

LOAD KING



OPERATORS MANUAL

LOAD KING

19-70
28-106

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

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

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

For more information go to www.P65warnings.ca.gov/diesel.

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Construction and Industrial Equipment Product Safety


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

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

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

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

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

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

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

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

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

Chassis Configurations



THE **19-70** BOOM TRUCK FROM LOAD KING COMES IN ONE CONFIGURATION FOR INSTALLATION ON A SINGLE REAR AXLE CHASSIS.

- THE **19-70** MODEL CAN BE INSTALLED ON SINGLE AXLE CHASSIS ONLY.
- IF THE MACHINE YOU ARE OPERATING IS LABELED AS A GBT-1970 AND IS MOUNTED ON A DUAL AXLE CHASSIS, STOP OPERATION IMMEDIATELY AND USING LOCK OUT / TAG OUT PROCEDURES, IMMOBILIZE THE MACHINE. CONTACT YOUR GENIE SERVICE REPRESENTATIVE IMMEDIATELY TO DISCUSS A RESOLUTION.



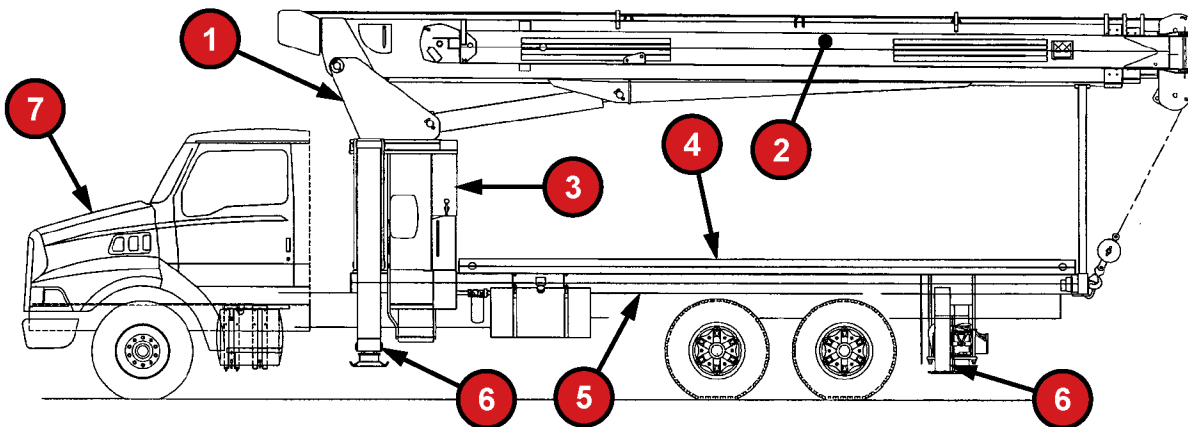
THE **28-106** BOOM TRUCK FROM LOAD KING COMES ONLY WITH ONE CONFIGURATION USING A TANDEM REAR AXLE CHASSIS.

- AT NO TIME CAN A **28-106** BE INSTALLED ON A SINGLE REAR AXLE CHASSIS.

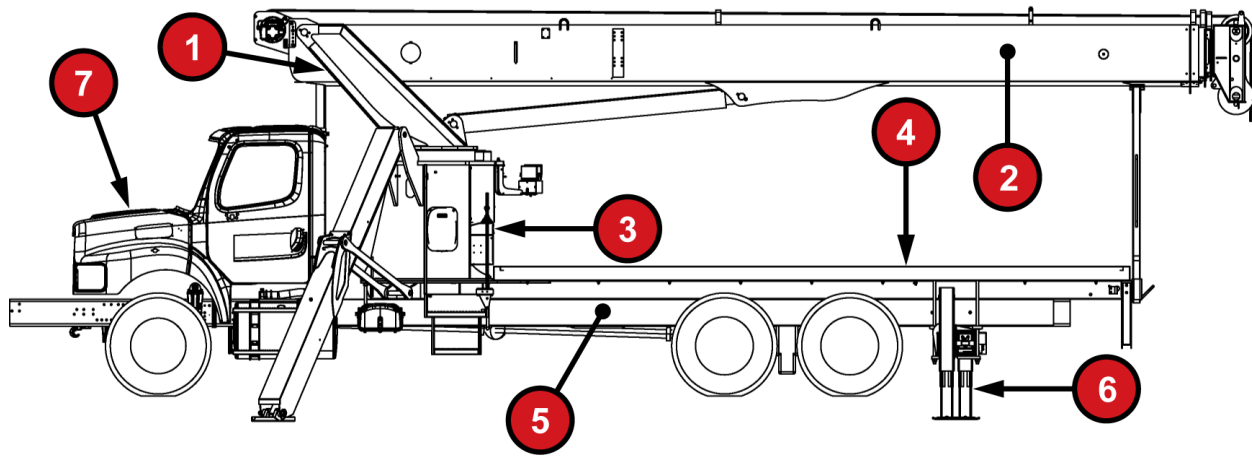
Nomenclature

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. TURRET** The turret weldment and swing mechanism.
 - 2. BOOM** The telescopic boom with hydraulic winch, lift cylinder, hook block assembly, and jib arrangement.
 - 3. PEDESTAL** The structure that supports the turret weldment, outriggers, and operator platforms on the truck.
 - 4. FLATBED** The deck of the boom truck.
 - 5. SUBFRAME** The frame of the crane that is mounted to the truck chassis and supports the flatbed and pedestal.
 - 6. OUTRIGGERS** The beams, cylinders, floats, boxes, hydraulic control system.
 - 7. TRUCK** The vehicle that all boom and operator structures are mounted on.
- RIGHT HAND/LEFT HAND** All references to right or left hand will correspond to the operator's right or left hand when he is facing forward from the operator's platform, with the truck cab to his back.



19-70



28-106

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 |
| Fax: | 973.882.8113 |
| 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 bulletins are used by **Load King** to communicate important safety and product information to dealers and machine owners.

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

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

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

Contacting Manufacturer

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

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

Manufacturer contact information:

Load King

7701 Independence Ave, Kansas City, MO 64125

Parts: (816) 241-8387

Service: (833) 281-7911

Transfer of Machine Ownership

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



LOAD KING WARRANTY DATA RECORD

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

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

Safety Introduction

Owners, Users, and Operators:

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

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



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

If there is anything in this manual that is not clear or you believe should be added, please send your comments to 7701 Independence Ave, Kansas City, MO 64125
(833) 281-7911 email: CIC@customtruck.com



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

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

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

These standards can be purchased from:

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






Email:

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




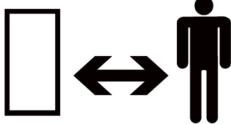

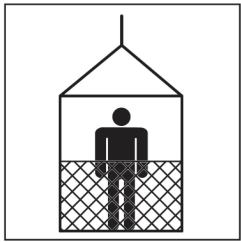

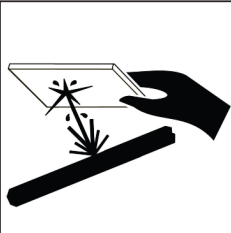
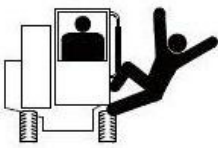

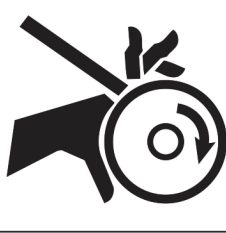
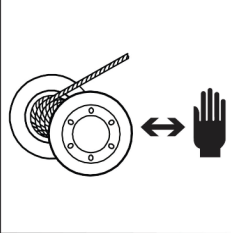
Product Safety Decals



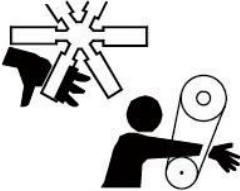


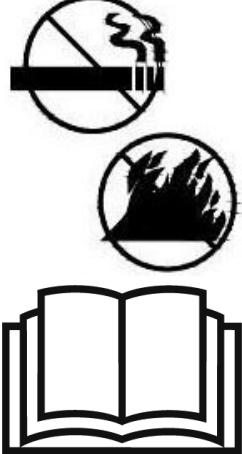


Safety Definitions Used in this Manual

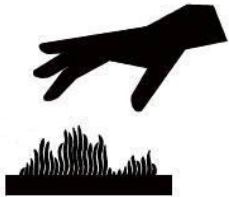
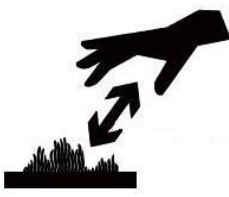




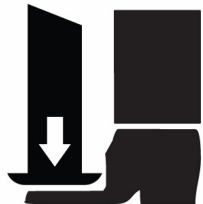

The following table describes text and symbols used to highlight important information.


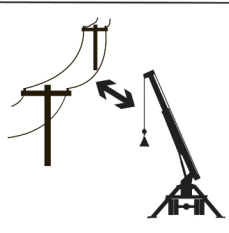
| Signal Word | Symbol | Explanation |
|-------------|---|--|
| DANGER |  | Danger is used to alert readers about an immediate and serious hazard that will likely be fatal. |
| WARNING |  | Warning is used to alert readers about the potential for serious injury or death or serious damage to equipment.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

SYMBOLS AND PICTORIALS

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

| Hazard | | Avoidance | |
|---|--|--|---|
|  | Entanglement in Drive Shaft. |  | Stay Clear of Rotating Shafts. |
|  | ENTANGLEMENT HAZARD Rotating parts can cause personal injury. |  | Keep away from fan and belt when engine is running. Stop engine before servicing. |
|  | Explosion / Burn Hazard Will cause death, burns or blindness due to ignition of explosive gases or contact with corrosive acid. |  | Keep all open flames and sparks away. Wear personal protective equipment, including face shield, gloves and long sleeve shirt. READ MANUALS Read all manuals prior to operation. DO NOT OPERATE equipment if you do not understand the information in the manuals. |
|  | BURN HAZARD Fuel and fumes can explode and burn. |  | No smoking. No flame. Stop engine. |

| Hazard | | Avoidance | |
|---|---|--|--|
|  | BURN HAZARD Contact with hot surfaces can cause burns. |  | Allow surfaces to cool before servicing. |
|  | Falling from height. |  | Use personnel lift or appropriate ladder to reach high places. Maintain 3-Point Contact when using access system. |
|  | Two blocking the crane can cause death, serious injury or property damage. Do not allow the hook block to contact the boom tip by hoisting up, extending or lowering the boom. |  | Check Anti-two Block System. |
|  | CRUSH HAZARD Contact with moving outriggers can result in death or serious injury. |  | Stay Clear of Outriggers. |

| Hazard | | Avoidance | |
|---|--|--|---|
|  | Electrical Shock / Electrocution from Crane to Power Line Contact. |  | Stay Sufficient Distance From Electrical Power Lines. |



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

General Safety

Safety Guidelines

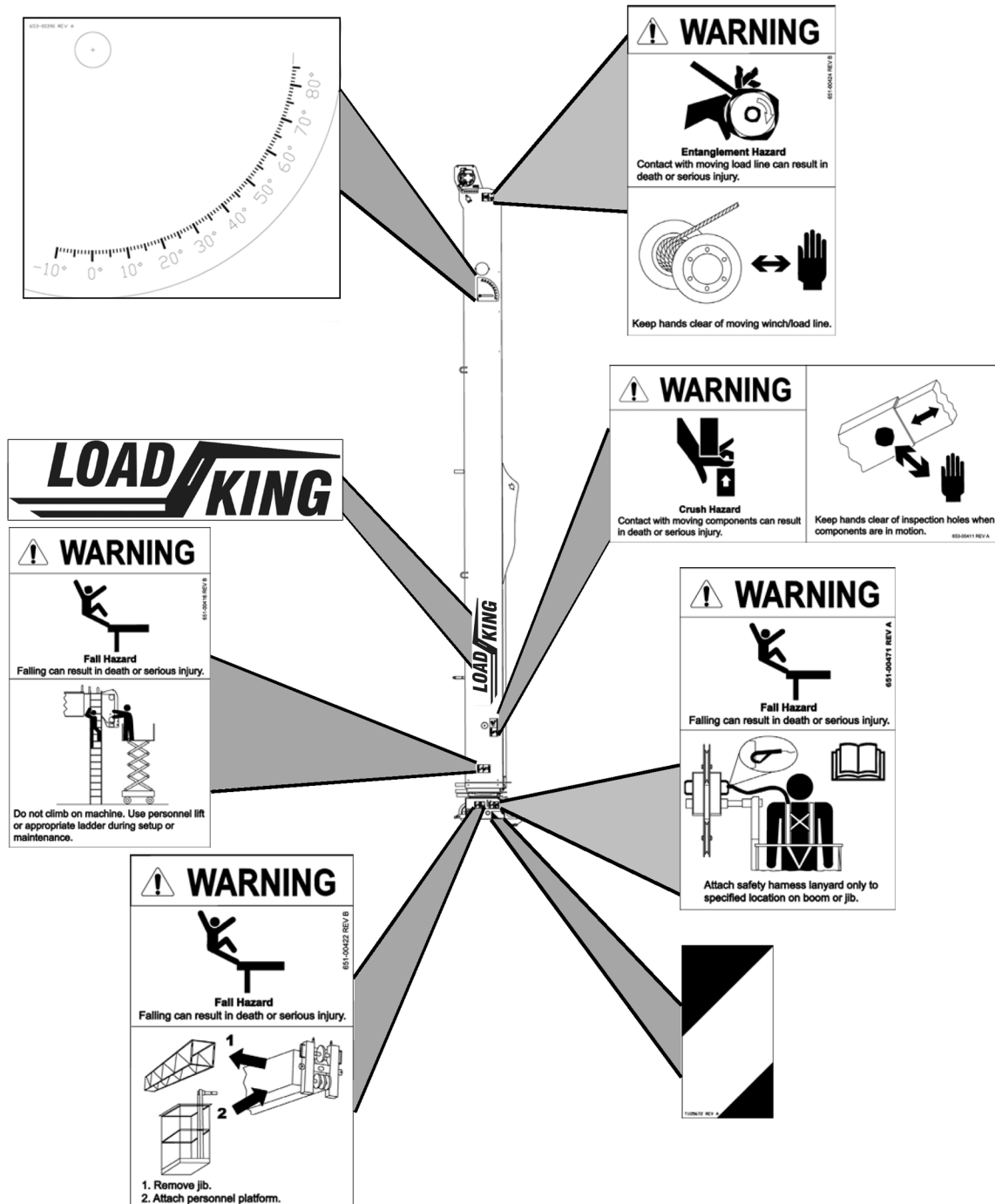


These are general safety rules, which must be followed. You are also required to read and understand the Operators Manual as there are instructions, which are more detailed specific to this machine.

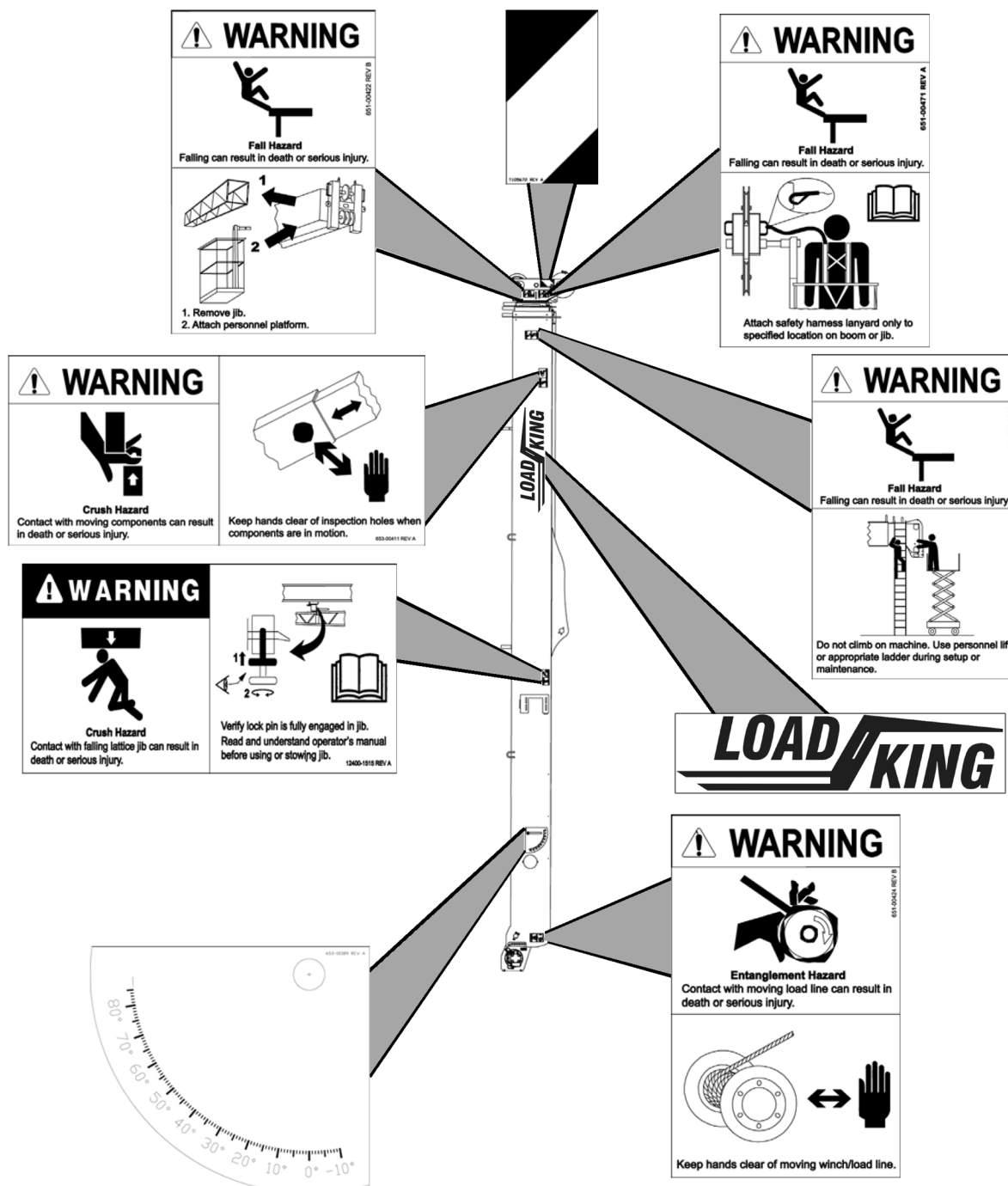
Safety Sign Maintenance

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

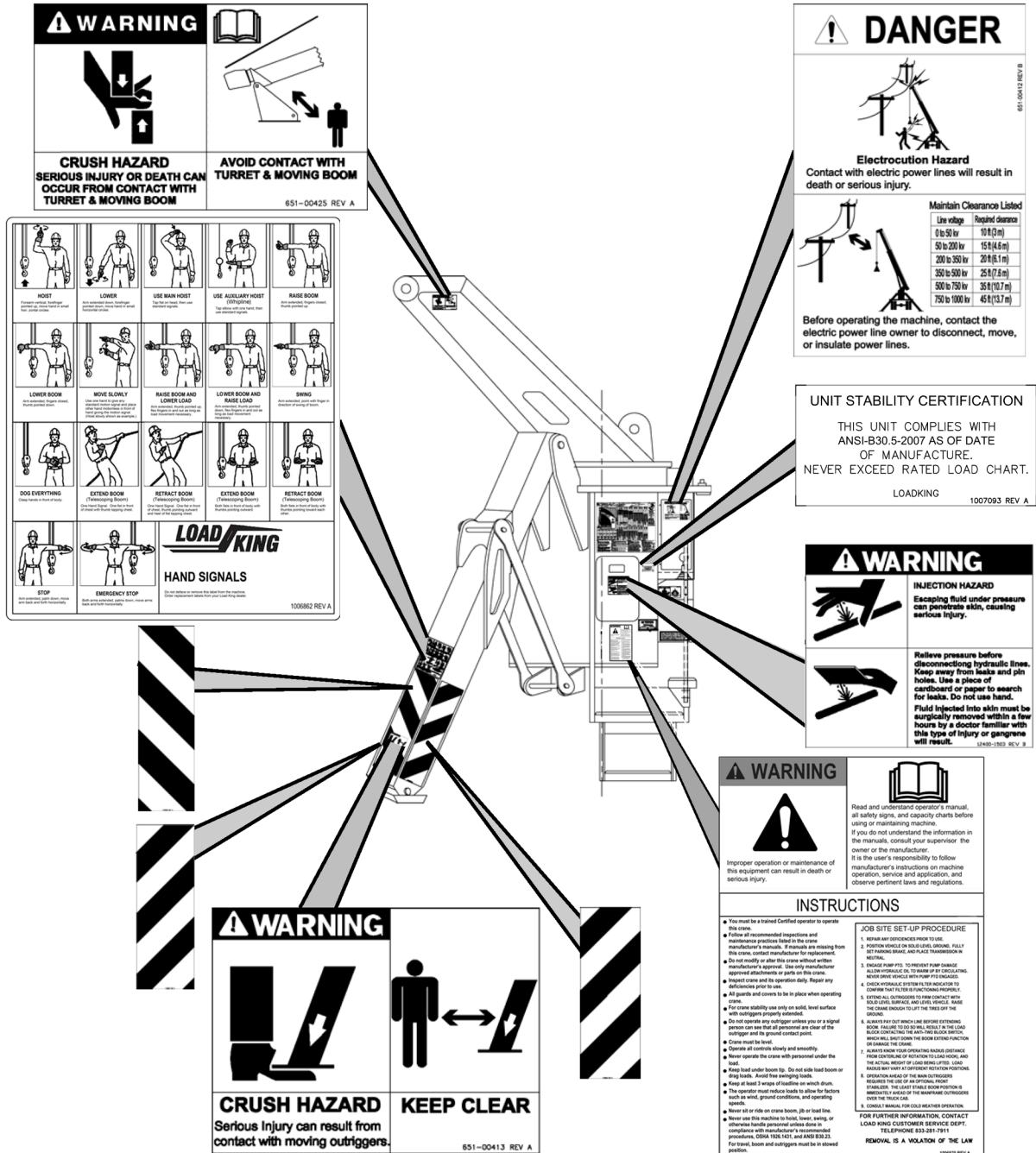
28-106 Safety Sign Locations



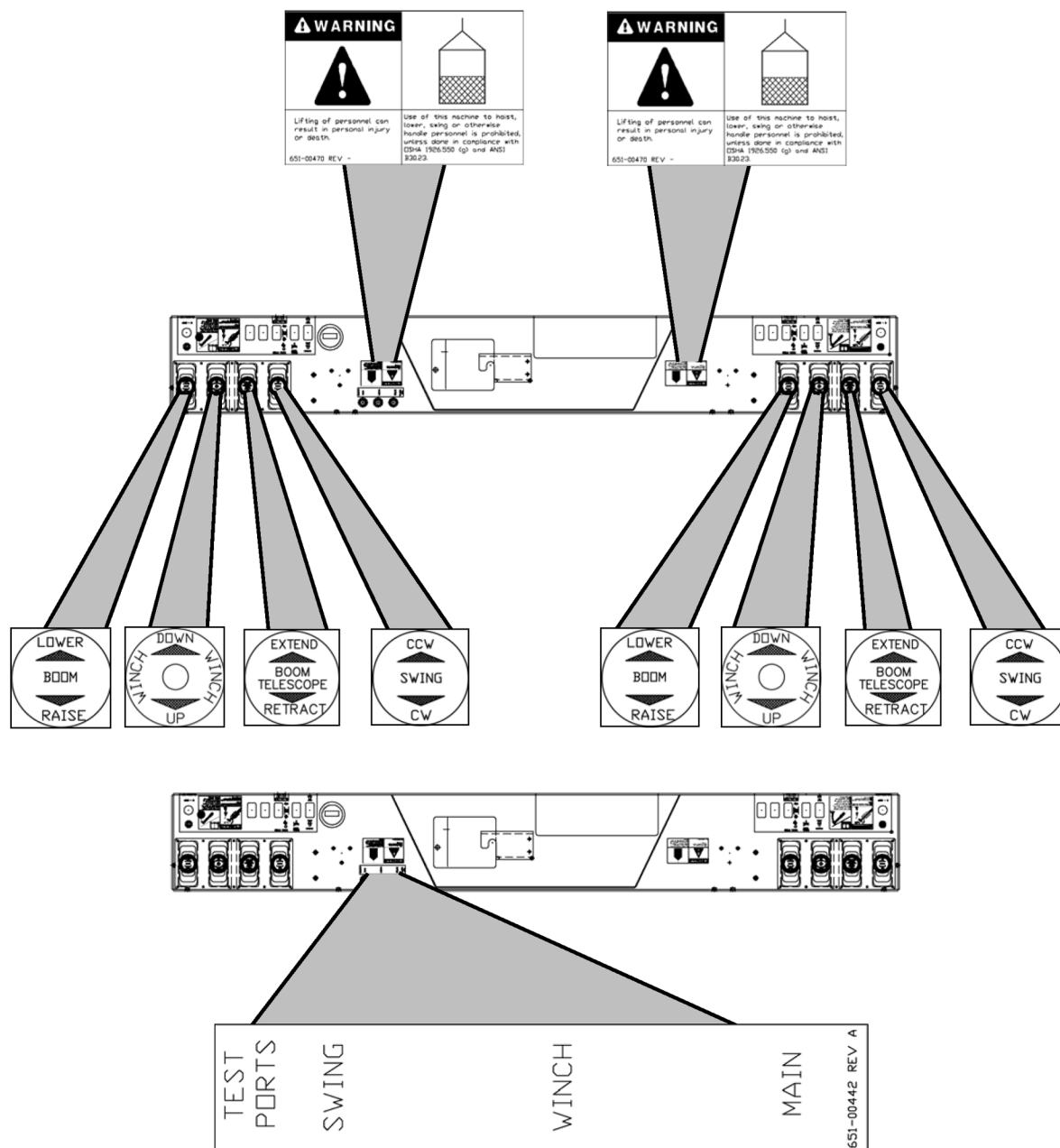
28-106 Boom Safety Sign Locations- Curbside



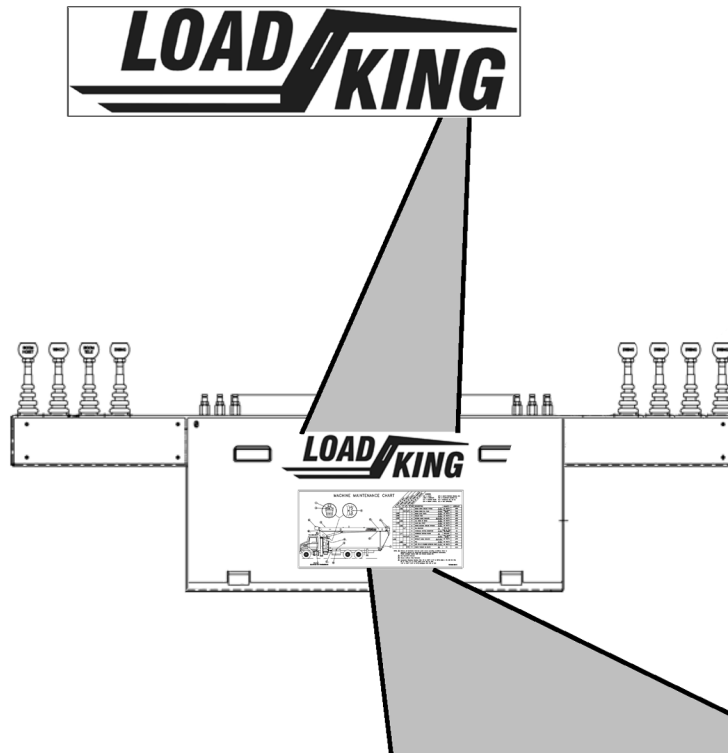
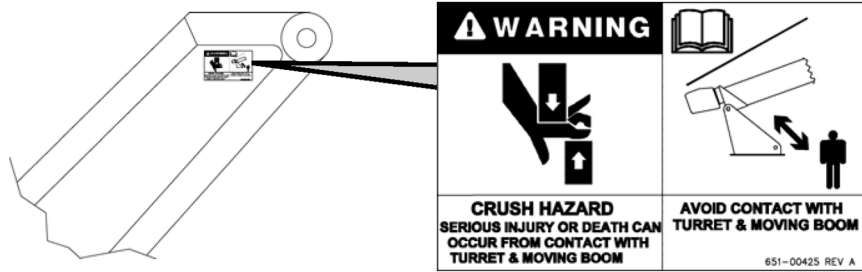
28-106 Boom Safety Sign Locations- Streetside

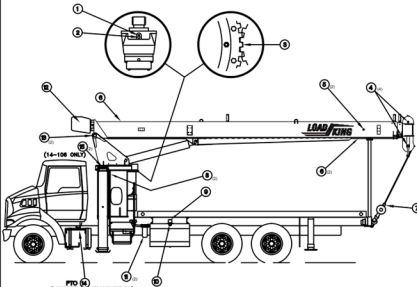


28-106 Mainframe Turret Safety Sign Locations



28-106 Mainframe Console Safety Sign Locations- Top View



| MACHINE MAINTENANCE CHART | | LEGEND: | |
|--|------------------------------------|----------------------|---------------------------------|
|  | | CHK = CHECK | MPG = MULTI-PURPOSE GREASE, EP2 |
| | | LUBE = LUBRICATE | PDO = PLANETARY GEARBOX OIL |
| | | C/F = CHANGE FILTER | HO = HYDRAULIC OIL, ISO 32 |
| | | D/R = DRAIN & REFILL | N/A = NOT APPLICABLE |
| ITEM NO. | DESCRIPTION | QUANTITY | LUBRICANT |
| 1 | SWING DRIVE BEARING FITTING | AS REQ'D | MPG |
| 2 | SWING DRIVE HILL PLATE | AS REQ'D | PDO |
| 3 | SWING GEAR TEETH | AS REQ'D | MPG |
| 4 | BEAVER PIN | AS REQ'D | MPG |
| 5 | EXTEND CABLE BEAVER | AS REQ'D | MPG |
| 6 | ALL SIDES OF BOOM | AS REQ'D | MPG |
| 7 | LOAD BALL PIN | AS REQ'D | MPG |
| 8 | SWING BEARING BEARING FITTING | AS REQ'D | MPG |
| 9 | OIL BREAKER | REPLACE | N/A |
| 10 | HYDRAULIC SYSTEM RESERVOIR | CHK & FILL | HO |
| 11 | HYDRAULIC SYSTEM FILTER | REPLACE | N/A |
| 12 | WASH | THE TURRET | PDO |
| 13 | RETRACT CABLE BEAVER | AS REQ'D | MPG |
| 14 | PDO | AS REQ'D | MPG |
| 15 | O/R PM AT CYLINDER (OPTIONAL ONLY) | AS REQ'D | MPG |
| 16 | CHECK TORQUE ON BOLTS | ALL | N/A |

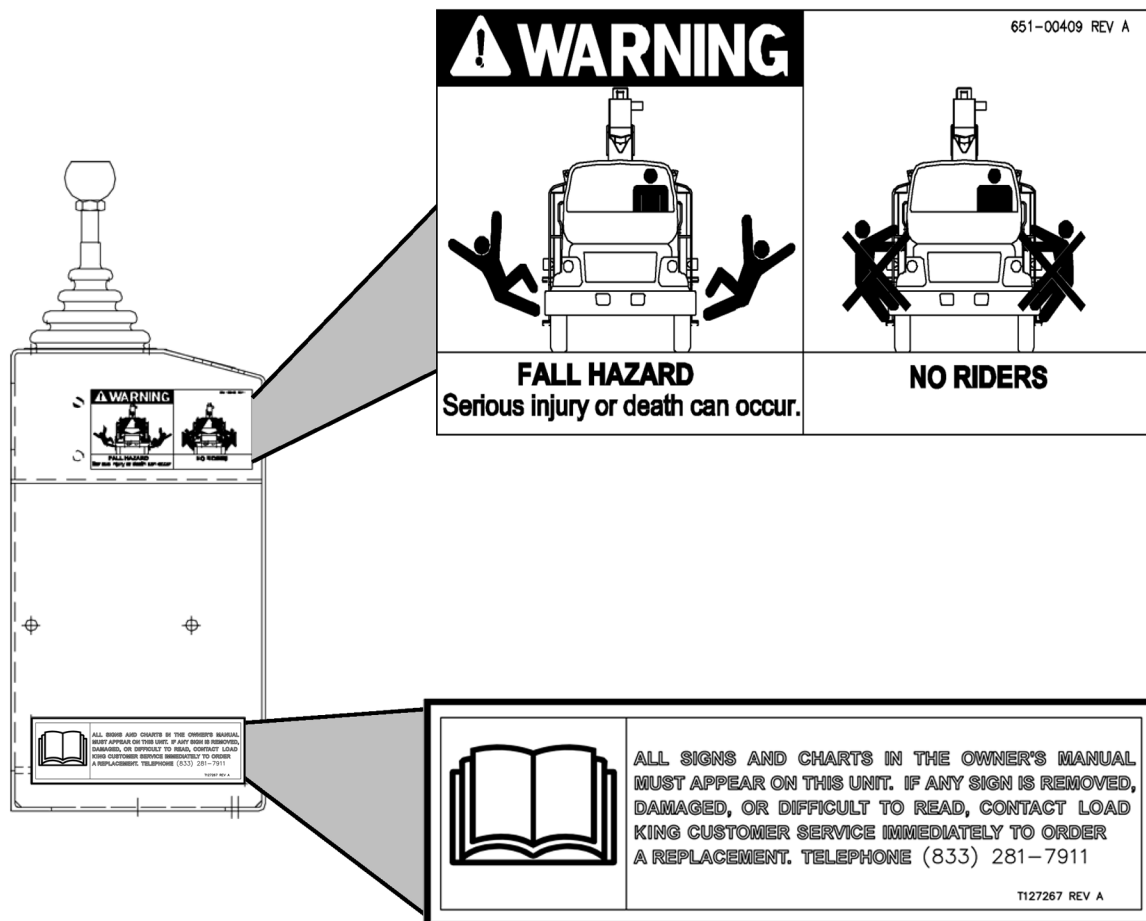
NOTE: Reduce all maintenance intervals under severe operating conditions. Refer to Operator's Manual for duty cycle, procedures and additional information. Check oil/grease levels daily and restore when full.

Drawn N/Boon Fully Retained

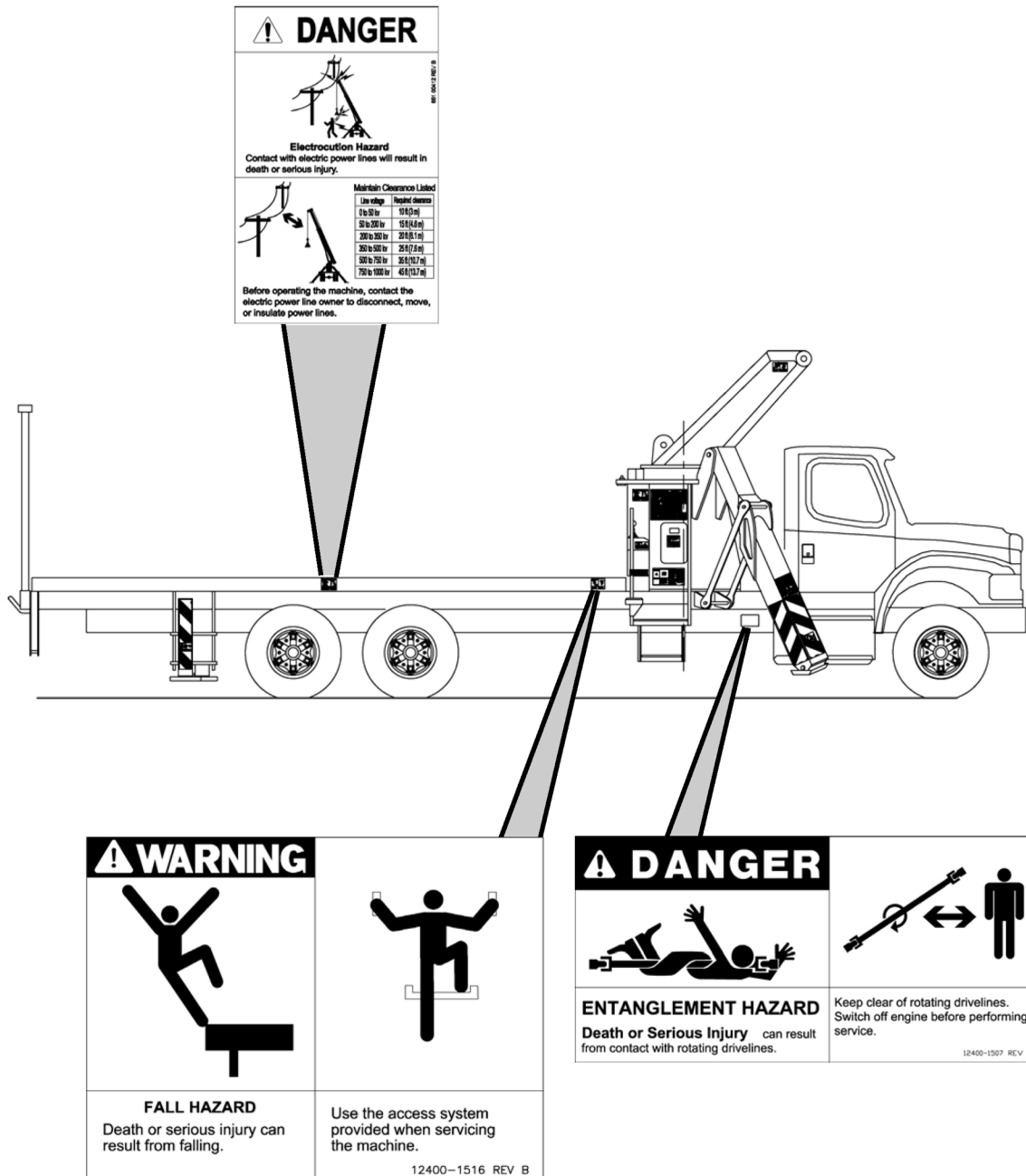
Assemble Planetary Gearbox Oil: 1P to 100P (-12" to 30P) 30W 4 EP, 500 VS 150, 1P to 100P (-4" to 30P) 30W 4 EP, 500 VS 150, 1P to 100P (-2P to 30P) 30W 4 EP, 500 VS 150

TECHNICAL REV B

28-106 Mainframe Turret - Curb Side & Console Front View Sign Locations

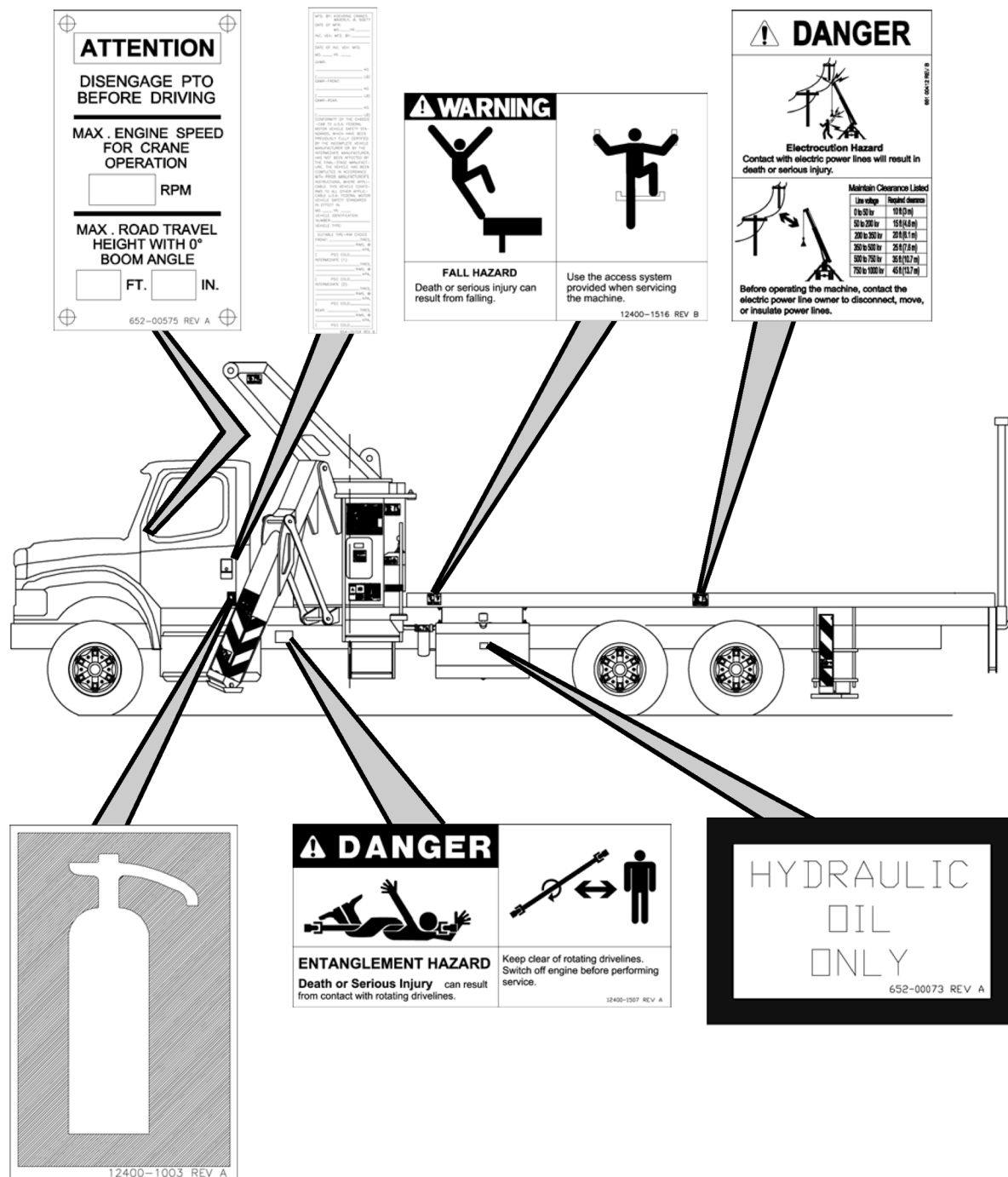


28-106 Mainframe Console - Right Side Safety Sign Locations

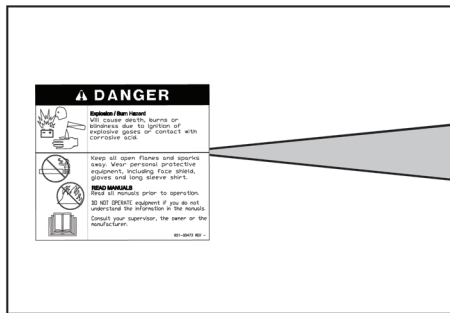





28-106 Flatbed - Curb Side Safety Sign Locations

19-70 / 28-106 Safety

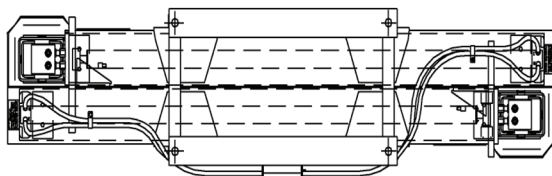
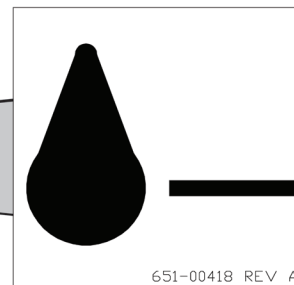
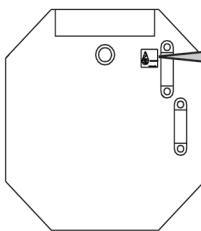


28-106 Flatbed/Hydraulic - Street Side Safety Sign Locations



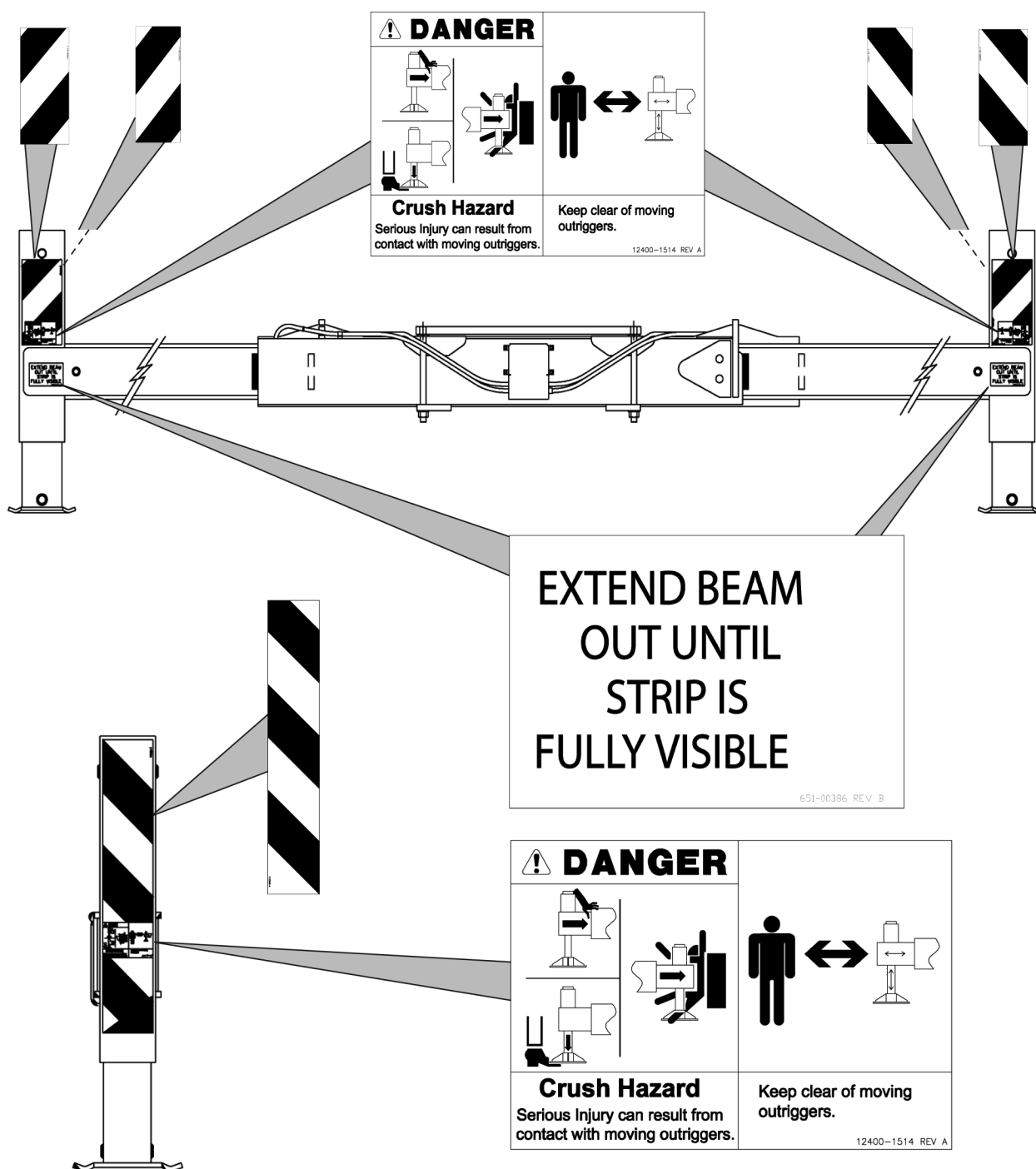
| ⚠ DANGER | |
|--|---|
|  | Explosion / Burn Hazard Will cause death, burns or blindness due to ignition of explosive gases or contact with corrosive acid. |
|  | Keep all open flames and sparks away. Wear personal protective equipment, including face shield, gloves and long sleeve shirt. |
|  | READ MANUALS Read all manuals prior to operation. DO NOT OPERATE equipment if you do not understand the information in the manuals. Consult your supervisor, the owner or the manufacturer. |

651-00473 REV -


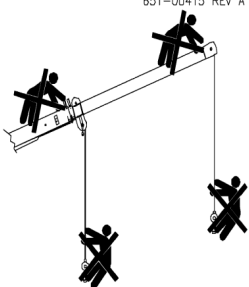




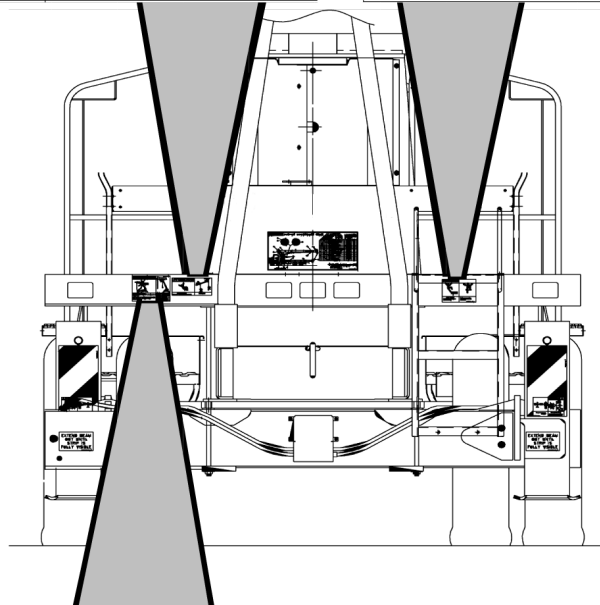
| |
|---|
| OUTRIGGER BEAM STOW PIN |
| ENGAGE PIN <u>BEFORE</u> ROADING UNIT |
| DISENGAGE PIN <u>BEFORE</u> EXTENDING OUTRIGGER BEAM. |
| 652-00469 REV-B |

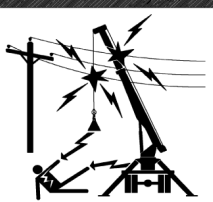
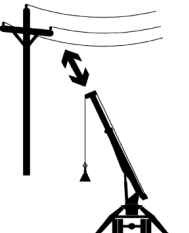
28-106 Hydraulic Tank and Outrigger Stow Safety Sign Locations



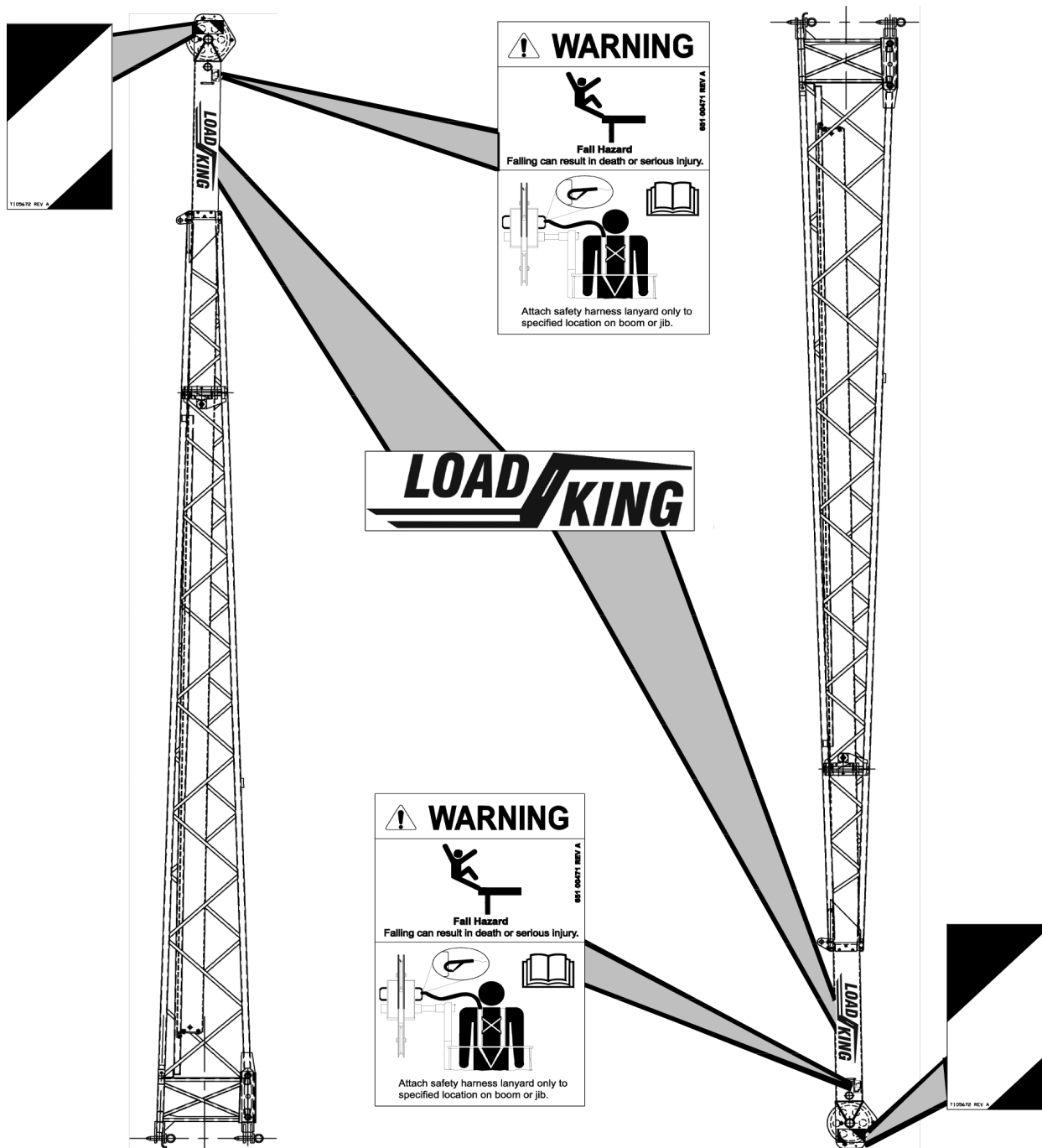
28-106 Outrigger Extended Safety Sign Locations

| | | | |
|---|--|--|---|
| <p>! WARNING</p>  | <p>651-00415 REV A</p>  | <p>! WARNING</p>  |  |
| <p>FALL HAZARD Serious injury or death can occur.</p> | <p>STAY OFF</p> | <p>FALL HAZARD Death or serious injury can result from falling.</p> | <p>Use the access system provided when servicing the machine.</p> <p>12400-1516 REV B</p> |

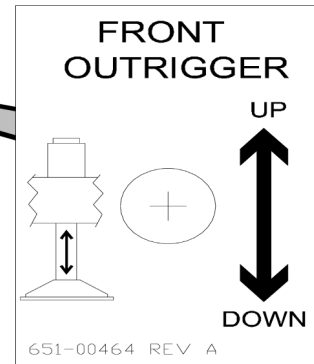
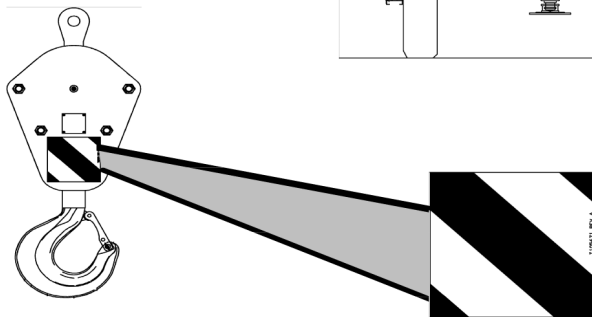
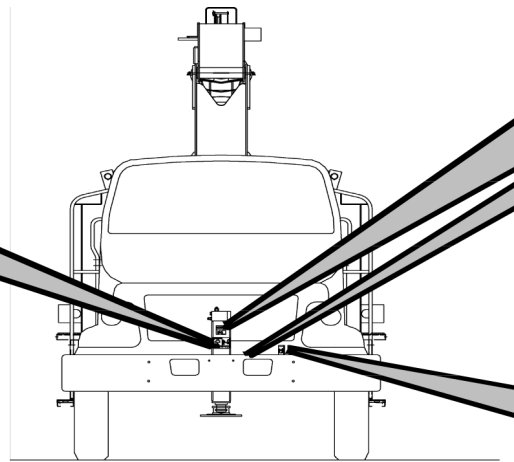


| <p>! DANGER</p>  | <p>651-00412 REV A</p>  | | | | | | | | | | | | | | |
|--|---|--------------|--------------------|-----------|-----------|-------------|-------------|--------------|-------------|--------------|-------------|--------------|--------------|---------------|--------------|
| <p>Electrocution Hazard Death or injury can result from contacting electric power lines.</p> <p>Always contact the electric power line owner. The electric power shall be disconnected or the power lines moved or insulated before machine operations begin.</p> | <p>Maintain required clearance</p> <table border="1"> <thead> <tr> <th>LINE VOLTAGE</th> <th>REQUIRED CLEARANCE</th> </tr> </thead> <tbody> <tr> <td>0 TO 50kV</td> <td>10FT (3m)</td> </tr> <tr> <td>50 TO 200kV</td> <td>15FT (4.6m)</td> </tr> <tr> <td>200 TO 350kV</td> <td>20FT (6.1m)</td> </tr> <tr> <td>350 TO 500kV</td> <td>25FT (7.6m)</td> </tr> <tr> <td>500 TO 750kV</td> <td>35FT (10.7m)</td> </tr> <tr> <td>750 TO 1000kV</td> <td>45FT (13.7m)</td> </tr> </tbody> </table> | LINE VOLTAGE | REQUIRED CLEARANCE | 0 TO 50kV | 10FT (3m) | 50 TO 200kV | 15FT (4.6m) | 200 TO 350kV | 20FT (6.1m) | 350 TO 500kV | 25FT (7.6m) | 500 TO 750kV | 35FT (10.7m) | 750 TO 1000kV | 45FT (13.7m) |
| LINE VOLTAGE | REQUIRED CLEARANCE | | | | | | | | | | | | | | |
| 0 TO 50kV | 10FT (3m) | | | | | | | | | | | | | | |
| 50 TO 200kV | 15FT (4.6m) | | | | | | | | | | | | | | |
| 200 TO 350kV | 20FT (6.1m) | | | | | | | | | | | | | | |
| 350 TO 500kV | 25FT (7.6m) | | | | | | | | | | | | | | |
| 500 TO 750kV | 35FT (10.7m) | | | | | | | | | | | | | | |
| 750 TO 1000kV | 45FT (13.7m) | | | | | | | | | | | | | | |

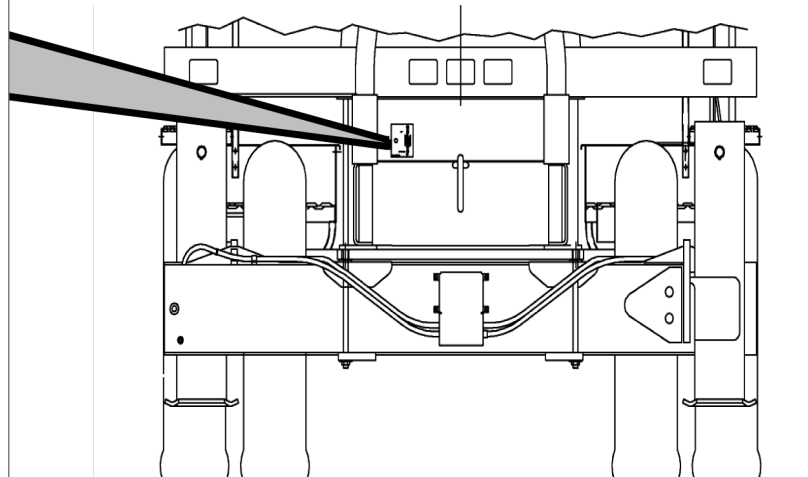
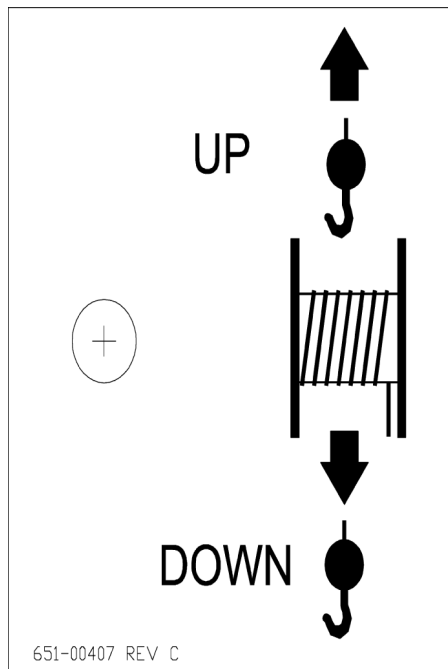
28-106 Rear Flatbed Safety Sign Locations



28-106 Jib Safety Sign Locations



28-106 Front Outrigger & Block Safety Sign Locations



28-106 Inching Winch Safety Sign Locations

Personal Protection Equipment

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

Common Types of PPE



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



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



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



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



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

Workplace Safety



HANDLING PERSONNEL

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



TRAINING AND KNOWLEDGE

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



OPERATOR'S RESPONSIBILITIES

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

(Continued on next page ...)

**OPERATOR'S RESPONSIBILITIES**

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

**SIGNAL PERSON'S RESPONSIBILITIES**

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



RESPONSIBILITIES OF ALL CREW MEMBERS

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



MANAGEMENT RESPONSIBILITIES

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



PLANNING THE JOB

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

(Continued on next page ...)

**PLANNING THE JOB**

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

**OPERATOR PRELIFT CHECK**

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

**OPERATOR AIDS CHECK**

Ensure that the listed items are in place and operational.

1. Boom angle indicator.
2. Backup Alarms.

(Continued on next page ...)



OPERATOR AIDS CHECK

3. Anti-Two Block devices.
4. Overload Protection, Load Indicators, Rated Capacity Indicator.



OPERATION OVERLOAD PROTECTION

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



OPERATION SETUP

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



POWER LINE SAFETY


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

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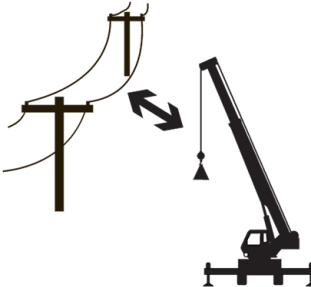


POWER LINE SAFETY

DANGER



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



Maintain Clearance Listed

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

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

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

(Continued on next page ...)

**POWER LINE SAFETY**

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

**TRAVEL**

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

**OPERATIONAL AIDS - EMERGENCY PROCEDURES**

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

1. Steps shall be taken to schedule repairs immediately. The operational aids shall be put back into service as soon as replacement parts, if required, are available and the repairs and calibration can be carried out. "Can be carried out" does not mean, when convenient. Every effort must be made to expedite the repairs and recalibration.

(Continued on next page ...)



OPERATIONAL AIDS - EMERGENCY PROCEDURES

2. When a load indicator, rated capacity indicator, or rated capacity limiter is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish procedures for determining load weights. Loads with unknown weights shall not be lifted without a properly functioning load indicating device.
3. When a boom angle or radius indicator is inoperative or malfunctioning, radii or boom angle shall be determined by measurement.
4. When an anti-two-block device, two-blocking damage prevention or two-block warning device is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish procedures, such as assigning and additional signal person, to furnish equivalent protection.
5. When a boom length indicator is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish the boom length at which the lift will be made by actual measurement or marking on the boom.
6. When a level indicator is inoperative or malfunctioning, other means shall be used to level the crane within the level requirements specified by the manufacturer.

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

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

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

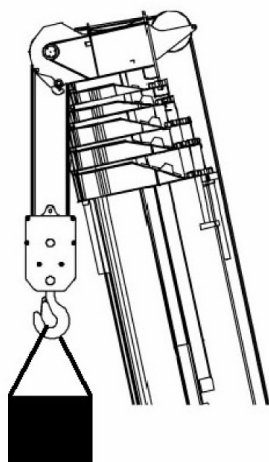
Effects of Wind Conditions

Lifting Constraints

The crane can be used safely by following the values given in the load capacity tables up to a wind speed of 20 mph (32 kph - force 5) on a load surface of 13 ft²/tonne.



Check the forecast and monitor wind speed conditions near the job site. When wind speed exceeds 20 mph (32 kph - force 5), derating of the cranes lifting capacity is required.



Wind

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 WARNING section of the LOAD CHART. Any governmental regulations applicable to the job site must also be observed.

| Wind Force | | Wind Speed | | Consequences |
|------------|-----------------|------------|--------|---|
| Scale | Terms Described | mph | kph | Inland Territories |
| 0 | Calm | 0 - 1 | 1 | Calm, Smoke rises vertically |
| 1 | Very Light | 1 - 3 | 1 - 5 | Wind direction indicated by the smoke and not by the banner |
| 2 | Light Breeze | 4 - 7 | 6 - 11 | The wind can be felt on the face, the leaves rustle, the banner moves |

| | | | | |
|---|---------------|---------|---------|---|
| 3 | Gentle Breeze | 8 - 12 | 12 - 19 | Leaves and small branches move, banners lift |
| 4 | Mild Breeze | 12 - 18 | 20 - 28 | The wind raises dust and leaves. Branches move |
| 5 | Fair Breeze | 18 - 24 | 29 - 38 | Small bushes sway. Wave crests form on the sea. |
| 6 | Strong Breeze | 24 - 31 | 39 -49 | Large branches sway. |
| 7 | Strong Wind | 31 - 38 | 50 - 61 | All the trees sway |

Lightning Storm

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

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

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

Temporary Interruption of Crane Operations

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

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

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

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

- A suitable and safe emergency plan shall be worked out to allow bringing the crane into a safe position in case of emergency such as an unforeseen weather change or other possible incidents as listed at the beginning of this document. This plan shall also include sufficient space around the crane to enable dismantling or lowering of boom or equipment, etc.
- The crane shall be left with no load on the hook.
- All slings or fastening ropes shall be removed from the crane hook.
- The hook block shall be at the highest position so that there is no contact possible between the wire ropes and the boom or other obstacles.

- The crane location and configuration does not create hazards to the road traffic, e.g. risk of collision with surrounding obstacles; this may require a specific risk assessment prior to leaving the crane unattended.
- Check for leakage and unintended (slow) movement on all load bearing hydraulic cylinders and winches:
 - Outrigger vertical cylinders
 - Boom luffing cylinder(s)
 - Jib luffing cylinder, as applicable
 - Hoist winch
 - Luffing winch, as applicable



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

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

Potential hazards from Unattended Crane - Possible Issue/Risk

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

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

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

- Vandalism.

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

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

Resuming Crane Operations

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

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

Ending Crane Operations

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

End of Operations checklist

1. _____ Is the load fully on the ground and unhooked from the crane?
2. _____ Is telescopic boom all the way in?
3. _____ Is work-site crane boom all the way down and disassembled if necessary?
4. _____ Is master control level to the centered (0) position?
5. _____ Is parking brake on crane chassis set?
6. _____ Is crane engine off and ignition key removed?
7. _____ Is the crane cab locked?
8. _____ Is the crane secured from unauthorized use?
9. _____ Is the vehicle cab unoccupied?
10. _____ Is the vehicle engine off and the key removed?
11. _____ Is the vehicle parking brake set?

Turning/Driving in Reverse

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



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

The following cautions must be observed at all times:

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



Injury or death may occur while driving in reverse.



Property damage may occur while driving in reverse.

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

Parking the Vehicle



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



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



Risk of Death

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

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



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

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

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

Lock Out & Tag Out

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

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

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



Typical Lock Out & Tag Out Kit

What is Lock Out & Tag Out

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

How to Lock Out & Tag Out

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

When is Lock Out & Tag Out required

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

Who must apply a lock & tag

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

When can a lock and tag be removed

After performing these six steps:

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

Who can remove a lock and tag

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

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

Access/Egress**Access/Egress Safety**

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

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



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







Personal Safety



SLIP AND FALL PREVENTION

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

Seat Belts

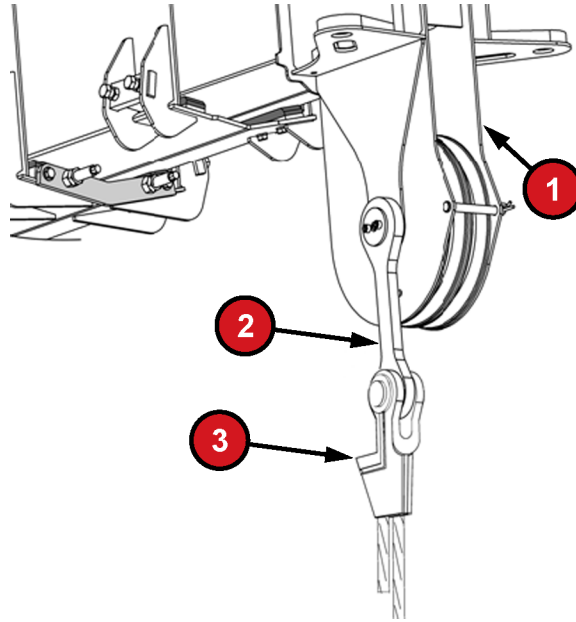
SOME SUGGESTED USAGE AND MAINTENANCE INSTRUCTIONS FOR SEAT BELTS

1. Wear your lap belt low and snug.
2. Manually adjustable lap belts and shoulder harnesses are adjusted by pulling the loose end of the webbing through the buckle or adjuster.
3. Seat belts using automatic-locking or emergency-locking retractors are self-adjusting.
4. Hand wash webbing with warm water and mild soap. Rinse thoroughly and dry in the shade.
5. Do not bleach or re-dye, because such processing may severely weaken the assembly.
6. Inspect the seat belt assembly frequently. Anytime it does not operate properly, or if there are any defects in the webbing (e.g. torn or frayed), the seat belt must be replaced.
7. For a non-locking retractor belt, completely extend the lap belt from the retractor(s). After adjusting the belt snugly (see # 2 above), attempt to pull additional webbing from the retractor. If no additional webbing can be pulled from the retractor after adjustment, then the seat belt is adjusted properly.

