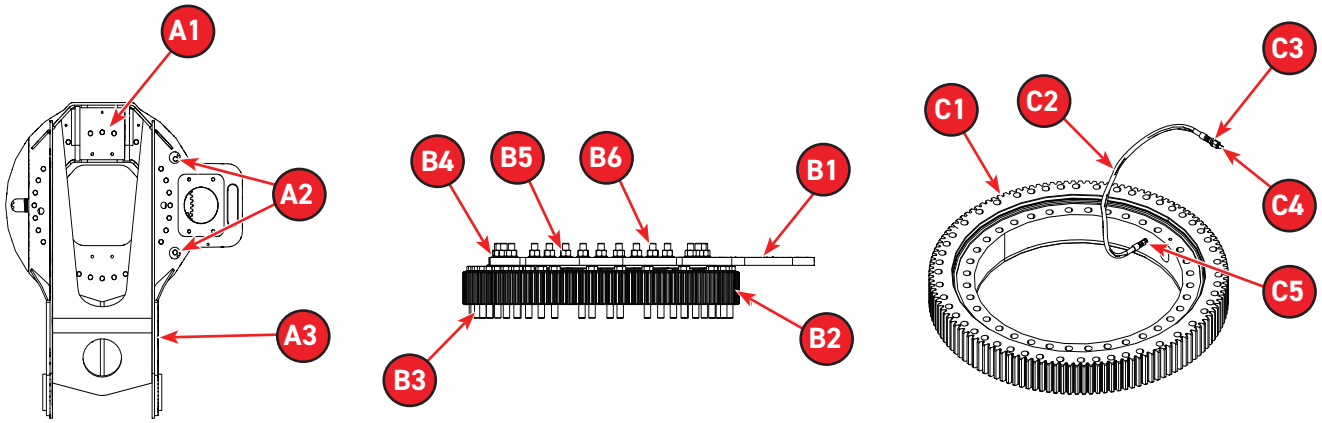
Care and Maintenance of the Rotation System

Contact **Load King** Service Parts Department to receive overhaul information for the gearbox on the unit. Have the serial number available at time of call and the information will be sent to you.

The following steps will produce the longest possible life of the rotation bearing and rotation gearbox:

1. **Load King** recommends that the torque be checked on the rotation gear hold-down bolts every 90 days. This inspection should be repeated more often for boom trucks that see heavy cycle operation or overloading. The figures shown on the next page shows the location of the rotation bolts.

⚠	Failure to observe the above recommendation could result in failure of rotation gear mounting bolts and endanger the Operator and job site personnel.



A1.	Holes on Inner Race	B5.	7/8-9 Nut
A2.	Holes on Outer Race	B6.	7/8-9 x 7 Head Cap Screw
A3.	Turret Assembly	C1.	Rotation Gear
B1.	Turret Base Plate	C2.	Grease Tubes
B2.	Rotation Bearing	C3.	Conn BHF 1/8 NPT X M 1/4 Jic Parker
B3.	7/8-9 x 6 Head Cap Screw	C4.	Grease Zerk
B4.	Washer	C5.	Bearing to Cab Tube

2. Regular periodic lubrication will increase the life and serviceability of the rotation bearing. Being a heavily loaded bearing, it's recommended that an extreme pressure grease (such as Texaco Starplex) be used.

Under normal operation, the rotation bearing should be greased once a week. The grease zerks are located in the Operator's cab, and can be greased by the Operator while rotating the superstructure.

To properly grease this bearing, the unit should be set up with the outriggers in an operating position. Attach the grease gun to the grease zerk on the bulkhead of the Operator's cab and apply 3 full shots from the grease gun. Then rotate the boom 90° and repeat the above steps. This operation should continue through a 360° cycle of the rotation. See the previous location chart.

	A shot is considered as one full pump stroke on a standard chassis type grease gun. It is important to not over-grease and create a wasteful run-off situation.

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 within the manual pack) for specific recommendations and specifications of the proper oil to use in the 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 the hoist is correct for the 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

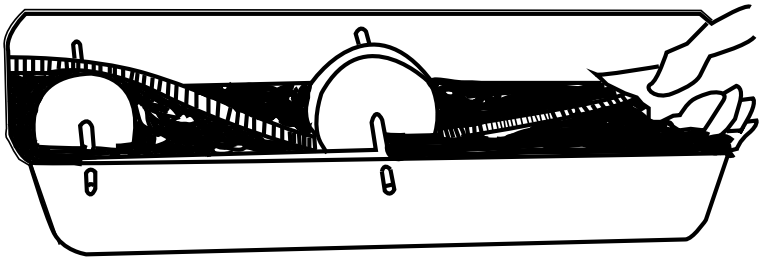
New wire rope is lubricated during manufacturing, but this lubrication is only adequate for initial storage and the early stage of operation. To prevent the damaging effects of corrosion and to reduce wear, the wire rope must be lubricated at regular intervals.

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 the 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. This manual covers the more commonly used methods of lubricating cable (wire rope). For special cable lubrication problems consult the cable manufacturer.

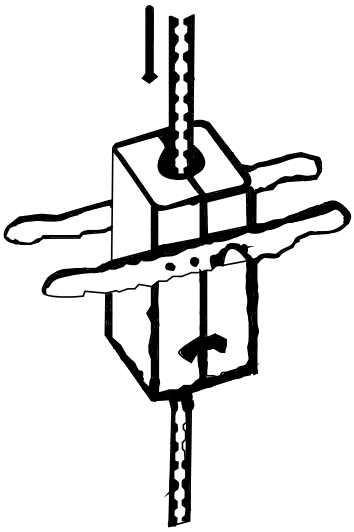
Hot Application

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.



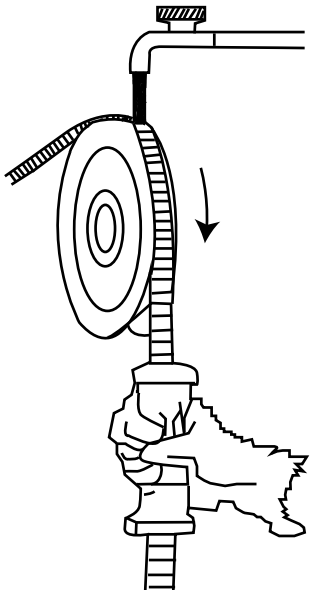
Continuous Bath

Run an operating rope through a specially constructed casing that has been packed with swabbing and loaded with lubricant. This affords continuous lubrication.



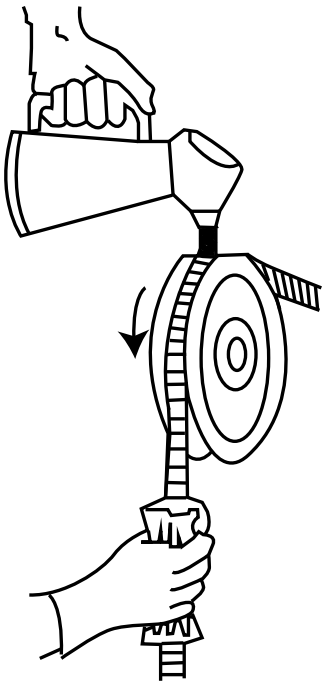
Dripping

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.



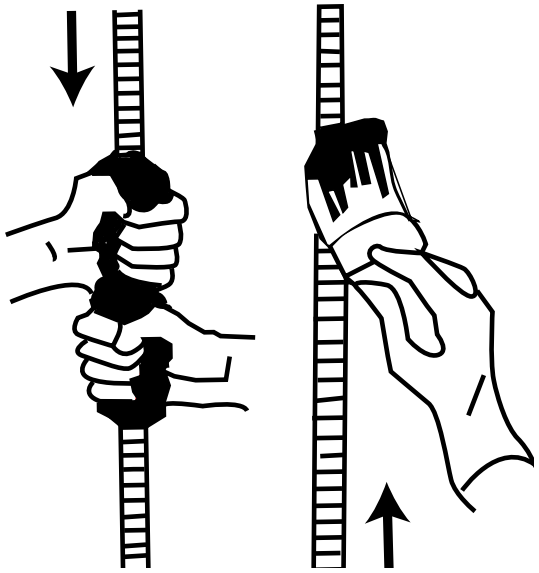
Pouring

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.

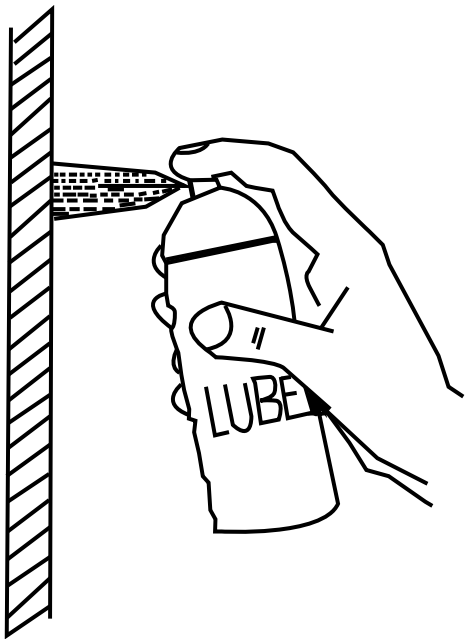


Spraying

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.



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

The machine should be thoroughly cleaned, lubricated in accordance with the Master Lubrication Chart, and painted surfaces retouched where the paint has deteriorated. Exposed portions of all hydraulic cylinders should be coated with multi-purpose grease. Coat unpainted metal surfaces with multi-purpose 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 Hydraulic System 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 or multi-purpose grease .
6. Block wheels so that 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 **CRC SP-400 Corrosion Inhibitor**. (This can be removed later with **CRC HD Degreaser**.)

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 cannot 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 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 down through the chrome layer and begin to corrode the base metal. 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.

If at all possible, cylinders should be stored in the retracted position. The steps outlined 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 **Ferro-Kote 5856-BF** [1] 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.

	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.

[1] Ferro-Kote 5856-BF is a product of Quaker Chemical Company, Conshohocken, PA 19428.

Lift Cylinder

How to Analyze Topping Performance

The lift cylinder should hold up the boom and load with a minimal amount of drop-off. The cylinder is equipped with a counterbalance type holding cartridge in the base of the cylinder.

	Do not remove the cartridge in the base end of the topping without the boom being unloaded and in a supported condition. Removing the cartridge with the boom in an unsupported condition will cause the boom to drop instantly and uncontrollably.

	Trapped pressure in cylinder can forcefully eject cartridge. Make sure pressure is relieved before removing a cartridge. Never stand behind a cartridge while removing it.

To test the cylinder for holding, the following procedure should be used:

	With the outriggers extended, mark each outrigger leg. These marks should be checked at the end of the test procedure below to determine if any outrigger is the cause of the movement noted.

