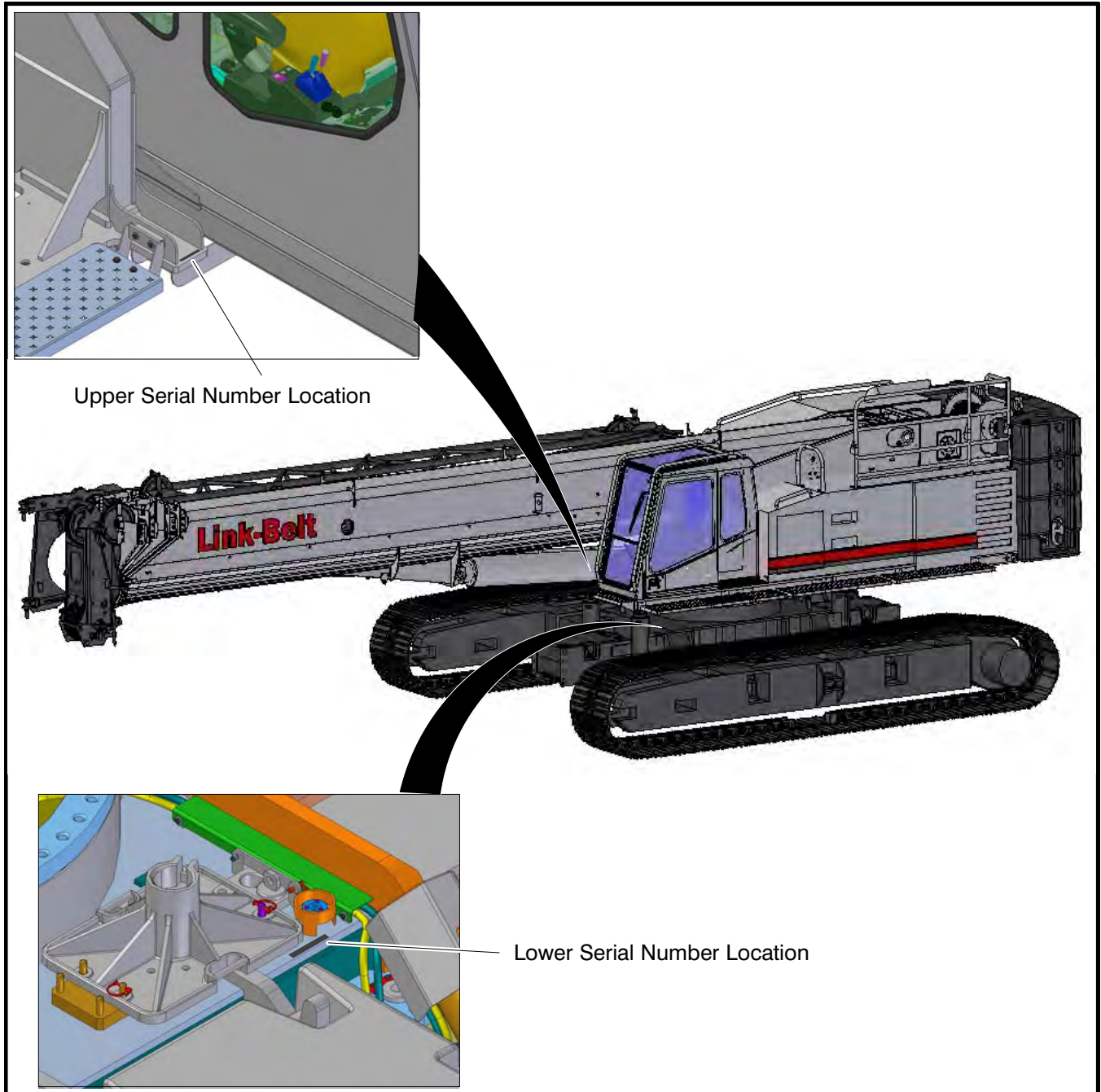


Operator's Manual



Crane Serial Number

The crane serial number is on the Crane Rating Manual in a box below the operator's seat in the operator's cab. The crane serial number should always be furnished when ordering parts for the crane, or when corresponding with the Link-Belt Distributor or Factory regarding the crane. The serial number is the only method the Link-Belt Distributor or Factory has of ensuring that the correct parts will be furnished.

In the event the serial number is not readable, a number is stamped on the top left side of the lower frame and on the left side of the upper frame just left of the boom hoist cylinder lug. This number can then be used to help to identify the crane.

Operator's Manual



WARNING

CONSTRUCTION EQUIPMENT CAN BE DANGEROUS IF IMPROPERLY OPERATED OR MAINTAINED. THIS CRANE SHOULD BE OPERATED AND MAINTAINED ONLY BY TRAINED AND EXPERIENCED PEOPLE WHO HAVE READ, UNDERSTOOD, AND COMPLY WITH THIS OPERATOR'S & MAINTENANCE MANUAL.

The productive life of construction equipment depends largely on the care and consideration given to it. This especially holds true for hydraulic cranes. This Operator's & Maintenance Manual was compiled to explain the procedures and adjustments necessary for proper operation of this crane.

A study of this Operator's Manual will acquaint the operator and service personnel with the construction of this crane. It will enable them to identify and remedy most problems that may occur. Any questions pertaining to the care and upkeep of this crane which are not covered in this Operator's Manual should be directed to your Link-Belt Distributor.

The Operator's Manual is stored in a pocket on the rear of the operator's seat. The Operator's Manual should remain in the cab and accessible at all times. **If the Operator's Manual becomes lost, damaged, or unreadable, it must be replaced before operating the crane.**

In addition to this Operator's & Maintenance Manual, a Parts Manual, Crane Rating Manual, and Safety Manual are supplied with the crane. Read and understand all safety guidelines before operating the crane. Additional copies of all manuals are available through your Link-Belt Distributor.

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents, and certain vehicle components contain or emit chemicals known to the State of California to cause cancer, birth defects, and other reproductive harm.

Operator's Manual

Throughout this Operator's Manual, reference is made to the left, right, front, and rear pertaining to direction and locations. These reference directions are relative to the operator, sitting in the operator's seat with the upper directly over the end of the lower with the travel motors to the rear, unless otherwise stated.

Danger, warning, and caution captions as well as special notes are used throughout this Operator's Manual and on the crane to emphasize important and critical instructions. Labels, decals, plates, etc. should be periodically inspected and cleaned as necessary to maintain good legibility for safe viewing. **If any instruction, caution, warning, or danger labels, decals, or plates become lost, damaged, or unreadable, they must be replaced.** Information contained on such labels, decals, and plates is important and failure to follow the information they contain could result in an accident. Replacement labels, decals, and plates can be ordered through your Link-Belt Distributor. For the purpose of this Operator's Manual, and the labels which are placed on the crane, danger, warning, and caution captions and notes are defined as follows:



DANGER

An operating procedure, practice, etc. which, if not correctly followed, will result in severe personal injury, dismemberment, or loss of life.



WARNING

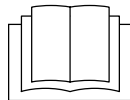
An operating procedure, practice, etc. which, if not correctly followed, may result in personal injury and may result in damage to or destruction of equipment or property.

CAUTION

An operating procedure, practice, etc. which, if not correctly followed, may result in damage to or destruction of equipment or property.

NOTE

Note: An operating procedure, step, condition, etc. which is essential in order for the process to be completed properly.



This symbol may appear in this Operator's Manual and/or on a label on the crane to alert personnel that additional instructions are included in this Operator's Manual.

Operator's Manual

General Index

A detailed Table Of Contents for each Section of this Operator's Manual is included at the beginning of each Section. The following is a description of each Section:

Section 1 – Operating Instructions Pages 1–1 Thru 1–176

Section 1 includes the necessary information for safe, productive crane operation. It includes the nomenclature and operation of all control switches, levers, pedals, and instrumentation of the crane.

Section 2 – Lubrication And Preventive Maintenance Pages 2–1 Thru 2–30

Section 2 includes the necessary information for proper lubrication and preventive maintenance for daily operations. It includes the check/change intervals and procedures for maximizing the service life of the crane under normal working conditions. It also includes lubrication types and specifications approved for use in the crane.

Section 3 – Periodic Adjustments Pages 3–1 Thru 3–22

Section 3 includes the adjustments which must be made periodically to keep the crane in proper, safe working order. It includes the procedures and necessary information for adjusting the track tension, mechanical linkages, and hydraulic pressures on the crane.

Section 4 – Attachments Pages 4–1 Thru 4–44

Section 4 includes the use and operation of the crane attachments. It includes the necessary information for installation, erection, storage, and removal of the auxiliary lifting sheave and lattice fly.

Section 5 – General Information Pages 5–1 Thru 5–26

Section 5 includes general information on the Crane Rating Manual and serial number as well as wire rope specifications, inspection, replacement, connections, and reeving. General specifications for the crane are also included.

Section 6 – Fundamental Terms Pages 6–1 Thru 6–6

Section 6 includes a list of terms which are used to refer to crane functions, assembly, operation, and maintenance. These terms are defined as to how they are used in this Operator's Manual.

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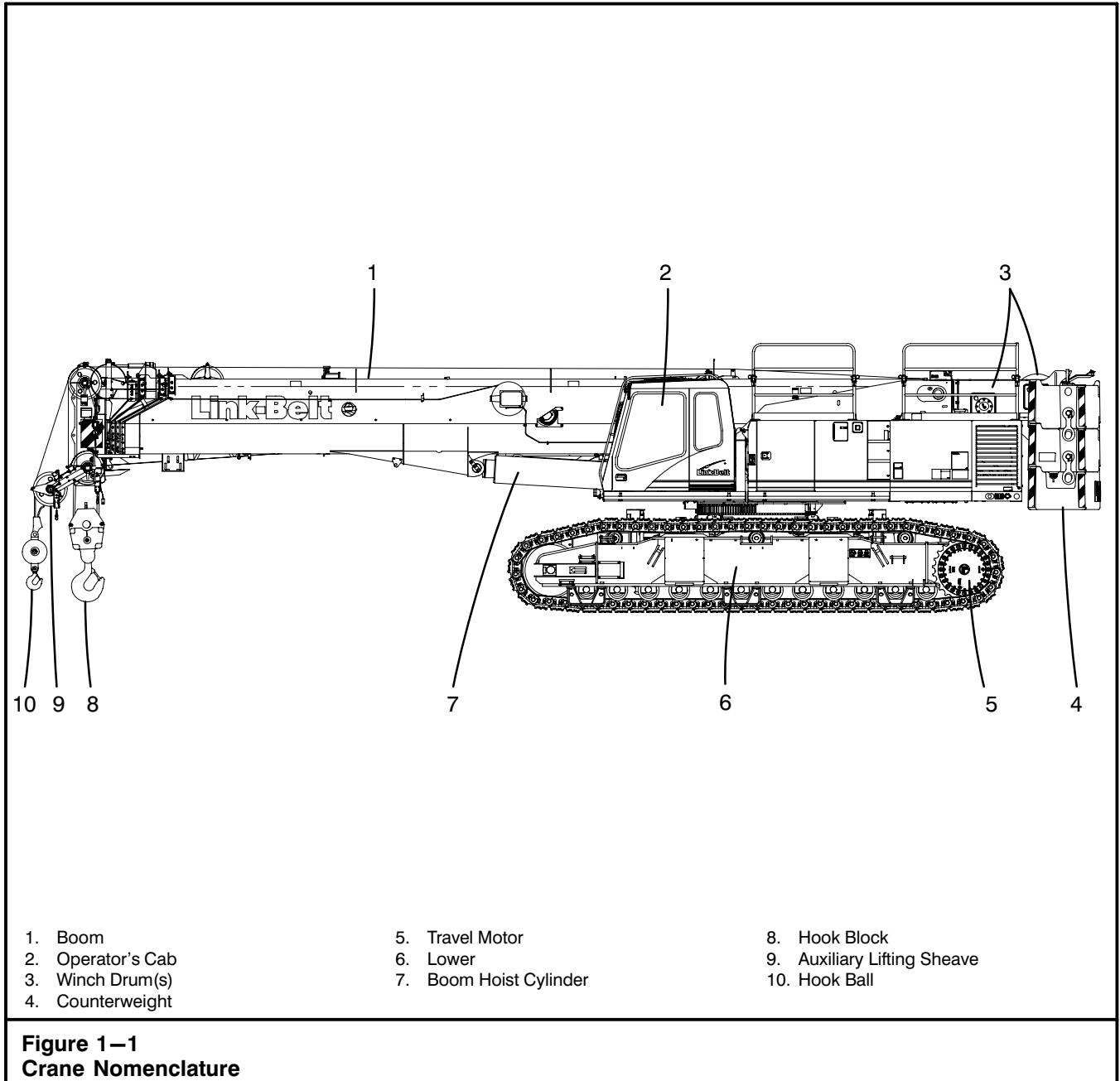
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- | | | |
|-------------------|------------------------|-----------------------------|
| 1. Boom | 5. Travel Motor | 8. Hook Block |
| 2. Operator's Cab | 6. Lower | 9. Auxiliary Lifting Sheave |
| 3. Winch Drum(s) | 7. Boom Hoist Cylinder | 10. Hook Ball |
| 4. Counterweight | | |

Operating Safety

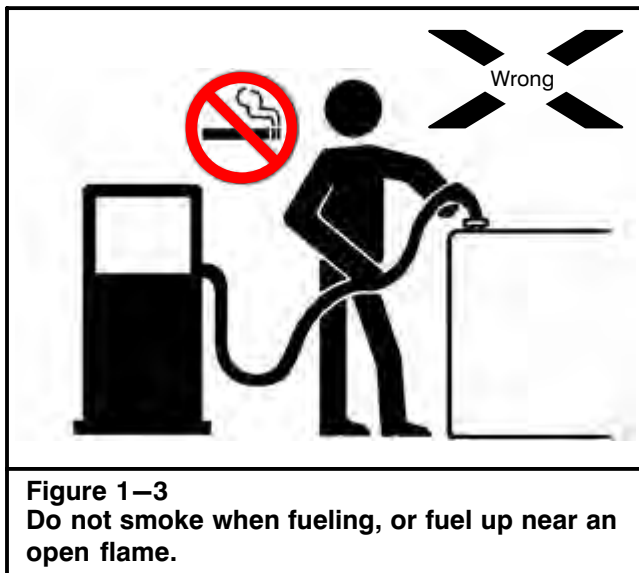
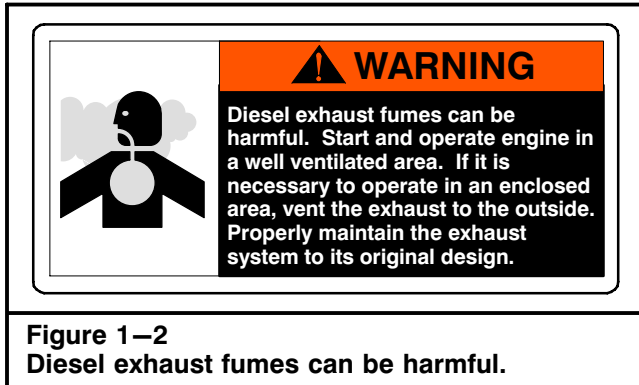
Remember SAFETY every day. Someone's LIFE may depend on it, **MAYBE YOUR OWN.**

Safe operations of a crane requires a well trained, qualified operator. Crane operation is more involved than it may appear, and operation by a careless or unqualified person can result in a serious accident.

When a crane is maintained and used properly it can be a safe, highly productive piece of equipment, but if not used properly, it can be dangerous.

Think Safety – You, the operator, are in charge of an important piece of equipment. It is very important that you know what it can do. It is also important that you know what it should not do. No set of instructions can anticipate all of the situations you will encounter. The rules given here cover the general usage, and some of the more common specific cases. If conditions arise not covered by these rules, contact a Link-Belt Distributor. A phone call could save someone's life.

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General Safety Rules

The following is a list of safety rules which should be followed during all crane operations.

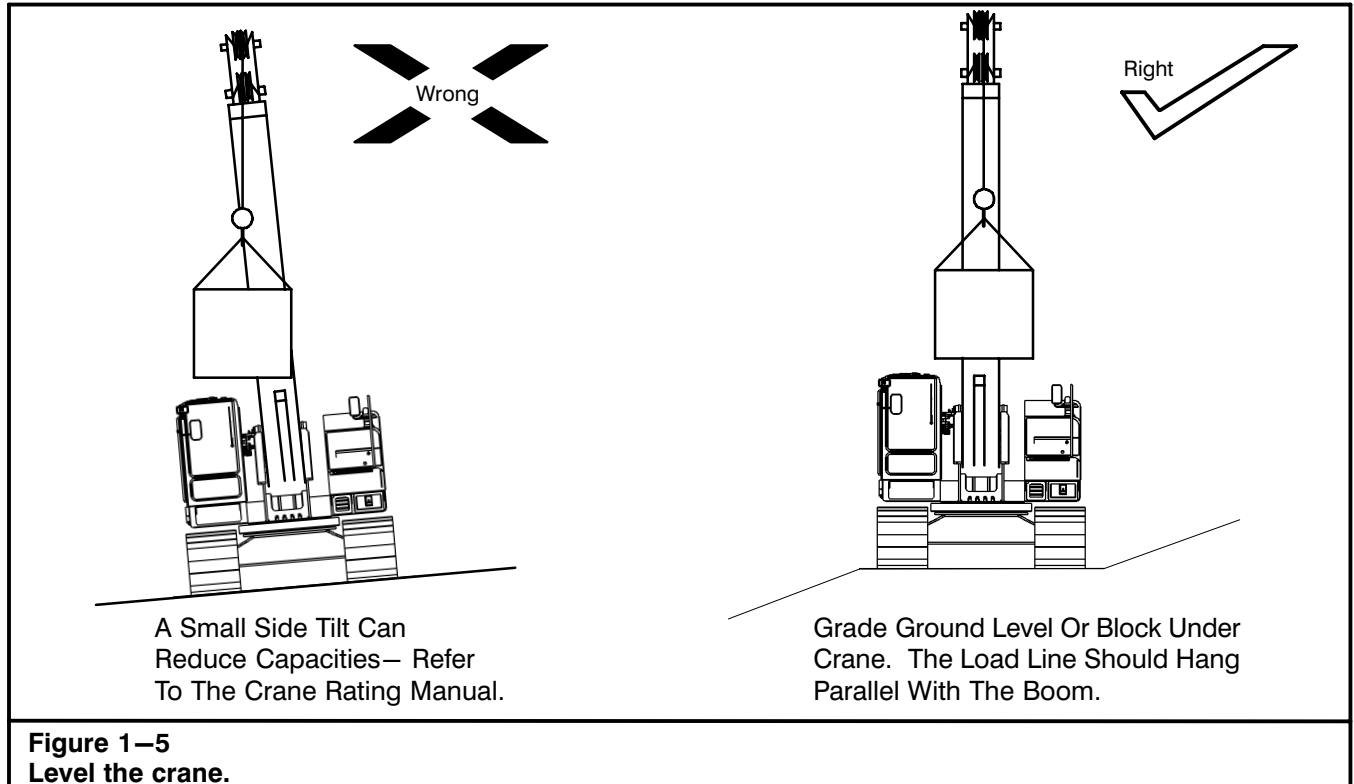
Operator Awareness

1. Read and understand this Operator's Manual, all Safety Manuals, and the Crane Rating Manual and heed them. These Manuals contain important information.
2. An operator must not eat, read, or otherwise divert his attention while operating a crane. Remember—operating is a full-time job.
3. Start and operate the engine in a well ventilated area. Diesel exhaust fumes can be harmful. If it is necessary to operate in an enclosed area, vent the exhaust to the outside. Properly maintain the exhaust system to its original design.
4. Do not smoke when fueling, or fuel up near an open flame. Keep the nozzle in contact with the filler neck to prevent static electric sparks. Shut-down the engine when fueling.