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.

BOOM CONNECTION FOR EVEN PARTS OF LINE



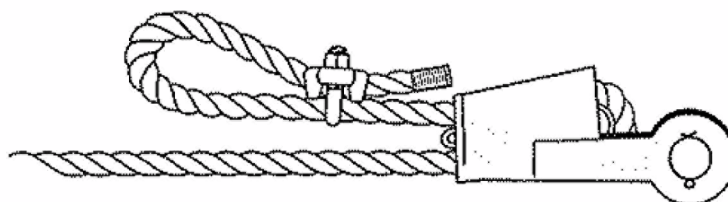
| | | | |
|---|---------------|---|-----------------|
| 1 | Boom Head | 3 | Dead End Socket |
| 2 | Dead End Link | | |

Use **Loop Back Method** for clamping dead end length of wire rope.

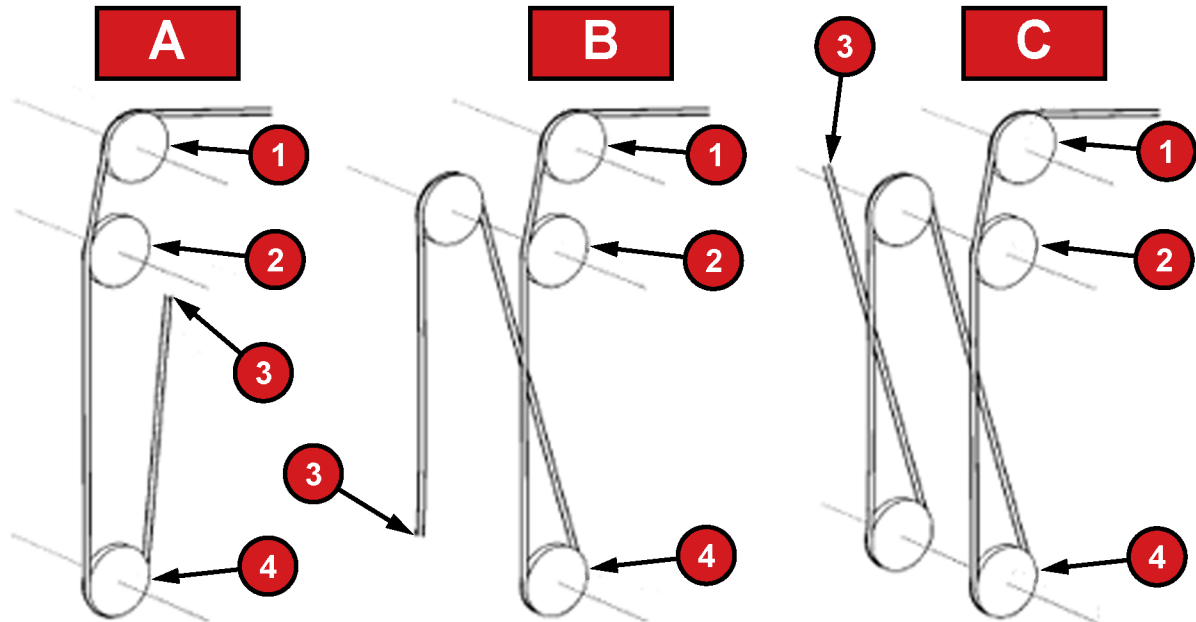


DO NOT SECURE THE DEAD END OF THE ROPE TO THE LIVE ROPE. ATTACHING A DEAD END TO A LIVE LINE CAN DAMAGE, CRIMP OR PINCH THE LIVE LINE. THIS CAN RESULT IN THE LOAD BEING TRANSFERRED TO THE DEAD END. THIS CONDITION COULD ULTIMATELY RESULT IN THE ROPE BREAKING UNEXPECTEDLY AT LOADS WELL BELOW THE ROPE'S NORMAL BREAKING STRENGTH.

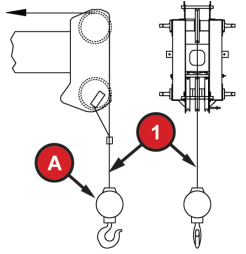
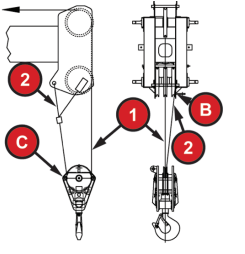
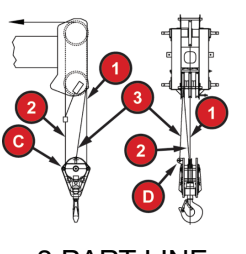
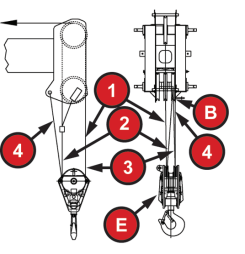
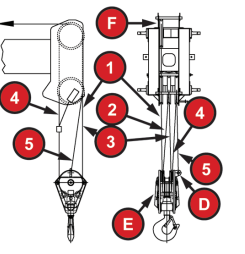
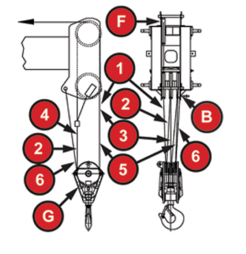
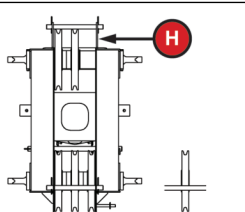
loop back method



MULTIPLE PARTS OF LINE EXAMPLES



| | | | |
|---|-----------------|---|-------------------|
| A | 2 Parts of Line | 2 | Boom Point Sheave |
| B | 3 Parts of Line | 3 | Dead End |
| C | 4 Parts of Line | 4 | Load Block Sheave |
| 1 | Guide Sheave | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|--|--------------------------|------------------|-----------------------------|---------------------|----------------------------|--------------------------|-----------------------------|----------------------|----------------------------|--------------------------|----------------------------|------------------------|--|----------------------------|--|--------------------------------|
|  <p>1 PART LINE</p> |  <p>2 PART LINE</p> |  <p>3 PART LINE</p> | | | | | | | | | | | | | | | | |
|  <p>4 PART LINE</p> |  <p>5 PART LINE</p> |  <p>6 PART LINE</p> | | | | | | | | | | | | | | | | |
|  <p>5 OR 6 PART OPTIONAL SHEAVE KIT</p> | <p>CALLOUT KEY</p> <table><tr><td>1. ONE PART OF LOAD LINE</td><td>A. OVERHAUL BALL</td></tr><tr><td>2. SECOND PART OF LOAD LINE</td><td>B. DEAD END ON BOOM</td></tr><tr><td>3. THIRD PART OF LOAD LINE</td><td>C. ONE-SHEAVE LOAD BLOCK</td></tr><tr><td>4. FOURTH PART OF LOAD LINE</td><td>D. DEAD END ON BLOCK</td></tr><tr><td>5. FIFTH PART OF LOAD LINE</td><td>E. TWO-SHEAVE LOAD BLOCK</td></tr><tr><td>6. SIXTH PART OF LOAD LINE</td><td>F. SEE OPT. SHEAVE KIT</td></tr><tr><td></td><td>G. THREE-SHEAVE LOAD BLOCK</td></tr><tr><td></td><td>H. OPTIONAL SHEAVE AND SPACERS</td></tr></table> | | 1. ONE PART OF LOAD LINE | A. OVERHAUL BALL | 2. SECOND PART OF LOAD LINE | B. DEAD END ON BOOM | 3. THIRD PART OF LOAD LINE | C. ONE-SHEAVE LOAD BLOCK | 4. FOURTH PART OF LOAD LINE | D. DEAD END ON BLOCK | 5. FIFTH PART OF LOAD LINE | E. TWO-SHEAVE LOAD BLOCK | 6. SIXTH PART OF LOAD LINE | F. SEE OPT. SHEAVE KIT | | G. THREE-SHEAVE LOAD BLOCK | | H. OPTIONAL SHEAVE AND SPACERS |
| 1. ONE PART OF LOAD LINE | A. OVERHAUL BALL | | | | | | | | | | | | | | | | | |
| 2. SECOND PART OF LOAD LINE | B. DEAD END ON BOOM | | | | | | | | | | | | | | | | | |
| 3. THIRD PART OF LOAD LINE | C. ONE-SHEAVE LOAD BLOCK | | | | | | | | | | | | | | | | | |
| 4. FOURTH PART OF LOAD LINE | D. DEAD END ON BLOCK | | | | | | | | | | | | | | | | | |
| 5. FIFTH PART OF LOAD LINE | E. TWO-SHEAVE LOAD BLOCK | | | | | | | | | | | | | | | | | |
| 6. SIXTH PART OF LOAD LINE | F. SEE OPT. SHEAVE KIT | | | | | | | | | | | | | | | | | |
| | G. THREE-SHEAVE LOAD BLOCK | | | | | | | | | | | | | | | | | |
| | H. OPTIONAL SHEAVE AND SPACERS | | | | | | | | | | | | | | | | | |

When 5 or 6 parting the unit, take one of the spacers & top sheave out and install in the opposite manner so both spacers are side by side and the sheave is to the outside.

If you are changing this quite often you can replace one of the spacers with optional sheave kit T105999.

The load line should always be in the middle on the top sheave unless your are 5 or 6 parting.

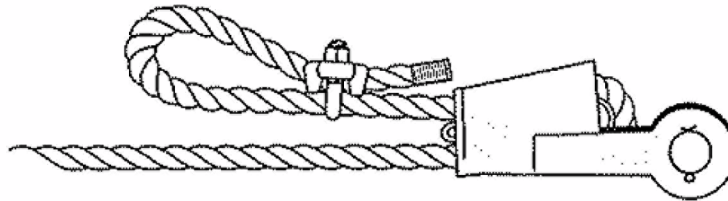
Dead Ending Wire Rope in Socket

The recommended method for the dead end of the wire rope is the **Loop Back Method** as shown in figure below.



DO NOT SECURE THE DEAD END OF THE ROPE TO THE LIVE ROPE. ATTACHING A DEAD END TO A LIVE LINE CAN DAMAGE, CRIMP OR PINCH THE LIVE LINE. THIS CAN RESULT IN THE LOAD BEING TRANSFERRED TO THE DEAD END. THIS CONDITION COULD ULTIMATELY RESULT IN THE ROPE BREAKING UNEXPECTEDLY AT LOADS WELL BELOW THE ROPE'S NORMAL BREAKING STRENGTH.

**loop back
method**



Boom Installation



DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF BOOM IS TELESCOPED WHILE HANDS OR TOOLS ARE IN HOLES. FOLLOW THE LOCK OUT - TAG OUT PROCEDURES CONTAINED IN THE SAFETY SECTION OF THIS MANUAL.

1. Lift the boom into position at the turret and install the boom hinge pin.
2. Lower the boom onto the boom rest.
3. Install the topping cylinder and connect hydraulic lines.
4. Connect the hydraulic lines to the boom extend cylinder.
5. Plug or cap the end of the hoses or tubes for the winch. This step must be performed so oil does not leak out of the lines when Step 7 is performed.
6. Adjust extension cable system. (See [Boom Cable Adjustment Procedure on page 332.](#))
7. Once the extension cable system is properly adjusted, assemble the winch to the base section. Tighten the mounting bolts to 280 ft.lbs.

NOTE: *Step 6 is easier to perform when the winch is not installed.*

8. Connect the hydraulic lines to the ports of the winch motor.
9. Install the lift cable over the sheaves of the boom tip. Be sure to pass the load line under wire cable guides on the end of the boom sections.
10. If equipped, assemble the jib to the side of the boom.
11. Connect the anti-two block cable to the limit switch and test the anti-two block system for proper operation.
12. Operate the winch and the telescope cylinder in both directions until all air is bled from the system. Check the level of oil in the hydraulic tank.

19-70 Jib Installation

DESCRIPTION

Jib extension option 1: 24 ft. (7.3 m) single stage swing-on tubular type extension.

Jib extension option 2: 24 - 40 ft (7.3 - 12.2 m) two stage swing-on tubular type extension.

Jib extension weights

- Single stage section only: 532 lbs (241 kg)
- Two stage w / stinger section: 815 lbs (370 kg)
- Stinger section only: 283 lbs (128 kg)



BEFORE STOWING OR DEPLOYING THE EXTENSION, ENSURE THAT NO PERSONNEL OR OBSTACLES ARE IN THE SWING PATH OF THE EXTENSION.



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.



WHEN PERFORMING INSTALLATION OPERATIONS AT HEIGHTS ABOVE 10 FT (3 m) FROM THE GROUND, A SAFETY HARNESS MUST BE USED. A SINGLE LADDER MAY BE USED PROVIDED THAT IT IS SECURED IN PLACE AND THE TOP 4 RUNGS ARE NOT USED. USE A STEPLADDER, SCAFFOLDING OR A PLATFORM THAT MEETS APPLICABLE SAFETY STANDARDS.



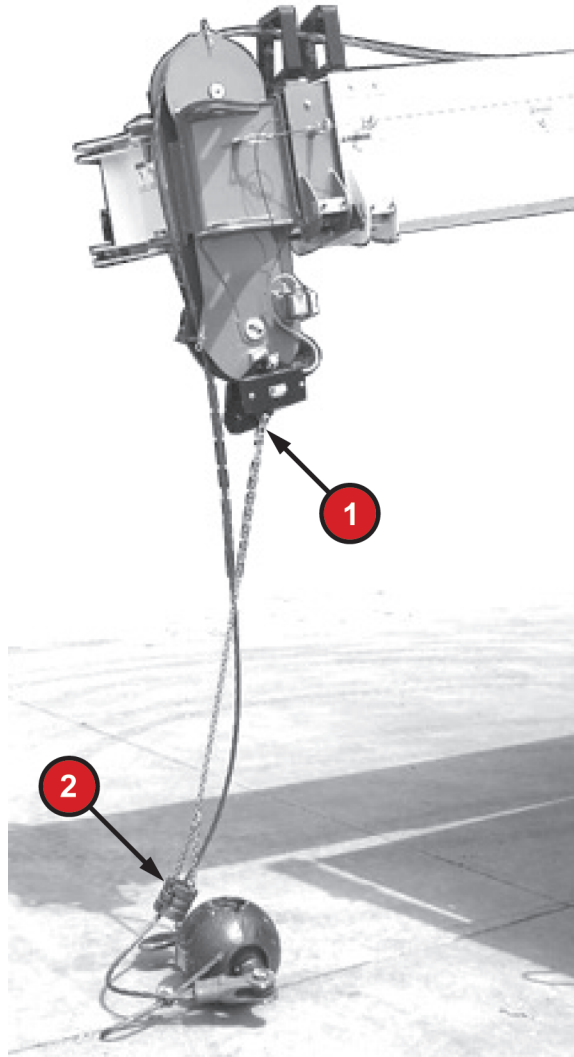
ALL THE EXTENSION ROTATION OPERATIONS USING THE NYLON ROPE MUST BE CARRIED OUT FROM THE GROUND.

| Auxiliary components for correct installation | |
|--|-------------------------------------|
|  | Ratchet tensioner |
|  | Hammer or mallet 4 - 7 lb. (2-3 kg) |
|  | Nylon Rope (L > = 15 ft (4.5m)) |
|  | Ladder (H useful 13 ft (4m)) |

JIB INSTALLATION PROCEDURE

1. Starting with a fully leveled boom truck, fully retract the boom, fully extended front outrigger arms and fully extended rear outrigger jack cylinders. Rotate the boom to the street side of the boom rest, and lower until boom head can be reached from the ground.

19-70 / 28-106
Assembly



| ITEM | DESCRIPTION |
|------|-----------------------|
| 1 | Chain Clevis |
| 2 | Anti-Two Block Weight |

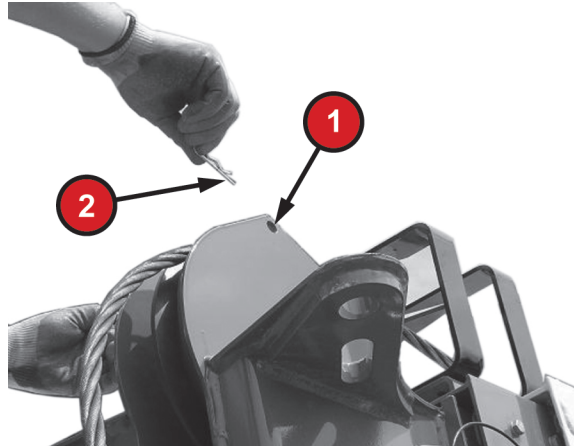
2. Remove the anti-two block weight and chain clevis from wire rope and the anti-two-block switch.

3. Remove bottom and top cotter pin retainers and guide pins from sheave head.



Guide Pin (bottom)

| ITEM | DESCRIPTION |
|------|-----------------------------|
| 1 | Guide Pin Location (bottom) |



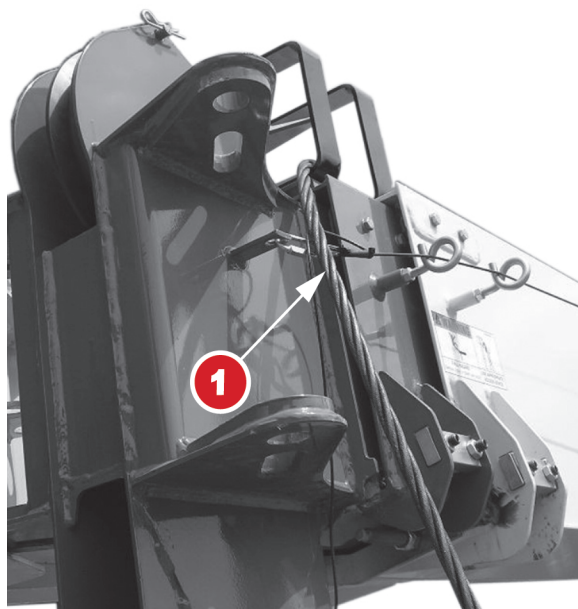
Guide Pin (top)

| ITEM | DESCRIPTION |
|------|--------------------------|
| 1 | Guide Pin Location (top) |
| 2 | Cotter Retainer Pin |

19-70 / 28-106

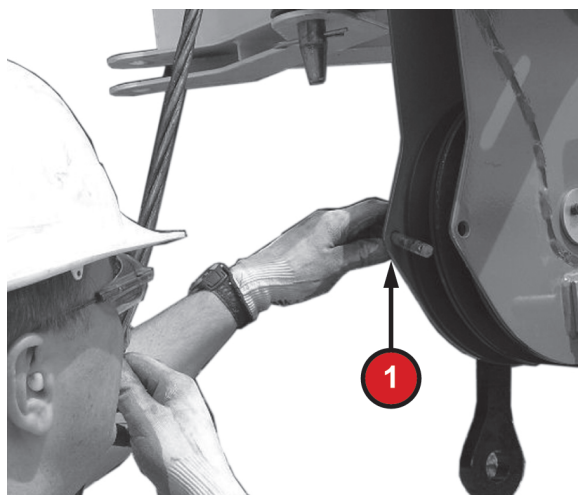
Assembly

4. Remove wire rope from boom head sheave and allow it to hang off the curb side of the boom.



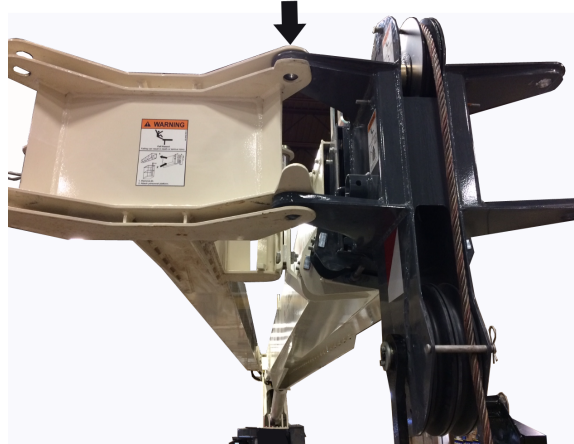
| ITEM | DESCRIPTION |
|------|-------------|
| 1 | Wire Rope |

5. Reinstall top and bottom guide pins and cotter pin retainers in the sheave head.

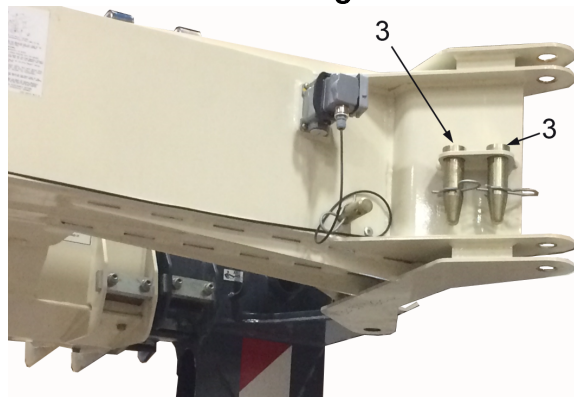


| ITEM | DESCRIPTION |
|------|---------------------|
| 1 | Guide Pin Locations |

6. When the boom is fully retracted, the jib mounting holes should line up. If holes in the jib do not line up with the holes in the boom head, re-adjust the boom head by slightly extending, then fully retracting the boom.



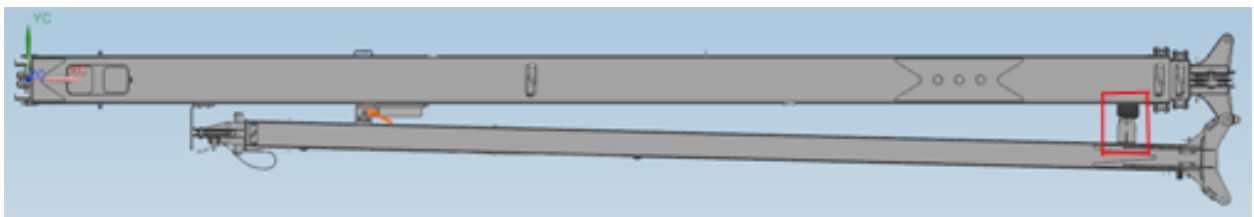
Jib Alignment to Boom Head Alignment of Mounting Holes



Jib Extension Retaining Pins and Pin Stowage Bracket

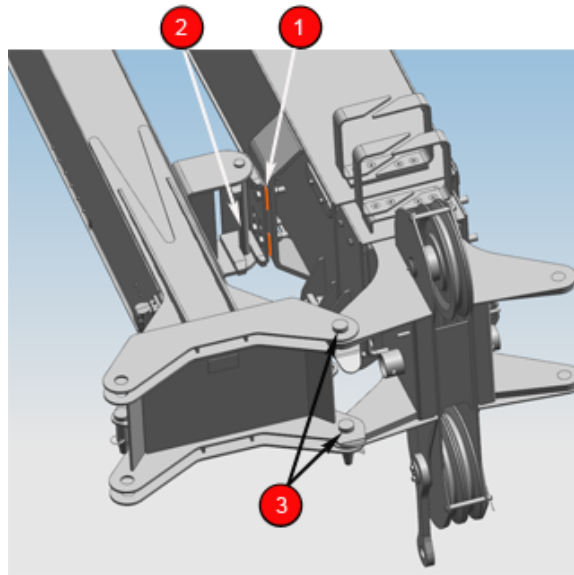
| ITEM | DESCRIPTION |
|------|--|
| 3 | Jib Extension retaining plns & cotter pin retainer |

7. Location of front alignment bar and bracket locking jib extension to boom. (see area in red square below)




Jib Extension Stowed - Front Alignment Bar (top view)

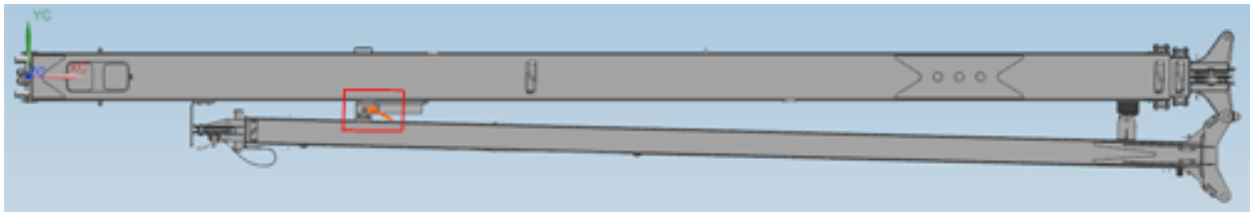
Install two PINS (item 3) and cotter pin retainers from pin stow bracket, to fasten jib in place on the street side of the boom.



Jib Pins & Cotter Pins Installed - Street side

| ITEM | DESCRIPTION |
|------|--|
| 1 | Jib Stow Bracket & Shims - shim as required to make proper alignment with (item 2) Stow Bar |
| 2 | Jib Stow Alignment Bar |
| 3 | Jib Extension retaining pins - Street side (qty. 2) & cotter pin retainers (qty. 2) |
| 4* | Jib Extension retaining pins - Curb side (qty. 2) & cotter pin retainers (qty. 2) (*see Curb side installation of pins below) |

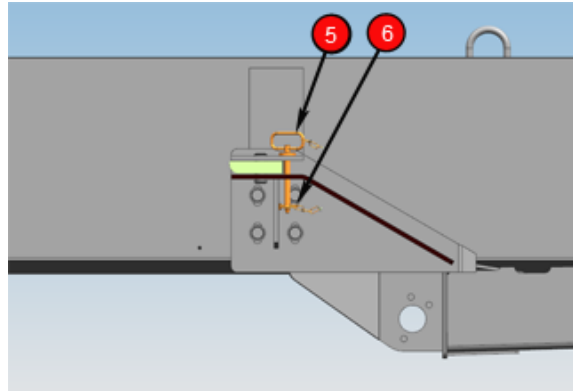
8.  BEFORE REMOVAL OF COTTER PIN (item 6), THEN REMOVAL OF LOCKING PIN (item 5) FROM THE TOP, CONFIRM THAT (item 3) JIB EXTENSION RETAINING PINS (qty. 2) ARE IN PLACE SECURING THE JIB TO THE BOOM HEAD, OTHERWISE JIB WILL FALL OFF THE BOOM CAUSING DEATH OR SERIOUS INJURY TO PERSONNEL AND PROPERTY DAMAGE.



Jib Extension Stowed - Rear Locking Pin (top view)

Hammer may be required to remove (item 5) Locking Pin.

Locking Pin is retained by a chain. Return pin to original location once the jib has pivoted away from side of the boom.



Jib Extension Stowed Position - Locking Pin

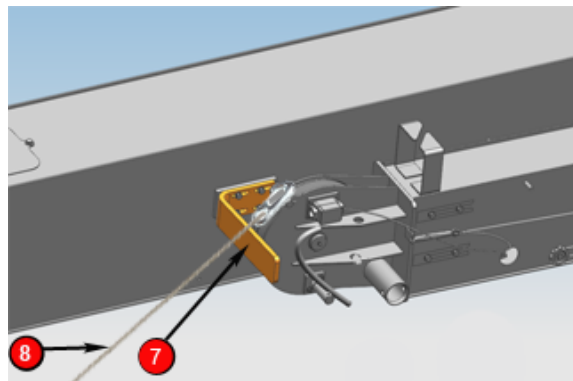
| ITEM | DESCRIPTION |
|------|---|
| 5 | Jib Extension stowed position locking pin |
| 6 | Jib Extension stowed position cotter pin |



THE AREA UNDERNEATH THE JIB MUST BE KEPT CLEAR AT ALL TIMES WHILE THE JIB IS BEING LOCKED OR UNLOCKED.



BEFORE DEPLOYING THE EXTENSION, ENSURE THAT NO PERSONNEL OR OBSTACLES ARE IN THE SWING PATH OF THE EXTENSION.



Tag Line Installed on Jib

Fasten the tag line rope (item 8), approximately 15' (4.5 m) to the anchor point at the end of the jib.

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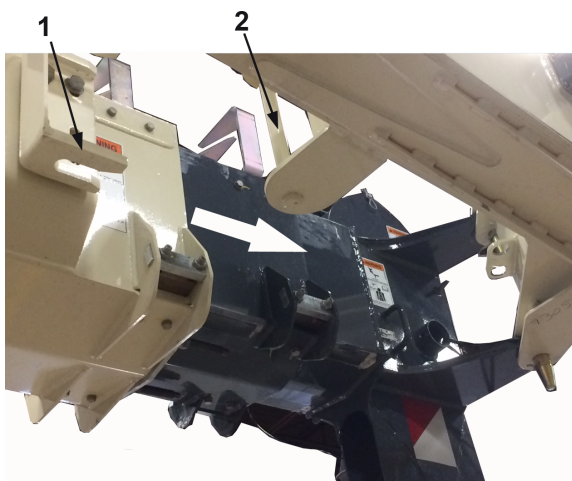
Assembly

| ITEM | DESCRIPTION |
|------|---------------------|
| 7 | Safety Stop Bracket |
| 8 | Tag line rope |

10. Raise boom to the horizontal position before proceeding.



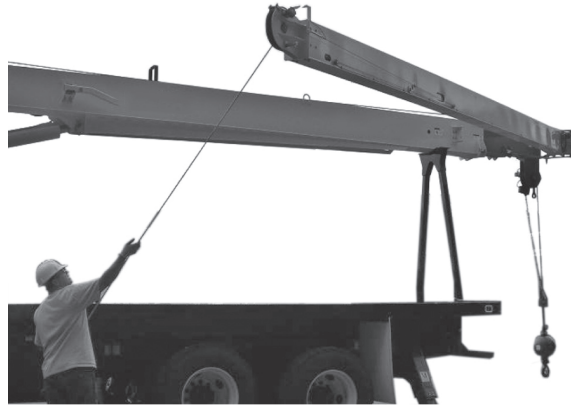
11. Extend the boom approximately 15 in. (380 mm) so the Jib Stow Bar (item 2) is clear of the Jib Stow Bracket.



Boom Extended for Jib Deployment

| ITEM | DESCRIPTION |
|------|------------------------|
| 1 | Jib Stow Bracket |
| 2 | Jib Stow Alignment Bar |

12. Position the boom so there is adequate room to swing the jib into the deployed position.
13. Swing jib away from boom with tag line rope and into erected position. Control movement of the jib at all times to prevent injury and / or equipment damage.



Jib controlled swing w/tag line rope -starting location of rigging person



JIB WILL SWING UNCONTROLLED IF BOOM IS NOT HORIZONTAL.
THERE IS A DANGER OF BODILY HARM IF THE JIB IS NOT PROPERLY
CONTROLLED.

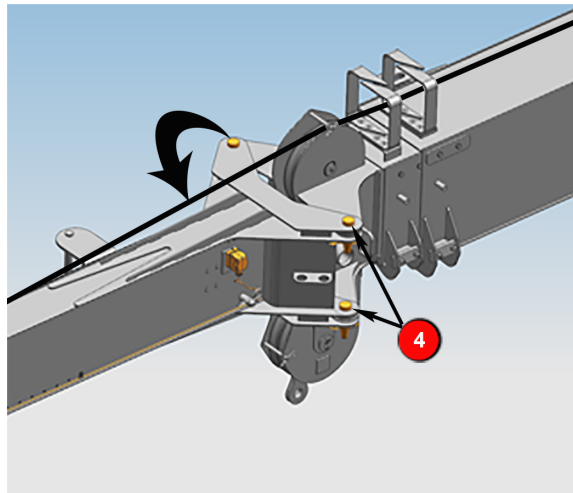


Jib controlled swing w/tag line rope - end location of rigging person

14. Install two pins (item 4) and cotter pin retainers from pin stow bracket, to fasten jib in place on the curb side of the boom.



NOTE: *If any force is required to install any of the four jib pins (items 3 & 4), it should not be more than a few hits from a machine hammer. If more force than this is required for the first 2 pins (item 3), check alignment as the jib stowage brackets may need adjustment.*

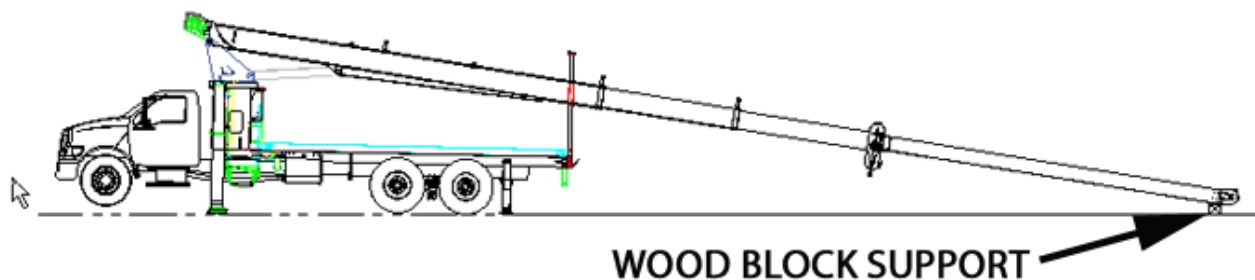


Jib Pins & Cotter Pins Installed - Curb side

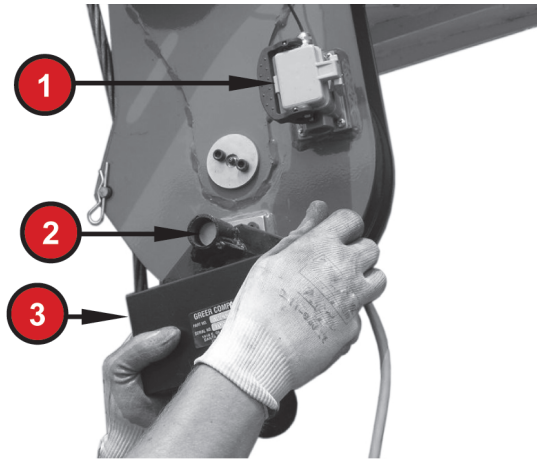
15. Due to the weight of the jib, most times it is difficult to get the top pin of the jib to the boom head installed. Proceed with installing the lower curb side pin and retainer of jib to boom head. Retract the rear outrigger jack cylinders while the front outrigger arms remain fully extended. Lower 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.



NOTE: *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.*

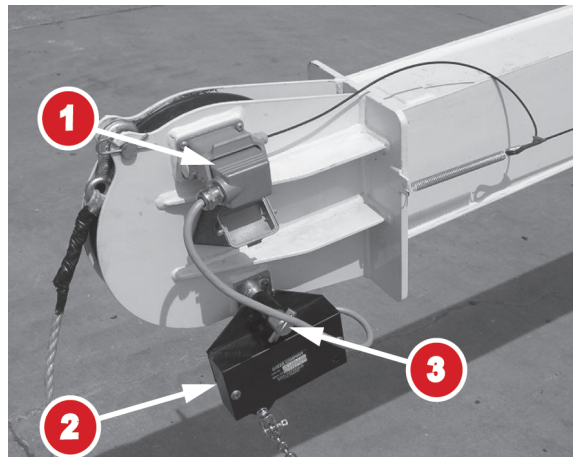


16. Downward pressure can then be applied to the jib sheave head to facilitate top curb side pin alignment and installation by the boom down function.
17. Remove anti-two block switch, retaining pin, and plug from the boom head. Install on jib head.



Boom Head

| ITEM | DESCRIPTION |
|------|------------------------|
| 1 | Plug |
| 2 | Retaining Pin Location |
| 3 | Anti-Two Block Switch |



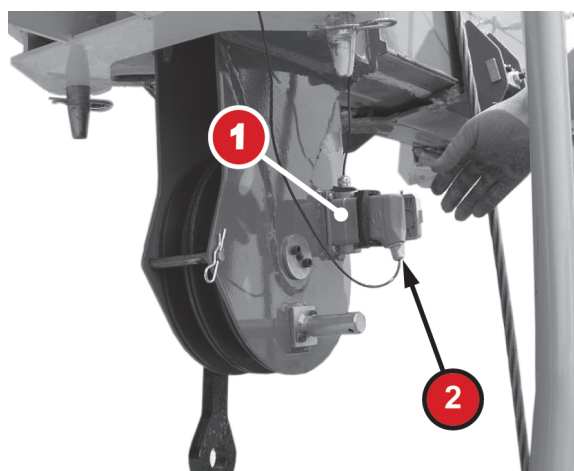
Jib Head

19-70 / 28-106

Assembly

| ITEM | DESCRIPTION |
|------|-----------------------|
| 1 | Plug |
| 2 | Retaining Pin |
| 3 | Anti-Two Block Switch |

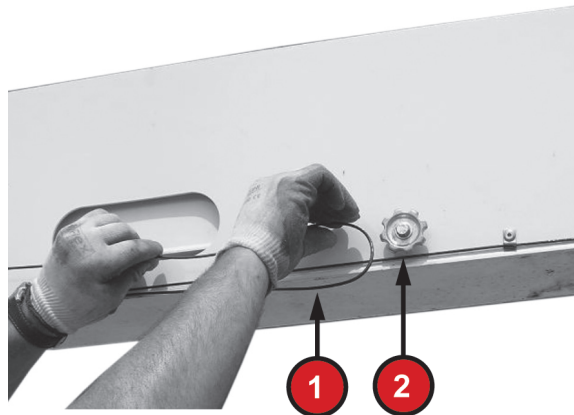
18. Remove anti-two block plug from base of jib and install in open receptacle on boom head.



Boom Head

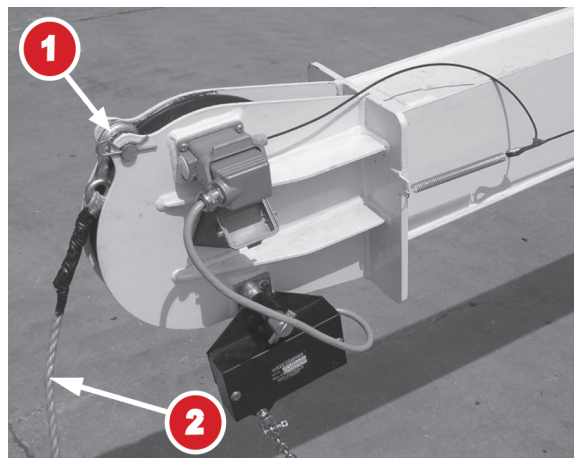
| ITEM | DESCRIPTION |
|------|---------------------|
| 1 | Receptacle |
| 2 | Anti-Two BLock Plug |

19. **IF THE SECOND STAGE OF THE JIB IS NOT GOING TO BE USED, SKIP TO STEP 27.**
20. **EXTENDING SECOND JIB STAGE:** Unstow anti-two-block cable from jib base section. This is highly important to avoid damaging the ATB cable.



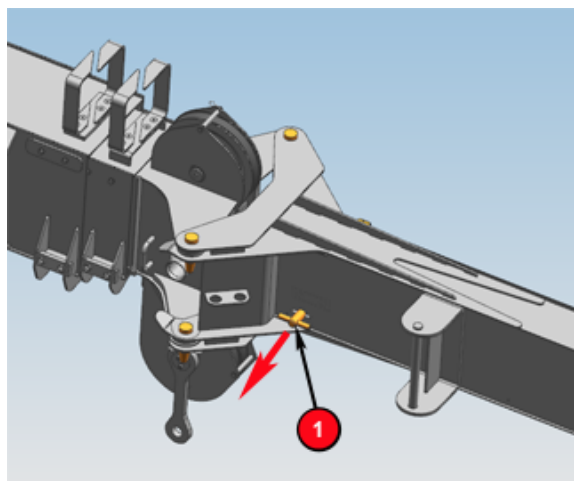
| ITEM | DESCRIPTION |
|------|----------------------|
| 1 | Anti-Two Block Cable |
| 2 | Anchor Pint |

21. Unstow anti-two-block cable from jib base section. This is highly important to avoid damaging the ATB cable.
22. Raise boom to angle high enough to allow the jib to be extended without contacting the ground.
23. Fasten a tag line rope to a suitable anchor point on the jib head.



| ITEM | DESCRIPTION |
|------|---------------|
| 1 | Anchor Point |
| 2 | Tag Line Rope |

24. Remove the second stage lock pin (item 1) and cotter pin retainer near the base of the jib.



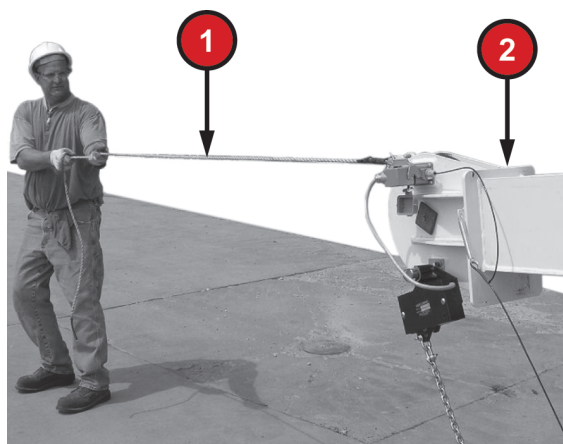
Second Stage Lock Pin Removal

| ITEM | DESCRIPTION |
|------|-----------------------|
| 1 | Second Stage Lock Pin |

25. Pull second stage jib extension out until it contacts jib stop pin. If it becomes difficult to pull second stage jib extension from main section, use a ratchet tensioner strap and anchor other end to a fixed object to break free, then proceed with the tag line rope. Booming down 1° or 2° below horizontal may be required to assist in pulling section out.



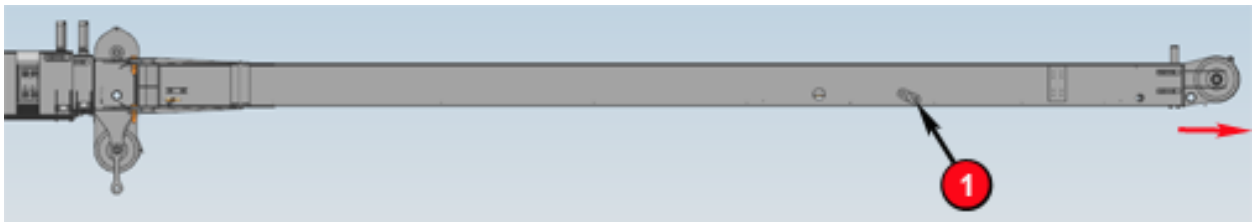
DO NOT STAND DIRECTLY IN FRONT OF SECOND STAGE JIB EXTENSION WHEN ATTEMPTING TO PULL OUT USING TAG LINE ROPE OR RACHET TENSIONER STRAP. SERIOUS INJURY OR DEATH COULD RESULT FROM UNCONTROLLED JIB INNER MEMBER EXTENDING.



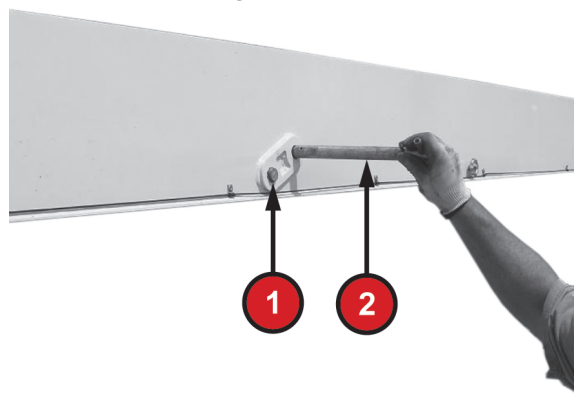
Jib Second Stage Pull Out Method

| ITEM | DESCRIPTION |
|------|----------------------------|
| 1 | Tag line rope |
| 2 | Second Stage Jib Extension |

26. Insert second stage lock pin into extend position and secure with retaining pin. Push back on second stage to ensure lock pin is securing second stage.



Second Stage Stop Pin Location



Second Stage Jib Stop Pin & Lock Pin

| ITEM | DESCRIPTION |
|------|-----------------------|
| 1 | Second Stage Stop Pin |
| 2 | Second Stage Lock Pin |

19-70 / 28-106

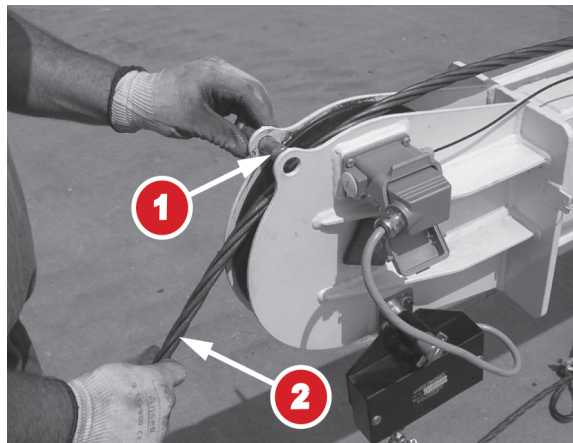
Assembly

27. Remove load ball or block from wire rope.



Load Ball

28. Winch out enough wire rope to place wire rope over boom head sheave.
29. Route cable through jib cable retainer and over jib sheave. Install wire rope guide pin and retainer.



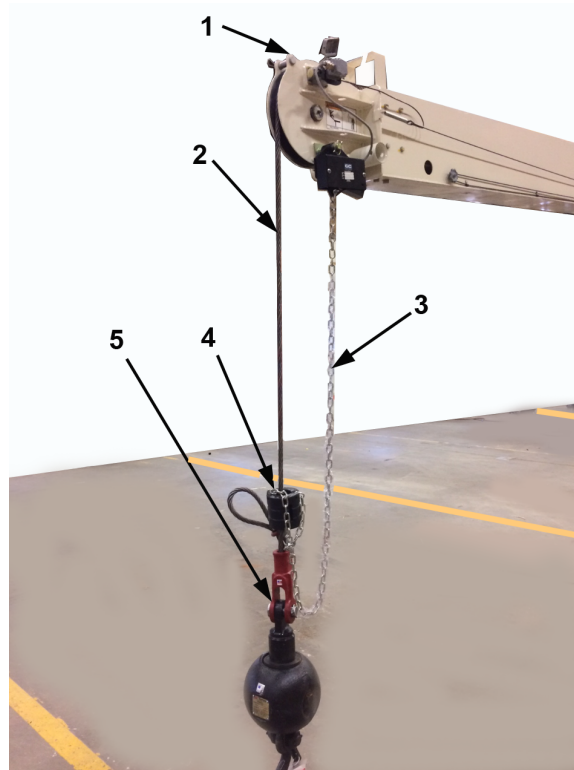
Jib Head Wire Rope Rigging

| ITEM | DESCRIPTION |
|------|---------------------|
| 1 | Wire Rope Guide Pin |
| 2 | Wire Rope |



NOTE: *It will be necessary to provide tension on the end of the wire rope to prevent birdnesting of the cable around the winch drum. This can be done by personnel wearing heavy leather gloves.*

30. Attach anti-two block weight to wire rope and anti-two block chain to anti-two block switch. Attach load ball or block to wire rope clevis with pin and cotter pin retainer.



Jib Head Load Ball Rigging Anti-Two Block System

| ITEM | DESCRIPTION |
|------|--------------------------------|
| 1 | Jib Sheave Wire Rope Guide Pin |
| 2 | Wire Rope |
| 3 | Anti-two Block Chain |
| 4 | Anti-two Block Weight |
| 5 | Load Ball Retaining Pin |

31. Check the anti-two block system for switch actuation and kickout of winching up function.

28-106 Jib Installation

DESCRIPTION

Jib extension option 1: 30 ft. (9.1 m) single stage swing-on lattice type extension.

Jib extension option 2: 30 - 47 ft (9.1 - 14.3 m) two stage swing-on lattice and tubular type extension.

Jib extension weights

- Single stage lattice section only: 1024 lbs (465 kg)
- Two stage w / stinger section: 1495 lbs (678 kg)
- Stinger section only: 471 lbs (214 kg)



BEFORE STOWING THE EXTENSION, ENSURE THAT NO PERSONNEL OR OBSTACLES ARE IN THE SWING PATH OF THE EXTENSION.



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.



WHEN PERFORMING INSTALLATION OPERATIONS AT HEIGHTS ABOVE 10 FT (3 m) FROM THE GROUND, A SAFETY HARNESS MUST BE USED. A SINGLE LADDER MAY BE USED PROVIDED THAT IT IS SECURED IN PLACE AND THE TOP 4 RUNGS ARE NOT USED. USE A STEPLADDER, SCAFFOLDING OR A PLATFORM THAT MEETS APPLICABLE SAFETY STANDARDS.



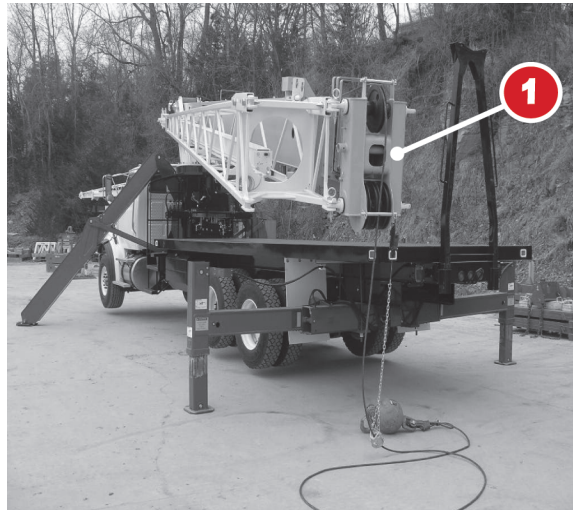
ALL THE EXTENSION ROTATION OPERATIONS USING THE NYLON ROPE MUST BE CARRIED OUT FROM THE GROUND.

| Auxiliary components for correct installation | |
|--|-------------------------------------|
|  | Ratchet tensioner |
|  | Hammer or mallet 4 - 7 lb. (2-3 kg) |
|  | Nylon Rope (L > = 15 ft (5m)) |
|  | Ladder (H useful 13 ft (4m)) |

Jib Installation Procedure

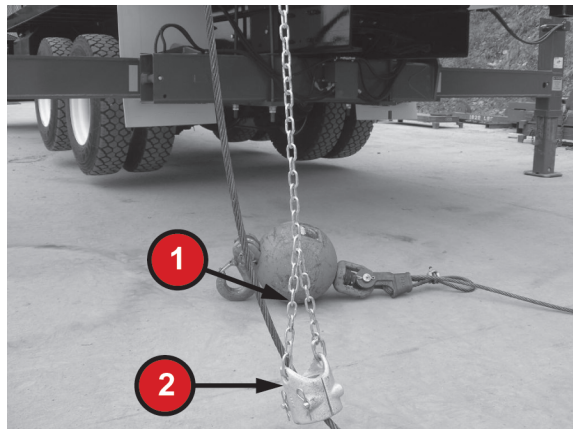
1. Starting with a fully leveled boom truck, fully retract the boom, fully extended front outrigger arms and fully extended rear outrigger jack cylinders. Rotate the boom to the street side of the boom rest, and lower until boom head can be reached from the ground.

19-70 / 28-106 Assembly



| | |
|---|-----------|
| 1 | Boom Head |
|---|-----------|

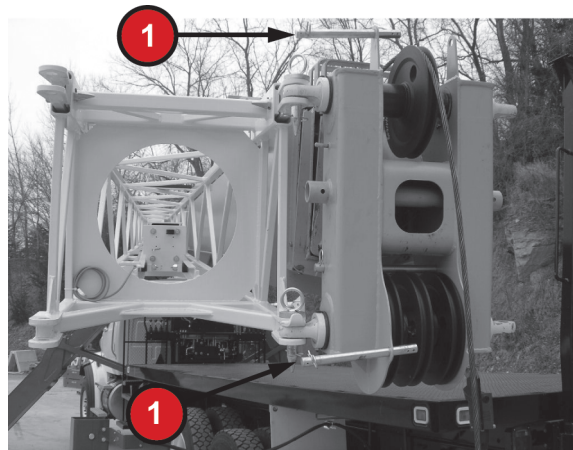
2. Remove the anti-two-block weight and chain clevis from the anti-two-block switch.



| | |
|---|--------------|
| 1 | Chain Clevis |
|---|--------------|

| | |
|---|-----------------------|
| 2 | Anti-Two Block Weight |
|---|-----------------------|

3. Remove bottom and top retainers and guide pins from sheave head.



| | |
|---|-----|
| 1 | Pin |
|---|-----|

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



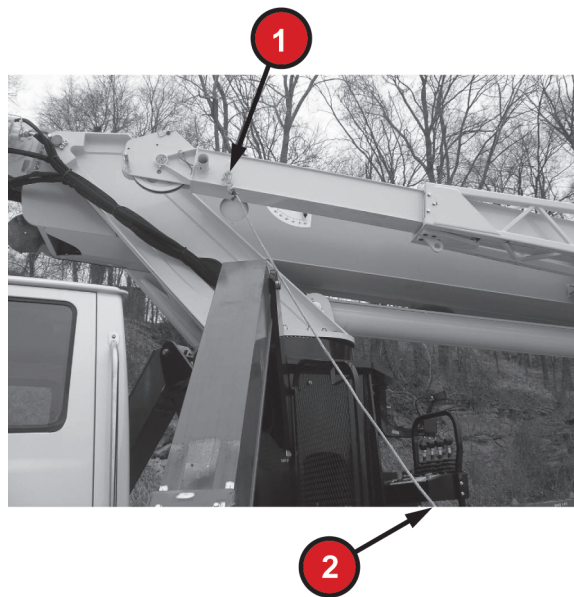
| | | | |
|---|----------|---|-----------|
| 1 | Retainer | 3 | Load Line |
| 2 | Pin | | |

5. Reinstall top and bottom guide pins and retainers in the sheave head.
6. When the boom is fully retracted, the jib mounting holes should line up. 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 retainers from pin stow bracket, to fasten jib in place on the street side of the boom.

NOTE: *If any force is required to install any of the four jib pins (items 3 & 4), it should not be more than a few hits from a machine hammer. If more force than this is required for the first 2 pins (item 3), check alignment as the jib stowage brackets may need adjustment.*

7. Fasten a tag line, approximately 15 feet long, to the anchor point at the end of the jib.



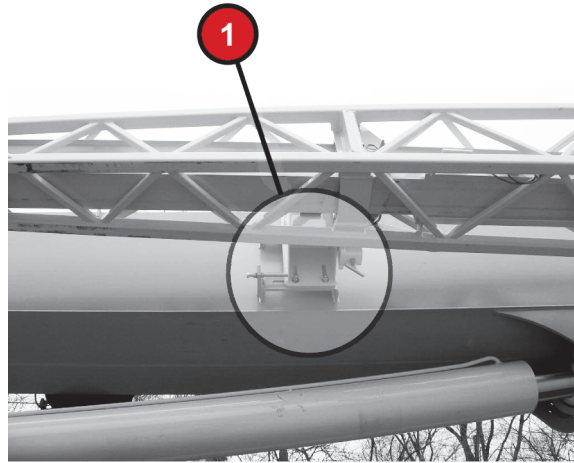
| | | | |
|---|--------------|---|----------|
| 1 | Anchor Point | 2 | Tag Line |
|---|--------------|---|----------|

8. Raise boom to horizontal position.



**JIB WILL SWING UNCONTROLLED IF BOOM IS NOT HORIZONTAL.
THERE IS A DANGER OF BODILY HARM IF THE JIB IS NOT PROPERLY
CONTROLLED.**

9. Remove pin from jib pin stow bracket on boom.



1 Jib Lock Pin Location

10. Extend the boom approximately 15 inches so the jib stow bar is clear of the front jib stow bracket at the boom head.
11. Swing jib away from boom with tag line. Control movement of the jib at all times to prevent injury and/or equipment damage.

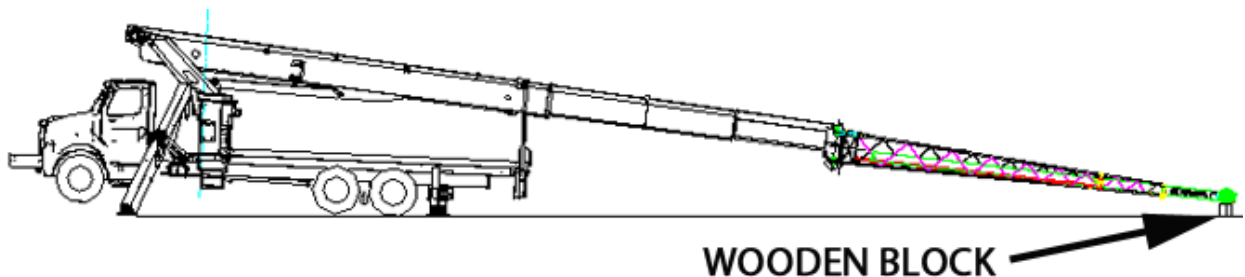


12. Swing jib into extended position. If it is difficult to bring the jib around you may slightly lower the boom angle and re-attempt.



13. Due to the weight of the jib, most times it is difficult to get the top pin of the jib to the boom head installed. Proceed with installing the lower curb side pin and retainer of jib to boom head. Retract the rear outrigger jack cylinders while the front outrigger arms remain fully extended. 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.

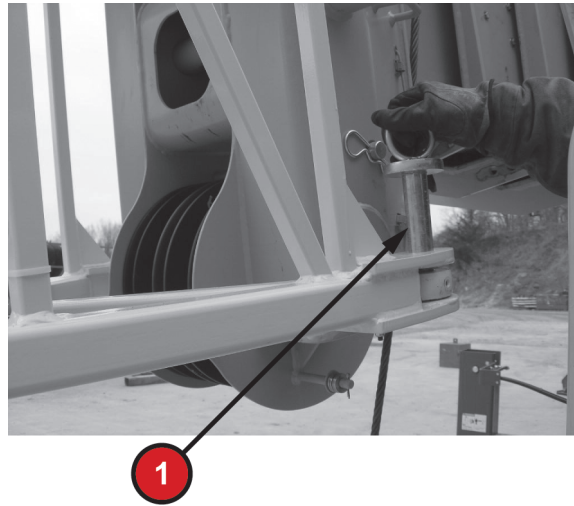
NOTE: Avoid allowing the jib tip to come in contact with soft surfaces (i.e. dirt, sand or gravel) as material can become wedged between jib tip sheave and side plates.



14. Downward pressure can then be applied to the jib sheave head to facilitate top curb side pin alignment and installation by the boom down function.



NOTE: 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.

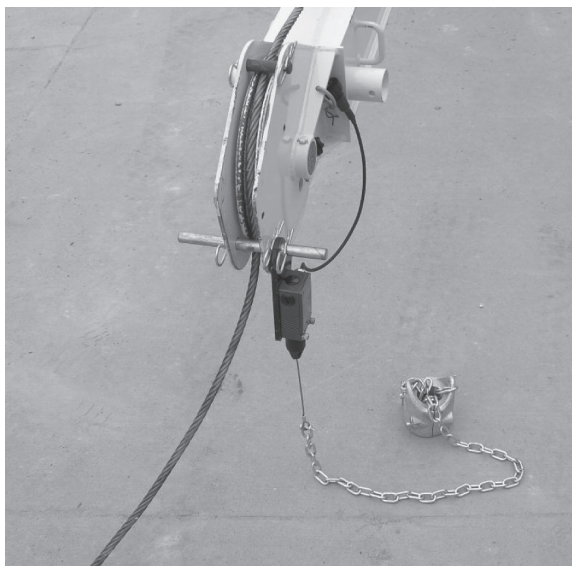


1 Jib Lock Pin

15. Remove anti-two-block switch, retaining pin, and plug from the boom head. Reinstall on jib head.



1 Anti-Two Block Switch



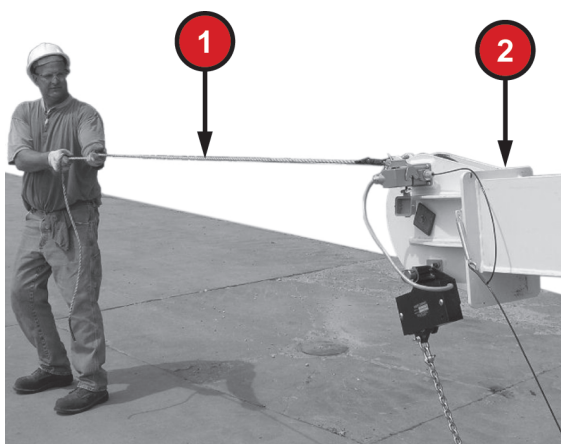
IF THE SECOND STAGE OF THE JIB IS NOT GOING TO BE USED, SKIP TO STEP 20.

Extending Second Stage Jib

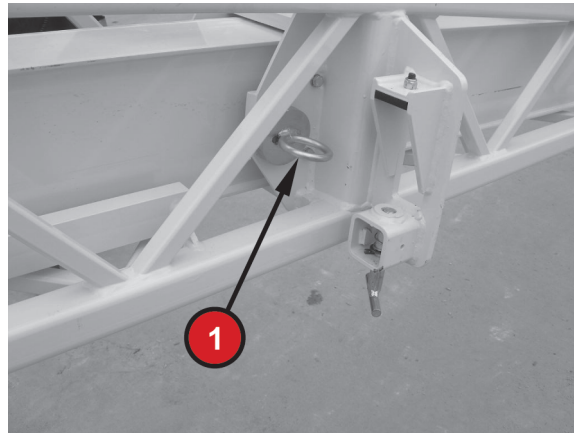
16. Raise boom to angle high enough to allow the jib to be extended without contacting the ground.
17. Remove lock pin and retainer from jib.



DO NOT STAND DIRECTLY IN FRONT OF SECOND STAGE JIB EXTENSION WHEN ATTEMPTING TO PULL OUT USING TAG LINE ROPE OR RACHET TENSIONER STRAP. SERIOUS INJURY OR DEATH COULD RESULT FROM UNCONTROLLED JIB INNER MEMBER EXTENDING.

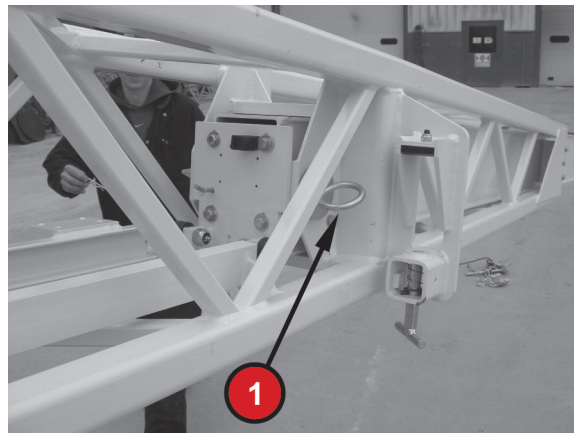


| | | | |
|---|---------------|---|----------------------------|
| 1 | Tag line rope | 2 | Second Stage Jib Extension |
|---|---------------|---|----------------------------|



1 Lock Pin

18. Pull second stage jib out until it contacts jib stop pin.
19. Insert jib lock pin into extend position and secure with retaining pin. Push back on second stage to ensure lock pin is securing second stage.

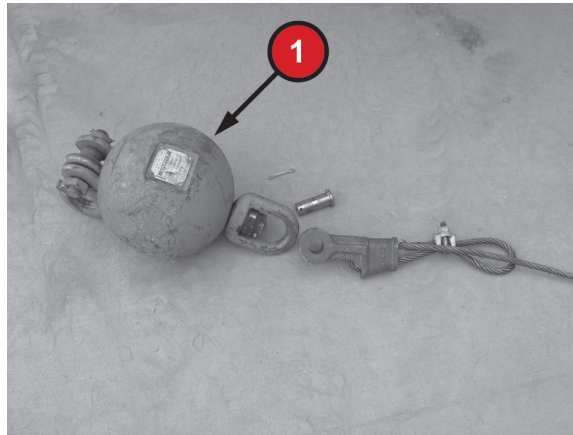


1 Lock Pin

20. Remove ball or block from wire rope.

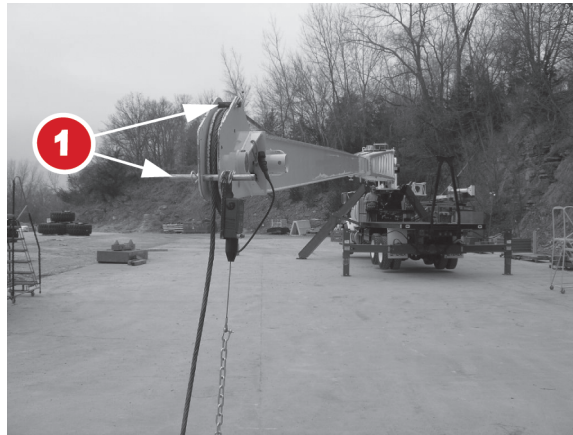
19-70 / 28-106

Assembly



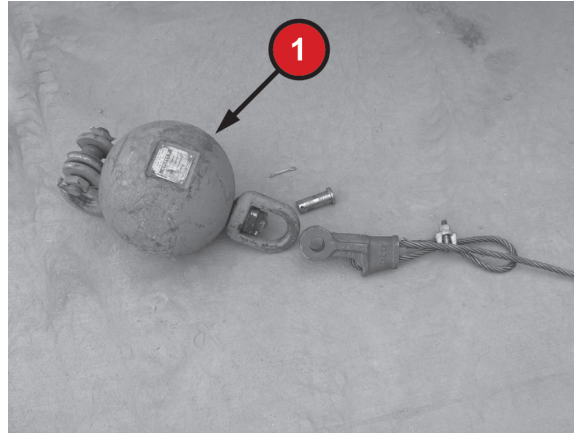
1 Hook Ball

21. Winch out enough cable to reach over the sheave of the jib.
22. Place wire rope over boom head sheave. If machine is equipped with a sheave retaining bracket, make sure the bracket slot is aligned with guide pin so it is held upright. Install guide pin and retainer.
23. Route cable through jib cable retainer and over jib sheave. Install sheave pin and retainer.



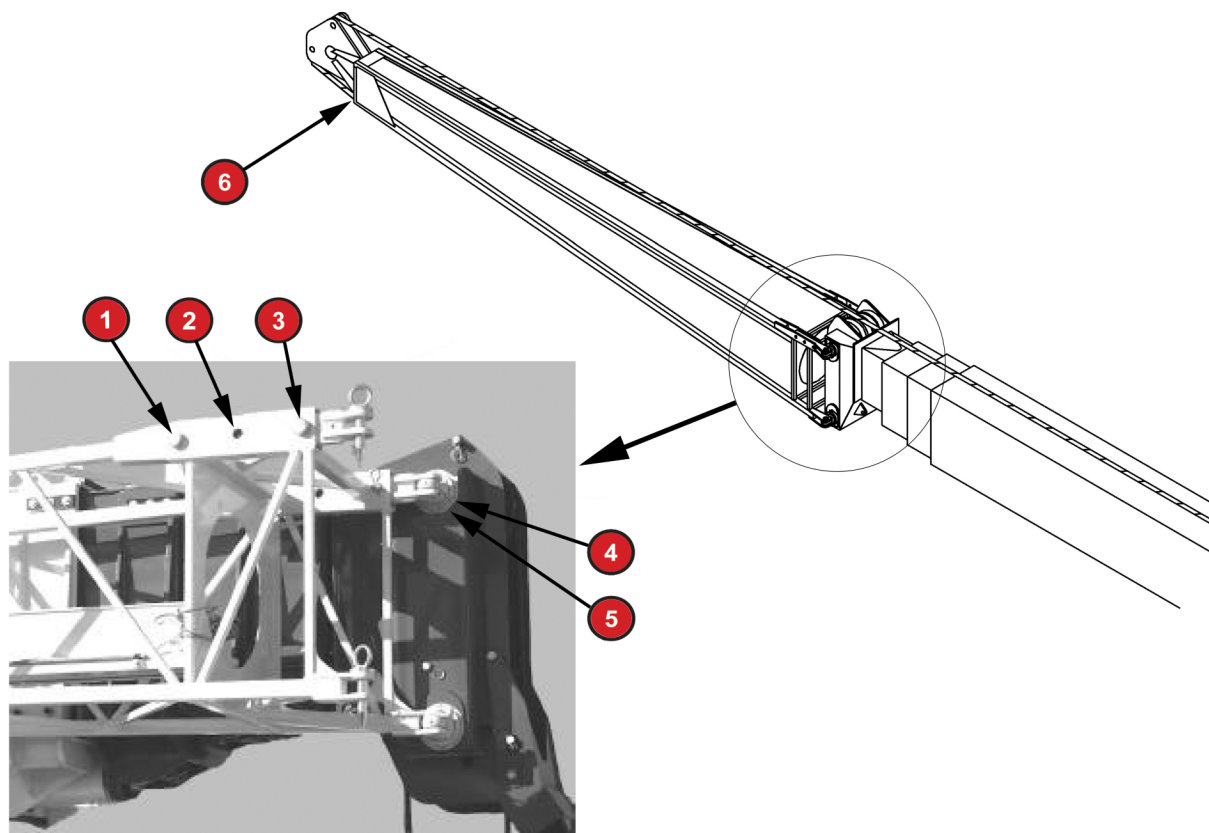
1 Sheave Pin

24. Attach ball or block to wire rope with pin and retainer.



1 Hook Ball

Changing Jib Offset



| Jib Offset Pins/Holes (both sides) | | 4 | Sheave Shaft |
|------------------------------------|----------|---|------------------------------|
| 1 | 0° Pin | 5 | Cap Screws |
| 2 | 15° Hole | 6 | Hoist Line Attach - Dead End |
| 3 | 30° Pin | | |

Increasing Offset

1. Retract the boom and set the outriggers.
2. Boom down to minimum boom angle.
3. Loosen the two (2) cap screws on the left side of the upper and lower sheave shafts. This will require a 3/ 4 inch hex wrench.
4. Reeve the hoist line over the top center sheave on the boom head, around the jib sheave, and attach to the eye on the bottom of the jib tip.
5. Winch up to take the slack out of the hoist line and to take the weight of the jib off of the jib offset pins.