With the boom fully retracted and at a 50-60° angle, attach a weight equivalent to the rated load and raise the load 2 feet off the ground. Accurately measure and record the distance from the ground. Shut off the engine. The load should not drop more than 1/2" in 10 minutes. If it drops more than the amount allowed, the following troubleshooting steps should be performed:

A leaking cylinder will generally fall into 2 categories:

1. External leaks (usually found around the base of the cylinder).
   - o LMI system sense line hose and fittings.
   - o End casting welds.
   - o Cartridge O-Rings.
   - o Cross-drilled passages and plugs.
2. Internal leaks (bypassing within the cylinder or holding cartridge). There are two things that must be checked in order to isolate the source of the leakage:
   - o Holding cartridge -Attach a weight equivalent to the rated load and raise the boom 2-3 inches off the boom rest. Shut off unit. Remove both topping hoses at the control valve. Oil coming from the boom-up hose indicates a bypass at the counterbalance cartridge. Replace or clean the cartridge. Boom must be unloaded and supported before cartridge is removed.
   - o Piston bypassing from base side to rod side - If oil comes out of the boom-down hose while still engaged in the same test, the cylinder is bypassing internally and will require internal repairs.

	This test should be performed with Ambient Temperature oil. If done with very hot oil, cylinder movement will be caused by thermo contraction of the oil held in the cylinder.

Lift Cylinder Removal

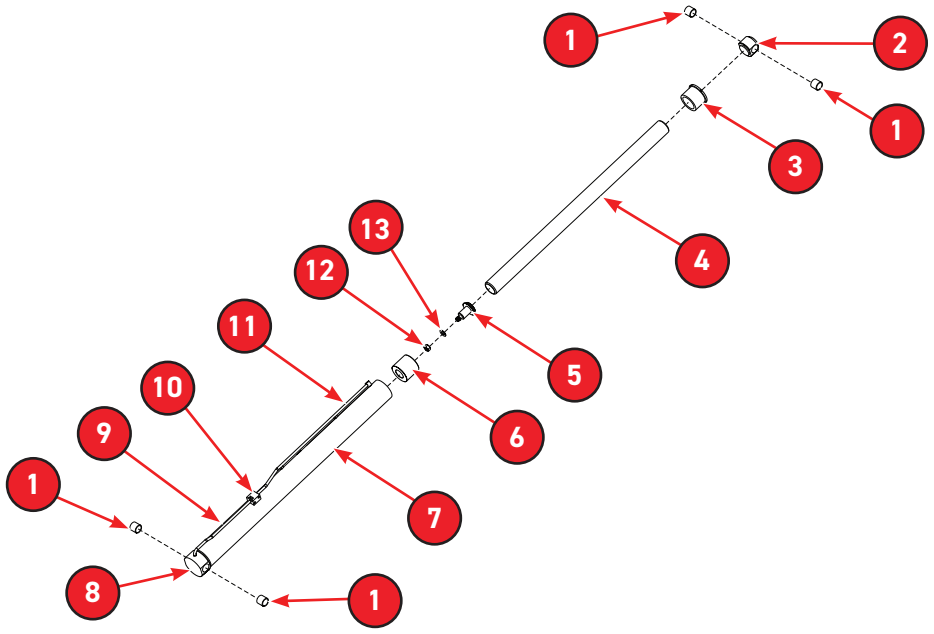
Perform the following steps to remove the lift cylinder:

1. Fully retract and lower the boom onto the boom rest. Disengage the PTO and stop engine.
2. Tag and disconnect the hydraulic lines from the lift cylinder.

⚠	Hydraulic oil may be under pressure. Loosen fittings very slowly to prevent injury.

These should be plugged or capped to prevent any fluid loss or slippery surfaces around the work area and also to prevent contamination from entering the hydraulic system. Plug the resulting open ports of the cylinder to prevent the loss of fluid.

3. Lift against the rod end of the lift cylinder with a hoist or another crane and remove the rod end pin.
4. With the cylinder balanced in a choker strap, that is attached to a suitable hoist or other type of lifting equipment, support the cylinder and remove the pin in the cylinder base. It weighs approximately 5000 lbs. Remove the cylinder, taking precautions to prevent scratching the paint finish.



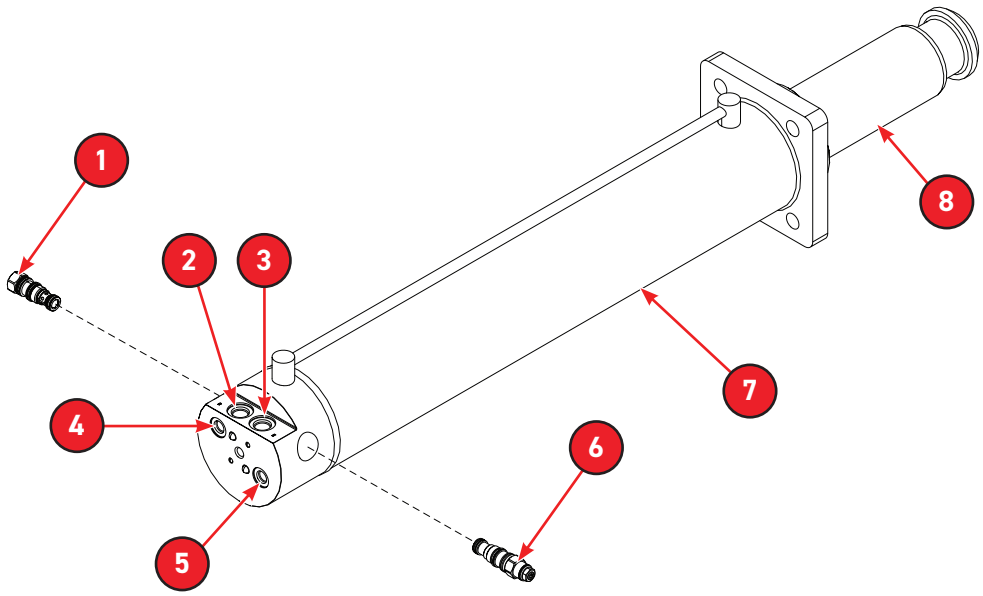
1.	Bearing	8.	Base End Cap
2.	Rod End	9.	Boom Up tube
3.	Gland	10.	Port Block
4.	Rod	11.	Boom Down tube
5.	Piston Adapter	12.	Nut
6.	Piston	13.	Washer
7.	Cylinder Barrel		

Lift Cylinder Overhaul Procedure

Contact **Load King** Service Department to receive overhaul information for the cylinder on the unit. Have the cylinder part number, located on the barrel, available at time of call and the information will be sent to you.

Outrigger Cylinder

Outrigger Two-Way Check System



1.	Check Valve	5.	Extend Test Port
2.	Retract Port	6.	Counterbalance Valve
3.	Extend Port	7.	Cylinder Case
4.	Retract Test Port	8.	Cylinder Rod

Outrigger two-way pilot to open check system

Located : On each outrigger jack cylinder.

Function : Locks outrigger in up position for travel, and down for crane operation. Requires internal pilot pressure to operate in either direction.

⚠	Do not remove cartridges without supporting the outriggers in an unloaded condition. Cartridges do not bleed off pressure by removing slowly, they can eject forcefully if the cylinder is pressurized.

The main reason for outrigger service is leaking. There are two types of leaks: External and internal.

External leaks may or may not cause the outrigger to drift depending on the source of the leak. External leaks can usually be located by visually inspecting the cylinder while it is at full system pressure, fully stroked in one direction or the other.

Some things to check might be:

1. Steel lines and fittings.
2. Welds (Base to cylinder barrel).
3. End gland of cylinder.
4. Cartridge O-Ring.

To Check Pilot-Operated Cartridge:

1. Raise truck off ground until tires are clear. If possible, apply maximum payload to flatbed.
2. Stop engine. Disconnect retract port hose at valve on cylinder.
3. If oil runs out of the retract port, the piston is internally bypassing and must be replaced.

To Check Stow Holding Cartridge:

1. Fully retract cylinder.
2. Devise a means of externally extending the cylinder (Porta-Power or Block & Tackle).
3. Disconnect retract port hose at cylinder. If oil runs out of the cylinder, retract pressure port. The stow holding cartridge is bypassing and must be replaced.

To Check Cylinder Piston:

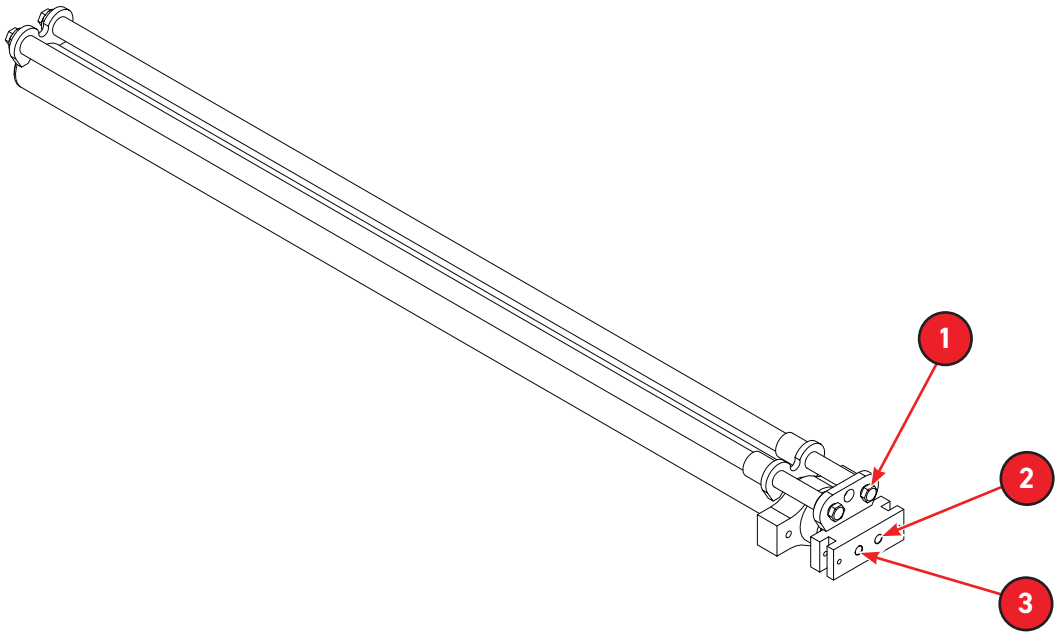
1. Fully extend cylinder.
2. Remove retract cartridge. Use caution, as there will be trapped pressure behind this cartridge.
3. Pressurize extend port to full system pressure.
4. If oil runs out of retract cartridge bore, piston is bypassing and cylinder must be serviced.

Removal & Disassembly of Main Outriggers

1. Support the cylinder using a jack, lift, or strap, then remove bolts under weldment.
2. Remove the snap rings from the link pin at the outrigger leg. The pin should drive out easily if the leg is properly positioned. If the pin does not drive out easily, reposition the leg so the pin is not loaded. Allow the links to swing down after the pin is removed.
3. Disconnect the outrigger hoses, after marking for later reinstallation. Cap hoses and fittings on cylinder.
4. Insert a 7/16" x 14" rod through the links, inner and outer legs. This will support the links and lock the leg sections together during removal.'"
5. Take up the slack in the strap with a hoist.
6. Move the cylinder to overhaul bench.