5. Keep your shoes clean. Before entering the operator's cab, wipe clean any mud, gravel, snow, ice, moisture, or grease from your feet. Slippery shoes could cause momentary loss of control of crucial foot operated controls.
6. Keep all walking surfaces (steps, ladders, platforms, etc.) and non-skid materials on the crane clean. Non-skid materials are placed on the crane to assist operators and service personnel with safe access/egress to/from the crane and to/from adjustment and inspection areas. Do not allow non-skid materials to become contaminated with mud, snow, ice, oil, paint, wax, etc. Any contamination can cause the non-skid materials to become slick, reducing their effectiveness for safety while walking on the crane. If any non-skid materials become ineffective due to wear, age, or destroyed in any way, they must be replaced.
7. Keep fingers, feet, and clothing away from sheaves, drums, and wire ropes unless the crane is shutdown and everyone knows what you are doing. Do not place a hand on wire ropes when climbing on the crane. A sudden movement could pull them into the drums or sheaves. Never wear loose clothing which may be caught in machinery.
8. To prevent movement of the individual boom sections, shutdown engine and ensure the operator has vacated the cab before putting your hands or tools inside the boom. Unexpected movement of boom sections could sever fingers, hands, arms, etc.
9. Operate the crane from the operator's seat only. Operating the crane from any other position, such as reaching in a window, constitutes a safety hazard.
10. Watch the load or a signal person at all times. A suspended load must have your undivided attention.
11. The operator, supervisor, or person in charge of the load must observe the following rules:
 - a. Loads must be well secured before lifting. Ensure that the rigging can't slip off or pull away from the load, or get out of position on the load. Use a three-point sling if necessary to keep the load from rolling or turning over.

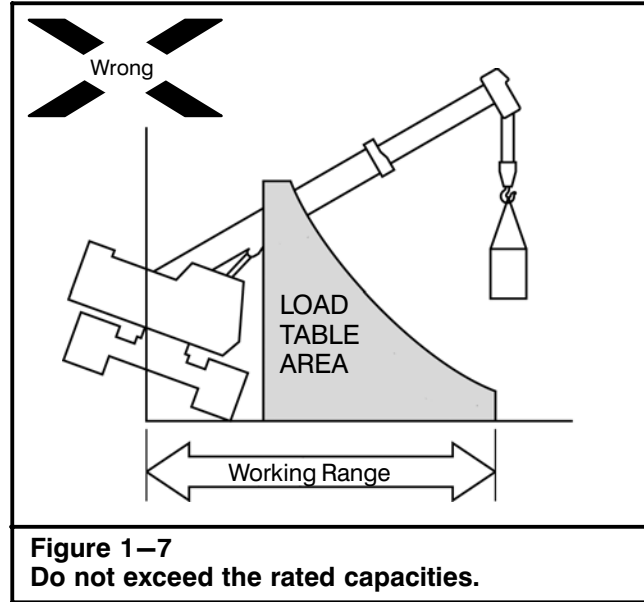
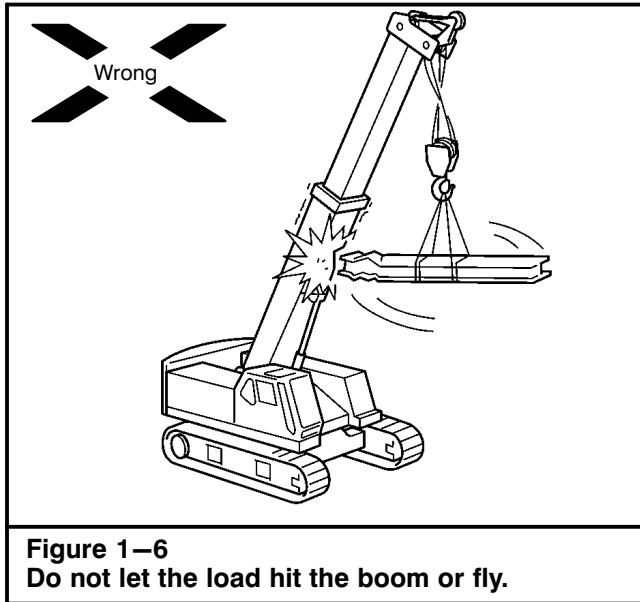
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- b. Chains and slings must be of adequate size, in good condition, and not twisted around each other.
- c. The load must not catch on an obstruction when lifting or swinging. Ensure the load, winch wire ropes, or any other parts of the crane do not snag or strike any obstruction.
- d. Do not allow the load to rotate out of control. Personal injury to ground personnel, load damage, crane damage, or damage to anti-two block system may occur.
- e. When hoisting with single part of line, especially in long falls applications, the design of wire rope and hook ball is crucial to minimize the potential for uncontrolled wire rope and/or load rotation. Rotation resistant wire rope is recommended for single part of line applications. See Wire Rope Capacity Chart in the Crane Rating Manual for the specific types of rotation resistant wire rope recommended for the crane.
- f. Avoid sudden starts and stops. Lift carefully, swing gently, brake smoothly, lower and set loads carefully. Jerking the load, swinging and engaging swing brake abruptly, and lowering the load rapidly and slamming on brakes, will put shock loadings and possible side loadings on the boom. Unnecessary abuse labels the operator as a beginner. Be a professional.
- g. Do not wrap the winch wire rope around the load. Do not use discarded, worn, or damaged wire ropes for slings. They may break and drop the load.
- h. Standard capacities require that the crane be on a firm, level supporting surface before making a lift. Use the bubble level to help determine when the crane is level. Check its accuracy frequently with a carpenter's level. Remember, a small side tilt can reduce capacities. Refer to the "List Capacities" charts in the Crane Rating Manual before making a lift when crane is not level.

The hook block or hook ball and hoist wire rope can be used as a "plumb bob" to level a crane. Pick up a compact load 2,000–3,000 lb (907–1 360kg) a few inches (*centimeters*) above the ground. If the crane is level, the load line will hang parallel to the boom. Now swing over the side. The load lines should still hang parallel to the boom. Be extra careful when using this method on a windy day.
- i. If working at night, ensure adequate lighting is provided so the operator and all other workers can see all movements of the crane, attachment, and load.

Operator's Manual



12. Don't let the load or bucket hit the boom or fly. Don't let the boom or attachment rest on, or hit, a building or any other object. A dent or other damage could result, which will weaken the boom or attachment. If the damage is major, the attachment could collapse. If a lattice or diagonal bracing member on the fly is broken, cracked, or bent, contact a Link-Belt Distributor for repair procedures. If the boom or fly is struck, or damaged by anything, STOP. The loading on a boom or attachments increases as they are lowered, therefore their suspension systems could collapse during lowering. Use another crane to lower a damaged boom or attachment.
13. Don't pull sideways on the boom or fly, not even a little. Lift straight up on every load. Moving trucks, rail cars, barges, or anything else pulling sideways on the winch wire rope could buckle the boom or fly. It could also damage the swing mechanism. Pulling sideways on the boom or fly can overturn the crane.
14. Do not "two block" (pulling the hook block, hook ball, or load into the head machinery) as this can cause winch wire rope and sheave breakage resulting in an accident.
15. Watch the load (or a signal person who can see the load) at all times. A suspended load must have your undivided attention.
16. Operate the crane from the operator's seat only. Operating the crane from any other position, such as reaching in a window, constitutes a safety hazard.
17. After slack winch wire rope operation, ensure the winch wire rope is properly seated in sheaves and on drums before continuing to operate. Use a stick or mallet to set the winch wire rope, not your hands.
18. Do not lower the load beyond the point where less than three full wraps of winch wire rope are left on the drum. This condition could occur when lowering a load below ground level. If all the winch wire rope runs off the drum, the load will jerk which could break the winch wire rope.
19. Don't alter any part of the crane. Additions to, or changes in, any part of the equipment can create loadings for which the crane was not designed. Such changes may seriously affect the usable capacities and make the entire Crane Rating Manual invalid. Such changes can dangerously overload or weaken critical parts and may cause disastrous failure.
20. Do not exceed the rated capacities of the crane under any circumstances. While a crane has more stability when lifting over a corner (as compared to straight over the side) the crane capacity is not increased. Any time the loads exceeds the rated capacities listed on the capacity charts in the Crane Rating Manual, the crane is overloaded. Overloads can damage the crane and such damage could cause failure and accidents.
21. Confirm that there is a safety latch on the hook, and that it works properly. Without a latch, it is possible for slings or chains to come off the hook, allowing the load to fall.

Operator's Manual

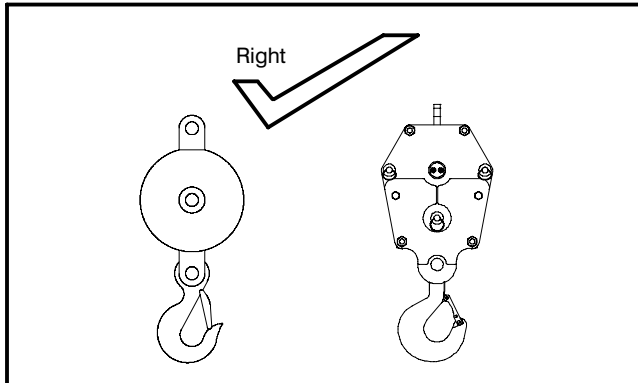


Figure 1-8
Ensure hook is equipped with a functional safety latch.

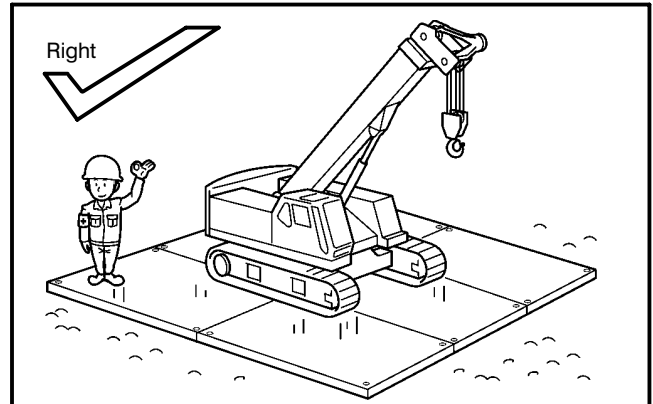
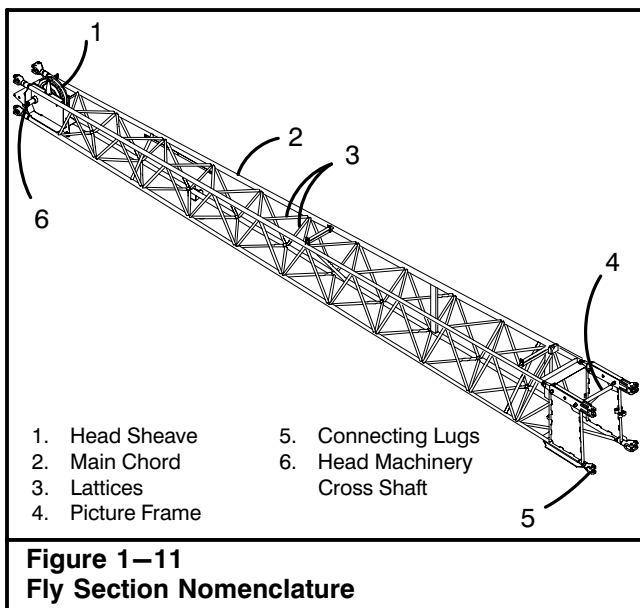
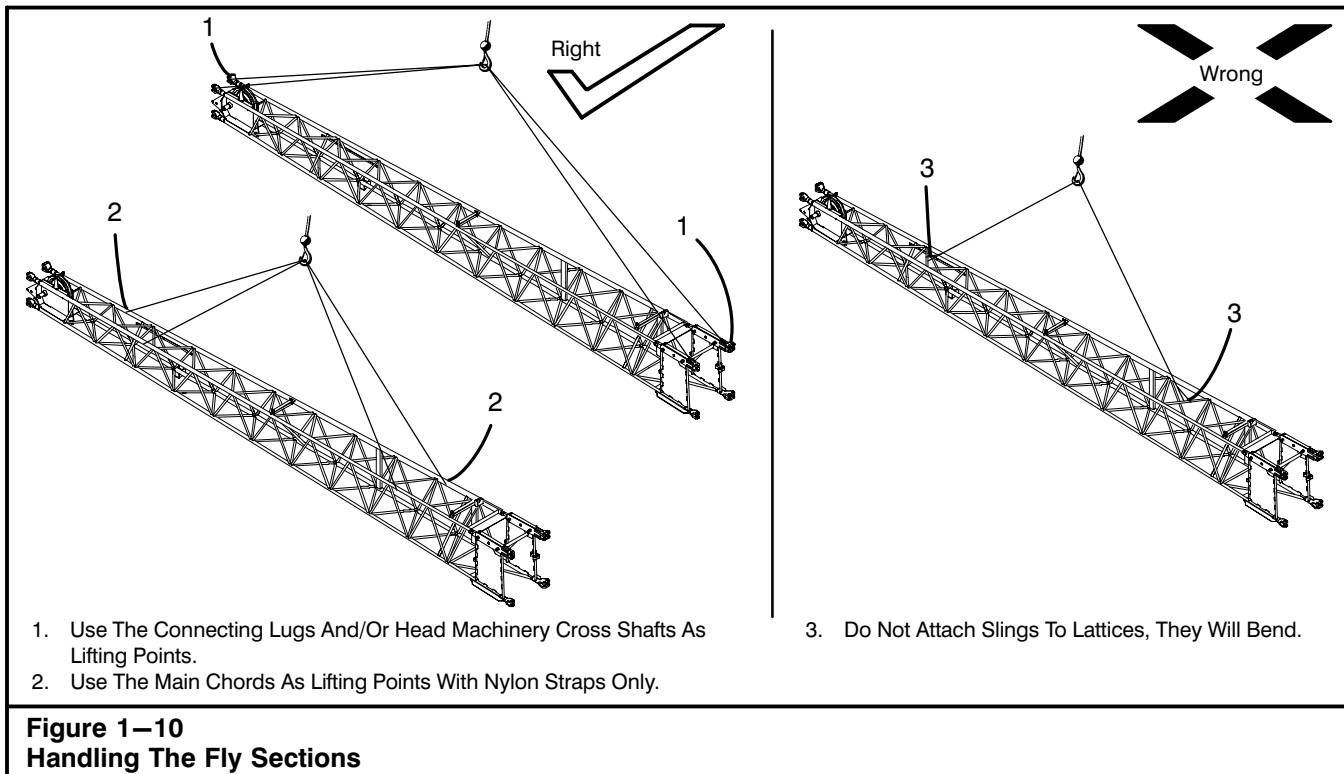


Figure 1-9
Use matting on soft ground.

22. Lifts where two or more cranes work together can be hazardous and should be avoided. Such lifts should be made only under the direction of a qualified engineer. If a multiple crane lift is unavoidable, observe the following rules:
 - a. The cranes must be level and located on firm surfaces.
 - b. The cranes should be the same size and capacity, use the same boom length, and be similarly reeved.
 - c. Cranes must be positioned so that each boom point is directly over its load attaching point. The winch lines must be vertical during all phases of the lift.
 - d. The rigging must be placed so each crane lifts a share of the load well within the crane's capacity.
 - e. Ensure that during handling more load is not transferred to either crane than it can handle.
 - f. Don't attempt to travel when making multiple crane lifts.
 - g. Coordinate plans with the other operator before beginning to lift.
 - h. Use only one signal person.
 - i. Use of an operable load and angle indicating system is desirable.
23. When operating the crane where the tracks could sink into the soil any noticeable amount, use matting. Timbers used for matting should be at least as long as the total width of the crane and should be heavy enough to withstand loadings without damage. Timbers should be close enough to form a solid platform when lifting over the ends (or raising and lowering attachment). Block under track ends so full support is provided where tracks leave the ground. This helps keep the tracks from digging in and reduces crane rocking.
24. When operating, use care not to hit the lower with the load or boom.
25. Cold weather operation requires some special attention by the operator to allow for changes in everyday routines:
 - a. Clean the crane, especially the boom, of accumulated amounts of ice or snow. Operating the crane with an ice covered boom is dangerous. The added weight of the ice or snow can drastically reduce the capacity of the crane. Also, falling ice may pose a danger for ground personnel.
 - b. Clean all snow and ice from steps, ladders, platforms, etc. to eliminate slippery walking surfaces.
 - c. If cold weather starting aids are provided on the crane, use them. The use of aerosol starting sprays can be dangerous if the manufacturer's directions are not closely followed.
 - d. Pay close attention to the gauges in the operator's cab when starting the engine. Normal "warm up" times will be longer. Ensure pressures and temperatures are within normal ranges before beginning operations.
 - e. Always handle flammable materials according to the manufacturer's instructions. Propane, diesel, or other fuel for auxiliary heaters can be dangerous if not properly handled. Do not store such fuels on the crane.
 - f. Use caution when lifting any load during freezing weather, as it may be frozen to the ground or the supporting surface. The added pull, to break the load free, could cause an unexpected overload situation. Also, when the load does finally break loose it could create an erratic motion causing damage or injury.
 - g. At the end of the work shift, park the crane where it will not freeze to the ground. Major damage to the drive mechanism could occur while trying to free the crane from a frozen surface.

Operator's Manual



26. Use care handling the fly when loading, transporting, and unloading. Damage that occurs during these operations can go undetected and could result in failure of the attachment, once subjected to loading. Do not attach slings to the lattices, when lifting the fly, as they will bend. It is recommended that the connecting lugs and/or head machinery cross shaft be used as the lifting points. However, it is permissible to attach nylon straps around the main chords.

27. Always wear proper eye protection when driving connecting pins.
28. Block under and between the fly sections when loading them on a transport vehicle. When securing the fly to a transport vehicle, it is best to use synthetic webs or slings. If using wire rope slings, pad the fly to protect it from damage. Do not overtighten the tie downs or the fly may be damaged. Do not use chain tie downs, as they may dent and damage the fly sections.
29. Thoroughly inspect all the elements of each fly before installing it on the crane. Check each main chord, picture frame, diagonal, lattice, and connecting lug for bends, dents, and cracked or corroded welds. Picture frames must be square. Do not use any fly that is even slightly damaged. Contact a Link-Belt Distributor for the proper repair procedures.
30. Use care during all access/egress to/from the crane. Use the hand rails, hand grips, steps ladders, guard rails, etc. to prevent slips and falls. Remain in three point contact (two hands and one foot or two feet and one hand) with the crane at all times.