NOTE: To prevent damaging the jib, do not winch up any more than is necessary to loosen the jib offset pins.

6. Remove the jib offset pins from the 0° offset hole and place in the 15° hole or if you are using 30° offset then place pins in tool box.



Never Remove Either 30° Pin

7. With the engine at idle, slowly winch down to pay out hoist cable. This will lower the tip of the jib until the jib comes in contact with the jib offset pins.



NOTE: *While lowering the tip of the jib, it may be necessary to raise the boom to prevent the tip of the jib from touching the ground.*

8. Remove the hoist line from the tip of the jib and reeve the hoist line as needed.

Decreasing Offset

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

Power Take-Off



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

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

Transmission Mounted, Shiftable PTO's

Automatic Transmission

Manual Transmission

To Engage PTO

1. Set parking brake.
2. Shift transmission to neutral
3. Engage PTO by **"Pulling Out"** knob on dash. (knob is shown below).
4. There may be an indicator light on the dash depending on truck chassis model that will illuminate when the PTO is engaged.



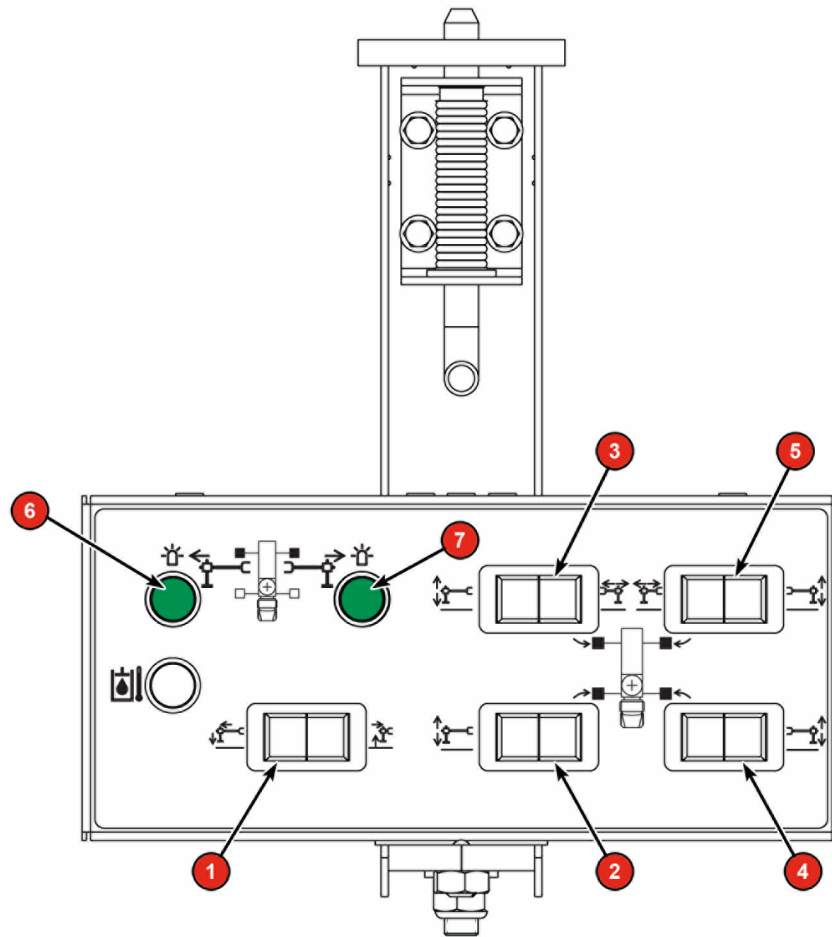
To Disengage PTO

1. Store boom in boom rack.
2. Store outriggers.
3. Disengage PTO by **"Pushing In"** the knob on dash.
4. Indicator light on the dash (if available) will go out when PTO is disengaged.
5. Shift transmission into gear (if necessary).

6. Release parking brake (if necessary).

Outrigger Controls

With the arm mounted Outrigger Control box, the Load King Boom Truck Main and Auxiliary outriggers can be operated from either station by swinging the arm from side to side.



1. **OUTRIGGER EXTEND / RETRACT SWITCH** - Use in combination with #2, #3, #4 or #5 rocker switches. Press left to activate extend, press right to activate retract on the selected outrigger.
2. **OUTRIGGER SELECTION SWITCH - CURBSIDE FRONT** - Use in combination with #1 rocker switch. Press left to activate the jack cylinder, press right to activate the outrigger beam.
3. **OUTRIGGER SELECTION SWITCH - CURBSIDE REAR** - Use in combination with #1 rocker switch. Press left to activate the jack cylinder, press right to activate the outrigger beam.
4. **OUTRIGGER SELECTION SWITCH - STREETSIDE FRONT** - Use in combination with #1 rocker switch. Press left to activate the outrigger beam, press right to activate the jack cylinder.

5. **OUTRIGGER SELECTION SWITCH - STREETSIDE REAR** - Use in combination with #1 rocker switch. Press left to activate the outrigger beam, press right to activate the jack cylinder.
6. **OUTRIGGER FULLY EXTENDED INDICATOR LIGHT - CURBSIDE REAR** - When outrigger beam is fully extended in the horizontal direction the indicator light will illuminate "GREEN".
7. **OUTRIGGER FULLY EXTENDED INDICATOR LIGHT - STREETSIDE REAR** - When outrigger beam is fully extended in the horizontal direction the indicator light will illuminate "GREEN".



DO NOT OPERATE OUTRIGGERS WITHOUT DETERMINING CLEARANCE FROM OBSTRUCTIONS OR PERSONNEL.

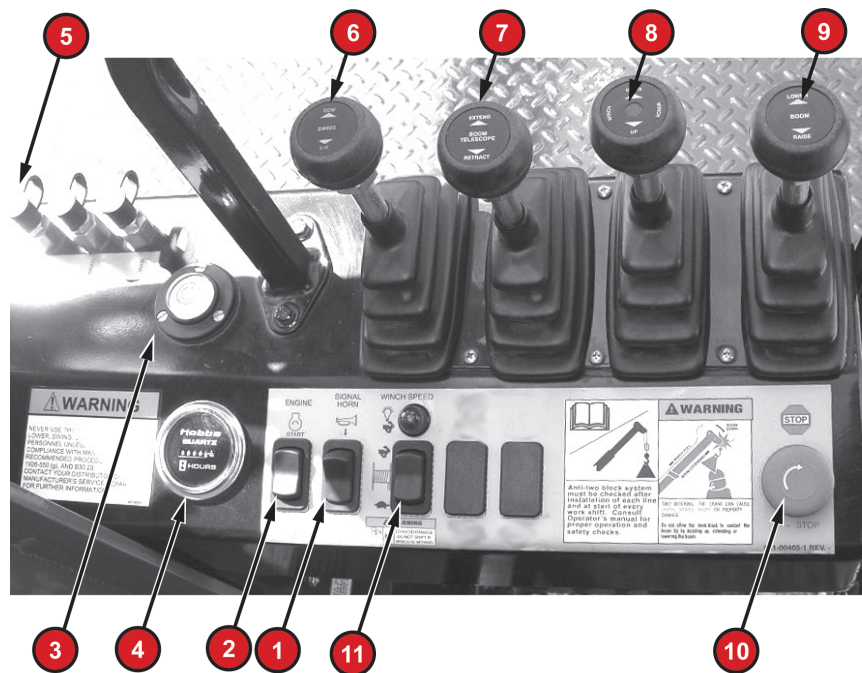


BOTH INDICATOR LIGHTS #6 & #7 NEED TO BE ILLUMINATED PRIOR TO PERFORMING ANY CRANE LIFTING OF LOAD.

Controls

With the dual operator control stations the Load King Stinger can be operated from either side of the unit. The controls on the console are: Boom Swing, Telescope, Hoist and Boom Raise. Engine Start/Stop, Outrigger System and Signal Device. All controls and direction of actuation for desired movement are identified by the information placards mounted on top of the control console or control knobs.

19-70 Control Panel



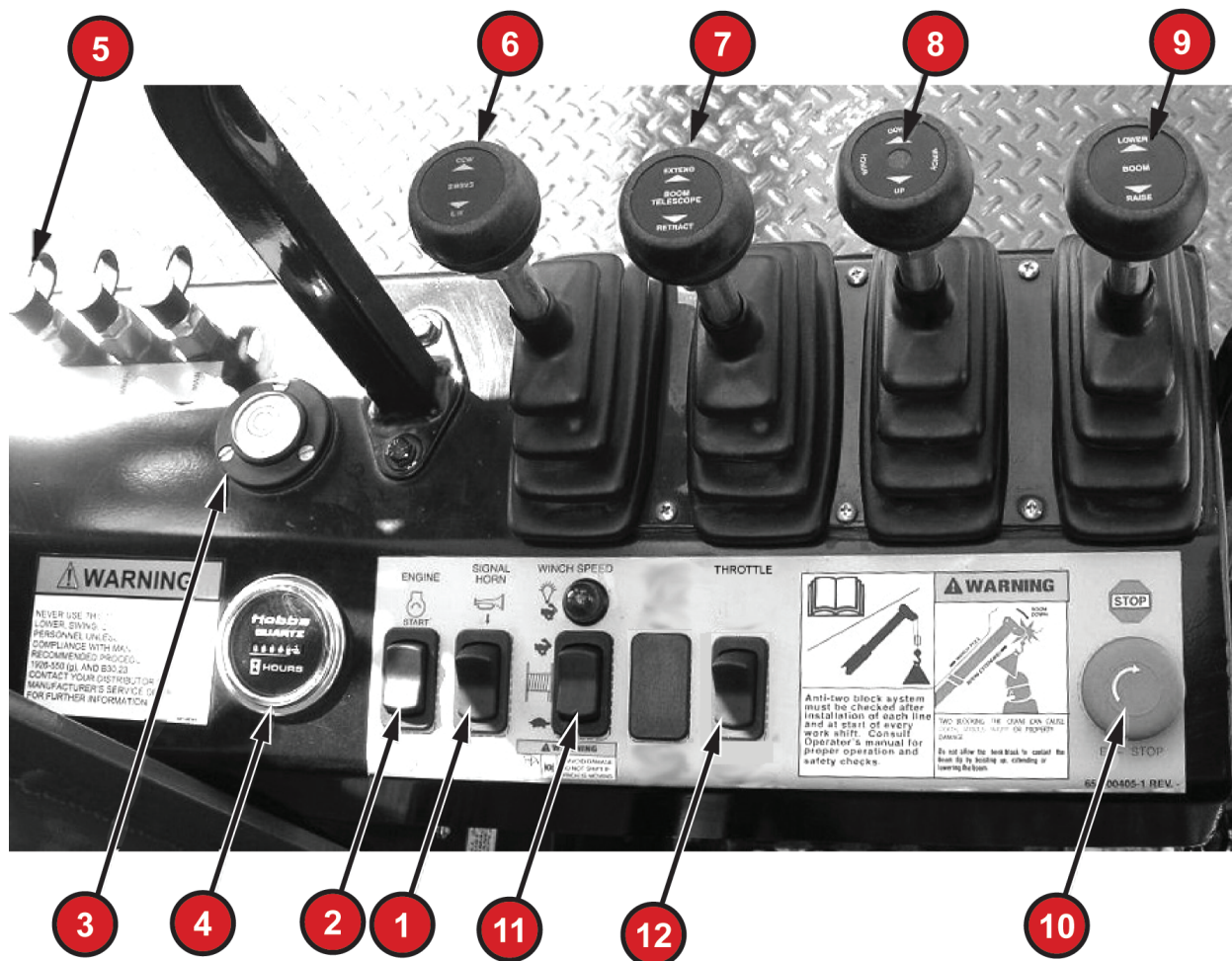
NOTE: Machine has dual control stations. Controls shown are right side. Left side controls are identical. (Except test ports)

1. SIGNAL DEVICE
2. ENGINE START/STOP SWITCH
3. LEVEL
4. HOUR METER
5. HYDRAULIC TEST PRESSURE PORTS
6. SWING
7. BOOM TELESCOPE
8. WINCH
9. BOOM HOIST
10. EMERGENCY STOP
11. WINCH SPEED SWITCH

19-70 / 28-106

Description Of Machine and Controls

28-106 Control Panel



NOTE: Machine has dual control stations. Controls shown are right side. Left side controls are identical. (Except test ports)

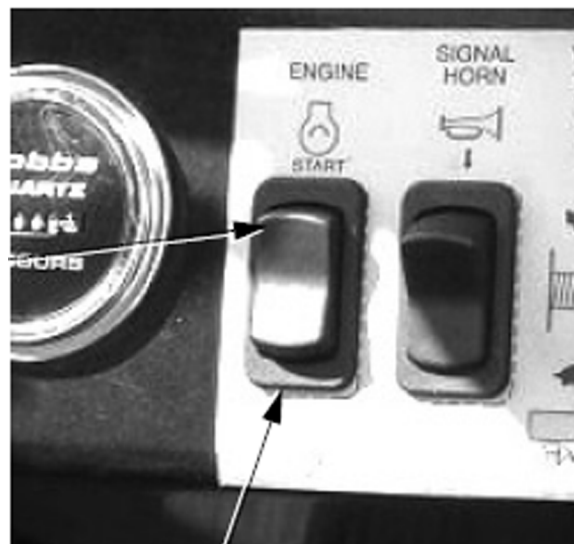
1. SIGNAL DEVICE
2. ENGINE START/STOP SWITCH
3. LEVEL
4. HOUR METER
5. HYDRAULIC TEST PRESSURE PORTS
6. SWING
7. BOOM TELESCOPE
8. WINCH
9. BOOM HOIST
10. EMERGENCY STOP

- 11. WINCH SPEED SWITCH
- 12. BUMP THROTTLE SWITCH

- 1. SIGNAL DEVICE - Push button to sound truck horn as an audible signal to warn other personnel in the area.



- 2. START/STOP SWITCH - Depress the upper end of the rocker switch to start engine, depress the lower end of the rocker switch to stop engine.



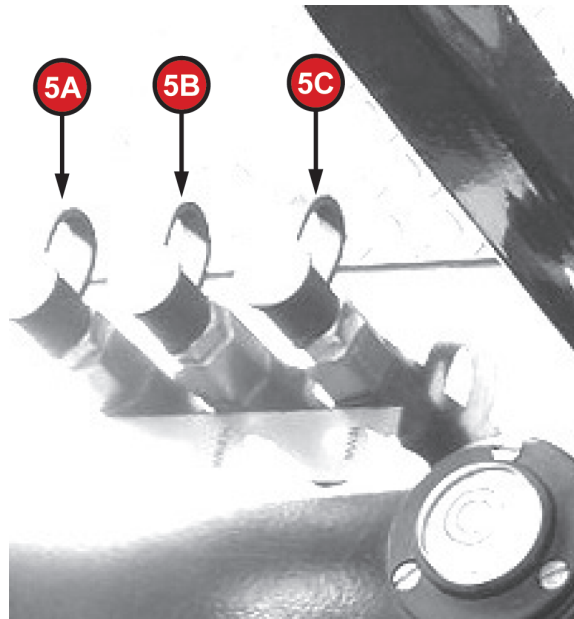
- 3. LEVEL - Use outriggers to make sure bubble is centered and machine is level prior to making a lift.



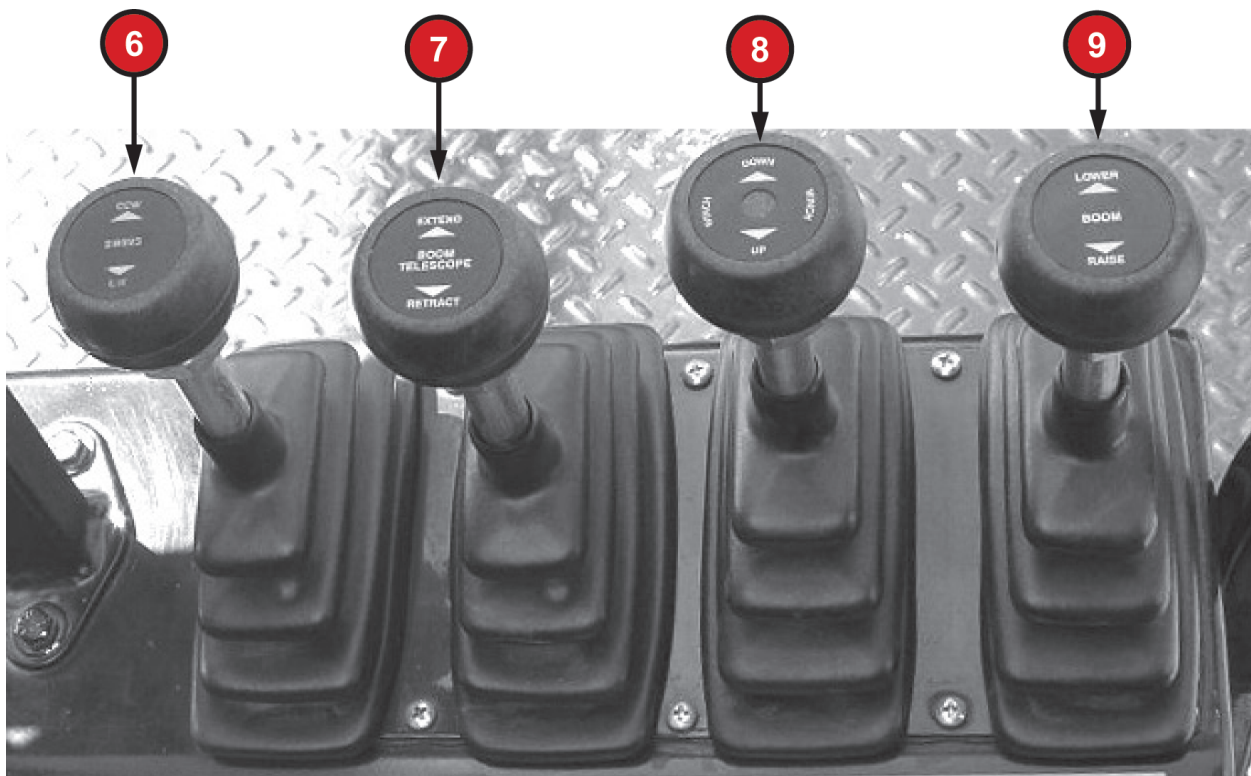
4. HOURMETER - Indicates machine hours.



5. HYDRAULIC TEST PRESSURE PORTS - Attach portable pressure gauge to test relief settings.



| | | | |
|----|--------------------------|----|-------------------------|
| 5A | SWING TEST PRESSURE PORT | 5C | BOOM TEST PRESSURE PORT |
| 5B | WINCH TEST PRESSURE PORT | | |



6. SWING - Push lever to rotate boom counterclockwise, pull lever to rotate boom clockwise.
7. BOOM TELESCOPE - Push lever to extend boom, pull to retract boom.

Description Of Machine and Controls

8. WINCH - Push lever to lower load line, pull lever to raise load line.

NOTE: Combined flow speed increase will be triggered at the limit of travel for both raise and lower.

9. BOOM HOIST - Push lever to lower boom, pull lever to raise boom.



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



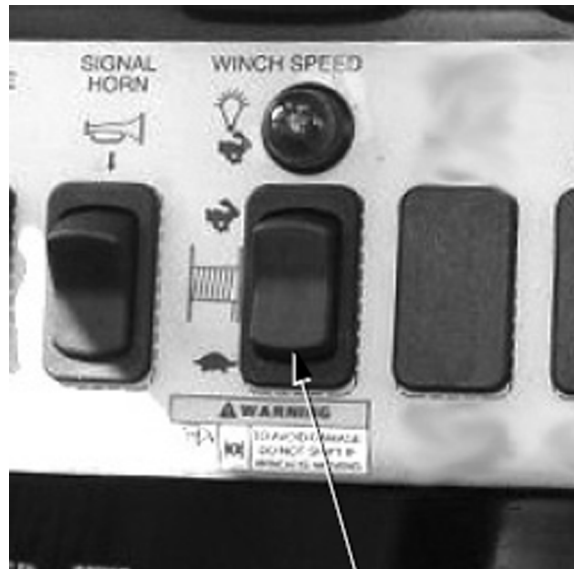
NOTE: Controls must be used together to achieve combinations of movements. For instance, the boom extension and loadline (hoist) must be used together to maintain clearance between boom tip and downhaul weight.

- 10.



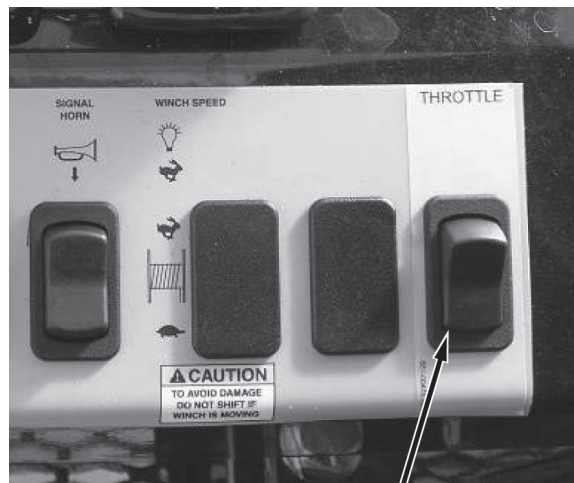
EMERGENCY STOP - Push to stop engine in case of emergency. Rotate clockwise to release button to allow machine to be started again.

11.



WINCH 2-SPEED SWITCH - (Motor-Shift 2 Speed option only) Depress the upper end for fast, Depress the lower end for slow.

12.



BUMP THROTTLE SWITCH (28-106)

- With the PTO on, the idle is 800 rpm (700 rpm when the PTO is off). The truck will idle with the switch off.
- The bump throttle is a two position switch, off or on.
- When the switch is on the number of times it is turned off is the speed setting it will go to.
- Turning the switch on-off-on in rapid succession will bring it to speed one.
- Turning the switch on-off-on-off-on will bring the truck to speed two.
- While in speed two, turning the switch off and back on will bring the truck back to speed one.

19-70 / 28-106

Description Of Machine and Controls

- Once again: the number of times the switch is turned off after it has been turned on will determine the speed setting.
- Idle: 800 rpm
- Speed one: 1100 rpm
- Speed two: 1610 rpm

13.



ACCELERATOR (19-70) - Foot operated, with factory adjusted stop for maximum pump speed of 2,000 to 2,200 R.P.M.

ACCELERATOR (28-106)- Foot operated, with factory adjusted stop for maximum pump speed of 2,300 to 2,350 R.P.M.



NOTE: *This foot-operated throttle control is optional for 28-106*

Front Stabilizer

1. FRONT BUMPER STABILIZER - Push switch down to extend outrigger, pull switch up to retract.



FRONT STABILIZER MUST BE USED WHEN WORKING/LIFTING OVER THE FRONT OF THE TRUCK.



DO NOT OPERATE OUTRIGGERS WITHOUT DETERMINING CLEARANCE FROM OBSTRUCTIONS OR PERSONNEL.



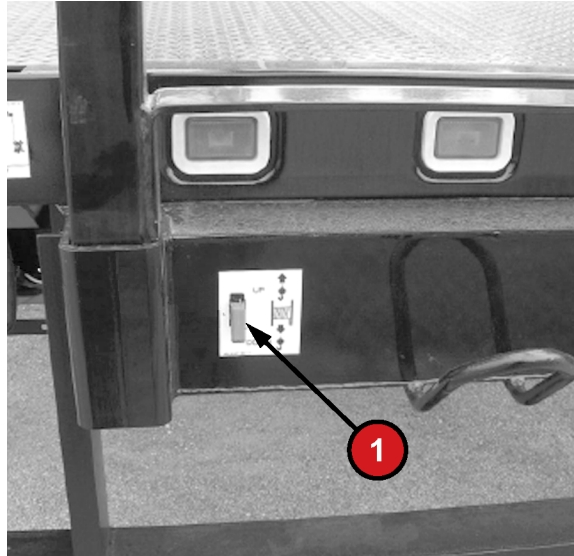
THE FRONT BUMPER OUTRIGGER MUST BE THE LAST OUTRIGGER TO BE EXTENDED AND THE FIRST OUTRIGGER TO BE RETRACTED.



1 Front Stabilizer Switch

Winch Inching Valve Switch

1. WINCH INCHING VALVE - lift switch cover to access switch. Press switch up to activate winch up, press switch down to activate winch down



Rated Capacity Indicator and Anti-Two Block

Rated Capacity Indicator System

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

Anti-Two Block Components

CABLE REEL

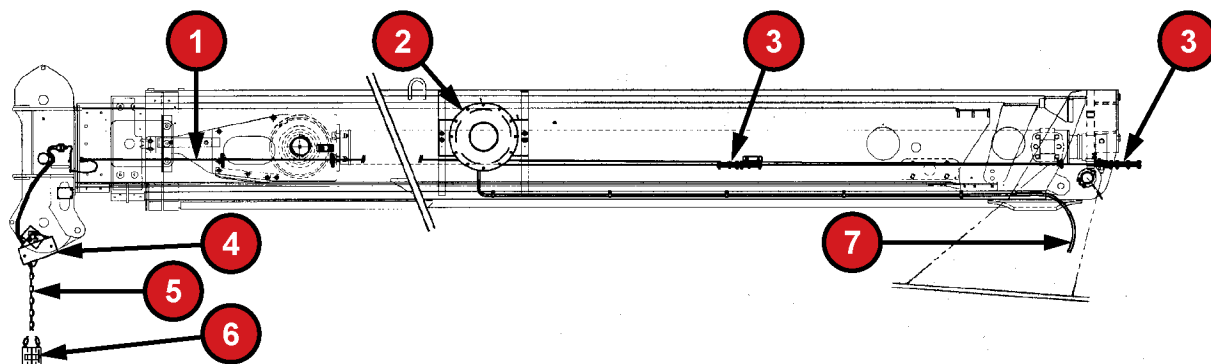
The anti-two block cable is wound onto a spring loaded cable reel which is bolted to the left side of the boom base. The reel allows the cable to pay-out and pay-in as the length of the boom is changed. The cable reel has slip rings which allow electric current to flow even while the reel is turning.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



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

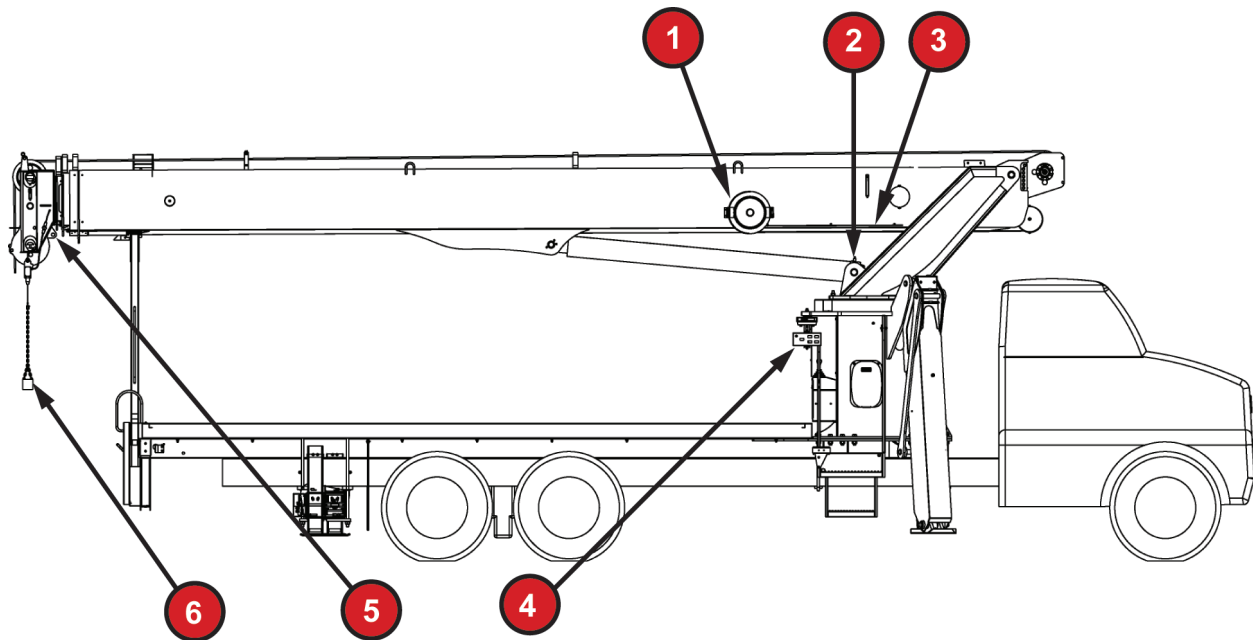
LIMIT SWITCH

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



19-70 Anti 2-Block Components

| | | | |
|---|-----------------|---|----------------------------------|
| 1 | 2-Block Wire | 5 | 2-Block Chain |
| 2 | 2-Block Reel | 6 | 2-Block Weight |
| 3 | Sheave Assembly | 7 | 2-Block Wire (to Electrical Box) |
| 4 | 2-Block Switch | | |



28-106 Anti 2-Block Components

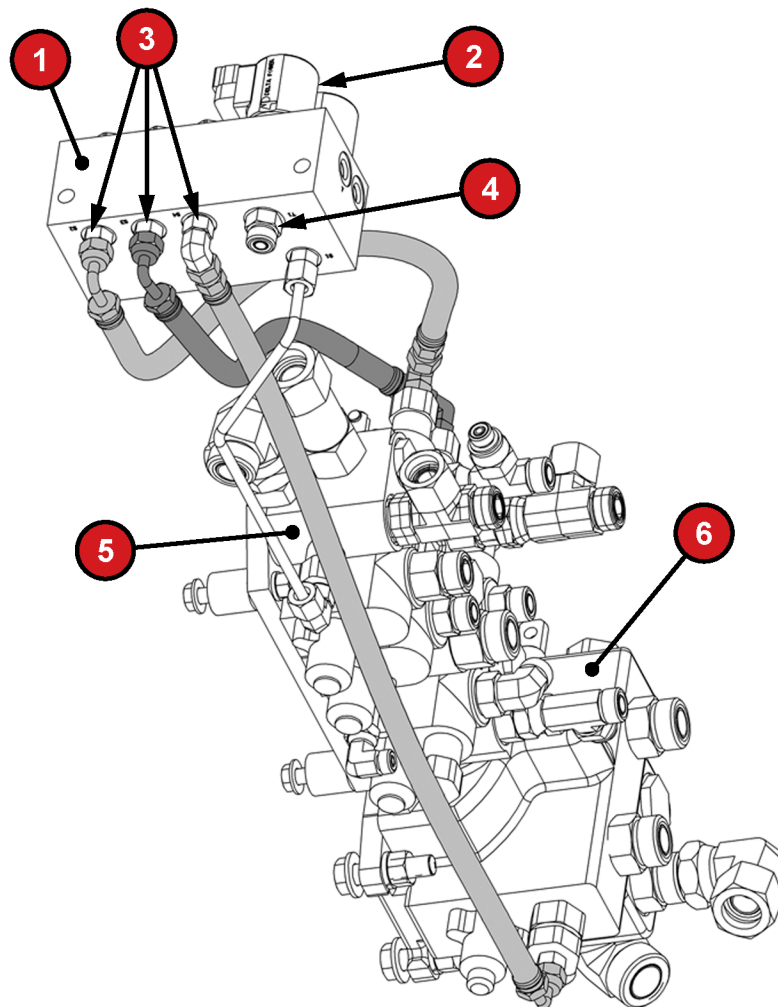
| | | | |
|---|---------------------|---|--------------------------|
| 1 | Reel Assembly Greer | 4 | 3B6 Assembly Display |
| 2 | Pressure Sensor | 5 | 3B6 Switch (Hoist Limit) |
| 3 | 3B6 Harness | 6 | 3B6 Counter Weight |

UNLOADER FOR RCI PARTS GROUP

The unloader valve solenoid manifold is located on top of the console assembly, under the swing drive cover. The valve contains two electrically operated solenoids. The RCI solenoid valve will operate to either contain or unload a pilot signal. (Note: the other solenoid is exclusively for the 2-speed winch.) When the RCI solenoid is energized, it is closed and no oil is permitted to pass through the valve. There are three check cartridges in the top of the valve to prevent inter-feed between the other functions feeding into the block (boom extend, winch up, and boom down.) The 2-speed winch solenoid is also isolated to prevent interference with the boom functions.

The function of “unloading” oil is done by a pilot operated cartridge referred to as a ported anti-void. These anti-void valves are located on the boom and winch control valves. The anti-void separates the work oil from the tank passage in the boom control valve. An orifice in the anti-void allows it to pressure balance. When the solenoid on the anti-two block unloader is opened, oil starts to flow across the orifice in the anti-void and the oil can get out faster than it can get in. This creates a pressure drop and allows the anti-void to open, routing the function oil to tank. See this page for the console components location chart.

Unloader for RCI Parts Group



| | | | |
|---|----------------|---|-------------------|
| 1 | Unloader Valve | 4 | To Drain Manifold |
| 2 | Solenoid Coils | 5 | Boom Valve |
| 3 | Unloader Ports | 6 | Winch Valve |

Pre-Start Inspection

The following items should be checked each day before start-up and the start of operations.

ENGINE OIL

The level should be at the full mark.

COOLANT

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

DIESEL EXHAUST FLUID

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

LEAKAGE

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

FUEL

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

LUBRICATION

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

LINES AND BLOCKS

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

SAFETY EQUIPMENT

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

TIRES

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

WHEEL NUTS

Torque all lug nuts per supplied chassis manual specifications. Check tightness daily during the first 50 miles of service on new units and any time the wheels have been removed.

GENERAL CONDITION

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

AIR TANKS

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

FUEL FILTER

Water and sediment should be drained from the fuel filter by opening the drain cock at the bottom of each.

ANTI TWO-BLOCK SYSTEM

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

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



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

PUMP DISCONNECT

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

Suggested Hydraulic Crane Inspection Checklist

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

| ITEMS TO BE INSPECTED & CHECKED | INSPECTION CODE | SATISFACTORY | ADJUST | REPAIR |
|--|-----------------|--------------|--------|--------|
| VISUAL INSPECTION H (Complete Machine) | D | | | |
| OVERALL CLEANLINESS | D | | | |
| HYDRAULIC SYSTEM (See Hydraulic Hose topic in Maintenance section) (Leaks or Damage) | D, A | | | |
| AIR SYSTEM (Leaks or Damage) | D | | | |
| HYDRAULIC FLUID | D | | | |
| TRANSMISSION FLUID LEVEL | D | | | |
| ENGINE CRANKCASE FLUID LEVEL | D | | | |
| FUEL TANK FLUID LEVEL | D | | | |
| RADIATOR FLUID LEVEL | D | | | |

| ITEMS TO BE INSPECTED & CHECKED | INSPECTION CODE | SATISFACTORY | ADJUST | REPAIR |
|--------------------------------------|-----------------|--------------|--------|--------|
| MACHINE LUBRICATION | D | | | |
| ATTACHMENT PIN BOLTS | D | | | |
| MUFFLER/ EXHAUST SYSTEM | D | | | |
| ALL CONTROL MECHANISMS | D | | | |
| INSTRUMENT GAUGES | D | | | |
| CLUTCHES & BRAKES | D | | | |
| WIRE ROPE, SHEAVES & GUARDS | D | | | |
| TWO BLOCK DAMAGE PREVENTION SYSTEM | D | | | |
| LOAD SUPPORTING COMPONENTS CONDITION | D | | | |
| FIRE EXTINGUISHER | D | | | |
| BACKUP ALARM | D | | | |
| BOOM ANGLE INDICATOR | D | | | |

| ITEMS TO BE INSPECTED & CHECKED | INSPECTION CODE | SATISFACTORY | ADJUST | REPAIR |
|--|-----------------|--------------|--------|--------|
| HEAD/TAIL/ BRAKE LIGHTS & 4 - WAY FLASHERS | D | | | |
| HORN | D | | | |
| CABLE SPOOLING PROPERLY | D | | | |
| WEDGE SOCKETS | D | | | |
| AXLE FLUID LEVEL | W | | | |
| SWING REDUCER FLUID LEVEL | W | | | |
| DRIVE SHAFTS & U JOINTS | W | | | |
| TIRE & WHEEL CONDITION & INFLATION PRESSURE | W | | | |
| AIR REGULATORS | W | | | |
| AIR CLEANER ELEMENT | W | | | |
| CLUTCH & BRAKE LINKAGE & PINS | W | | | |
| WHEEL LUG NUT TORQUE | W | | | |

Inspection

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

H Inspect OVERALL machine (including carrier) for cracks, weld separation, leaks, damage, vandalism.

INSPECTION CODE INTERVALS

D - DAILY

W - WEEKLY

M - MONTHLY

A - ANNUALLY

P - PERIODIC

Daily Check (8 Hours)

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

Weekly Check (40 Hours)

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

Monthly Check (80 hours)

- ☐ Perform Daily And Weekly Checks
- ☐ Perform Monthly Lubrication
- ☐ Check Engine Belts
- ☐ Check Hydraulic Reservoir For Moisture
- ☐ Check All Slider Pads
- ☐ Have Hydraulic Oil Sample Analyzed
- ☐ Clean Radiator & Oil Cooler Exterior
- ☐ Check Engine Manufacturer's Manual For Additional Maintenance Requirements

Quarterly Checks (250 Hours)

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

Semiannual Checks (1000 Hours)

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

Annual Check (1500 - 2000 Hours)

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

Crane Boom

MAIN BOOM INSPECTION & MAINTENANCE PROCEDURE

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



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

WEEKLY:

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

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

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

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

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



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

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

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



NOTE: Sections are equalized by fully extending or fully retracting the boom. When the boom reaches either full extension or retraction continuing to hold the telescope lever in the extended or retracted position will allow the boom sections to be proportioned equally.

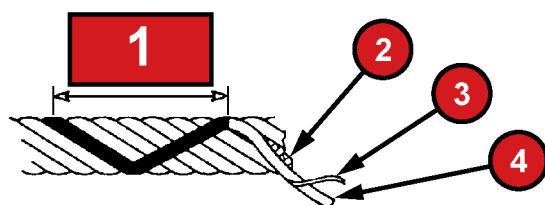
If any indicator decals are missing or illegible (either triangle markers or boom length numbers), order the applicable items through your distributor.

Wire Rope Inspection

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

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

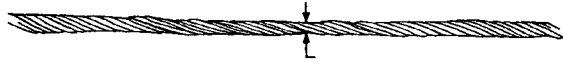
In the interest of safety, **Load King** believes that any wire rope, where failure might endanger personnel, equipment, or the load, must be removed from service when any of the listed conditions are detected. We recommend a daily visual inspection of the entire length of rope, and a thorough inspection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



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

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

| | |
|-------|--|
| 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 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 |
| | | | |
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| | Inspector | | |

Mobile Crane Load Test Inspection

General

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

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

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

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


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

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

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

Load and Overload Test

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

| | |
|---|--|
|  | <p>Decreased service life due to regular overload tests. As a manufacturer, Load King aims to avoid overload tests, as such tests decrease the service life of the cranes.</p> |
|---|--|

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

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

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

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

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

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

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

Recommendations of Load King with Regard to Load Tests***Checking Assembly***

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

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

Load Test Factors

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

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

Load tests may be required by law.

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



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

Reason: In lattice mast cranes, erecting the boom from the ground is one of the most critical load cases of a crane configuration with regard to load; erecting must therefore be regarded as a load test for the tension-carrying structures such as the lattice mast sections (with regard to pressure and bending stress), the bracing rods (tensile load), the boom adjustment winch, the Superlift mast, etc.

Job-Site

Job Site Setup Procedure

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

Outrigger Positioning

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

OUTRIGGER POSITIONING - FOR LOAD HANDLING OVER SIDE OR REAR OF UNIT

The main outriggers should be extended first, then the auxiliary stabilizers. Optional front bumper stabilizer (if equipped) must be extended last. Raise the crane enough to lift the tires off the ground. The front tires should remain close to the ground when the unit is setup and leveled.

OUTRIGGER POSITIONING - FOR LOAD HANDLING OVER FRONT OF UNIT

The main outriggers should be extended first, then the auxiliary stabilizers. Front bumper outrigger is required for lifting over the front of the unit and must be extended last. The front tires should remain close to the ground when the unit is setup and leveled. When the load is being handled over the front of the truck, the front outrigger must be extended.



TO PREVENT STRUCTURAL DAMAGE TO THE CARRIER CHASSIS - THE OPTIONAL FRONT BUMPER STABILIZER (IF SO EQUIPPED) MUST BE EXTENDED LAST AND RETRACTED FIRST.



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

Work Site Position

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

Cold Weather Operation

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



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

General Operational Issues

General Rules

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



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

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

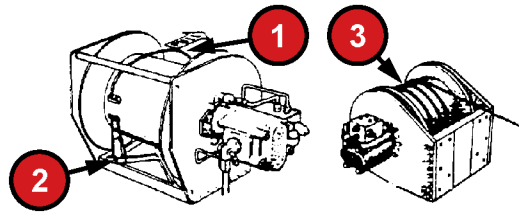


WHEN USING A MULTIPART LOAD LINE, BOOM EXTENSION MUST BE LIMITED TO MAINTAIN (3) FULL WRAPS ON WINCH DRUM.

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

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Operating Instructions



| | | | |
|---|------------|---|---------------------|
| 1 | Load Line | 3 | Three Wraps Minimum |
| 2 | Drum Wedge | | |

Safety Devices

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



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

BOOM LIFT CYLINDER HOLDING VALVE

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



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

EXTENSION CYLINDER HOLDING VALVE

A holding valve is mounted to the cylinder rod end (boom base) for 2nd and 3rd stage extension (also 4th stage, if applicable). 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** dealer.

OUTRIGGER CYLINDER HOLDING VALVE

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

WINCH SAFETY BRAKE

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

SWING DRIVE BRAKE (ROTATION GEARBOX)

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

Training and Operator Qualifications

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

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

Operators and trainees will meet the following qualifications:

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

Operator Aids

ANTI-TWO BLOCK

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

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

DO NOT RELY ON THE ANTI-TWO BLOCK DEVICE AS A WINCH HOIST STOP.

OUTRIGGER WARNING ALARM

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



LOAD INDICATING EQUIPMENT ON THIS CRANE IS INTENDED ONLY AS AN AID TO SAFE OPERATION.

LOAD/RADIUS INDICATING ELECTRONICS SHOULD NOT BE RELIED UPON TO REPLACE THE USE OF CAPACITY CHARTS AND PROPER OPERATING PROCEDURES.

RATED CAPACITY INDICATOR (Greer Insight)

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

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

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

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



ABUSE OR MISUSE OF THE ANTI-TWO-BLOCK/ RCI OVERRIDE CAN RESULT IN DEATH, SERIOUS INJURY, OR PROPERTY DAMAGE.

Load Handling Operations

Before moving a load, you must study the capacity placards carefully and adhere the load capacities and radii of operation given. During operations when lifting, swinging, or extending the load, the controls should always be metered when beginning or terminating movement to prevent sudden starting or stopping which imposes undue shock loads on the equipment. This is especially true when handling heavy loads and in extreme cold temperatures. Note that the least stable position for a standard mount (crane behind cab) is usually over the front of the truck. The optional front bumper mounted stabilizer must be used to lift in front of the main outriggers.

Max. Load and Boom Angle Charts

Using the Maximum Load Chart

The maximum lift capacity chart shown on the following page is located on either side of the Main Frame. Their purpose is to show you the maximum capacities at various radii. The boom lengths match the markings on the sides of the boom second section.

The boom angle indicators display the boom angle and are located on the base boom just above the operator's station.

The boom extension is synchronized so the operator has only to observe which number is showing on the second stage. By using this boom extension and reading the boom angle off 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.



360° OPERATION REQUIRES THAT A FRONT BUMPER STABILIZER IS INSTALLED AND PROPERLY SET.

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

1. Assume you have extended the boom until the 53' mark is exposed on the second boom section.
2. Using the boom angle indicator as your guide, you have raised the boom to 40° elevation.

Using the range diagram section of the maximum load chart, find the 40° angle line and follow it to the 53' arc. Then follow the vertical line down; the operating radius is approximately 40'.

Using the Load Rating section of the load chart, go across the top of the chart (boom length) to the 53' column and go down (operating radius) to 40' the number to the immediate right is the maximum load that can be lifted (i.e. 4,700 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 40'. If the boom is not raised up above 40° before lifting the load - the load will swing out, increasing the operating radius. This may cause an overload condition.



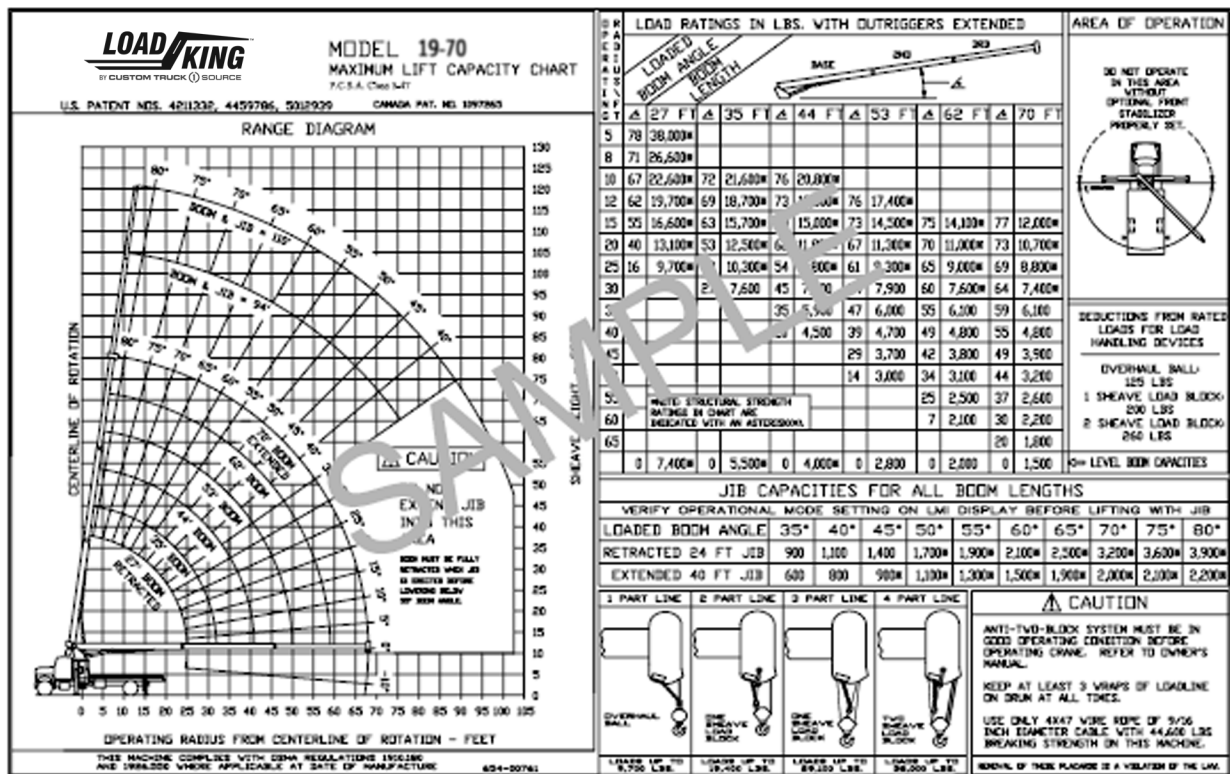
NOTE: *In an occurrence where the operating radius is between those listed on the chart, use the smaller lift capacity. When the boom length is between those listed, use the smaller lift capacity.*



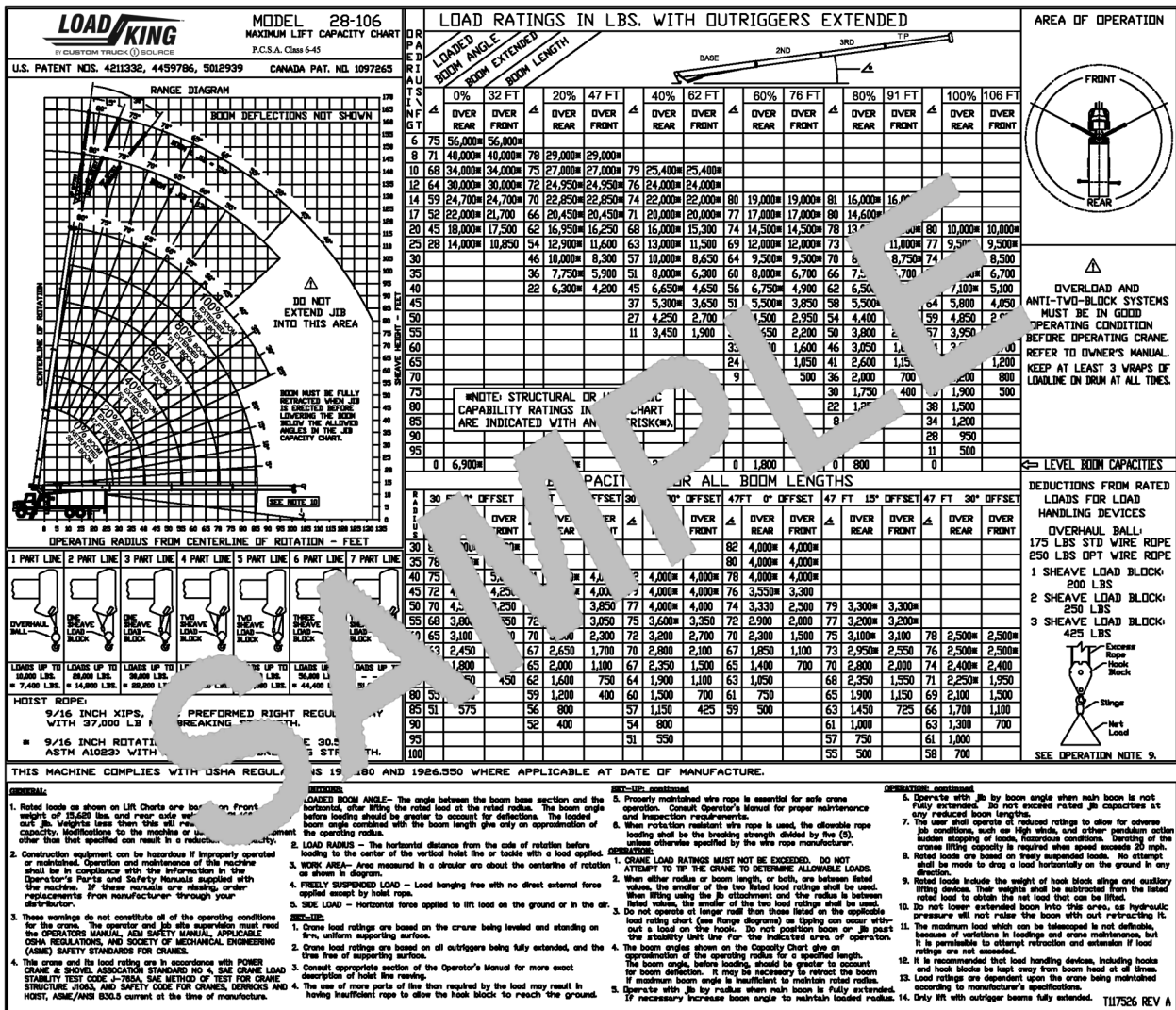
It is important that you know the weight of any material that you attempt to handle. This can be determined by use of a dynamometer or scales.

The maximum lift capacity 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 you can lift.

Operating Instructions



Sample 19-70 Load Chart

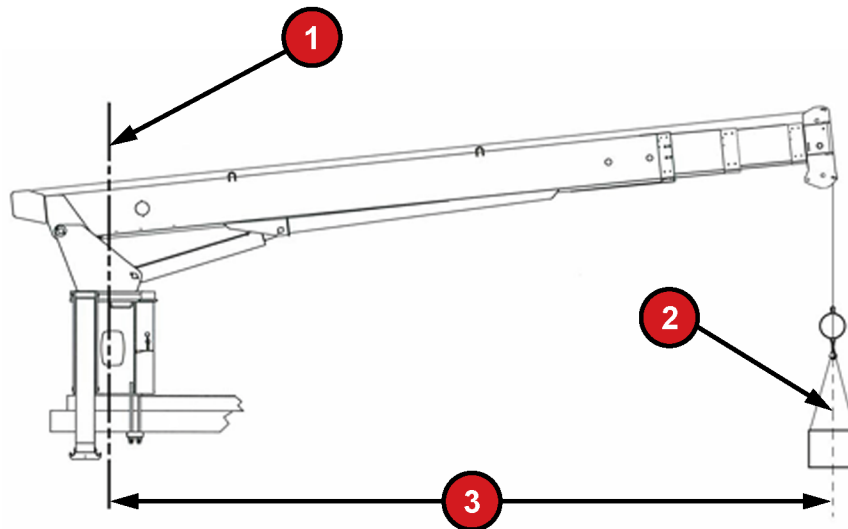


Swinging of a suspended load can cause the load to drift away from the crane. The drifting of the load away from the crane will increase the cranes operating radius. The increase in operating radius may cause the crane to tip or the boom to fail.



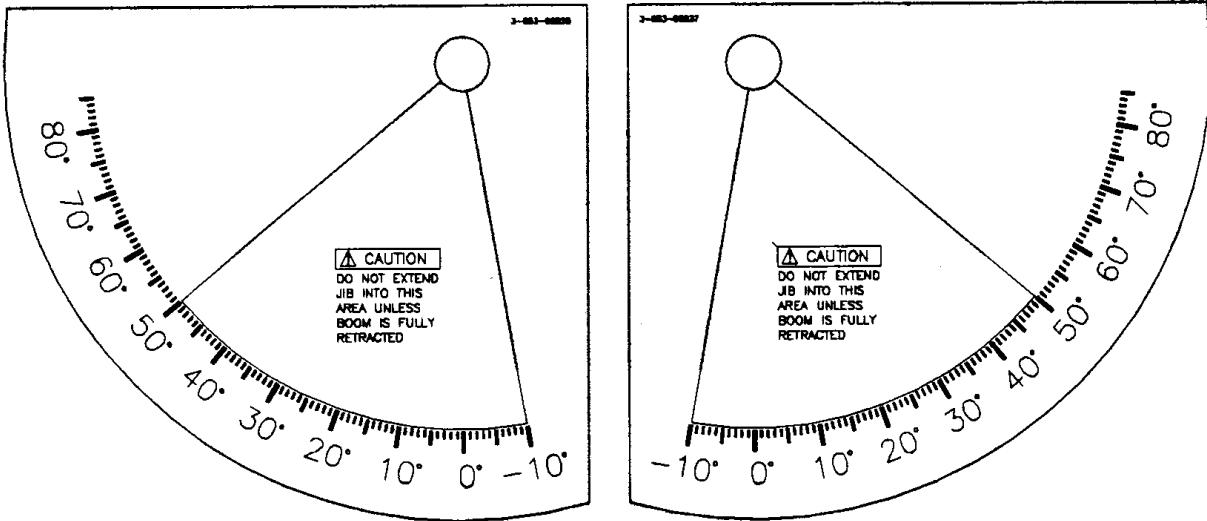
Bouncing or jerking of a load will cause shock loading to many critical parts of the crane. The shock loads may cause these critical parts to fail.

Operating Radius



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

Boom Angle Placards



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

Operating the Unit

Operating the Unit

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

Initiating Operation

1. If possible, position the unit at the job site in such a manner as to assure all work operations can be performed without repositioning the truck (see [Work Site Position on page 147](#)). However, strict observance of load weight, radius and maximum load rating must always be complied with.
2. Set parking brake securely.
3. Place transmission in neutral and engage PTO.
4. Extend all outriggers to make firm contact with ground. (See [Outrigger Positioning on page 146](#).) Provide outrigger pads if terrain is soft or if outriggers tend to sink into ground. Properly level the machine using the console mounted bubble level.



IF UNIT IS EQUIPPED WITH OPTIONAL FRONT BUMPER MOUNTED STABILIZER, IT MUST BE EXTENDED LAST TO PREVENT STRUCTURAL DAMAGE.

While operating the crane, frequently check that proper level condition is maintained.



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

5. Position yourself at the operator's console and accelerate the truck engine to desired speed. Maximum pump speed should not exceed 2,300 R.P.M.
6. Bring the hydraulic oil up to operating temperature. (See [Cold Weather Operation on page 148](#).)
7. Check all controls for proper operation. During all operations, the controls should be metered to prevent sudden starting and stopping.


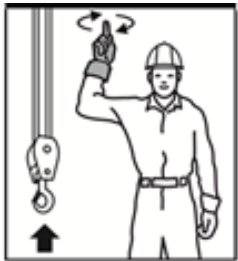
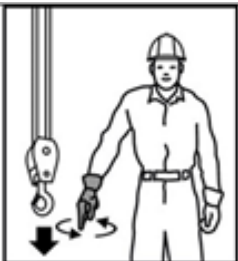




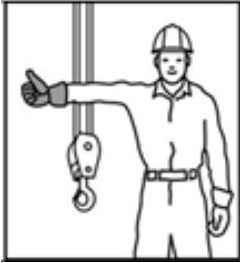
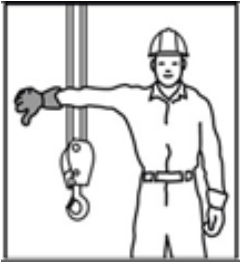

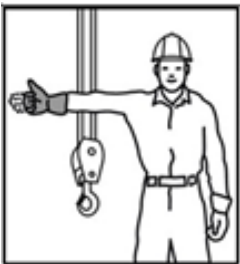
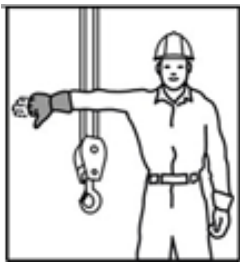
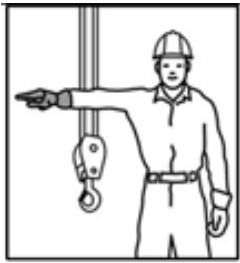
FAILURE TO METER YOUR CONTROLS INDUCES HIGH SHOCK LOADS ON THE EQUIPMENT WHICH MAY RESULT IN STRUCTURAL FAILURE OR OVERTURNING OF THE CRANE.
DEATH OR SERIOUS INJURY MAY RESULT.

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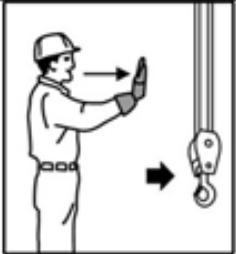

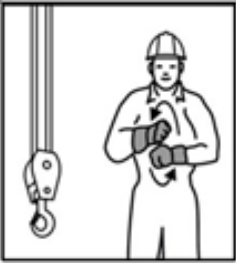

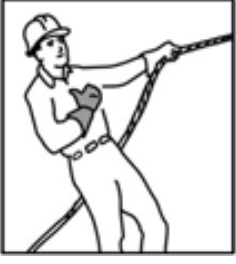
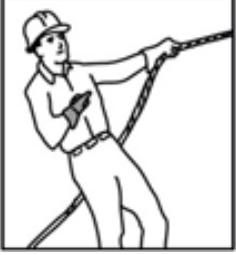
Operating Instructions

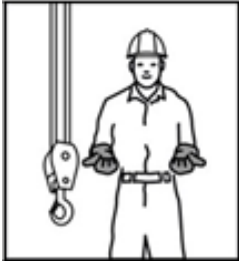
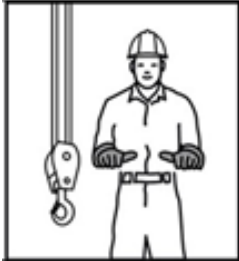
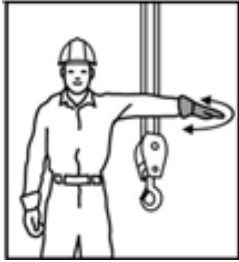

Arm and Hand Signals

| Hand Signals | | |
|---|--------------------------------|---|
| Graphic | Operation | Action |
|  | | |
|  | STOP | Arm extended, palm down, move arm back and forth horizontally. |
|  | LOWER | With arm extended downward, forefinger pointing down, move hand in small horizontal circle. |
|  | USE MAIN HOIST | Tap fist on head; then use regular signals. |
|  | USE WHIPLINE (Auxiliary Hoist) | Tap elbow with one hand, then use regular signals. |

| | | |
|---|-----------------------------------|--|
|  | RAISE BOOM | Arm extended, fingers closed, thumb pointing upward. |
|  | LOWER BOOM | Arm extended, fingers closed, thumb pointing downward. |
|  | MOVE SLOWLY | Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.) |
|  | RAISE THE BOOM AND LOWER THE LOAD | With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired. |
|  | LOWER THE BOOM AND RAISE THE LOAD | With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired. |
|  | SWING | Arm extended, point with finger in direction of swing of boom. |

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Operating Instructions

| | | |
|---|--|---|
|  | <p>TRAVEL</p> | <p>Arm extended forward, hand open and slightly raised, make a pushing motion in direction of travel.</p> |
|  | <p>DOG EVERYTHING</p> | <p>Clasp hands in front of body.</p> |
|  | <p>TRAVEL (Both Tracks)</p> | <p>Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward and backward. (For land cranes only.)</p> |
|  | <p>TRAVEL (One Track)</p> | <p>Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For land cranes only.)</p> |
|  | <p>EXTEND BOOM (Telescoping Boom)</p> | <p>One Hand Signal. One fist in front of chest with thumb tapping chest.</p> |
|  | <p>RETRACT BOOM (Telescoping Boom)</p> | <p>One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.</p> |

| | | |
|---|--|---|
|  | <p>EXTEND BOOM (Telescope Boom)</p> | <p>Both fists in front of body with thumbs pointing outward.</p> |
|  | <p>RETRACT BOOM (Telescoping Boom)</p> | <p>Both fists in front of body with thumbs pointing toward each other.</p> |
|  | <p>STOP</p> | <p>Arm extended, palm down, move arm back and forth horizontally.</p> |
|  | <p>EMERGENCY STOP</p> | <p>Both arms extended, palms down, move arms back and forth horizontally.</p> |

Lifting the Load

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

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

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



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

STEPS TO LIFTING A LOAD

- 1.** Determine what the total load weighs.



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

- 2.** Consult the maximum load chart on your crane and determine the correct boom radius and parts of line required based upon your load weight using 3B6 for 28-106.
- 3.** Check the configuration setting number for the Greer Insight RCI - It must match the actual crane configuration (Including parts of line rigged).
- 4.** Rotate the boom tip until it is directly over the material to be lifted. Unless continuous rotation is specified, Load King Boom Trucks are equipped with 370° rotation stops. It is important that you be aware of the position of the stops before lifting in order to assure maximum rotation and prevent excess handling of the load. The stops are generally over the front of the truck.
- 5.** Attach load line to material and begin operation. Observe proper sling or chain usage and make sure any load handling attachment used has adequate size and capacity for the load being lifted.



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

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

Note: Opposite corner outrigger pad lift.

When lifting a rated load over a front or rear corner of the crane it is possible that frame torsion (twist) will cause the opposite corner outrigger pad to lift off the ground a few inches. This is normal and not an indication of a stability problem.



Emergency Procedures

Emergency Procedures

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

1. Steps shall be taken to schedule repairs and recalibration immediately. The operational aids shall be put back into service as soon as replacement parts, if required, are available and the repairs and recalibration can be carried out. Every reasonable effort must be made to expedite the repairs and recalibration.
2. When a load indicator, rated capacity indicator, or rated capacity limiter is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish procedures for determining load weights and shall ascertain that the weight of the load does not exceed the crane ratings at the radius where the load is to be handled.
3. When a boom angle or radius indicator is inoperative or malfunctioning, the radius or boom angle shall be determined by measurement.
4. When an anti-two-block device, two-blocking damage prevention, or two-block warning device is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish procedures, such as assigning an additional signal person, to furnish equivalent protection.
5. When a boom length indicator is inoperative or malfunctioning, the designated person responsible for supervising the lifting operations shall establish the boom length at which the lift will be made by actual measurement or marking on the boom.
6. When a level indicator is inoperative or malfunctioning, other means shall be used to level the crane within the level requirements specified by the manufacturer.

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

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

Emergency Boom Retraction

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

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

Although we DO NOT recommend that you adjust this cartridge, it may be used as an emergency retraction device in the case of ruptured lines or pump failure. This may be accomplished with the following procedures:

1. Have qualified operator (per ANSI B30.5) hold the extend handle in the retract position.
2. Loosen the nut on the counterbalance cartridge and rotate the screw very slowly clockwise until inward movement is noticed. Be sure to count the turns so the cartridge may be returned to original adjustment.
3. If the boom is not elevated sufficiently, friction may hold it in place. An external load may need to be applied against the boom tip to retract the boom.



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

Emergency Lowering of Boom

The Load King Stinger Boom Truck is equipped with a pilot operated holding cartridge in the base of the topping cylinder. This cartridge provides a means of supporting loads in a static condition to prevent any downward creep. It also provides support in the event of a ruptured line, or hydraulic failure.

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

Although we DO NOT recommend that you adjust this cartridge, it may be used as an emergency lowering device in the case of ruptured lines or pump failure. This may be accomplished with the following procedures:

1. Have qualified operator (per ANSI B30.5) hold the topping handle in the down position.
2. Loosen the nut on the counterbalance cartridge and rotate the screw very slowly clockwise until downward movement is noticed. Be sure to count the turns so the cartridge may be returned to original adjustment.
3. Regulate boom down speed with the control handle.



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

Emergency Rotation

The Load King Stinger Boom Truck is equipped with a spring applied, pressure released rotation brake. This brake will only allow rotation if there is sufficient hydraulic pressure. In case of hydraulic failure this brake will have to be HYDRAULICALLY released. This may be accomplished with the following procedures:

1. Use emergency retraction procedures to fully retract the boom.
2. Use emergency lowering procedures to lower the boom about 1 foot above the boom rest. Attach a tag line to the boom..
3. Plumb a PORT-A-POWER or other hydraulic source into the brake port on the rotation gearbox..
4. Remove counterbalance valve cartridges from motor..
5. Pressurize the brake port to 600 PSI and rotate boom over boom rest with a tag line. Oil will be lost through counterbalance valve cavities as the boom is rotated. Catch any spilled oil in a pan..
6. Release hydraulic pressure and reattach brake line. Reinstall counterbalance valves..