Reassembly & Installation of Main Outriggers

1. Connect the outrigger hoses. Cycle cylinder several times to full stroke to remove any air in the cylinder.



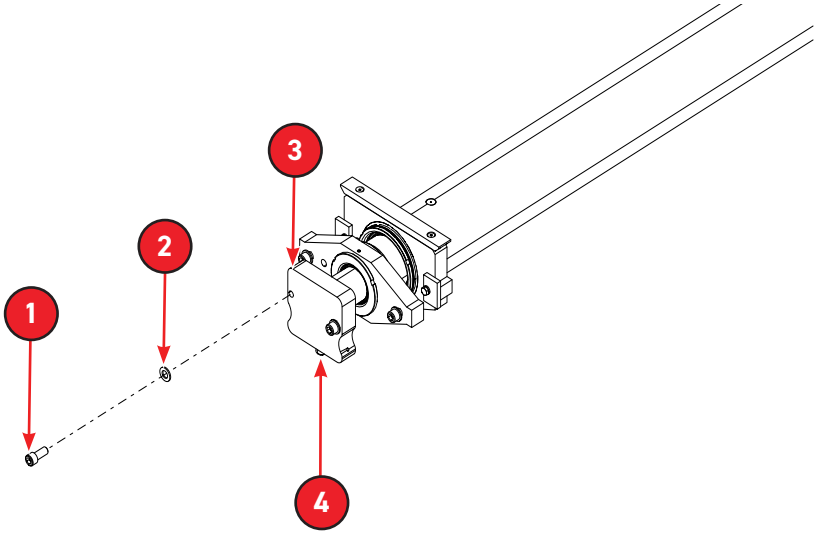
1.	SAE O-Ring Port
2.	Retract Port
3.	Extend Port

Checking Load Holding

	Do not remove counterbalance valve unless boom is fully retracted and supported to prevent sudden movement.

	When loosening fittings, high pressure oil could be present if counterbalance valve is stuck open or if internal leakage is severe. Boom should only be slightly extended so that sudden movement does not cause injury or property damage.

1. Extend boom 3-4" at maximum angle. Remove both the extend and retract hoses at the control valve.
   - Oil coming from the boom extend hose indicates bypass from the counterbalance. Clean or replace the counterbalance.
   - If oil comes out of the boom retract hose the cylinder is by passing internally and will require internal repairs.



1.	Valve Body Bolt
2.	Washer
3.	Cartridge Block
4.	Cartridge

Cylinder Overhaul Instructions

For removal of the extension cylinder assembly see Boom Disassembly Procedure.

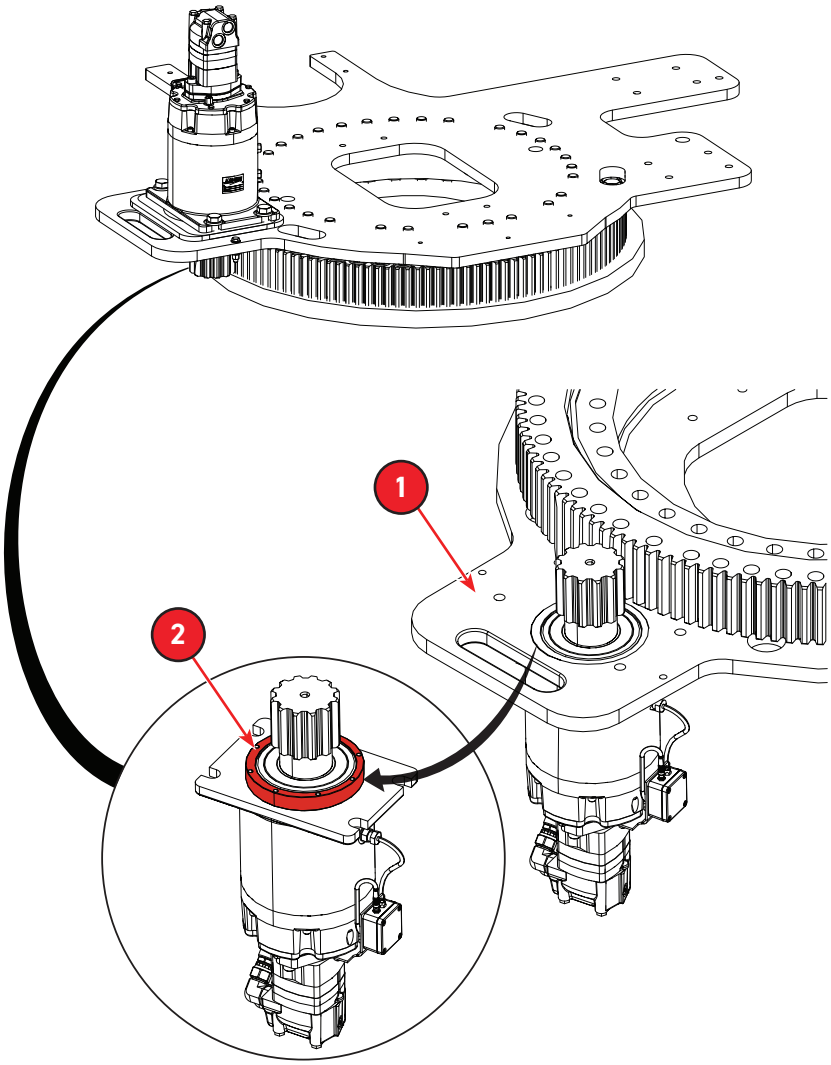
Contact **Load King** Service Parts Department to receive overhaul information for the cylinder on the unit. Have the cylinder part number, located on the barrel, available at time of call and the information will be sent to you.

Backlash Adjustment

The rotation mechanism should be checked periodically for any signs of looseness or excess lash between the gears.

The procedure for setting backlash is as follows:

1. Locate the high spot on the rotation gear. This spot is marked with blue or yellow paint at the time of manufacture of the bearing. You will be able to see this spot by wiping away some of the gear grease. The high spot can also be located with a dial indicator.
2. Be sure the high spot is aligned to the pinion; turn the eccentric cam ring until the gears are in mesh and there is no clearance at all.
3. Install a dial indicator as shown in the following illustration and set to 0.



1.	Plate Turret Mount
2.	Eccentric Cam Ring

4. Loosen the mounting bolts holding the gearbox just enough so that the gearbox may be moved when the eccentric cam ring is turned.
5. Rotate the cam ring slowly until the reading is .020 - .025.
6. Remove the gearbox bolts one at a time and apply new LOC-TITE to the threads. Retorque the bolts to 280 - 300 ft-lbs.



Coat rotation gearbox pilot and mainframe pilot bore with anti-seize compound to prevent rust and binding of the eccentric ring.

Control Valves and Pressures

The relief pressure settings on the RS Boom Truck are very important. They protect the system components from being overpressured by allowing oil above the main relief setting to be vented to the tank. If this does not happen on a fixed displacement system, it could cause serious damage to hoses, pumps, and other components in the system.

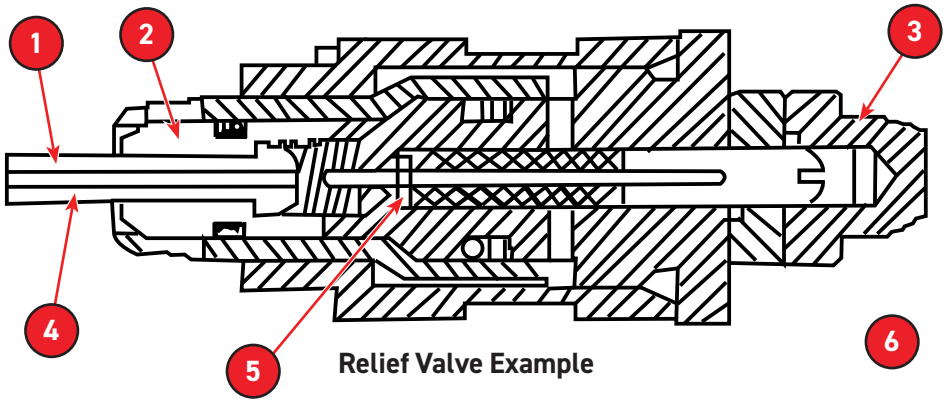
The chart below summarizes the valves used on the RS Boom Truck by function and configuration. It also gives the rated operating pressures required for the boom, swing, and winch system. All pressures are +/- 50 psi.

Valve Specifications and Pressure Settings

Function	Configuration	Pressure
Winch / Boom	Closed Port	4200 psi
Boom Extend	Cross Port Relief, Port A	3000 psi
Boom Retract	Cross Port Relief, Port B	3000 psi
Swing	Open Center/Open Port (Motor)	2900 psi
Outrigger Relief	In Diverter Valve	2500 psi
Main Relief	In Diverter Valve	3500 psi

The relief used on the control valve is a pilot operated type. Oil enters through the orifice in the end of the piston and is trapped against the seat of the pilot poppet. As long as the relief valve has the signal trapped and isolated from the tank, the main relief will remained closed. However, if the spring force holding the pilot poppet closed is overcome, oil can get out faster than it can get in through the orifice in the piston poppet. This causes a pressure drop inside the cartridge and the relief piston opens, unloading the oil to the tank. Any malfunction of this relief is usually caused by dirt or foreign material caught on the sealing surfaces.

The pressure relief for the outrigger valve is controlled by a pilot relief working with the bypass spool.



Relief Valve Example

1.	Oil inlet Orifice	4.	Poppet Adjustment Screw
2.	Relief Piston	5.	Pilot Poppet
3.	Acorn Nut	6.	Piston

The reliefs are factory set and should not be tampered with unless poor performance is experienced. Any relief which has been removed for inspection, cleaning, or replacement must be adjusted after installation. The figure above is a cutaway view of a typical relief found in the boom, winch, and swing system of the RS Boom Truck.