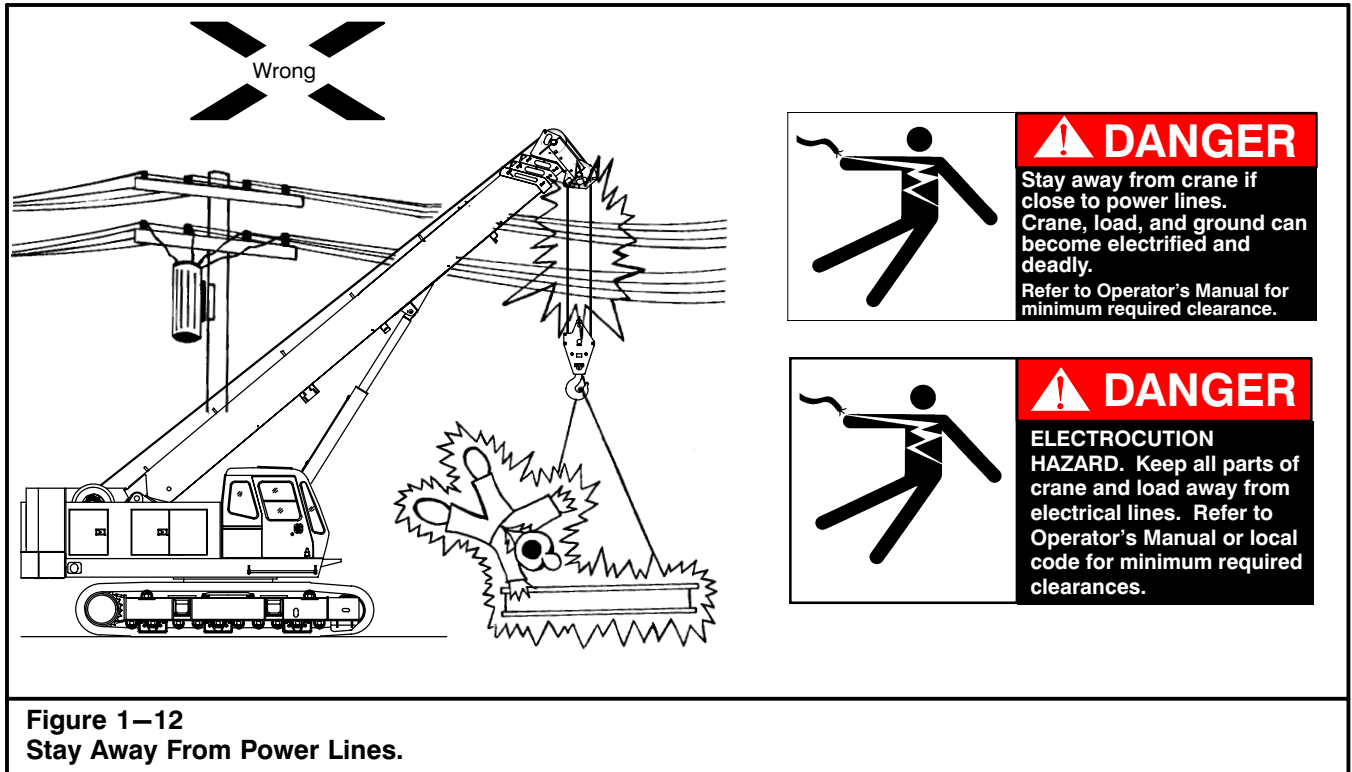


Figure 1–12
Stay Away From Power Lines.

Electrical Dangers

1. All Electrical Power Lines Are Dangerous. Contact with them, whether insulated or not, can cause death or injury. When operating near power lines, the best rule is to have the power company turn off the power and ground the lines. However, in some cases, the operator may be unable to have the power turned off. Follow these rules whether the power is turned off or not. Follow all requirements per OSHA regulations 1926.1407 through 1926.1411 as applicable while assembling, disassembling, operating, or traveling the crane in the vicinity of any power lines.
 - a. Be alert. You are working around conditions which can cause death.
 - b. Keep all parts of the crane – winch wire rope(s), hook block, hook ball, and load – at least the distance from the power line as specified in the “High Voltage Power Line Clearance Chart”, or such distance as required by any other state or local requirements.
 - c. Assume that every line is “Hot”.
 - d. Appoint a reliable person equipped with a loud signal (whistle or horn) to warn the operator when any part of the crane is working around the power line. This person should have no other duties while the crane is working around the power line.
 - e. Do not perform any crane assembly/disassembly under any energized power line.

Minimum Clearance When Operating Near High Voltage Power Lines Or During Crane Assembly/Disassembly	
Normal Voltage, kV (Phase to Phase)	Minimum Required Clearance, ft (m) See Note 1
To 200	15 (4.57)
Over 200 To 350	20 (6.10)
Over 350 To 500	25 (7.62)
Over 500 To 750	35 (10.67)
Over 750 To 1000	45 (13.72)
Over 1000	As established by the power line owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.
Minimum Clearance When Traveling With No Load	
To 345	15 (4.57)
Over 345 To 750	16 (4.87)
Over 750 To 1000	20 (6.10)
Over 1000	As established by the power line owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution.
Note 1: Maintain 50 ft (15.2m) minimum clearance from power lines if voltage is unknown. If unknown but yet known to be less than 350 kV, maintain 20 ft (6.1m) minimum clearance.	
Note 2: Environmental conditions such as wind, fog, smoke, or precipitation may require increased clearances.	
High Voltage Power Line Clearance Chart	

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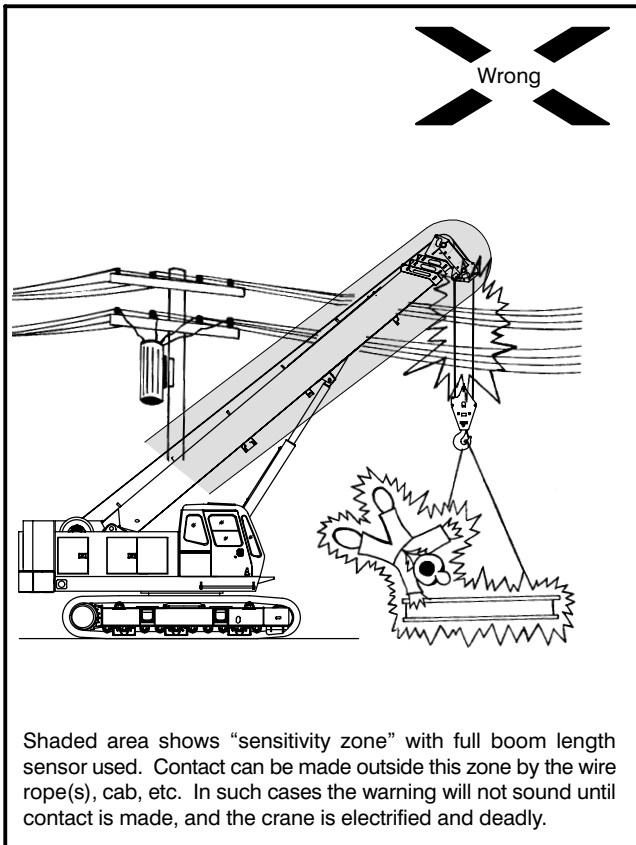


Figure 1–13
Crane equipped with proximity warning device on the entire boom.

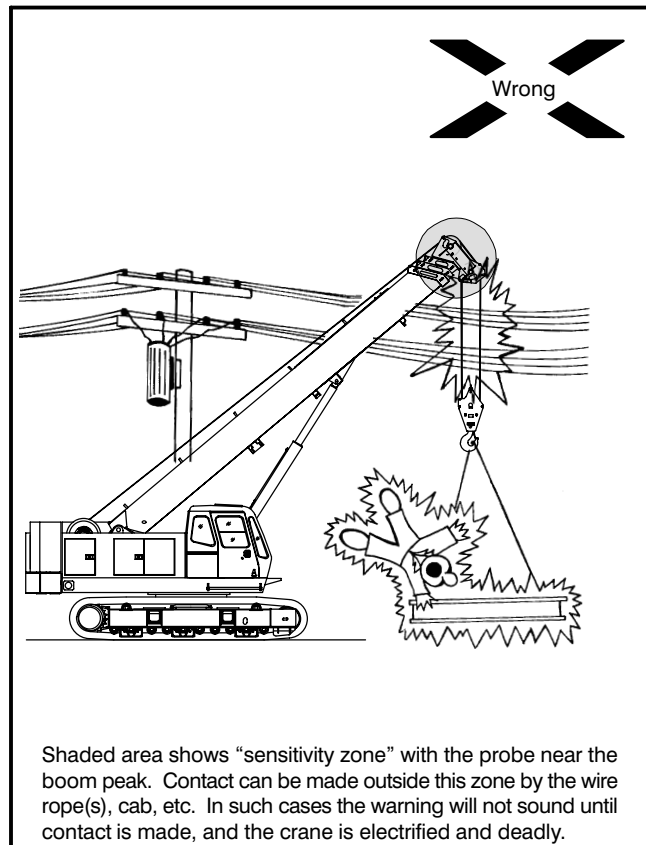


Figure 1–14
Crane equipped with proximity warning device on boom tip.

- f. Warn all personnel of the potential danger. Don't allow unnecessary persons in the area. Don't allow anyone to lean against or touch the crane. Don't allow workers or load handlers to hold load, load lines, or rigging gear unless absolutely necessary. In these cases, use dry hemp or plastic ropes as tether lines. Make certain everyone stays at least the minimum distance away from the load as specified in the "High Voltage Power Line Clearance Chart", or such distance as required by any other state or local requirements.
- g. The use of boom point guards, proximity devices, insulated hooks, or swing limit stops do not assure safety. Even if codes or regulations require the use of such devices, you must follow rules listed here. If you do not follow them, the result could be serious injury or death.
- h. Grounding the crane can increase the danger. Poor grounding such as a pipe driven into the ground, may give little or no protection. In addition, a grounded crane may strike an arc so heavy that a live line may be burned down.

This could cause the crane and the area around it to be electrified.

- i. When operating near radio or T.V. transmitting stations, high voltage can be induced in metal parts of the crane, or in the load. This can occur even if the crane is some distance from the transmitter or antenna. Painful, dangerous shocks could occur. Consult trained electronic personnel before operating the crane to determine how to avoid electrical hazards.
 - j. Overhead lines can move when the wind blows against them. Allow for this when determining safe operating distances.
2. **What do you do if a power line is touched by a crane or load?**
- a. Remain calm – think – a mistake can kill someone.
 - b. Warn all personnel to keep clear.
 - c. If crane will still operate, try to move it away from contact. You, the operator are reasonably safe in the cab unless the crane is on fire or an arc is cutting through the cab.

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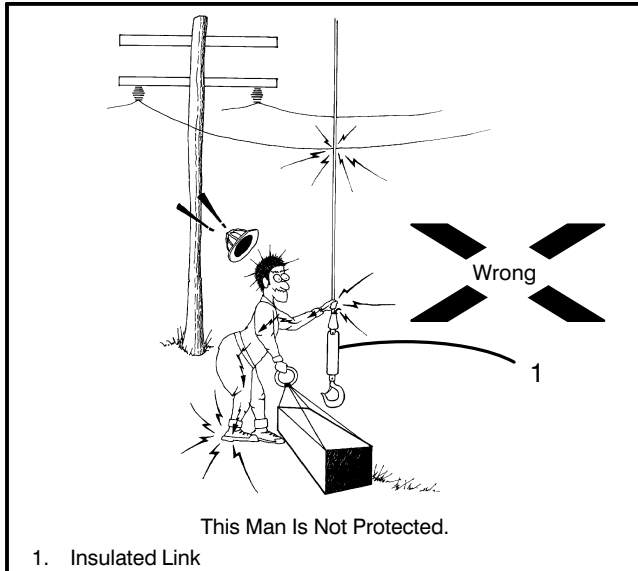


Figure 1-15
Crane equipped with insulated link.

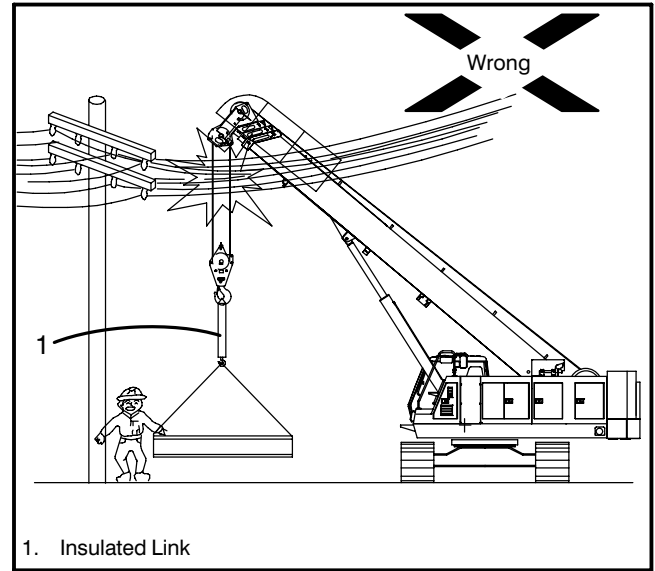


Figure 1-16
Crane equipped with insulated link and boom point guard.

- d. Move away from contact in the reverse direction to that which caused the contact. Example: If you swing left to the wire, swing to the right to break contact. Remember – once an arc has been struck, it may stretch out much farther than you think before it breaks. Keep moving until the arc is broken.
 - e. When the arc breaks, continue moving until you are at least the minimum distance away as specified in the “High Voltage Power Line Clearance Chart”, or such distance as required by any other state or local requirements. Stop the crane. Thoroughly inspect crane and repair any damage before further use. Contact a Link-Belt Distributor and request a “Crane Inspection After Contacting Power Line” form which lists necessary inspection items.
 - f. If you cannot disengage from the electrical line, and the crane is not on fire or no arc is cutting through the cab, stay in your seat until the power line can be turned off.
 - g. If you must leave the crane, don't step off. Leap from the crane as far as you can, landing with feet together, then hop away from the crane with feet together, or shuffle feet to keep them close together. This could help prevent personal injury.
3. When using a magnet:
- a. Lifting magnet generators produce voltage in excess of 200 volts and present an electrical shock hazard. Only trained personnel should work on the magnet, controller, or wiring. Don't open the controller door with the generator running.

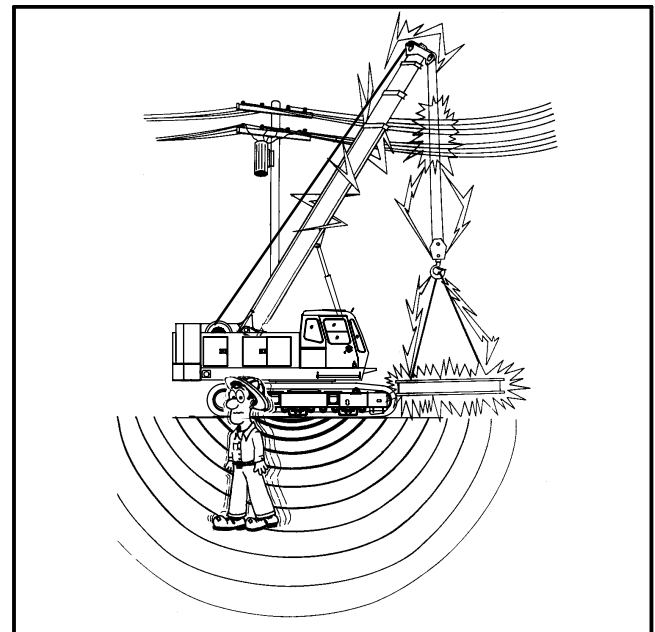
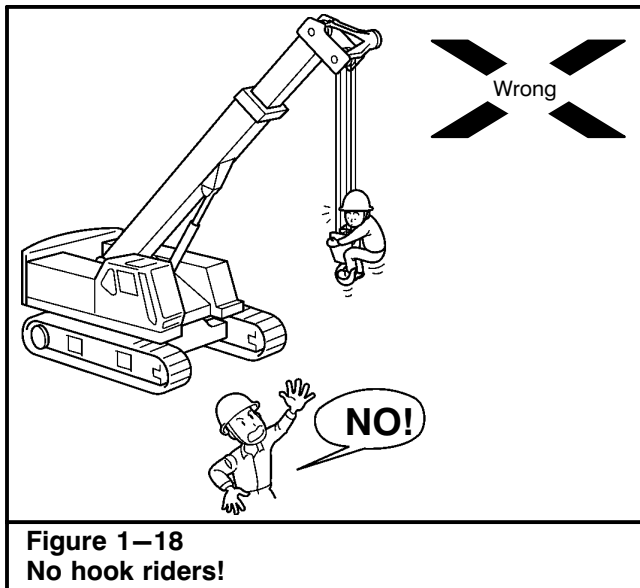


Figure 1-17
If you must leave the crane, do not step off. Leap as far as you can with feet together and hop or shuffle away from the crane.

- b. Do not let workers touch magnet or load.
- c. Do not let workers get between magnet and a metal object.
- d. If necessary to position a load, use a dry, wooden stick.
- e. Open magnet disconnect switch at magnet control panel before connecting or disconnecting leads.

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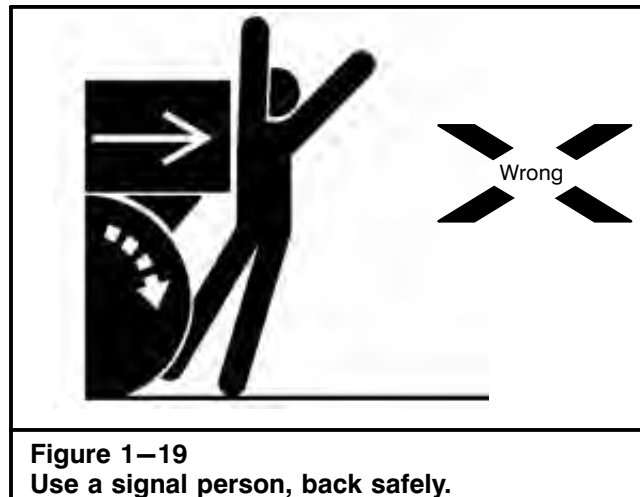


Radio Frequency Or Electro Magnetic Interference (RFI Or EMI)

Certain areas may contain high Radio Frequency Or Electro Magnetic Interference (RFI or EMI). In these areas the boom can act like an antenna and produce an electrical current that may cause electrical shocks and/or the crane to malfunction. If operating in an area where these conditions may exist, test the crane or have the area tested for the magnitude of this interference before operating the crane. Operation may not be possible or boom length may be limited. Comply with all local, state, and federal laws when operating in high RFI/EMI areas.

Protective Equipment

1. Always replace protective guards and panels before operating the crane.
2. Always wear hard hats, safety glasses, steel toe shoes, hearing protection, and any other safety equipment required by local job conditions, OSHA, or any other requirements of applicable codes.
3. Always wear safety glasses when drilling, grinding, or hammering. Flying chips could injure the eyes.
4. Always wear a mask to prevent breathing any dust, smoke, fumes, etc. while cleaning, drilling, welding, grinding, sanding, etc. on any part of the crane. Breathing dust, smoke, fumes, etc. can be very hazardous.
5. Keep a dry chemical or carbon dioxide fire extinguisher of 5BC rating or larger in the cab or in the immediate area of the crane at all times. Instruct all operating and maintenance personnel in proper use of the extinguisher. Check periodically to ensure it is fully charged and in working order.



6. Do not tamper with safety devices. Keep them in good repair and properly adjusted. They were put on the crane for your protection.
7. When operating a crane equipped with any form of load indicating mechanism, overload warning system, or any automatic safety device, remember that such devices cannot replace the skill and judgment of a good operator. For instance, such devices cannot tell when a crane is located on a supporting surface that will give away, that too few parts of line are being used to lift a load, cannot correct for the effects of wind, warn that the device may be improperly adjusted, correct for side pulls on the boom, or for many conditions which could occur and create hazards. It requires all the skill, experience, judgment, and safety consciousness that a good operator can develop to attain safe operation. Many safety devices can assist the operator in performing his duties, but he should not rely on them to keep him out of trouble.

Signal Persons And Bystanders

1. Don't allow crane boom or loads to pass over people, or endanger their safety. Remove all loose objects from load. All unnecessary personnel should leave the immediate area when crane is operating.
2. Do not allow anyone to ride on the hook block, hook ball, or any part of the load or attachment for construction work or recreational activities. (This applies to recreational activities such as "bungee jumping" or "bungee cord jumping".) Cranes are intended to lift objects, not people. They are not elevators.
3. Do not carry passengers! There is only one seat and it is for the operator. Do not allow personnel to ride on the crane during operation or while traveling the crane. A fall from the crane can cause death or serious injury.



Figure 1–20
Inspect crane daily.

4. Always look before you travel and post a signal person to guide you. Ensure the travel alarm is working properly. Use the horn as a signal. Use a code such as one beep – stop, two beeps – forward, and three beeps – backward. Ensure everyone on the job site knows the code.
5. Do not make a lift which is not in plain sight without a signal person. This can lead to an accident or crane damage.