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

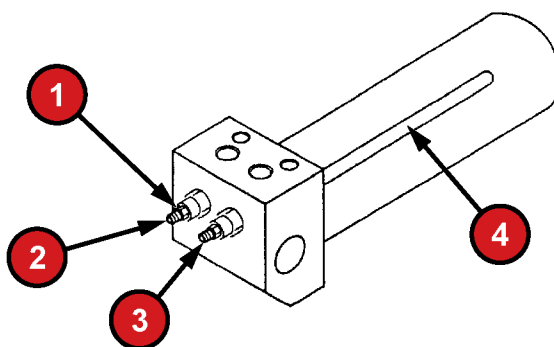
Emergency Retraction of Outriggers

The Load King Stinger Boom Truck is equipped with pilot operated holding cartridges in both parts of the outrigger cylinder. The extend cartridges provide a means of supporting loads in a static condition to prevent any upward creep of the outrigger legs. They also provide support in the event of a ruptured line, or hydraulic failure. The retract cartridges hold the outriggers in position during roading

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

These cartridges may be used as an emergency retraction device in the case of ruptured lines, or hydraulic pump failure. This may be accomplished with the following procedures:

1. Have qualified operator (per ANSI B30.5) hold the outrigger handle in the retract position.
2. Loosen the jam nut on the extend holding valve cartridge. Rotate the screw very slowly clockwise using a 3/16" allen wrench until inward movement is noticed. Once the truck tires are on the ground, further retraction will require the use of a jack or Come-Along. After adequate ground clearance is obtained, secure the outriggers in the retracted position with a chain or sling. Then return the holding valve cartridge to its original setting. Finally, remove the jack or Come-Along. The chain or sling should be left in place until the hydraulic system is restored to proper working order.



| | | | |
|---|------------------|---|-----------------------|
| 1 | Jam Nut | 3 | Retract Cartridge |
| 2 | Extend Cartridge | 4 | Cylinder Retract Tube |



NEVER RETRACT THE OUTRIGGERS UNTIL THE BOOM IS SECURED INTO THE BOOM REST FOR ROADING.

Roading the Unit

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

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



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

3. Fully retract all outriggers.



IF UNIT IS EQUIPPED WITH OPTIONAL FRONT BUMPER MOUNTED STABILIZER, IT MUST BE EXTENDED LAST TO PREVENT STRUCTURAL DAMAGE.

4. Disengage Power Take Off (PTO).
5. Secure any load or lifting attachments (steel platforms, roofer's package) to the flatbed.



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



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

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



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

19-70 Jib Stowage

DESCRIPTION

Jib extension option 1: 24 ft. (7.3 m) single stage swing-on tubular type extension.

Jib extension option 2: 24 - 40 ft (7.3 - 12.2 m) two stage swing-on tubular type extension.

Jib extension weights

- Single stage section only: 532 lbs (241 kg)
- Two stage w / stinger section: 815 lbs (370 kg)
- Stinger section only: 283 lbs (128 kg)



BEFORE STOWING THE EXTENSION, ENSURE THAT NO PERSONNEL OR OBSTACLES ARE IN THE SWING PATH OF THE EXTENSION.



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.







WHEN PERFORMING INSTALLATION OPERATIONS AT HEIGHTS ABOVE 10 FT (3 m) FROM THE GROUND, A SAFETY HARNESS MUST BE USED. A SINGLE LADDER MAY BE USED PROVIDED THAT IT IS SECURED IN PLACE AND THE TOP 4 RUNGS ARE NOT USED. USE A STEPLADDER, SCAFFOLDING OR A PLATFORM THAT MEETS APPLICABLE SAFETY STANDARDS.



ALL THE EXTENSION ROTATION OPERATIONS USING THE NYLON ROPE MUST BE CARRIED OUT FROM THE GROUND.

19-70 / 28-106

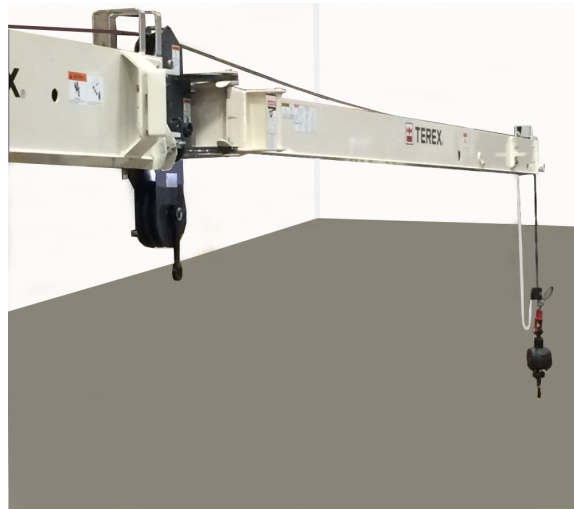
Disassembly

| Auxiliary components for correct installation | |
|--|-------------------------------------|
|  | Ratchet tensioner |
|  | Hammer or mallet 4 - 7 lb. (2-3 kg) |
|  | Nylon Rope (L > = 15 ft (4.5m)) |
|  | Ladder (H useful 13 ft (4m)) |

If you have installed the optional side stow jib, the instructions for stowing the jib follow.

Jib Stowage Procedure

1. Starting with a fully levelled boomtruck, retract the boom until it is extended only 2 ft. (0.6 m). Rotate the boom to the street side of the boom rest, and lower until jib head can be reached from the ground.



2. Remove ball or block from wire rope.



3. Remove the anti-two block chain clevis from the anti-two block switch.

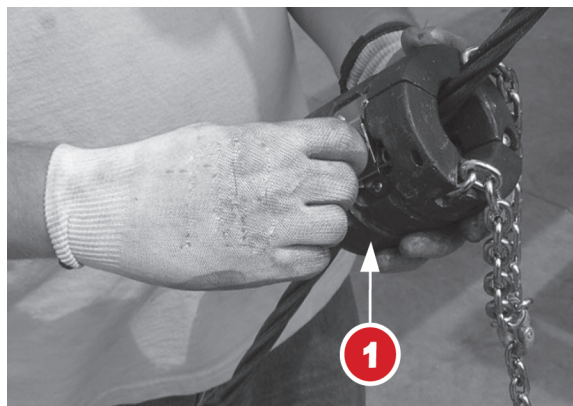


19-70 / 28-106

Disassembly

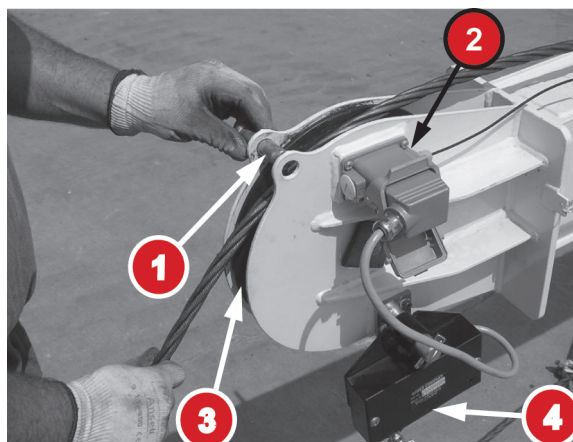
| ITEM | DESCRIPTION |
|------|-----------------------------|
| 1 | Anti-Two Block Chain Clevis |

4. Remove anti-two block weight from wire rope.



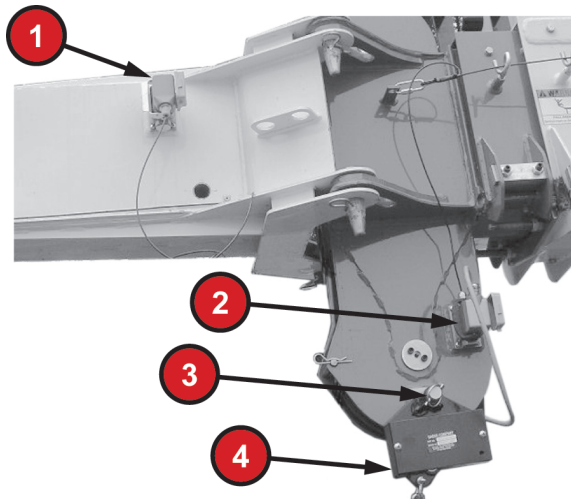
| ITEM | DESCRIPTION |
|------|-----------------------|
| 1 | Anti-Two Block Weight |

5. Remove the jib head guide pin. Extract the wire rope from the jib head sheave. Reinstall jib head guide pin.



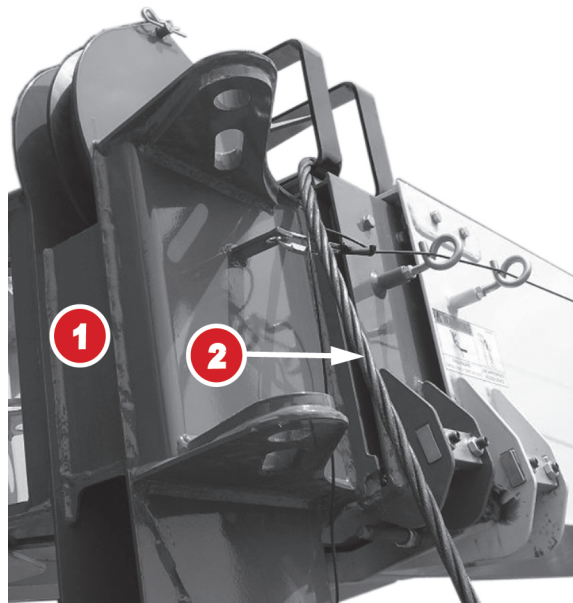
| ITEM | DESCRIPTION |
|------|-----------------------------------|
| 1 | Guide Pin |
| 2 | Jib Tip Anti-Two Block Receptacle |
| 3 | Jib Head Sheave |
| 4 | Anti-Two Block Switch |

6. Remove jib anti-two block plug from the boom head and install in open receptacle on the jib base.



| ITEM | DESCRIPTION |
|------|-------------------------------|
| 1 | Jib Anti-Two Block Receptacle |
| 2 | Anti-Two Block Receptacle |
| 3 | Retaining Pin |
| 4 | Anti-Two Block Switch |

7. Remove anti-two block switch, retaining pin, and plug from the jib. Reinstall on boom head.
8. Extract wire rope from jib cable retainer, back to the boom head.



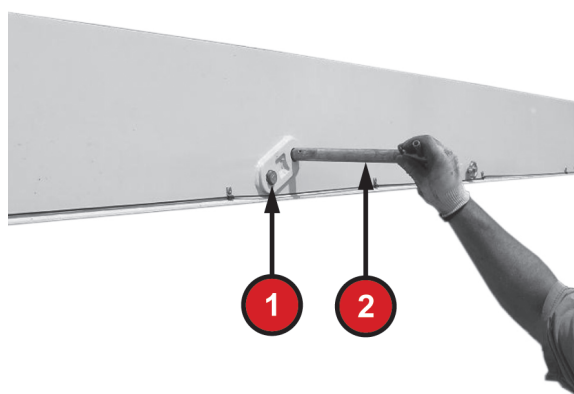
19-70 / 28-106

Disassembly

| ITEM | DESCRIPTION |
|------|-------------|
| 1 | Boom Head |
| 2 | Wire Rope |

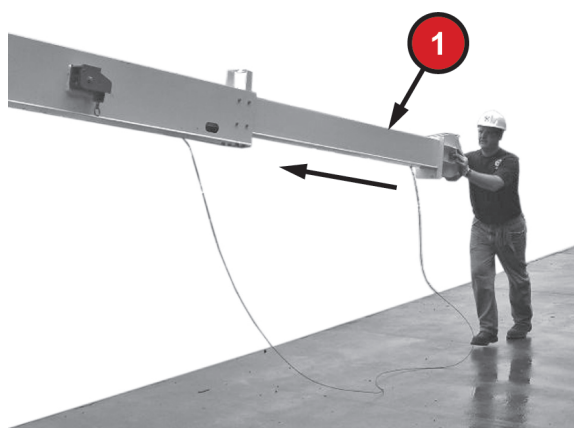
IF THE SECOND STAGE OF THE OPTIONAL 2 STAGE JIB HAS NOT BEEN USED, SKIP TO STEP 13.

9. Remove second stage lock pin and retainer.



| ITEM | DESCRIPTION |
|------|-----------------------|
| 1 | Second Stage Stop Pin |
| 2 | Second Stage Lock Pin |

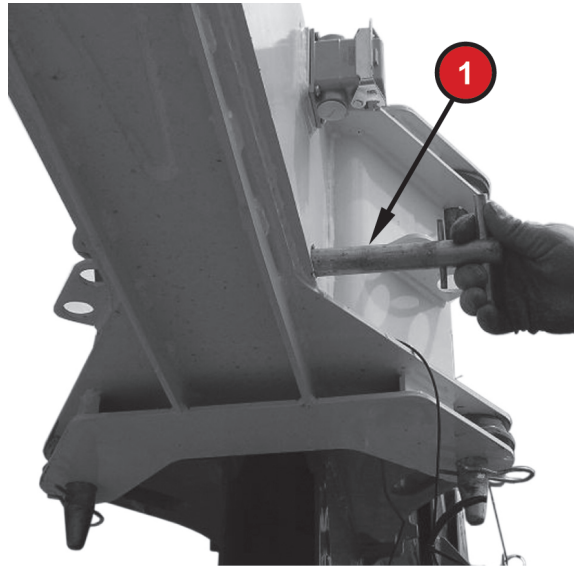
10. Push the second stage jib in until the jib is fully retracted.



Jib Second Stage Retraction

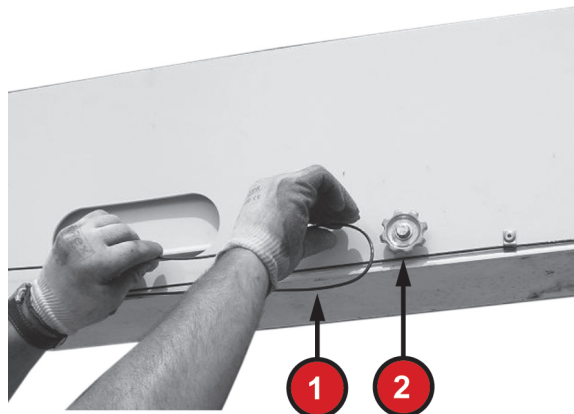
| ITEM | DESCRIPTION |
|------|------------------|
| 1 | Second Stage Jib |

11. Insert jib second stage lock pin into retracted position and secure with retaining pin. Pull on second stage to ensure lock pin is securing second stage.



Jib Second Stage Lock Pin

12. Stow the anti-two block jib cable on the anchor points.

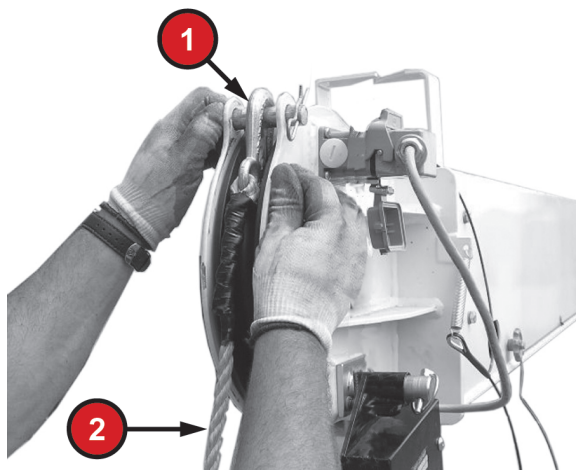


| ITEM | DESCRIPTION |
|------|----------------------|
| 1 | Anti-Two Block Cable |
| 2 | Anchor Point |

19-70 / 28-106

Disassembly

13. Fasten a tag line rope clevis (item 1) to a suitable anchor point on the jib head.



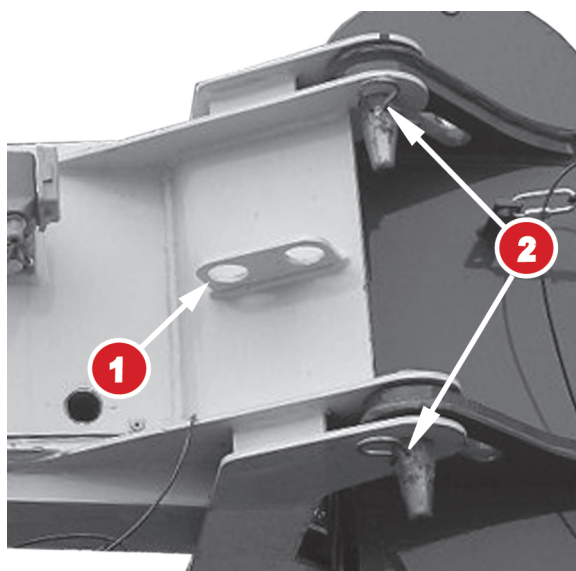
Jib Head Tag Line Rope Anchor Point

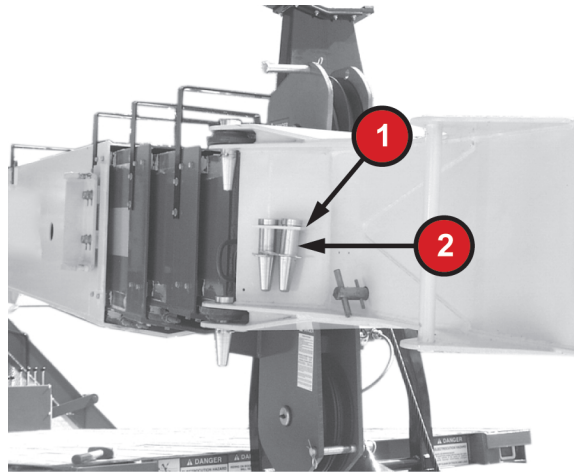
| ITEM | DESCRIPTION |
|------|---------------------|
| 1 | Clevis Anchor Point |
| 2 | Tag Line Rope |



JIB WILL SWING UNCONTROLLED IF BOOM IS NOT HORIZONTAL.
THERE IS A DANGER OF BODILY HARM IF THE JIB IS NOT PROPERLY
CONTROLLED.

14. Remove the two jib pins and cotter pin retainers on the side opposite the jib stow brackets (curb side). Store these pins in the pin stowage bracket provided.





| ITEM | DESCRIPTION |
|------|------------------------------|
| 1 | Pin Stowage Bracket |
| 2 | Jib Extension Retaining Pins |

15. Check to ensure that the boom is extended approximately 15 in. (380 mm), this will allow the jib stow bars to clear the jib stow brackets.



Jib Stowage Bracket Location

| ITEM | DESCRIPTION |
|------|-----------------|
| 1 | Stowage Bracket |

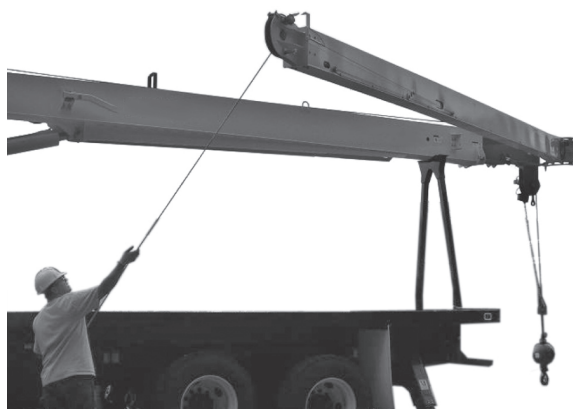
16. Swing jib back along the side of the main boom with tag line rope.



BEFORE STOWING THE EXTENSION, ENSURE THAT NO PERSONNEL OR OBSTACLES ARE IN THE SWING PATH OF THE EXTENSION.



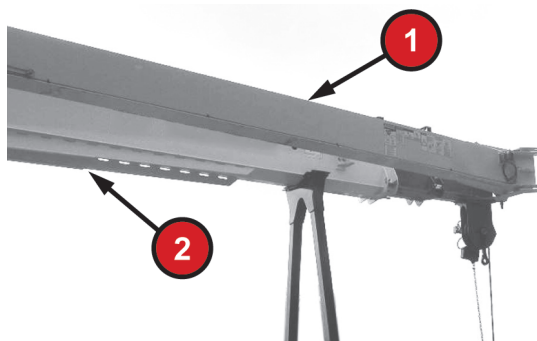
CONTROL MOVEMENT OF THE JIB AT ALL TIMES TO PREVENT INJURY AND/OR EQUIPMENT DAMAGE.



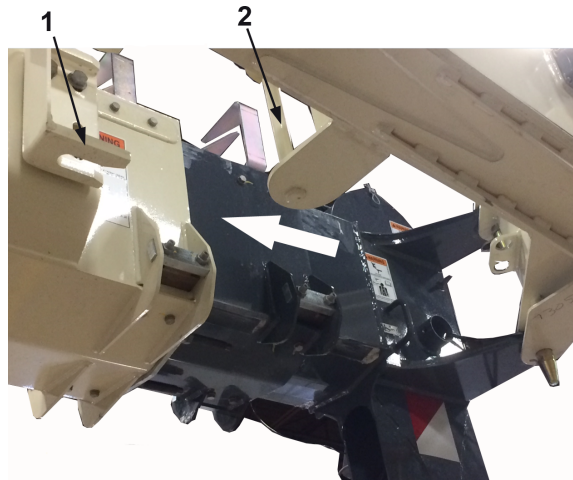
Jib controlled swing w/tag line rope

17. Jib should be parallel to the boom and the jib stow alignment bar and jib stow brackets in alignment.

NOTE: *There are front and rear stow brackets to secure the boom, both must be observed for proper alignment during this procedure. Refer to the following images to be sure the locations and procedures for these brackets is understood.*

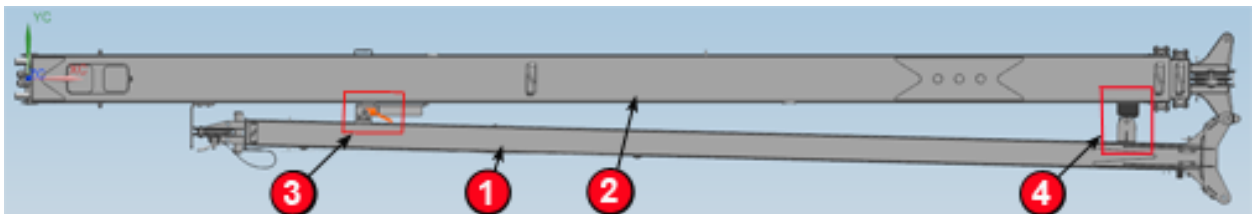


| ITEM | DESCRIPTION |
|------|-------------|
| 1 | Jib |
| 2 | Boom |



Boom Retracting to Engage Front Jib Stowage Bar to Bracket

| ITEM | DESCRIPTION |
|------|------------------------|
| 1 | Jib Stow Bracket |
| 2 | Jib Stow Alignment Bar |



Jib Extension Stowed (top view)

Slowly retract the boom while observing that the jib properly engages the at locations (3) and (4) above.

| ITEM | DESCRIPTION |
|------|-----------------------------|
| 1 | Jib Stowed |
| 2 | Boom Fully Retracted |
| 3 | Rear Stowage Lock Pin Area |
| 4 | Front Stowage Lock Pin Area |

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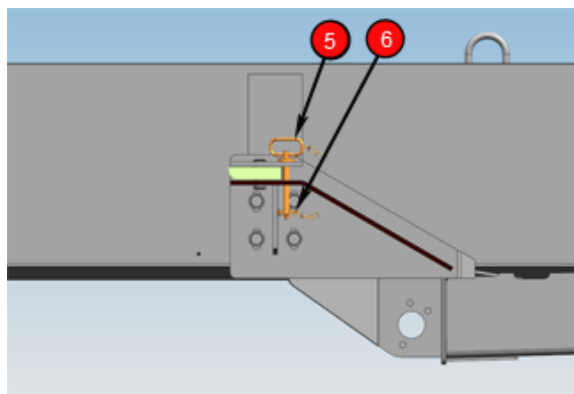
Disassembly



Install Locking Pin (item 5) from the top. Do not install pin from the bottom.



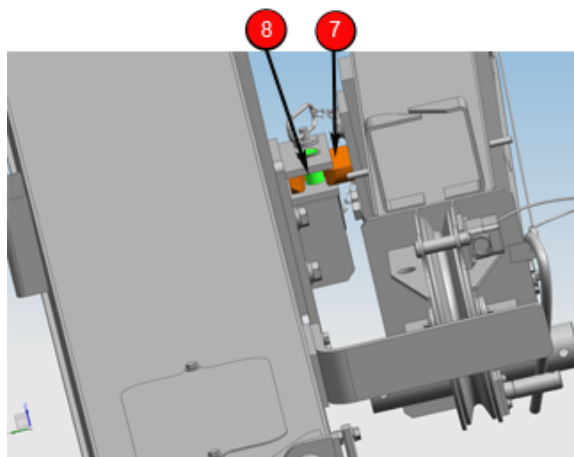
The area underneath the extension must be kept clear at all times while the extension is being locked.



Jib Extension Stowed Position - Locking Pin

| ITEM | DESCRIPTION |
|------|---|
| 5 | Jib Extension stowed position locking pin |
| 6 | Jib Extension stowed position cotter pin |

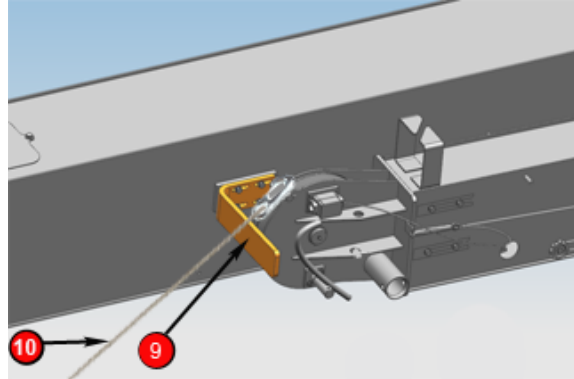
19. When boom is near full retraction, pin (item 8) will engage into slotted alignment bar (item 7).



Jib Extension Alignment Pin Guide

| ITEM | DESCRIPTION |
|------|-----------------------|
| 7 | Slotted alignment bar |
| 8 | Alignment pin |

20. Remove (item 10) tag line rope from jib.
21. Check that (item 9) Safety Stop Bracket is adjusted to make contact with leading edge of jib sheave.



Jib Extension Stowed - Safety Stop Bracket & Tag Line Rope

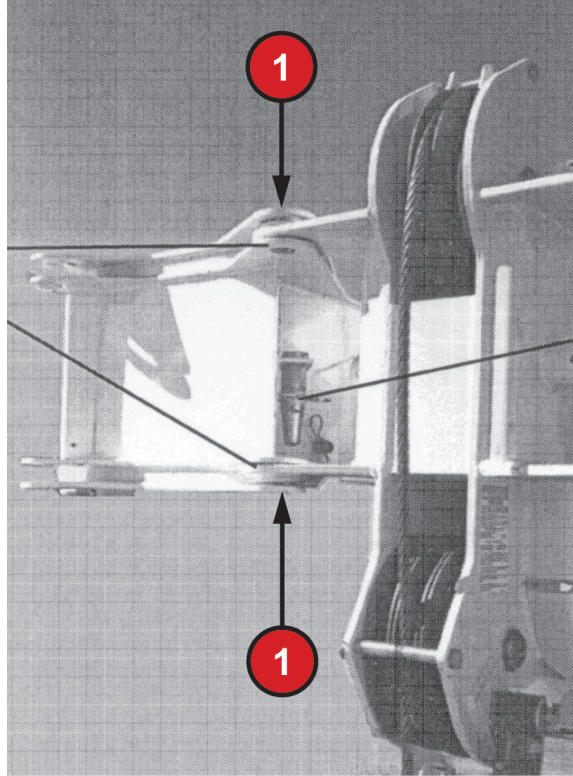
| ITEM | DESCRIPTION |
|------|---------------------|
| 9 | Safety Stop Bracket |
| 10 | Tag line rope |



DO NOT PROCEED TO THE NEXT STEP UNTIL THE JIB IS FULLY AND ABSOLUTELY SECURED TO ITS STOWAGE BRACKETS. IF THERE IS ANY DOUBT ABOUT THE SECURITY OF THE JIB ON THE STOWAGE BRACKETS, STOP AND REVIEW THE STEPS CONTAINED IN THIS MANUAL, CONFIRMING THE SECURITY OF THE STOWED JIB BEFORE PROCEEDING.

22. Remove the remaining two pins and cotter pin retainers from boom / jib ears.

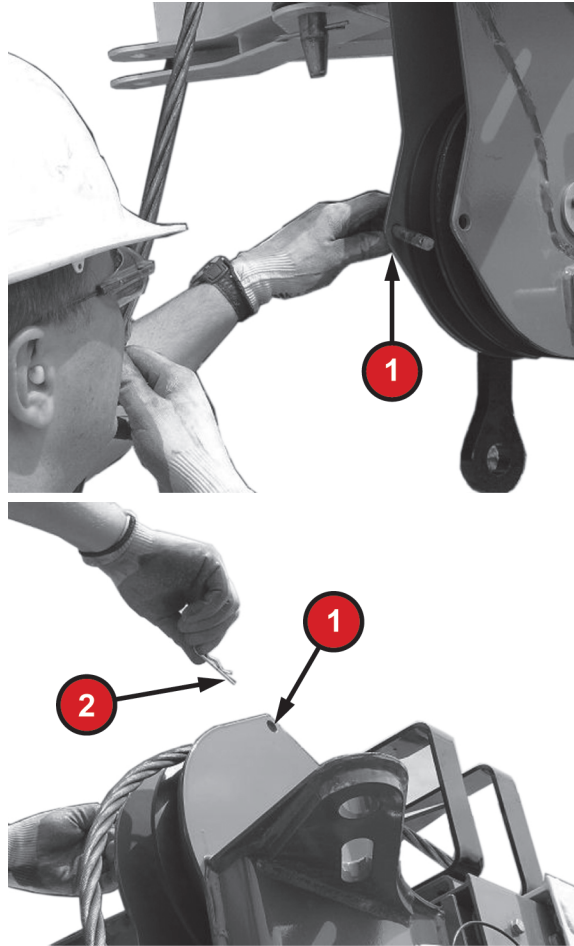
NOTE: *If any force is required to remove the two jib pins (item 1), it should not be more than a few hits from a machine hammer.*



Jib pin removal from boom head at location (1)

23. Stow the two pins and retainers in the outer pin stowage bracket.

24. Remove bottom and top retainers and guide pins from sheave head.



| | | | |
|---|---------------------|---|----------|
| 1 | Guide Pin Locations | 2 | Retainer |
|---|---------------------|---|----------|

25. Route cable through both sheaves and re-install the pins and cotter pin retainers.

26. Attach load ball or block to wire rope with pin and cotter pin retainer.



Load Ball

27. Winch in the excess cable while being sure that the cable is spooling on the winch drum correctly. It may be necessary to provide tension on the wire rope to ensure that it lays on the winch drum correctly.

28-106 Jib Stowage

DESCRIPTION

Jib extension option 1: 30 ft. (9.1 m) single stage swing-on lattice type extension.

Jib extension option 2: 30 - 47 ft (9.1 - 14.3 m) two stage swing-on lattice and tubular type extension.

Jib extension weights

- Single stage lattice section only: 1024 lbs (465 kg)
- Two stage w / stinger section: 1495 lbs (678 kg)
- Stinger section only: 471 lbs (214 kg)



BEFORE STOWING THE EXTENSION, ENSURE THAT NO PERSONNEL OR OBSTACLES ARE IN THE SWING PATH OF THE EXTENSION.



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.







WHEN PERFORMING INSTALLATION OPERATIONS AT HEIGHTS ABOVE 10 FT (3 m) FROM THE GROUND, A SAFETY HARNESS MUST BE USED. A SINGLE LADDER MAY BE USED PROVIDED THAT IT IS SECURED IN PLACE AND THE TOP 4 RUNGS ARE NOT USED. USE A STEPLADDER, SCAFFOLDING OR A PLATFORM THAT MEETS APPLICABLE SAFETY STANDARDS.



ALL THE EXTENSION ROTATION OPERATIONS USING THE NYLON ROPE MUST BE CARRIED OUT FROM THE GROUND.

19-70 / 28-106

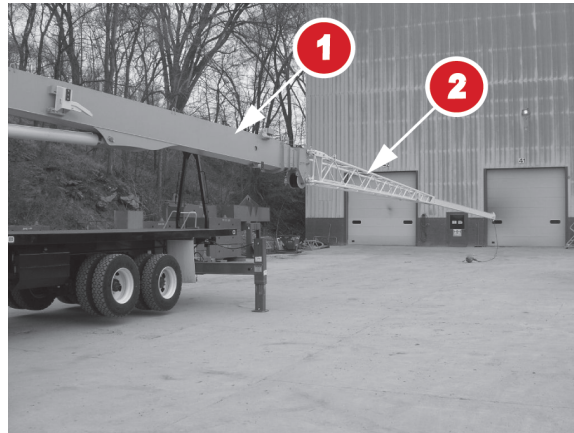
Disassembly

| Auxiliary components for correct installation | |
|--|-------------------------------------|
|  | Ratchet tensioner |
|  | Hammer or mallet 4 - 7 lb. (2-3 kg) |
|  | Nylon Rope (L > = 15 ft (5m)) |
|  | Ladder (H useful 13 ft (4m)) |

If you have installed the optional side stow jib, the instructions for stowing the jib follow.

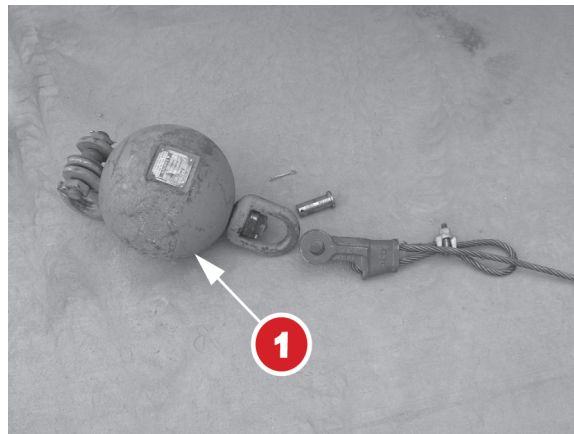
Jib Stowage Procedure

1. Starting with a fully levelled boomtruck, retract the boom until it is extended only 2 ft. Rotate the boom to the street side of the boom rest, and lower until jib head can be reached from the ground.



| | |
|--------|-------|
| 1 Boom | 2 Jib |
|--------|-------|

2. Remove ball or block from wire rope.

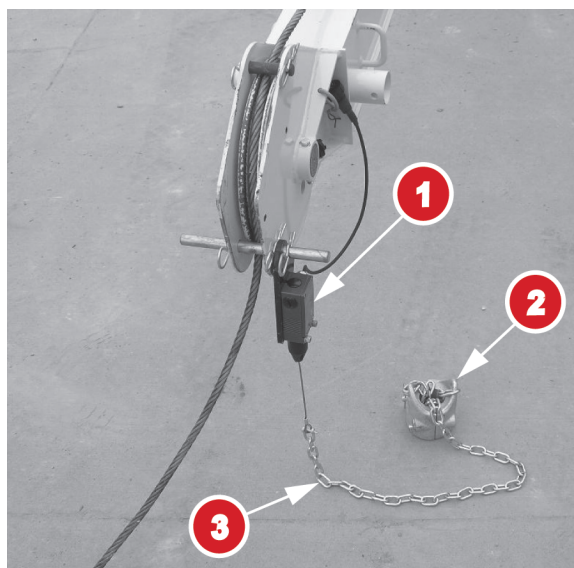


| |
|-------------|
| 1 Hook Ball |
|-------------|

3. Remove the ANTI-TWO BLOCK CHAIN CLEVIS from the anti-two-block switch.

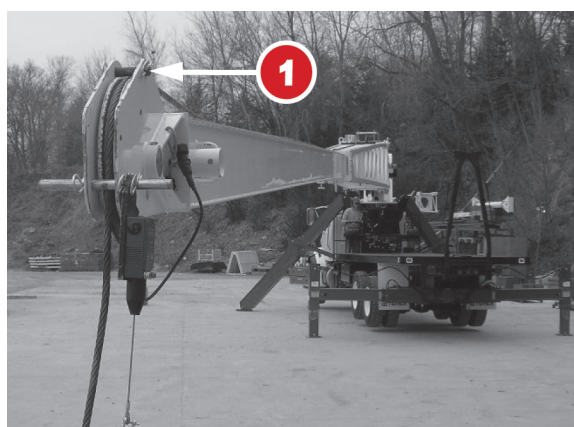
19-70 / 28-106

Disassembly



| | | | |
|---|-----------------------|---|----------------------|
| 1 | Anti-Two Block Switch | 3 | Anti-Two Block Chain |
| 2 | Anti-Two Block Weight | | |

4. Remove ANTI-TWO BLOCK WEIGHT from wire rope.
5. Remove the JIB HEAD GUIDE PIN. Extract the wire rope from the JIB HEAD SHEAVE. Reinstall JIB HEAD GUIDE PIN.
6. Remove JIB ANTI-TWO BLOCK PLUG from the boom head and install in open RECEPTACLE on the jib base.
7. Remove ANTI-TWO-BLOCK SWITCH, RETAINING PIN, and PLUG from the jib. Reinstall on boom head.

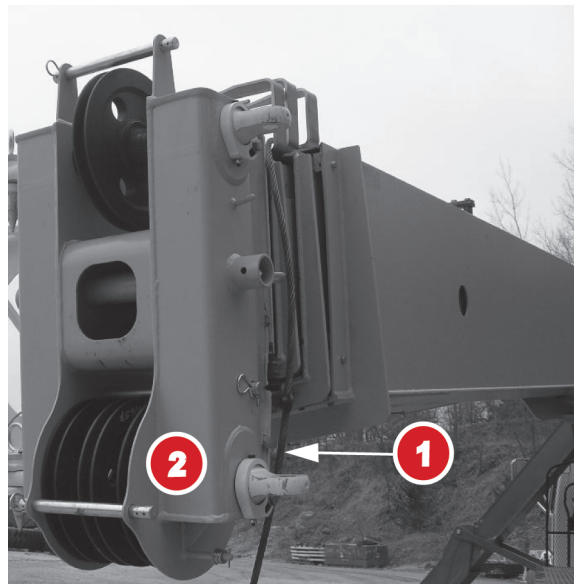


| | |
|---|-----------|
| 1 | Guide Pin |
|---|-----------|



| | |
|---|--------------|
| 1 | Retainer Pin |
|---|--------------|

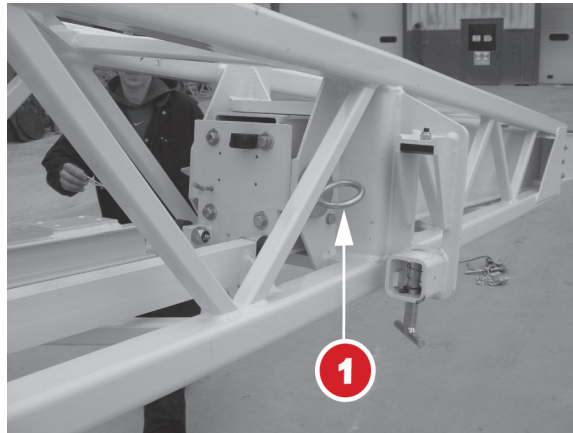
8. Extract WIRE ROPE from jib cable retainer, back to the boom head.



| | | | |
|---|-----------|---|-----------|
| 1 | Wire Rope | 2 | Boom Head |
|---|-----------|---|-----------|

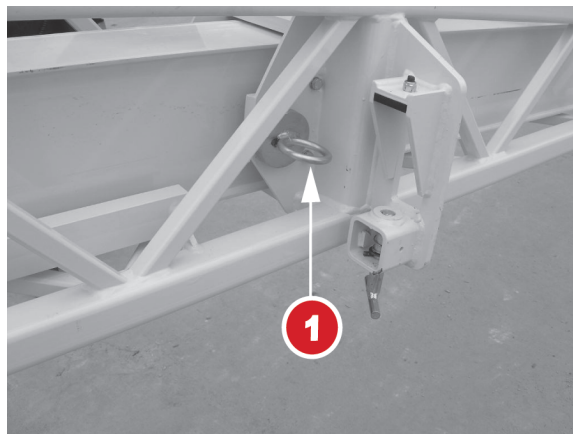
IF THE SECOND STAGE OF THE OPTIONAL 2 STAGE JIB HAS NOT BEEN USED, SKIP TO STEP 14.

9. Remove SECOND STAGE LOCK PIN and retainer.



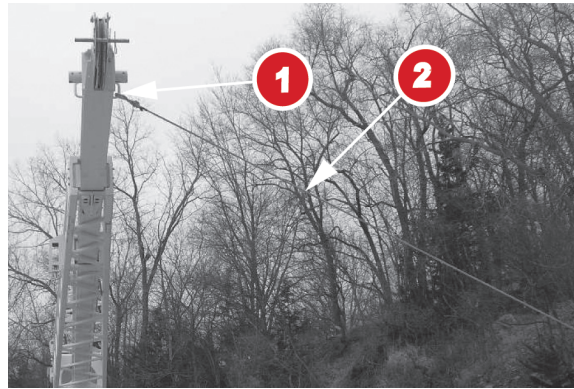
1 Jib Lock Pin

10. Push the SECOND STAGE JIB in until the jib is fully retracted.
11. Insert jib SECOND STAGE LOCK PIN into retracted position and secure with retaining pin. Pull on second stage to ensure lock pin is securing second stage.



1 Jib Lock Pin - Locked Position

12. Stow the ANTI-TWO BLOCK JIB CABLE on the ANCHOR POINTS.
13. Fasten a TAG LINE to a suitable ANCHOR POINT on the jib head.



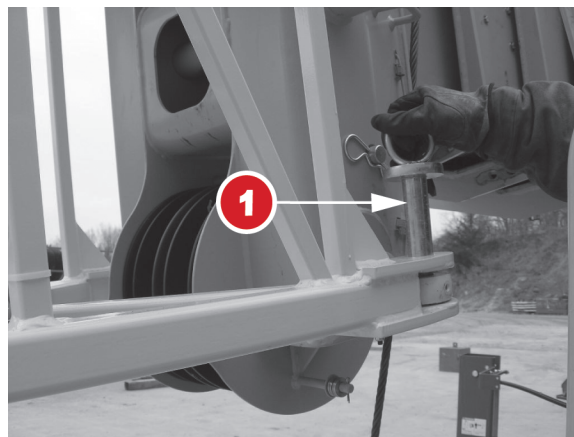
| | | | |
|---|--------------|---|----------|
| 1 | Anchor Point | 2 | Tag Line |
|---|--------------|---|----------|



JIB WILL SWING UNCONTROLLED IF BOOM IS NOT HORIZONTAL.
THERE IS A DANGER OF BODILY HARM IF THE JIB IS NOT PROPERLY CONTROLLED.

14. Remove the two jib PINS and RETAINERS on the side opposite the jib stow brackets (curb side). Store these pins in the TOOL BOX.

NOTE: *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.*



| | |
|---|--------------|
| 1 | Jib Lock Pin |
|---|--------------|

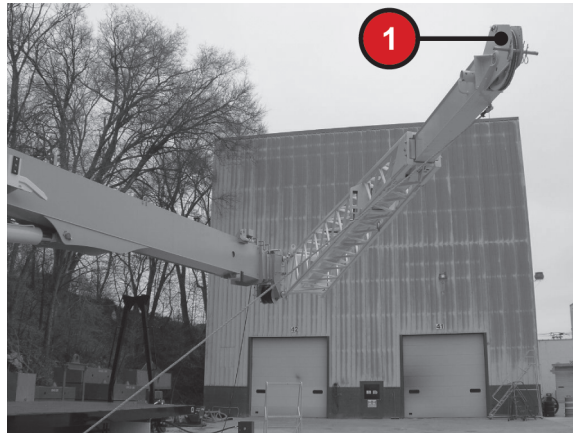
15. Check to ensure that the boom is extended approximately 15 inches this will allow the jib stow bars to clear the jib STOW BRACKETS.
16. Swing jib back along the side of the main boom with tag line.



CONTROL MOVEMENT OF THE JIB AT ALL TIMES TO PREVENT INJURY AND/OR EQUIPMENT DAMAGE.

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Disassembly



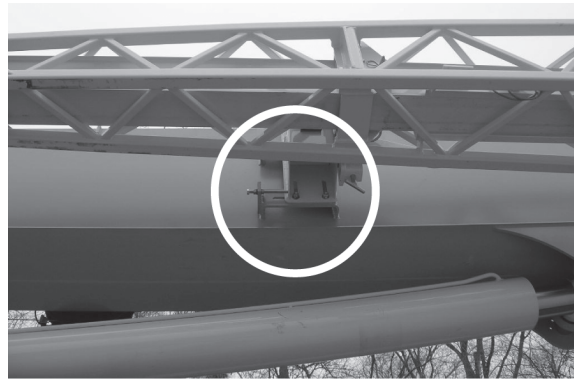
1 Pin Stow Bracket

17. Jib should be parallel to the boom and the JIB STOW BAR and JIB STOW BRACKETS in alignment.

NOTE: *There are front and rear stow brackets to secure the boom, both must be observed for proper alignment during this procedure. Refer to the following images to be sure the locations and procedures for these brackets is understood.*



18. Lock the JIB LOCK PIN in the open position. This can be done by pulling on the handle and adding a twist to lock it in the open position.
19. Slowly retract the boom while observing that the jib properly engages the JIB STOW BRACKETS.



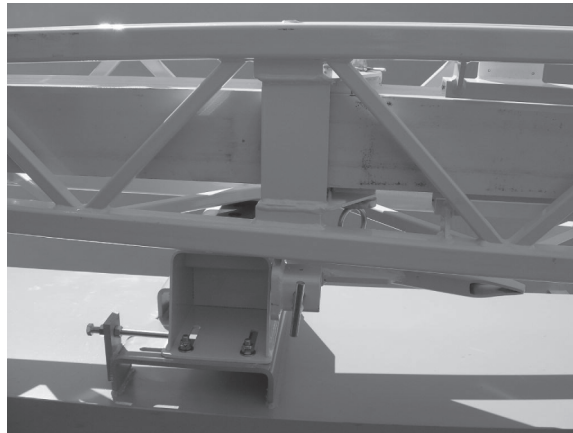
Jib Lock Pin Location

20. Lock the JIB LOCK PIN. This pin is spring loaded and will slide into it's closed position when the handle is rotated to the proper orientation. Confirm that the pin is fully seated and that the jib is fully secured to the boom.



DO NOT PROCEED TO THE NEXT STEP UNTIL THE JIB IS FULLY AND ABSOLUTELY SECURED TO ITS STOWAGE BRACKETS. IF THERE IS ANY DOUBT ABOUT THE SECURITY OF THE JIB ON THE STOWAGE BRACKETS, STOP AND REVIEW THE STEPS CONTAINED IN THIS MANUAL, CONFIRMING THE SECURITY OF THE STOWED JIB BEFORE PROCEEDING.

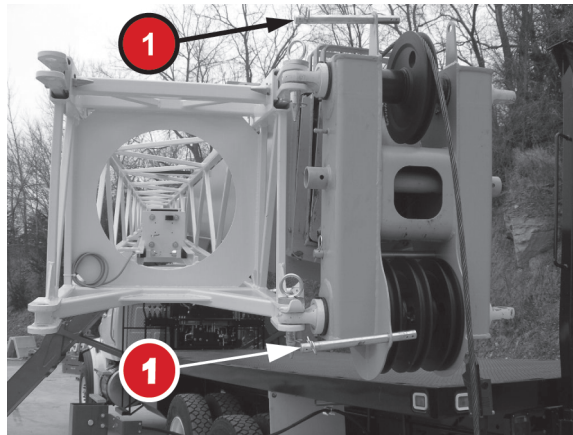




21. Remove the remaining two PINS and retainers from boom/jib ears.

NOTE: *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.*

22. Stow the two PINS and RETAINERS TOOL BOX.
23. Remove bottom and top retainers and GUIDE PINS from sheave head.
24. Route Cable through both sheaves and re-install the PINS and RETAINERS.



| | |
|---|-----|
| 1 | Pin |
|---|-----|

25. Attach ball or block to wire rope with pin and retainer.
26. Winch in the excess cable while being sure that the cable is spooling on the winch drum correctly. It may be necessary to provide tension on the wire rope to ensure that it lays on the winch drum correctly.



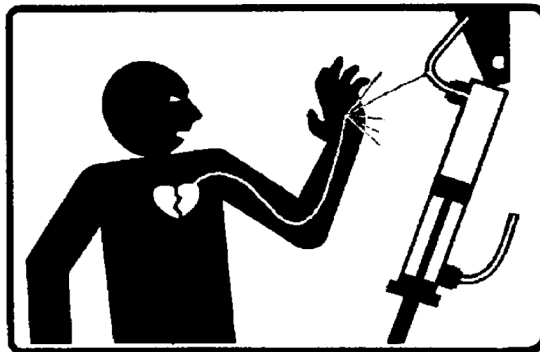
Safety Practices

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



DO NOT GO NEAR LEAKS

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

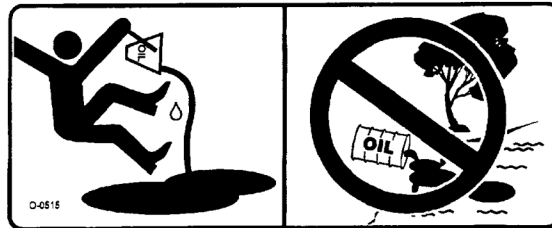


9. Hydraulic oil is flammable; DO NOT check inside hydraulic tank with an open flame.



DO NOT SPILL OR DUMP OIL

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



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

General Work Practices


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

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

Cold Weather Package Specification

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

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



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

COLD WEATHER PACKAGE COMPONENTS

| Description | SPEC. NO. | Load King Part No. |
|---------------------------------------|---|---------------------------|
| Main & Aux. Winch, Swing Drive | Mobil Gear SHC 150 or Shell OMALA HD 150 | T117493 |
| Hydraulic Oil-see data sheet | Petro-Canada Hydrex Extreme or Shell Tellus Arctic 32 | T117487 |
| Hydraulic Tank Heater | 120V or 240V | A38556 |
| Grease (upper structure & outriggers) | Mobilith SHC 220 Schaeffer 274 Moly EP Shell Alvania EP Arctic Moly O | T117494 |

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

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.

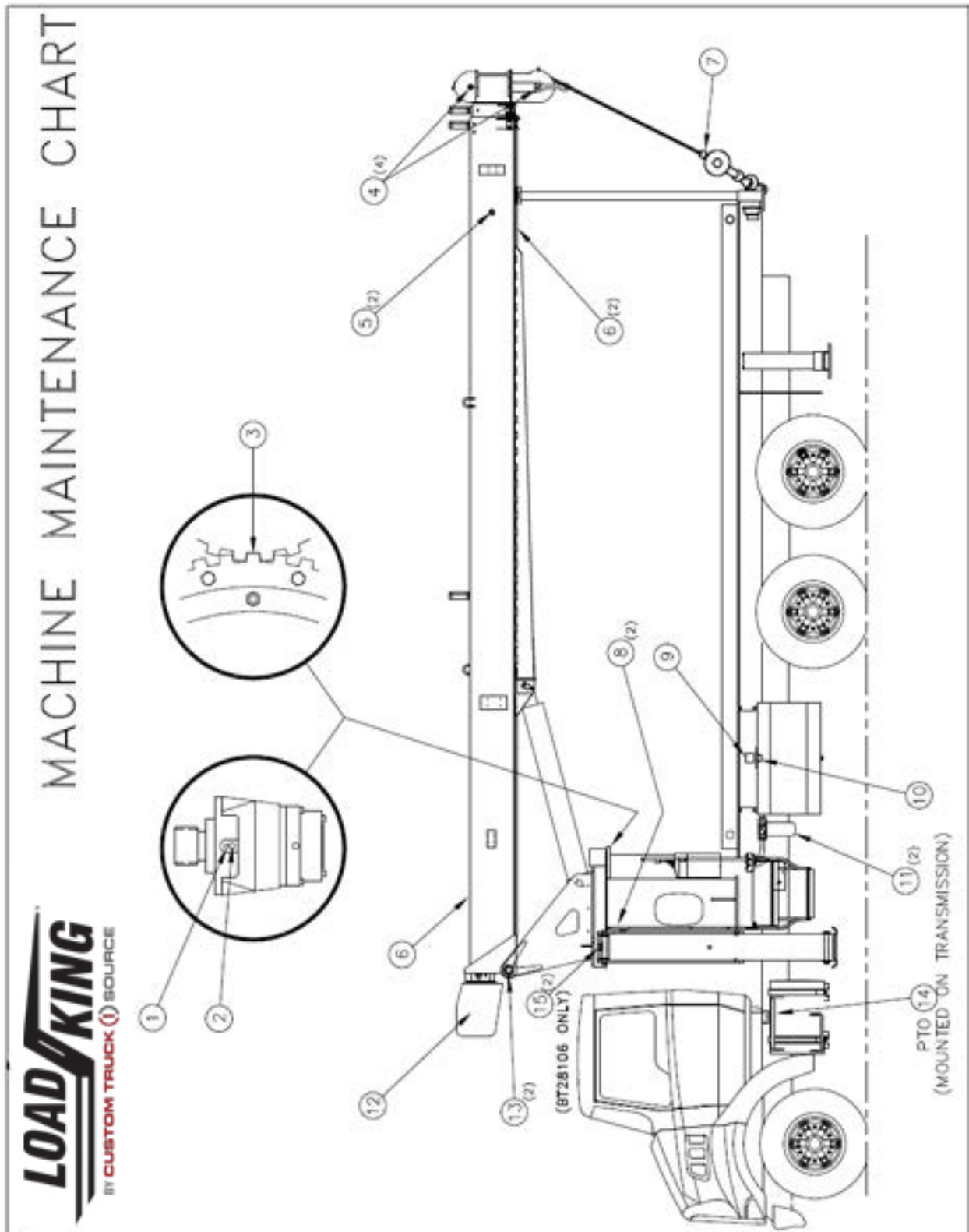


DO NOT USE RAGS TO PLUG OPENINGS. USE CLEAN PLASTIC OR METAL PLUGS AND CAPS.

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.


19-70 & 28-106 Master Lube Chart





19-70 / 28-106


Maintenance

| | | | | | | | | | |
|--|------|------|------|-----|---|------------------------------------|--|---------------------|-----------|
| <div> <div>8 HOURS OR DAILY</div> <div>40 HOURS OR WEEKLY</div> <div>150 HOURS OR MONTHLY</div> <div>450 HOURS OR THREE MONTHS</div> <div>900 HOURS OR SIX MONTHS</div> </div> | | | | | <div> <div>LEGEND:</div> <div> <div>CHK = CHECK</div> <div>LUBE = LUBRICATE</div> <div>C/F = CHANGE FILTER</div> <div>D/R = DRAIN & REFILL</div> </div> <div> <div>MPG = MULTI-PURPOSE GREASE, EP2</div> <div>PGO = PLANETARY GEARBOX OIL</div> <div>HO = HYDRAULIC OIL, ISO 32</div> <div>N/A = NOT APPLICABLE</div> </div> </div> | | | | |
| | | | | | REF | DESCRIPTION | | QUANTITY | LUBRICANT |
| | | LUBE | | | 1 | SWING DRIVE GREASE FITTING |   | AS REQ'D | MPG |
| | | | CHK | D/R | 2 | SWING DRIVE FILL PLUG |   | FILL PLUG LEVEL | PGO |
| | LUBE | | | | 3 | SWING GEAR TEETH |   | AS REQ'D | MPG |
| | LUBE | | | | 4 | SHEAVE PINS |   | AS REQ'D | MPG |
| | LUBE | | | | 5 | EXTEND CABLE SHEAVES |    | AS REQ'D | MPG |
| | | LUBE | | | 6 | ALL SIDES OF BOOM |   | AS REQ'D | MPG |
| | LUBE | | | | 7 | LOAD BALL PIVOT |   | AS REQ'D | MPG |
| | | LUBE | | | 8 | SWING BEARING GREASE FITTINGS |   | AS REQ'D | MPG |
| | | | C/F | | 9 | OIL BREATHER |  | REPLACE | N/A |
| CHK | | | | | 10 | HYDRAULIC SYSTEM RESERVOIR |   | CHK & FILL AS REQ'D | HO |
| | | C/F | | | 11 | HYDRAULIC SYSTEM FILTER |  | REPLACE | N/A |
| | | | CHK | D/R | 12 | WINCH |   | FILL PLUG LEVEL | PGO |
| LUBE | | | | | 13 | RETRACT CABLE SHEAVES |    | AS REQ'D | MPG |
| | | LUBE | | | 14 | PTO |   | AS REQ'D | MPG |
| | | | LUBE | | 15 | O/R PIN AT CYLINDER (BT28106 ONLY) |   | AS REQ'D | MPG |
| | | | | CHK | 16 | CHECK TORQUE ON BOLTS |  | ALL | N/A |

NOTE:  Reduce all lubrication intervals under severe operating conditions. Refer to Operator's Manual for drain/refill procedures and additional information. Check outrigger beams daily and remove excess dirt.

 See Operator's Manual.

 Grease w/Boom Fully Retracted

 Acceptable Planetary Gearbox Oils: 10° to 100°F (-12° to 38°C) AGMA 4 EP, ISO VG 150; 25° to 130°F (-4° to 54°C) AGMA 5 EP, ISO VG 220; -30° to 130°F (-34° to 54°C) Mobilgear SHC 150 or 220

T137469 REV B

1. SWING DRIVE GREASE FITTING - LUBE @ 150 HRS. OR MONTHLY
2. SWING DRIVE FILL PLUG - CHECK @ 450 HRS.- DRAIN AND REFILL @ 900 HRS. OR SIX MONTHS
3. SWING GEAR TEETH - LUBE @ 40 HRS. OR WEEKLY
4. SHEAVE PINS - LUBE @ 40 HRS. OR WEEKLY
5. EXTEND CABLE SHEAVES - LUBE @ 40 HRS. OR WEEKLY
6. ALL SIDES OF BOOM - LUBE @ 150 HRS. OR MONTHLY

- 7.** LOAD BALL PIVOT - LUBE @ 40 HRS. OR WEEKLY
- 8.** SWING BEARING GREASE FITTINGS - LUBE @ 150 HRS OR MONTHLY
- 9.** OIL BREATHER - CHANGE FILTER @ 450 HRS. OR THREE MONTHS
- 10.** HYDRAULIC SYSTEM RESERVOIR - CHECK EVERY 8 HRS OR DAILY
- 11.** HYDRAULIC SYSTEM FILTER - CHANGE FILTER @ 150 HRS OR MONTHLY
- 12.** WINCH - CHECK @ 450 HRS. OR THREE MONTHS - DRAIN AND REFILL AT 900 HRS OR SIX MONTHS
- 13.** RETRACT CABLE SHEAVES - LUBE @ 8 HRS OR DAILY
- 14.** PTO - LUBE @ 150 HRS. OR MONTHLY
- 15.** O/R PIN AT CYLINDER (28-106 ONLY) - LUBE @ 450 HRS. OR THREE MONTHS
- 16.** CHECK TORQUE ON BOLTS - CHECK AT 900 HRS. OR SIX MONTHS

| LEGEND | |
|--------|---------------------------|
| CHK | CHECK |
| LUBE | LUBRICATE |
| C/F | CHANGE FILTER |
| D/R | DRAIN & REFILL |
| MPG | MULTI-PURPOSE GREASE, EP2 |
| PGO | PLANETARY GEARBOX OIL |
| HO | HYDRAULIC OIL, ISO 32 |
| N/A | NOT APPLICABLE |



NOTE: Δ 1. Reduce all lubrication intervals under severe operating conditions. Refer to Operator's Manual for drain/refill procedures and additional information. Check outrigger beams daily and remove excess dirt.

Δ 2. See Operator's Manual.

Δ 3. Grease w/Boom Fully Retracted.

Δ 4. Acceptable Planetary Gearbox Oils: 10° to 100°F (-12° to 38°C) AGMA 4 EP, ISO VG 150; 25° to 130°F (-4° TO 54°C) AGMA 5 EP, ISO VG 220; -30° to 130°F (-34° to 54°C) Mobilgear SHC 150 or 220.

Maintenance Checks and Lubrication

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

DAILY OPERATOR CHECKS

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

CHECKING THE TRUCK

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

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

Do additional checks per truck operator's manual.

DAILY CHECKS

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

1. Set parking brake, start engine, put transmission in neutral and engage PTO. Allow the hydraulic system to warm up slightly. Check for any sign of oil leaks or damaged hoses.
2. Extend all four outriggers to a firm surface, raise truck to just clear tires from ground, and shut the engine off. Move outrigger handles to unload any oil trapped in the hoses. This is an opportunity to ensure the outrigger holding cartridges are not leaking under load.
3. Check all controls for any signs of sticking and proper operation of functions. With boom elevated and extended, shut off engine, move topping and extension control handles, and check for signs of boom drift.
4. Check to make certain that the load line is properly spooled on the winch drum and that it is not damaged.

5. Check all Operator Aids for proper operation (Anti-2 Block, Load Moment Sensing System and Holding Valves).
6. Do daily lubrication.
7. Check that the downhaul weight (load block or ball) is properly secured to the loadline and the hook safety latch is in proper operating condition.

WEEKLY CHECKS

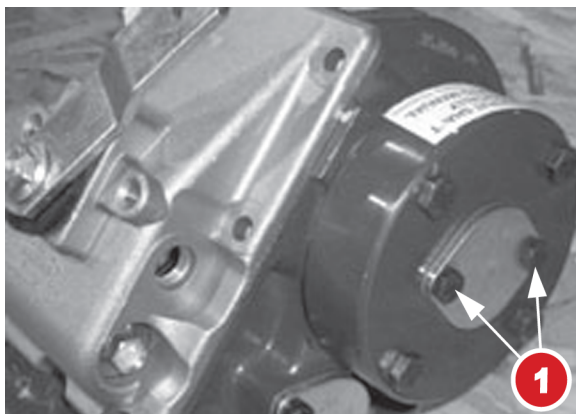
The following weekly checks should be performed in addition to the daily checks:

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

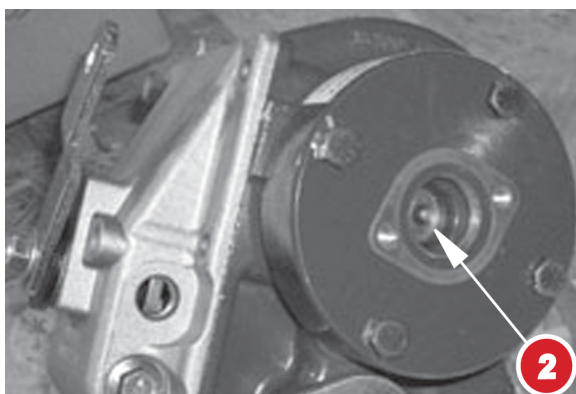
MONTHLY OPERATIONAL CHECKS

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

1. Check oil level in the rotation gearbox. It should be filled with HD-80W90 to the fill plug. At this time a shot of grease should be added to the grease zerk on the upper bearing. (Caution: Do not overgrease this bearing!)
2. Check for excessive movement in the rotation gear mechanism. If over 4" of movement (side to side) is detected by moving the boom tip back and forth when fully retracted, it would be considered excessive. (See [Care and Maintenance of the Rotation System on page 228.](#))
3. Inspect all crane mounting bolts for signs of looseness or breakage. Replace or retorque where necessary. (See [Care and Maintenance of the Rotation System Torque Specs -SAE & Metric on page 349.](#))
4. Extend all boom sections and check for physical defects, cracks and signs of overstress. Check the boom while extending to make sure it is properly sequencing. With the boom fully extended, check for excessive droop. Check the torque on the retraction cables (torque must be at 30-35 ft/lbs). Check to make certain all boom wear pads are in place and tight, and no excessive slop between boom sections is detected. (If repair is indicated, see [19-70 Wear Pad Adjustment and Replacement on page 290](#) or [28-106 Wear Pad Adjustment and Replacement on page 305.](#))
5. Check that all boom and outrigger pins are properly secured and make certain that keepers and snap rings are present and properly installed.
6. Inspect load line for signs of kinking, crushing, cutting, or other damage.
7. Inspect weldments for signs of cracks at weld joints on all structural members.
8. Lubricate PTO with multi-purpose grease



1 Shaft Cover Screws



2 Grease Zerk

PTO Lubrication Instructions:

1. Remove Shaft cover Screws (1) and remove cover.
2. Using grease gun, apply 2-3 pumps of multipurpose grease through grease zerk (2).
3. Replace shaft cover and tighten screws.
9. Change hydraulic oil filter.

Hydraulic Hoses

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

Inspection of Hydraulic Hoses

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

Inspection Criteria:

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

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

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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:

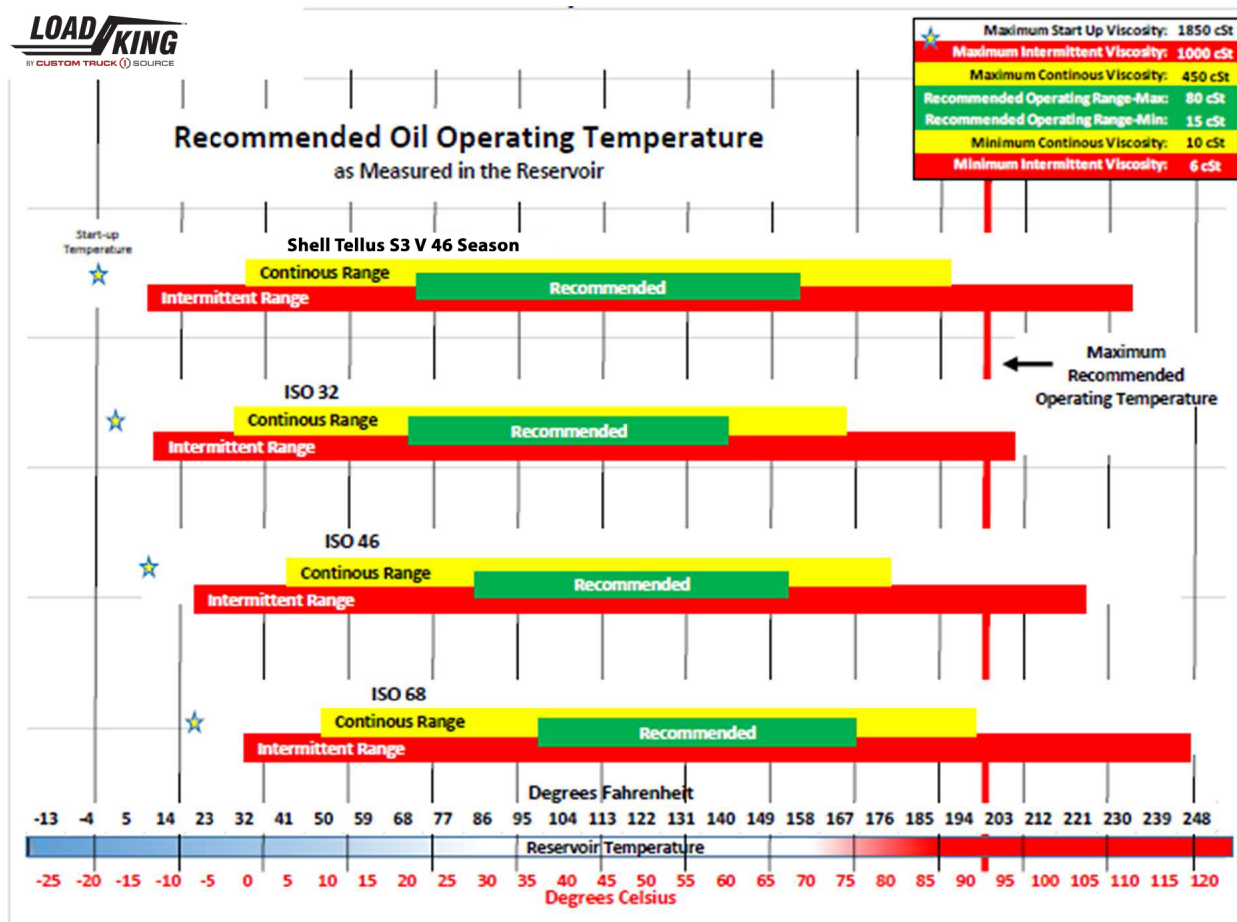
If replacement of hydraulic hose assemblies is required, it is recommended to use original spare parts from the OEM or hose assemblies according to the OEM specification which includes the fittings, bulk hose material and manufacturing process.

Hydraulic Oil Requirements

The hydraulic system is filled with a **Shell Tellus S3 V 46** premium hydraulic oil. This hydraulic oil is recommended for a broad range of operating temperatures but the end user is ultimately responsible for determining if the oil is appropriate for their specific operating conditions or if another hydraulic oil is required. To ensure the longest life for this piece of equipment, it is critical to maintain the hydraulic oil at the proper level, to keep the hydraulic fluid clean (see Hydraulic Maintenance section), and to avoid overheating the oil.