Inspection and Repair

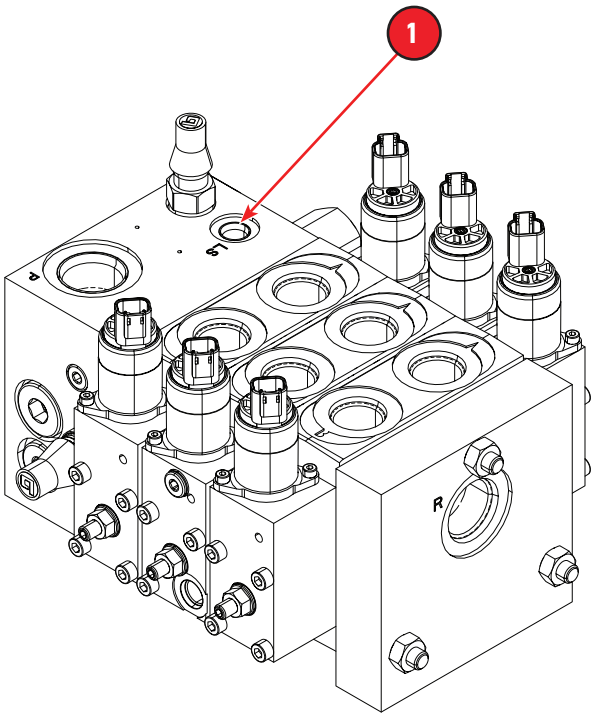
Clean all parts with solvent and dry with compressed air. Make sure the orifice in the piston is open. Examine seat on the pilot poppet and make sure it is free of grooves or ridges. If these conditions are present, the entire relief cartridge must be replaced. All seating surfaces should be smooth and free of nicks, scratches, or grooves. Examine o-rings and back-up rings for any signs of damage. Replace damaged or faulty parts. All moving parts should slide freely with only seal friction present. If possible, remove minor nicks or scratches in poppets or poppet seats by lapping with a fine grade of lapping compound. Clean poppets thoroughly after this procedure. If operating difficulties indicate that pilot poppet is leaking or sticking, remove internal parts of pilot section and follow same procedure as above. After inspecting and cleaning, immerse all parts in hydraulic oil and reassemble. Torque pilot section in housing to 40 ft-lbs and recheck system pressure.

Relief Valve Specifications

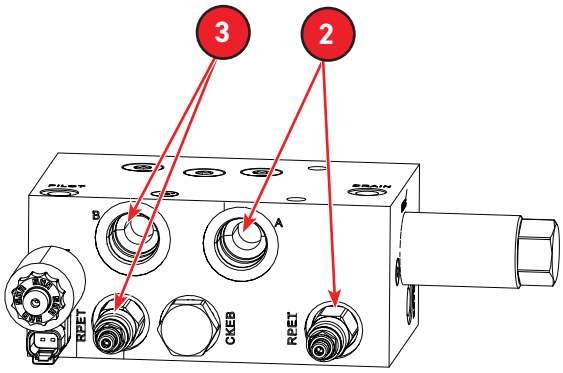
Problem	Cause	Remedy
No Pressure	Poppet Stuck Dirt in Poppet	Check for Wear Clean as Required
Pressure Erratic	Poppet Seat Damage Poppet Sticking	Replace Damaged Parts Clean Cartridge
Pressure Setting Not Correct	Internal Wear Adjuster Loose	Clean or Replace Adjust Relief
Leaks	Damage O-Rings or Worn Parts	Replace Worn Parts or Reseal

Procedure for Adjusting Boom Valve Adjustments

The system reliefs should be set only when the oil in the hydraulic system is warm or at operating temperature.



BOOM VALVE



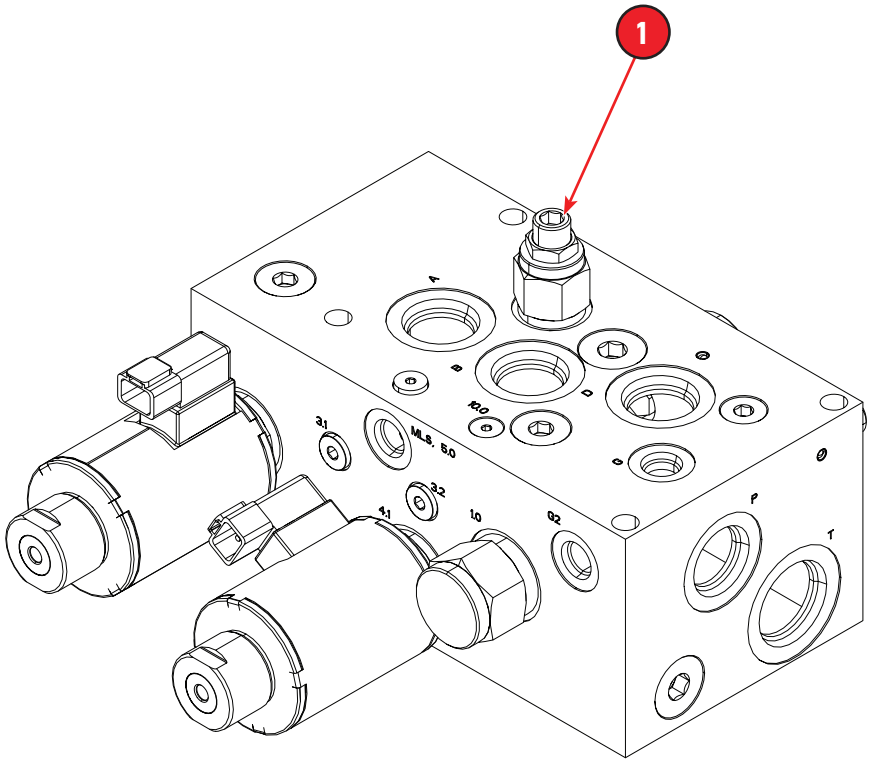
CROSS PORT RELIEF

1.	LS port
2.	Extend boom - Regen Valve line mount pilot operated (A)
3.	Retract boom - Regen Valve line mount pilot operated (B)

1. Install pressure reading on display gauge in LS port (1) on boom valve (Inlet of boom valve).
2. Engine at full throttle (Approx 1650 rpm depending on chassis).
3. Fully extend boom - Set Cross port relief (2) to 3000 psi
4. Fully retract boom - Set cross port relief (3) to 3000 psi.
5. Fully raise boom and set boom valve relief to 4200 psi.

Procedure for Adjusting Outrigger Reliefs

The system reliefs should be set only when the oil in the hydraulic system is warm or at operating temperature.



Diverter Valve

1.	Outrigger Relief

1. With the control levers in neutral position, raise pump RPM to 2,300.
2. Slowly retract the beam extension cylinder until it reaches the end of the stroke and forces the system pressure upward to relief pressure.

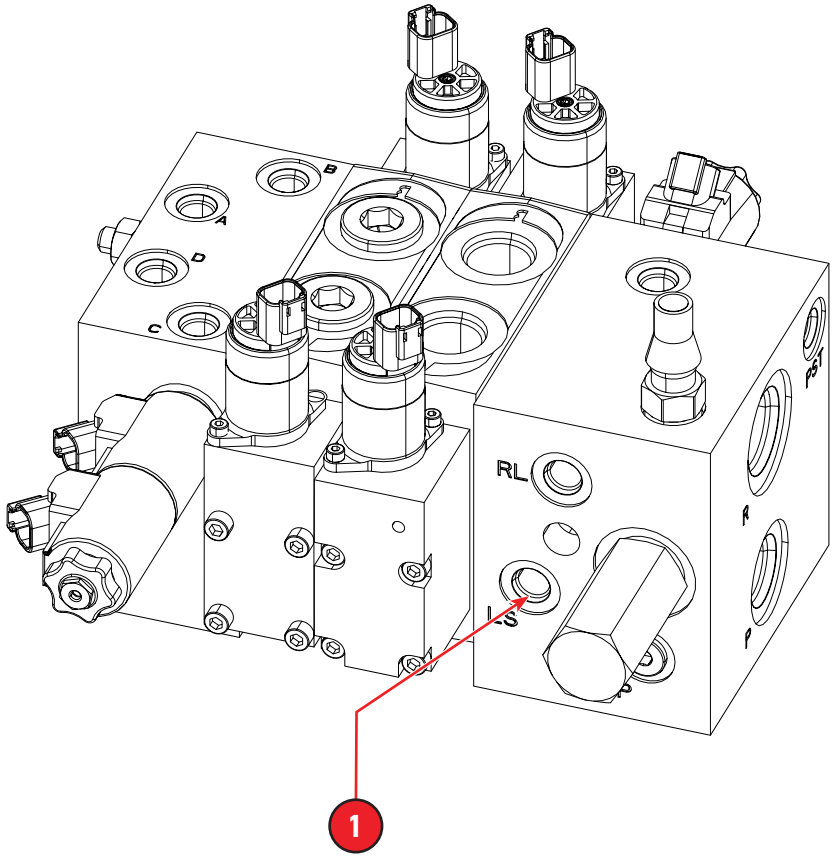
Leave all other control levers in the neutral position.

3. Check the reading on the test gauge. See pressure table for proper settings.

	Move the lever to the neutral position immediately after taking the pressure reading to avoid excessive heat.

4. Make proper adjustments to relief by turning the relief adjustment clockwise for more pressure and counter clockwise for less pressure. Be sure to retighten the jam nut to 10 ft.lbs. and install the acorn nut.

Procedure for Adjusting Swing Valve



Swing Valve

1.	LS Port

1. Install pressure reading on display gauge in LS port (1) in swing valve (Inlet section swing valve).
2. Engage park break.
3. Operate swing and set pressure to 2900 psi.

Rotation System

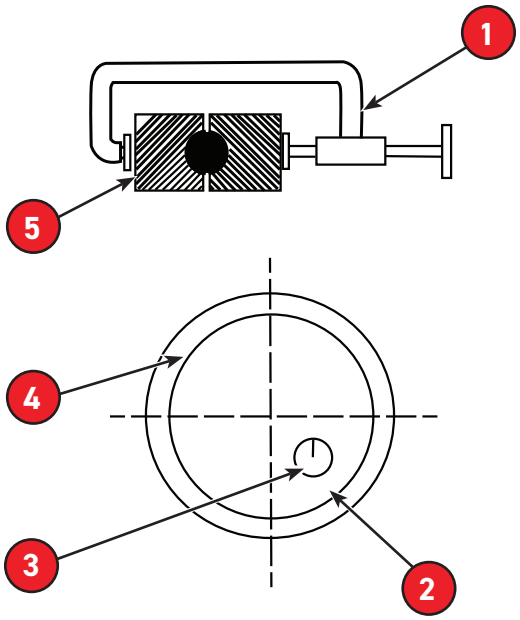
Inspection of Rotation Bearing Clearance

- 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.
- 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 (2), and tighten just enough to take all the slack out of the raceway. Install a dial indicator as close to position (2) as possible, and set it to "0".

Remove the C-clamp and attach at clamp position (4). 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.



Radial Clearance Check Procedure

1.	Clamp Position (1)
2.	C-clamp
3.	Dial Indicator
4.	Clamp Position (2)
5.	Rotation Gear

The following bearing clearances should be observed:

- Any new bearing being installed on a **Load King** boom truck should not have more than 0.004 - 0.007 radial clearance.
- Any bearing removed from a unit that has a radial clearance of 0.030 to 0.050 should be thoroughly screened 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.

Restoration of Machine to Service

Remove the machine from storage via the following procedure:

1. Remove the preservative lubricants from all surfaces.
2. Check all fluid levels, adding or draining as required.
3. Lubricate the machine according to the Master Lubrication Chart, 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.