Crane Inspections And Adjustments

1. Inspect the crane daily. Do not operate a damaged or poorly maintained crane. Pay particular attention to the winches, controls, attachments, and wire ropes. If a component is worn or damaged, replace it before operating.
2. Labels, decals, plates, etc. should be periodically inspected and cleaned as necessary to maintain good legibility for safe viewing. If any instruction, caution, warning, or danger labels, decals, or plates become lost, damaged, or unreadable, they must be replaced.
3. When performing repetitive lift applications, especially at or near maximum strength limited capacities, an inspection for cracks or other damage of the major structural areas of the crane, should be conducted on a regular basis. (A non-destructive test such as magnetic particle or dye penetrant may even be considered.) Along with inspection for cracks and damage, frequently check the critically loaded fasteners, such as the turntable bearing mounting capscrews, to ensure they have not been stretched. Not only does frequent inspection promote safety, but it is also much easier and less expensive to perform a repair when a crack is small, before it has a chance to traverse through a structural member. Any sign of cracks or damage must be repaired before continuing operations. Contact a Link-Belt Distributor for repairs.

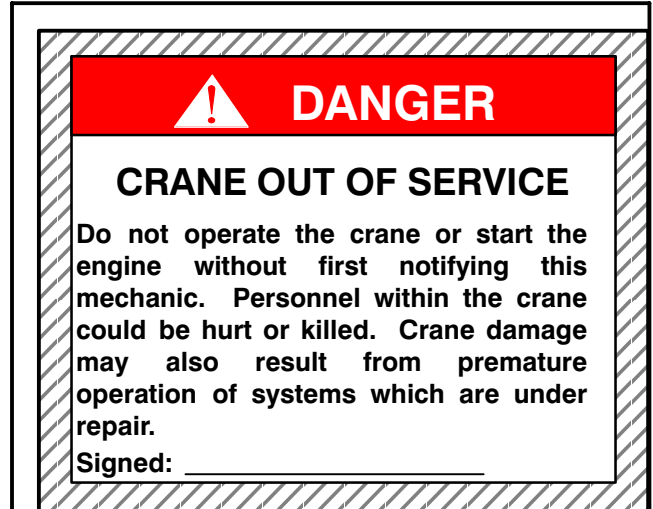
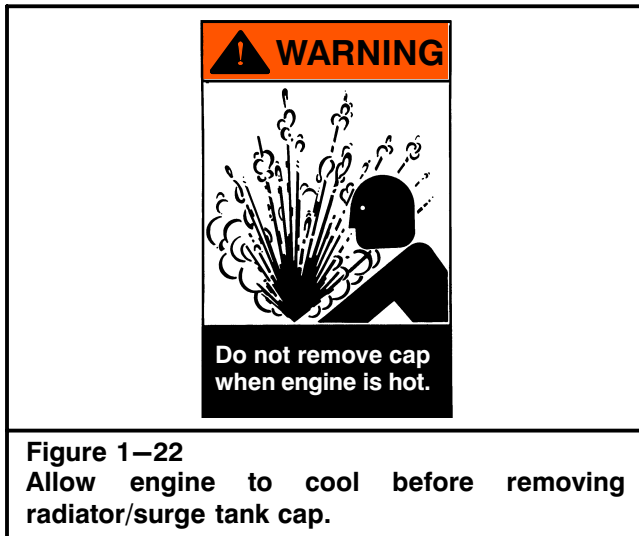


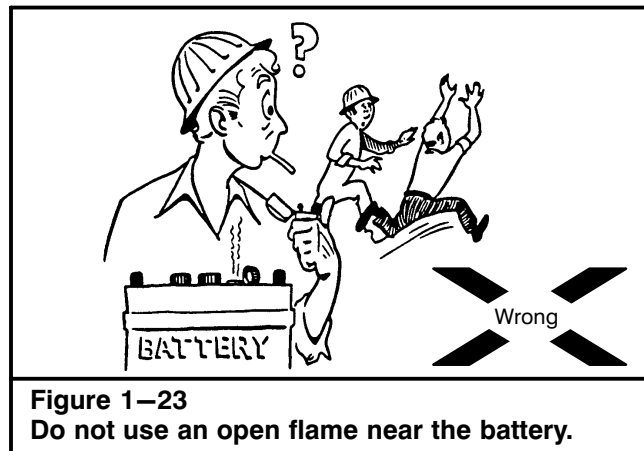
Figure 1–21
Remove the keys from the ignition and post a sign to make others aware of repair activity.

4. When performing maintenance on the crane, do the following:
 - a. Fully retract the boom. Lower the boom to the limit of the boom hoist cylinder.
 - b. Shutdown the engine and work all control levers back and forth to relieve pressure and relax the attachment.
 - c. If the above instructions cannot be followed, block securely under the attachment so it cannot move.
 - d. Bleed any precharge off the hydraulic reservoir before opening it or disconnecting a line.
 - e. Hydraulic oil becomes hot during operation. In some cases it becomes hot enough to cause severe burns. Be careful not to let hydraulic oil come in contact with skin.
 - f. Post warning signs in cab so no one will try to start the engine. Do not adjust, maintain, or repair a crane while it is in operation without visual and/or verbal contact with all personnel involved to ensure the safety of service personnel.
5. When making repairs, which require welding, use proper welding procedures. Also the following precautions must be taken:
 - a. All paint and acoustical material in the area should be removed to prevent burning them. The smoke and fumes from the burning paint and/or acoustical material can be very hazardous.
 - b. Turn the battery disconnect switches to the "OFF" position to protect any electronic equipment on the crane which may be effected by electric arc welding. Contact a Link-Belt Distributor for proper procedures.

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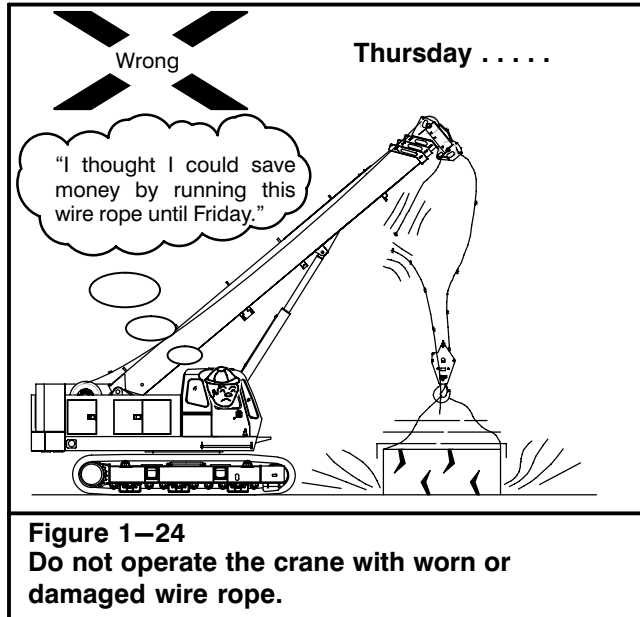
- c. The welding ground cable should be attached to the portion of the crane being welded. If welding on the upper, ground on the upper. If welding on the lower, ground on the lower. Failure to take this precaution may result in electrical arcs in the turntable bearing.
 - d. The welding ground cable should always be connected as close as possible to the area being welded. This minimizes the distance that electricity must travel.
 - e. Disconnect computers and other electronic equipment (such as rated capacity limiters and engine computers) to prevent damage. Contact a Link-Belt Distributor for proper procedures.
 - f. Remove all flammables from the proximity of the welding area.
6. Keep the crane clean, in good repair, and in proper adjustment. Oil or grease on the walkways may cause falls. Improper adjustments can lead to crane damage, load dropping, or other malfunctions.
 7. Keep all walking surfaces (steps, ladders, platforms, etc) and non-skid materials on the crane clean. Non-skid materials are placed on the crane to assist operators and service personnel with safe access/egress to/from the crane and to/from adjustment and inspection areas. Do not allow non-skid materials to become contaminated with mud, snow, ice, oil, paint, wax, etc. Any contamination can cause the non-skid materials to become slick, reducing their effectiveness for safety while walking on the crane. If any non-skid materials become ineffective due to wear, age, or destroyed in any way, they must be replaced.
 8. Use proper fall protection such as a fall arrest system as required by any applicable codes when working at elevated heights. Falls can lead to severe personal injuries and/or death.



9. Use extreme caution when removing radiator/surge tank caps, hydraulic pressure caps, etc. They can fly off and hit you, or you could be burned by hot oil, water, or steam.
10. When checking battery fluid level, use a flashlight, not an open flame. If battery explodes, you can get acid in your eyes, which could cause blindness. Don't check battery charge by shorting across posts. The resulting spark could cause battery to explode. Check with a tester or hydrometer. Don't smoke near batteries.

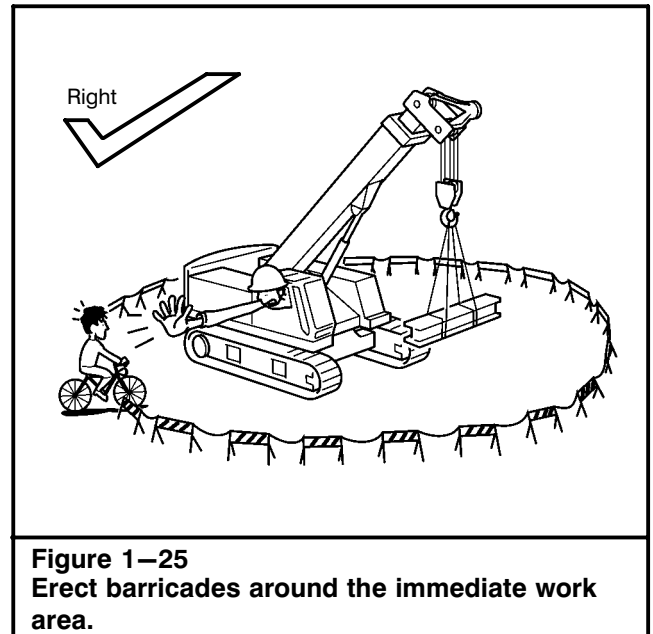


11. When using jumper cables to start an engine, connect negative post to negative ground. Always connect the two positive posts first. Then make one negative post connection. Make the final negative connection a safe distance from the battery. It can be made on almost any bare metal spot on the crane. Any spark could cause the battery to explode. Refer to "Jump Starting The Crane" in this Section of this Operator's Manual.
12. Test the automatic winch brake by raising the load a few inches (*cm*) and holding. It should hold without slipping. It takes more braking power to hold a load in the air when the drum is full of wire rope than when it is a few inches (*cm*) above the ground with only a few wraps of wire rope on the drum.
13. Always reduce the pressure in hydraulic system to zero before working on any part of the system.
14. Use extreme care when working with circuits with accumulators. Check that the hydraulic pressure is relieved before opening the circuit for repairs.
15. When setting pressures, do not exceed the manufacturer's ratings. Always follow instructions exactly. Over pressurization can cause hydraulic component damage or failure of mechanical parts on the crane. Either of the above can lead to an accident.



Wire Rope

1. Inspect all wire rope thoroughly. OSHA (Occupational Safety And Health Act) regulations state "a thorough inspection of all wire ropes shall be made once a month and a full written, dated, and signed report of the wire rope condition be kept on file where readily available." A visual inspection must also be performed daily. Replace any worn or damaged wire rope. Pay particular attention to winch wire ropes. Check end connections (pins, sockets, wedges, etc.) for wear or damage.
2. Use at least the number or parts of hoist wire rope specified on the Wire Rope Capacity Chart in the Crane Rating Manual to handle the load. Local codes may require more parts of line than is shown. Check code requirements and use them where applicable.
3. Non-rotating, rotation resistant, or spin resistant wire ropes are recommended for single part of line applications. This is of utmost importance for long fall hoist line applications. Only if certain criteria are met may a swivel hook ball be used with rotation resistant wire rope. Refer to "Single Part Line Hoisting" and "Hook Ball Usage With Rotation Resistant Wire Rope" in Section 5 of this Operator's Manual.
4. Do not handle wire rope with bare hands. Always use gloves to prevent possible injury from frayed or damaged spots in the wire rope.
5. Inspect head machinery and hook block often as damaged or deteriorating sheaves can cause unnecessary wear on the wire rope.
6. When reeving wire rope on the crane, do not stand, walk, or climb on the boom or attachment. Use a ladder or similar device to reach necessary areas.



7. Use caution when disconnecting the dead end of wire ropes. Reeved wire rope can become twisted on the sheaves. When the dead end pin or socket is removed the wire rope may spin.

Crane And Area Clearance

1. Know the job site conditions. Familiarize yourself with work site obstructions and other potential hazards in the area which might lead to mishaps. Make any necessary arrangements to eliminate any potential hazards, if possible.
2. Erect barricades around the immediate work area to prevent unauthorized personnel from wandering onto the job site.
3. Ensure the work area is clear. Ensure proper clearance for the crane, boom, and load. Don't swing, travel, lift, or lower loads without first making sure no one is in the way. If your vision is obscured, locate a signal person so you can see him, and he can see all areas you can't. Follow his signals. Ensure you and the signal person understand each other's signals. See Hand Signals Chart in this Section of this Operator's Manual. Use the horn to signal or warn. Ensure everyone on the job site understands all signals before starting operations.
4. When working inside a building, check overhead clearance to avoid a collision. Check load limits on floors or ramps so as not to crash through.
5. Don't operate close to an overhang or deep ditch. Avoid falling rocks, slides, etc. Don't park crane where a bank can fall on it, or it can fall in an excavation. Don't park where rain can wash out footing.

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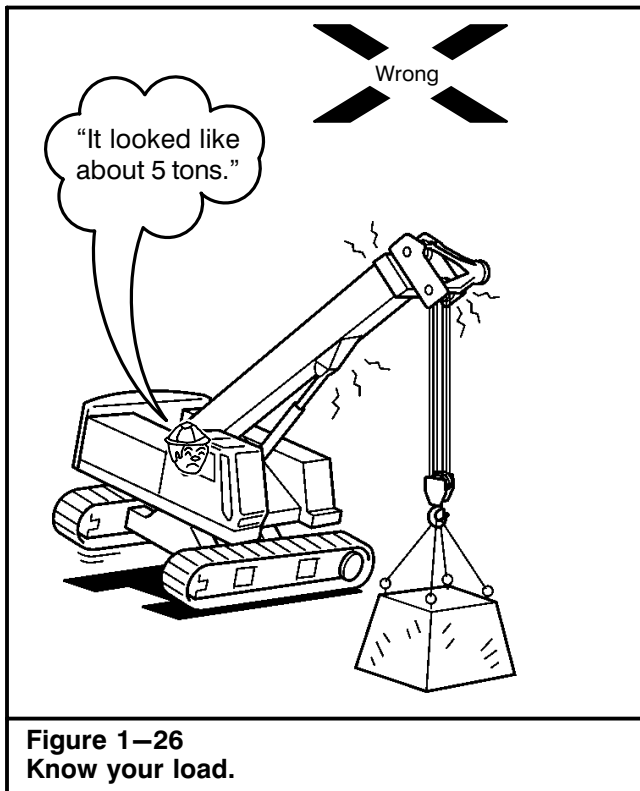


Figure 1-26
Know your load.

6. Watch the tailswing of the upper revolving frame and counterweight. Even though the original set-up may have been clear, situations change.
7. Do not store material under or near electrical power sources. Make material handlers aware of the dangers involved with storing material under power lines or in the vicinity of any other hazards.

Weights, Lengths, And Radii

1. Know your load. Don't try to guess or estimate the load. Use a scale or a load indicating system to determine exact weight. Remember the weight you are lifting includes the weight of any lifting slings or gear, the hook block, hook ball, and any other weight on the hook. If lifting off the boom with the fly installed, the weight of the fly and rigging must also be considered as part of the load. The total load weight must never exceed the rated capacity of the crane, as listed in the Crane Rating Manual, for the position, boom length, load radius, and condition of operation being used. Remember – capacity chart ratings in the Crane Rating Manual are based on ideal conditions:
 - a. Standing on firm, level surface.
 - b. Calm wind.
 - c. No side loads or out swing of load.
 - d. Good visibility.
 - e. Crane in good working condition and equipped as shipped from the factory.

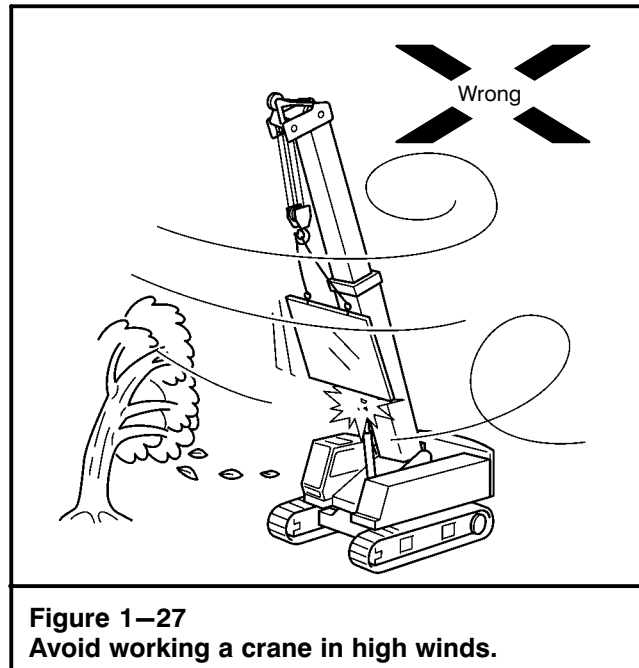


Figure 1-27
Avoid working a crane in high winds.

When such conditions cannot be attained, loads being handled must be reduced to compensate. The amount loads are reduced depends upon actual operating conditions. It is a matter of judgment and experience. Some factors which may require reduction of capacities are:

- a. Soft or unpredictable supporting surfaces.
- b. Wind.
- c. Hazardous surroundings.
- d. Inexperienced personnel.
- e. Poor visibility.
- f. Fragile loads.
- g. Crane in poor condition.

When in doubt, do not take a chance. Reduce ratings more than you think you need. Avoid working a crane in high winds. If you must work in a wind, reduce capacities as shown in "Wind Restrictions Guide" in the Crane Rating Manual. Wind blowing against the load and the boom produces a side load on the boom and reduces its capacity.

When lifting loads in a wind which have large surface areas, such as building panels, the movement of the load may pose a danger to workmen or building structures. Out swing of a load will increase the load radius, and may overload the crane. This could lead to boom failure or the crane tipping. Refer to "Wind Restrictions Guide" in the Crane Rating Manual.

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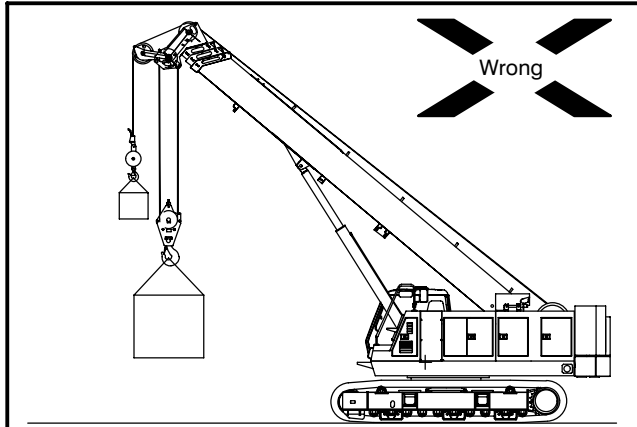


Figure 1–28
Do not lift two loads at the same time.