The oil for the hydraulic system performs multiple functions. While the hydraulic oil must transmit power and provide superior lubrication under high pressure, there are other properties that are critical to the oil and the performance of the equipment. These include, but are not limited to, wear protection, oil oxidation, rust and corrosion protection and foaming. To guide in the selection of the proper oil, refer to the [Oil Viscosity Selection Chart on page 218](#) and the listings of [Typical Qualified Hydraulic Oils on page 219](#) below.

Oil Viscosity Selection Chart



Oil Viscosity Selection Chart Color Legend

| | |
|--------|---|
| GREEN | Recommended - Component manufacturer's optimal Range |
| YELLOW | Continuous - Component manufacturer's limits for 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 on page 218](#)). For startup temperatures lower than what is indicated in the chart, follow the warm up procedures in the operating manual to increase the fluid temperature and decrease potential damage. Additionally, these machines should not be operated with hydraulic reservoir temperatures in excess of 200°F (93°C). These high temperatures cause degradation of the hydraulic fluid and rubber components such as hoses and seals.

If overheating occurs, discontinue operation and:

1. Check the hydraulic fluid level.

- 2.** Check the oil cooler for plugs or restricted air flow.
- 3.** Check that the oil viscosity matches that recommended for the operating temperature.
- 4.** Check pressure settings – Is a pump failing or a relief set to low?
- 5.** Reduce the duty cycle of the machine.
- 6.** Consult an Authorized Load King Dealer.

The following hydraulic oils are not recommended:

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

Typical Qualified Hydraulic Oils

| OIL COMPANY | ISO | BRAND NAME | OIL COMPANY | ISO | BRAND NAME |
|-------------------------------|-----|---|-----------------------------|-----|--|
| Conoco | 32 | Conoco DN 600 (Arctic) | Northland Products (USA) | 32 | Talamar 150 |
| | | Conoco Super Hyd. 5W-20 (Multi-Viscosity) | | 46 | Talamar 215 |
| | | Conoco Super Hyd. 32 | | 68 | Talamar 315 |
| | 46 | Conoco Super Hyd. 46 | | 46 | Talamar All-Season Premium (Multi-viscosity) |
| Exxon Co. (USA) | 32 | Nuto-H 32 | | 32 | Talamar Extreme 32 |
| | | Nuto-H 46 | | 68 | Talamar Extreme HTA 68 |
| | | Nuto-H 68 | Pennzoil Products Co. (USA) | 32 | AWX Multi-Viscosity |
| Imperial Oil Limited (Canada) | 46 | Nuto H 32 | | 46 | AW 32 Hyd. Fluids |
| | 46 | Nuto H 46 | | 46 | AW 46 Hyd. Fluids |
| | 68 | Nuto H 68 | | 68 | AW 68 Hyd. Fluids |
| Kendall Refining Co. (USA) | 32 | Kenoil R&O AW 32 | Shell Co. (USA) | 23 | Tellus 23 |
| | 46 | Kenoil R&O AW 46 | | 32 | Tellus 32 |
| | 68 | Kenoil R&O AW 68 | | 46 | Tellus 46 (XSL 9101) |
| | | | | 68 | Tellus 68 |

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Maintenance

| OIL COMPANY | ISO | BRAND NAME | OIL COMPANY | ISO | BRAND NAME |
|-----------------|-----|----------------|----------------------|-----|----------------------------|
| Mobil Oil Corp. | 32 | DTE 24/DTE-13M | Texaco Inc. (USA) | | Rando Oil HD A2 (5w-20) |
| | 46 | DTE 25/DTE-15M | | 32 | Rando Oil HD 32 |
| | 68 | DTE 26/DTE-16M | | 46 | Rando Oil HD 46 |
| | | | | 68 | Rando Oil HD 68 |

90-Day Maintenance Items

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

1. Check and reset the rotation gear backlash. (See [Backlash Adjustment on page 341](#).)
2. Torque rotation gear mounting bolts. (See [Torque Specs -SAE & Metric on page 349](#).)
3. Run the unit long enough to get the hydraulic system fully warmed up and inspect thoroughly for signs of leakage due to worn hoses or loose fittings. Correct as necessary.
4. Check the load block and the downhaul weight for signs of overloading, spread side plates, elongated holes, bent tie bolts or cracks.
5. 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 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 (Anti- Two Block, Rated Capacity Indicator System, holding valves) for proper functioning and signs of deterioration.
8. Replace hydraulic tank breather.

Semi-Annual Maintenance Items

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

1. Torque the mainframe and rear outrigger mounting bolts. (See [Torque Specs- SAE & Metric on page 349](#).)
2. Check Hydraulic system pressures and adjust as necessary.
3. Inspect all visible wear pads for excessive wear or looseness.



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

Filters and Maintenance

DETERMINING THE CONDITION OF THE OIL

The only definite way to assure that all accumulated contaminants which will wear the pump, motors, and cylinders are removed from the hydraulic system is to drain the old oil and replace it with new. If oil did not break down or could be kept lean permanently, changing would not be necessary. The easiest way to determine the condition of oil is to obtain a sample from the system and make a visual examination.

Drain some oil from the reservoir into a clean glass container. If it has a burnt or rancid smell, or is cloudy or dark in color, the oil needs to be changed. If water appears in the bottom of the glass after it has stood awhile there may be either an opening for water to enter into the system, or the unit has been operating under conditions causing condensation. A good example of condensation from extreme temperature changes is when the unit is parked in a warm garage after being out in the cold all day.

The entry and sustained presence of water, solvents, and abrasive dirt will adversely affect the proper condition of the oil. This can cause premature breakdown of viscosity, 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 used.

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

If the oil is drained from the unit and replaced with new oil, the unit must be run for a total of 10 hours after the change before another sample is taken for testing. This will acclimate the oil to the unit and give more conclusive results during testing.

FILTRATION

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

This system is equipped with a 10 micron spin on type filter to strain out particles down to 10 microns in size. (40 microns is as small as the eye can see).

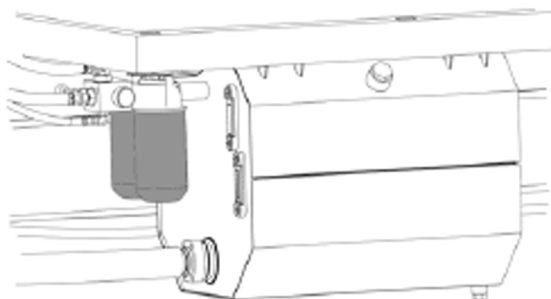
All new equipment will experience some wear during initial operation. This should improve the operation of the new components after they have seated. This wear will introduce small metal particles into the system - most of which will be collected by the filter. After this breaking in process, it is mandatory 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 3,000 RPM it is a warning that the filter is in the bypass mode and filtration is not occurring.



NOTE: *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 on the front of the oil tank, as shown above. To change the return filter, shut off the power supply to the pump and unscrew the filter canister. Be careful to catch any oil spilled in a drain pan. Slightly lubricate the rubber seal on the new filter and tighten 1/3 turn past contact.



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, remember there is no other single factor more important to the unit's life and economic operation than the quality of the oil used. Protect the oil from losing its proper condition by rigidly following the inspection schedules and servicing of filters.

Our equipment has been quality engineered for quality oils. The finely machined cylinder and valve components cannot be expected to withstand abuse due to improper care of the hydraulic system. The most economical operation of the hydraulic system results from the use of a premium quality oil and conscientious preventative maintenance in accordance with this manual.

Load King recommends the following oil, because of its quality and availability.

| RECOMMENDED OIL | AMBIENT TEMPERATURE | VISCOSITY INDEX AT 100° C |
|-----------------|---------------------|---------------------------|
| Arctic | -55°F | 217 |
| RENOLIN AW 32 | -40° to 210°F | 150 |

Any quality hydraulic oil formulated for heavy-duty applications and meeting Texaco performance requirements is acceptable for use in a Load King Stinger Boom Truck. However, different manufacturer's use chemical formulations which may not be compatible. Therefore, at a minimum, you must verify that any makeup oil added is compatible with the oil already in the system. When changing oil, if a different brand is used, the system should be flushed by cycling all cylinders at least once to their limits to insure that as much as possible of the old oil has been removed from the system.



NOTE: *Observe all oil handling hazards. Used oil should be recycled or reclaimed. Remember, oil is not a disposable resource and it is your responsibility to maintain sound environmental practices in regards to used oil and other fluids*



IMPROPER OR INADEQUATE MAINTENANCE OF THE HYDRAULIC OIL OR OIL FILTER WILL RESULT IN PREMATURE WEAR TO VALVES, CYLINDERS, MOTORS, ETC.

Rotation System Maintenance and Troubleshooting

Swing System

The swing system is equipped with a counterbalancing motor control. There are some basic reasons to have this system as follows:

1. To insure that the swing brake is used only as a parking brake instead of a service type brake. The brake system is not designed to slow the rotation of the unit as some people believe. It is designed to hold the boom from drifting after it is brought to a stop hydraulically. To use in any other way would cause premature wear and early failure of the brake. One counterbalance valve must pilot open the other to allow swing movement. This in turn provides a brake release signal so the brake is fully released before the boom moves.
2. The counterbalance valves used on the swing system have a 4:1 operating ratio. When used in the pilot to open mode, the sleeve portion of the cartridge may be moved in mere thousandths of an inch which provides a very precise metering control.

OPERATE MODE

When the swing control valve is shifted to swing counterclockwise, oil is directed to the valve port on the counterbalance valve which free-flows through to the motor inlet. But, the motor cannot turn because the counterbalance valve on the return side of the motor is closed and the swing brake is applied.

As pressure at the motor inlet increases, the internal shuttle valve shifts thus directing pilot pressure to release the parking brake. At the same time, this pilot pressure opens the counterbalance valve on the return side, allowing the motor to swing the boom. Return oil then flows through the other counterbalance cartridge and returns to tank through the return circuit.

The swing brake springs and the counterbalance valve are sized so that the brake releases at lower pressure than the counterbalance valve opens. This action prevents premature brake wear and chatter that could occur if the motor was allowed to turn through a partially applied brake.

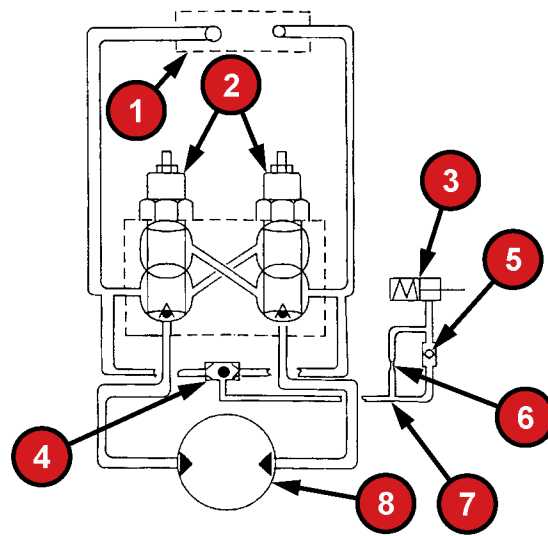
If the boom attempts to swing faster than the supply of oil to the motor, pressure on the inlet side of the motor will decrease. This decrease in pressure will cause the counterbalance valve, at the motor outlet, to partially close and restrict return oil flow, thus decreasing the swing speed. With a given flow rate to the motor (determined by position of swing control valve spool), the counterbalance valve will automatically establish a balance between spring force trying to close the valve and pilot pressure trying to open the valve; therefore, the swing speed will be controlled at a constant rate.

NEUTRAL MODE

As the swing control valve is shifted to the neutral position; pressure at the motor inlet, counterbalance valve, and swing brake decreases. As pressure decreases, the counterbalance valve gradually closes, bringing the boom to a smooth stop. The Swing brake then applies, holding the swing in a "zero drift" condition. Braking is done primarily

by the counterbalance valve which prevents brake chatter that could occur if only the swing brake was used to stop the swing motion. The swing brake is also delayed from engaging by a check valve in the pressure line. This gives more assurance that the swing stops before the brake engages, maintaining long life of the brake components.

If pressure is lost for any reason while swinging, the counterbalance valve will fully close and the swing brake will spring apply to stop the swing motion. This is why it is important to smoothly meter the application and release of the swing control handle. To assist the operator with these requirements, a brake application restrictor orifice and brake release free flow check valve allow the brake to release quickly and re-engage slowly. The schematic on the next page will aid in following the descriptive operation of the swing system.



SWING SYSTEM FLOWCHART

| | | | |
|---|---------------------------|---|--------------------------------------|
| 1 | Valve Section | 5 | Brake Release Free-Flow Check |
| 2 | Counterbalance Cartridges | 6 | Brake Application Restrictor Orifice |
| 3 | Swing Brake | 7 | Brake Release Line |
| 4 | Shuttle | 8 | Hydraulic Motor |

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 faxed to you.

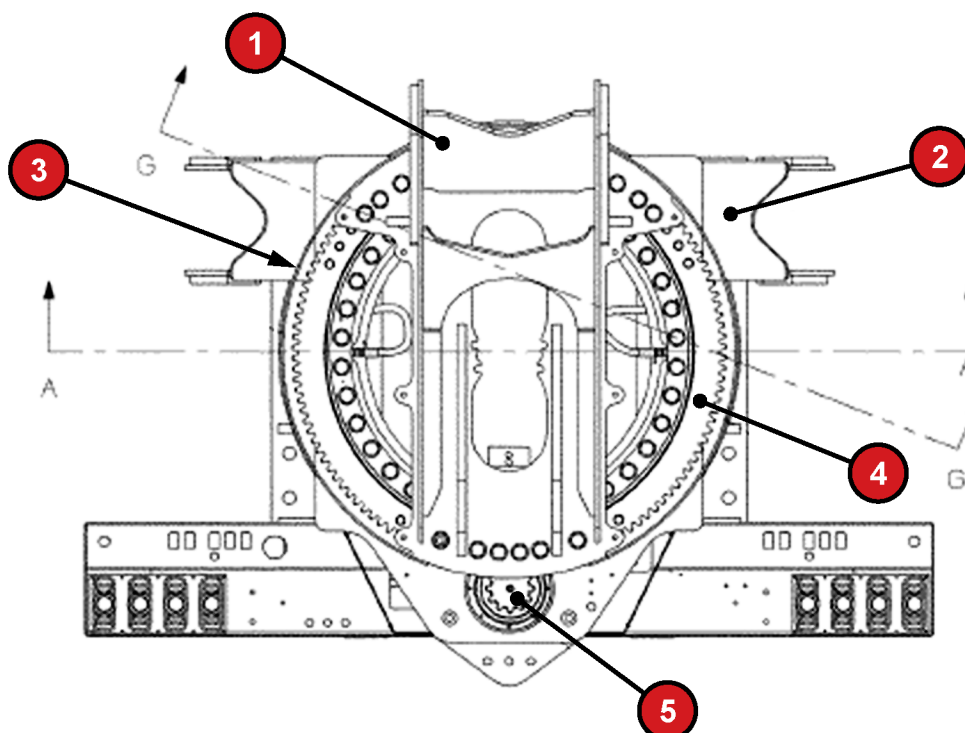
The following steps will produce the longest possible life of the rotation bearing and rotation gearbox:

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 below show the location of the rotation bolts.



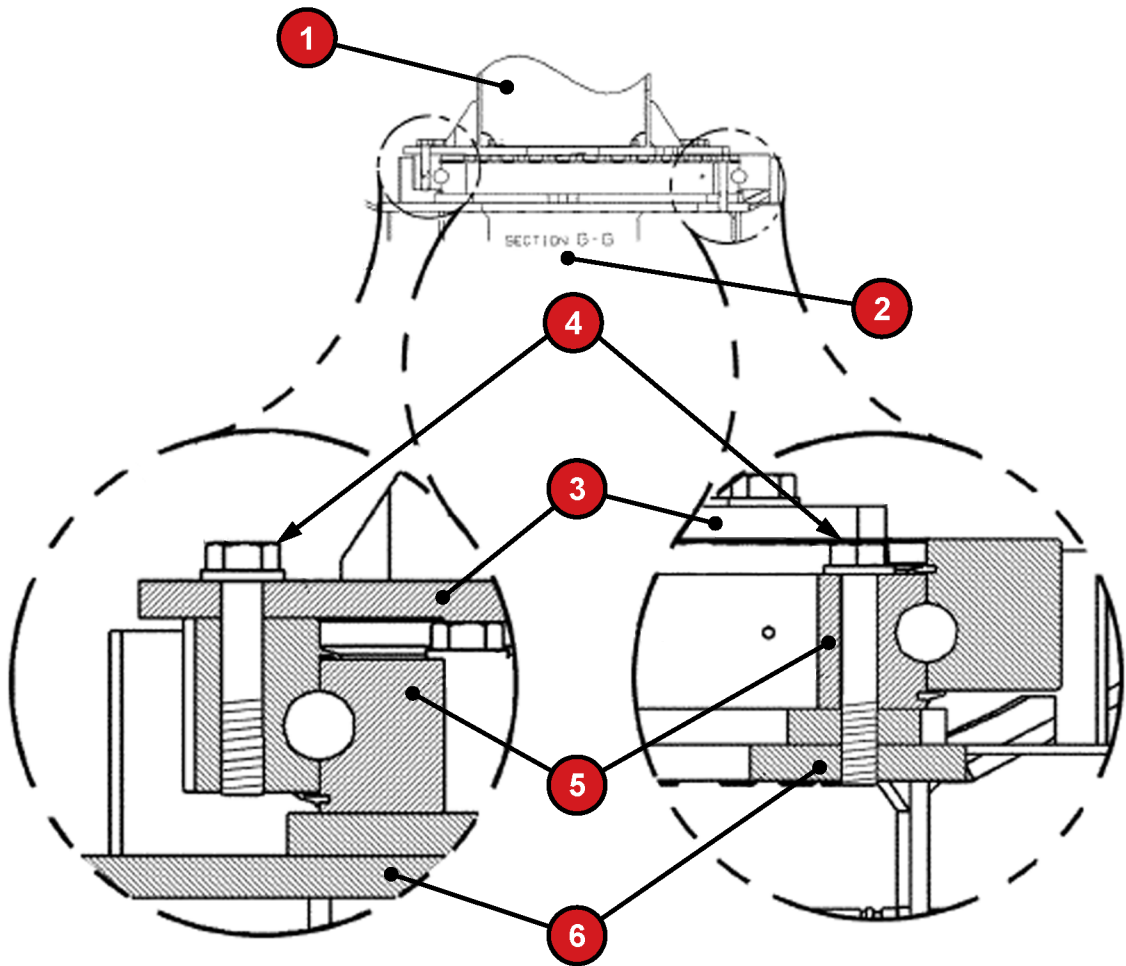
FAILURE TO OBSERVE THE ABOVE RECOMMENDATION COULD RESULT IN FAILURE OF ROTATION GEAR MOUNTING BOLTS AND ENDANGER THE OPERATOR AND JOB SITE PERSONNEL.

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 #2) be used.



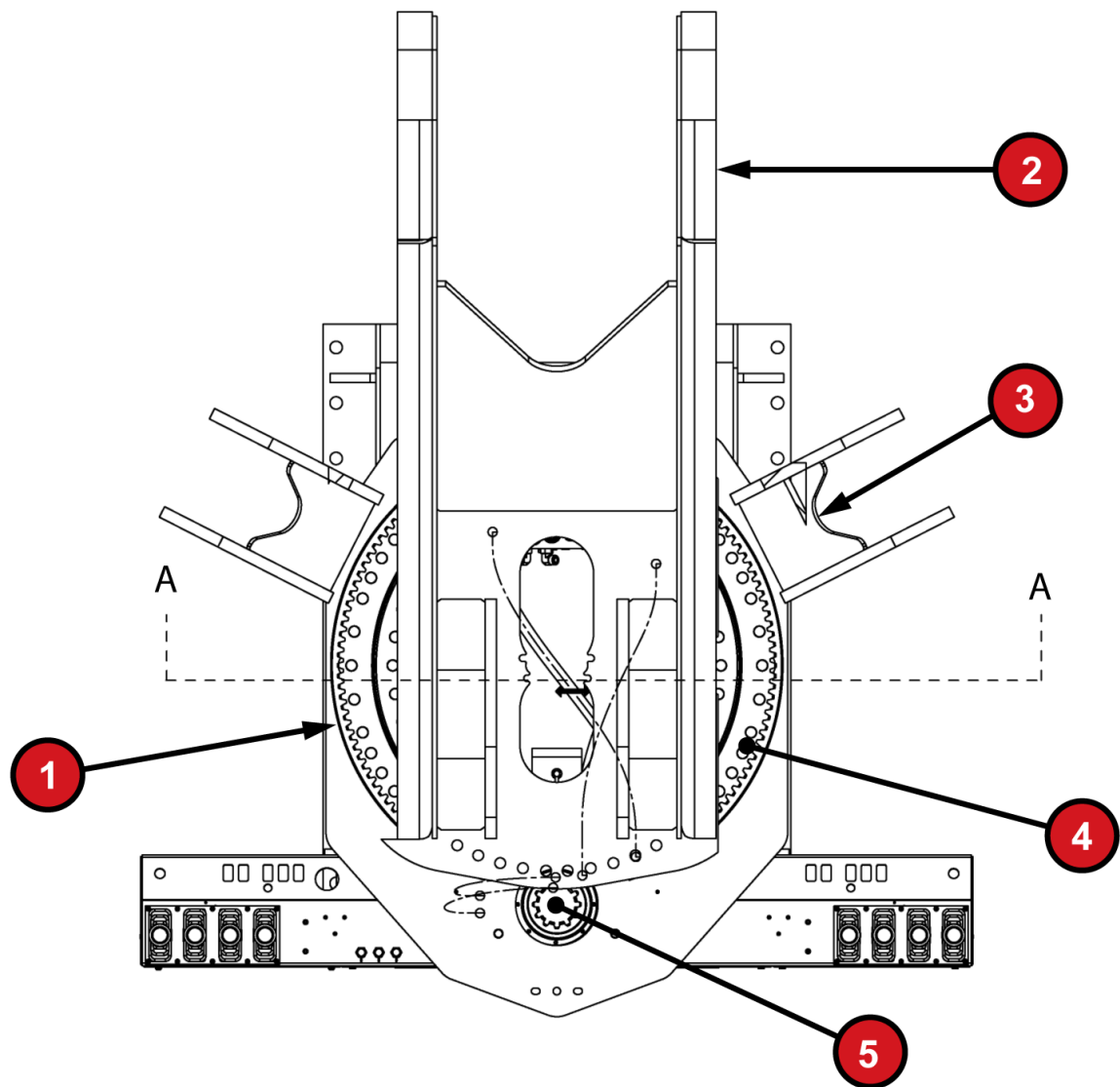
19-70 Mainframe/Turret Assembly - Top View

| | | | |
|---|-------------------------|---|---------------------|
| 1 | Turret | 4 | Rotation Bearing |
| 2 | Mainframe | 5 | Rotation Drive Gear |
| 3 | Rotation Bearing Shroud | | |



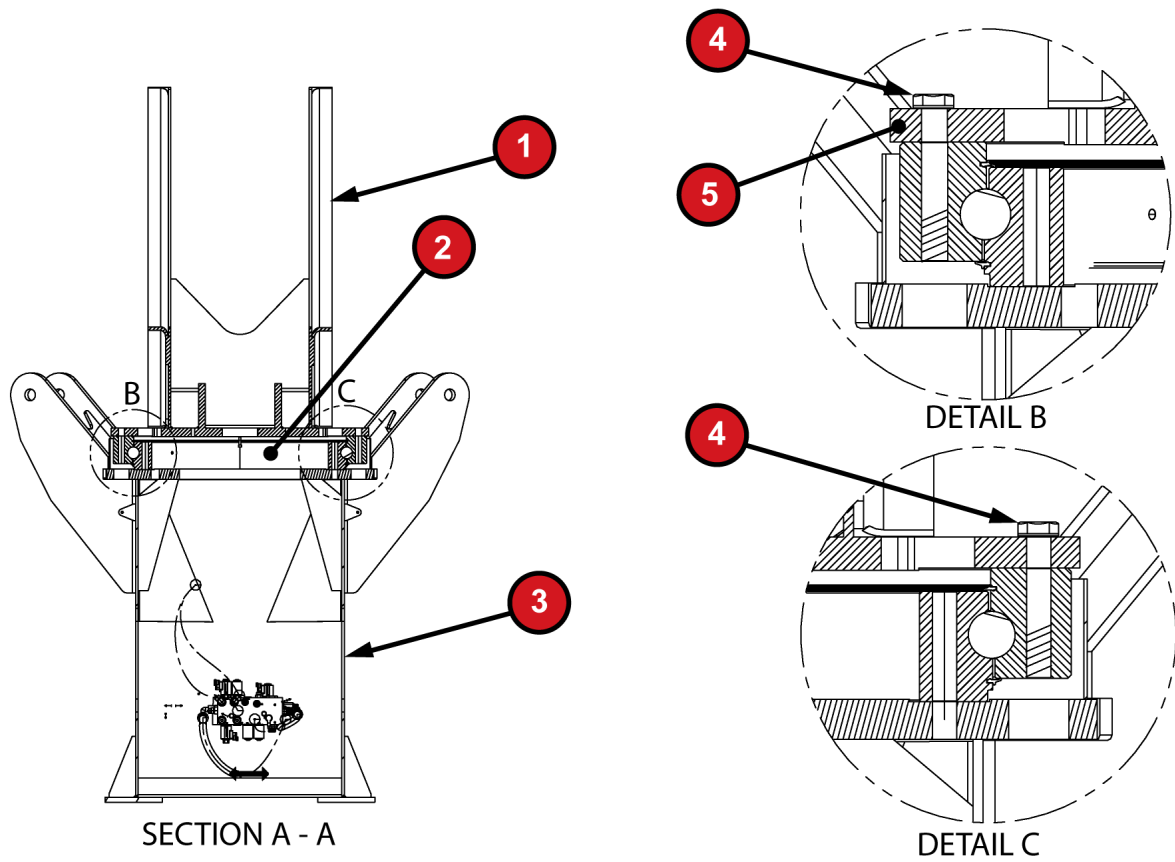
19-70 Mainframe/Turret Assembly - Side View

| | | | |
|---|-------------------|---|--------------------------|
| 1 | Turret | 4 | .875-9 GR8 Hex Head Bolt |
| 2 | Mainframe | 5 | Rotation Bearing |
| 3 | Turret Base Plate | 6 | Mainframe Top Plate |



BT26106 Mainframe/Turret Assembly - Top View

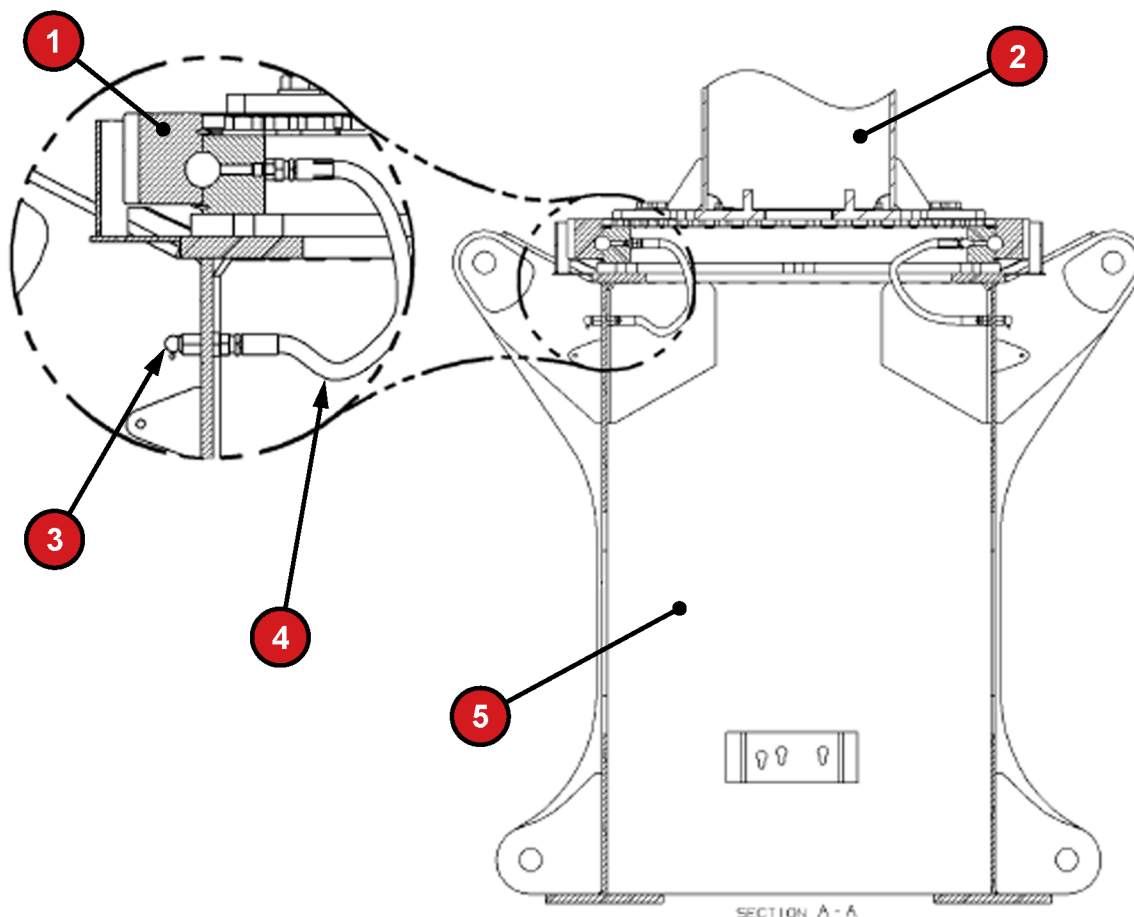
| | | | |
|---|-------------------------|---|---------------------|
| 1 | Rotation Bearing Shroud | 4 | Rotation Bearing |
| 2 | Turret | 5 | Rotation Drive Gear |
| 3 | Mainframe | | |



BT26106 Mainframe/Turret Assembly - Side View w/ Detail

| | | | |
|---|------------------|---|----------------------------|
| 1 | Turret | 4 | Hex Head Bolt, .875-9, GR8 |
| 2 | Rotation Bearing | 5 | Turret Base Plate |
| 3 | Mainframe | | |

Rotation Bearing Lubrication



| | | | |
|---|------------------|---|-------------|
| 1 | Rotation Bearing | 4 | Grease Line |
| 2 | Turret | 5 | Main Frame |
| 3 | Grease Fitting | | |

Under normal operation, the rotation bearing should be greased once a week. The grease fittings are located on either side of the mainframe, near the upper outrigger gussets. There is one grease fitting for each side of the rotation bearing, 180° apart.

To properly grease this bearing, the unit should be set up with the outriggers in an operating position. Attach the grease gun to a fitting and apply 3 full shots from the grease gun. Repeat for the other grease fitting. 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.



NOTE: 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.

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 #2 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.

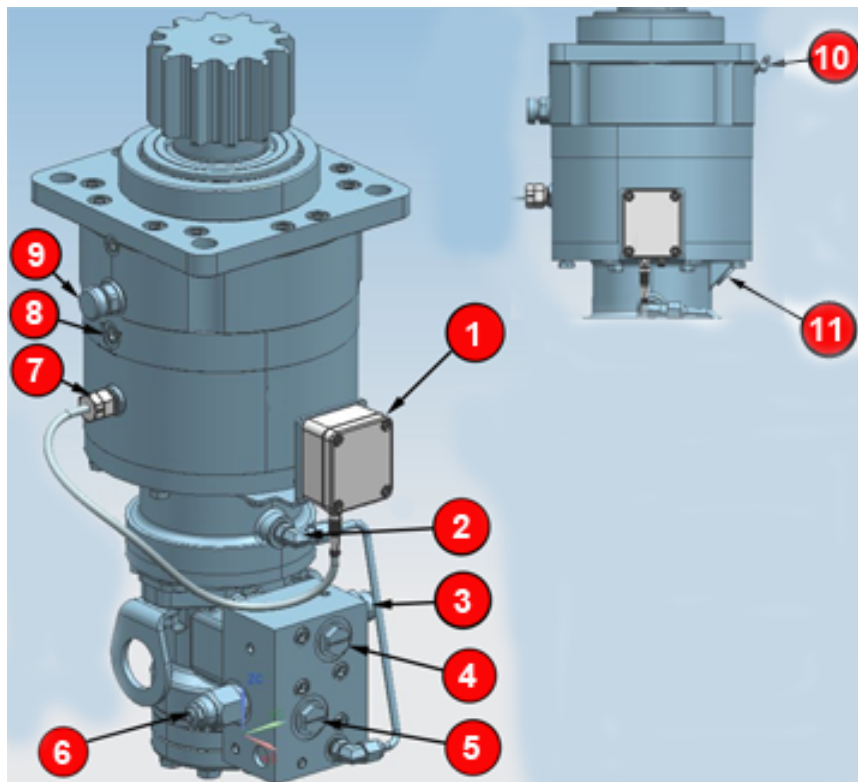
The gearbox is equipped with a grease zerk (item #10) on the upper pinion bearing. Give this zerk a shot of grease about once a month to insure this bearing has adequate lubrication (see following illustration).



NOTE: 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.



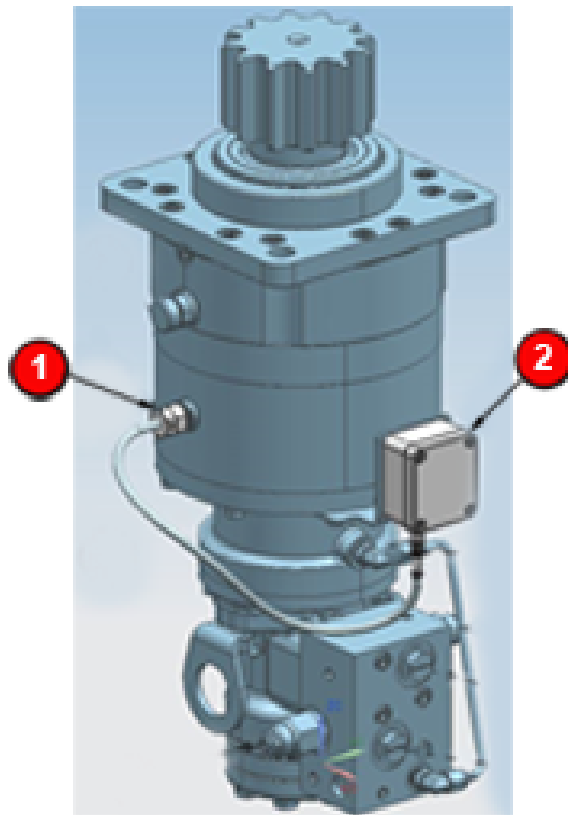
DO NOT OVER-LUBRICATE THIS BEARING OR THE GREASE WILL BE PUMPED OUT OF THE UPPER PINION SEAL.



Swing Drive Gearbox & Motor

| | | | |
|---|---------------------|----|------------------------------|
| 1 | Conditioning Box | 7 | Swing Sensor (WAD) |
| 2 | Brake Pressure | 8 | Oil Level Plug |
| 3 | Cartridge Valve | 9 | Breather & Oil Fill Location |
| 4 | Motor Pressure Port | 10 | Grease Zerk |
| 5 | Motor Pressure Port | 11 | Oil Drain Port |
| 6 | Cartridge Valve | | |

Swing (WAD/ISS) Sensor Check & Replacement Procedure



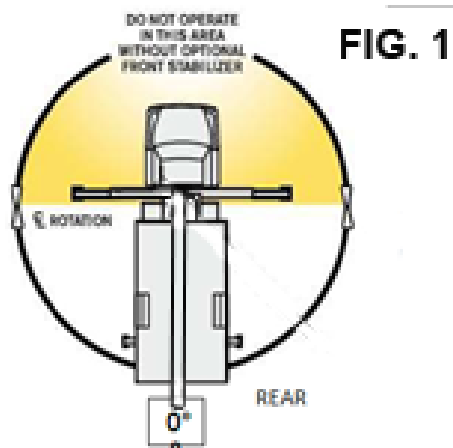
Swing Gearbox & Motor

1. Swing (WAD) Sensor
2. Conditioning Box

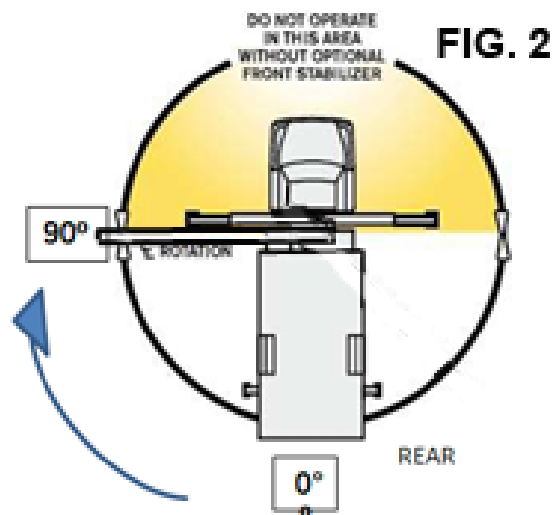
Operation into an unintended work zone may result if the Operator Programmable Alarms do not function as programmed and an operator is relying on them to alert him/her when approaching the unintended work zone.

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

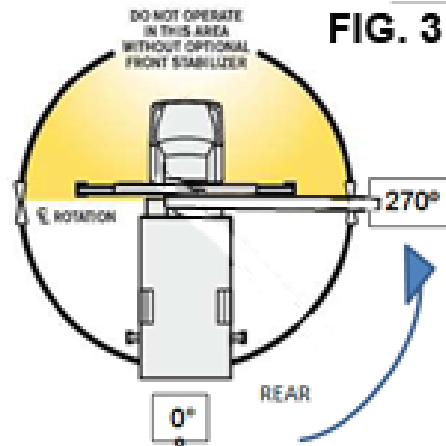
1. Set the boom in the boom rest and align to the zero location as shown in Fig. 1.
Record the CURRENT SWING ANGLE displayed on the LMI/RCI display.



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.



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.



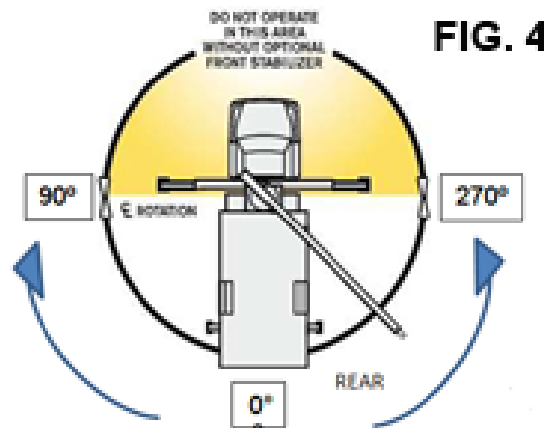
7. Repeat Steps 3 thru 6 nine times, for a total of ten cycles.
8. Set the boom in the boom rest and align to the zero location as shown in Fig. 1. Record the CURRENT SWING ANGLE displayed on the LMI/RCI display.
9. If the CURRENT SWING ANGLE readings recorded in Steps 1 or 8 are **zero**, The WAD/ISS 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 replacing the WAD sensor. Part No. T145537.

Until unit passes the test procedure, unit may only be operated with the LEFT SWING and RIGHT SWING on the LMI/RCI 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.

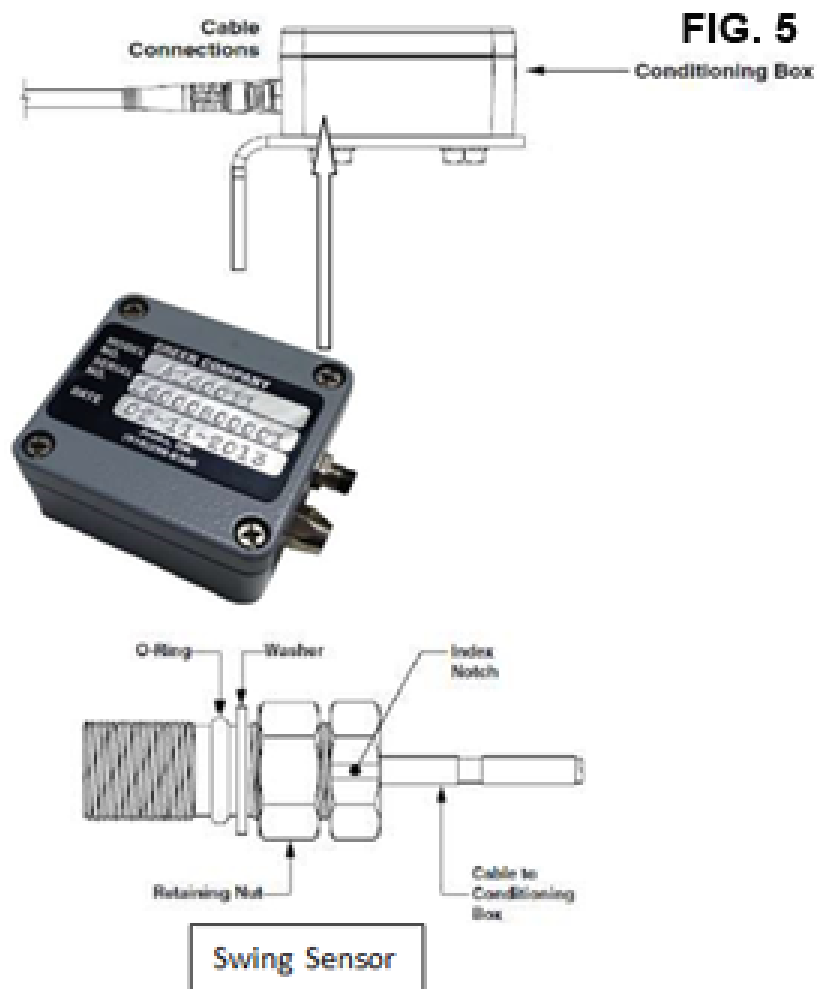


2. Place the boom in the boom rest (stowed position).
3. Turn off the power to the crane.

19-70 / 28-106

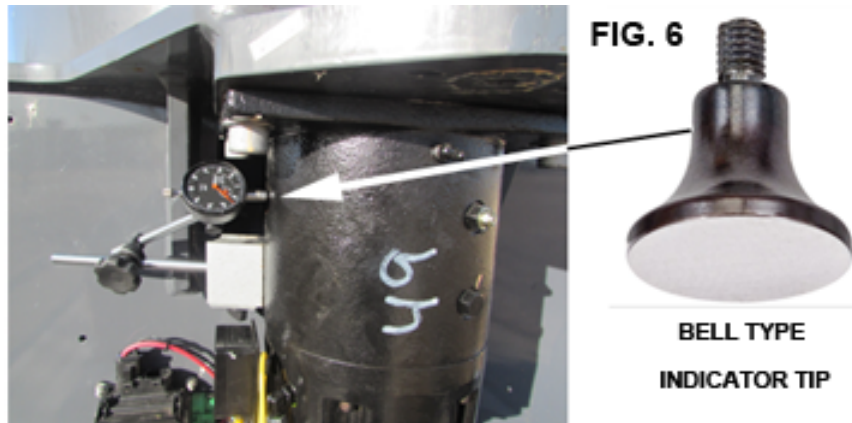
Maintenance

4. Remove covers to gain access to swing-drive and pinion using a socket wrench.
5. Manually unthread and disconnect the sensor cable from the conditioning box as shown in Fig. 5.



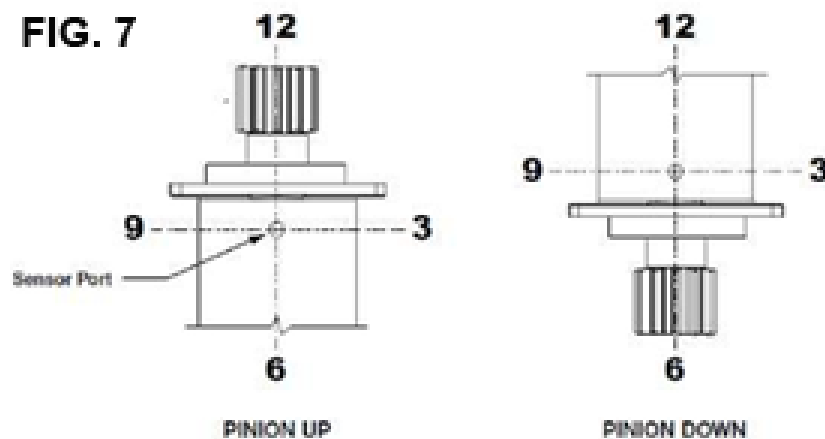
Conditioning Box & Swing Sensor

6. Loosen the sensor retaining nut using a 3/4" open-end wrench.
7. Unthread and disconnect the sensor from the swing drive housing using a 3/4" open-end wrench.
8. Mount dial indicator as shown in Fig. 6 using 1/2" diameter bell-type indicator tip.



Dial Indicator & Bell Type Indicator Tip

9. Re-power the crane.
10. Raise boom out of boom rest to approximately 40°.
11. 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.
12. Rotate the swing drive to the position of the lowest reading.
13. Remove the dial indicator.
14. Install the new WAD Sensor, Part No. T145537, by inserting the threaded end of the sensor into the sensor port of the swing drive (see Fig. 7) by hand, thread it clockwise until the end of the sensor contact the gear inside the swing drive housing. Do not force the sensor any past this point, as you may damage the sensor.



Swing Drive Port

15. Note the location of the index notch on the sensor. Rotate the sensor counterclockwise exactly 1/2 turn.
16. 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.
17. Tighten the sensor retaining nut using 3/4" open-end wrench.

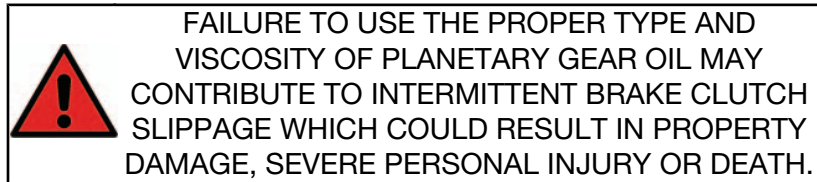
18. Manually insert the sensor cable into the conditioning box and thread clockwise.
19. Replace covers for swing-drive and pinion using socket wrench.
20. Calibrate per Swing Sensor Setup instructions in the LMI/RCI manual.
21. Repeat the Precheck procedure Steps 1 thru 8.

Winch Lubrication

RECOMMENDED PLANETARY GEAR OIL

Field experience, supported by engineering endurance tests, indicates the use of the proper gear oil and a program of regular preventative maintenance will help provide extended gear train life and reliable hoist brake performance. The information below is intended to assist in determining which lubricant is best suited to your application.

Please refer to the winch manufacturer's documentation (included with your manual pack) for specific recommendations and specifications of the proper oil to use in your winch.

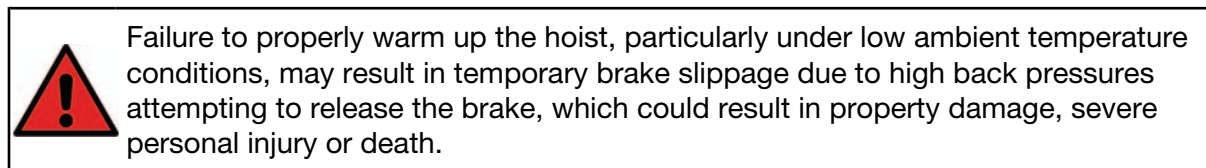


SOME GEAR LUBRICANTS CONTAIN LARGE AMOUNTS OF EP (EXTREME PRESSURE) AND ANTI-FRICTION ADDITIVES WHICH MAY CONTRIBUTE TO BRAKE CLUTCH SLIPPAGE OR DAMAGE TO BRAKE FRICTION DISCS OR SEALS. OIL VISCOSITY WITH REGARD TO AMBIENT TEMPERATURE IS ALSO CRITICAL TO RELIABLE BRAKE CLUTCH OPERATION. TESTS INDICATE THAT EXCESSIVELY HEAVY OR THICK GEAR OIL MAY CONTRIBUTE TO INTERMITTENT BRAKE CLUTCH SLIPPAGE. MAKE CERTAIN THAT THE GEAR OIL VISCOSITY USED IN YOUR HOIST IS CORRECT FOR YOUR PREVAILING AMBIENT TEMPERATURE.

Unless otherwise specified, it is recommended that the gear oil be changed after the first (100) hours or two (2) months of machine operation, then every one thousand (1,000) hours or six (6) months, whichever occurs first. The gear oil should also be changed whenever the ambient temperature changes significantly and an oil from a different temperature range would be more appropriate.

A warm-up procedure is recommended at each startup and is essential at ambient temperatures below +40°F (4°C).

The prime mover should be run at its lowest recommended RPM with the hydraulic hoist control valve in neutral allowing sufficient time to warm up the system. The hoist should then be operated at low speeds. Raise and lower, several times to prime all lines with warm hydraulic oil and to circulate gear lubricant through the planetary gear sets.



Wire Rope Lubrication

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

The lubrication interval and the type of lubricant to be used depend on the type of wire rope, the severity of duty, and the type of corrosive elements the wire rope is subjected to. General guidelines are printed in your maintenance manual. Contact the nearest wire rope dealer for specific lubrication recommendations.

The wire rope must be properly protected at all times; therefore, the gaps between the strands and wires must be filled with lubricant to provide a complete seal. Refer to maintenance manual for proper lubrication methods.

Storage

Storage

Machines being placed in storage must be adequately protected from deterioration during the period of idleness. This will ensure that they can be restored to active service with a minimum effort.

Before removing this hydraulic crane from service for extended periods, it should be prepared for storage as prescribed in the following paragraphs. In general, three (3) major components must undergo preparation. These are the Machine Proper, the Engine and the Transmission. The specific procedure to be followed depends upon the expected period of storage.

SHORT TERM STORAGE - 30 DAYS OR LESS

Short term storage requires minimal preparation.

The MACHINE should be thoroughly cleaned, lubricated in accordance with Section 4, and painted surfaces retouched where the paint has deteriorated. exposed portions of all hydraulic cylinders should be coated with multipurpose grease. Coat unpainted metal surfaces with multipurpose grease after removing any rust accumulations.

The ENGINE should be prepared as prescribed in the topic [“Engine Storage” on page 245](#).

The TRANSMISSION should be prepared as prescribed in the topic [“Transmission Storage” on page 248](#).

LONG TERM STORAGE - 30 DAYS OR MORE

Long term storage requires greater preparation than short term storage and must be undertaken with greater care.

The MACHINE should be prepared as follows:

1. Perform the short term machine storage preparation, making certain that all points with grease fittings are liberally lubricated.
2. Drain and refill the swing reducer, winch(es), axle differentials, planetary hubs and the hydraulic reservoir. Refer to page Group 4 when servicing the reservoir.
3. Distribute the new hydraulic fluid to all parts of the system by operating all functions.
4. Clean and tape the battery cables after removing and storing the battery.
5. Coat the external ring gear of the swing bearing with open gear lubricant.
6. Block wheels so any rubber tires are not in contact with concrete. Cover tires if exposed to sunlight.
7. Fill the hydraulic reservoir to the top AFTER THE MACHINE IS PARKED IN ITS STORAGE SPOT.
8. Coat wire rope with lubricant.

9. Coat exposed cylinder rods with grease.

The ENGINE should be prepared as prescribed in the topic [“Engine Storage” on page 245](#).

The TRANSMISSION should be prepared as prescribed in the topic [“Transmission Storage” on page 248](#).

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 for use when excessive dampness prevails 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.



NOTE: *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 MIL-L-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 throwout 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.

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.

Chrome Cylinder Rod Storage

Hard chrome plating is primarily applied to steel cylinder rods for its wear resistant properties, although it does provide considerable corrosion resistance as well. Once the chrome-plated rod is assembled into a cylinder and put into service, the hydraulic fluid on the surface of the rod provides all the corrosion resistance required for the rod during its life cycle. As a cylinder cycles, hydraulic fluid is driven into any surface cracks that exist in the chrome plate. When these cracks are filled with hydraulic fluid, moisture or corrosive fluids can not penetrate the cracks. However, some machining and cleaning operations can negatively impact the future corrosion resistance of chrome-plated shafting. For example, additives such as chlorine, sulfur, and sodium found in Extreme Pressure (EP) coolants and some washing solutions are known rust accelerates and can strip chrome plating from the base metal. Cleaning processes, such as phosphate washing are also known to be detrimental to the corrosion resistance of hard chrome plated shafting.

If the rod is not periodically cycled and is subject to a corrosive environment, moisture and oxygen can work its way down through the chrome layer and begin to corrode the base metal. Brand new equipment may be stored outside for a considerable period of time at the equipment dealership before it is sold. During these times, a protective barrier must be applied to the exposed cylinder rod. This protective barrier will preserve the integrity of the chrome plating by preventing the elements of corrosion from getting to the metal substrate.

Cylinders should be stored in the retracted position, if at all possible. The steps outline below cover the procedures to be followed for Protecting New Equipment from corrosion if it must be stored in the extended position:

1. Position the equipment as it will be stored and identify all the exposed portions of the chrome plated cylinder rods.
2. Clean any dirt and dust from the exposed portions of the cylinder rods using a dry cloth or a cloth which has been dampened with an appropriate solvent. Do not use caustics or acids.
3. Apply a thin coating of ¹“Ferro-Kote 5856-BF” to the exposed surfaces of the chrome plated cylinder rods. The Ferro-Kote may be thinned using a 40% Kerosene or No. 1 fuel oil mixture.
4. Inspect the cylinder rod surfaces and reapply at three to six month intervals.
5. If the equipment is to be moved and then stored again for an extended period of time or if the cylinder is cycled, steps 1 through 4 should be repeated for all cylinder rods that were exposed.

For the protection of Older Equipment that is to be stored, the procedure outlined above can be used, but greater attention to cleaning the exposed portions of each cylinder rod is required. Solvent applied with plastic or copper wool can be used, but abrasives such as sandpaper should never be used to clean the exposed surfaces of the cylinder rod. If surface damage to the chrome plate is discovered, the frequency of corrosion barrier applications should be increased.

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



NOTE: *Caution must be used when cleaning equipment in service with high pressure washes. Soaps or chemicals containing chlorines or other corrosive elements should be avoided. Cylinders should be cleaned in a retracted position as not to expose rods to the chemicals. Cylinders should be cycled immediately following the wash. If rods are to be stored in the extended position, refer to steps 1-4 above.*

Restoration to Service

Refer to [“Restoring Engine to Service” on page 252](#), and [“Restoring Transmission to Service” on page 253](#), for the procedures required to restore these components to service.

Remove the MACHINE from storage via the following procedure:

1. Remove preservative lubricants from all surfaces.
2. Check all fluid levels, adding or draining as required.
3. Lubricate the machine according to Group 4, making certain that all points with grease fittings are lubricated.
4. Make a thorough visual inspection of the entire machine, placing special emphasis on the condition of all hydraulic hoses.

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 heavy-duty 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.



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

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.

Pumps and Function Speeds

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

The required speed for the pump is very important when testing the unit speeds and checking or handling maximum loads. Remember also that pump speed and engine speed are not always the same. For instance, if the truck transmission is equipped with a 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 following charts will allow you to accurately test the flow of the pump, as well as determine what is the proper speed of the functions on the unit. Oil temperature below 140° F may result in slower functions.

SYSTEM FLOWS - 28-106

| GPM @ 2,300 RPM | FUNCTION |
|-----------------|----------|
| 38 GPM | WINCH |
| 20 GPM | BOOM |
| 9 GPM | SWING |

SYSTEM FLOWS - 19-70

| GPM @ 2,000 RPM | FUNCTION |
|-----------------|----------|
| 33 GPM | WINCH |
| 18 GPM | BOOM |
| 8 GPM | SWING |

FUNCTION SPEEDS

The following chart is a list of the speeds you can expect from the Stinger Boom Truck. All speeds are noted as being one (1) complete cycle. For instance, the swing time is for one 370° rotation, (stop to stop) at the full 2,300 RPM - and all times are in seconds.

| MODEL | 19-70 | 28-106 |
|-----------|--------|---------|
| SWING | 70 Sec | 65 Sec |
| EXTEND | 56 Sec | 110 Sec |
| RETRACT | 40 Sec | 70 Sec |
| BOOM UP | 25 Sec | 50 Sec |
| BOOM DOWN | 17 Sec | 20 Sec |

19-70 / 28-106

Specifications

| | | |
|--------------------------------|---------|---------|
| WINCH (Normal Speed) | 115 FPM | 135 FPM |
| WINCH (Combined Flow Hi Speed) | 190 FPM | 220 FPM |
| WINCH (Motor Shift Lo Speed) | 98 FPM | 110 FPM |
| WINCH (Motor Shift Hi Speed) | 197 FPM | 205 FPM |

NOTE: Winch speeds based on 3rd wrap on the winch drum, and represented in FPM of wire rope at pump speeds of:

19-70 at 2000 pump RPM

28-106 at 2300 pump RPM

Winch System Maintenance and Troubleshooting

Winch Maintenance and Repair

The Load King Stinger 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, we simply 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. The 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 which 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.

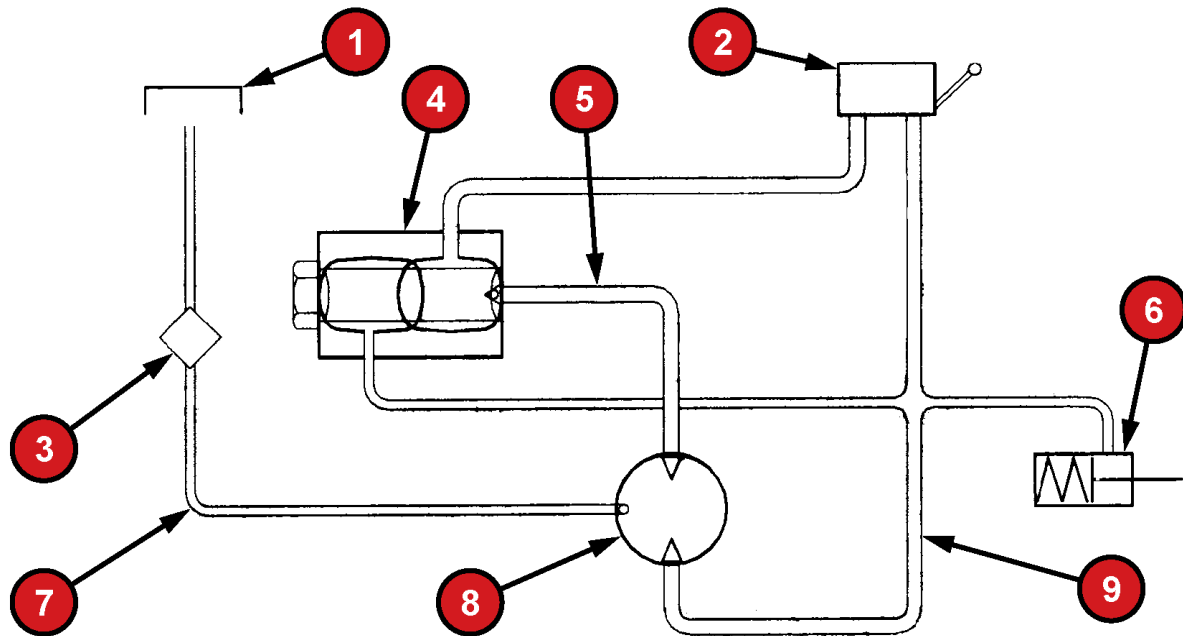
NOTE: *Incorporated into the counterbalance is an in-line check which allows the motor case to drain while preventing winch pressure from entering the motor case.*

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 this 300-400 PSI is reached. Contact **Load King** Service Department to receive overhaul information for the winch on the unit. Have the serial number available at time of call and the information will be faxed to you.

19-70 / 28-106

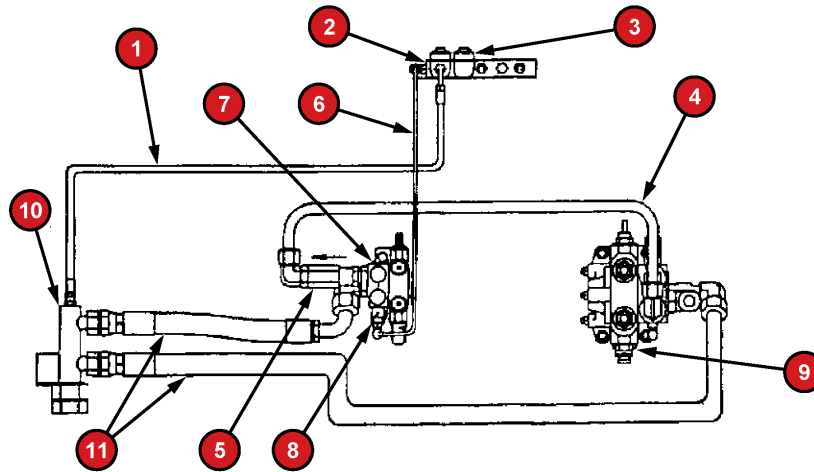
Troubleshooting



| | | | |
|---|----------------------|---|-----------------|
| 1 | Hydraulic Tank | 6 | Winch Brake |
| 2 | Valve Section | 7 | Case Drain |
| 3 | Return Filter | 8 | Winch Motor |
| 4 | Counterbalance Valve | 9 | Winch Down Line |
| 5 | Winch Up Line | | |

Two-Speed Winch Function

The Load King Stinger boom truck is equipped with a combined flow two-speed winch system as standard equipment. This is controlled by a switch activated when the winch lever is at full throw. When the winch control handle is pushed to the full throw position, oil flow from the boom pump that is not used by the boom functions is directed to be added to winch pump oil flow, causing an increase in the winch speed. This increase in speed can be as much as 50%. When the winch control handle is moved back from the full stroke position, the flow of the unused boom oil is directed back to tank.



| | | | |
|---|---------------------------|----|----------------------------|
| 1 | Unloader Tank Line | 7 | Control Valve Inlet |
| 2 | Winch Unloader Valve | 8 | Anti-Void |
| 3 | ATB Unloader Valve | 9 | Winch Control Valve |
| 4 | Regenerative Oil to Winch | 10 | Return Manifold |
| 5 | One-Way Check | 11 | Control Valve Return Lines |
| 6 | Regenerative Pilot Line | | |

NOTE: *The boom functions have first chance at the boom oil flow, so the winch speed increase will be reduced when a boom function is in use.*

Note in the picture above that the winch and boom control valves are linked together by a tube at the inlets. In this tube, there is a one way check valve to insure the winch oil is not allowed to make its way into the boom circuit. The arrow on the check valve should be pointing away from the boom control valve.

The boom circuit oil is directed or bypassed by a ported anti-void cartridge in the inlet section. If the pilot signal is contained in the anti-void, the winch speed will stay low. If the pilot signal is allowed to escape through the unloader valve, it creates a pressure drop in the spring chamber, which allows the anti-void to open. When this happens, boom circuit oil is allowed to go to the inlet of the winch valve, where it is added to the oil from the winch section of the hydraulic pump. If the high speed circuit fails to operate, check the following:

1. Check all electrical connections to make sure power is getting to the winch unloader valve solenoid.
2. Check the setting of the micro switch used to activate the 2 speed winch. Make sure that at full throw, the switch is being triggered.
3. If the solenoid coil is getting power, check with a screwdriver on the end of the solenoid to see if it is energized. (The metal screwdriver should be magnetically attracted to the end of the solenoid shaft if the coil is working properly.)
4. If the coil is working, the solenoid may be stuck and should be cleaned or replaced.
5. If the high speed fails to function after replacing the solenoid, the anti-void valve is tuck and will need to be disassembled and cleaned.

If, on the other hand, the high speed circuit is on constantly, check the following:

1. Check that the unloader solenoid coil is deenergized (off).
2. Check that the solenoid is not stuck open. Remove the tank line and plug both the hose and valve. If normal operation is restored, the solenoid is stuck open.
3. The anti-void valve is bypassing internally.
4. Check that the 2 speed micro switch has not been damaged, and that the switch disengages when the winch lever is at less than full throw.

COMBINED-FLOW 2 SPEED WINCH MICROSWITCH ADJUSTMENT

The combined-flow 2 speed winch is operated by a micro switch located under the winch gearbox cover and attached to a spring plate mounted on the top of the console. This micro switch is in a normally closed configuration, and is held in the open state until the winch lever is activated to it's full throw position. The 2 speed winch solenoid is not powered until the switch is activated and changes to it closed state.

To adjust the activation point of the 2 speed switch see the following procedure.

- 1.** Turn on the electric power of the **Stinger** with the engine NOT running. The 2 speed valve solenoid coil should show NO magnetic pull when a screwdriver is placed near the end of the solenoid coil.
- 2.** Turn the adjustment set screw in until the switch goes to its normally closed state. The 2 speed valve solenoid coil should now show a magnetic pull when a screwdriver is placed near the end of the coil.
- 3.** Turn the adjustment set screw out until the switch button contacts the metal plate and goes to its open state, the valve solenoid coil should now show no magnetic pull when a screwdriver is placed near it.
- 4.** Turn the adjusting set screw out an additional 1/8 turn.

This adjustment should show that the 2 speed is engaged only at the full throw position in both the winch up and winch down positions. If this is not so, the following procedure will allow you to set the activation points in both winch up and winch down.

By visually inspecting the activation mechanism during cycling of the winch control lever, one can determine if either or both links of the activating mechanism need adjustment. A

screwdriver held near the 2 speed winch valve solenoid coil will help determine the precise activation point of the micro switch.

1. To adjust the appropriate link, use a 3/8" open end wrench to loosen the jam nut locking the clevis to the adjustment rod.
2. Change the length of the adjustment screw, by screwing it further into the clevis for a later activation, and out of the clevis for a earlier activation. There is a flat blade screwdriver slot in the end of the adjustment rod to assist in this adjustment. Activation of the switch should occur just as the winch lever reaches its maximum throw. The Adjustment screw can be turned out an additional 1/8 turn to assure operation with wear over time.
3. Once the correct activation point has been set, use your 3/8" wrench on the jam nut to lock the rod and clevis in position.

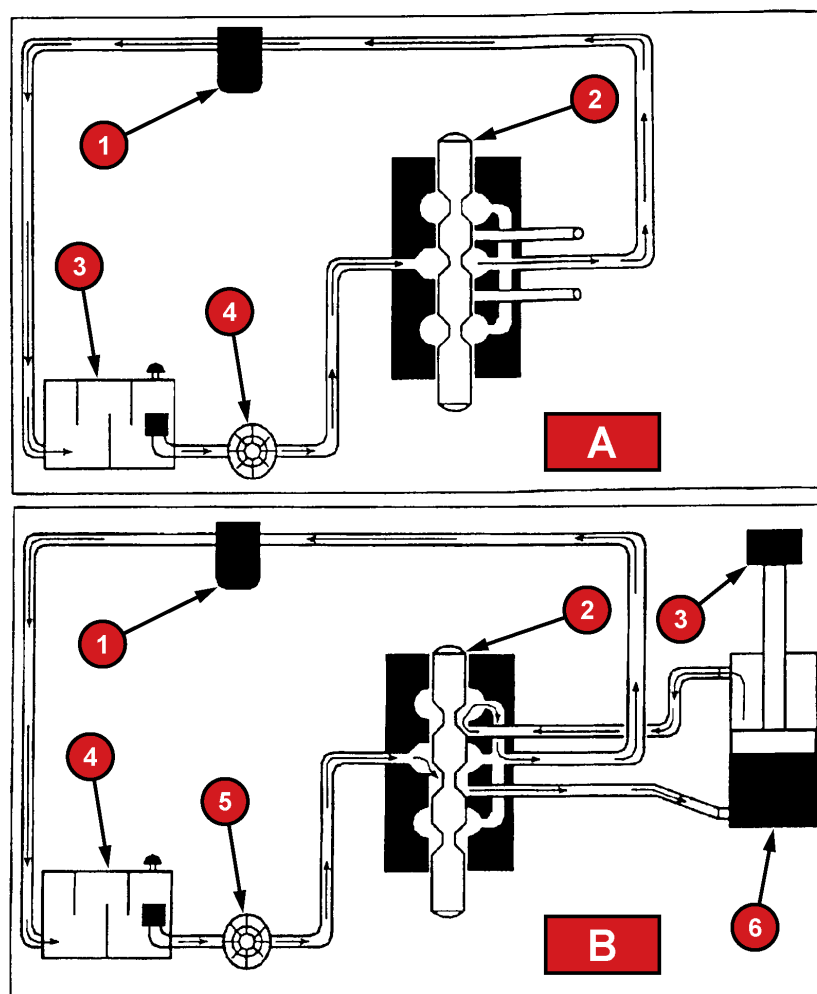
General Work Practices

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

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

Hydraulic System Description

The hydraulic system on the **Stinger** boom truck is an open center system. The open-center means that any time the hydraulic pump is running and the control valves are in the neutral position, oil is going into the inlet of the control valves and through the open center of the valve and back to the tank. The oil is at low pressure because an opening to the tank exists in the return line. If a spool is moved and the oil is diverted to an enclosed function line, the pressure of the pump will rise to meet the load requirement. As long as the control valve handle is held open and the load is unchanged (constant) , this working pressure will be sustained. The pump is a fixed displacement pump; it produces a given volume each revolution. If there was no system relief when the cylinder or actuator bottoms out, the pump would produce enough pressure to either destroy itself, the main pressure line, or another component. For this reason, there are system reliefs incorporated. The proper working order and settings of these reliefs is extremely important. Operation of open center hydraulics is illustrated on this page.



| A | Open Center Hydraulics/ Neutral | B | Open Center Hydraulics/Operate |
|----|------------------------------------|----|--------------------------------|
| A1 | Filter | B1 | Filter |
| A2 | Open Center Valve | B2 | Open Center Valve |
| A3 | Tank | B3 | Load |
| A4 | Pump | B4 | Tank |
| | | B5 | Pump |
| | | B6 | Actuator |

The **Load King** Boom Truck has an electro-hydraulic control circuit for the outriggers. The oil flow of the boom pump is routed through the outrigger valve giving the outriggers first chance at the oil flow. When the outrigger functions are not being activated, the oil is bypassed to the boom control valve with a minimum of pressure loss.