Engine Storage

Preparing Engine for Storage

When an engine is to be stored or removed from operation for a period of time, special precautions should be taken to protect the interior and exterior of the engine, transmission, and other parts from rust accumulation and corrosion. The parts requiring attention and the recommended preparations are given below.

It will be necessary to remove all rust or corrosion completely from any exposed part before applying a rust preventive compound. Therefore, it is recommended that the engine be processed for storage as soon as possible after removal from operation.

The engine should be stored in a building which is dry and can be heated during the winter months. Moisture absorbing chemicals are available commercially if there is excessive moisture in the storage area.

Temporary Storage (30 Days or Less)

To protect an engine for a temporary period of time proceed as follows:

1. Drain the engine crankcase.
2. Fill the crankcase to the proper level with the recommended viscosity and grade of oil.
3. Fill the fuel tank with the recommended grade of fuel oil. Operate the engine for two minutes at 1200 rpm and no load.

	Do not drain the fuel system or the crankcase after this run.

4. Check the air cleaner and service it, if necessary as outlined under Air System.
5. If freezing weather is expected during the storage period, add a high boiling point type antifreeze solution in accordance with the manufacturer's recommendations. Drain the raw water system and leave the drain cocks open.
6. Clean the entire exterior of the engine (except the electrical system) with fuel oil and dry it with air.
7. Seal all of the engine openings. The material used for this purpose must be waterproof, vapor proof and possess sufficient physical strength to resist puncture and damage from the expansion of entrapped air.

An engine prepared in this manner can be returned to service in a short time by removing the seals at the engine openings, checking the engine coolant, fuel oil, lubricating oil, transmission, and priming the raw water pump, if used.

Extended Storage (30 Days or More)

When an engine is to be removed from operation for an extended period of time, prepare it as follows:

1. Drain and thoroughly flush the cooling system with clean, soft water.
2. Refill the cooling system with clean, soft water.
3. Add a rust inhibitor to the cooling system (refer to Group 4, “Corrosion Inhibitor”).
4. Remove, check and recondition the injectors, if necessary, to make sure they will be ready to operate when the engine is restored to service.
5. Reinstall the injectors in the engine, time them, and adjust the valve clearance.
6. Circulate the coolant through the entire system by operating the engine until normal operating temperature is reached (160° F. to 185° F).
7. Stop the engine.
8. Remove the drain plug and completely drain the engine crankcase. Reinstall and tighten the drain plug. Install new lubricating oil filter elements and gaskets.
9. Fill the crankcase to the proper level with a 30- weight preservative lubricating oil MILL- 21260, Grade 2 (P10), or equivalent.
10. Drain the engine fuel tank.
11. Refill the fuel tank with enough rust preventive fuel oil such as Americal Oil Diesel Run- In Fuel (LH 4089), Mobil 4Y17, or equivalent, to enable the engine to operate 10 minutes.
12. Drain the fuel filter and strainer. Remove the retaining bolts, shells and elements. Discard the used elements and gaskets. Wash the shells in clean fuel oil and insert new elements. Fill the cavity between the element and shell about two-thirds full of the same rust preventive compound as used in the fuel tank and reinstall the shell.
13. Operate the engine for 5 minutes to circulate the rust preventive throughout the engine.
14. Refer to page Group 4 and service the air cleaner.
15. With an all-purpose grease such as Shell Alvania No. 2, or equivalent, lubricate the clutch throughout bearing, clutch pilot bearing, drive shaft main bearing, clutch release shaft, and the outboard bearings (if so equipped).
16. Remove the inspection hole cover on the clutch housing and lubricate the clutch release lever and link pins with a hand oiler. Avoid getting oil on the clutch facing.
17. Apply a non-friction rust preventive compound, to all exposed parts. If it is convenient, apply the rust preventive compound to the engine flywheel. If not, disengage the clutch mechanism to prevent the clutch disc from sticking to the flywheel.



Do not apply oil, grease or any wax base compound to the flywheel. The cast iron will absorb these substances which can “sweat” out during operation and cause the clutch to slip.

18. Drain the engine cooling system (tag cap).
19. The oil may be drained from the engine crankcase if so desired. If the oil is drained, reinstall and tighten the drain plug (tag cap).
20. Remove and clean the battery and battery cables with a baking soda solution and rinse them with fresh water. Store the battery in a cool (never below 32°F.) dry place. Keep the battery fully charged .
21. Insert heavy paper strips between the pulleys and belts to prevent sticking.
22. Seal all of the openings in the engine, including the exhaust outlet, with moisture resistant tape. Use cardboard, plywood or metal covers where practical.
23. Clean and dry the exterior painted surfaces of the engine. Spray the surfaces with a suitable liquid automobile body wax, a synthetic resin varnish or a rust preventive compound.
24. Cover the engine with a good weather-resistant tarpaulin or other cover if it must be stored outdoors. A clear plastic cover is recommended for indoor storage.

The stored engine should be inspected periodically. If there are any indications of rust or corrosion, corrective steps must be taken to prevent damage to the engine parts. Perform a complete inspection at the end of one year and apply additional treatment as required.

Restoring Engine to Service

1. Remove the valve rocker cover(s) and pour at least one-half gallon of oil, of the same grade as used in the crankcase, over the rocker arms and push rods.
2. Reinstall the valve rocker cover(s).
3. Remove the covers and tape from all of the openings of the engine, fuel tank, and electrical equipment. Do not overlook the exhaust outlet.
4. Wash the exterior of the engine with fuel oil to remove the rust preventive.
5. Remove the rust preventive from the flywheel.
6. Remove the paper strips from between the pulleys and the belts.
7. Check the crankcase oil level. Fill the crankcase to the proper level with the heavyduty lubricating oil recommended under Lubricating Oil Specifications.
8. Fill the fuel tank with the fuel specified under Diesel Fuel Oil Specifications.
9. Close all of the drain cocks and fill the engine cooling system with clean soft water and a rust inhibitor. If the engine is to be exposed to freezing temperatures, add a high boiling point type antifreeze solution to the cooling system (the antifreeze contains a rust inhibitor).
10. Install and connect the battery.
11. Service the air cleaner as outlined under Air System.
12. Prepare the generator for starting.
13. Remove the inspection hole cover and inspect the clutch release lever and link pins and the bearing ends of the clutch release shaft. Apply engine oil sparingly, if necessary to these areas.
14. After all of the preparations have been completed, start the engine. The small amount of rust preventive compound which remains in the fuel system will cause a smoky exhaust for a few minutes.

	Before subjecting the engine to a load or high speed, it is advisable to check the engine tune-up.

Transmission storage

Preservative Selection

It is recommended that the highest viscosity monograde lubricant available be used for the anticipated ambient temperature. Typically this will be a Cat TO-4 qualified lubricant. When large swings in ambient temperature are probable J20 C, D multigrades are recommended. Multigrade lubricants should be applied at the lower viscosity rating for the prevailing ambient temperature i.e., a 10W20 should be used where a 10W monograde is used. If a C-4 multigrade is used in place of J20 lubricant it is recommended that the viscosity be no more than 10 points, i.e., 10W20.

Storage

If the transmission is to be stored in excess of 60 days before being put into service, the units should be completely filled with the lubricant specified above and stored in a dry area. It is also recommended that at least every 30 days all flanges be rotated by not less than two complete turns to insure complete lubrication of the seals.

Restoring Transmission to Service

1. Drain oil.
2. Install a new oil filter element(s).
3. Refill transmission with hydraulic transmission fluid to proper level.

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Troubleshooting

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 comprehensive checklist serves as a tool to help record preventive maintenance checks performed, problem areas identified, and maintenance requirements.

Check points are categorized as per the maintenance inspection intervals. Refer to the Maintenance and Service section, "Maintenance Checks and Lubrication".

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.

	While performing periodic checks on the engine, always refer to the manufacturer's manual for maintenance requirements. The engine manufacturer's recommendations take precedence over this manual.

Operator Observation

It is the responsibility of an Operator to notice and report any unusual sounds, odors, or other signs of abnormal performance that may indicate trouble ahead.

The following items should be checked on a regular basis before starting or while operating the crane.

- Visual Inspection - Check the complete machine for any unusual conditions.
- Check the hydraulic system for any leaks or damage.

- Check the crane boom for the following:
    - Hook block for wear or damage
    - Two-block system for proper function
    - Cable and cable spooling on the winch
    - Cylinder pin connections for wear
- Check the 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 of the lights are operational
    - Cleanliness - free from mud and debris

General Procedure

1. **Know the system**: Study the manual and learn what makes the machine "tick" as well as how it should behave, sound, and smell.
2. **Operate the machine**: Test and 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 unusual sounds, and identify the source of unusual odors. Check the condition of the oil and filters.
4. **List the possible causes**: The Operator should use their best judgment in listing all possible causes of the failure.
5. **Reach a conclusion**: Review the list of possible causes and decide which ones are the most likely to cause the failure. Consider the most obvious first.
6. **Test the conclusion/resolution**: Test the conclusions in order of obviousness until the source of failure has been found. The machine can then be repaired at a low cost and with minimal downtime. Make the necessary repairs.

   Check again to ensure that nothing has been missed. Functionally test the repaired part in the system.
7. **Review maintenance procedures**: Prevent the recurrence of all premature failures by checking the filters, temperature, adjustments, and lubrication on a regular basis. Conduct daily inspections.

	Safety is always the number one consideration when working around cranes. Safety requires a thorough understanding of the job to be done as well as the use of common sense.

Condition	Possible Cause
No response to any control	PTO not engaged Low hydraulic oil supply Broken hydraulic pressure line Defective pump Crane power switch not ON
Slow operation	Pump not operating at proper speed Low hydraulic oil supply Relief setting too low Worn pump, motor, or cylinder Plugged filter Valve spools not fully opening Cold oil Hot oil
Excessive noise during operation	Low oil supply causing pump cavitation Suction line gate valve closed Relief settings too low Excessive load Suction line kinked, causes pump cavitation Hydraulic tube vibrating
No response, slow or erratic operation of winch function	Defective counterbalance valve Sprag clutch defective (up only) Relief settings too low Gears damaged or locked in gear case Defective drive motor
No response, slow or erratic operation of swing function	Rotation drive motor worn Gears damaged or locked in rotation mechanism Backlash at pinion or pinion not adjusted on bearing Broken teeth
Boom will not hold position with controls in neutral and load suspended	Defective counterbalance in lift cylinder Defective counterbalance in extension cylinder Defective cylinder seals False signal to control valve Winch brake not holding
Outrigger drifts down during travel or drifts up under load	Defective pilot operated check cartridge Cylinder seals worn Counterbalance catridge is not seating

Hydraulics - General

Before beginning any troubleshooting, become thoroughly acquainted with the two basic fundamental facts of a hydraulic system:

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.

Power: The power or force of a hydraulic function is related to pressure.

If the differences between speed and power of a hydraulic system are correctly understood, accurate troubleshooting can be accomplished in a short amount of time.