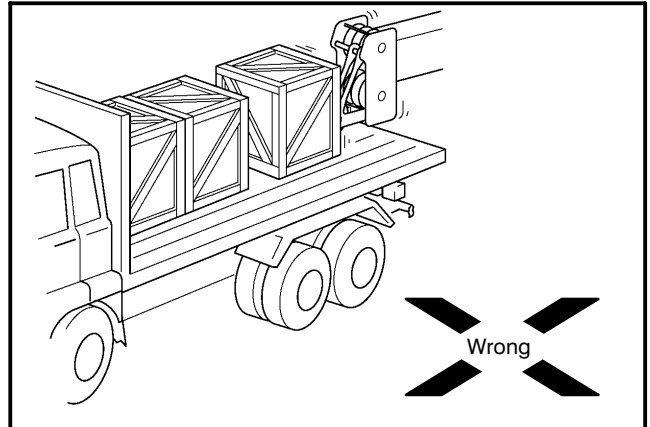


Figure 1–29
Do not push with the boom.

2. When operating off the main boom with the fly erected, deductions must be made for its weight. (The Rated Capacity Limiter will automatically deduct the weight of the stowed fly to obtain the total allowable load.) The weight of the fly, pendants, etc., must be subtracted to obtain a “NET” capacity. Failure to do so could result in an overload condition and cause boom failure. Refer to the Crane Rating Manual for amounts to be deducted.
3. When operating off the main boom with the auxiliary lifting sheave installed, the weight of the auxiliary lifting sheave must be deducted. Refer to the Crane Rating Manual for amount to be deducted.
4. Do not lift two loads at the same time, even if the total load weight is within crane capacity. Loads on the boom and fly at the same time, stress the boom and drastically reduce its ability to handle loads. Your full attention cannot be given to both loads, creating a dangerous situation.
5. Some capacities are based on strength of materials. In these cases, overloads will cause a component on the crane to break, before it will tip. Do not use signs of tipping as a warning of overload.
6. Don't tie a crane down. Tying a crane down encourages overloading. Crane damage or injury could result.
7. Do not shock load and/or overload the crane at anytime. Shock loading or overloading the crane will reduce the fatigue life of crane components and could result in component failure.
8. When performing repetitive lift applications, especially at or near maximum strength limited capacities, be aware that these applications may reduce component life. These applications include repeated lifting (or lifting and swinging) of near 100% strength limited capacities and repeated lifting of maximum moment loads. These applications may fatigue the major structural portions of the crane. Although the crane may not break during these applications, they can reduce the fatigue life and shorten the service life of the crane. To improve the service life, while performing repetitive lift applications, consider reducing the capacities to 70% of maximum strength limited capacities to reduce fatigue cracking. Frequently perform a thorough inspection of all the structural areas of the crane. Any sign of cracks or damage must be repaired before continuing operations. Contact a Link-Belt Distributor for repairs.
9. Always refer to the Crane Rating Manual after changing the arrangement of the attachments for the correct lifting capacities.
10. The boom must be extended in the correct manner before making a lift. The capacities listed in the Crane Rating Manual for this crane are based on the boom sections being extended in accordance with the boom modes as selected through the RCL System.
11. Do not use the boom to push or pull. It is not designed for this purpose. Such action can damage the boom and lead to an accident.
12. Know the load radius. Don't guess at it. Determine the load radius by using the boom angle indicator, the boom length indicator, and the Crane Rating Manual, or measure it with a steel tape. Remember – Radius is the horizontal distance from the centerline of rotation of the upper to the center of gravity of the load, when the load is hanging free.

Operator's Manual

SAFETY INSTRUCTIONS

Operation under conditions which exceed listed capacities may result in overturning.

Swinging, extending, or lowering boom to radii where no capacities are listed may result in overturning even without a load.

Figure 1–30
Safety Instruction Label

13. Do not operate the crane at radii or boom lengths where the capacity charts in the Crane Rating Manual show no capacity. Don't use a fly not shipped with or for the crane. Either of the above can tip the crane over or cause attachment failure. In some cases, the crane can tip over, forward or backward, with no load on the hook. If the boom is fully extended at a low angle, the crane may tip until the boom touches the ground. In any of these cases, injury or crane damage could result.
14. When lifting a load with any crane, the load may swing out, or sideways. The load radius will increase. Due to the design of hydraulic crane booms, (cantilever boom, supported by a cylinder and overlapping sections) this increase is much more pronounced. The increase or out swing of the load can overload the boom, and lead to boom failure or tipping. Also, movement of the load can cause it to hit something. Ensure the load being lifted will remain within capacity as it is lifted and the boom deflects.
15. When extending or lowering a boom with a load, the load radius increases. As the load radius increases, capacity decreases. If capacity is exceeded, the boom may bend or the crane may tip over. Sometimes at low angles, a hydraulic crane boom can be extended with a load, but cannot be retracted. This is because more power is available in the boom cylinders to extend than to retract. If an operator extends the boom under load, he may not be able to retract the boom and may get into a dangerous situation.
16. Know the boom length. Don't guess. Use of an incorrect boom length can cause an accident.
17. When lowering or retracting the boom, the load will lower. To compensate for this, the operator must hoist up on the winch wire rope. Otherwise, movement of the load may cause an accident. When extending the boom, the load will raise. The operator

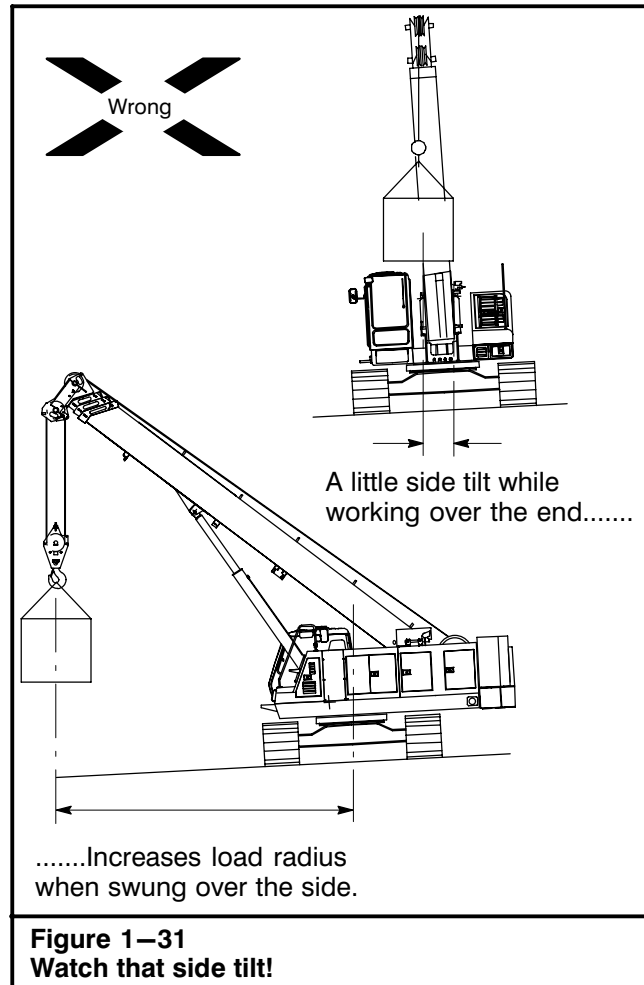
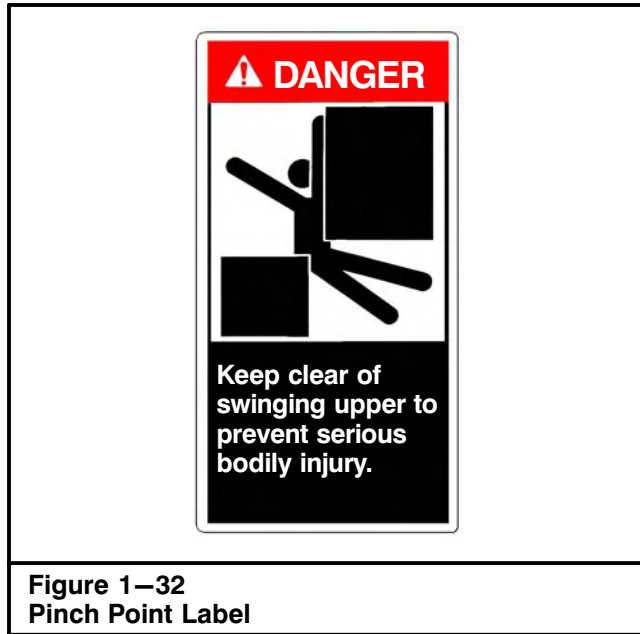


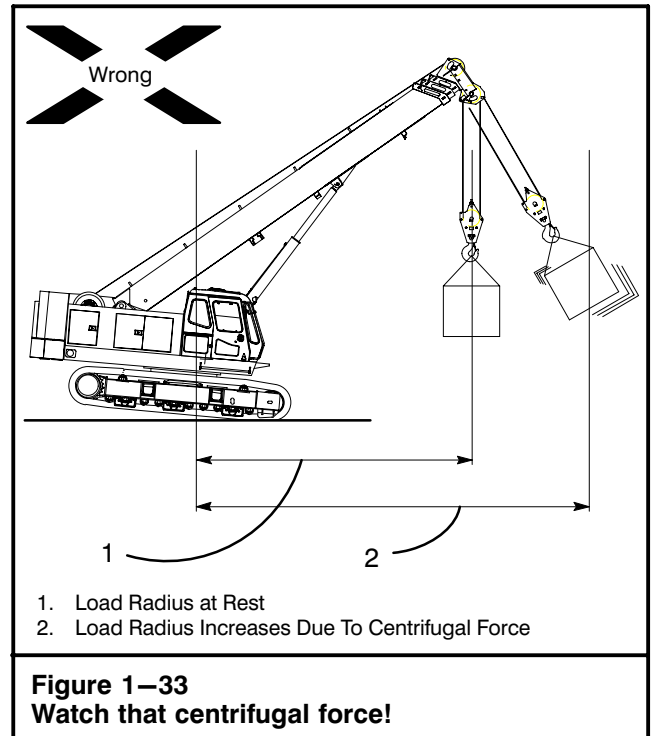
Figure 1–31
Watch that side tilt!

must hoist down the winch wire rope to keep the load in place. Extending the boom without winching down, can lead to “two blocking”. This is when the hook block, hook ball, or the load contacts the head machinery. Two blocking can lead to sheave or wire rope damage.

18. The winch wire rope must be vertical when starting to lift. If not, the load will swing in, out, or sideways when lifted from the ground. The crane will lean toward the load when lifting heavy loads. This is caused by elasticity of the crane and the boom. This lean will increase operating radius so the load will swing outward when it clears the ground. This out swing is dangerous to anything in the path of the load, and because of the increase in load radius may overload the crane. To overcome this out swing, boom up as the load is lifted so winch wire rope remains vertical. When setting the load on the ground, lower the boom after the load touches down to avoid hook block and/or hook ball swing when it is unhooked from load.



19. Pinch points, which result from relative motion between mechanical parts, can cause injury. Keep clear of the rotating upper or other moving parts.
20. Lifting heavy loads can cause the crane to tilt or lean toward the load. When swinging a load from over the end to over the side, the tilt of the crane will increase. Since tilt acts to increase load radius, it must be compensated for when swinging the load. Swing slowly. Change boom angle (raise the boom) while swinging, to maintain a constant radius, and prevent in swing or out swing of load. If not, a dangerous condition could result.
21. Watch out for centrifugal force when swinging a load. Swing gently. Centrifugal force tends to increase load radius. This increase in radius could overload the crane and cause crane damage or tipping. When stopping the swing, over swing of the load can side load the boom.
22. Keep the winch wire ropes as short as possible to prevent excessive swinging. Always use the shortest boom length which will do the job. Remember – the shorter the boom, the better the capacity.
23. Do not move a crane away from the load while handling near capacity loads. Due to load inertia (weight) the load will tend to stay in position when the crane starts to move, and then will swing in towards the crane. The inertia effect will tend to increase load radius and decrease stability. This could lead to boom failure or crane tipping.



24. Don't increase the maximum allowable counterweight. Don't add anything to the crane that will act as additional counterweight. Remember that anything which has weight, if carried behind the crane's center of gravity, acts as counterweight. Adding counterweight affects backward stability of the crane, particularly when working over the side. It also encourages overloading of the crane.
25. Working areas for cranes are defined per the Working Areas Chart in the Crane Rating Manual. Permissible loads, per the Crane Rating Manual, will vary from lifting quadrant to lifting quadrant. The operator must ensure capacity ratings are not exceeded, regardless of which quadrant he is operating in, or when swinging from one quadrant to another.

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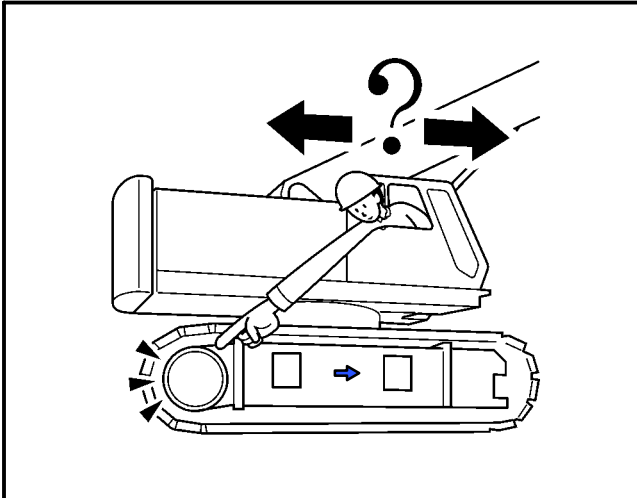


Figure 1-34
Check the location of the travel motors.

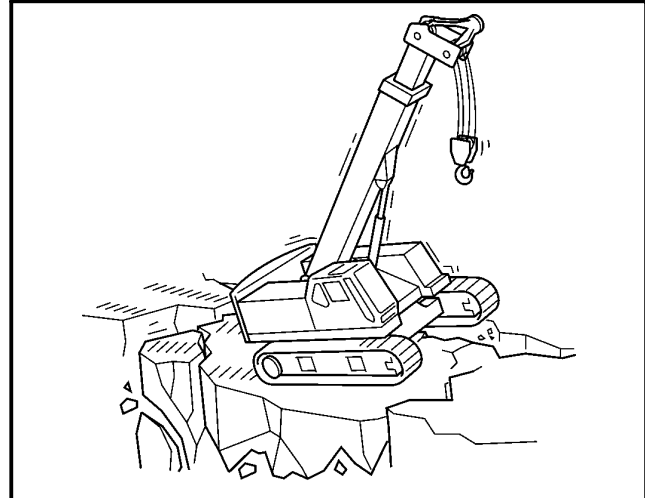


Figure 1-35
Avoid traveling over obstacles.

Traveling

1. Relative direction of the crane is based on the position of the upper over the lower. Before operating the travel controls, check the location of the travel motors. When the operator is sitting in the operator's seat with the travel motors to the rear, the upper is positioned over the front of the lower. An arrow decal is placed on the lower to assist in determining upper position over the lower.
2. Travel by the smoothest, most level route. If a smooth, level route is not available, grade the route to provide a smooth, level path. If it is not possible to grade the route, travel up or down the slope. Shift crane to lowest speed when starting up or down the slope. If the crane starts slipping sideways on a grade, immediately turn the crane down the grade. Avoid side-hill travel whenever possible.
3. Avoid traveling over obstacles: rough terrain, rocks, logs, curbs, ditches, etc. The size and type of obstacle that can be safely crossed will depend on many factors, including good judgment. When obstructions must be crossed, do so with extreme caution, at an angle if possible, and at slow speed. Ease up to the break over point, balance on the obstruction, and then ease down to minimize jolt of contact of the other side.
4. Cross a gully or ditch at an angle and very slowly. Carry boom at a low angle for increased stability.
5. When traveling the crane around on the job site with the attachment in the air, observe the following precautions:
 - a. Engage the travel swing lock or swing park brake.
 - b. Terrain must be smooth and solid. If not, grade the area before traveling the crane.
 - c. Tie down the hook block and/or hook ball to prevent them from swinging when traveling.
 - d. Position a signal person to guide you.
 - e. Refer to "Traveling The Crane" in this Section for additional information.
6. Traveling with a suspended load should be avoided if possible. It is especially hazardous when terrain is rough or irregular, on a side slope, or in a hilly area. When traveling with a load, observe the following rules:
 - a. Engage the travel swing lock or swing park brake.
 - b. Use a hand line to control the load and reduce load swing.
 - c. Travel by the smoothest, most level route. If a smooth, level route is not available, grade the route to provide a smooth, level path. If it is not possible to grade the route, don't travel with a suspended load.
 - d. Carry loads as close to the ground as possible.
 - e. Do not allow side swing of the load.
 - f. Do not attempt to carry loads which exceed the crane's rating as listed in the Crane Rating Manual.
 - g. Use a signal person to warn of any danger or obstruction along the route being traveled.
 - h. Don't travel with a load on soft ground. If the crane sinks into ground, stability can be affected to the point of tipping the crane.
 - i. Keep all personnel clear of crane and load. Be prepared to set load down quickly at any time.
 - j. Refer to "Traveling The Crane" in this Section of this Operator's Manual for additional information.



Figure 1–36
Transport the crane safely.

7. Transport the crane safely. Watch for narrow bridges and low clearances. Check load limits, heights, width, and length restrictions in the area you are traveling. Ensure the crane complies with all regulations.
8. When transporting the crane, note the following:
 - a. Operate with lights on. Use proper warning signs, flags, and other devices. Use an escort service if required.
 - b. Engage the travel swing lock.
 - c. Remove or restrain the hook block and/or hook ball.
 - d. Check for maximum allowable travel speed and any other travel limitations. Don't exceed these maximums. Crane damage or an accident could result.

Leaving The Station

1. Do not get on or off a crane in motion. Remain in three point contact at all times (two hands and one foot or two feet and one hand) when climbing on or off the crane. If steps and/or a ladder is/are provided, use them.

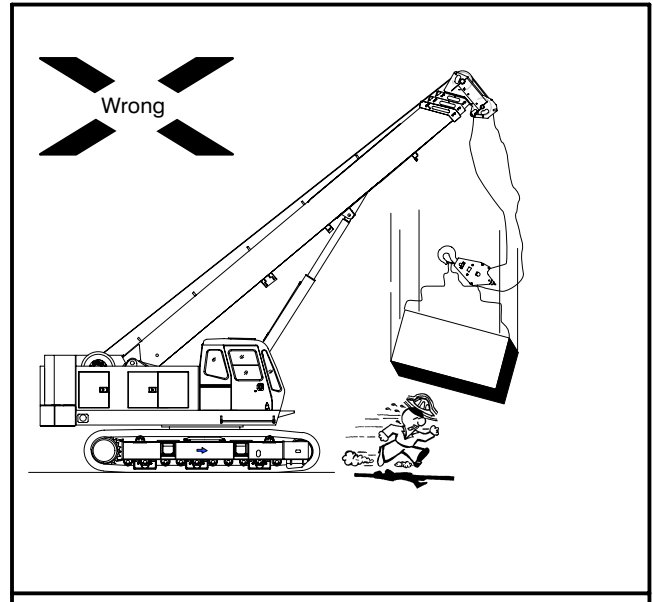


Figure 1–37
Do not leave the crane with a load suspended.

2. Whenever an operator leaves the control station for any reason, the following must be done:
 - a. Lower the load to the ground.
 - b. Tie down the hook block and/or hook ball. Do not leave them where the wind could swing them to cause damage to the attachment and/or nearby objects.
 - c. Apply the swing park brake and raise the left control console. Shutdown the engine and remove the keys.
 - d. Do not depend on a brake to suspend a load unless the operator is at the controls, alert, and ready to handle the load. Brake slippage, vandalism, or mechanical malfunctions could cause the load to drop.
3. Do not leave the crane unattended with the engine running.
4. When changing work shifts always notify the next operator of any changes or problems with the crane.
5. Hydraulic cylinders, left extended under load, oftentimes have a tendency to drift in (retract) due to internal fluid passage in the cylinders and/or control valves. Do not shutdown the crane and leave it unattended for extended periods of time, i.e. overnight, with the boom positioned over anything that the boom could damage if it should lower.