The outrigger valve housing has a diagnostic test port to measure the outrigger pressure setting. This pressure setting is adjustable via the relief valve located on the valve housing.

The outrigger valve circuit has one solenoid valve controlling bypass flow and four solenoid valves which cause the valve to be in: neutral, extend, or retract modes. In the neutral, the work ports are drained to tank. The valve also has five other solenoids to control each of the 4 outriggers and the front bumper stabilizer.

The **Load King** boom truck has increased pressure for the boom hoist and telescope functions compared to previous models. However the long extend cylinder would be subject to damage if this higher pressure was used while extending the cylinder. Therefore, a relief valve is added to this function by a tee fitting at the work port of the control valve. This valve is adjustable to ensure proper operation.

When adjusting, the pressure reading at the boom valve must be as shown in the table listing pressure settings.

Repairs-Adjustments-Remarks Log

[illegible]

Control Valves and Pressures

The relief pressure settings in any hydraulic system 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 by function and configuration. It also gives the rated operating pressures. All pressures are +/- 50 psi.

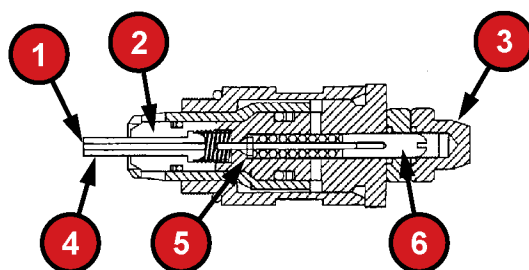
VALVE SPECIFICATIONS AND PRESSURE SETTINGS

| FUNCTION | CONFIGURATION | PRESSURE |
|------------------|-------------------------------|--------------------------|
| WINCH | OPEN CENTER/OPEN PORT (MOTOR) | 3200 PSI OF 3000 PSI INS |
| BOOM | OPEN CENTER/CLOSED PORT | 3500 PSI |
| SWING | OPEN CENTER/OPEN PORT (MOTOR) | 1800 PSI |
| BOOM / OUTRIGGER | OPEN CENTER/POWER BEYOND | 2900 PSI |
| TELESCOPE | IN LINE RELIEF | 3000 PSI |

The system pressures can be checked by installing a pressure reading device on the hydraulic test pressure ports located at the right-side console, or on the outrigger valve.

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 remain 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.



Hydraulic System Pilot Relief

| | | | |
|---|-------------------|---|------------------|
| 1 | Oil Inlet Orifice | 4 | Piston Poppet |
| 2 | Relief Piston | 5 | Pilot Poppet |
| 3 | Acorn Nut | 6 | Adjustment Screw |

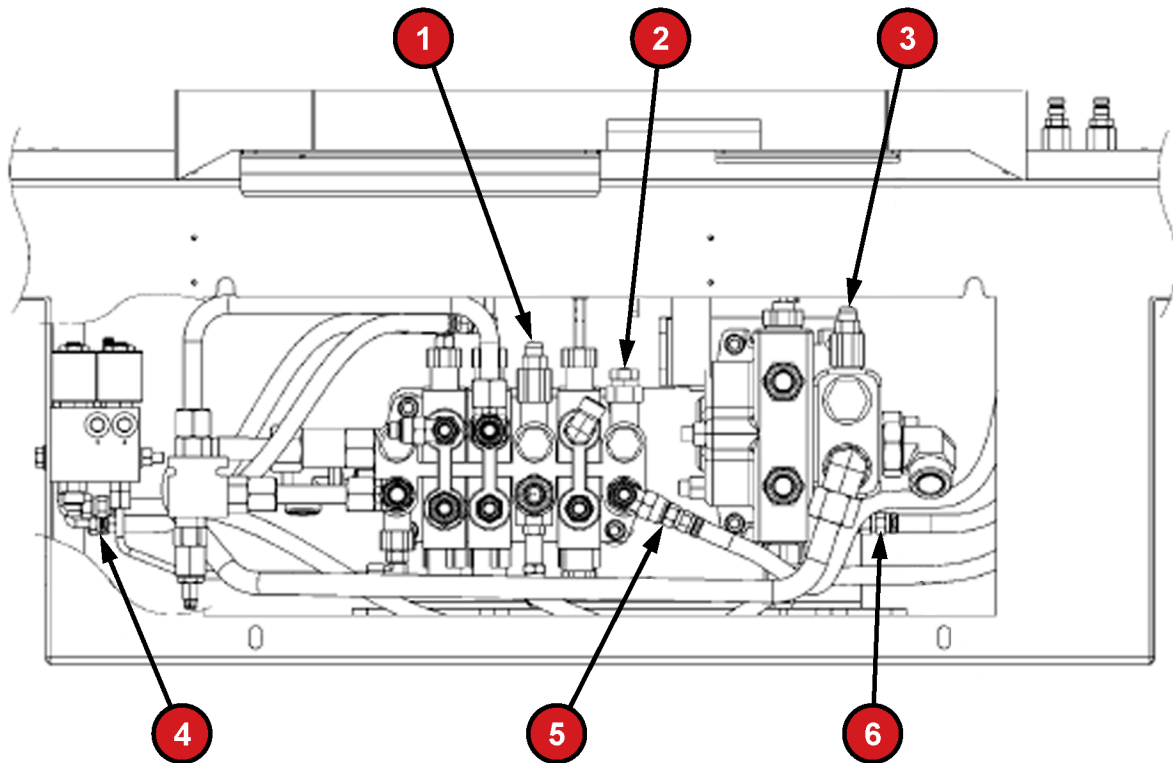
The reliefs are factory set and should not be tampered with unless poor performance is experienced. Any relief which has been removed for inspection, cleaning, or replacement must be adjusted after installation. The figure above is a cutaway view of a typical relief found in a 19-70.

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.

HYDRAULIC SYSTEM ADJUSTMENTS

| PROBLEM | CAUSE | REMEDY |
|------------------------------|-------------------------------|------------------------------|
| NO PRESSURE | POPPET STUCK | CHECK FOR WEAR |
| | DIRT IN POPPET | CLEAN AS REQUIRED |
| PRESSURE ERRATIC | POPPET SEAT DAMAGE | REPLACE DAMAGED PARTS |
| | POPPET STICKING | CLEAN CARTRIDGE |
| PRESSURE SETTING NOT CORRECT | INTERNAL WEAR | CLEAN OR REPLACE |
| | ADJUSTER LOOSE | ADJUST RELIEF |
| LEAKS | DAMAGED O-RINGS OR WORN PARTS | REPLACE WORN PARTS OR RESEAL |



CONTROL CONSOLE HYDRAULICS - Inside Mainframe View

| | | | |
|---|--------------|---|---------------------|
| 1 | BOOM ADJUST | 4 | BOOM TEST PRESSURE |
| 2 | SWING ADJUST | 5 | SWING TEST PRESSURE |
| 3 | WINCH ADJUST | 6 | WINCH TEST PRESSURE |

PROCEDURE FOR ADJUSTING BOOM RELIEFS

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

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

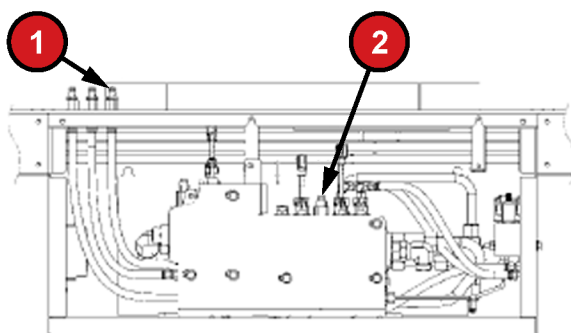
NOTE: *Leave all other control levers in the neutral position.*

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

NOTE: *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 RELIEFS



| | | | |
|---|--------------------------|---|--------------|
| 1 | SWING TEST PRESSURE PORT | 2 | SWING ADJUST |
|---|--------------------------|---|--------------|

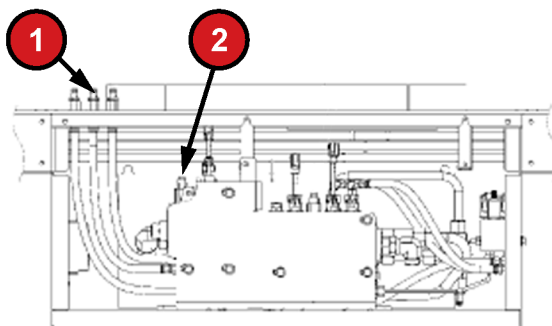
1. Stop the engine, remove the brake release hose at the rotation gearbox. Plug this hose. Attach a 0 - 3,500(min) PSI pressure gauge to the swing test pressure diagnostic port. The brake release fitting does not need to be capped.
2. Start engine and run the pump at 2,000 rpm and slowly move the swing lever to full travel in either direction. The spring applied swing brake will stall the swing motor and cause the hydraulic system to go over relief. Look at the pressure gauge; see previous pressure table for proper setting.

NOTE: *Move the handle back to neutral immediately after taking the reading to prevent excessive heat.*

3. Make proper adjustments by turning the adjusting screw clockwise for more pressure and counterclockwise for less. Be sure to torque the jam nut to 10 ft.lbs and reinstall the acorn nut.

PROCEDURE FOR ADJUSTING THE WINCH RELIEF

The system relief should be set only when the oil in the hydraulic system is warm or at operating temperature. Attach a 0 - 3,500(min) PSI pressure gauge to the swing test pressure diagnostic port.



| | | | |
|---|--------------------------|---|--------------|
| 1 | WINCH TEST PRESSURE PORT | 2 | WINCH ADJUST |
|---|--------------------------|---|--------------|

1. With control levers in neutral position, raise pump RPM to 2,000.

2. With either the winch engaged in a deadman pull, or the winch-up workport capped and plugged, move the winch handle to the up direction. Hold the handle until the system goes over relief.

LEAVE ALL OTHER CONTROL LEVERS IN THE NEUTRAL POSITION.

3. Check the reading at the winch test Diagnostic port.

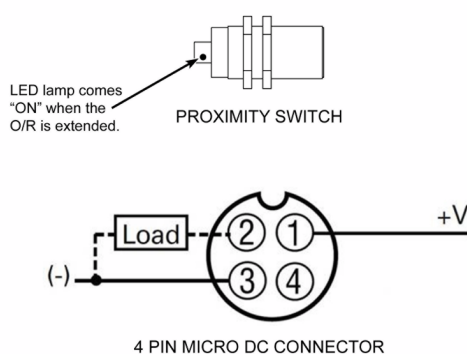
NOTE: *Move the lever to the neutral position immediately after taking the pressure reading to avoid excessive heat.*

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

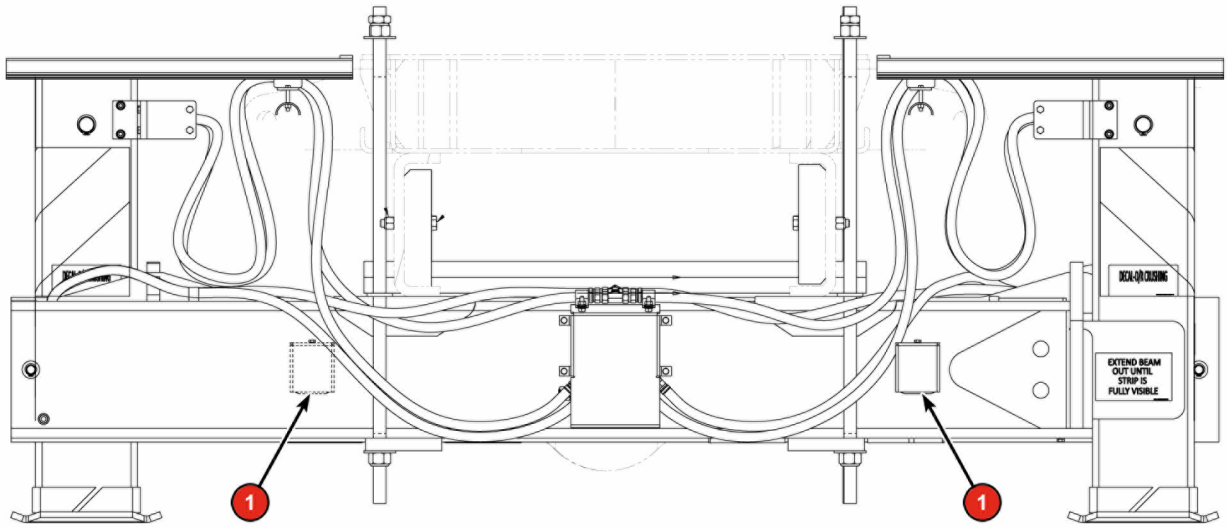
Outrigger and Cylinder Maintenance and Troubleshooting

28-106-Outrigger Position Sensors

If your crane is equipped with Outrigger Position Sensors-the rear outrigger box will contain (2) two proximity sensors for determining the location of each outrigger beam at full extension. Each sensor has an air gap to maintain to operate properly and send signals to the Load Moment Indicator (LMI). When each rear outrigger beam is fully extended a green light on the operator's Outrigger control box and will illuminate for both the left side and right side. Visually inspect sensors for damage, the condition of related wiring harness connections and dirt / debris that could inhibit the sensor signal or proper air gap.



| SENSOR CHARACTERISTICS & SETTING | |
|----------------------------------|-----------------|
| OUTPUT TYPE | NORMALLY CLOSED |
| SENSING RANGE | 15 MM |
| MINIMUM OPERATING VOLTAGE | 6 VDC |
| MAXIMUM OPERATING VOLTAGE | 48 VOLTS |
| MINIMUM OPERATING TEMPERATURE | -40C |
| MAXIMUM OPERATING TEMPERATURE | +70C |
| MINIMUM LOAD CURRENT | 200 MA |
| AIR GAP SETTING | 0.12" (3.2 mm) |



1. Proximity Sensor-Outrigger Position

Hoist Cylinder

HOW TO ANALYZE HOIST CYLINDER PERFORMANCE

The HOISTcylinder 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:



NOTE: *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 and move the control levers to release the hydraulic pressure trapped in the hoses. 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).
 - A. Rated Capacity sensing system hose and fittings.
 - B. End casting welds.
 - C. Cartridge O-Rings.
 - D. 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:
 - A. Holding cartridge leaks:

Attach a weight equivalent to the rated load and raise the boom 2-3 inches off the boom rest. 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.

B. 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.



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

HOIST CYLINDER REMOVAL

Perform the following steps to remove the hoist cylinder:

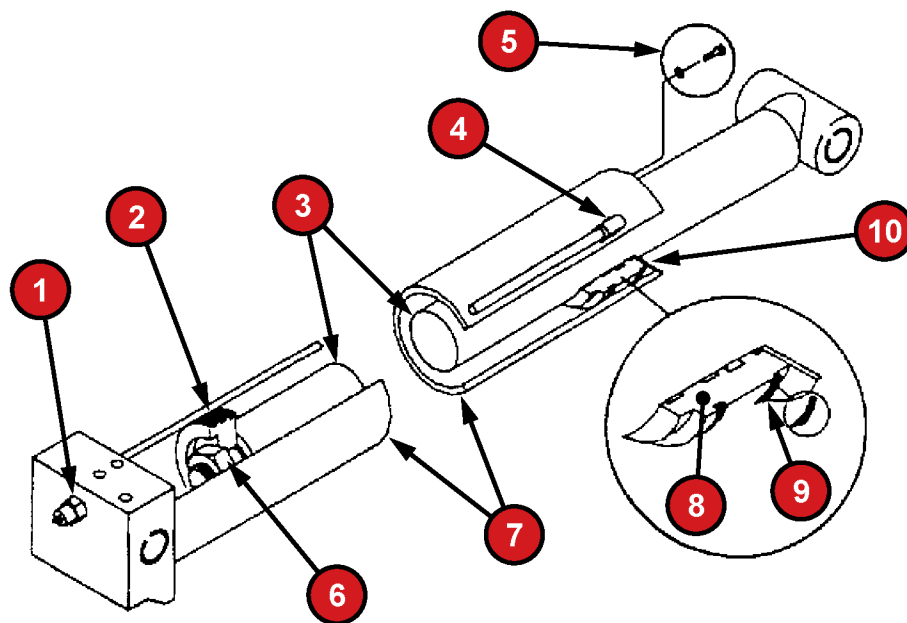
1. Fully retract and lower the boom onto the boom rest. Disengage the PTO and stop engine. Actuate hoistlever in both directions to release trapped pressure.
2. Tag and disconnect the hydraulic lines from the topping cylinder.



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

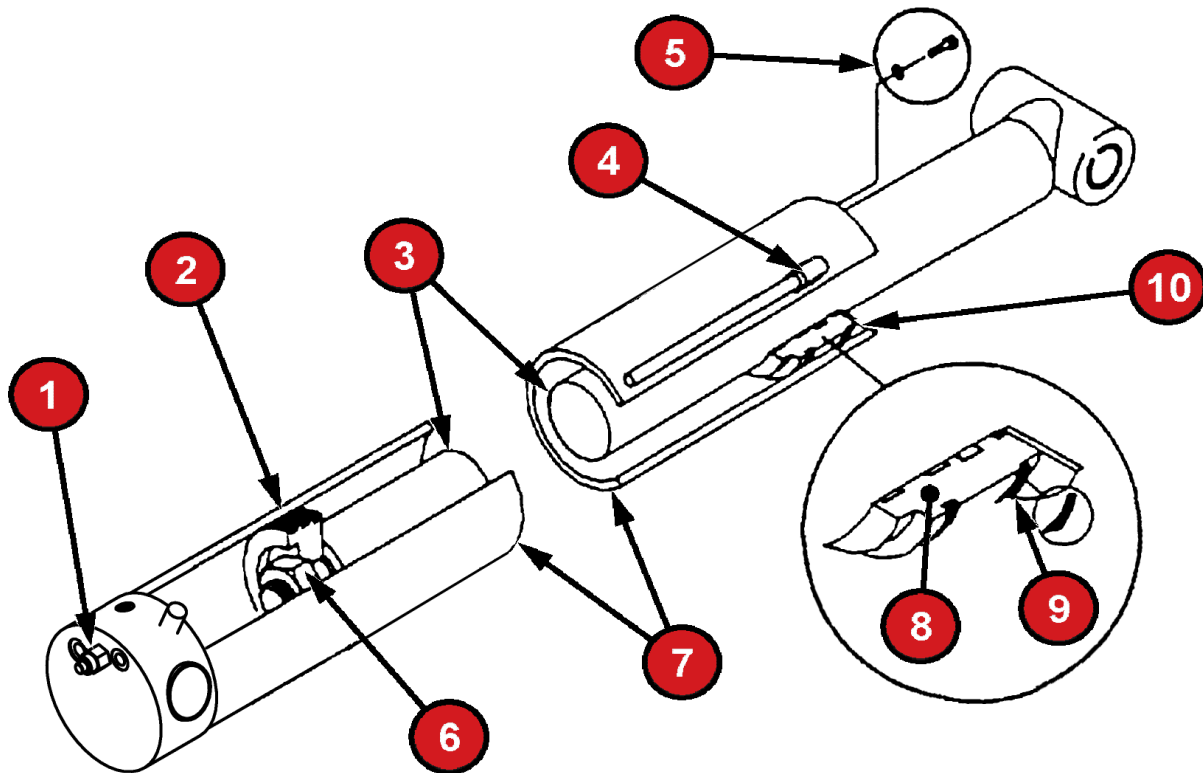
These should be plugged or capped to prevent any fluid loss or slippery surfaces around the work area - also to prevent contamination from entering the hydraulic system. Plug the resulting open ports of the cylinder to prevent the loss of fluid.

3. Lift against the rod end of the topping 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.



19-70 Hoist Cylinder Assembly

| | | | |
|---|----------------------|----|----------------|
| 1 | CARTRIDGE | 6 | PISTON NUT |
| 2 | PISTON | 7 | BARREL |
| 3 | ROD | 8 | END GLAND |
| 4 | BYPASS ORIFICE | 9 | RETAINER RING |
| 5 | RETAINER PLATE BOLTS | 10 | RETAINER PLATE |



28-106 Hoist Cylinder Assembly

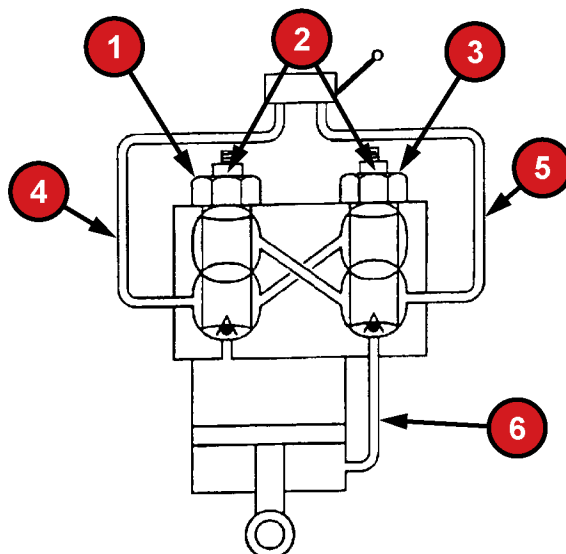
| | | | |
|---|----------------------|----|----------------|
| 1 | CARTRIDGE | 6 | PISTON NUT |
| 2 | PISTON | 7 | BARREL |
| 3 | ROD | 8 | END GLAND |
| 4 | BYPASS ORIFICE | 9 | RETAINER RING |
| 5 | RETAINER PLATE BOLTS | 10 | RETAINER PLATE |

HOIST 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 faxed to you.

Outrigger Cylinder

OUTRIGGER TWO-WAY CHECK SYSTEM



| | | | |
|---|---|---|-----------|
| 1 | Outrigger Pilot Check Holding Cartridge - LOAD | 4 | Extend |
| 2 | Manual Release | 5 | Retract |
| 3 | Outrigger Counterbalance Valve Holding Cartridge - STOW | 6 | Side Tube |

OUTRIGGER TWO-WAY PILOT TO OPEN CHECK SYSTEM

LOCATED: On each outrigger cylinder.

FUNCTION: Locks outrigger in up position for roading, and down for crane or 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. NEVER STAND IN LINE WITH CARTRIDGE WHILE

The main reason for outrigger servicing 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.

Internal leaks are more difficult to find and almost without exception require cylinder removal. Three items must be checked to isolate the leak:

1. The load holding cartridge.
2. Stop engine. Activate outrigger control handle to relieve trapped pressure. Disconnect extend port hose at valve.
3. If oil runs out of the extend port, the cartridge is bypassing and must be replaced.

TO CHECK LOAD HOLDING CARTRIDGE:

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

TO CHECK STOW HOLDING CARTRIDGE:

1. Fully retract cylinder.
2. Devise a means of externally trying to extend the cylinder. (Porta-Power or Block & Tackle).
3. Disconnect retract port hose at valve. 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

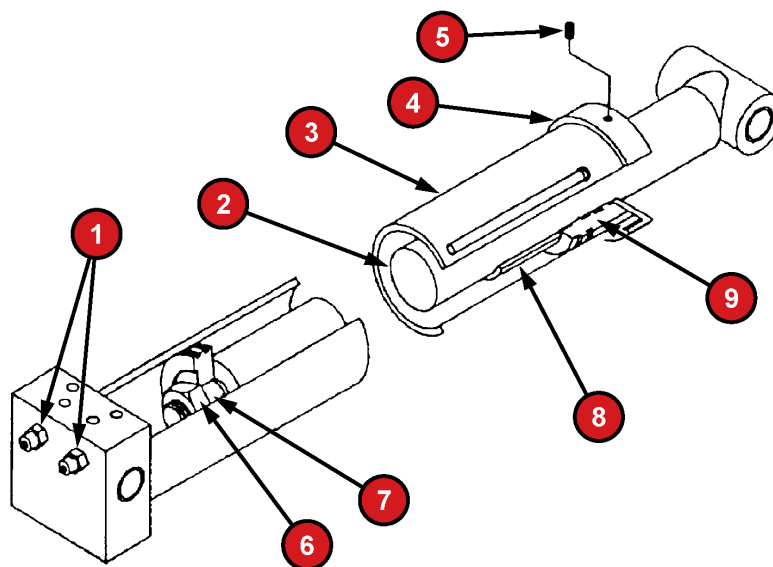
1. Extend the outrigger until the shoe just touches the ground.
2. Remove the snap rings from the link pin at the mainframe. The pin should drive out easily if the leg is properly positioned. If the pin does not drive out easily, reposition the leg so the pin is not loaded. Allow the links to swing out after the pin is removed..
3. 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.
4. Disconnect the outrigger hoses, after marking for later reinstallation. Cap hoses and fittings on cylinder.
5. Insert a 1/2"-13 lifting eye into the boss located on the top plate of the outrigger.

6. Using an overhead hoist attached to the lifting eye, lift the leg into a horizontal position.



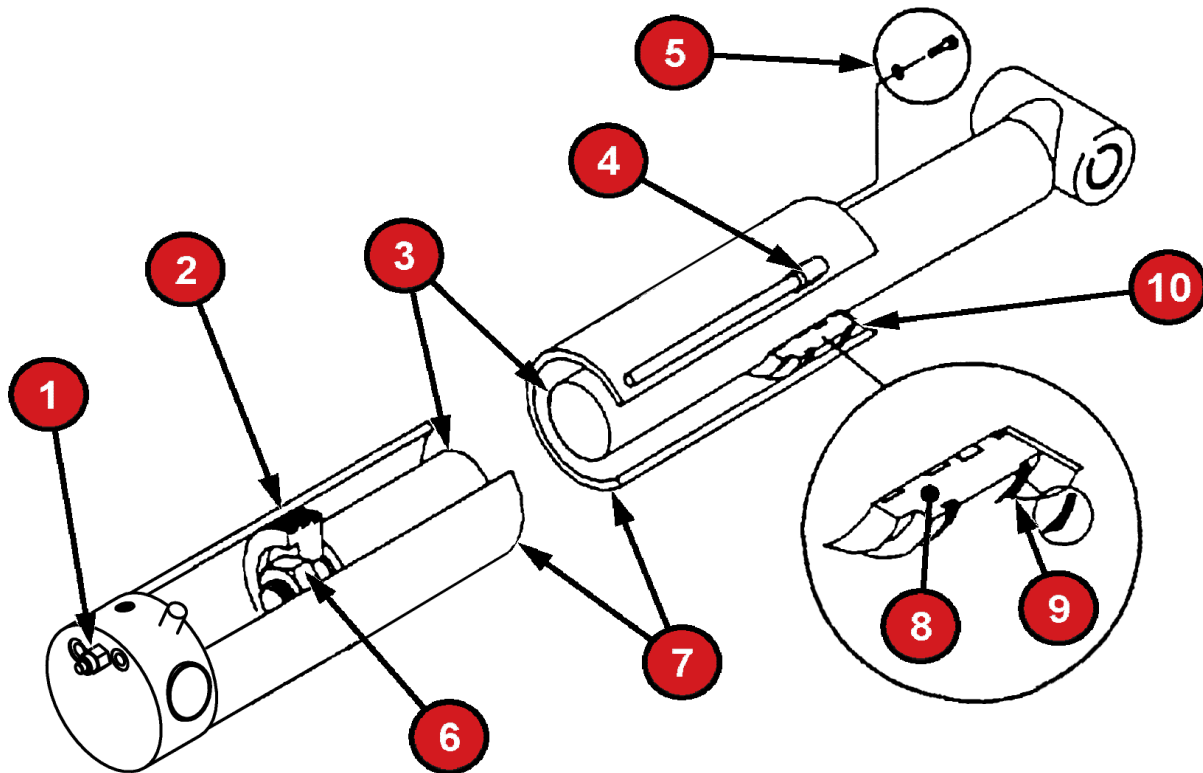
NOTE: *THIS WILL LEAVE THE LEG VERY HIGH IN THE AIR AND STICKING OUT APPROXIMATELY 7 FT. DO NOT STAND OR WALK UNDERNEATH THE LEG WHILE IN THIS POSITION.*

7. Remove the snap ring from the upper pivot pin, and with a brass or dead blow hammer and a drift, drive the upper pin out of the outrigger housing and mainframe bracket.
8. Raise the hoist until the leg is balanced, then lay the leg on the floor with the link pivot boss turned down (upside down). Block up under the outrigger leg until the outrigger shoe clears the floor.
9. Remove the snap rings for the outrigger shoe pin and drive the pin out with a drift. Remove the shoe and pin.
10. With the assistance of a hoist, pull the cylinder out of the top end of the outrigger housings.
11. Remove the inner leg and check the weldments thoroughly for any sign of damage, bending, or welds cracking. Check the wear pads for damage. If pads are worn and have excessive clearance, they should be shimmed or replaced.
12. Move the cylinder to overhaul bench.



19-70 Outrigger Cylinder

| | | | |
|---|-------------------|---|------------|
| 1 | Holding Cartridge | 6 | Piston Nut |
| 2 | Rod | 7 | Piston |
| 3 | Barrel | 8 | Spacer |
| 4 | Thread Cap | 9 | Gland |
| 5 | Set Screw | | |



28-106 Outrigger Cylinder

| | | | |
|---|----------------------|----|----------------|
| 1 | Cartridge | 6 | Piston Nut |
| 2 | Piston | 7 | Barrel |
| 3 | Rod | 8 | End Gland |
| 4 | Bypass Orifice | 9 | Retainer Ring |
| 5 | Retainer Plate Bolts | 10 | Retainer Plate |

REASSEMBLY & INSTALLATION OF MAIN OUTRIGGERS

1. Apply a thin film of brush-type anti-seize lubricant (rust inhibitor) to outrigger wear pads before assembly.
2. Using the proper bolts, attach the top upper and lower wear pads. (Note: It's a good idea to use Loctite on these bolts to prevent them from loosening and coming out.) Using a hoist, slide the inner and outer legs together, and install the upper bottom wear pad.
3. Have the cylinder extended to approximately mid-stroke. Insert the cylinder into the outrigger housings and align the cylinder rod eye with the pin hole and shoe holes. Apply a thin coat of antiseize lubricant (rust inhibitor) to the pin before insertion. Install pin and snap rings.
4. Using the upper pivot pin as a pilot, line up cylinder base pin hole with upper pivot hole in the inner leg. After holes are aligned, drive the wedge between the inner and outer legs again to help maintain alignment.



DO NOT DRIVE THE WEDGE TO THE POINT OF BOWING THE METAL IN THE LEG.

5. Apply a thin coat of anti-seize lubricant (rust inhibitor) to pin before installation.
6. Using the choker strap and hoist, pin the upper leg to the mainframe bracket. Lower the leg until the links align with the hole in the outrigger leg boss.
7. Install the pin through the links and outrigger boss and install the snap rings.
8. Connect the outrigger hoses. Cycle cylinder several times to full stroke to remove any air in the cylinder.

REMOVAL & DISASSEMBLY OF AUXILIARY OUTRIGGERS

1. Either work with the rear outriggers over a pit or raise the rear of the truck so that there is at least 36" of clearance from the bottom of the outrigger shoes.
2. Extend outrigger leg 1" and shut off power.
3. Tag and disconnect cylinder hoses. Cap hoses and fittings on cylinder.
4. Support the outrigger inner leg while removing the upper pin.
5. Swing cylinder inward to rest against inner leg. Carefully lower inner leg out of housing.
6. Remove lower pin snap rings and pin. Using a hoist, pull the cylinder out of the inner leg.

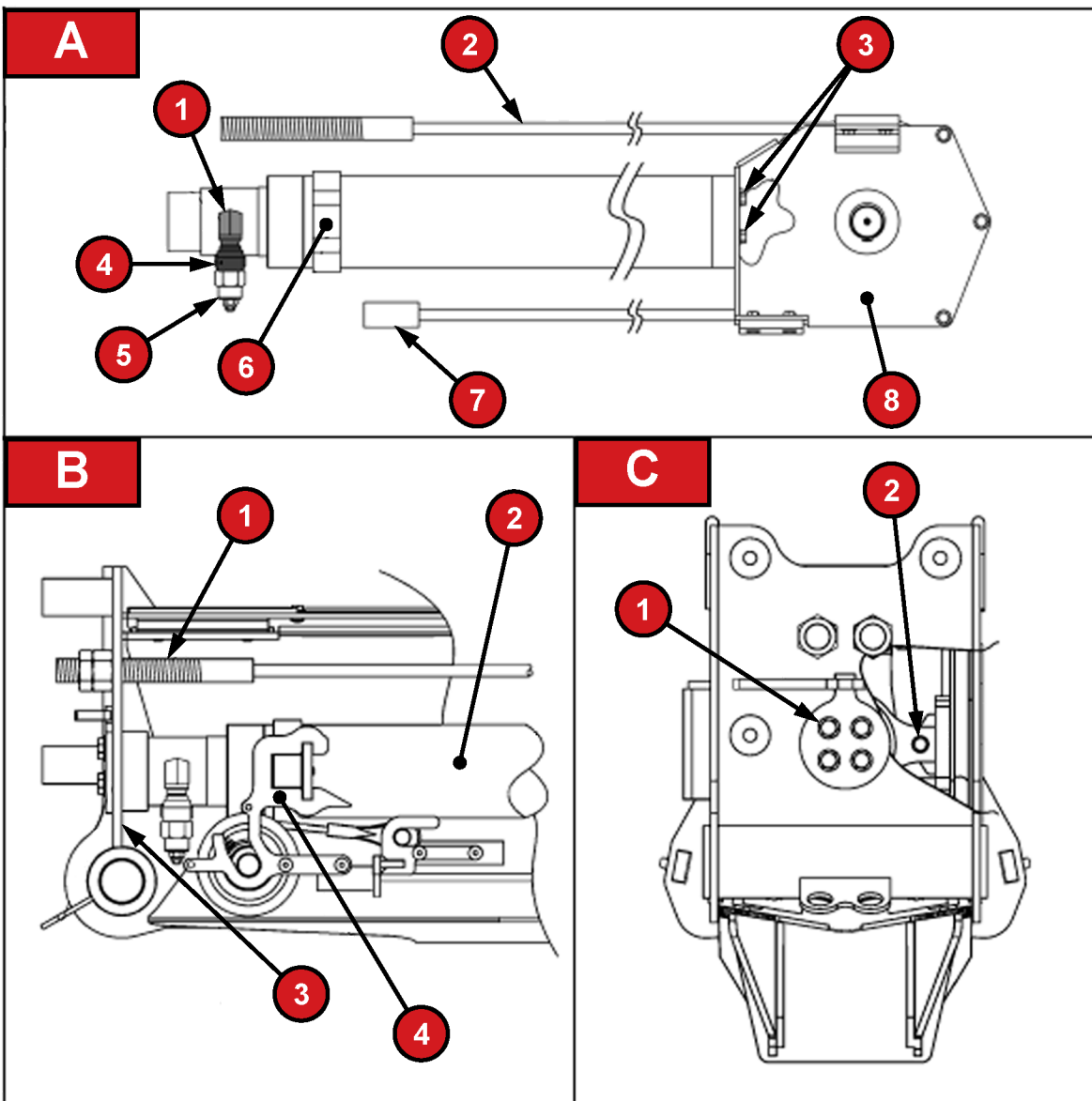
REASSEMBLY & INSTALLATION OF AUXILIARY OUTRIGGERS

1. Extend cylinder 1"-2" and insert into inner leg. Cylinder must be oriented so that ports are to outside when inner leg is installed.
2. Align rod end with holes in inner leg and install pin and snap rings. Apply a thin coat of anti-seize lubricant to pin before installation.
3. If slider pad is still inside outer housing (located under doubler strap at lower end of housing), pry it loose and remove.
4. Inspect slider pad for wear and/or damage. If worn to less than 3/8" thickness over 25% of surface, replace with new pad.
5. Use a heavy gun grease (chassis lube) - applied to back (flat) side of slider pad - to hold pad in place during reassembly.
6. Install inner leg into outer housing and slide up all the way. Make sure the inner leg is oriented correctly.
7. Align cylinder end between housing ears with cylinder ports facing out. Apply never-seize to pin prior to installation.
8. Reconnect cylinder hoses to proper ports.
9. Cycle the leg fully up and down several times to purge air from system and check for proper operation.

Extension Cylinder

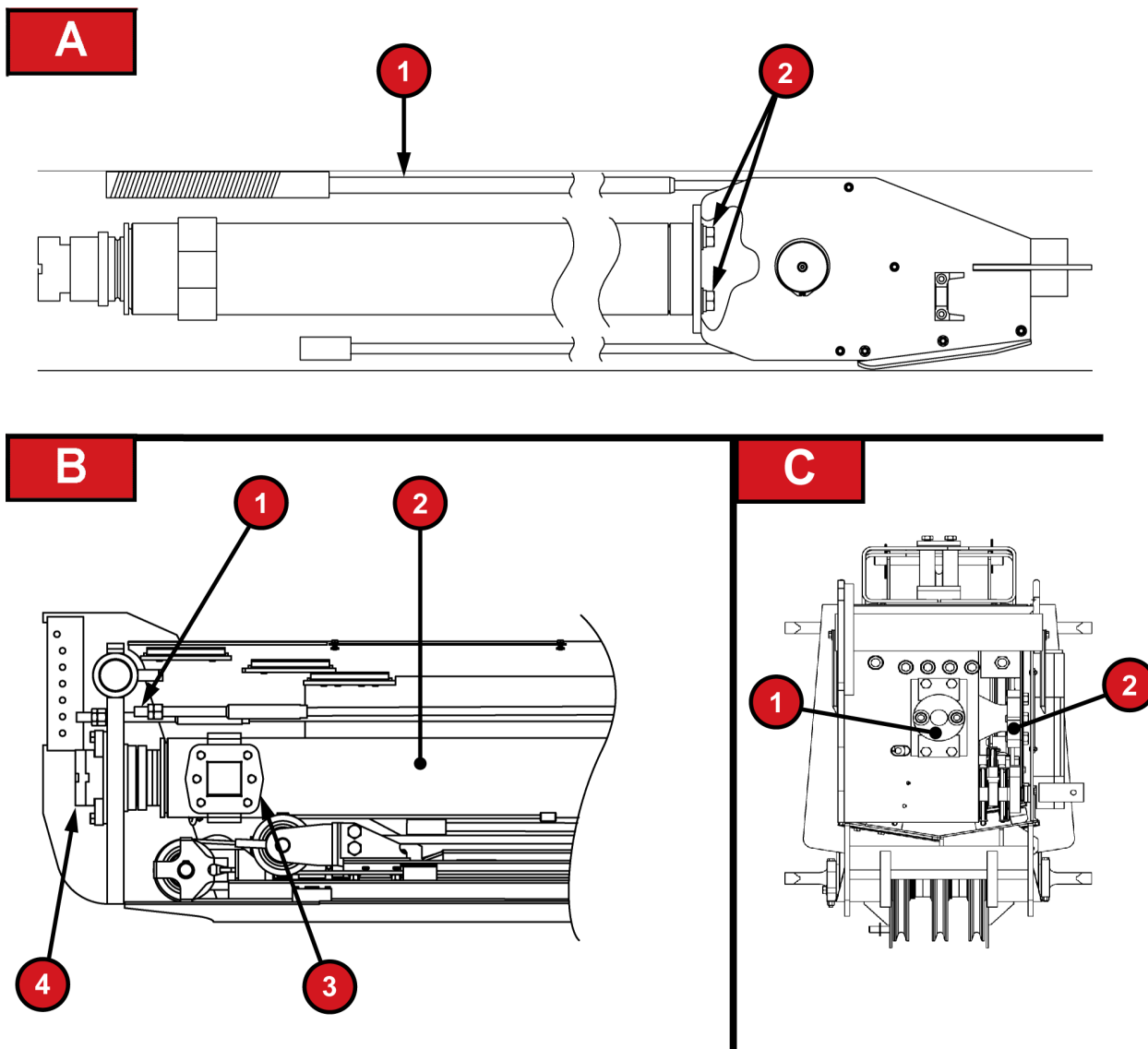
HYDRAULIC ASSIST EXTENSION SYSTEM

The extension system on the **Stinger** extends and retracts by means of a hydraulic cylinder and a series of cables. The picture below describes the cylinder mounting. The cylinder mounts into the boom by a series of mounting trunnions shown in the illustrations below. For further reference, there are descriptions of this and other boom features located in the [BOOM REASSEMBLY on page 312](#) section.



19-70 Extension Cylinder Assembly

| | | | |
|----|--------------------|----|-------------------------------|
| A | EXTENSION CYLINDER | B | CYLINDER MOUNT - SIDE VIEW |
| A1 | HYDRAULIC FITTING | B1 | EXTENSION CABLE ADJUSTMENT |
| A2 | EXTEND CABLE | B2 | EXTENSION CYLINDER ASSEMBLY |
| A3 | RETAINER BOLTS | B3 | BASE SECTION CYLINDER MOUNT |
| A4 | HYDRAULIC PLUG | B4 | SECOND SECTION CYLINDER MOUNT |
| A5 | CARTRIDGE | C | CYLINDER MOUNT - FRONT VIEW |
| A6 | 2ND STAGE TRUNNION | C1 | BASE SECTION CYLINDER MOUNT |
| A7 | ATTACHMENT LUG | C2 | SECOND SECTION CYLINDER MOUNT |
| A8 | SHEAVE BRACKET | | |

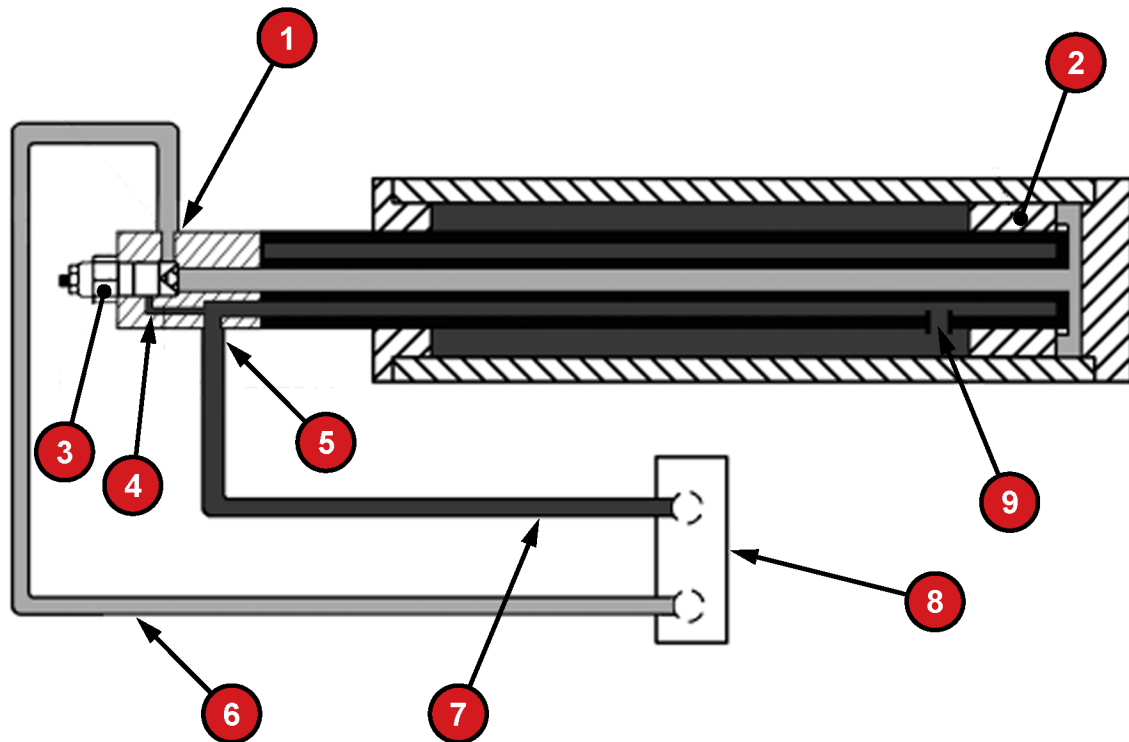


28-106 Extension Cylinder Assembly

| | | | |
|----|----------------------------|----|-------------------------------|
| A | EXTENSION CYLINDER | B1 | EXTENSION CABLE ADJUSTMENT |
| A1 | EXTEND CABLE | B2 | EXTENSION CYLINDER ASSEMBLY |
| A2 | RETAINER BOLTS | B3 | SECOND SECTION CYLINDER MOUNT |
| A3 | SHEAVE BRACKET | B4 | BASE SECTION CYLINDER MOUNT |
| A4 | ATTACHMENT LUG | C | CYLINDER MOUNT - FRONT VIEW |
| A5 | 2ND STAGE TRUNNION | C1 | BASE SECTION CYLINDER MOUNT |
| B | CYLINDER MOUNT - SIDE VIEW | C2 | SECOND SECTION CYLINDER MOUNT |

The extension cylinder is equipped with a counterbalance cartridge to hold the rated load suspended. The system is designed so that when the extension handle is pushed to extend, the oil is allowed to free-flow through the counterbalance and into a hollow porting tube in the center of the cylinder rod and into the cylinder's base. The rod side oil is bypassed back to the tank through the retract hose as the boom extends.

When the handle is pulled to retract, the oil is routed directly into the rod side of the cylinder. As pressure is applied, the oil gets into the pilot portion of the counterbalance and pilots it open, allowing the base oil to be exhausted back to tank. See the following illustration:



| | | | |
|---|--------------------------|---|-----------------------------------|
| 1 | EXTEND PORT | 6 | EXTEND LINE |
| 2 | PISTON | 7 | RETRACT LINE |
| 3 | COUNTERBALANCE CARTRIDGE | 8 | BOOM EXTEND/RETRACT VALVE SECTION |
| 4 | PILOT PASSAGE | 9 | RETRACT FLOW PASSAGE |
| 5 | RETRACT PORT | | |

CHECKING LOAD HOLDING- TELESCOPE CYLINDER

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

1. Raise boom to maximum angle and extend the boom approximately 3'. Attach a live load, as used in the topping test, to the load line and lift rated load. Raise the load 4"-5" off the ground. Shut off the engine and move the control lever to release hydraulic pressure trapped in the hose. The load should not fall more than 1/2" in 10

minutes. If it does fall more than 1/2", the following troubleshooting procedures should be followed:



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

2. A leaking cylinder will generally fall into 2 categories.
 - A. External leaks (usually found around the base of the cylinder).
 - i. All weld joints
 - ii. Cartridge O-Rings
 - iii. Cross-drilled passages
 - B. 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:
 - i. Holding Cartridge
 - ii. Piston bypassing from base side to rod side.

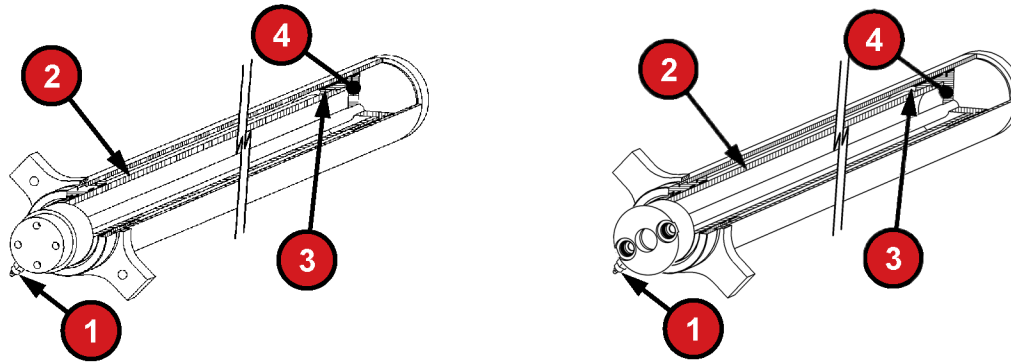


DO NOT REMOVE COUNTERBALANCE VALVE UNLESS BOOM IS FULLY RETRACTED AND SUPPORTED TO PREVENT SUDDEN MOVEMENT.



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

3. Extend boom 3-4" at maximum angle. Remove both the extend and retract hoses at the control valve.
 - A. Oil coming from the boom extend hose indicates bypass from the counterbalance. Clean or replace the counterbalance.
 - B. If oil comes out of the boom retract hose while still engaged in this test, the cylinder is bypassing internally and will require internal repairs.



| | |
|--|----------------|
| Left 19-70 TELESCOPE CYLINDER - INSIDE VIEW | 2 CYLINDER ROD |
| Right 28-106 TELESCOPE CYLINDER - INSIDE VIEW | 3 SLEEVE |
| 1 CARTRIDGE | 4 PISTON |

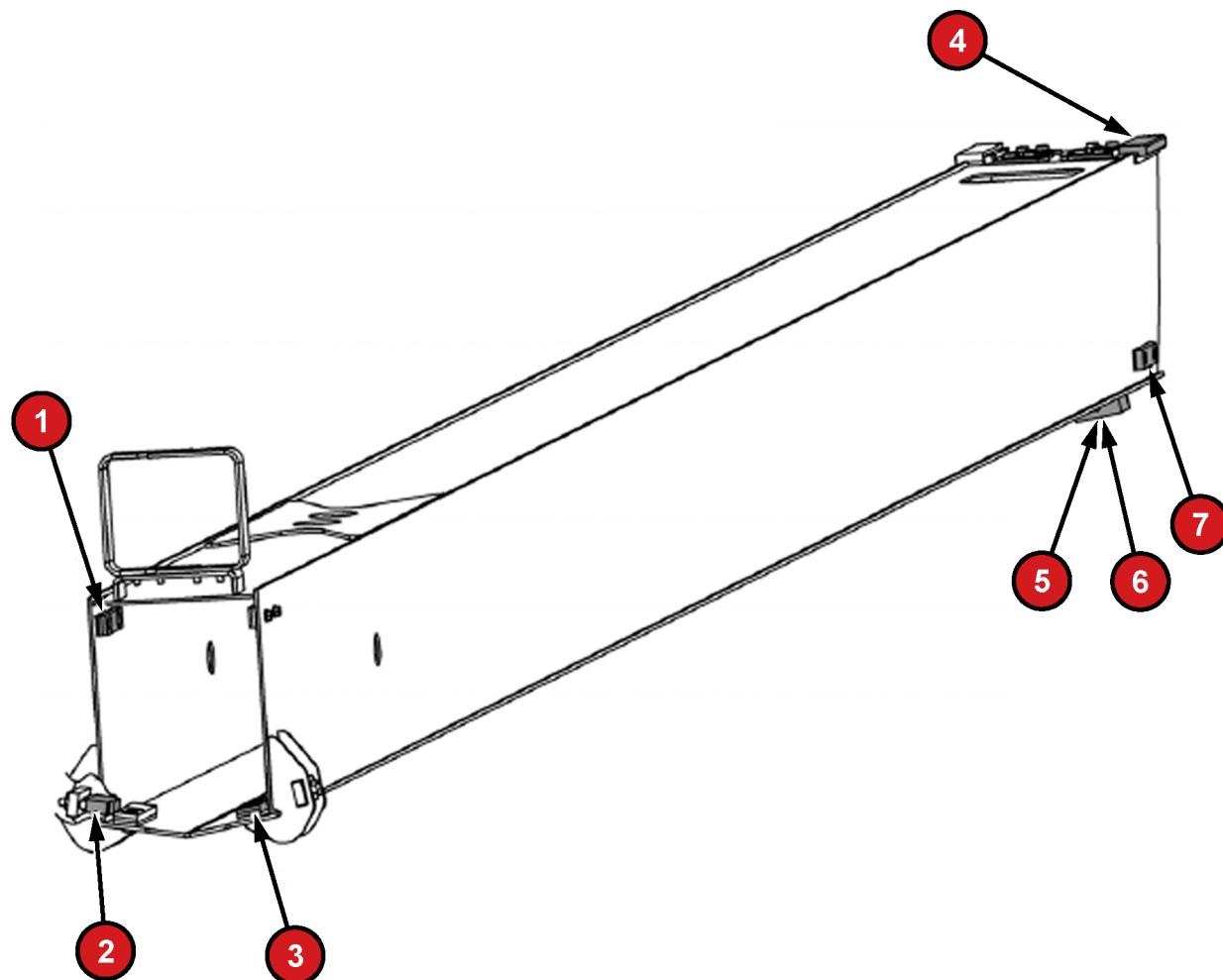
CYLINDER OVERHAUL INSTRUCTIONS

For removal of the extension cylinder assembly see [Wear Pad Adjustment and Replacement - Boom Disassembly on page 290](#).

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 faxed to you.

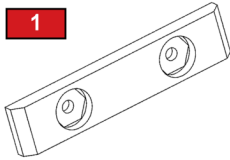
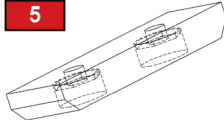
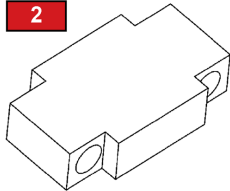
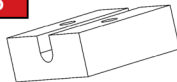
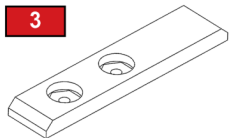
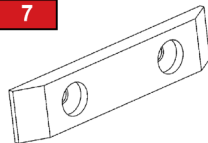

Boom Maintenance, Adjustment and Repair

19-70 Wear Pad Adjustment and Replacement



| | | | |
|---|----------------------------|----|---------------------------|
| 1 | FRONT TOP WEAR PAD | 5* | REAR BOTTOM WEAR PAD |
| 2 | FRONT BOTTOM SIDE WEAR PAD | 6* | REAR BOTTOM WEAR PAD |
| 3 | FRONT BOTTOM WEAR PAD | 7 | REAR BOTTOM SIDE WEAR PAD |
| 4 | REAR TOP WEAR PAD | | |

* 729-02856 shown, see following page for representation of 729-02857

| | |
|---|--|
|  <p>1</p> <p>FRONT TOP WEAR PAD 729-02862 Sections:Base, Second</p> |  <p>5</p> <p>REAR BOTTOM WEAR PAD 729-02857 Sections:Tip only</p> |
|  <p>2</p> <p>FRONT BOTTOM SIDE WEAR PAD 729-02860 Sections:Base, Second</p> |  <p>6</p> <p>REAR BOTTOM WEAR PAD 729-02856 Sections:Second only</p> |
|  <p>3</p> <p>FRONT BOTTOM WEAR PAD 729-02838 Sections:Base, Second</p> |  <p>7</p> <p>REAR BOTTOM SIDE WEAR PAD 729-02872 Sections:Tip, Second</p> |
|  <p>4</p> <p>REAR TOP WEAR PAD 729-02836 Sections:Tip, Second</p> | |

WEAR PAD MINIMUM DIMENSIONS

Boom wear pads must be adjusted and dimensions checked periodically. During inspection, if any of the indicated dimensions should be outside of what is specified here, pad shall be replaced. Pad shall also be replaced if pad has suffered extensive damage.

WEAR PAD SPECIFICATIONS

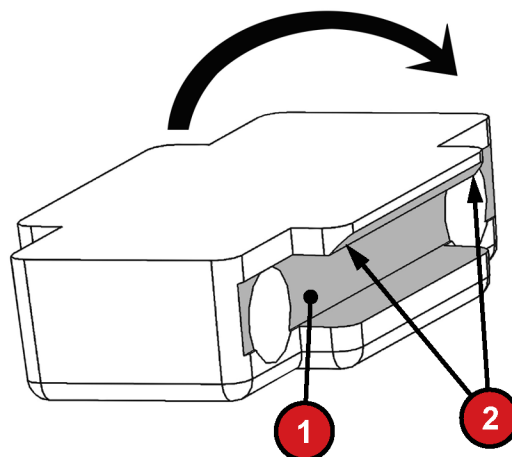
| Wear Pad | Location | Material | Height (in) | | Width (in) | Length (in) |
|------------|-----------|----------|-------------|------|------------|-------------|
| | | | MAX | MIN | | |
| 729-02836 | Rear Top | Plastic | 3/4" | 5/8" | 1 3/4" | 7" |
| *729-02872 | Rear Side | Plastic | 1/2" | 3/8" | 1 1/4" | 6" |

19-70 / 28-106 Service / Parts

| | | | | | | |
|------------|------------------------|-----------|-----------|------|--------|----|
| *729-02856 | Rear Bottom Sec2 | Plastic | 1 1/8" | 1" | 3" | 3" |
| *729-02857 | Rear Bottom Tip | Plastic | 1/2" | 3/8" | 1 1/8" | 4" |
| 729-02862 | Front Side Top | Plastic | 1/2" | 3/8" | 1 1/4" | 6" |
| 729-02838 | Front Bottom | Plastic | 1/2" | 3/8" | 1 1/2" | 7" |
| 729-02860 | Front side Bottom | Cast Iron | See Below | | | |

* these pads need not be checked or replaced on a regular basis, only during a boom tear down procedure should they be checked and replaced if needed

729-02860 Front Side Bottom wear pad.



| | | | |
|---|---|---|--|
| 1 | Shaded area indicates typical wear pattern and maximum wear | 2 | Worn edge indicates contact with boom weld |
|---|---|---|--|

Rotate or replace wear pad when it shows either or both of the following conditions.

- If indicated surface has worn down to lower surface at any point.
- Wear pad shows indications of contact with boom weld.

This pad has two (2) usable wear surfaces. Rotate pad to opposite face and readjust. If both faces are worn, replace with new wear pad.

FRONT SIDE BOTTOM WEAR PAD ADJUSTMENT



SHUT OFF ENGINE AND DISENGAGE PTO



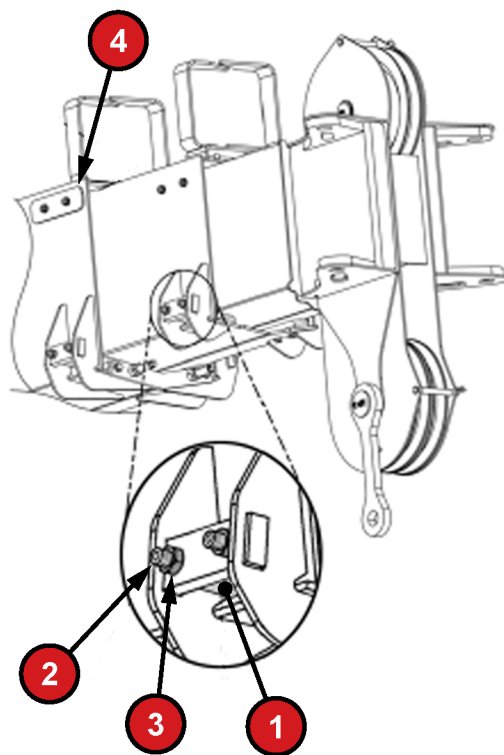
DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF BOOM IS TELESCOPED WHILE HANDS OR TOOLS ARE IN HOLES. FOLLOW THE LOCK OUT - TAG OUT PROCEDURES CONTAINED IN THE SAFETY SECTION OF THIS MANUAL.

1. Extend the boom approximately 10". Stop the engine and disengage the PTO.
2. Visually inspect the front side wear pads (1). Using the [Wear Pad Specifications table on page 291](#), check for excessive wear as shown.
3. Adjust set screws (2) until wear pad is tight against bottom plate edge, back screw off 1/4 turn.
4. Check for section alignment, adjust the sections of the boom from side to side until each section is centered in the adjacent section.
5. Holding the adjustment screw head with a wrench, tighten the adjustment jam nut (3) to lock the adjustment set screw.

FRONT SIDE TOP WEAR PAD INSPECTION AND REPLACEMENT (SECOND SECTION)

1. Extend the boom approximately 10". Stop the engine and disengage the PTO.
2. Visually inspect the Front Side Top wear pads (4). Using the [Wear Pad Specifications table on page 291](#), check for excessive wear.
3. Replace both wear pads if the thickness of either pad has decreased to less than the minimum.

NOTE: *It will be necessary to lift ends of the sections with a hoist to remove the front bottom wear pads.*



| | | | |
|---|----------------------|---|--------------------------|
| 1 | FRONT SIDE WEAR PADS | 3 | JAM NUT |
| 2 | SET SCREWS | 4 | FRONT SIDE TOP WEAR PADS |

FRONT BOTTOM WEAR PAD INSPECTION AND REPLACEMENT (BASE SECTION)

INSPECTION

1. Extend the boom approximately 10”.
2. Stop the engine and disengage the PTO.
3. Visually inspect the front bottom wear pads (1). Using the [Wear Pad Specifications table on page 291](#), check for excessive wear.
4. If the thickness of either pad has decreased to less than the minimum, proceed to replacement.

REPLACEMENT

5. Mark position of retainer nuts on retract cable adjustment studs (2), remove nuts.



BE SURE TO HOLD THE CABLE STUD BY THE WRENCH FLATS PROVIDED TO PREVENT TWISTING OF THE CABLE. FAILURE TO DO THIS WILL RESULT IN DAMAGE TO THE CABLES.

6. Remove anchor plate (3) from boom.
7. Remove wear pads



NOTE: *It will be necessary to lift ends of the sections with a hoist to remove the front bottom wear pads.*

8. Replace Wear pads
9. Replace retract anchor plate, reinstall retract anchor nuts to mark made in step 5.

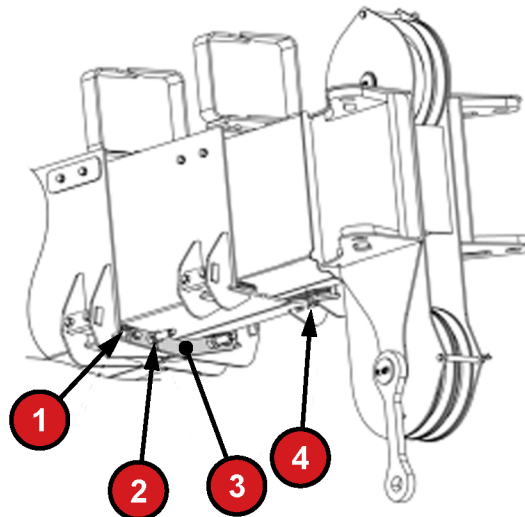
FRONT BOTTOM WEAR PAD INSPECTION AND REPLACEMENT (SECOND SECTION)

1. Extend the boom approximately 10”.
2. Stop the engine and disengage the PTO.
3. Visually inspect the front bottom wear pads (4). Using the table on the previous page, check for excessive wear.
4. Replace both wear pads if the thickness of either pad has decreased to less than the minimum.

NOTE: *It will be necessary to lift ends of the sections with a hoist to remove the front bottom wear pads.*



DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF BOOM IS TELESCOPED WHILE HANDS OR TOOLS ARE IN HOLES. FOLLOW THE LOCK OUT - TAG OUT PROCEDURES CONTAINED IN THE SAFETY SECTION OF THIS MANUAL.



| | | | |
|---|--------------------------------------|---|--|
| 1 | FRONT BOTTOM WEAR PAD (BASE SECTION) | 3 | ANCHOR PLATE |
| 2 | RETRACT CABLE ADJUSTMENT STUD | 4 | FRONT BOTTOM WEAR PAD (SECOND SECTION) |

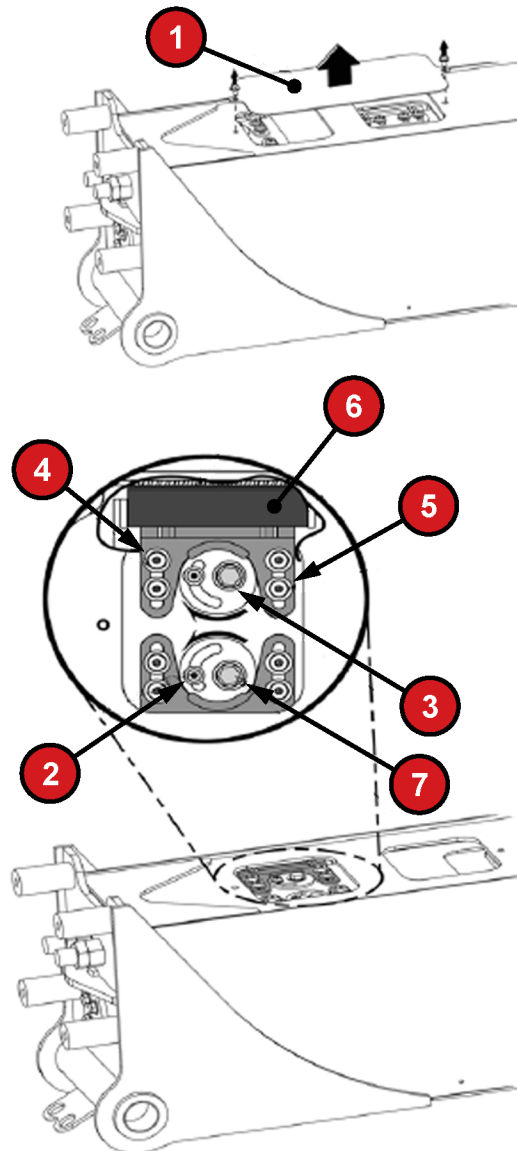
SECOND SECTION - REAR TOP WEAR PAD**WEAR PAD ADJUSTMENT AND REPLACEMENT**

1. From fully retracted, extend the boom approximately 18 inches.
2. Shut Off Engine and Disengage the PTO



DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF BOOM IS TELESKOPED WHILE HANDS OR TOOLS ARE IN HOLES. FOLLOW THE LOCK OUT - TAG OUT PROCEDURES CONTAINED IN THE SAFETY SECTION OF THIS MANUAL.

3. Remove Wear Pad Service Cover (1) on top rear of boom.
4. Remove Cam Retaining Screw (2) and Cam (3).
5. Loosen and remove Wear Pad Bracket Screws (4), Wear Pad Bracket (5) and Wear Pad (6).
6. Inspect Wear Pad for the following criteria:
 - Less than minimum thickness (see [Wear Pad Specifications table on page 291](#)).
 - Less than minimum width (see [Wear Pad Specifications table on page 291](#)).
 - Uneven wear
 - Heavy distortion
 - Cracking
 - Breaking
7. If the pad suffers from any of the above, replace the Wear Pad with a new one.
8. Reinstall Wear Pad, Wear Pad Bracket and Wear Pad Bracket Screws into the boom.
9. Reinstall Cam and Cam Retaining Screw.
10. Rotate the Cam, using a socket and breaker bar on the Cam Driver (7) until all play is removed from Wear Pad.
11. While maintaining pressure on the Cam Driver, tighten Cam Retaining Screw to lock Cam Driver in place.
12. Check Wear Pad for play to ensure all play has been removed.
13. Tighten all 4 Wear Pad Bracket Screws.
14. Repeat steps 3 through 13 on opposite wear pad.
15. Reinstall Wear Pad Service Cover.