	Do not resort to increasing the valve relief pressure in an attempt to cure the ills of the system. Fully diagnose the problem, rather than put increased pressure into the system that is lacking proper.

Hydraulic components are precision units, and their continued smooth operation depends on proper care. Therefore, do not overlook hydraulic systems. Keep them clean and change the oil and oil filter at established intervals.

If in spite of these precautions, improper operation occurs, the cause can generally be traced to one of the following:

- Use of the wrong viscosity or type of oil.
- Insufficient fluid in the system.
- Presence of air in the system.
- Mechanical damage or structural failure.
- Internal or external leakage.
- Dirt, decomposed packing, water, sludge, rust, etc., in the system.
- Improper adjustments.
- The oil cooler is clogged, dirty, or leaking.

When disconnecting hydraulic fuel, lubricating oil lines, or air lines, clean the surrounding area as well as the point of disconnect. Cap, plug, or tape each line or opening as soon as it is disconnected to prevent the entry of foreign particles.

	When access covers or inspection plates are removed, the same cleaning and covering recommendations apply.

All parts should be cleaned and inspected. Make sure that all passages and holes are open. Keep all parts clean by covering them.

When installing parts, make sure they are all clean. Keep new parts in their original packaging until they are ready for assembly. Before installing new parts, clean the preservative compound from all machined surfaces.

Operator Controls

With the electrically controlled valves on the outriggers, two spools must be checked.

The extend and retract valves are in the diverter valve. The function valves are in 2/3 sectional valves - two (2) for the rear outriggers and three (3) for the front outriggers (including the front stabilizer).

To operate an outrigger cylinder, the extend valve or the retract valve plus a function valve must be shifted by the solenoids. If pressure is not detected at the pressure tap on the diverter valve, see the electrical troubleshooting section for verifying the operation of the solenoids.

Swing Circuit

Cause	Remedy
Swing Completely Inoperative	
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".
Internal leakage in the swing motor is excessive.	See section of "Fluid Motor".
Mechanical fault in swing reducer gearbox or swing bearing.	Repair swing reducer gearbox or replace swing bearing.
Hose plugged or liner collapsed.	Replace hose.
Rotary manifold leaking internally.	Reseal rotary manifold.
Faulty swing pump.	Replace swing pump. See section on "Pumps".
Joystick unresponsive or erratic.	Check electrical connections to joystick.
Swing Motion Sluggish	
Main relief valve stuck in open position.	Replace main relief valve.
Faulty swing pump.	Repair or replace swing pump.
Internal leakage in the swing motor is excessive.	Replace or reseal swing motor.
Leakage around swing control valve spool.	Replace or reseal swing control valve.
Swing Motion Erratic	
Swing brake and/or swing lock brake not releasing completely.	Check operation of swing brake and/or swing lock.
Low hydraulic oil level.	Add hydraulic oil as required.
Swing bearing not lubricated properly.	Lubricate swing bearing.
Main relief valve malfunctioning.	See section on "Relief Valves".

Boom Hoist Circuit

Cause	Remedy
Boom Drifts Down	
Hold valve not seating properly.	Replace hold valve.
Hoist cylinder by-passing.	See section on "Cylinder".
Boom Hoist Only - Inoperative or Erratic	
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 greater than LMI capacity.	Refer to capacity chart, check LMI.
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	
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	
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".
Joystick unresponsive or erratic.	Check electrical connections to joystick.

Telescope Circuit

Cause	Remedy
Telescope Function Only - Will Not Operate	
Load is greater than LMI capacity.	Refer to capacity chart, check LMI.
Both port relief valves sticking.	See section on "Relief Valves".
Hose plugged or liner collapsed.	Replace hose.
Boom Extension Jerky or Erratic	
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 counterbalance valve.	Replace counterbalance valve.
Loose extend/retract cables.	Adjust extend/retract cables as required.
Telescope Cylinder Extends But Will Not Retract	
Port relief valve sticking.	See section on "Relief Valves".
Hold valve malfunctioning.	Repair or replace.
Internal leakage in cylinder.	See section on "Cylinders".
Control valve malfunctioning.	Repair or replace.
Boom Sections Retract Under Load	
O-rings around hold valve damaged.	Replace O-rings.
Hold valve not seating properly.	Repair or replace.
Telescope cylinder by-passing.	See section on "Cylinders".

Winch Circuit

Cause	Remedy
Winch Will Not Develop Maximum Line Pull	
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 not lift at full speed.	2-speed option selected on winch. Turn off option.
Winch Will Lower But Will Not Raise	
The sprag clutch is assembled backwards.	Make sure that the winch is assembled properly.
Insufficient parts of line for the load being lifted.	See the reeving diagram on the capacity chart.
Load is greater than LMI capacity.	Refer to capacity chart, check LMI.
Winch Will Raise But Will Not Lower	
The winch hold valve is mounted on the winch motor incorrectly.	Make sure that the winch is assembled properly.
The winch hold valve spool is sticking.	Repair or replace.
The winch brake is not releasing.	Make sure 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)	
System back pressure too high.	Warm oil: check for restriction in downstream flow.
The over-running sprag on the brake is broken.	Inspect and replace, if necessary.
The automatic brake is not applying.	Make sure 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.
Winch Chatters When Lowering	
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.

Winch System

Winch Maintenance and Repair

The **Load King** Boom Truck is equipped with a power drum type winch. It is equipped with a spring applied, pressure-released brake. Operation of this system requires a counterbalance valve to insure that the brake is totally released when winching down, with or without a load. When winching in the up direction, the input shaft turns through a sprag clutch in the freewheel direction, which does not require the brake to be released.

Winching up the load is quite simple. To winch in, supply the winch motor with enough pressure to lift the load. When pressure is removed, the sprag clutch engages the brake automatically to prevent the load from dropping.

Winching down is a little more complicated. There are two systems that prevent the winch from back driving and allowing a load to drop.

1. Winch brake is a spring applied, pressure released brake that requires internal pressure to release. The sprag clutch connects the brake to the winch drum. Being a special one-way clutch, it allows the winch to free-wheel in the up direction, and lock in the winch down direction.
2. Counterbalance valve is a special valve blocking the flow of oil at the motor. To winch down, the motor is pressurized and through a pilot signal passage it releases the brake and opens the counterbalance . This allows oil to flow through the motor. It takes more pressure to open the counterbalance than to release the brake, so the brake is totally released before the winch rotates.

	Incorporated into the counterbalance is an in-line check which allows the motor case to drain while preventing winch pressure from entering the motor case.

To test the counterbalance valve, tee a gauge to the brake release line at the winch. The winch should begin to move down at no lower pressure than 300-400 PSI.

If the counterbalance system is working properly, the winch will make no attempt to turn until 300-400 PSI is reached. Contact **Load King** Service Department to receive overhaul information for the winch on the unit. Have the model and serial number available at time of call.

Outrigger Circuit

Cause	Remedy
All Outriggers Inoperative	
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".
Crane Power is inoperative.	Turn Crane Power switch ON.
Solenoid valve sticking.	Check solenoid valve connections.
Individual Outrigger Inoperative	
Electrical malfunction.	See section on "Electrical Controls".
Cylinder leaking internally.	See section on "Cylinders".
Hold valve on jack cylinder not operating.	Repair or replace jack cylinder hold valve.
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	
Outrigger relief valve malfunctioning.	See section on "Relief Valves".
Outrigger diverter valve malfunctioning.	Repair or replace.
Outrigger pump is worn or damaged.	See section on "Pumps".
Cylinder by-passing.	See section on "Cylinders".
Jack Cylinder Drifts Down (Out and Down)	
Hold valve on top of cylinder malfunctioning.	Replace cartridge.
Cylinder by-passing.	See section on "Cylinders".

Pumps

Cause	Remedy
Pump Making Noise	
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 the oil intake suction filter.
Rag, paper, etc., pulled into suction line or pump.	Remove all debris and matter from suction line or pump.
Worn or broken parts.	Replace broken or worn parts.
External Oil Leakage Around Pump	
Shaft seal worn causing oil to leak into gear drive housing.	Replace worn shaft seal.
Loose fitting on pump intake or discharge.	Keep all joints tight.
Damaged O-ring seals between pump sections.	Replace damaged O-ring seals.
Damaged O-ring at fittings.	Replace damaged O-ring at fittings.
Excessive Wear	
Abrasive matter in the hydraulic oil being circulated through the pump.	Clean suction filter and replace return filter. Drain and flush hydraulic system as necessary.
Viscosity of oil too low at working conditions.	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.
Breakage of Parts Inside Pump Housing	
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 frequently.
Solid matter is wedged in pump.	Check suction line filter, drain and flush system as necessary.

Fluid Motor

Cause	Remedy
Motor Will Not Turn	
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.
Workload jammed or stuck.	Remove obstruction from workload.
Large contaminating foreign bodies in fluid.	Flush hydraulic system completely. Use new oil and install new filters.
Slow Operation	
Wrong oil viscosity.	Use proper viscosity oil.
Rotary manifold leaking.	Reseal rotary manifold.
Worn pump.	Repair or replace pump.
Extremely high fluid temperatures cause 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	
Hose connections wrong.	Reverse connections.
Wrong timing.	Re-time motor.
Erratic Motor Operation	
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	
Worn or cut shaft seal.	Replace shaft seal.
Leak Between Housing and Wear Plate or Between Wear Plate and Geroler Assembly	
Motor housing bolts loose.	Clean mating surfaces and tighten nuts to appropriate value.
Pinched O-ring seal.	Replace.
Leak at Oil Ports	
Damaged seal or O-ring.	Replace O-ring or seal.
Poor fittings.	Replace fittings carefully.
Damaged threads.	Replace housing.

Cylinders

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 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.
3. With engine shut off but the master crane power ON, hold or tie the joystick in the full "extend" position for approximately 15 minutes.
4. Return the telescope joystick to neutral, start engine, ground the load, and return the boom to horizontal. Re-mark the boom section as in Step 1 above. 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 degrees 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 valve 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, a hold valve problem exists. If oil continues to flow from retract, then it is faulty or leaking from the piston in cylinder.

	With hollow rod telescope cylinders, in excess of 40 gallons of oil can be drained from the rod. If the boom comes in while doing this test, then the cylinder is faulty or leaking from 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. Perform an air test on the piston rod prior to reassembling the cylinder by blocking the retract ports on the rod near the piston end. Slip a plastic bag over the piston end of the rod and secure it with a rubber band. Apply and maintain a slight amount of air pressure at the rod's retract port (port marked with an "R"). Expansion of the plastic bag indicates a faulty rod weldment or seal on the rod's port tube.

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.

	External leaks from telescope cylinders or hydraulic lines within the boom assembly do not cause leak-down unless one or more of the conditions listed on the previous page are present.