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Personnel Handling Guidelines

Introduction

The following information is intended to provide Link-Belt's recommended minimum requirements that must be followed when handling personnel with a personnel basket or work platform (hereafter referred to as a work platform) suspended by wire rope from the boom of Link-Belt cranes. These requirements are based upon several sources and are put forth in recognition of current industry practices. However, safety, when handling personnel, remains the full responsibility of job site management and is dependent upon the responsible action of every person on the job involved in the related work.

This information is intended to supplement and not to supersede or replace any more restrictive federal, state, or local regulations, safety codes, or insurance requirements. It is intended to serve users of personnel work platforms in achieving the following objectives.

1. Reduce risk of personal injuries to users and the public.
2. Inform users of their respective responsibilities.
3. Provide standards of equipment requirements.
4. Provide standards for tests and inspections.
5. Provide standards of operation to promote safety.

Link-Belt cranes are designed and intended for handling material. They are not normally equipped with secondary systems or other devices required by personnel lift or elevator standards and are not intended for handling personnel for construction or amusement purposes. Use of cranes for these purposes is hazardous and is not recommended by Link-Belt. However, Link-Belt understands that circumstances may occur (in construction work) when lifting or lowering personnel on a materials handling crane load line is the only or the least hazardous method available to position personnel. In fact, Occupational Safety and Health Administration (OSHA) Part 29, CFR 1926.1431 states "The use of equipment to hoist employees is prohibited except where the employer demonstrates that the erection, use, and dismantling of conventional means of reaching the work area, such as personnel hoist, ladder, stairway, aerial lift, elevating work platform, or scaffold, would be more hazardous, or is not possible because of the project's structural design or worksite conditions."

Much corollary and supplementary information is contained within the following resource documents pertaining to both cranes and personnel work platforms. Job site management must ensure all requirements listed in these resource documents are followed for all personnel handling operations.

- American National Standards Institute Reference – ANSI Standards A10.28, A92.2, A92.3, B30.5, and B30.23.

- Power Crane and Shovel Association (PCSA) Bureau of the Association of Equipment Manufacturers (AEM) Reference – PCSA Standard No. 4.
- American Petroleum Institute (A.P.I.) Specification 2C.
- OSHA Part 29, CFR 1926.1431 Cranes and Derricks.

Authorization

Authorized use of a work platform may be permitted only after the following on-site procedures have been performed:

1. A competent person on the job site (job site manager) specifically responsible for the overall work function to be performed has determined that there is no practical alternative means to perform the needed work and has authorized a personnel lifting operation.
2. For each instance of such lifting, a competent person responsible for the task has attested to the need for the operation by issuing a written statement describing the operation and its time frame and itemizing that each of the on-site authorization requirements has been met. The written statement, after being approved by a qualified person, shall be retained at the job site. (Refer to *Personnel Handling Pre-Lift Check List For Link-Belt Cranes* in this Section for a sample check list.)
3. Review of crane inspection records has been conducted to ensure the crane being used meets applicable provisions in ANSI B30.5 and B30.23.
4. Review of the work platform inspection records and specifications has been conducted to ensure it meets applicable design standards (refer to ANSI A10–28).
5. Review of the personnel lifting operation practices specified in these instructions have been conducted with job site managers and crane operator(s), foreman, designated signal person, personnel to be lifted, safety supervisor, and any other person(s) who has jurisdiction over the operation to ensure that they are aware of the hazards of the operation and they are aware of provisions of these instructions that must be adhered to before and during the personnel lifting operation.

Equipment

1. The crane system shall be equipped with the following:
 - a. A fully functional working operational aid such as a Rated Capacity Limiter (RCL) system – A system consisting of devices that sense crane loading, boom length (extendable booms only), boom angle, and also automatically provide an audible/visual signal when the loading conditions approach, reach, and/or exceed the rated capacity values. When the

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Actual Load exceeds the Rated Capacity, the system supplies a signal to a function cutout system. The operational aid shall be equipped with these additional devices:

1. Anti-two block device to prevent damage to the hoist wire rope, other crane components, or attachments, and subsequent endangerment of personnel.
 - It is required that the anti-two block device warn both audibly and visually as well as have the capability to cutout the controls/functions that may cause a two block condition.
 2. Boom angle indicator.
 - Cranes with extendable booms must utilize a boom angle indicator having “high and low” set points and audible/visual alarm(s) capable of activating function cutouts.
 - b. Boom hoist and load line shall have power lowering and raising and shall have an automatic brake which is applied when the applicable control is in neutral, or when the anti-two block device is actuated.
 - c. If the crane is equipped with a “free-fall” hoist, steps shall be taken to ensure its use is not possible during the use of the work platform. (Note: A.P.I. applications do not permit the crane to be equipped with free-fall.)
 - d. Each crane shall have a mechanical swing park brake or swing lock capable of being set at any swing position, and shall have a variable swing brake or swing controls capable of stopping the upper swing motion smoothly. The swing brake must be properly maintained at all times to ensure its holding capability.
- Note: All operational aids and equipment must be maintained in operable condition. Alternative measures are not permitted.**
2. The work platform shall be designed by a qualified engineer competent in structural design. Its maintenance, and its attachment to the crane load line, is the responsibility of the job site management. Their arrangement shall comply with the following as a minimum:
 - a. The work platform harness must be of sufficient length to prevent any portion of the work platform or the harness from coming in contact with the boom at any working boom angle.
 - b. Audible and visual alert systems shall be provided to the personnel in the work platform to signal for assistance in the event of an emergency.

- c. Hooks on hook block assemblies, hook ball assemblies, or other assemblies, shall be of a type that can be closed and locked, (with a working safety latch) eliminating the hook throat opening, and shall be full load-bearing, and contain a manual trigger release.
3. No unauthorized alterations or modifications are allowed to be made to the basic crane.

Maintenance, Lubrication, And Adjustments

1. The crane operator must have a complete understanding of the crane's maintenance, lubrication, and adjustment instructions as outlined in the Operator's Manual.
2. The crane shall be maintained, lubricated, and adjusted, by a designated person, as specified in the Operator's Manual.
3. The crane and work platform decals must be understood and maintained.
4. All decal precautions and instructions shall be strictly observed.

Inspection And Rigging

1. The lift crane and work platform shall be inspected immediately prior to commencement of operation. (Refer to the Crane Operator's Manual and ANSI B30.5, Section 5, Section 5–2.1.2 and 5.2.4, and ANSI B30.23 for the required inspection procedures for the crane. Refer to ANSI A10–28 for inspection procedures required for the work platform.)
2. The inspection shall be performed once daily when the crane is being used in work platform service or each time the crane is converted from material lifting to personnel handling operation. In the event the operator is replaced, a new inspection is required. Written documentation of all inspections must be kept on the job site during personnel handling operations.
3. Inspect the crane and work platform for any loose, damaged, or missing components.
4. Any structural or functional defect which adversely affects the safe operation of the lift crane shall be corrected before any operation utilizing a work platform begins or continues.
5. The hoist drum shall have at least three full wraps of wire rope remaining on the drum at all times when using a work platform.
6. Minimum load hoist and boom hoist wire rope design factors for the combined weight of the lift attachments, work platform personnel, and tools shall be 10:1 for “Non-Rotating” and “Rotation Resistant” wire ropes. All other wire rope types require a 7:1 design factor. (Note: A.P.I. applications require 10:1 design factor for all wire rope construction.)

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Telescopic Booms	Main Boom Head Sheaves	Auxiliary Head Sheaves	Fixed Fly Sheave	
	Allowed	Allowed	Allowed	
	Offset Fly Sheave	Offset Fly With Extension(s) Sheave	A-Frame Jib Sheave	
	Allowed	Allowed	Not Recommended	
Conventional Lattice Tubular or Angle Booms	Main Boom Head Sheaves	Tip Extension Sheaves	Jib Head Sheave	
	Allowed	Allowed	Allowed	
Luffing Attachments	Luffing Boom Auxiliary Head Sheaves	Midfall Sheaves	Luffing Jib Head Sheaves	Fixed Jib Head Sheave
	Not Recommended	Allowed	Allowed	Not Recommended
Lifting Sheaves For Personnel Handling With Suspended Work Platforms				

7. The work platform shall be suspended from a wire rope that is reeved from an allowed lifting sheave. Refer to "Lifting Sheaves For Personnel Handling With Suspended Work Platforms" chart to determine the allowed sheave(s).
8. Inspect the wire ropes, sheaves, hoist drum brakes, and other mechanical and rigging equipment vital to the safe operation of the crane.
9. Ensure that all wire rope sockets and dead end lugs are properly installed and are in good working condition.
10. Ensure that all wire rope guards are in good working order and that they are properly installed and adjusted to prevent wire rope from jumping off sheaves.
11. Inspect all structural members of all boom sections, fly sections, luffing jib sections, and live mast, as equipped.
12. In addition to other regular inspections, visual inspection of the crane and work platform shall be conducted immediately after testing and prior to lifting personnel. The following inspections shall be conducted on extendable booms prior to lifting personnel:
 - a. Full power style booms:
 1. Inspection of all extension wire ropes at the access points in the boom where the end connections are visible – Refer to the Operator's Manual for inspection and adjustment procedures.
 - b. Pinning and latching style booms:
 1. Inspection of the latching mechanism, sensors, and hydraulic/electrical circuit at the access points.
 2. Inspection of all pins and pinning locations in the individual boom sections and at the fully retracted position.
 3. Verification of the accuracy of the boom length indicator. Refer to the Operator's Manual for the procedures.
13. The following inspections shall be conducted on fixed length style booms prior to lifting personnel:
 - a. Inspection of all pendants, pendant links, pendant spreader bars, links, etc.
 - b. Inspection of all mechanical linkages, shafts, drums, etc.
14. A written record of all the above inspections must be maintained on the job site.

Crane Test Procedures

The test procedures listed below shall be conducted at the following intervals:

- Daily,
- At each job site before hoisting employees,
- After any repairs or modifications to the equipment,
- When an operator is replaced, and
- When, in the judgement of responsible job site management, or controlling entity, there has been a significant change in the conditions of the personnel lifting operation.

Note: No personnel are allowed to ride the work platform during any of the tests recommended in this Section.

1. The work platform and rigging shall be proof tested to 125 percent of the work platform's rated capacity. (The proof test may be done concurrently with the trial lift by completing the following test procedures.) Do not exceed the rated lifting capacity of the applicable lift crane as listed on the crane capacity charts. (Refer to ANSI A10.28 for suspended work platform testing and inspection.)
 - a. This test load shall be tested for stability.
 - The operator and signal person shall conduct this test.
 - This test shall include movement of the work platform through its entire intended range of motion, simulating the specific operation to be undertaken.

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- A successful stability test must not produce instability of the crane or cause permanent deformation of any component.
 - b. This test load shall be raised and lowered at maximum power controlled line speed (NOT FREE-FALL). The acceleration must be smooth and the deceleration capability of the control/braking system shall be confirmed by bringing the work platform to a smooth stop. The work platform shall be held in a suspended position for a minimum of five minutes with the test load evenly distributed on the work platform. (This experience is intended to sharpen the skill of the operator in handling the work platform and to give the operator an opportunity to evaluate the crane's performance.) The work platform shall then be inspected for any evident sign of damage or defect.
2. All limiting and warning devices shall be tested by activation of each appropriate control function.
 3. With pinning and latching style extendable booms, a visual inspection shall be conducted to verify that the boom extend pins are properly set in the extended boom sections.
 4. At the beginning of each lift, the work platform must be hoisted a few inches (*mm*) with the personnel and materials/tools on board and inspected by a competent person to ensure;
 - The work platform is secure and properly balanced,
 - All wire ropes are free of deficiencies such as kinking, crushing, corrosion, etc.,
 - Any multiple part lines are not twisted,
 - The primary attachment is centered over the work platform, and
 - If any load rope is slack, it must be inspected to ensure that all ropes are properly seated on the drum and in the sheaves.
 5. Any condition found during any of these tests/inspections that fails to meet requirements or may create a safety hazard, must be corrected before hoisting personnel.
- ## Operation And Safety
1. The Operator's Manual for the crane shall be read and fully understood by operating personnel. The Crane Operator's Manual shall be available to them at all times.
 2. Safety when handling personnel remains the full responsibility of job site management and is dependent upon the responsible action of every person on the job involved in the related work.
 3. Mobile lift cranes shall be erected to obtain maximum crane stability. The crane must be level and on firm ground. It is recommended that the outriggers be fully extended and the tires must be clear of the ground before beginning any operation.
 4. The operator shall not leave the operator's station when the work platform is occupied. The operator shall remain alert in a position of readiness at the work station with the engine running and the master clutch engaged, if crane is so equipped.
 5. Unauthorized personnel shall not be in the operator's cab on the lift crane, or near the lift crane while a work platform is suspended from the load line.
 6. Any operation in which a work platform is to be suspended from the load line shall be carefully planned by the operator, supervisory personnel, designated signal person, and personnel to be lifted prior to commencement of such operation. They are to be advised:
 - a. That the crane does not have safety devices normally used on personnel handling equipment.
 - b. That the safety of the operation depends on the skill and judgment of the crane operator and others present.
 - c. Of procedures to enter and leave the work platform and other safety procedures.
 7. After positioning of the work platform:
 - a. All brakes and locks on the lift crane shall be set before personnel perform any work.
 - b. With pinning and latching style extendable booms, a visual inspection shall be conducted to verify that the boom extend pins are properly set in the extended boom sections.
 8. Telescope operation is not recommended with any extendable boom with personnel in a suspended work platform.
 9. A work platform attached to load line of lift cranes shall not be used for working on any energized electric power line, or any energized device or facility used for electric power generation or transmission. Minimum working clearance shall be at least twice that recommended for material handling operations in ANSI B30.5b section 503.4.5 and ANSI B30.23.
 10. The combined weight of the work platform, any attachment device, personnel, tools, and other equipment shall not exceed 50% of the lifting capacity of the applicable lift crane as listed on the crane capacity chart. (Note: A.P.I. applications require 25% of lifting capacity as the limit.)
 11. Use caution when utilizing pendant supported lattice jibs on tubular or angle booms as the jib can drift backwards into the jib backstops under certain conditions. This is most likely with short jib lengths with minimum jib offset and maximum boom angle. Pay special attention to detect the possibility of jib drift during the work platform test lift. An additional test lift is recommended with an empty work platform when operation at or near these conditions.

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12. The following actions and operations are strictly prohibited when working with personnel suspended in a work platform:
 - a. Cranes shall not travel while personnel are in the work platform.
 - b. No lifts shall be made on another of the crane's load lines with personnel suspended in a work platform.
 - c. No external load is allowed to be lifted by attaching it to the work platform.
 - d. Work platform lifts shall be a single crane operation. A work platform shall not be lifted using two cranes.
 - e. Hoisting of personnel shall be discontinued upon indication of any dangerous weather conditions, wind, or other impending danger.
 - f. The emergency manual mode operation of pinning and latching style extendable booms shall not be utilized.
 - g. Free-fall (if equipped) shall not be used.
13. Movement of the work platform with personnel shall be done in a slow, controlled, cautious manner with no sudden movements of the crane or work platform. Do not use high speed functions, if equipped.
14. Do not use multi-function crane operation. If load hoist, boom hoist, and swing functions must be used to position the work platform, perform each function individually.
15. Clear, unobstructed visibility between personnel on the work platform and the crane operator shall be maintained at all times except where a designated signal person has been assigned and positioned such that he is visible to both. Such designated signal person shall have no other duties to perform when personnel are in the work platform.
16. Voice communication between work platform personnel, the crane operator, and designated signal person, if assigned, shall be maintained.
17. If other cranes or equipment may interfere with the lifting of personnel, signals or other means of communication between all crane or equipment operators shall be maintained to avoid interference with individual operations.
18. If the work platform is not landed, it shall be tied to a structure before personnel mount or dismount the work platform.
19. Personnel in the work platform shall wear personal fall arrest systems. Anchors used for attachment of personal fall arrest equipment shall be independent of any anchors being used to support or suspend work platforms. Personnel shall keep all parts of body, tools, and equipment inside work platform during raising, lowering, and positioning.
20. Personnel shall always stand firmly on the floor of the work platform and shall not sit or climb on the

edge of the work platform or use planks, ladders, or other devices for attaining a work position. (This does not apply to offshore personnel transfer baskets. Personnel must ride on the exterior of this type of personnel handling device to assure greater safety of the operation.)

21. When welding is done by personnel in the work platform, the electrode holders shall be protected from contact with metal components of the work platform. If electrically connected electrode holders contact work platform, work platform could be dropped due to burning/melting of wire ropes suspending the work platform.
22. A pre-lift meeting must be conducted with the crane operator, signal person, employee(s) to be hoisted, person responsible for the task to be performed, and anyone else that is directly involved with the lift (as applicable) to review all the requirements and procedures that must be followed to complete the lift.
23. Follow all procedures for determining the rated capacity and perform all testing as outlined in the Crane Operator's Manual, the Crane Rating Manual, and this Safety Manual.

Additional Requirements For Offshore Cranes

1. Link-Belt offshore cranes are designed to handle materials. However, due to the special conditions commonly existing offshore, the use of cranes to transfer personnel between vessels or from a vessel to a work platform is an established practice. The safety of the personnel, if a materials handling crane is used in transferring personnel, depends upon the skill and judgment of the crane operator and alertness of the personnel being transferred. Sea and weather conditions may create additional hazards beyond the skill of persons involved.

This operation is approved by the American Petroleum Institute (A.P.I.). By adopting procedures for this operation, the institute has determined that the transfer of personnel may be performed safely under certain offshore conditions. Therefore, whenever an offshore crane is used to transfer personnel, all persons involved in the operation must know and implement the A.P.I. procedures and verify that sea and weather conditions are within safe limits for the transfer.

In addition to all previous requirements in these Instructions, A.P.I. 2C requires the following:

- Boom and load hoists used shall be approved by the hoist manufacturer for personnel handling and shall be so indicated on their name plate.
- Refer to A.P.I. 2C Section 6 for further details and procedures.

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Personnel Handling Pre-Lift Check List for Link-Belt Cranes



1	<p>I am the designated person responsible for verifying that all safety requirements are met for this personnel handling operation;</p> <p>Name: _____ Title: _____</p> <p>Signature: _____ Date: ____/____/____ Initials</p>
2	I have verified that there are no conventional means to handle personnel for this operation.
3	I have a written statement authorizing personnel handling from a competent person on the job who accepts full responsibility, or I accept full responsibility for the operation.
4	The Crane Operator acknowledges that he has read and fully understands the Crane Operator's Manual and Crane Rating Manual. All personnel involved have been informed and understand the tasks required to complete the personnel lifting operation.
5	The crane has been maintained, lubricated, and adjusted by a designated person, as specified in the Crane Operator's Manual.
6	<p>The lift crane is equipped, and all devices operate properly as follows:</p> <ul style="list-style-type: none"> • Anti-two block device with hydraulic cutouts • Power load raising and lowering with automatic brakes and function cutouts – Free-Fall (if equipped) shall not be used • Boom angle indicator with high and low set points and function cutouts • Boom length indicator (telescopic booms only) and function cutouts • Load Indicating System or Rated Capacity Limiter System • A variable swing brake or swing controls capable of stopping upper swing motion smoothly • A mechanical swing park brake or swing lock to hold the upper in position while personnel are working from the work platform • Hook block or hook ball being used can be closed and locked with a safety latch
7	A working audible and visual alert system is provided to the personnel in the work platform.
8	A mechanical and structural crane inspection has been completed by a designated person.
9	The wire rope used to lift the work platform is reeved from an allowed lifting sheave
10	Crane travel is not allowed with personnel in the work platform.
11	Telescoping the boom is not recommended with personnel in the work platform.
12	When handling personnel with pinning and latching style booms, it is recommended boom be kept in a pinned position. Inspections must be made to ensure boom extend pins are set.
13	All wire rope sockets and dead end lugs are properly installed and are in good working condition. All Wire rope guards are properly installed and adjusted to hold all ropes on the appropriate sheaves.
14	Voice communications between the Crane Operator and the personnel in the work platform are present and operational.
15	Fall arrest systems are present and in use by personnel in the work platform.
16	Weather and wind conditions are acceptable to safely perform the lift.
17	A Proof-Test/Trial Lift was completed with 125% of the work platform's rated capacity.
18	The total load being lifted will not exceed 50% of the standard lift crane capacity charts.
19	Cranes with outriggers have them equally extended with tires clear of the ground.
20	A Pre-Lift meeting was held with all appropriate personnel to review all aspects of the lift.