Expanded view shows pad position and mounting

| | | | |
|---|-------------------------|---|------------------|
| 1 | WEAR PAD SERVICE COVER | 5 | WEAR PAD BRACKET |
| 2 | CAM RETAINING SCREW | 6 | WEAR PAD |
| 3 | CAM | 7 | CAM DRIVER |
| 4 | WEAR PAD BRACKET SCREWS | | |

TIP SECTION - REAR TOP WEAR PAD

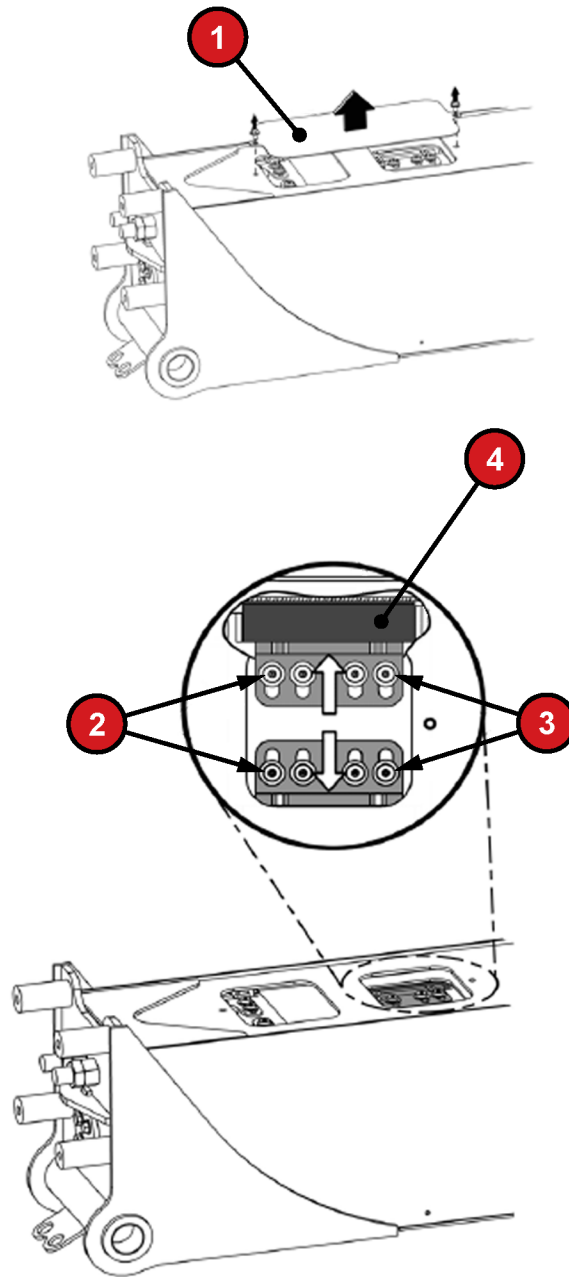
WEAR PAD ADJUSTMENT AND REPLACEMENT

1. From fully retracted, extend the boom approximately 9 inches.
2. Shut Off Engine and Disengage PTO.



DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF BOOM IS TELESKOPED WHILE HANDS OR TOOLS ARE IN HOLES. FOLLOW THE LOCK OUT - TAG OUT PROCEDURES CONTAINED IN THE SAFETY SECTION OF THIS MANUAL.

3. Remove Wear Pad Service Cover (1) on top base of boom.
4. Loosen and remove Wear Pad Bracket Screws (2), Wear Pad Bracket (3) and Wear Pad (4).
5. Inspect Wear Pad for the following criteria:
 - Less than minimum thickness (see [Wear Pad Specifications table on page 291](#))
 - Less than minimum width (see [Wear Pad Specifications table on page 291](#))
 - Uneven wear
 - Heavy distortion
 - Cracking
 - Breaking
6. If the pad suffers from any of the above, replace the Wear Pad with a new one.
7. Reinstall Wear Pad, Wear Pad Bracket and Wear Pad Bracket Screws into the boom.
8. Push wear pad bracket outward until all play is removed from wear pad.
9. Tighten all 4 screws holding wear pad bracket into place.
10. Repeat steps 3 through 8 on opposite wear pad.



Expanded view shows pad position and mounting

| | | | |
|---|-------------------------|---|------------------|
| 1 | WEAR PAD SERVICE COVER | 3 | WEAR PAD BRACKET |
| 2 | WEAR PAD BRACKET SCREWS | 4 | WEAR PAD |

BOOM REMOVAL

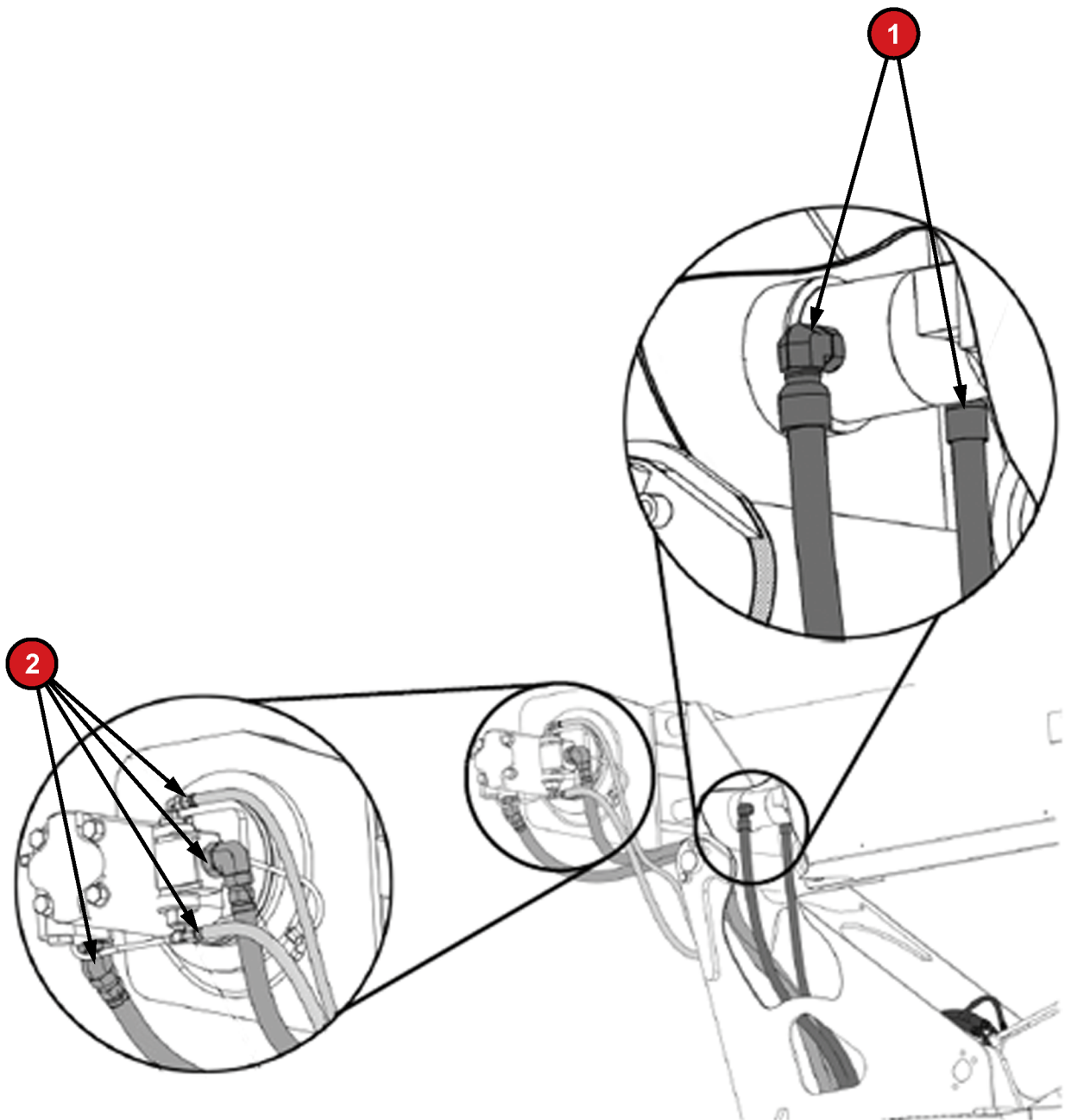


ANY LIFTING DEVICE USED SHOULD HAVE CAPACITY OF AT LEAST 10,000 LBS.

1. Fully retract boom and lower onto the boom rest.
2. Disengage the PTO and stop engine.



DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF BOOM IS TELESCOPED WHILE HANDS OR TOOLS ARE IN HOLES. FOLLOW THE LOCK OUT - TAG OUT PROCEDURES CONTAINED IN THE SAFETY SECTION OF THIS MANUAL.

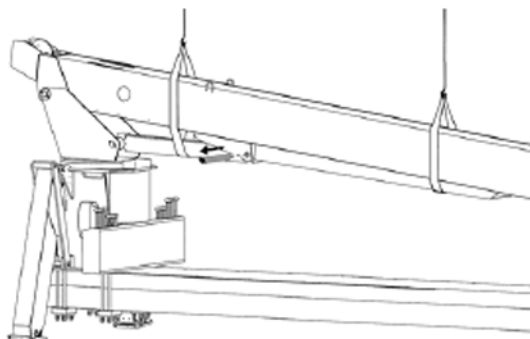


Motor shift two speed winch shown. Combined flow winch will be similar.

| | | | |
|---|--|---|-----------------------------|
| 1 | TELESCOPE CYLINDER HYDRAULIC CONNECTIONS | 2 | WINCH HYDRAULIC CONNECTIONS |
|---|--|---|-----------------------------|

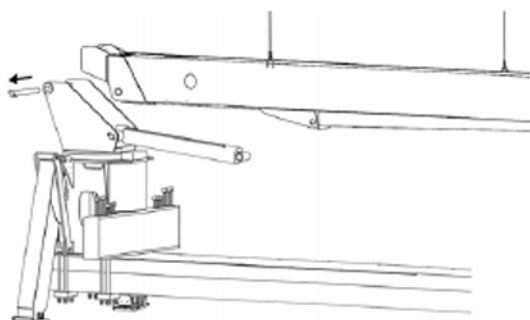
3. Tag and disconnect the hydraulic lines from the telescope cylinder (1) and winch (2) at fittings indicated below. Cap the hoses and plug the cylinder ports. The winch fittings can be removed with an appropriately sized wrench.

4. Lift towards the rod end of the topping cylinder with another crane or suitable hoist and remove the rod pin. Lower the rod end of the cylinder down onto a block wedged between the bottom of the cylinder and the turret.



DO NOT DROP THE TOPPING CYLINDER DOWN AGAINST THE TURRET, OR THE BARREL OF THE CYLINDER MAY BE DAMAGED. SUPPORT THE END OF THE CYLINDER SO IT CANNOT MOVE ACCIDENTALLY.

5. Using chains or cables with a capacity of 10,000 lbs. Connect to the lifting lugs on top of the base boom and lift slightly. This will be center of gravity for the boom assembly.
6. Remove the boom hinge pin.



7. Lift the boom onto stands or blocking. Stands or blocking must have the capacity of holding approximately 10,000 lbs and be installed close to both ends of boom base to provide a sturdy support preventing any unexpected movement. Secure the boom to these stands.

BOOM DISASSEMBLY PROCEDURE

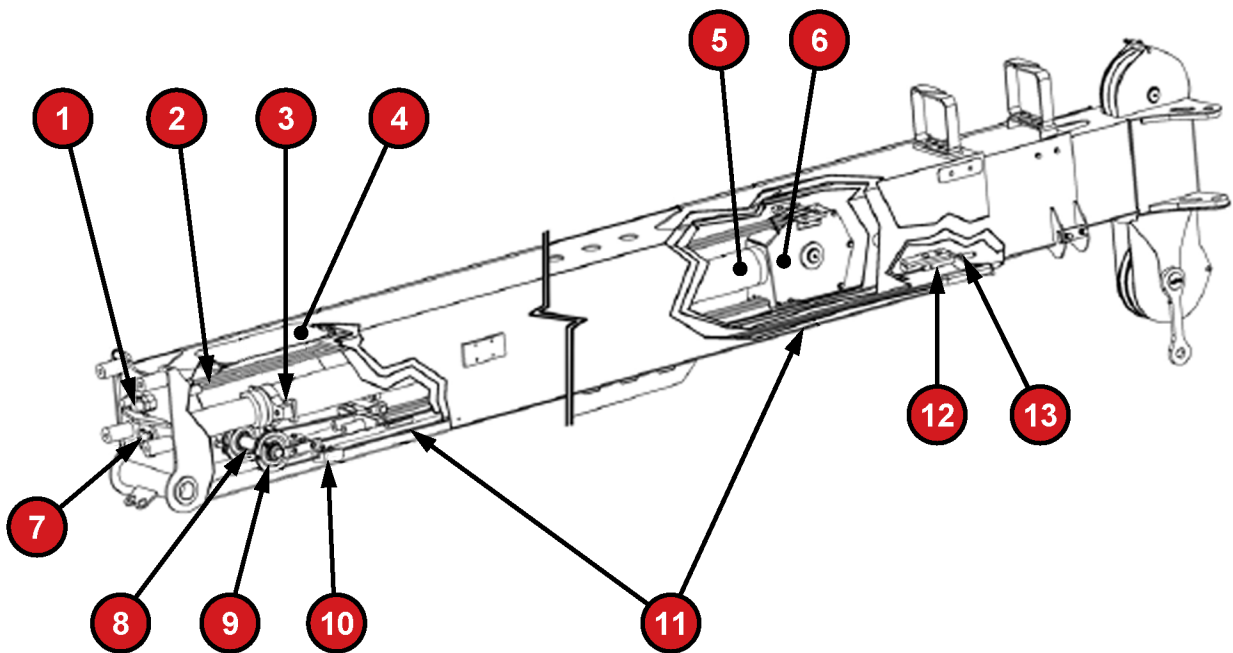
These instructions assume that the winch assembly has been removed after the boom was removed from the boom truck. Any stands or lifting devices used should have the capacity of holding approximately 10,000 lbs. Stands or blocking must be installed close to both ends of the base boom to provide a sturdy support. The boom should be secured to these stands to prevent any unexpected movement.

It is best if the stands are shaped in such a way that the keel shape of the boom is matched so it will not tilt or fall over during servicing. This will also prevent the boom from being

damaged due to self weight. (Large timbers with a “V” cut to match the bottom side of the boom make excellent stands.)



NOTE: To avoid confusion when reassembling the boom, keep wear pads and shims in matched sets as they are removed. Keep bolts, capscrews, lock washers, and nuts with the parts they retain.



| | | | |
|---|--------------------------|----|------------------------|
| 1 | EXTEND CABLE ANCHOR | 8 | CABLE RETAINER SCREWS |
| 2 | EXTEND CABLE | 9 | RETRACT CABLE SHEAVE |
| 3 | EXTEND CYLINDER TRUNNION | 10 | CABLE RETAINER |
| 4 | WEAR PAD SERVICE COVER | 11 | RETRACT CABLE |
| 5 | EXTENSION CYLINDER | 12 | RETRACT CABLE ANCHOR |
| 6 | EXTENSION SHEAVE | 13 | RETRACT ANCHOR BRACKET |
| 7 | EXTEND CYLINDER CAP | | |

1. Remove nuts from Retract Cable Anchor on front of base section.



BE SURE TO HOLD THE CABLE STUD BY THE WRENCH FLATS PROVIDED TO PREVENT TWISTING OF THE CABLE. FAILURE TO DO THIS WILL RESULT IN DAMAGE TO THE CABLES.

2. Remove Retract Anchor Bracket from front of base section.
3. Remove all front wear pads between base and second sections. This includes side top, side bottom and bottom wear pads.



NOTE: *Bottom wear pads will require that the weight of the second and tip sections be lifted to free the wear pads for removal.*

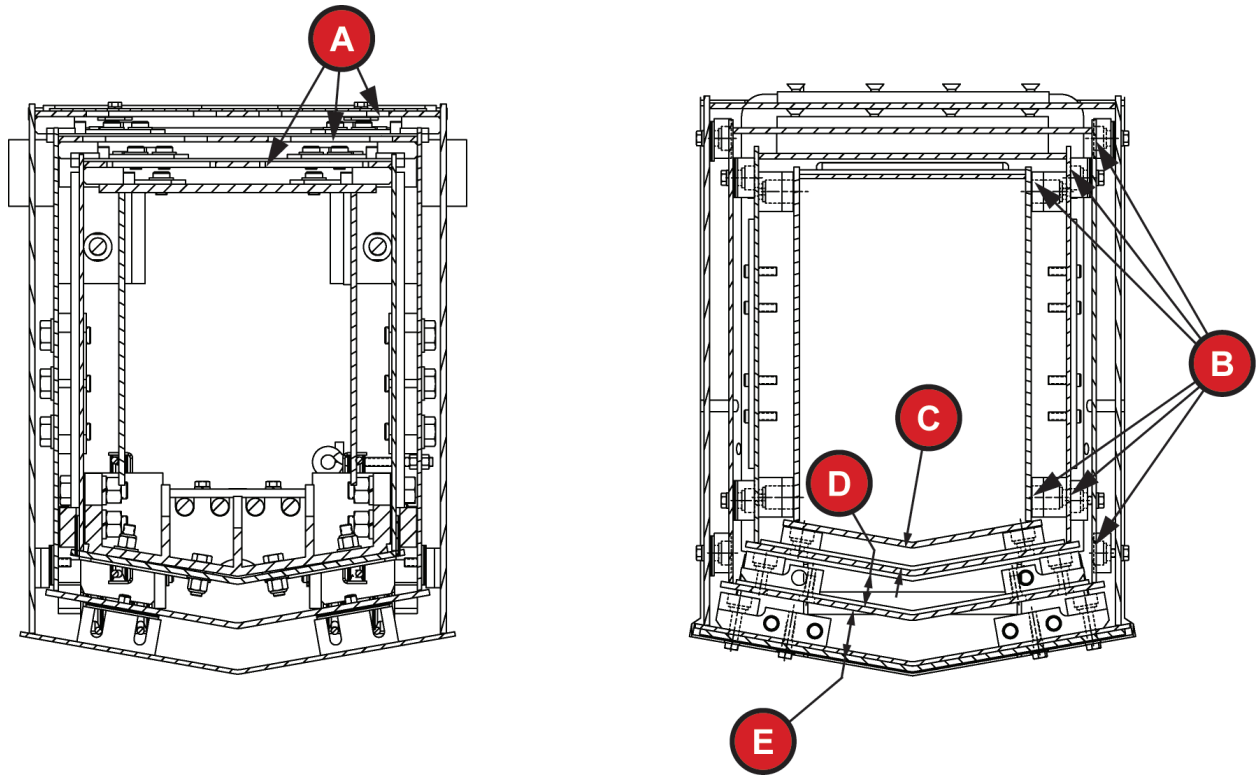
4. Remove extension cable nuts from rear of base section.
5. Remove Extend Cylinder Cap from rear of base section.
6. Remove Wear Pad Service Cover from the top of the base section.
7. Remove the rear side top wear pads between base and second sections.
8. Remove rear side bottom wear pads.
9. Remove rear bottom wear pads between base and second sections.



NOTE: *Bottom wear pads will require that the weight of the second and tip sections be lifted to free the wear pads for removal.*

10. Slide second and tip sections out of base section.
11. Remove bolts from Extend Cylinder Trunnion.
12. Remove tabs from Extend Cylinder Trunnion.
13. Remove Cable Retainer Screws from around Retract Cable Sheaves.
14. Using zip ties, anchor Retract Cable ends to the Extend Cylinder rod.
15. Using zip ties, anchor Extend Cables to Extend Cylinder rod.
16. Remove front bottom wear pads from between second and tip section.
17. Remove extend cylinder and tip section from second section.
18. Extend cylinder will rest on retract cable anchor pin.
19. Remove extend cable anchor plate by pulling it out through the back of the boom.
20. Remove rear side wear pads from tip section.
21. Support cylinder and remove retention cable anchor pin.
22. Remove rear bottom wear pad from tip section.
23. Slide extend cylinder assembly from tip section.

28-106 Wear Pad Adjustment and Replacement



Front View (left) and Rear View (right)

The following notes will apply anytime replacement or removal of any wear pads are involved. Use shims under the pads to attain proper clearances between boom sections. See dimension notes on above illustration for clarification.

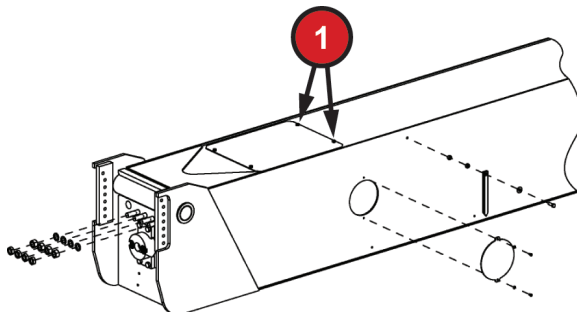
- | | |
|---------------|--|
| Dim A | Rear top wear pads and adjacent boom sections: 1/16" maximum clearance. |
| Dim. B | Front and rear side wear pads and adjacent boom sections: 1/32" maximum clearance. |
| Dim. C | Front bottom 3rd and 4th stage boom sections: 3/4" |
| Dim. D | Front bottom 2nd and 3rd stage boom sections: 1 9/16" |
| Dim. E | Front bottom base boom and 2nd stage boom sections: 1 5/8". |

Front View on the dimension notes illustration above.

1. When making adjustments, remove the shims from one side and add same shims to the other side. Dimension B in Section A no longer applies. Clearance for the bottom wear pads that make contact with the keel sections at the boom tip end sections must be checked to insure shimming is consistent from one side to the other side and both lower pads make contact with the keel surface of the boom.
2. Apply a thin film of brush-type anti-seize lubricant on the base, 2nd, and 3rd stage boom sections where pads make contact, on inside surfaces. On outer boom tip

surfaces use lithium based grease. The width and length of lubrication needs to be full wear pad contact area. Use a heavy duty temperature resistant lubricant; Military Spec: MIL-A-9070 Bossert P/N 76764 or equivalent.

3. Apply a thin film of lithium grease (Fleet Industries Stock #1454-SW-G) to the outside surfaces of side plates and bottom plates on 2nd, 3rd, and 4th stage booms where wear pads make contact. Width and length of lubrication to be full wear pad contact area. Apply grease before assembly of boom sections.



1 Wear Pad Inspection Location: Rear of Base Boom

WEAR PAD REPLACEMENT CHART

| PART NUMBER | NEW SIZE | MINIMUM THICKNESS |
|-------------|----------|-------------------|
| 729-02235 | 3/4" | 5/8" |
| 729-02236 | 3/4" | 5/8" |
| 729-02640 | 3/4" | 5/8" |



NOTE: Wear pad bolts should be either shimmed or shortened as necessary to prevent contact or scraping of the adjacent boom section. Serious damage to boom weldment may occur if these steps are not followed.



SHUT OFF ENGINE AND DISENGAGE PTO

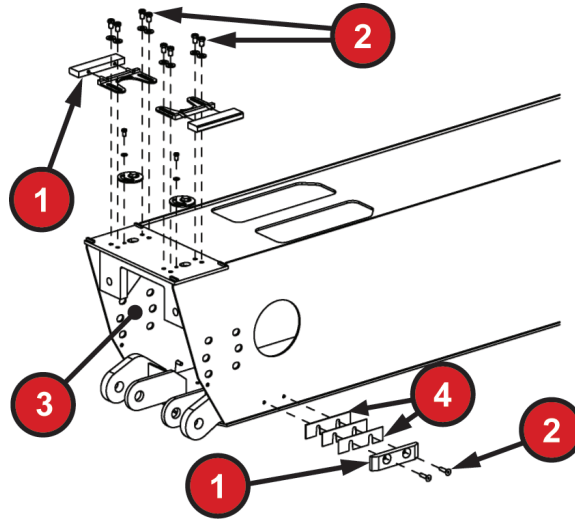


DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF BOOM IS TELESKOPED WHILE HANDS OR TOOLS ARE IN HOLES

REAR TOP WEAR PADS

1. Fully retract the boom so the top rear wear pads on the 2nd stage are accessible through the holes in the top of the base section.
2. Measure the thickness of the rear top wear pads on the top of the 2nd stage boom. Replace both wear pads if worn too much to maintain the proper clearance, to avoid unnecessary boom droop.

3. Measure the clearance between the rear top wear pads and the adjacent section.
4. If necessary, loosen the mounting screws and add shims under the wear pads to provide the clearance given in the wear pad clearance chart.



| | | | |
|---|----------|---|------------------------|
| 1 | Wear Pad | 3 | Rear of 2nd Stage Boom |
| 2 | Screws | 4 | Shims |



NOTE: *Shims come in three thicknesses as noted below.*

| PART NUMBER | DESCRIPTION | THICKNESS |
|-------------|-------------|-----------|
| 787-00238 | SHIM | 0.04 |
| *787-00308 | | |
| 787-00239 | SHIM | 0.063 |
| *787-00309 | | |
| 787-00240 | SHIM | 0.10 |
| * 787-00310 | | |



NOTE: ** These shims used with wear pad # 729-02640 top rear 2nd stage boom.*

5. Securely tighten the mounting screws after the shims are installed. Use Loctite 242 on all bolts.
6. Extend the boom so top rear wear pads on the 3rd stage are accessible through the holes in the base and 2nd stage.
7. Repeat Rear Top Wear Pads, Steps 1 through 5 for the 3rd section.



NOTE: *Rear side wear pads can only be adjusted or replaced when the boom is disassembled.*

FRONT BOTTOM AND SIDE WEAR PADS



SHUT OFF ENGINE AND DISENGAGE PTO



DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF BOOM IS TELESKOPED WHILE HANDS OR TOOLS ARE IN HOLES

1. Extend the boom approximately 6". Stop the engine and disengage the PTO.
2. Measure the thickness of the front side wear pads. Replace all of the wear pads for the respective section if the thickness of any side wear pad has decreased to the minimum dimension given in the previous table. Check for metal to metal contact between the pad fastener and boom.
3. Adjust the stages of the boom from side to side until each stage is centered in the adjacent section.
4. Measure the clearance between front side wear pads and the adjacent section.
5. If necessary, loosen the mounting screws after the shims are installed.
6. Securely tighten the mounting screws after the shims are installed.



NOTE: *Mounting screws for the side wear pads must not rub against the adjacent section. If necessary, add washers behind the head of the mounting screws so screws fully engage the nuts in the wear pads but not rub against the section.*

7. Measure the thickness of the front bottom wear pads and replace both wear pads for the respective sections if the thickness of either pad has decreased to the dimension given in the table above.



NOTE: *It will be necessary to lift ends of the sections with a hoist to remove the front bottom wear pads. The front bottom wear pads on the base boom are fastened to the retraction cable mounting pads; the mounting pad must be removed from the end of each retraction cable to gain access to the wear pad.*

Readjust the retraction cables after reinstalling mounting pads. See Extension and Retraction Cable Adjustment sections of [Boom Cable Adjustment Procedure on page 332](#).

8. Measure the clearance between the sections as in pad clearance chart.
9. If necessary, add shims under the wear pads to provide the clearance given above. Make sure both pads are making contact with the keel of the boom. Shim as high as possible to achieve even contact on both pads without contacting side slider pads.
10. Securely tighten the mounting screws after the shims are installed.

BOOM REMOVAL



ANY LIFTING DEVICE USED SHOULD HAVE CAPACITY OF AT LEAST 10,000 LBS.

1. Fully retract boom and lower onto the boom rest. Disengage the PTO and stop engine.
2. Tag and disconnect the hydraulic lines from the cartridge block on the end of the telescope cylinder. Cap the hose and plug the cylinder ports. Remove winch hoses and cap and plug.
3. Lift against the rod end of the topping cylinder with another crane or suitable hoist and remove the rod pin. Lower the rod end of the cylinder down onto a block.



DO NOT DROP THE TOPPING CYLINDER DOWN AGAINST THE TURRET, OR THE BARREL OF THE CYLINDER MAY BE DAMAGED. SUPPORT THE END OF THE CYLINDER SO IT CANNOT MOVE ACCIDENTALLY.

4. Using slings with legs at least 4' long and a capacity of 10,000 lbs. connect to the lifting lugs on top of the base boom and lift slightly. This will be center of gravity for the boom assembly.
5. Remove the boom hinge pin.
6. Lift the boom onto stands or blocking. Stands or blocking must have the capacity of holding approximately 10,000 lbs and be installed close to both ends of boom base to provide a sturdy support preventing any unexpected movement. Secure the boom to these stands.

BOOM DISASSEMBLY PROCEDURE

These instructions assume that the winch assembly has been removed after the boom was removed from the boom truck. Any stands or lifting devices used should have the capacity of holding approximately 10,000 lbs. Stands or blocking must be installed close to both ends of the base boom to provide a sturdy support. The boom should be secured to these stands to prevent any unexpected movement.

It is best if the stands are shaped in such a way that the keel shape of the boom is matched so it will not tilt or fall over during servicing. This will also prevent the boom from being damaged due to self weight. (Large timbers with a "V" cut to match the bottom side of the boom make excellent stands.)



NOTE: *To avoid confusion when reassembling the boom, keep wear pads and shims in matched sets as they are removed. Keep bolts, capscrews, lock washers, and nuts with the parts they retain.*

1. Remove the cartridge block, by cautiously unscrewing the four socket head capscrews. Use caution as there may be some pressure trapped in the cylinder. **MAKE SURE THAT THE O-RINGS DO NOT FALL OUT OF THE CARTRIDGE BLOCK.**
2. Remove the inspection cover on top of the base boom. Remove the lock and jam nuts from the four 3rd stage extend cables protruding from the cylinder mounting at the rear of the base boom. Secure the cables to the cylinder through the inspection hole in

the top of the base boom. BE SURE TO HOLD THE CABLES BY THE WRENCH FLATS PROVIDED ON THE ENDS TO PREVENT TWISTING. FAILURE TO DO THIS WILL RESULT IN DAMAGE TO THE CABLES.

3. Remove the nuts from the four 3rd stage retract cables at the front of the base boom. Lift the front of the 3rd stage boom to unload the lower pads. Remove the side, top, and lower wear pads as well as cable blocks. BE SURE TO HOLD THE CABLES BY THE WRENCH FLATS PROVIDED ON THE ENDS TO PREVENT TWISTING. FAILURE TO DO THIS WILL RESULT IN DAMAGE TO THE CABLES.
4. Carefully slide the 2nd, 3rd, and 4th stages out of the boom. BE SURE THAT THE RETRACT CABLES ARE PULLED OUT WITH THE BOOM ASSEMBLIES TO AVOID DAMAGING THEM.

Temporarily reinstall the cartridge block onto the extension cylinder to avoid the possibility of contamination entering the cylinder porting.

5. Remove the retract cable guides from the bottom of the 2nd stage boom, and stretch the 4th stage cables out behind the boom to prevent them from being kinked.
6. Remove the nuts on the 4th stage extension cables from the mounting plate on the upper rear end of the 2nd stage boom. BE SURE TO HOLD THE CABLES BY THE WRENCH FLATS PROVIDED ON THE ENDS TO PREVENT TWISTING. FAILURE TO DO THIS WILL RESULT IN DAMAGE TO THE CABLES.

Supporting the weight of the extension cylinder with a hoist, remove the 12 bolts holding the trunnion mount plates to the 2nd stage boom.

Push the trunnion mount plates inboard on the cylinder trunnions.

7. Remove the jam nuts on the 4th stage retraction cables and remove the upper, side and lower front wear pads from the front of the 2nd stage boom. Remove the cable mounting blocks also.
8. Lift the cylinder and extend tube assembly as high as possible, and remove the 3rd stage retract cable sheave pins, sheaves, and cable guides. Remove the 3rd stage retraction cables and inspect for rust, kinks, and any signs of damage.
9. Carefully remove the 3rd and 4th stage assemblies from the 2nd stage boom. The cylinder and extend tube assembly should remain with the 3rd and 4th stage booms.
10. Remove the retract cable retainers from the bottom of the 3rd stage boom. Remove the buck eyes from the retract cable pins and remove the cable guides and sheave assemblies. Lay the retract cables straight out behind the booms to prevent kinking or damage to the cables.
11. Again, raise the base of the extension cylinder as high as possible to gain working room, and remove the three 1/2" bolts anchoring the four 3rd stage extend cables to the extend/retract cable bracket.
12. Remove the four bolts holding the extend/retract bracket to the extend tube assembly. Remove the extend/retract bracket assembly.
13. After devising some means to secure the extend cables to the cylinder barrel, slowly remove the cylinder assembly from the 4th stage and extend tube assembly. Stop

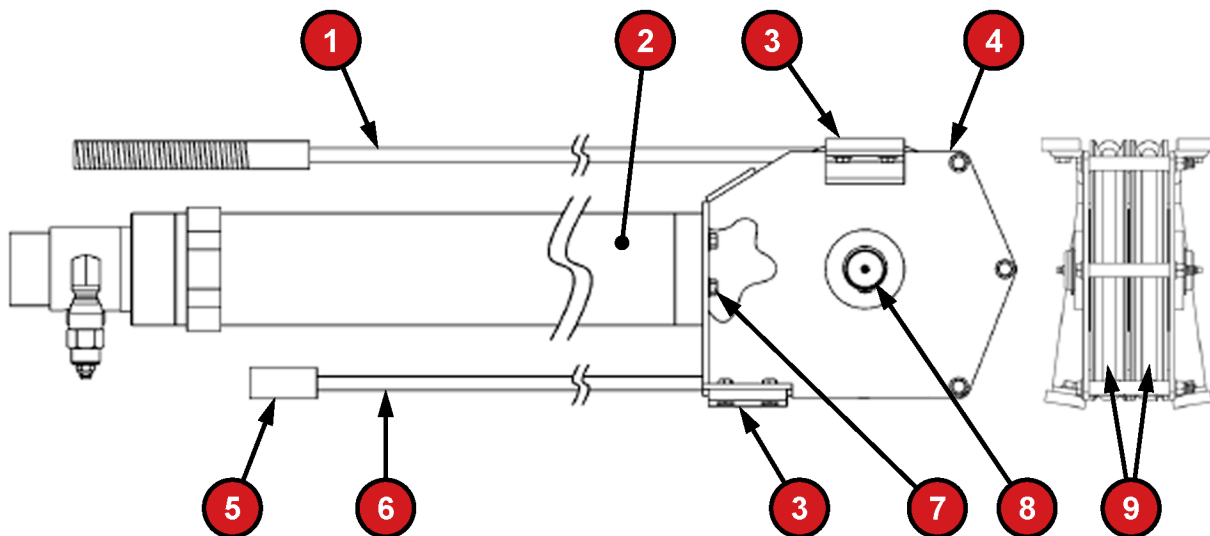
about half of the way out and find the approximate center of gravity of the cylinder assembly and reposition the sling. Set cylinder assembly on work stands and disassemble if necessary. Check the extend cables thoroughly for wear and damage.

14. Raise the extend tube assembly as high as possible and remove the 4th stage extend cable anchors in the rear bottom of the 4th stage boom. After securing the 4th stage extend cables to the extend tube, slowly remove the extend tube assembly. Stop about half of the way out and find the approximate center of gravity and reposition the sling. Put the assembly on a work stand and disassemble if necessary

Boom Assembly

These instructions assume that the boom is in a completely disassembled condition. The re-assembly will be carried out in several stages of sub-assembly starting with the extend cylinder assembly first

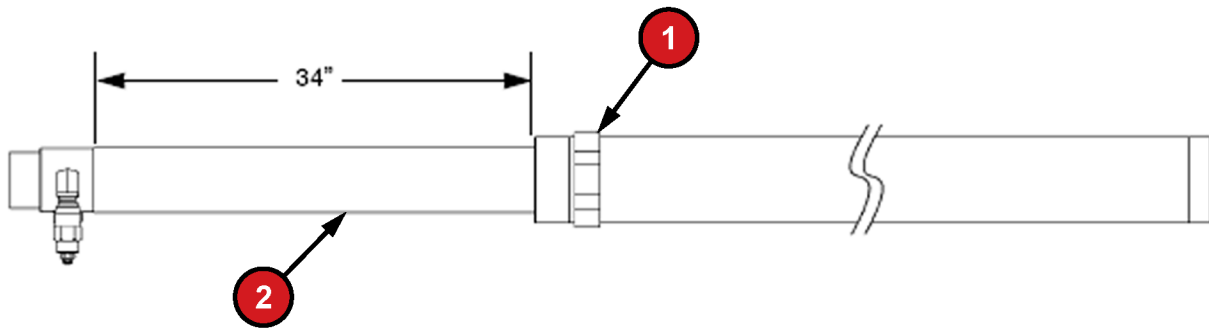
EXTEND CYLINDER ASSEMBLY



| | | | |
|---|--------------|---|------------------------------|
| 1 | EXTEND CABLE | 6 | EXTEND CABLE |
| 2 | CYLINDER | 7 | HEAD UNIT INSTALLATION BOLTS |
| 3 | WEAR PAD | 8 | SHEAVE PIN |
| 4 | HEAD UNINT | 9 | ROPE EXTEND SHEAVES |
| 5 | LUG | | |

IMPORTANT NOTE:

Before beginning assembly of the Boom Extend Mechanism, the extend cylinder needs to be extended approximately 34 inches, this can be accomplished by connecting the cylinder to a hydraulic pressure source or by uncapping the hydraulic ports and mechanically pulling the cylinder rod out to the 34 inches. Do not scratch or mar the polished portion of the rod cylinder.



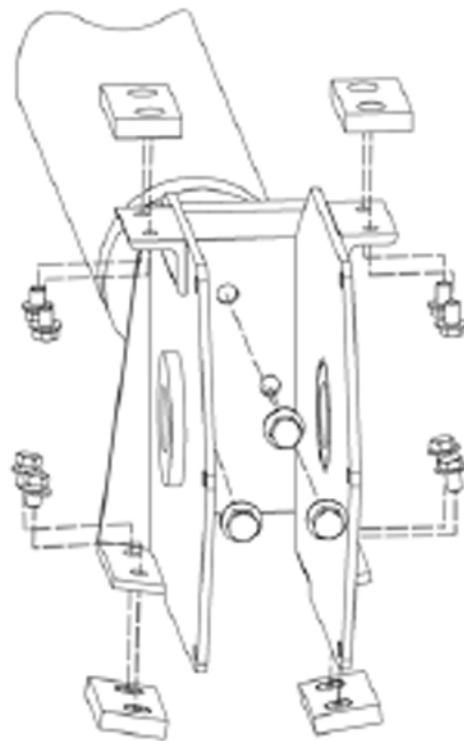
Assemble the extension cylinder assembly as follows:



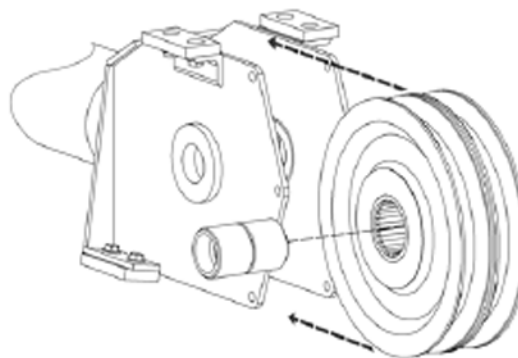
NOTE: Use Loctite 2440 on ALL bolts during assembly.

Telescope Cylinder Assembly

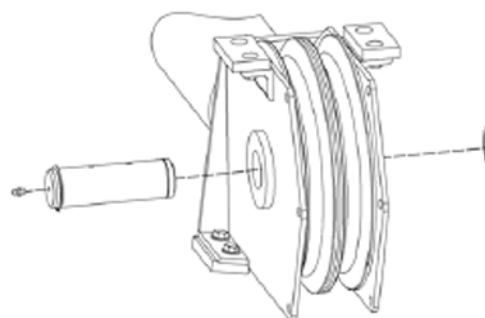
1. Install top and bottom Wear Pads (4 total) on Sheave Head Unit. Assemble the sheave head unit to cylinder using the 1/2-13 x 1 1/8 Gr. 8 bolts with flat washers.



2. Install bearing inner races into the (2) rope extend sheaves. Insert sheave assembly as shown.



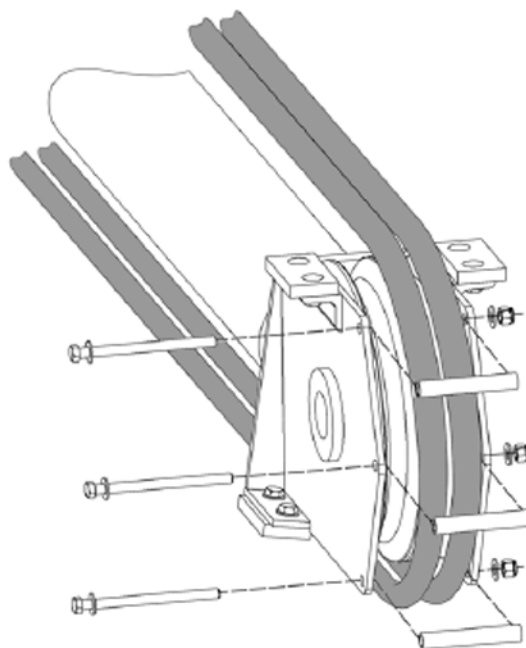
3. Install sheave pin. Install snap rings and grease fittings.



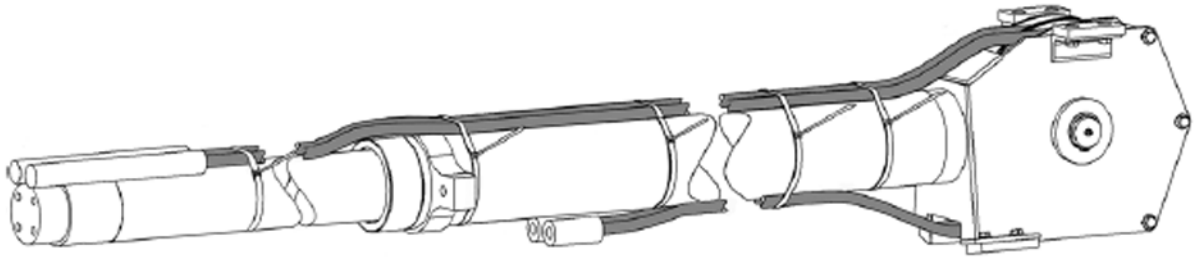
4. Place Extend Cables around Sheaves. Install spacers and bolts as shown.



NOTE: BEFORE PROCEEDING, BE SURE THAT YOU HAVE EXTENDED THE CYLINDER ROD PER THE INSTRUCTIONS ABOVE.



5. Secure Extend Cables to Extend Cylinder with large gauge zip ties as shown, spacing should be every 4-6 ft.

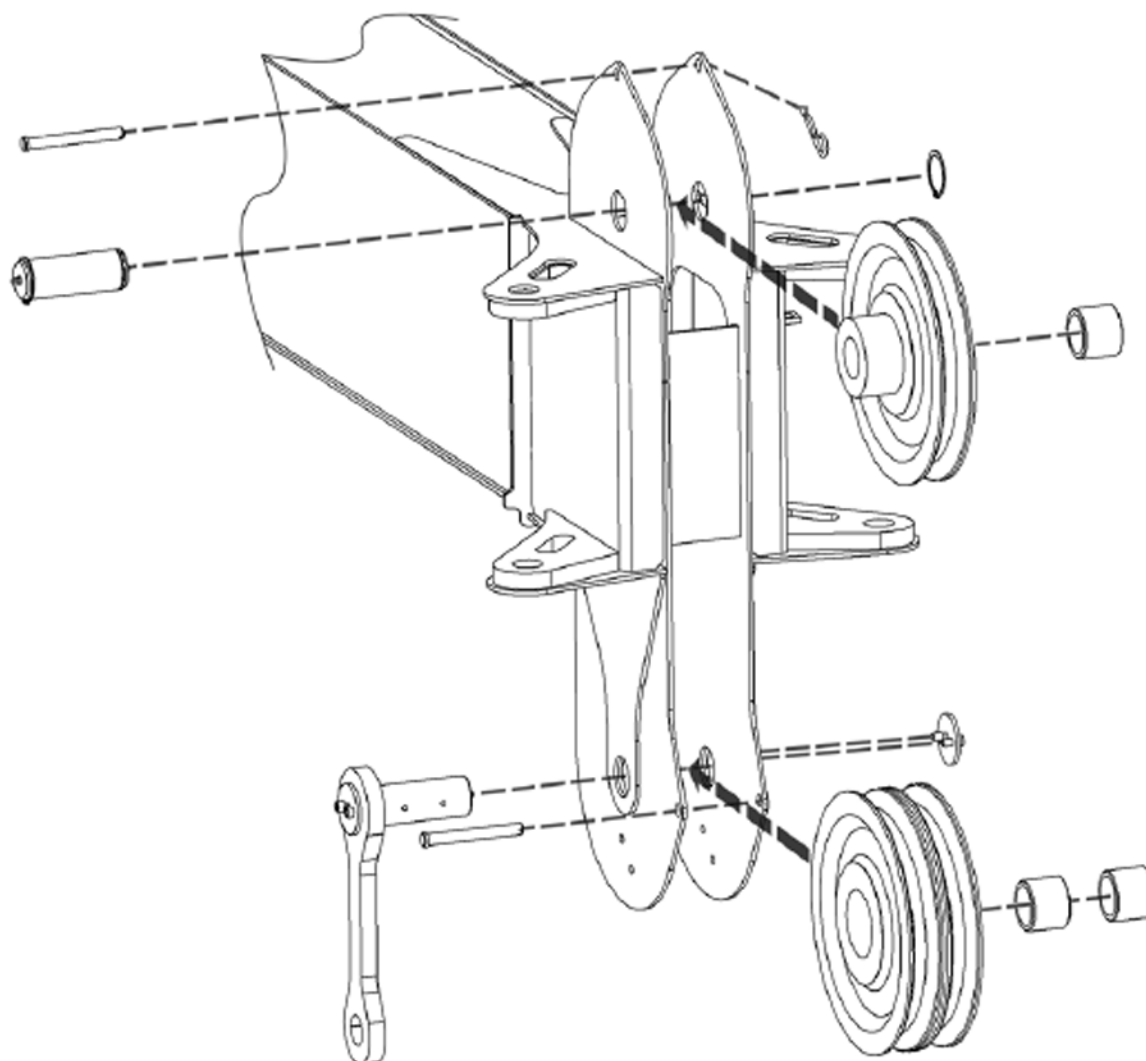


CABLES MUST NOT BE CROSSED DURING ANY PORTION OF THIS ASSEMBLY

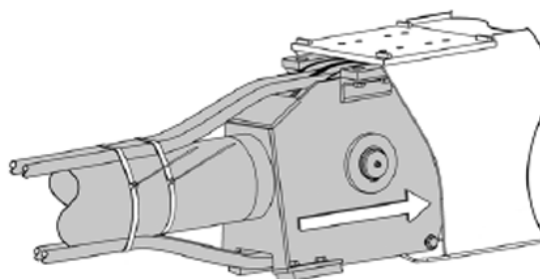
BOOM ASSEMBLY - TIP SECTION

TIP SECTION ASSEMBLY

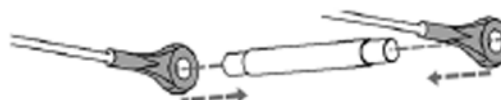
1. Starting with the tip section, assemble sheaves, bearing races, pins, spacer and snap rings to the boom tip.



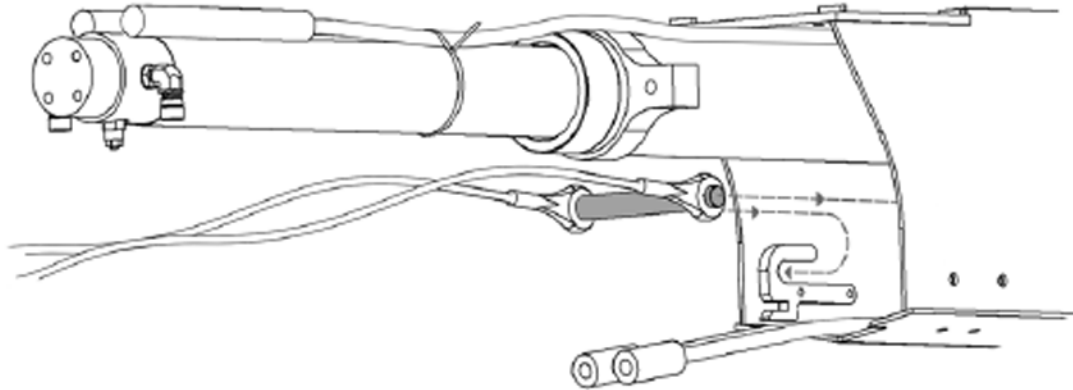
2. Insert Extend Cylinder Assembly into Tip Section as shown. Clip and remove cable ties as assembly is inserted. DO NOT allow cables to cross or tangle.



3. Install Retract Cable Eyes on Retract Anchor Rod.

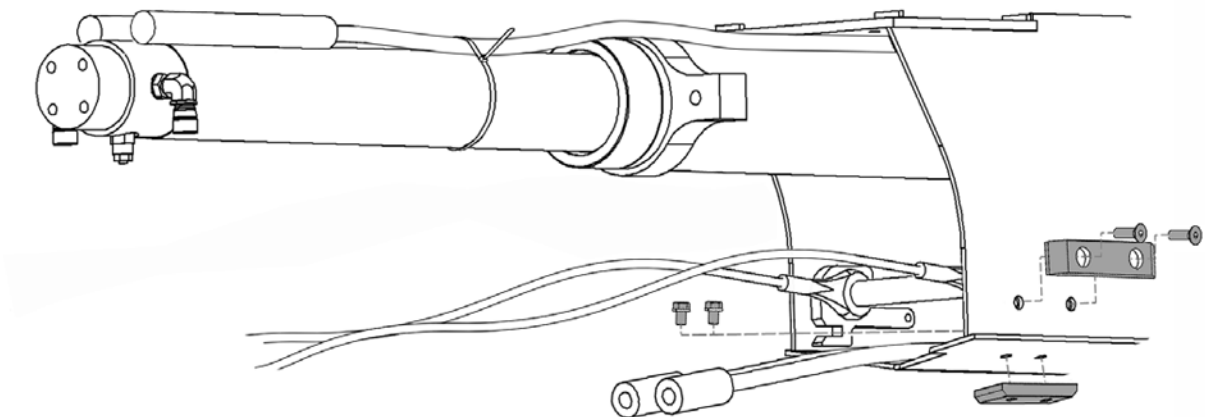


4. Install Retract Anchor Rod and Cable Assembly into Tip section anchor points.

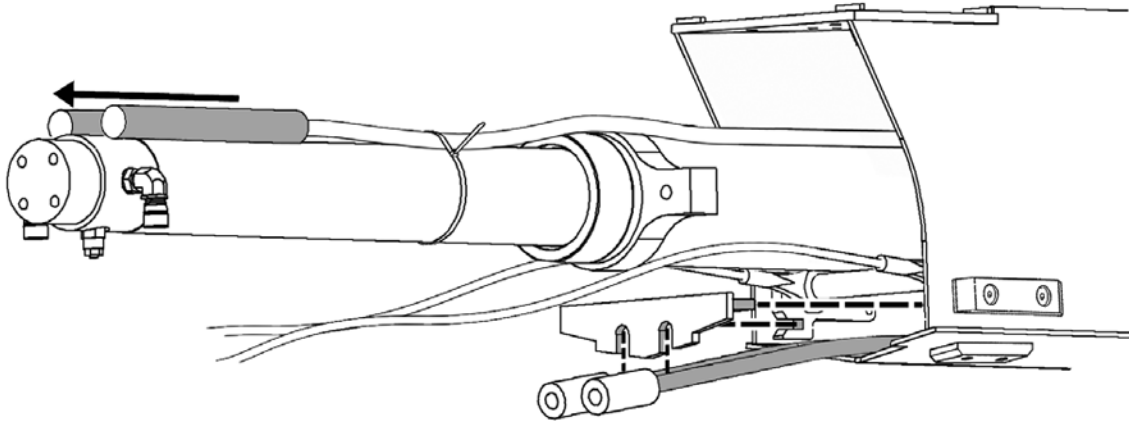


5. Install Rear Wear Pads, side and bottom (4 Total) on Tip Section. Bottom wear pads require hex head screws, side wear pads require flat head screws.

Apply **FS White Lithium Grease 12** to boom sides that contact wear pads and wear pad surfaces. Apply **Northland Moly Tac II Grease Lithium Complex** to top and bottom surfaces of boom that contact wear pads and wear pad surfaces. Using 4" paint roller to apply the grease and a long pole as required to reach internal surfaces.



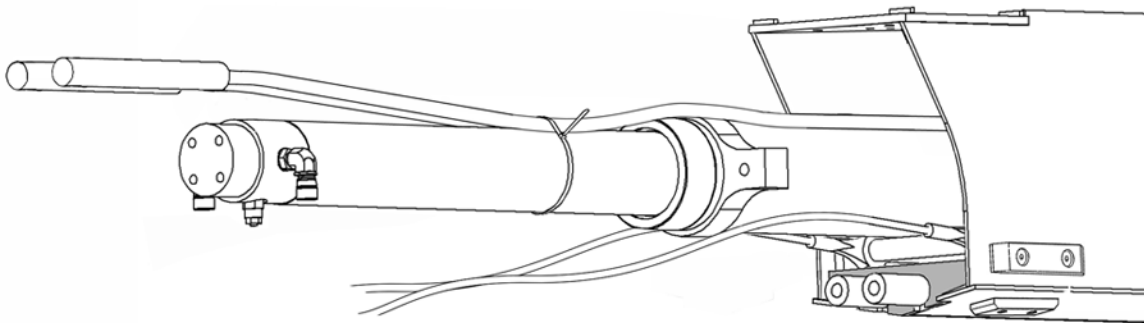
6. Lower Cylinder to rest on Retract Anchor Rod. Install Extend Cable Anchor Plate by sliding Extend cables into slots in plate. Seat plate by putting tension on the upper end of the Extend Cables.



7. Correct positioning of Extend cable anchor plate and cable after installation.



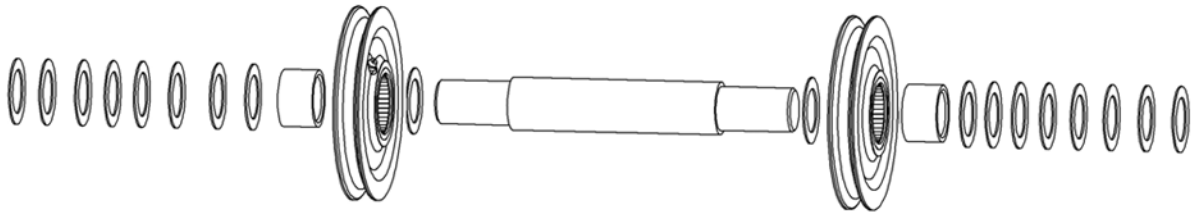
NOTE: *Cable length and cylinder extension will vary from what is shown.*



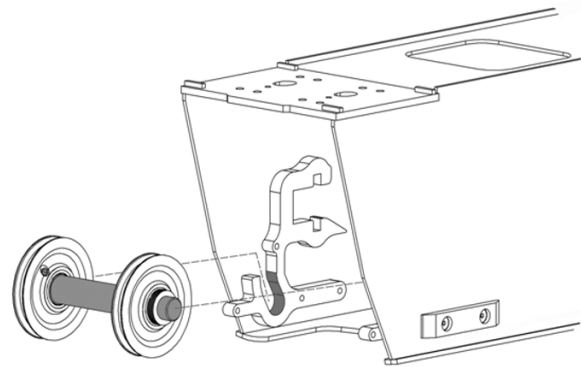
BOOM ASSEMBLY - SECOND SECTION

SECOND SECTION ASSEMBLY

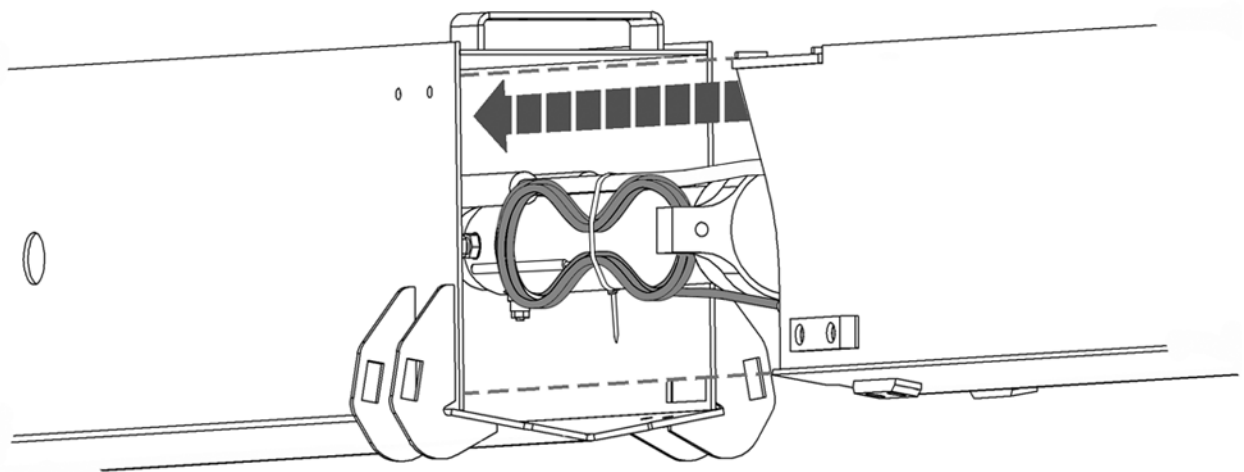
1. Assemble Retract Cable Sheave assembly as shown below, be sure to use a single spacer on the inside of each bearing. The number of spacers used on the outside of each bearing will need to be adjusted so the sheaves are centered and fit snugly into the brackets.



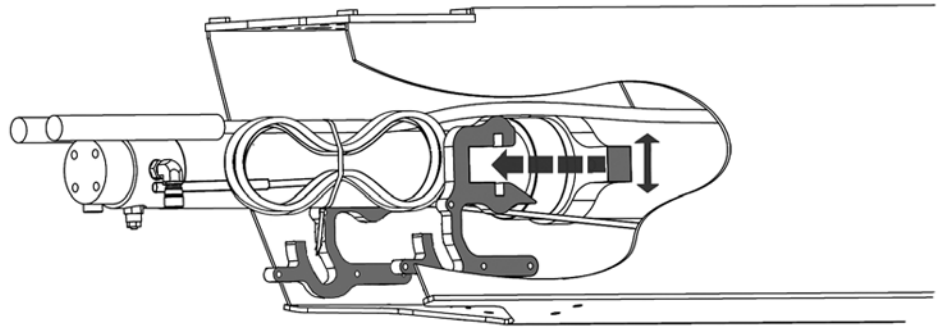
2. Test- fit Retract Cable Sheave assembly as shown. Remove Assembly and set aside before moving on to step 3.



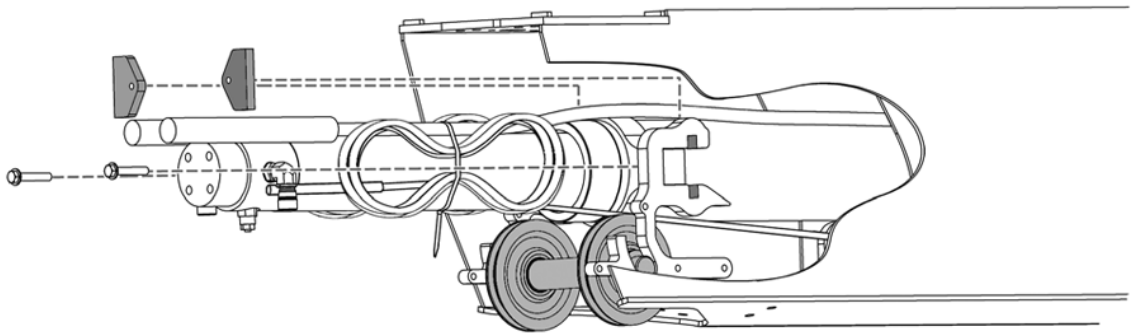
3. After coiling and anchoring the retract cables to the rod of the extend cylinder assembly. Insert base end of Tip section into the tip end of the Second section.



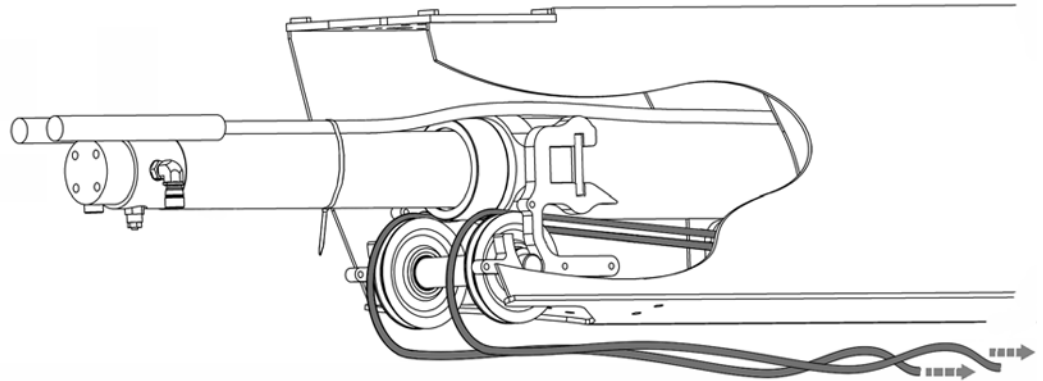
4. As the tip section approaches full insertion, the Extend Cylinder Trunnion must be checked for alignment with it's anchor point as shown in the cutout view below. The cylinder will most likely need to be lifted slightly to align trunnion.



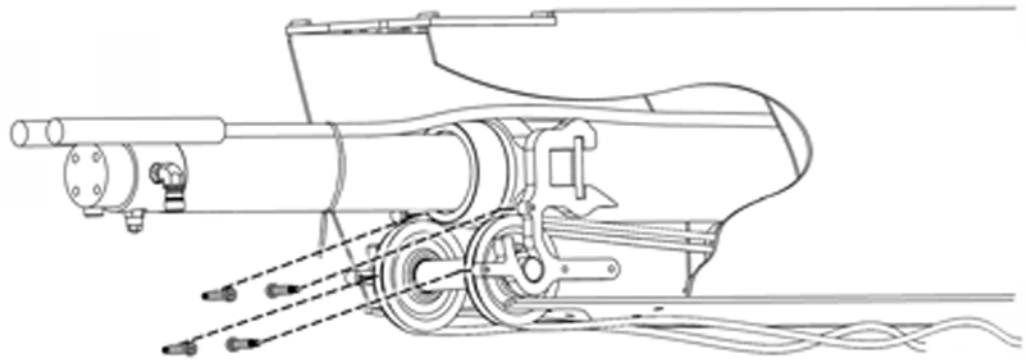
5. Once the Cylinder Trunnion is fully seated, insert the locking tabs behind the trunnion, engaging the slots in the mount, and secure with bolts. Install previously configured Retract Cable Sheave assembly.



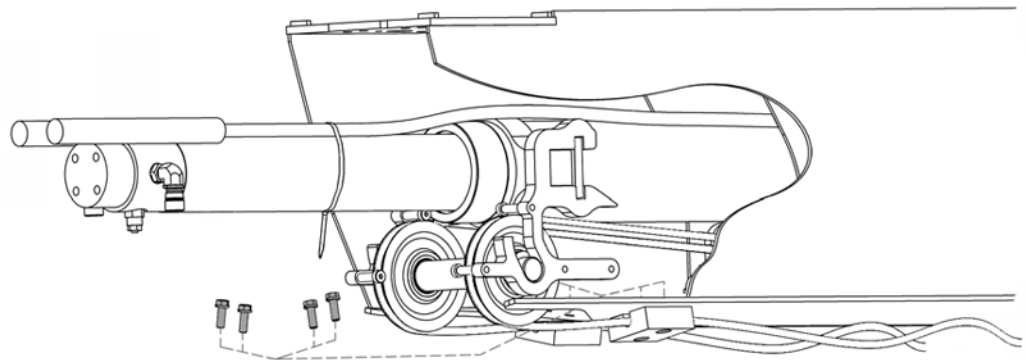
6. Release Retract cables from their tied position and route them over the second section retract sheaves.



7. Insert cable guide shoulder bolts (4) to retain retract cables on sheaves.

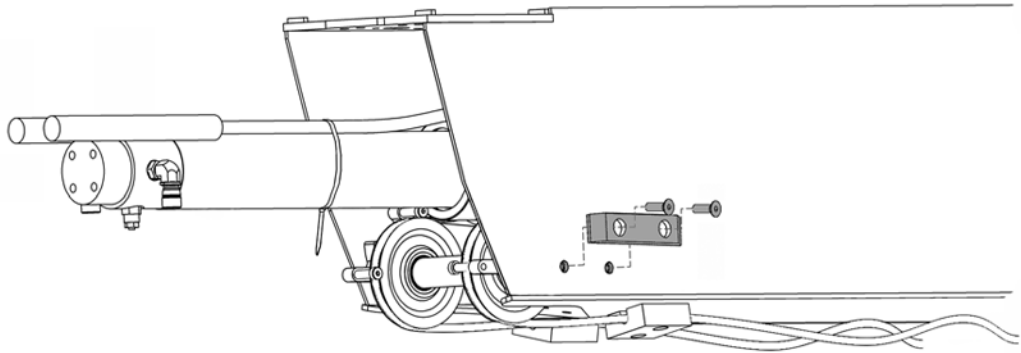


8. Install cable guide wear pads (2) on the rear bottom of the second section, routing retract cable through pad groove, install bolts from inside the section.



9. Install side wear pads (2) on second section as shown using (4) flat head bolts.

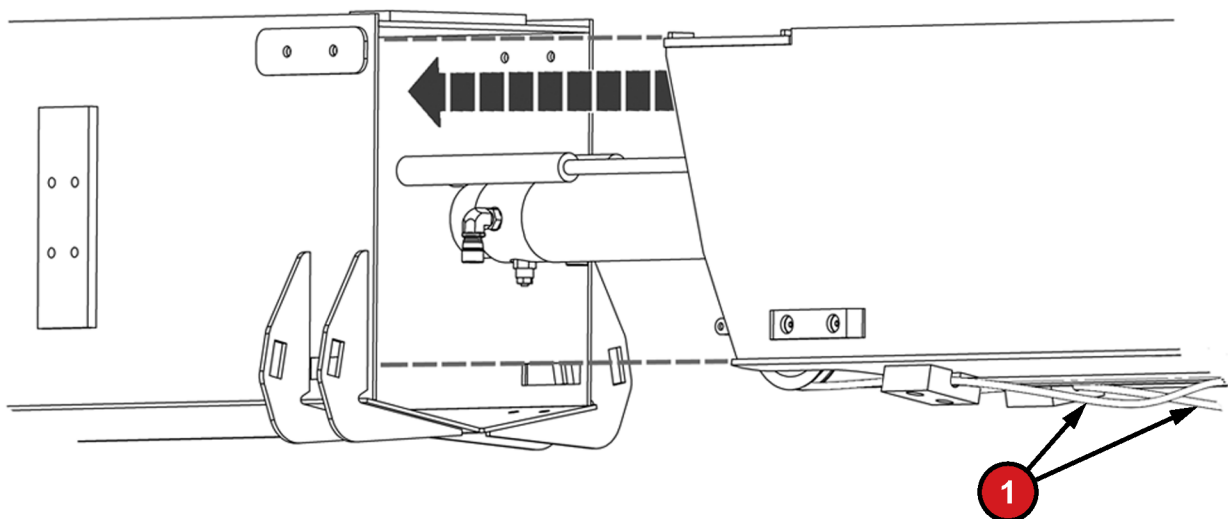
Apply **FS White Lithium Grease 12** to boom sides that contact wear pads and wear pad surfaces. Apply **Northland Moly Tac II Grease Lithium Complex** to top and bottom surfaces of boom that contact wear pads and wear pad surfaces. Using 4" paint roller to apply the grease and a long pole as required to reach internal surfaces.