Boom Lift Cylinder

The suggested procedure for identifying the specific cause of leak-down should be performed in the following sequence:

1. Elevate the boom to near maximum angle, not completely extended, with a boom length sufficient to winch up a convenient payload approximately 1 ft. from ground level. Shut off engine.
2. 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.
3. 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.
4. 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:

1. Set the outriggers.
2. Elevate the boom to near maximum angle, not completely extended, with a boom length sufficient to winch up a convenient payload approximately 1 ft. from ground level over the outrigger in question. Shut off engine.
3. 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.
4. 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.
5. If cylinder leak-down occurs with no oil leak from the hold valve port, the cause is within the cylinder.
6. 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

Cause	Remedy
Heating Caused by Power Unit (Reservoir, Pump, Relief Valve, and Coolers)	
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.
Pump assembled after overhaul may be assembled too tightly. This reduces clearances and increases rubbing friction.	Follow instructions when reassembling.
Leaking relief valves.	Repair.
Improper machine operation.	Return control to neutral when stalled, cylinder at end of stroke, etc.
Oil Cooler	
Improper functioning of oil cooler.	Inspect cooler and see that it is working properly.
Fan not running.	Check electrical connections to fan. Check fan motor.
Oil cooler thermostat not signaling fan.	Check oil cooler thermostat functionality. Check thermostat connections to fan.
Heating Because of Conditions in System	
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.

Electrical Controls

Cause	Remedy
Electrical Failure	
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 solenoid connection.
Defective solenoid.	Replace solenoid.
Solenoid failure.	Replace solenoid.
Poor ground connections.	Clean and tighten connections.

Checklist and Inspection Form

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.

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

Inspection Code Intervals	**D** - Daily **W** - Weekly **M** - Monthly **A** - Annually **P** - Periodic **Q** - Quarterly			
Items to be Inspected and 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			
** Refer to Maintenance and Service section, "Hydraulic Hoses".				
Overall cleanliness	D			
Air system (Leaks or Damage)	D			
Hydraulic fluid	D			
Machine lubrication	D			
Attachment pin bolts	D			
All control mechanisms	D			
Instrument gauges	D			

Items to be Inspected and Checked	Inspection Code	Satisfactory	Adjust	Repair
Clutches and brakes	D			
Wire rope, sheaves, and guards	D			
Two block damage prevention system	D			
Load supporting components condition	D			
Fire extinguisher	D			
Backup alarm	D			
Boom angle indicator	D			
Horn	D			
Proper cable spooling	D			
Wedge sockets	D			
Drive shafts and U-joints	W			
Structural members and welds	Q			
Boom inspection	M			
Swing bearing bolt torque	W			
Machinery guards	Q			
Load chart and safety warnings	Q			

Daily Check (8 Hours)

Check Points	Status
Perform daily lubrication.	
Check hydraulic reservoir fluid level.	
Check hydraulic cylinder mounting bushings and pins.	
Check hydraulic components including hoses, refer to Maintenance and Service section, "Hydraulic Hoses".	
Check boom front slider pads.	
Check boom chains and ends.	
Check wire rope and related components.	
Check controls.	
Check instruments, gauges, lights, and safety equipment.	
Make overall visual inspection.	
Check anti-two-block system.	
Check Truck Manufacturer's Manual for additional maintenance requirements.	
Ensure swing brake is able to hold against full torque of swing motor.	

Weekly Check (40 Hours)

Check Points	Status
Perform the daily check.	
Perform weekly lubrication.	
Check battery condition.	
Check hydraulic cylinders and rods.	
Make thorough inspection of wire rope.	
Check Truck Manufacturer's Manual for additional maintenance requirements.	
Clean machine weekly if salt-covered to prevent rust and corrosion.	

Monthly Check (80 hours)

Check Points	Status
Perform daily and weekly checks.	
Perform monthly lubrication.	
Check boom for wear cracked welds, alignment and missing or illegible decals.	
Check hydraulic reservoir for moisture.	
Check all slider pads.	
Have hydraulic oil sample analyzed.	
Check Truck Manufacturer's Manual for additional maintenance requirements.	

Quarterly Checks (250 Hours)

Check Points	Status
Perform daily, weekly, and monthly checks.	
Perform quarterly lubrication.	
Change hydraulic return line filters.	
Check Truck Manufacturer's Manual for additional maintenance requirements.	
Lubricate valve disconnects.	
Clean and wax all exterior painted surfaces.	
Visually inspect all structural members and welds for cracks, alignment, and wear.	

Semiannual Checks (1000 Hours)

Check Points	Status
Perform daily, weekly, monthly, and quarterly checks.	
Perform semiannual lubrication.	
Check hydraulic reservoir relief valve.	
Clean hydraulic reservoir intake suction filter.	
Check air dryer desiccant for signs of oil accumulation.	
Check hydraulic relief valve pressure settings.	
Torque swing bearing bolts.	
Check Truck Manufacturer's Manual for additional maintenance requirements.	
Check all adjustments specified in the "Maintenance and Service" section of this manual and any vendor manuals supplied.	

Annual Check (1500 - 2000 Hours)

Check Points	Status
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.	
Check the hose lines, refer to Maintenance and Service section, "Hydraulic Hoses".	

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: _____

Appendix

General Bolt Torque Values

Head Type	Hardware		A (K=0.12) (ft-lbs)	B (K=0.15) (ft-lbs)	C (K=0.17) (ft-lbs)	D (K=0.20) (ft-lbs)
Socket Head	1/4"-20	.25"	-	9	10	12
	5/16"-18	.3125"		19	22	26
	3/8"-16	.375"		35	40	48
	7/16"-14	.4375"		55	65	75
	1/2"-13	.5"		85	100	115
	5/8"-11	.625"		170	190	230
	3/4"-10	.75"		310	350	410
	7/8"-9	.875"		500	570	670
	1"-8	1"		760	860	1000
	1-1/4"-7	1.25"		1450	1650	1940
	1-1/2"-6	1.5"		2530	2870	3375

Hex Head – Grade 8	1/4"-20	.25"	6	7	9	10
	5/16"-18	.3125"	13	17	19	22
	3/8"-16	.375"	24	30	35	40
	7/16"-14	.4375"	40	50	55	65
	1/2"-13	.5"	55	70	80	90
	5/8"-11	.625"	120	150	170	200
	3/4"-10	.75"	210	270	310	370
	7/8"-9	.875"	350	440	500	590
	1"-8	1"	535	670	760	900
	1-1/4"-7	1.25"	1035	1290	1465	1725
	1-3/8"-6	1.5"	1355	1675	1920	2260
	1-1/2"-6	1.5"	1800	2250	2550	3000

Coefficient of Friction for Torque Values

A – Super Slick – 0.12 friction coefficient when Fastenal's EcoGuard is coated on nut, bolt, and washer.

B – Slick – 0.15 friction coefficient zinc plated, EcoGuard, MAGNI, etc, if lubricated in any way (wet torque).

C – Semi Dry – 0.17 friction coefficient if some form of anti-seize or thread lockers are used with otherwise plain conditions.

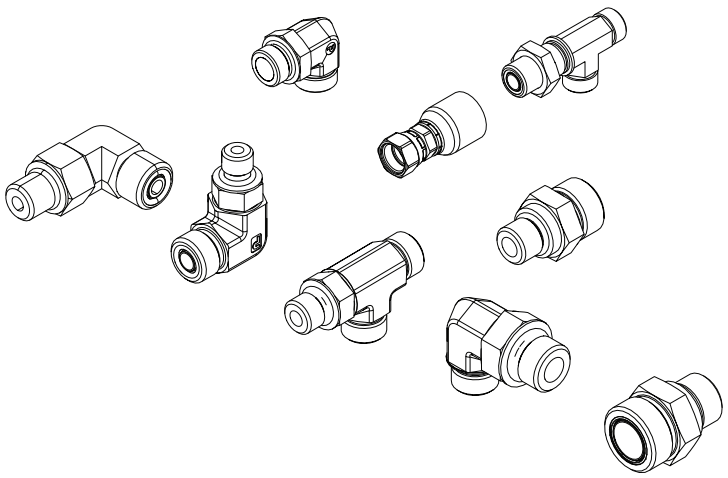
D – Dry – 0.20 friction coefficient zinc plated, etc, wiped DRY of any form of lubrication (dry torque).



Dry indicates hardware has been cleaned and dried with some form of grease remover, solvent, and dry cloth. This table is for standard coarse thread. Ask engineering for torque values for fine threaded or other unique hardware.

Hydraulic Fitting Torque Values

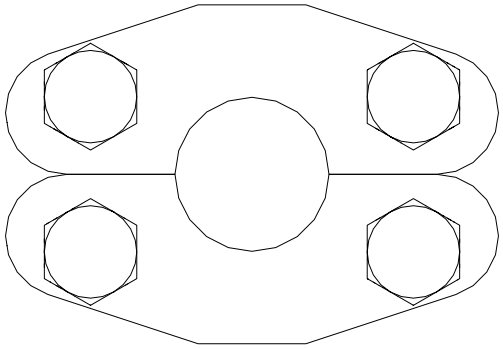
	Torque values within +/-5%. All torque values in foot-pounds. Use appropriate calibrated torque tools.



Port Size SAE Dash No.	Steel Ports	Aluminum Ports	Hose to Fitting and Fitting to Fitting	
	ORB Fittings O-Ring Boss (ft-lbs)	ORB Fittings O-Ring Boss (ft-lbs)	O-Ring Face Seal OFS (ft-lbs)	37 Deg Flare JIC (ft-lbs)
-4	18	15	15	15
-6	30	25	25	25
-8	60	40	40	40
-10	90	60	60	60
-12	135	85	85	85
-16	200	110	110	110
-20	250	150	150	150
-24	305	200	200	200

Hydraulic Flange Fitting Torque Values

Torque values within +/-5%. All torque values in foot-pounds. Use appropriate calibrated torque tools.