Note: This checklist is to be used as a supplement to (not a substitute for) the information and procedures supplied for personnel handling operations.

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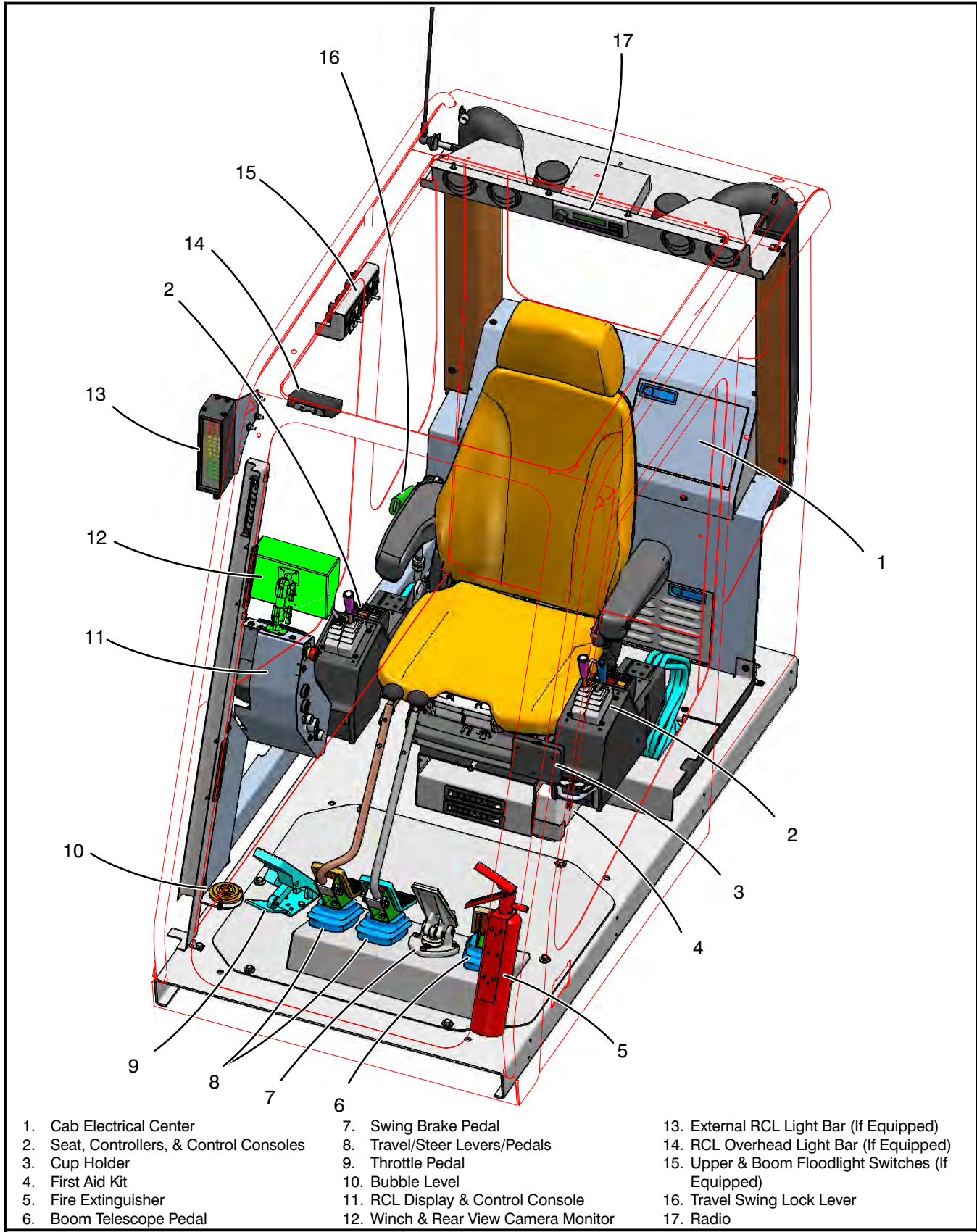


Figure 1–38
Operator's Cab

Operator's Cab

Several panels which contain the gages, switches, and controls to operate and monitor crane operations are mounted throughout the operator's cab. Refer to Figure 1–38. The following is a description of each gauge, switch, or control in each panel, along with an explanation of their function and/or operation.

Bubble Level

The bubble level is provided to assist the operator in determining when the crane is level. It is on the lower right front of the operator's cab. Refer to Figure 1–38.

Fire Extinguisher

A fire extinguisher is mounted in the left front corner of the operator's cab. Refer to Figure 1–38. It is an ABC type fire extinguisher, meaning it is capable of extinguishing most types of fires. The operator should be familiar with its location, the clamp mechanism used to secure it in place, and foremost the operation of the device. Specific instructions, regarding operation, are given on the label on the fire extinguisher. A charge indicator on the fire extinguisher monitors the pressure within the tank. Check the indicator daily to ensure the fire extinguisher is adequately charged and ready for use.

RCL Overhead Light Bar (If Equipped)

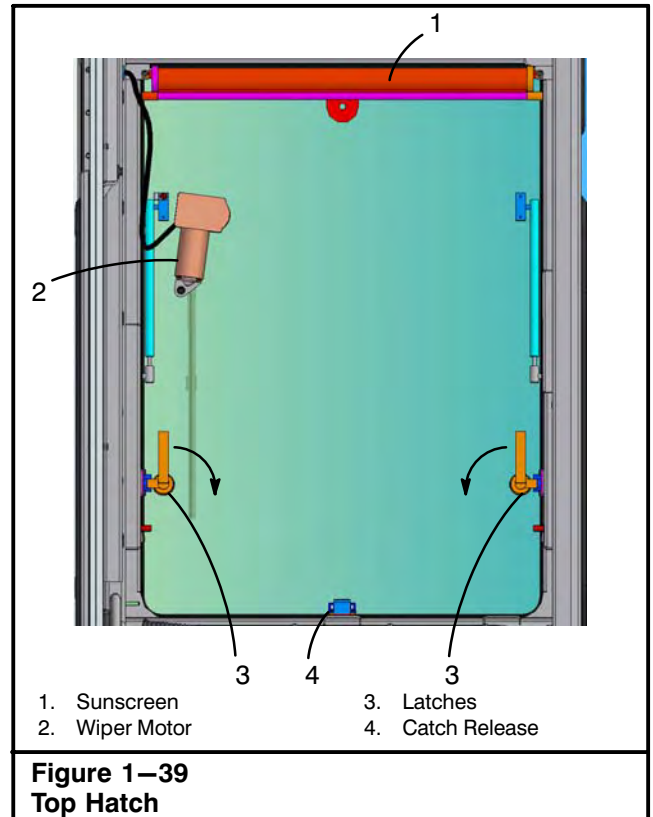
The operator's cab may be equipped with an overhead light bar which gives a visual indication of how much of the crane's capacity is being used and the rate at which an overload is being approached. This light bar operates similar to the bar-graph on the RCL Display. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual for additional information.

External RCL Light Bar (If Equipped)

An external RCL light bar may be mounted on the outside top right corner of the operator's cab. It gives ground personnel a visual indication of how much of the crane's capacity is being used and the rate at which an overload is being approached. This light bar operates similar to the bar-graph on the RCL Display. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual for additional information.

First Aid Kit

The crane has a multi-purpose first aid kit to the left of the operator's seat. Refer to Figure 1–38.



Top Hatch

Top Hatch Wiper And Washer

The top hatch wiper is mounted in the top of the operator's cab roof. Refer to Figure 1–39. The switch for the top hatch wiper/washer is on the cab control console. Refer to Figure 1–42 for switch location.

Top Hatch Window

The top hatch window can be opened to improve operator's cab ventilation. To open the top hatch window, rotate the latches, press the catch release, and push up on the top hatch window. Refer to Figure 1–39.

Top Hatch Sunscreen

The top hatch is equipped with a roller type sunscreen to assist operator vision when looking up through the top hatch. Refer to Figure 1–39.

Operator's Manual

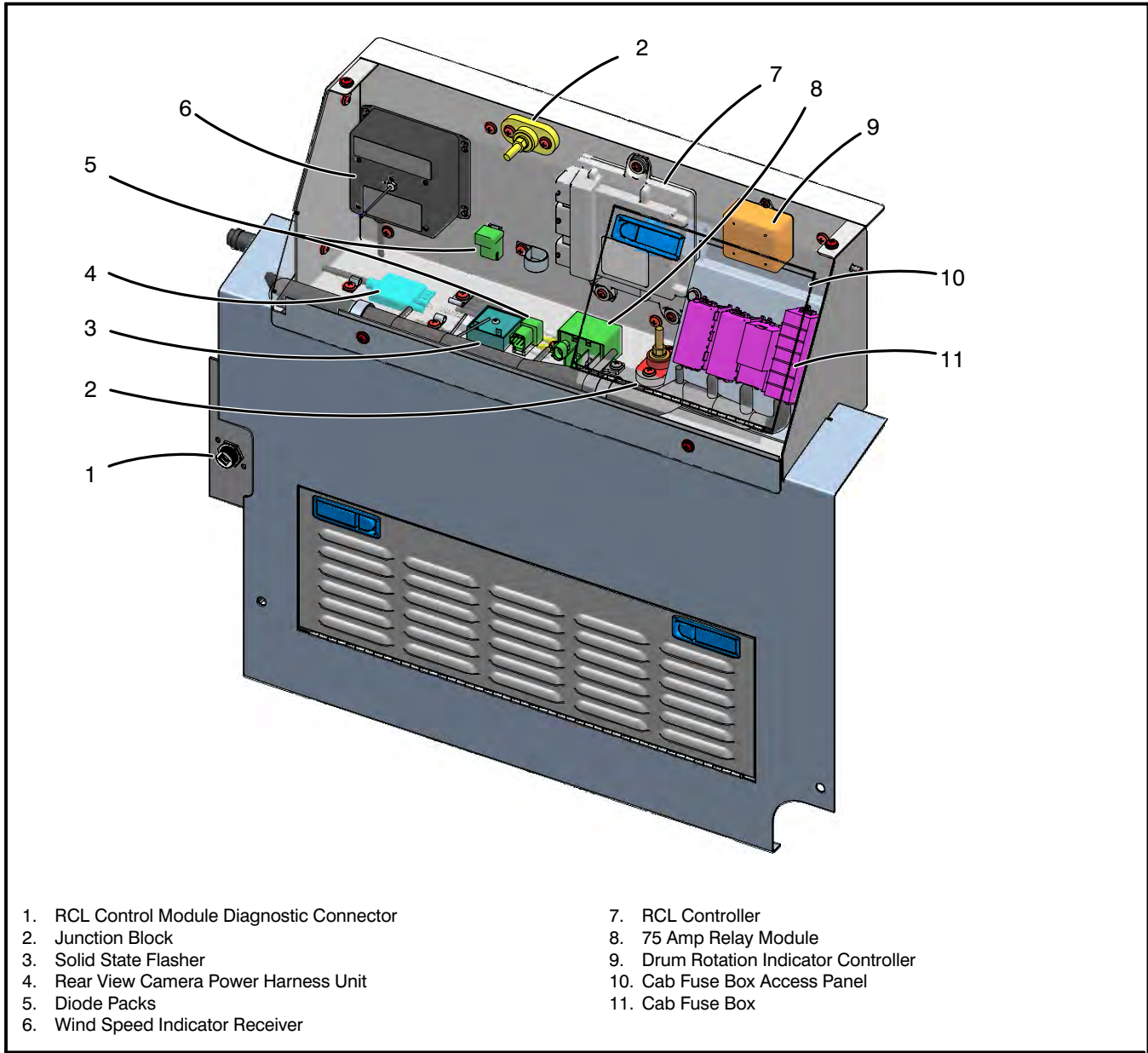


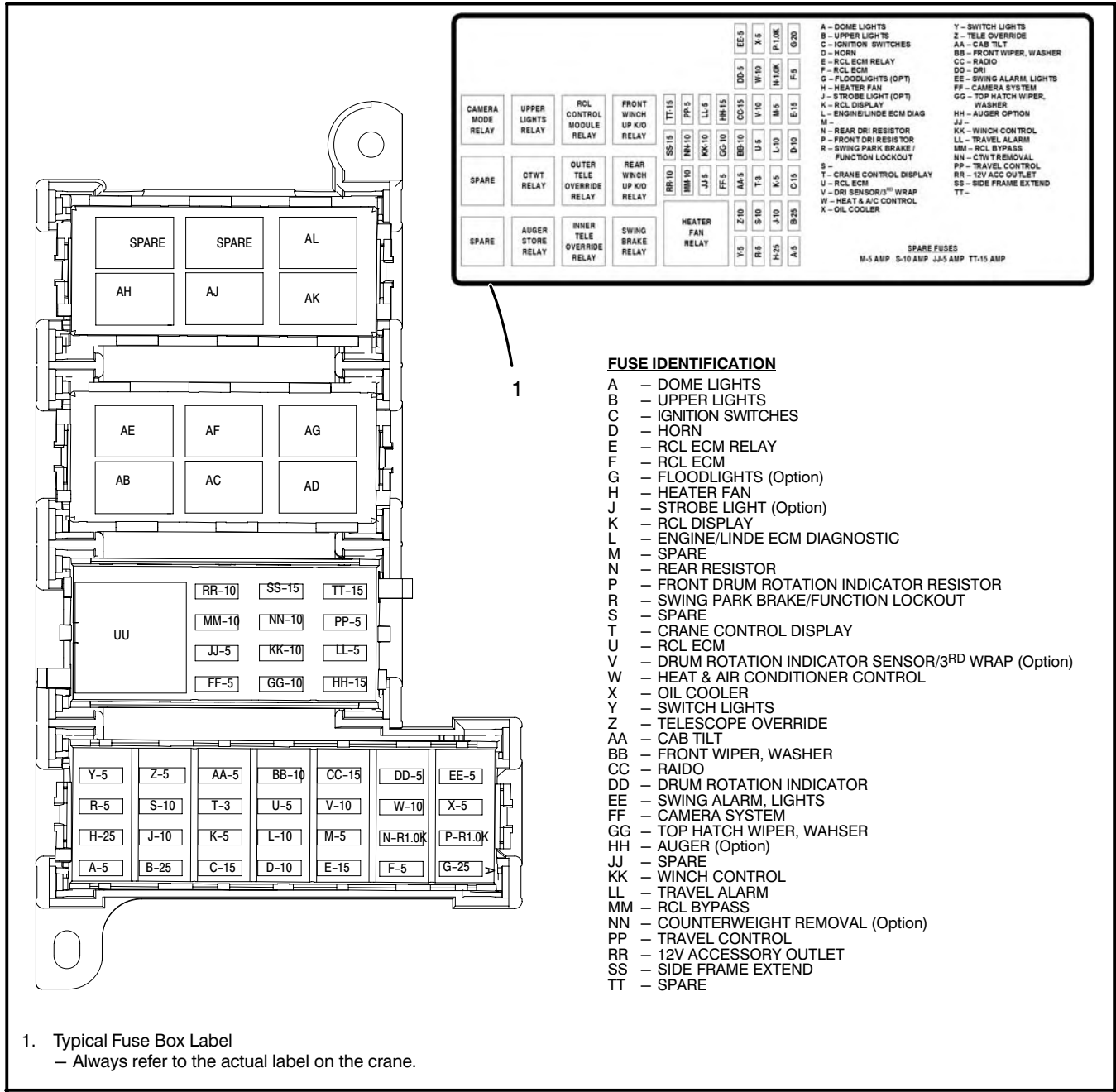
Figure 1–40
Cab Electrical Center

RCL Control Module Diagnostic Connector

A diagnostic connector is located behind the operator's seat for initial calibration or extensive troubleshooting for the RCL control module. Refer to Figure 1–40. Extensive troubleshooting requires a laptop computer, diagnostic software, and a factory trained technician. Contact a Link-Belt Distributor if extensive troubleshooting is required.

Cab Electrical Center

The cab electrical center is mounted behind the operator's seat. Refer to Figure 1–38 and Figure 1–40. Remove the access panels to gain access to electrical components within the electrical center. The electrical center contains the fuse box, the RCL control module, and other various electrical components for the crane.

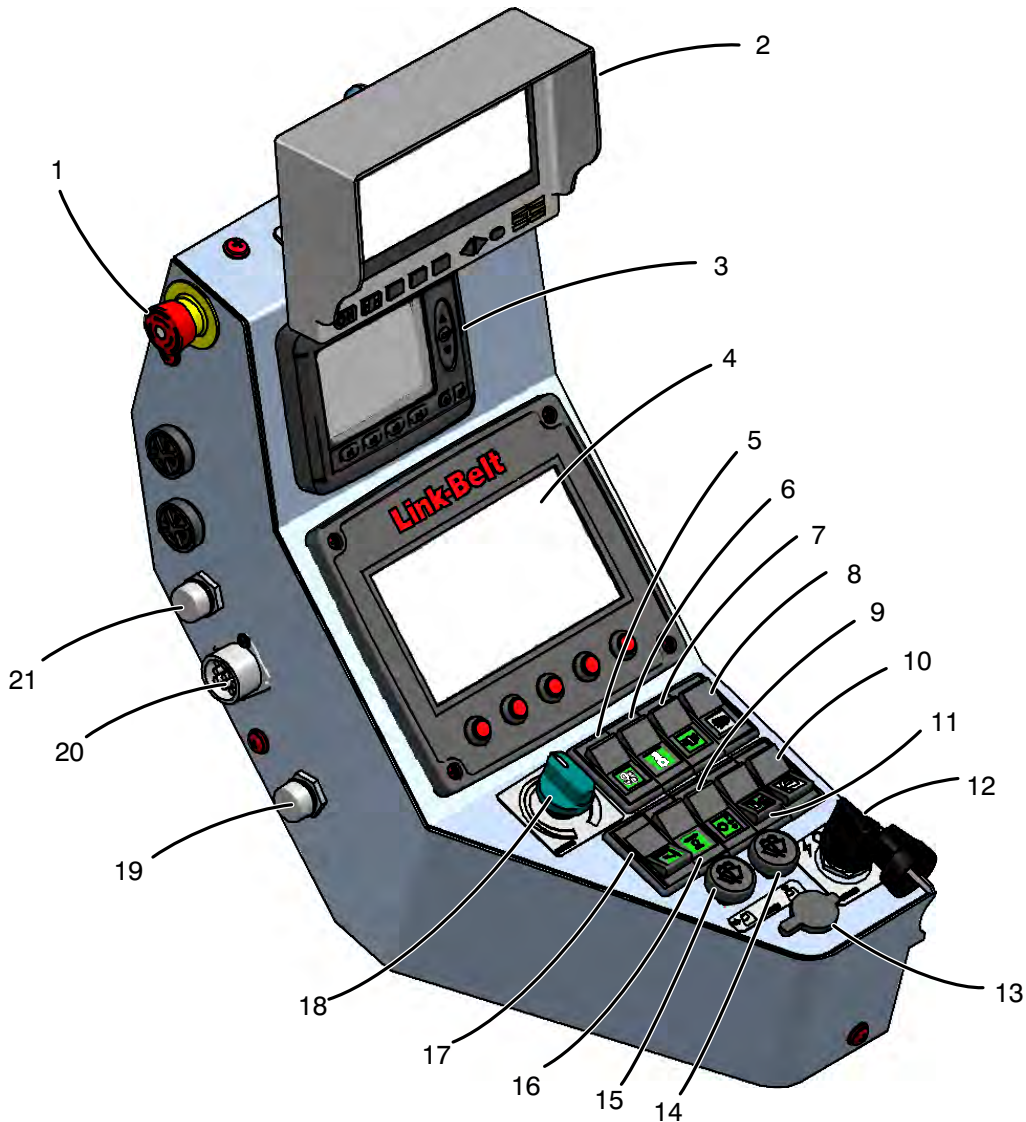


**Figure 1–41
 Cab Fuse Box**

Cab Fuse Box

The cab fuse box is in the electrical center behind the operator's seat. Refer to Figure 1–40 and Figure 1–41. Remove the access panel to gain access to the fuse box. A label which designates the electrical circuit protected by each fuse is mounted on the back of the box cover. Use a fuse puller when replacing a fuse.