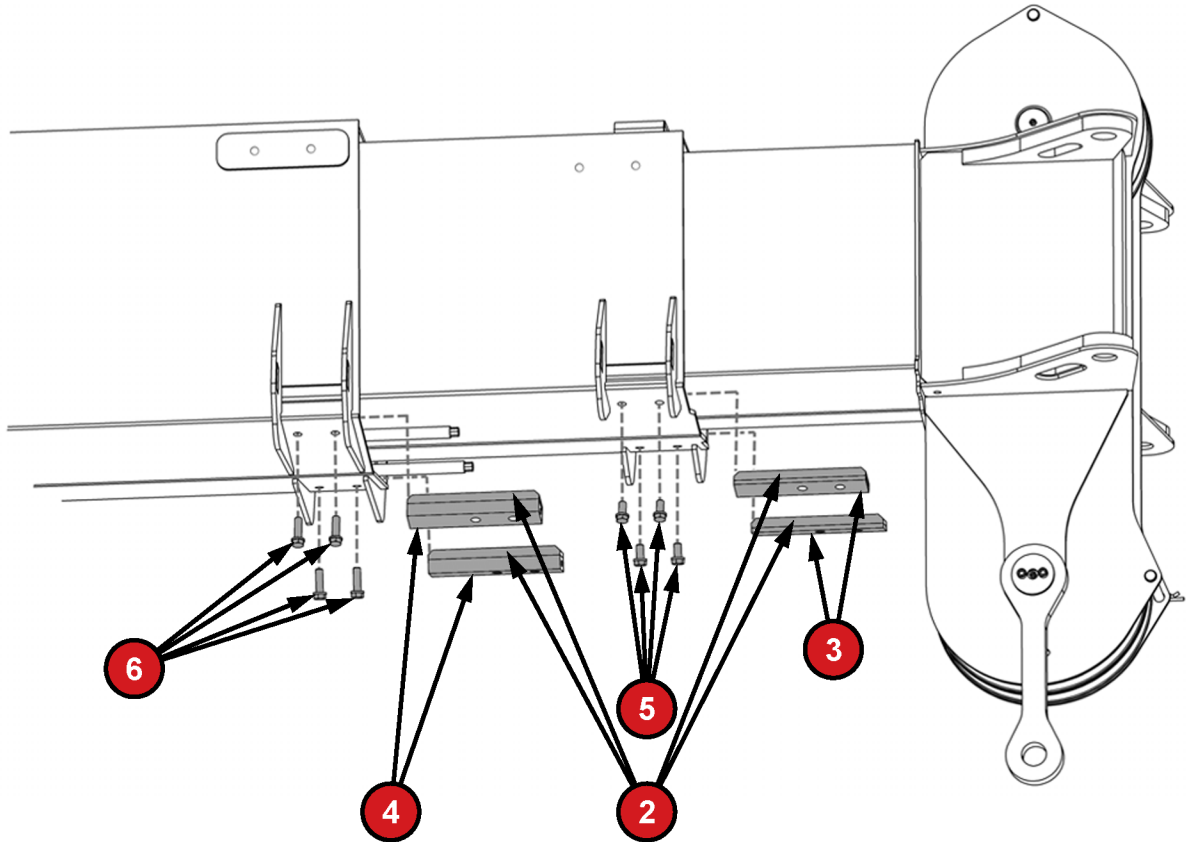
BOOM ASSEMBLY - BASE SECTION

BASE SECTION ASSEMBLY

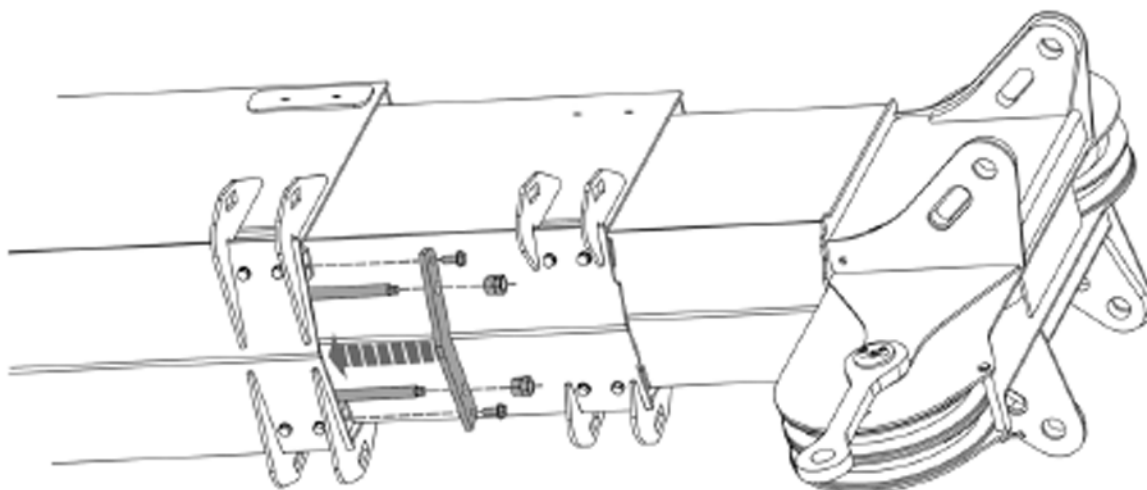
1. Install second and tip section assembly into base section. During insertion be sure that retract cables (1) do not cross or tangle and that they are not pinched between the sections.



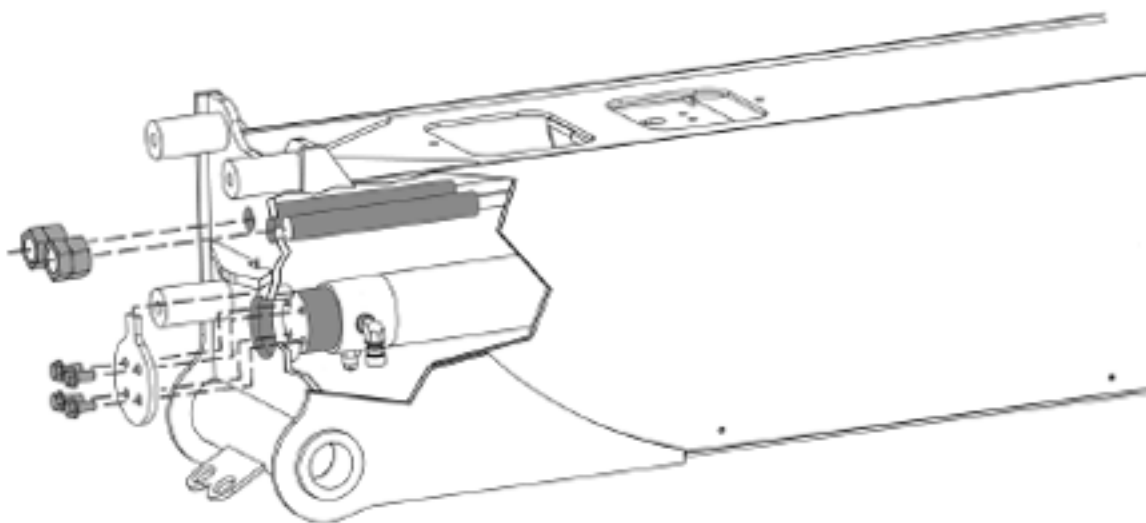
2. Install lower front wear pads (2) and riser blocks, be sure to pay attention to the orientation of the riser blocks. Thinner riser blocks (3) install in the second section, thicker blocks (4) install in the base section. Secure with bolts (4+4) as shown. Shorter bolts (5) secure second section wear pads, longer bolts (6) secure base wear pads.



3. Install Retract Anchor plate, route Retract Cable Lugs through plate, secure loosely with nuts. Secure plate with bolts and washers into wear pad riser blocks.



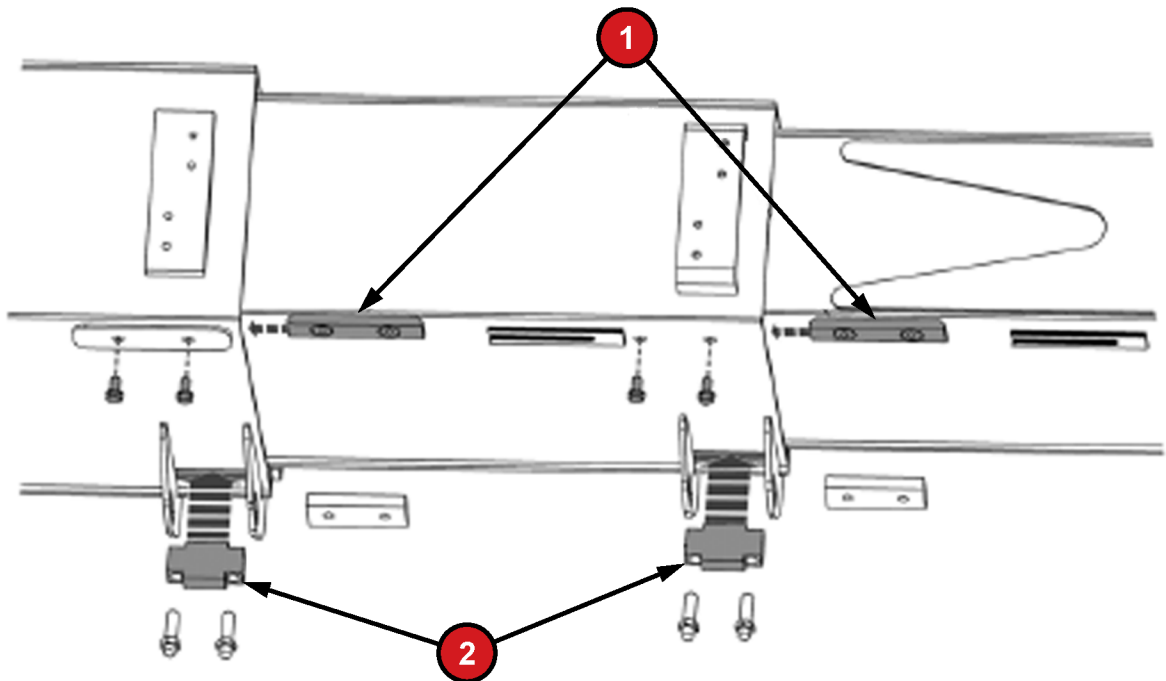
4. Align and insert the cylindrical cylinder base into the boom cylinder boss of the base section. DO NOT pry on the polished portion of the cylinder rod. Secure the cylinder using the base plate, being sure to align and insert the tab as shown and installing bolts with washers. After checking for crossed or tangled cables, route Extend Cable Lugs through anchor holes and secure with nuts.



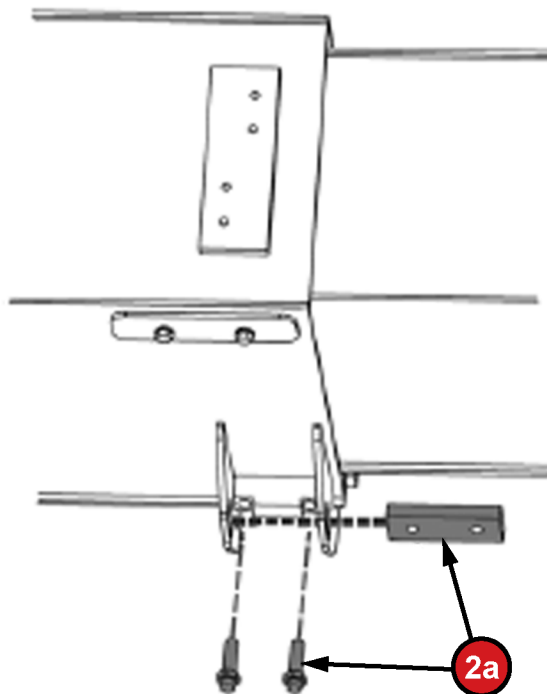
BOOM ASSEMBLY - WEAR PAD INSTALLATION

Base and Second Section

1. Install upper front wear pads (1) by inserting from front and loosely install bolts. Insert lower side wear pads (2) through holes in the side of the base and second sections as shown.

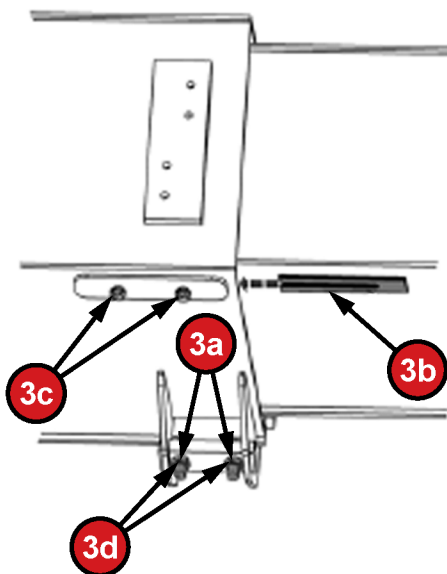


2. Install Lower wear pads.
 - a. Insert lower wear pad anchor plate through gusset holes as shown.
 - b. Install lower wear pad adjustment bolts through anchor plate.



3. Secure wear pads.
 - a. Use the lower wear pad adjustment bolts to center boom sections.

- b. Install shims for upper wear pads, be sure that slot straddles both retaining bolts. Shims should be installed in such a way as to minimize clearance without binding sections.
- c. Tighten upper wear pad bolts.
- d. Adjust lower wear pad bolts until pad contacts boom, back each screw off 1/2 half turn and lock in place with locknut.



NOTE: Steps 2 and 3 need to be performed on base and second sections, both sides.

Second Section - Rear Top Wear Pad Installation and Adjustment

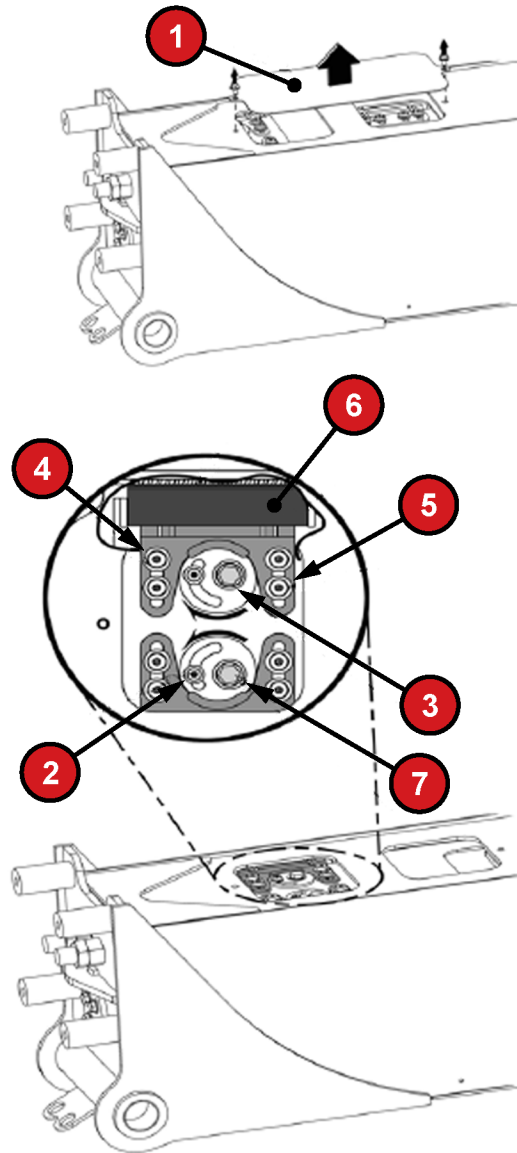
1. From fully retracted, extend the boom approximately 18 inches.
2. Shut Off Engine and Disengage the PTO.



DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. SERIOUS INJURY WILL RESULT IF BOOM IS TELESCOPED WHILE HANDS OR TOOLS ARE IN HOLES. FOLLOW THE LOCK OUT - TAG OUT PROCEDURES CONTAINED IN THE SAFETY SECTION OF THIS MANUAL.

3. Remove Wear Pad Service Cover (1) on top rear of boom.
4. Install Wear Pad (6), Wear Pad Bracket (5) and Wear Pad Bracket Screws (4) into the boom.
5. Install Cam (3) and Cam Retaining Screw (2).
6. Rotate the Cam, using a socket and breaker bar on the Cam Driver (7) until all play is removed from Wear Pad.
7. While maintaining pressure on the Cam Driver, tighten Cam Retaining Screw to lock Cam Driver in place.

8. Check Wear Pad for play to ensure all play has been removed.
9. Tighten all 4 Wear Pad Bracket Screws.
10. Repeat steps 3 through 13 on opposite wear pad.
11. Reinstall Wear Pad Service Cover.



Expanded view shows pad position and mount.

| | | | |
|---|-------------------------|---|------------------|
| 1 | WEAR PAD SERVICE COVER | 5 | WEAR PAD BRACKET |
| 2 | CAM RETAINING SCREW | 6 | WEAR PAD |
| 3 | CAM | 7 | CAM DRIVER |
| 4 | WEAR PAD BRACKET SCREWS | | |

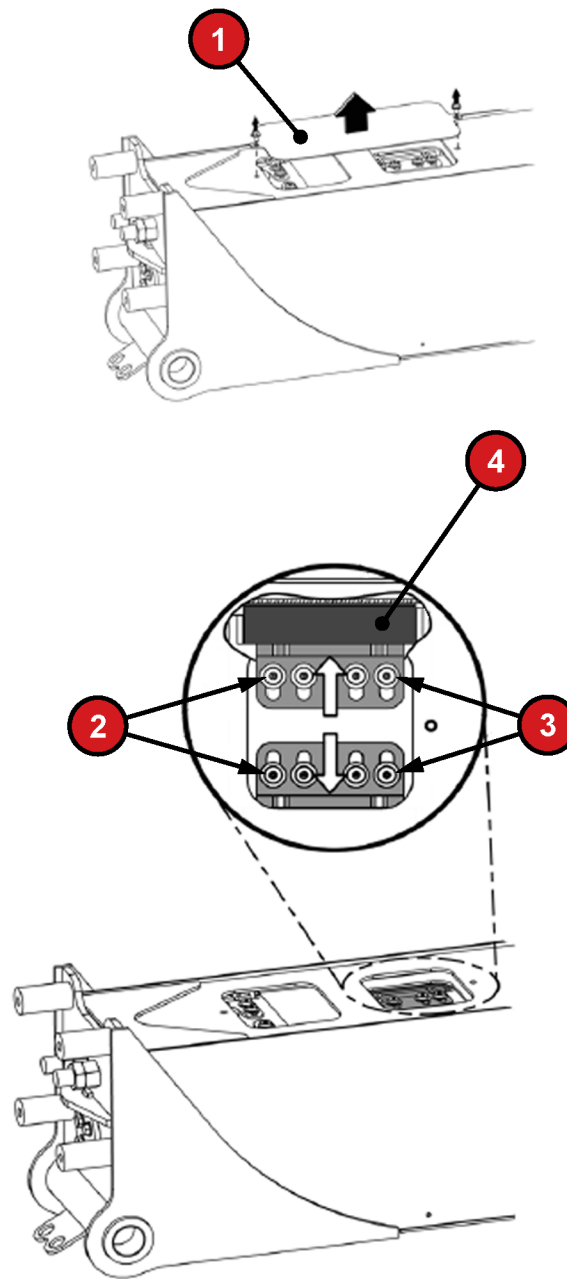
Tip Section - Rear Top Wear Pad Adjustment and Replacement

1. From fully retracted, extend the boom approximately 9 inches.
2. Shut Off Engine and Disengage PTO.



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3. Remove Wear Pad Service Cover (1) on top base of boom.
4. Install Wear Pad (4), Wear Pad Bracket (3) and Wear Pad Bracket Screws (2) into the boom.
5. Push wear pad bracket outward until all play is removed from wear pad.
6. Tighten all 4 screws holding wear pad bracket into place.
7. Repeat steps 3 through 8 on opposite wear pad.
8. Reinstall Wear Pad Service Cover.

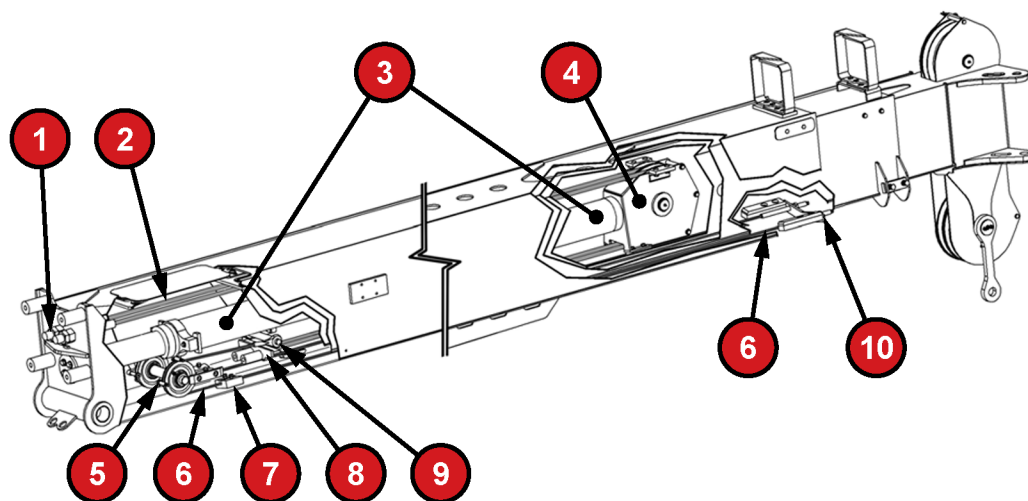


Expanded view shows pad position and mounting

| | | | |
|---|-------------------------|---|------------------|
| 1 | WEAR PAD SERVICE COVER | 3 | WEAR PAD BRACKET |
| 2 | WEAR PAD BRACKET SCREWS | 4 | WEAR PAD |

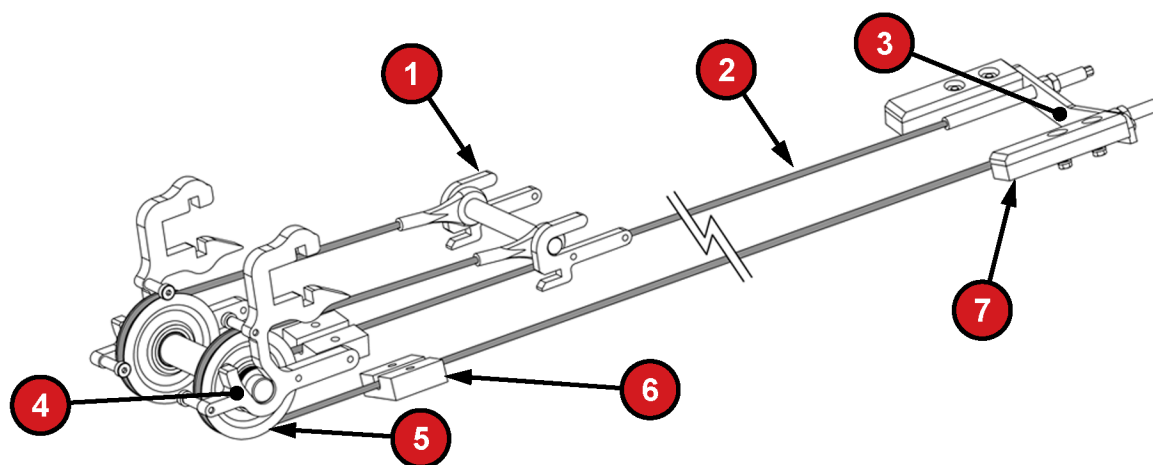
BOOM ASSEMBLY REFERENCE - EXTEND AND RETRACT MECHANISMS

The following diagrams display the Extend and Retract mechanisms in hopes to further clarify their proper assembly and function, please use these diagrams as reference for any questions you may have about the assembly or function of these mechanisms.



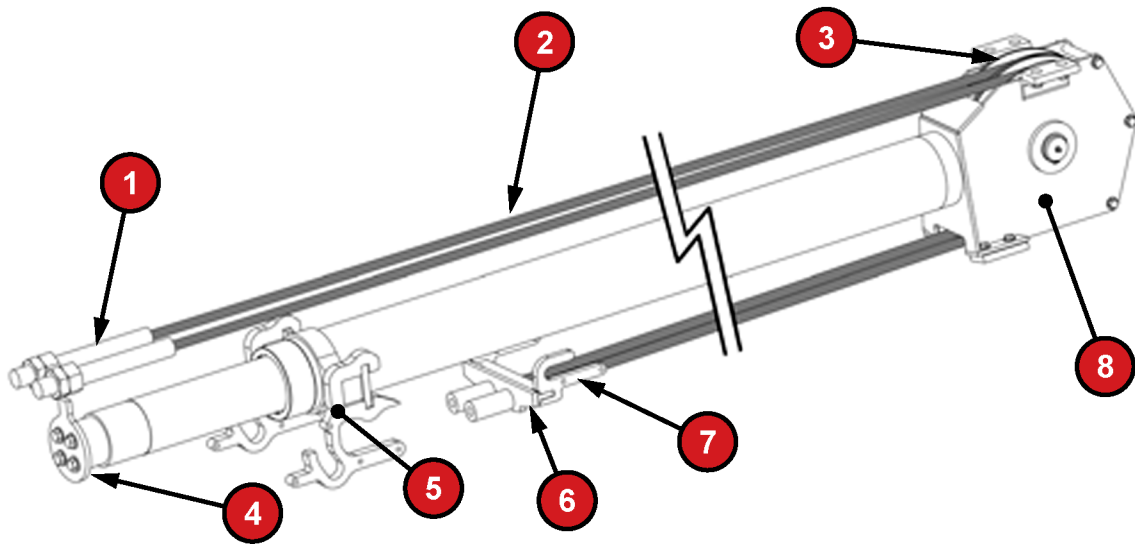
| | | | |
|---|---------------------------|----|------------------------|
| 1 | EXTEND CABLE ANCHOR | 6 | RETRACT CABLE |
| 2 | EXTEND CABLE | 7 | CABLE RETAINER |
| 3 | EXTENSION CYLINDER | 8 | EXTEND BRACKET |
| 4 | EXTENSION SHEAVE ASSEMBLY | 9 | RETRACT BRACKET |
| 5 | CABLE RETAINER SCREWS | 10 | RETRACT ANCHOR BRACKET |

RETRACT MECHANISM



| | | | |
|---|-------------------------------|---|---------------------------|
| 1 | RETRACT ANCHOR TIP SECTION | 5 | RETRACT SHEAVE |
| 2 | RETRACT CABLE | 6 | RETRACT CABLE GUIDE |
| 3 | RETRACT ANCHOR PLATE | 7 | ANCHOR BLOCK BASE SECTION |
| 4 | RETRACT ANCHOR SECOND SECTION | | |

EXTEND MECHANISM



| | | | |
|---|-------------------------------------|---|---------------------------------------|
| 1 | EXTEND ANCHOR BASE SECTION | 5 | EXTEND CYLINDER ANCHOR SECOND SECTION |
| 2 | EXTEND CABLE | 6 | EXTEND ANCHOR PLATE |
| 3 | EXTEND SHEAVE | 7 | EXTEND ANCHOR TIP SECTION |
| 4 | EXTEND CYLINDER ANCHOR BASE SECTION | 8 | EXTEND SHEAVE ASSEMBLY |

19-70 Boom Cable Adjustment Procedure

1. Loosen the adjusting nuts on the 3rd stage extend cables so that the cables are slack. Be sure to hold the cable from rotating as the nuts are turned.
2. Extend the boom approximately 3' to 4' and remove power. Working through the access hole in the top of the base boom section, remove the lock nuts and loosen the jam nuts on the 4th stage extend cables until the cables are slack.
3. Fully retract the boom and put a match mark "A" on the side of the 2nd stage boom, flush with the end of the base boom section. Put a match mark "B" on the side of the 3rd stage boom flush with the end of the 2nd stage boom.



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4. Extend the boom approximately 3' to 4' and remove power. Working through the access hole in the base section, check the tension of the 3rd stage extend cables by hand. Tighten the adjusting nut on the loosest cables until all four cables are tensioned equally.
5. Torque the adjusting nut on the 3rd stage retract cables to 25 ft.lbs. (four cables)
6. Fully retract the boom while watching the 2nd and 3rd stages. Note which stage stops first.
7. Extend the boom approximately 6" and repeat previous step, noting which boom section stops first.
8. Determine the remaining stroke to fully retract the boom as follows:
 - A. If the 3rd stage stopped first:

Measure the remaining stroke between match mark A on the 2nd stage boom section and the base boom.
 - B. If the 2nd stage stopped first:

Measure the remaining stroke between match mark B on the 3rd stage and the end of the 2nd stage.
9. If the remaining stroke is greater than 1/8" proceed as follows:
 - A. Extend the boom approximately 3' to 4' and remove power.
 - B. If the 3rd stage stopped first:
 - i. Loosen the adjusting nut on each retract cable 1 1/2 turns for each 1/8" of remaining stroke.
 - ii. Tighten the adjusting nut on each extend cable 2 turns for each 1/8" of remaining stroke.
 - C. If the 2nd stage stopped first:

- i. Loosen the adjusting nut on each extend cable 2 turns for each 1/8" of remaining stroke.
 - ii. Tighten the adjusting nut on each extend cable 1 1/2 turns for each 1/8" of remaining stroke.
10. Repeat steps 16-19 until the remaining stroke is 1/ 8" or less.
11. Recheck the torque on the retract cables and assure that they are still at 35 ft.lbs.
12. Cycle the boom two or three more times and check that all boom sections are properly synchronized per the above instructions. If not synchronized, check which sections require adjustment and perform the proper adjustment procedure to correct.
13. Repeat step above until the boom is properly synchronized.
14. Recheck the torque on all the retract cables and insure that all adjusting nuts are installed and jammed.
15. Install the inspection cover on the top of the base boom section.

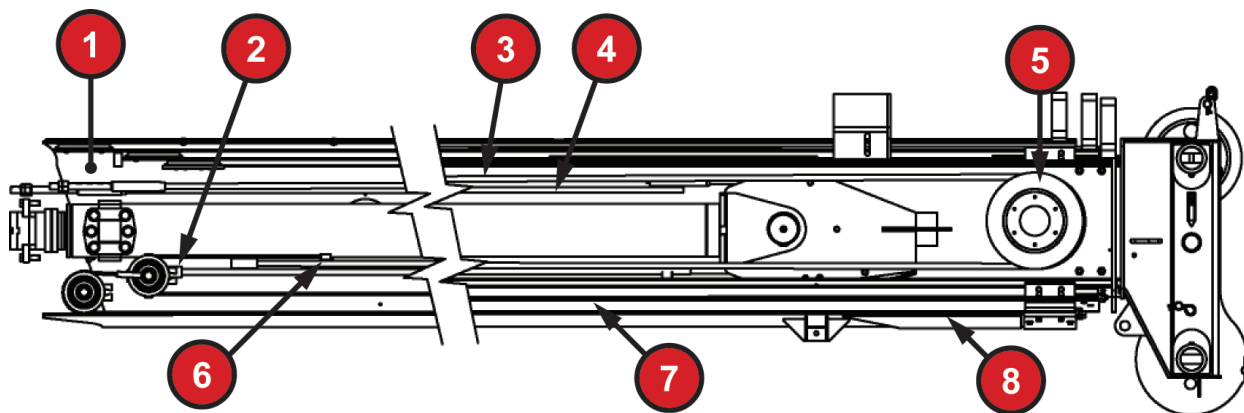


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28-106 Boom Cable Adjustment Procedure



SHUT OFF ENGINE AND DISENGAGE PTO. DO NOT STICK HANDS OR TOOLS IN BOOM SECTIONS UNTIL THE ENGINE IS SHUT OFF AND PTO IS DISENGAGED. FAILURE TO DO THIS MAY RESULT IN SEVERE PERSONAL INJURY, INCLUDING LOSS OF HANDS OR FINGERS!



| | | | |
|---|----------------------------|---|--|
| 1 | Second Stage Boom | 5 | Fourth Extend Tube |
| 2 | Third Stage Extend Anchor | 6 | Third and Fourth Stage Retract Anchors |
| 3 | Fourth Stage Extend Cables | 7 | Fourth Retract Cable |
| 4 | Third Stage Extend Cables | 8 | Third Retract Cable |

1. Loosen the adjusting nuts on the 3rd stage extend cables so that the cables are slack. Be sure to hold the cable from rotating as the nuts are turned.
2. Extend the boom approximately 3' to 4' and remove power. Working through the access hole in the top of the base boom section, remove the lock nuts and loosen the jam nuts on the 4th stage extend cables until the cables are slack.
3. Fully retract the boom and put a match mark "A" on the side of the 2nd stage boom, flush with the end of the base boom section. Put a match mark "B" on the side of the 3rd stage boom flush with the end of the 2nd stage boom.
4. Extend the boom approximately 3' to 4' and remove power. Working through the access hole in the base section, check the tension of the 3rd stage extend cables by hand. Tighten the adjusting nut on the loosest cables until all four cables are tensioned equally.
5. Torque the adjusting nut on the 3rd stage retract cables to 25 ft.lbs.
6. Fully extend the boom and check tension of the 4th stage extend cables. Tighten the adjusting nut on the loosest cable until the cables are equally tensioned.
7. Fully retract the boom while watching the 4th and 3rd stages. Note whether the 4th stage stops before the match mark B aligns itself with the end of the second stage boom.

8. Extend the boom approximately 6" and repeat previous step as slowly as possible. Remove power as soon as the 4th stage stops or as soon as match mark B is fully aligned, whichever occurs first..
9. Determine the remaining stroke to fully retract the boom as follows:
 - A. If the 4th stage boom stopped first:

Measure the remaining stroke between match mark on the 3rd stage boom and the end of the end of the second stage boom.
 - B. If match mark B aligned itself first,:

Measure the remaining stroke between the 4th and 3rd stages (at the bottom, where the 3rd stage tip contacts the 4th stage tip weldment).
10. If the remaining stroke is greater than 1/8" proceed as follows:
 - A. Extend the boom approximately 3' to 4' and remove power.
 - B. If the 4th stage stopped first:
 - i. Loosen the adjusting nut on each extend cable 2 turns for each 1/8" of remaining stroke.
 - ii. Tighten the adjusting nut on each retract cable 1 1/2 turns for each 1/8" of remaining stroke.
11. Repeat steps 7 -10 until the remaining stroke is 1/ 8" or less.
12. Recheck the torque of the adjusting nut on the 4th stage retract cables and assure that the torque setting is still at 25 ft.lbs..
13. Reinstall the locking nuts removed earlier from the 4th stage retract cables and lock down against the jam nuts.
14. Extend the boom approximately 3' to 4' and remove power. Working through the access hole in the base section, check the tension of the 3rd stage extend cables by hand. Tighten the adjusting nut on the loosest cables until all four cables are tensioned equally.
15. Torque the adjusting nut on the 3rd stage retract cables to 25 ft.lbs. (four cables)
16. Fully retract the boom while watching the 2nd and 3rd stages. Note which stage stops first.
17. Extend the boom approximately 6" and repeat step 16. Note which boom section stops first.
18. Determine the remaining stroke to fully retract the boom as follows:
 - A. If the 3rd stage stopped first:

Measure the remaining stroke between match mark A on the 2nd stage boom section and the base boom.
 - B. If the 2nd stage stopped first:

Measure the remaining stroke between match mark B on the 3rd stage and the end of the 2nd stage.

19. If the remaining stroke is greater than 1/8" proceed as follows:
 - A. Extend the boom approximately 3' to 4' and remove power.
 - B. If the 3rd stage stopped first:
 - i. Loosen the adjusting nut on each retract cable 1 1/2 turns for each 1/8" of remaining stroke.
 - ii. Tighten the adjusting nut on each extend cable 2 turns for each 1/8" of remaining stroke.
 - C. If the 2nd stage stopped first:
 - i. Loosen the adjusting nut on each extend cable 2 turns for each 1/8" of remaining stroke.
 - ii. Tighten the adjusting nut on each extend cable 1 1/2 turns for each 1/8" of remaining stroke.
20. Repeat steps 16-19 until the remaining stroke is 1/8" or less.
21. Recheck the torque on the retract cables and assure that they are still at 35 ft.lbs.
22. Cycle the boom two or three more times and check that all boom sections are properly synchronized per the above instructions. If not synchronized, check which sections require adjustment and perform the proper adjustment procedure to correct.
23. Repeat previous step until the boom is properly synchronized.
24. Recheck the torque on all the retract cables and insure that all adjusting nuts are installed and jammed.
25. Install the inspection cover on the top of the base boom section.



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Rotation Gear and Gearbox

Removal/Installation of Rotation Gear and Gearbox

REMOVAL OF ROTATION GEAR & GEARBOX



THE BOOM MUST BE REMOVED BEFORE ATTEMPTING THE FOLOWING PROCEDURE

1. Thoroughly steam clean unit in rotation gear area.
2. Remove the rotation gearbox from its mounting and lay it on the control console. 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.

INSTALLATION OF ROTATION BEARING & GEARBOX

1. Both the turret and mainframe bearing mounting surfaces must be carefully inspected for flatness and smoothness. Remove all burrs and ridges that might prevent the bearing race from sitting flat. Maximum surface flatness tolerance is .006" TIR. in any 90° segment.



NOTE: *Before installing bearing, use the procedure on the following page to inspect the bearing.*

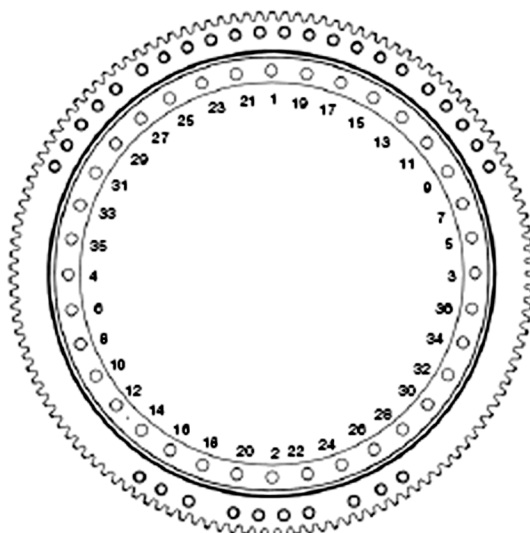
2. Place the rotation bearing on the mainframe, being sure to place the bearing side, with the inner ring protruding, against the mainframe. Rotate the inner ring so the loading plug is 90° to the left of the rotation gearbox.



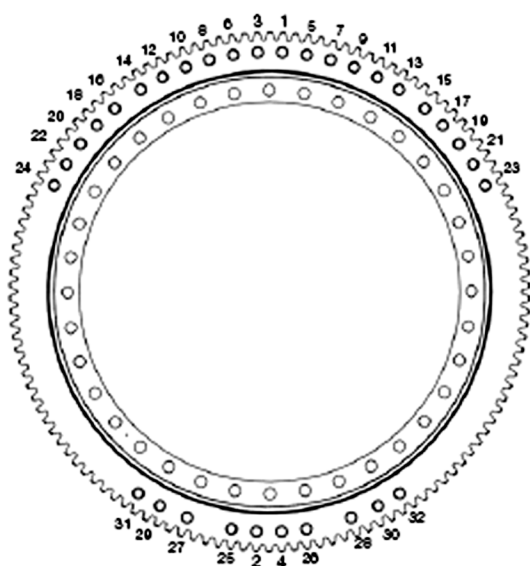
NOTE: *Left corresponds to the operator's left side when standing at the controls.*

3. Assemble bearing to the mainframe using new bolts and hardened flat washers. Do not begin torquing bolts until all bolts are in place. Torque the bolts to 100 ft.lbs first, then final torque the bolts to 350 - 380 ft.lbs. See bolt torque sequence chart below.
4. Connect grease hoses to inner ring grease ports. This enables greasing of the rotation bearing from fitting located on the sides of the mainframe.
5. Lift the turret into position over the rotation gear. Mounting surfaces must be clean and flat. Orient the turret so that all mounting holes in the turret align with the mounting holes in the bearing. For certain machines, the rotation bearing will have more mounting holes than the turret, position the turret so that there are equal numbers of unused holes to each side.

6. Install new bolts and hardened flat washers to fasten the turret to the rotation bearing. Do not begin torquing until all the bolts are in place. Torque the bolts for the turret to 100 ft.lbs first then final torque to 350 - 380 ft.lbs. See bolt torque sequence chart below.



Inner ring/Mainframe torque sequence



Outer ring/Turret torque sequence

The gearbox is equipped with a grease zerk (item #10) on the upper pinion bearing . Give this zerk a shot of grease about once a month to insure this bearing has adequate lubrication (see following illustration).

Inspection of Rotation Bearing Clearance

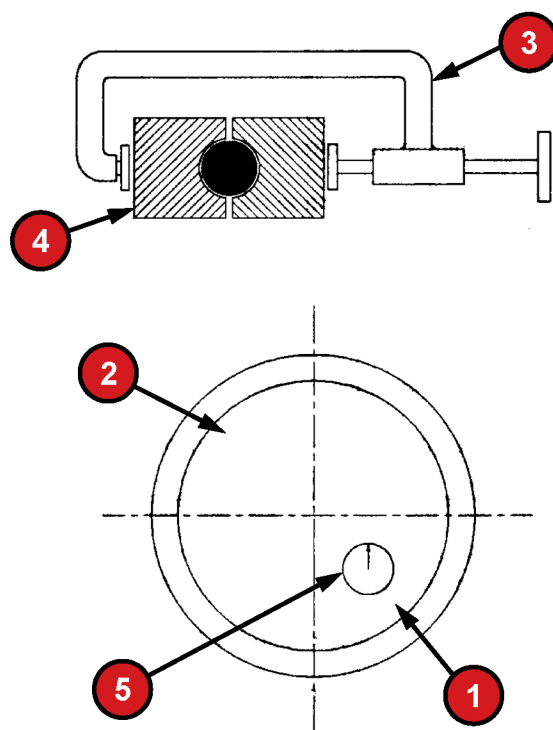
1. It is not feasible to make an analysis of the condition of the rotation gear while it is on the unit. There are too many variables involved for this to be accurate.
2. A bearing may cause a problem in the operation of the boom truck or the confidence of the operator long before it would be deemed structurally unsafe.

To properly check the radial clearance of the rotation gear, it must first be removed from the boom truck and placed on a heavy flat table. Remove all dirt and grease from the outside of the gear and secure it to the table with clamps, assuring that the inner raceway rotates freely after clamping it to the table.

As shown in the figure below, attach a large “C” clamp in position #1, and tighten just enough to take all the slack out of the raceway. Install a dial indicator as close to position #1 as possible, and set it to “0”.

As shown in the figure below, attach a large “C” clamp in position #1, and tighten just enough to take all the slack out of the raceway. Install a dial indicator as close to position #1 as possible, and set it to “0”.

Remove the “C” clamp and attach at clamp location #2 and again tighten just enough to take up the slack in the two raceways. Look at the dial indicator, noting the amount of change in the reading. This measurement is the radial clearance of the bearing. The following bearing clearances should be observed.



Radial Clearance Check Procedure

| | | | |
|---|-------------------|---|-------------------|
| 1 | "C" Clamp | 4 | Clamp Position #2 |
| 2 | Rotation Gear | 5 | Dial Indicator |
| 3 | Clamp Position #1 | | |

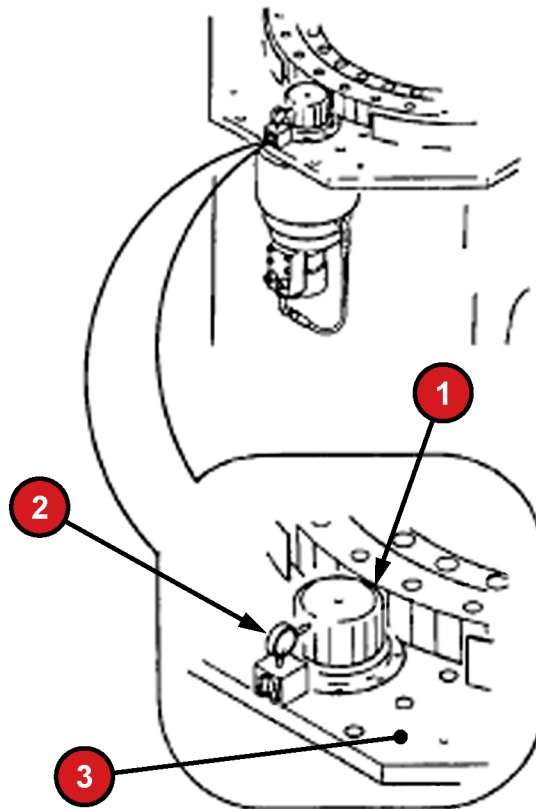
1. Any new bearing being installed on a **Load King** boom truck should not have more than .004 - .007 radial clearance.
2. Any bearing taken off a unit which has .030 - .050 radial clearance should be screened carefully for roughness while rotating. If excessively rough, the bearing should be disassembled and thoroughly inspected for damage in the raceways, and for rust or pitting.

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 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 by rotating the bearing assembly without the swing gearbox installed.
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 | Pinion | 3 | Mainframe Top Plate |
| 2 | Dial Indicator | | |

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. Re-torque 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.

Conversion Tables

DECIMAL AND METRIC EQUIVALENTS OF FRACTIONS OF AN INCH

| Fractions of an Inch | Decimals of an inch | Millimeters |
|----------------------|---------------------|-------------|
| 1/64 | 0.0156 | 0.397 |
| 1/32 | 0.0313 | 0.794 |
| 3/64 | 0.0469 | 1.191 |
| 1/16 | 0.0625 | 1.588 |
| 5/64 | 0.0781 | 1.985 |
| 3/32 | 0.0938 | 2.381 |
| 7/64 | 0.1094 | 2.778 |
| 1/8 | 0.1250 | 3.175 |
| 9/64 | 0.0406 | 3.572 |
| 5/32 | 0.1563 | 3.969 |
| 11/64 | 0.1719 | 4.366 |
| 3/16 | 0.1875 | 4.762 |
| 13/64 | 0.2031 | 5.159 |
| 7/32 | 0.2188 | 5.556 |
| 15/64 | 0.2344 | 5.953 |
| 1/4 | 0.2500 | 6.350 |
| 17/64 | 0.2656 | 6.747 |
| 9/32 | 0.2813 | 7.144 |
| 19/64 | 0.2969 | 7.541 |
| 5/16 | 0.3135 | 7.937 |
| 21/64 | 0.3281 | 8.334 |
| 11/32 | 0.3438 | 8.731 |
| 23/64 | 0.3594 | 9.128 |
| 3/8 | 0.3750 | 9.525 |
| 25/64 | 0.3906 | 9.922 |
| 13/32 | 0.4063 | 10.319 |
| 27/64 | 0.4219 | 10.716 |
| 7/16 | 0.4375 | 11.12 |
| 29/64 | 0.4531 | 11.509 |
| 15/32 | 0.4688 | 11.906 |
| 31/64 | 0.4844 | 12.303 |

| Fractions of an Inch | Decimals of an inch | Millimeters |
|----------------------|---------------------|-------------|
| 1/2 | 0.5000 | 12.700 |
| 33/64 | 0.5156 | 13.097 |
| 17/32 | 0.5313 | 13.494 |
| 35/64 | 0.5469 | 13.891 |
| 9/16 | 0.5625 | 14.287 |
| 37/64 | 0.5781 | 14.684 |
| 19/32 | 0.5938 | 15.081 |
| 39/64 | 0.6094 | 15.478 |
| 5/8 | 0.6250 | 15.875 |
| 41/64 | 0.6406 | 16.272 |
| 21/32 | 0.6563 | 16.688 |
| 43/64 | 0.6719 | 17.085 |
| 11/16 | 0.6875 | 17.462 |
| 45/64 | 0.7031 | 17.859 |
| 23/32 | 0.7188 | 18.256 |
| 47/64 | 0.7344 | 18.653 |
| 3/4 | 0.7500 | 19.050 |
| 49/64 | 0.7656 | 19.447 |
| 25/32 | 0.7813 | 19.843 |
| 51/64 | 0.7969 | 20.240 |
| 13/16 | 0.8125 | 20.637 |
| 53/64 | 0.8281 | 21.034 |
| 27/32 | 0.8438 | 21.430 |
| 55/64 | 0.8594 | 21.827 |
| 7/8 | 0.8750 | 22.224 |
| 57/64 | 0.8906 | 22.621 |
| 29/32 | 0.9063 | 23.018 |
| 59/64 | 0.9219 | 23.415 |
| 15/16 | 0.9375 | 23.812 |
| 61/64 | 0.9531 | 24.209 |
| 31/32 | 0.9688 | 24.606 |
| 63/64 | 0.9844 | 25.003 |
| 1 | 1.0000 | 25.400 |

WEIGHTS AND MEASURES

LIQUID MEASURE (U.S.)

| | | |
|-------------------------|---|-----------|
| 4 gills | = | 1 pint |
| 2 pints | = | 1 quart |
| 4 quarts | = | 1 gallon |
| 7.48 gallons | = | 1 cu. ft. |
| 240 gallons of water | = | 1 Ton |
| 340 gallons of gasoline | = | 1 Ton |

LIQUID MEASURE (METRIC)

| | | |
|------------|---|----------------------------|
| 1 litre | = | 0.0353 cu. ft. |
| 1 litre | = | 0.2642 gallon |
| 1 litre | = | 61.023 cu. in. |
| 1 litre | = | 2.202 lbs. of water(62°F.) |
| 1 cu. foot | = | 28.32 litres |
| 1 gallon | = | 3.785 litres |
| 1 cu. inch | = | 0.0164 litre |

MEASURES OF WEIGHTS (U.S.)

| | | |
|--------------|---|---------------------|
| 16 ounces | = | 1 pound |
| 2000 pounds | = | 1 short ton |
| 2240 pounds | = | 1 long ton |
| 100 cu. feet | = | 1 register ton |
| 40 cu. feet | = | 1 U.S. shipping ton |

MEASURES OF WEIGHTS (METRIC)

| | | |
|------------|---|------------------|
| 1 gram | = | 0.0353 ounce |
| 1 kilogram | = | 2.205 lbs. |
| 1 ounce | = | 28.35 grams |
| 1 pound | = | 0.454 kilogram |
| 1 ton | = | 0.907 metric ton |

CIRCULAR MEASURE

| | | |
|-------------|---|-----------------|
| 60 seconds | = | 1 minute |
| 60 minutes | = | 1 degree |
| 90 degrees | = | 1 quadrant |
| 360 degrees | = | 1 circumference |

ELECTRICAL UNITS

| | | |
|--------------|---|-----------|
| 1 kilowatt | = | 1.34 H.P. |
| 1 horsepower | = | 746 watts |

SURVEYOR'S MEASURE

| | | |
|-------------|---|------------------------------------|
| 7.92 inches | = | 1 link |
| 100 links | = | 66 feet or 4 rods or 1 chain |
| 80 chains | = | 1 mile |

Average Weight of Materials

| MATERIAL | KG/CU. METER | KG/CU. FOOT | 1 CU. YARD |
|--------------------------------|--------------|-------------|------------|
| Ashes - Piled Dry | 560.70 | 35 | 945 |
| Brick Bats | 881.10 | 55 | 1485 |
| Cement - Portland | 1505.88 | 94 | 2538 |
| Charcoal | 400.50 | 25 | 695 |
| Cinders | 881.10 | 55 | 1485 |
| Clinker - Portland Cement | 1361.70 | 85 | 2295 |
| Clay - Dry, in Lumps | 1009.26 | 63 | 1701 |
| Clay - Compact, Natural Bed | 1746.18 | 109 | 2943 |
| Coal - Anthracite | 897.12 | 56 | 1512 |
| Coal - Bituminous R of M Piled | 881.10 | 55 | 1485 |
| Coal - Bituminous Slack, Piled | 801.00 | 50 | 1350 |
| Coke - Blast Furnace Size | 432.54 | 27 | 729 |
| Coke - Foundry Size | 448.56 | 28 | 756 |
| Concrete - Ready to Pour | 2370.96 | 148 | 3996 |
| Dolomite - Crushed Fine | 1521.90 | 95 | 2565 |
| Dolomite - Broken Lump | 1521.90 | 95 | 2565 |
| Earth - Loamy, Dry Loose | 1201.50 | 75 | 2025 |
| Earth - Dry, Packed | 1521.90 | 95 | 2565 |
| Earth - Wet (Mud) | 1762.20 | 110 | 2970 |
| Flue Dust - Blast Furnace | 1842.30 | 115 | 3105 |
| Flue Dust - Blast Furnace, Wet | 2403.00 | 150 | 4050 |
| Gypsum - Crushed to 3" | 1521.90 | 95 | 2565 |
| Gypsum - Calcined | 961.20 | 60 | 1620 |
| Gravel - Dry, Loose | 1762.20 | 110 | 2970 |
| Gravel - Dry, Packed | 1810.26 | 113 | 3051 |
| Gravel - Wet, Packed | 1922.40 | 120 | 3240 |
| Iron Ore - 60% Iron | 4806.00 | 300 | 8100 |
| Iron Ore - 50% Iron | 4005.00 | 250 | 6750 |
| Iron Ore - 40% Iron | 3204.00 | 200 | 5400 |
| Iron Punchings - Scrap | 4325.40 | 270 | 7290 |
| Iron Turnings - Scrap | 2803.50 | 175 | 4725 |
| Limestone - Run of Crushed | 1521.90 | 95 | 2565 |
| Limestone - Fines Out | 1602.00 | 100 | 2700 |

| MATERIAL | KG/CU. METER | KG/CU. FOOT | 1 CU. YARD |
|-------------------------------|-----------------|-------------|------------|
| Limestone - 1 1/2 or 2 Graded | 1361.70 | 85 | 2295 |
| Limestone - Above 2 Graded | 1281.60 | 80 | 2160 |
| Phosphate, Acid (Fertilizer) | 1361.70 | 85 | 2295 |
| Phosphate, Rock | 1281.60 | 80 | 2160 |
| Pyrites | 2167.70 | 135 | 3645 |
| Salt | 929.16 | 58 | 1566 |
| Sand - Dry, Loose | 1521.90 | 95 | 2565 |
| Sand - Wet, Packed | 1922.40 | 120 | 3240 |
| Scale - Rolling Mill, Wet | 2114.64 | 132 | 3564 |
| Shale - Broken | 1361.70 | 85 | 2295 |
| Slag - Blast Furnace, Broken | 2210.76 | 138 | 3726 |
| Slag - Open Hearth, Crushed | 1682.10 | 105 | 2835 |
| Slag - Granulated, Dry | 606.76 | 38 | 1026 |
| Slag - Granulated, Wet | 929.16 | 58 | 1566 |
| Snow | 528.66 | 33 | 891 |
| Sulphur - Broken | 528.66 | 60 | 1620 |
| Timber - Green Cedar | 592.74 | 37 | 999 |
| Douglas Fir | 606.76 | 38 | 1026 |
| Hemlock | 656.82 | 41 | 1107 |
| Southern Pine | 881.10 | 55 | 1485 |
| Spruce | 576.72 | 36 | 972 |
| Redwood | 801.00 | 50 | 1350 |
| Zinc Ore - Broken | 2403.00 | 150 | 4050 |

Torque Specs -SAE & Metric

| | | | | PLAIN & ZINC PLATED FASTENERS | | | | | | | | | | HIGH STRENGTH BLACK OXIDE BOLTS, SHC | | | |
|-------|--------|-----------------|-------------------------------|---|----------------|------------------------|-------------------------------------|--|------------------------|-------------------------------------|----------------|------------------------|-------------------------------------|--------------------------------------|------------------------|-------------------------------------|----------------|
| | | | | SAE GRADE 2 or GRADE 5 with a GRADE A nut | | | | SAE GRADE 5 with a GRADE 5 or higher nut | | | | SAE GRADE 8 | | | | ASTM A574 - ANSI B18.3 | |
| SIZE | THREAD | BOLT DIA. (IN.) | TENSILE STRESS AREA (SQ. IN.) | PROOF STRENGTH (psi) S _p | | | MAX CLAMP LOAD (LB.) F _i | | | PROOF STRENGTH (psi) S _p | | | MAX CLAMP LOAD (LB.) F _i | | | PROOF STRENGTH (psi) S _p | |
| | | | | TORQUE* | | | TORQUE* | | | TORQUE* | | | TORQUE* | | | TORQUE* | |
| | | | | MAX CLAMP LOAD (LB.) F _i | DRY K=20 IN-LB | OIL LUBED** K=15 IN-LB | MAX CLAMP LOAD (LB.) F _i | DRY K=20 IN-LB | OIL LUBED** K=15 IN-LB | MAX CLAMP LOAD (LB.) F _i | DRY K=20 IN-LB | OIL LUBED** K=15 IN-LB | MAX CLAMP LOAD (LB.) F _i | DRY K=20 IN-LB | OIL LUBED** K=15 IN-LB | MAX CLAMP LOAD (LB.) F _i | DRY K=30 IN-LB |
| 4 | 40 | 0.112 | 0.00604 | 250 | 6 | 4 | 250 | 6 | 4 | 250 | 6 | 4 | 250 | 6 | 4 | 630 | 11 |
| | 48 | | 0.00661 | 270 | 6 | 5 | 270 | 6 | 5 | 270 | 6 | 5 | 270 | 6 | 5 | 690 | 12 |
| 6 | 32 | 0.138 | 0.00909 | 370 | 10 | 8 | 370 | 10 | 8 | 370 | 10 | 8 | 370 | 10 | 8 | 950 | 20 |
| | 40 | | 0.01015 | 420 | 12 | 9 | 420 | 12 | 9 | 420 | 12 | 9 | 420 | 12 | 9 | 1070 | 22 |
| 8 | 32 | 0.164 | 0.014 | 580 | 19 | 14 | 580 | 19 | 14 | 580 | 19 | 14 | 580 | 19 | 14 | 1470 | 36 |
| | 36 | | 0.01474 | 610 | 20 | 15 | 610 | 20 | 15 | 610 | 20 | 15 | 610 | 20 | 15 | 1550 | 38 |
| 10 | 24 | 0.19 | 0.0175 | 720 | 27 | 21 | 720 | 27 | 21 | 720 | 27 | 21 | 720 | 27 | 21 | 1840 | 52 |
| | 32 | | 0.02 | 830 | 32 | 24 | 830 | 32 | 24 | 830 | 32 | 24 | 830 | 32 | 24 | 2100 | 60 |
| 1/4 | 20 | 0.25 | 0.0318 | 1310 | 66 | 49 | 1310 | 66 | 49 | 1310 | 66 | 49 | 1310 | 66 | 49 | 3340 | 130 |
| | 28 | | 0.0364 | 1500 | 75 | 56 | 1500 | 75 | 56 | 1500 | 75 | 56 | 1500 | 75 | 56 | 3820 | 140 |
| | | | | 55000 | | | 85000 | | | 120000 | | | 140000 | | | 140000 | |
| 5/16 | 18 | 0.3125 | 0.0524 | 2160 | 11 | 8 | 2160 | 11 | 8 | 2160 | 11 | 8 | 2160 | 11 | 8 | 5500 | 21 |
| | 24 | | 0.058 | 2390 | 12 | 9 | 2390 | 12 | 9 | 2390 | 12 | 9 | 2390 | 12 | 9 | 6090 | 24 |
| 3/8 | 16 | 0.375 | 0.0775 | 3200 | 20 | 15 | 3200 | 20 | 15 | 3200 | 20 | 15 | 3200 | 20 | 15 | 8140 | 38 |
| | 24 | | 0.0878 | 3620 | 23 | 17 | 3620 | 23 | 17 | 3620 | 23 | 17 | 3620 | 23 | 17 | 9220 | 43 |
| 7/16 | 14 | 0.4375 | 0.1063 | 4380 | 32 | 24 | 4380 | 32 | 24 | 4380 | 32 | 24 | 4380 | 32 | 24 | 11160 | 61 |
| | 20 | | 0.1187 | 4900 | 36 | 27 | 4900 | 36 | 27 | 4900 | 36 | 27 | 4900 | 36 | 27 | 12460 | 68 |
| 1/2 | 13 | 0.5 | 0.1419 | 5850 | 49 | 37 | 5850 | 49 | 37 | 5850 | 49 | 37 | 5850 | 49 | 37 | 14900 | 93 |
| | 20 | | 0.1599 | 6600 | 55 | 41 | 6600 | 55 | 41 | 6600 | 55 | 41 | 6600 | 55 | 41 | 16900 | 105 |
| 9/16 | 20 | 0.5625 | 0.182 | 7510 | 70 | 53 | 7510 | 70 | 53 | 7510 | 70 | 53 | 7510 | 70 | 53 | 18430 | 130 |
| | 18 | | 0.203 | 8370 | 78 | 59 | 8370 | 78 | 59 | 8370 | 78 | 59 | 8370 | 78 | 59 | 20550 | 140 |
| 5/8 | 11 | 0.625 | 0.226 | 9320 | 100 | 73 | 9320 | 100 | 73 | 9320 | 100 | 73 | 9320 | 100 | 73 | 22880 | 180 |
| | 18 | | 0.256 | 10600 | 110 | 83 | 10600 | 110 | 83 | 10600 | 110 | 83 | 10600 | 110 | 83 | 25920 | 200 |
| 3/4 | 10 | 0.75 | 0.334 | 13800 | 170 | 130 | 13800 | 170 | 130 | 13800 | 170 | 130 | 13800 | 170 | 130 | 33820 | 320 |
| | 16 | | 0.373 | 15400 | 190 | 140 | 15400 | 190 | 140 | 15400 | 190 | 140 | 15400 | 190 | 140 | 37770 | 350 |
| 7/8 | 9 | 0.875 | 0.462 | 19100 | 280 | 210 | 19100 | 280 | 210 | 19100 | 280 | 210 | 19100 | 280 | 210 | 46780 | 510 |
| | 14 | | 0.509 | 21000 | 310 | 230 | 21000 | 310 | 230 | 21000 | 310 | 230 | 21000 | 310 | 230 | 51540 | 560 |
| 1 | 8 | 1 | 0.606 | 25000 | 420 | 310 | 25000 | 420 | 310 | 25000 | 420 | 310 | 25000 | 420 | 310 | 61360 | 770 |
| | 12 | | 0.663 | 27300 | 460 | 340 | 27300 | 460 | 340 | 27300 | 460 | 340 | 27300 | 460 | 340 | 67130 | 840 |
| 1 1/8 | 7 | 1.125 | 0.763 | 31500 | 590 | 440 | 31500 | 590 | 440 | 31500 | 590 | 440 | 31500 | 590 | 440 | 77250 | 1090 |
| | 12 | | 0.856 | 35300 | 660 | 500 | 35300 | 660 | 500 | 35300 | 660 | 500 | 35300 | 660 | 500 | 86670 | 1220 |
| 1 1/4 | 7 | 1.25 | 0.969 | 40000 | 830 | 630 | 40000 | 830 | 630 | 40000 | 830 | 630 | 40000 | 830 | 630 | 98710 | 1350 |
| | 12 | | 1.073 | 44300 | 920 | 690 | 44300 | 920 | 690 | 44300 | 920 | 690 | 44300 | 920 | 690 | 108600 | 1700 |
| 1 1/2 | 6 | 1.5 | 1.405 | 58000 | 1450 | 1090 | 58000 | 1450 | 1090 | 58000 | 1450 | 1090 | 58000 | 1450 | 1090 | 142300 | 2670 |
| | 12 | | 1.58 | 65200 | 1630 | 1220 | 65200 | 1630 | 1220 | 65200 | 1630 | 1220 | 65200 | 1630 | 1220 | 160000 | 3000 |

*Acceptable manufacturing torque value range is +0% / -10% of listed torque.
 **For other lubricants consult supplier.

Table 2. Metric Size Bolt Torque

| | | PLAIN & ZINC PLATED FASTENERS | | | | | | | | | | | | | | | | | | | |
|----------------|------------------------------|-------------------------------|----------------------|--------------|-------------------------------------|-----------------------------------|-------------------------|--------------|-------------------------------------|-----------------------------------|----------------------|--------------------------|-------------------------------------|-----------------------------------|----------------------|--------------|-------------------------------------|-----------------------------------|----------------------|--|--|
| | | CLASS 4.6 per ISO 898/1 | | | | | CLASS 8.8 per ISO 898/1 | | | | | CLASS 10.9 per ISO 898/1 | | | | | CLASS 12.9 per ISO 898/1 | | | | |
| BOLT DIA. (mm) | TENSILE STRESS AREA (SQ. mm) | TORQUE* | | | PROOF STRENGTH (Mpa) S _p | MAX CLAMP LOAD (N) F _i | TORQUE* | | PROOF STRENGTH (MPa) S _p | MAX CLAMP LOAD (N) F _i | TORQUE* | | PROOF STRENGTH (MPa) S _p | MAX CLAMP LOAD (N) F _i | TORQUE* | | PROOF STRENGTH (MPa) S _p | MAX CLAMP LOAD (N) F _i | TORQUE* | | |
| | | DRY K=20 N-m | OIL LUBED** K=15 N-m | DRY K=20 N-m | | | OIL LUBED** K=15 N-m | DRY K=20 N-m | | | OIL LUBED** K=15 N-m | DRY K=20 N-m | | | OIL LUBED** K=15 N-m | DRY K=20 N-m | | | OIL LUBED** K=15 N-m | | |
| SIZE | d | A _t | | | | | | | | | | | | | | | | | | | |
| M3-0.5 | 3 | 5.03 | | | | | | | | | | | | | | | | | | | |
| M3.5-0.6 | 3.5 | 6.78 | | | | | | | | | | | | | | | | | | | |
| M4-0.7 | 4 | 8.78 | | | | | | | | | | | | | | | | | | | |
| M5-0.8 | 5 | 14.2 | | | | | | | | | | | | | | | | | | | |
| M6-1 | 6 | 20.1 | | | | | | | | | | | | | | | | | | | |
| M7-1 | 7 | 28.9 | | | | | | | | | | | | | | | | | | | |
| M8-1.25 | 8 | 36.6 | | | | | | | | | | | | | | | | | | | |
| M10-1.5 | 10 | 58 | | | | | | | | | | | | | | | | | | | |
| M12-1.75 | 12 | 84.3 | | | | | | | | | | | | | | | | | | | |
| M14-2 | 14 | 115 | | | | | | | | | | | | | | | | | | | |
| M16-2 | 16 | 157 | | | | | | | | | | | | | | | | | | | |
| M18-2.5 | 18 | 192 | | | | | | | | | | | | | | | | | | | |
| M20-2.5 | 20 | 245 | | | | | | | | | | | | | | | | | | | |
| M22-2.5 | 22 | 303 | | | | | | | | | | | | | | | | | | | |
| M24-3 | 24 | 353 | | | | | | | | | | | | | | | | | | | |
| M27-3 | 27 | 459 | | | | | | | | | | | | | | | | | | | |
| M30-3.5 | 30 | 561 | | | | | | | | | | | | | | | | | | | |
| M33-3.5 | 33 | 694 | | | | | | | | | | | | | | | | | | | |
| M36-4 | 36 | 817 | | | | | | | | | | | | | | | | | | | |

*Acceptable manufacturing torque value range is +0% / -10% of listed torque.

**For other lubricants consult supplier.

Personnel Platform Installation & Operation Manual

Greer Insight Operation's Manual

Your crane is set up with a Greer Insight Rated Capacity Indicator (RCI) system. Completely read the attached manual in the Appendix section and view the Setup & Operations Video DVD (Part No. 12261-644) supplied in your crane manual pack before attempting to operate the crane.

[illegible]

LOAD KING WARRANTY

Load King (herein after referred to as the COMPANY) warrants all products manufactured by it and purchased by you to be free from defects in material and manufacture at the time of shipment, for one (1) year from date of delivery. The COMPANY will furnish replacements for such parts as the COMPANY finds to have been defective at the time of delivery or, at the COMPANY's option, will make or authorize repairs to such parts, provided that, upon request, such parts are returned, transportation is prepaid to the factory from which they were shipped.

This warranty shall not apply to any Product which has been subjected to misuse, misapplication, overloading, neglect (including but not limited to use of unauthorized parts or attachments), adjustments or repair. Engines, motor, tires, wheels, suspensions, axles, etc. and any accessories furnished with or used in the COMPANY's products, but which are not manufactured by the COMPANY, are not warranted by the COMPANY but are sold only with the express warranty, if any, or the manufacturers thereof. This warranted is limited to the first purchaser/user and is not transferable.

THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED (INCLUDING, WITHOUT LIMITATIONS, OF MERCHANTABILITY AND FITNESS OF ANY PRODUCT FOR A PARTICULAR PURPOSE), AND OF ANY OTHER OBLIGATION OR LIABILITY ON THE PART OF THE COMPANY. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THE FACE THEREOF.

LIMITATION OF LIABILITY

It is expressly understood and agreed by you that the COMPANY's liability for its products, whether due to breach of warranty, or otherwise is limited to the furnishing of such replacement parts, F.O.B.

factory, and the COMPANY will not be liable for any other injury, loss, damage, or expense, whether direct or consequential, including but not limited to loss of use, income, profit, or production, injury to person or increase in cost of operation, spoilage of or damage to material, arising out of or in connection with the sale, installation, use or inability to use, or the repair or replacement of the COMPANY's products.

All used vehicles and/or bodies are sold in the "AS IS" condition and no expressed or implied warranty is made.

All of COMPANY'S Products are of high quality and are manufactured in conformity with the best commercial practices in the various lines. The COMPANY guarantees all Products manufactured by it to be free from defects in material and manufactured at the time of shipment, for one (1) year from date of delivery. In addition, the COMPANY guarantees the portion of the product to be considered structural for one (1) year from date of manufacture.

While Load King, LLC. designs and manufactures its specific equipment configurations to industry standards, it is ultimate responsibility of the buyer/operator to assure that all loads are properly loaded and distributed. All loads must comply with the applicable state and federal load limits.



www.loadkingmfg.com

Load King
7701 Independence Ave, Kansas City, MO
64125
Parts: (816) 241-8387
Service: (833) 281-7911
Email: CIC@customtruck.com



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