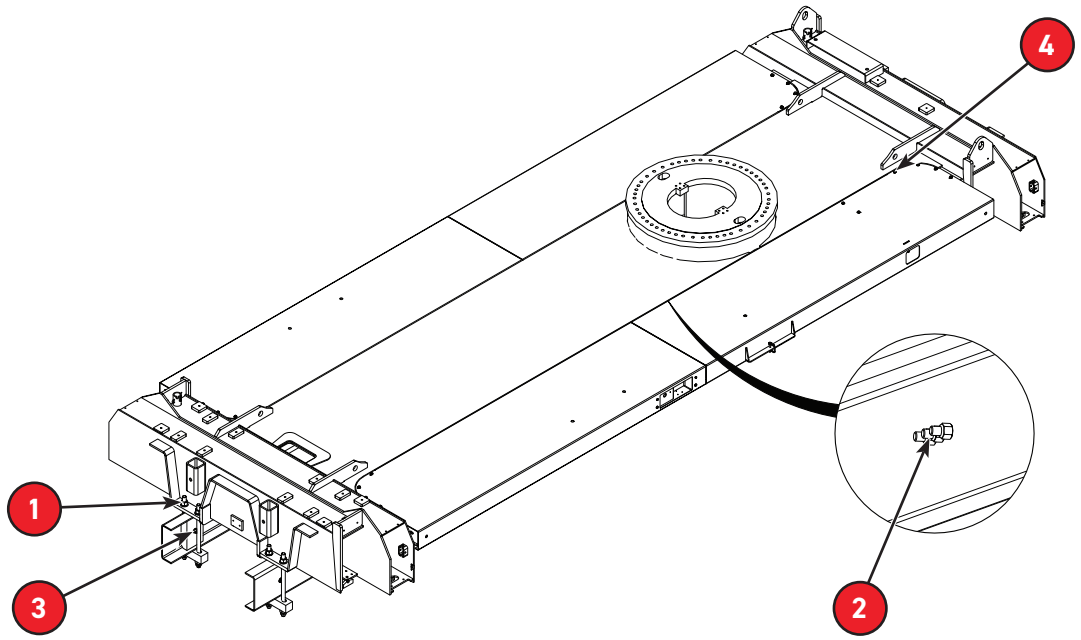


Code 61 (3000-5000 psi Max)					
SAE Dash No.	Mounting hardware (in.)	Flange Size (in.)	Dimension B (in.)	Dimension E (in.)	Torque Steel (ft-lbs)
-8	5/16"-18 x 1.25	0.50	2.12	0.50	17
-12	3/8"-16 x 1.25	0.75	2.56	0.56	30
-16	3/8"-16 x 1.25	1.00	2.75	0.62	30
-20	7/16"-14 x 1.50	1.25	3.12	0.56	50
-24	1/2"-13 x 1.50	1.50	3.69	0.62	70
-32	1/2"-13 x 1.50	2.00	4.00	0.62	70
40	1/2"-13 x 1.75	2.50	4.50	0.75	70
-48	5/8"-11 x 1.75	3.00	5.31	0.88	110
-56	5/8"-11 x 1.75	3.50	6.00	0.88	110
-64	5/8"-11 x 2.00	4.00	6.38	1.00	110

Code 62 (6000 psi Max)					
SAE Dash No.	Mounting hardware (in.)	Flange Size (in.)	Dimension B (in.)	Dimension E (in.)	Torque Steel (ft-lbs)
-12	3/18"-16 x 1.50	0.75	2.81	0.75	30
-16	7/16"-14 x 1.75	1.00	3.19	0.94	50
-20	1/2"-13 x 1.75	1.25	3.75	1.06	70
-24	5/8"-11 x 2.25	1.50	4.44	1.19	110
-32	3/4"-10 x 2.75	2.00	5.25	1.44	54-67

Subframe Torque Values

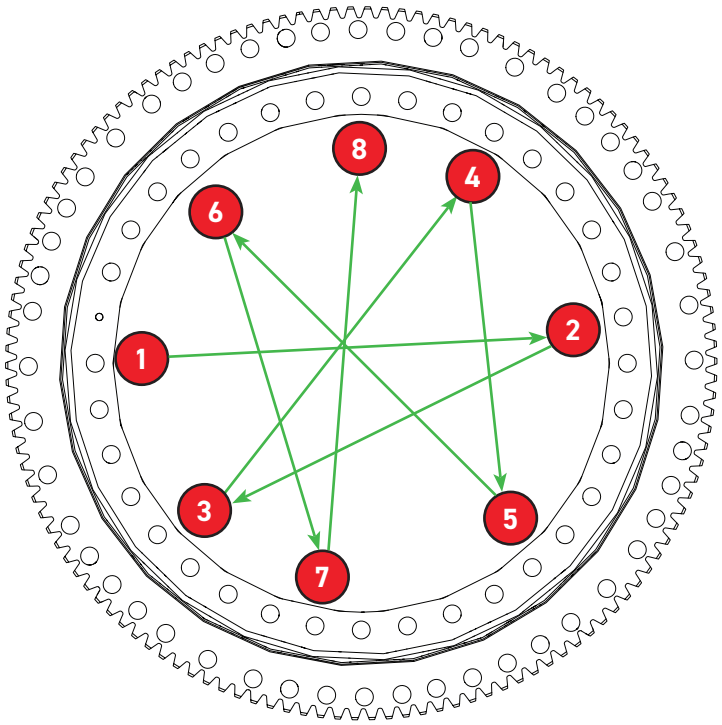
	This chart is for lubricated hardware (plain, plated or coated). Torque values within +/-5%. All torque values in foot-pounds. If there are no frame stiffners used, then maximum of 180 ft-lbs is allowed on installation hardware compressing frame.



Sl No.	Location	Fastener	Clamping Torque
1	Subframe Bolts	1"-8 UNC	400 ft-lbs
2	Shear Plate	5/8"-11 UNC	150 ft-lbs
3	Frame Stiffner Bolts	5/8"-11 UNC	150 ft-lbs
4	Decking Bolts	3/8"-16 UNC	50 ft-lbs

Swing Bearing Torque Values

	Torque values within +/-5%. All torque values in foot-pounds. Use appropriate calibrated torque tools. Ensure star pattern is followed for even tightening. Torque to half rating on first round and fully torque in second round.

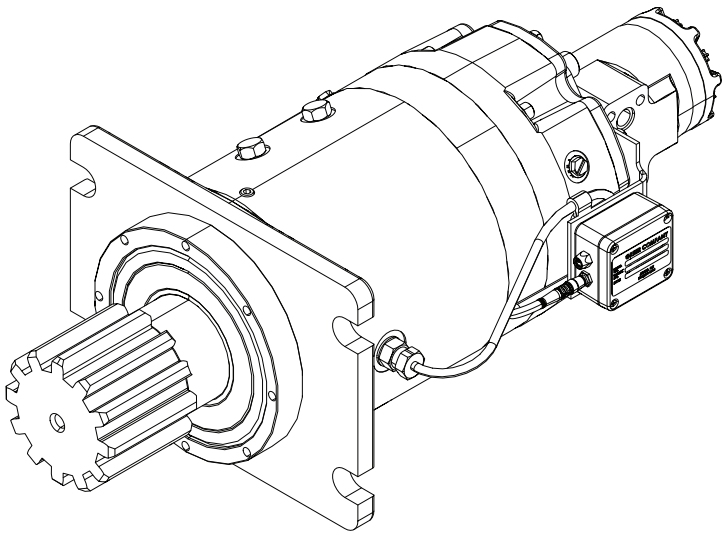


Crane Model	Hardware	Head Type	A (K=0.12) (ft-lbs)	B (K=0.15) (ft-lbs)	C (K=0.17) (ft-lbs)	D (K=0.20) (ft-lbs)
35/40-127 RS	7/8"-9 UNC	Hex Head – Grade 8	350	440	500	590

Refer to the "Coefficient of Friction for Torque Values", cleaned with some form of grease remover or solvent and dried with a cloth.

Swing Drive Torque Values

	Torque values within +/-5%. All torque values in foot-pounds. Use appropriate calibrated torque tools.

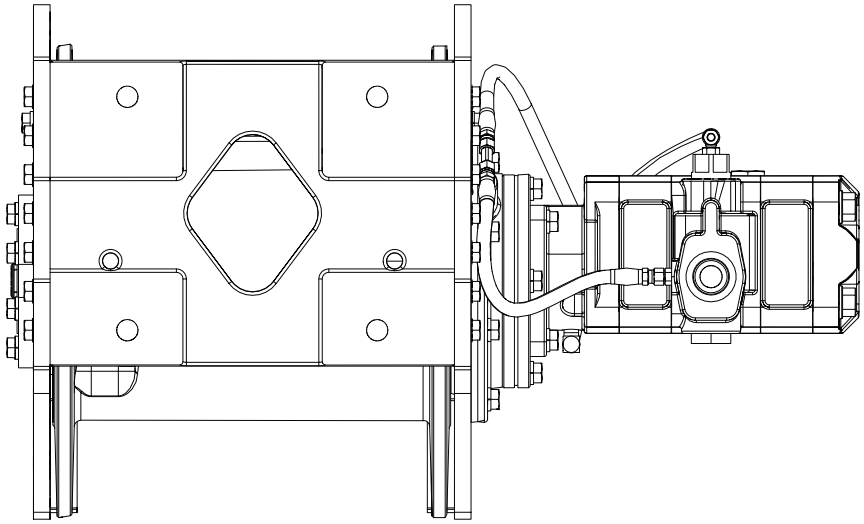


Crane Model	Hardware	Head Type	A (K=0.12) (ft-lbs)	B (K=0.15) (ft-lbs)	C (K=0.17) (ft-lbs)	D (K=0.20) (ft-lbs)
35/40-127 RS	3/4"-10 UNC	Hex Head – Grade 8	210	270	310	370

Refer to the "Coefficient of Friction for Torque Values".

Winch Mounting Torque Values

Torque values within +/-5%. All torque values in foot-pounds. Use appropriate calibrated torque tools.

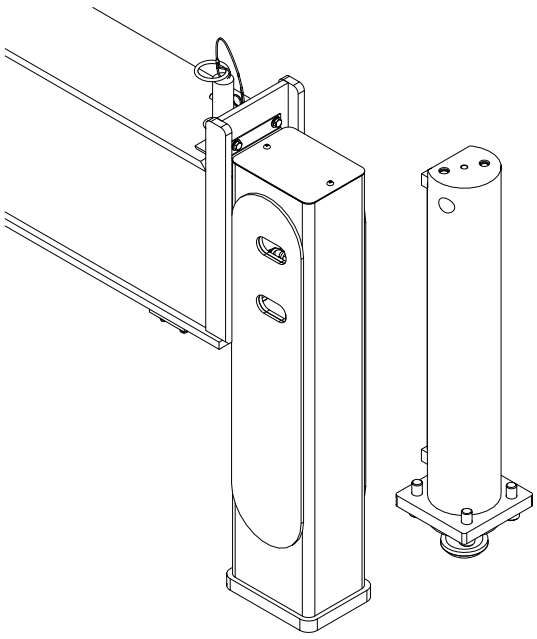


Crane Model	Hardware	Head Type	A (K=0.12) (ft-lbs)	B (K=0.15) (ft-lbs)	C (K=0.17) (ft-lbs)	D (K=0.20) (ft-lbs)
35/40-127 RS	3/4"-10 UNC	Hex Head – Grade 8	210	270	310	370

Refer to the "Coefficient of Friction for Torque Values".

Outrigger Jack Torque Values

	Torque values within +/-5%. All torque values in foot-pounds. Use appropriate calibrated torque tools.



Crane Model	Hardware	Head Type	A (K=0.12) (ft-lbs)	B (K=0.15) (ft-lbs)	C (K=0.17) (ft-lbs)	D (K=0.20) (ft-lbs)
35/40-127 RS	3/4"-10 UNC	Socket Head	-	310	350	410

Refer to the "Coefficient of Friction for Torque Values".

Greer Insight Operator's Manual

The **Load King** crane is set up with a Greer Insight Load Moment Indicator (LMI) system. This manual is included in the accompanying flash drive.

Notes

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