Operator's Manual



- | | |
|--|--|
| 1. Emergency Engine Shutdown Button | 11. Side Frame Extend/Retract Switch |
| 2. Winch & Rear View Cameras Monitor | 12. Ignition Switch |
| 3. Crane Control Display | 13. 12V DC Accessory Outlet |
| 4. RCL Display | 14. Top Hatch Wiper/Washer Switch |
| 5. Fan Speed Switch | 15. Windshield Wiper/Washer Switch |
| 6. Heater/Air Conditioner Selector Switch | 16. Auger Activation Switch (If Equipped) |
| 7. Rotating Beacon or Strobe Light Switch
(If Equipped) | 17. Auger Lock/Unlock Switch (If Equipped) |
| 8. Upper Driving Lights Switch | 18. Temperature Control Knob |
| 9. Travel Control Switch | 19. RCL Display Diagnostic Connector |
| 10. Cab Tilt Switch | 20. Engine Diagnostic Connector |
| | 21. Crane Control Display (CCD) Diagnostic Connector |

Figure 1–42
Cab Control Console

Cab Control Console

A panel that contains the following controls, gauges, and indicators is mounted inside the right front corner of the operator's cab and is shown in Figure 1–42.

Operator's Manual

1. Emergency Engine Shutdown Button



The emergency engine shutdown button is used to shutdown the engine in emergency situations. Reset the button by turning it counterclockwise.

2. Winch & Rear View Cameras Monitor

The crane is equipped with two cameras. One camera gives the operator a view of the winches to monitor wire rope spooling on the winch drum(s). The other camera gives a view of the area directly behind the crane. Refer to "Winch And Rear View Cameras" in this Section of this Operator's Manual.

3. Crane Control Display

This unit will display various crane and engine data such as rpm's, coolant temperature, oil pressure, etc. It will also display crane indicators such as function lockout, swing park brake, throttle lock, etc. Refer to "Crane Control Module And Display" in this Section of this Operator's Manual for operating instructions.

4. Rated Capacity Limiter (RCL) Display

This displays the boom length, boom angle, load weight, etc. See "Crane Monitoring System" in this Section of this Operator's Manual for complete operating instructions.

5. Fan Speed Switch



This switch controls the fan speed. Use the high, medium, or low position to control the air flow into the operator's cab.

6. Heater/Air Conditioner Selector Switch



This switch selects either air conditioning or heater. Press the top part of the switch to turn the heater on, bottom part to turn the air conditioning on.

7. Rotating Beacon or Strobe Light Switch (If Equipped)



This switch controls the operator's cab rotating beacon or strobe light. Push the top side of the switch to turn it on, bottom side to turn it off.



8. Upper Driving Lights Switch



This switch operates the upper lights. Push the top side of the switch to turn lights on, bottom side to turn them off.

9. Travel Control Switch



The travel control system employs a two speed travel which can be utilized to provide the operator with two speeds of crane travel. Place the switch in the  position for high speed and in the  position for standard speed. Place the switch in the **P** position to disable the travel levers. Refer to "Steering And Traveling The Crane" in this Section of this Operator's Manual.

10. Cab Tilt Switch



This switch is used to tilt the operator's cab from 0 to 20 degrees above horizontal. Use this switch to improve vertical visibility and help to reduce operator fatigue due to neck strain when the load is high overhead. Refer to "Cab Tilt Operation" in this Section of this Operator's Manual.

11. Side Frame Extend/Retract Switch



This switch is used to extend and retract the lower side frames. This switch will extend/retract both side frames simultaneously. Push the top side of the switch to retract the side frames, bottom side to extend them. The side frames can be used in any one of three positions; fully retracted, intermediate extended, or fully extended. Refer to "Extending And Retracting The Side Frames" in this Section of this Operator's Manual.

12. Ignition Switch



The ignition switch is the conventional, key operated, automotive type. It controls engine off/on/start, accessories, and energizes the instrument panels in the operator's cab.

13. 12V DC Accessory Outlet

Use this outlet for electrical accessories.

CAUTION

Do not connect an accessory to any part of the crane other than the accessory outlet. Damage to the crane's electrical system may result. If it is necessary to do so, contact a Link-Belt Distributor.

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14. Top Hatch Wiper/Washer Switch



Rotate the wiper/washer switch clockwise to activate the top hatch wiper. Rotate the switch to the first detent for low speed wiper and to the second detent for high speed wiper. Rotate the switch counterclockwise to turn the wipers off. Pushing the wiper/washer switch sprays washer fluid on the top hatch window to clean the window.

15. Windshield Wiper/Washer Switch



Rotate the wiper/washer switch clockwise to activate the windshield wiper. Rotate the switch to the first detent for low speed wiper and to the second detent for high speed wiper. Rotate the switch counterclockwise to turn the wipers off. Pushing the wiper/washer switch sprays washer fluid on the windshield to clean the windshield.

16. Auger Activation Switch (If Equipped)

This switch activates the left control lever to be used as the auger control. Refer to “Auger Attachment” in Section 4 of this Operator's Manual for additional information.

17. Auger Lock/Unlock Switch (If Equipped)

This switch is used to lock or unlock the auger attachment to the lower storage bracket. Refer to “Auger Attachment” in Section 4 of this Operator's Manual for additional information.

18. Temperature Control Knob

Turn the temperature control knob to adjust the temperature in the operator's cab.

RCL Display Diagnostic Connector

A diagnostic connector is on the left side of the Cab Control Console for initial calibration or extensive troubleshooting for the RCL Display. Refer to Figure 1–42. Extensive troubleshooting requires a laptop computer, diagnostic software, and a factory trained technician. Contact a Link-Belt Distributor if extensive troubleshooting is required.

Engine Diagnostic Connector

The engine diagnostic connector is on the Cab Control Console. Refer to Figure 1–42. The diagnostic connector provides access to diagnostic codes within the engine control module (ECM). When the check or stop engine light illuminates, the service technician can plug in a data reader or laptop computer to retrieve the engine fault codes stored in the ECM. Refer to the engine manufacturer's manual for information on engine diagnostics and engine fault code descriptions.

Crane Control Display (CCD) Diagnostic Connector

A diagnostic connector is on the left side of the Cab Control Console for initial calibration or extensive troubleshooting for the Crane Control Display. Refer to Figure 1–42. Extensive troubleshooting requires a laptop computer, diagnostic software, and a factory trained technician. Contact a Link-Belt Distributor if extensive troubleshooting is required.

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Upper & Boom Floodlights (If Equipped)

1. Boom Floodlight ON/OFF Switch



This switch operates the boom floodlight. Push the top part of the switch to turn floodlight on, bottom part to turn it off.

2. Boom Floodlight Directional Control



Use the directional control to move the floodlight up, down, left, or right.

3. Upper Floodlight ON/OFF Switch

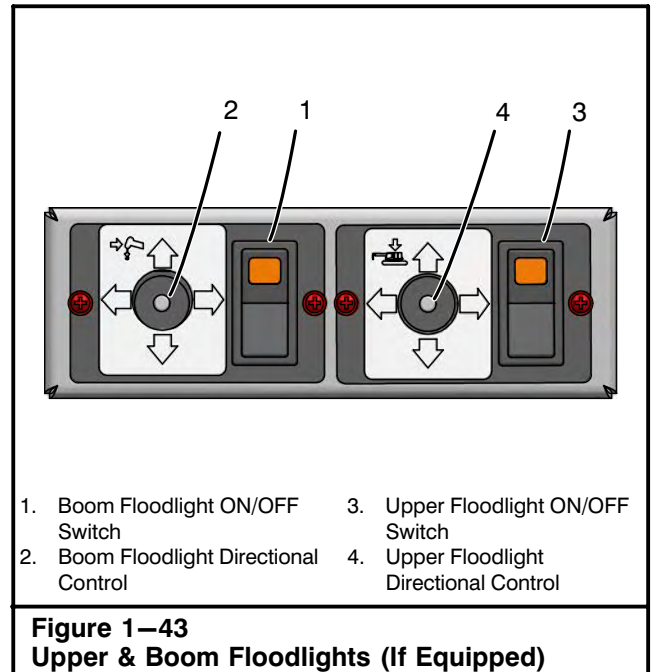


This switch operates the upper floodlight. Push the top part of the switch to turn floodlight on, bottom part to turn it off.

4. Upper Floodlight Directional Control



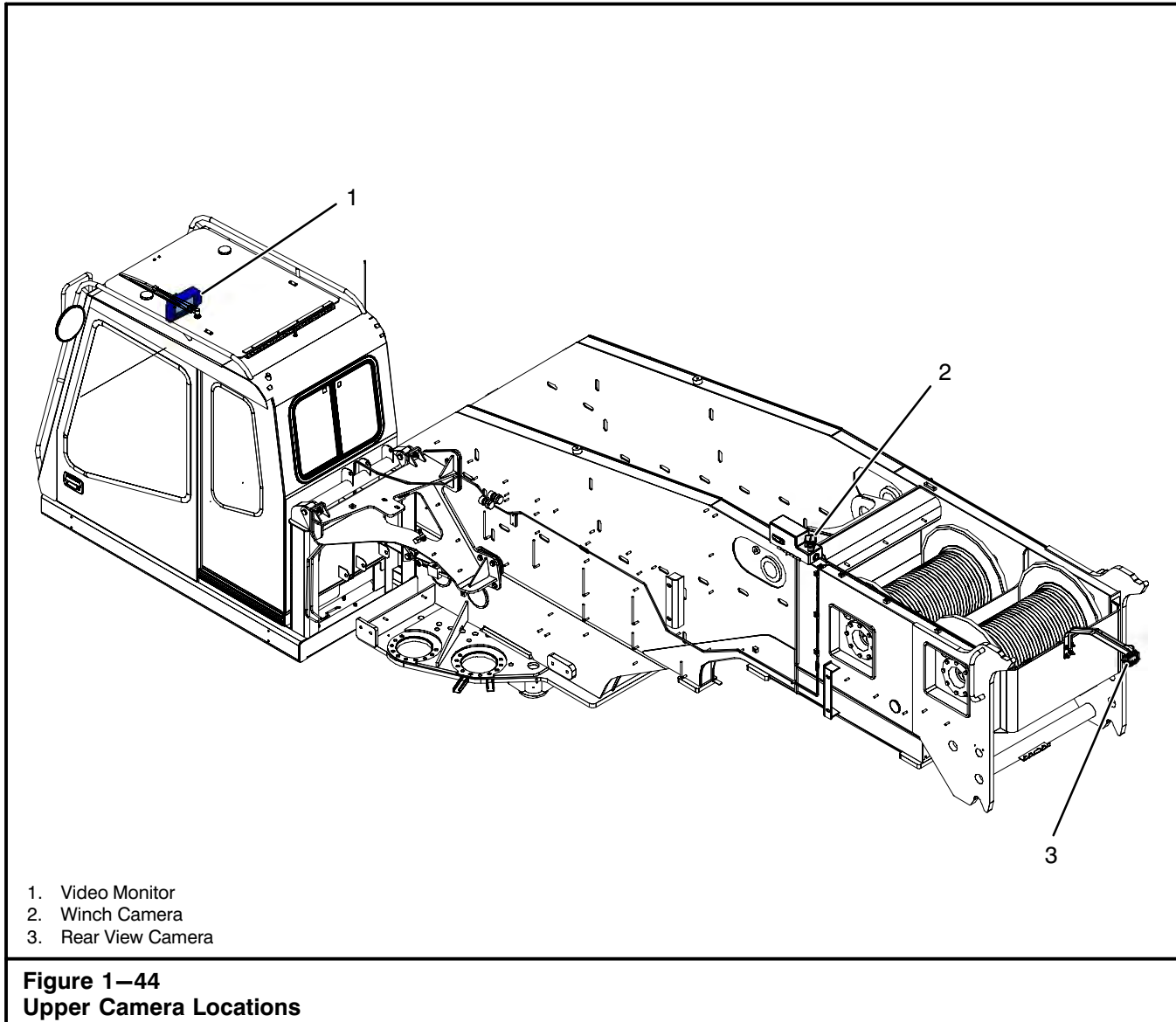
Use the directional control to move the floodlight up, down, left, or right.



- | | |
|--|---|
| 1. Boom Floodlight ON/OFF Switch | 3. Upper Floodlight ON/OFF Switch |
| 2. Boom Floodlight Directional Control | 4. Upper Floodlight Directional Control |

Figure 1-43
Upper & Boom Floodlights (If Equipped)

Operator's Manual



Winch And Rear View Cameras

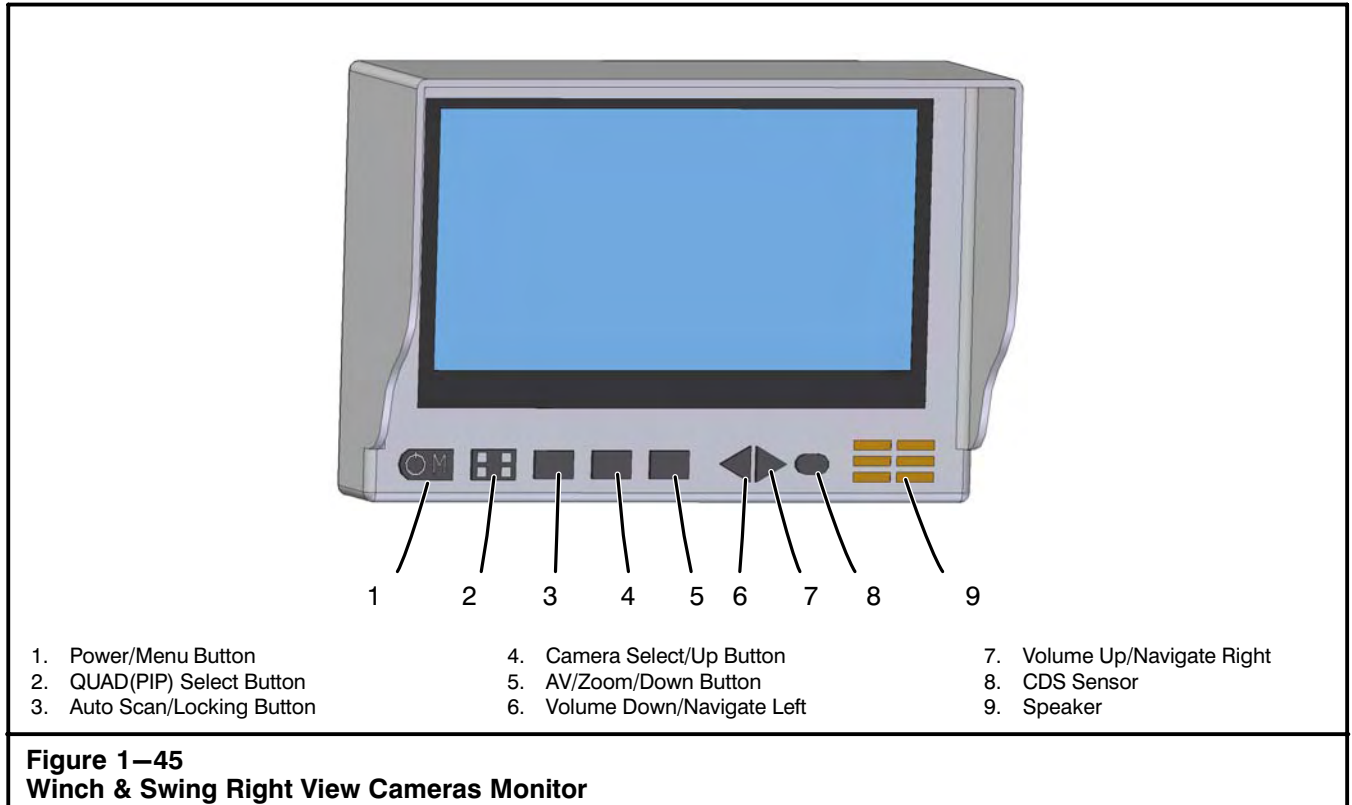
The upper is equipped with two cameras. One camera gives the operator a view of the winches to monitor wire rope spooling on the winch drum(s). The other camera gives a view of the area to the rear of the crane to be used before swinging the upper and backing up.

During initial crane start up and inspection each day, verify the proper operation of all cameras. If the cameras are found to be damaged or missing, order replacement parts as required to repair or replace the damaged or missing component. Continue operation with caution as you should normally do with all crane operations.

WARNING

Cameras are being supplied as an operator's aid. They do not relieve the crane operator of any responsibilities during crane operation. Always look directly in the direction of crane travel or at the load during crane lifting operations. Do not rely solely on the camera to determine if an obstruction is present.

When the swing brake is released the monitor will automatically display the right swing view.



Camera Monitor

A video monitor in the Operator's Cab is supplied to help the Operator see areas that can be obstructed from their view. This monitor can distract the Operator from their normal duties if not used properly. Use these monitors as an Operator's aid and not as the sole method of seeing where the crane is going. Primary attention is to be on where the crane is going or the lifted load, not the monitor.

Cameras do not eliminate the requirement for a signal person during crane travel. Do not attempt to move the crane without a signal person. A trained signal person working in conjunction with a trained Operator is required to move the crane.

WARNING

Do not rely solely on the cameras and monitors.

- **The field of vision of the camera may be limited.**
- **Just because the monitor looks clear does not mean that an obstruction does not exist.**
- **Images in the monitor may be farther than they appear.**
- **Images in the monitor may be distorted.**
- **Weather conditions (ice, snow, rain, etc) may distort or block the camera lens and inhibit visibility.**
- **Do not operate the crane using the camera's alone.**
- **Always look before moving the crane.**
- **Always employ a signal person to move the crane.**

Operator's Manual

1. Power/Menu Button

Power

Press the top left corner of the Power/Menu Button to turn the monitor ON.

Press and hold the top left corner of the Power/Menu Button to turn the monitor OFF.

Menu (While Monitor Is Powered ON)

Press the bottom right corner of the Power/Menu Button to enter MENU MODE.

Press the AV/Zoom/Down Button or Camera Select/Up Button to scroll through the MENUS.

2. QUAD(PIP) Select Button

The QUAD(PIP) Select Button allows the Operator to change the monitor to a split screen display. Refer to "Split Screen Displays" in this section of the Operator's Manual for additional information.

3. Auto Scan/Locking Button

Auto Scan

Press the Auto Scan/Locking button one time to initiate auto scan mode. Auto scan mode will scroll through the camera views for a set period of time as follows: CA1->CA2->CA3->CA4. After the last camera (CA4) is shown in scan mode the screen will automatically go back to the first camera (CA1). Refer to "SCAN Function" in this section of the Operator's Manual for additional information.

Button Lock

Hold the Auto Scan/Locking Button for 3 seconds to lock all of the buttons. At this time all functions of the buttons are disabled. While the buttons are locked, press and hold the Auto Scan/Locking Button for 3 more seconds to unlock the buttons.

4. Camera Select/Up Button

Press the Camera Select/Up Button to scroll through the camera views one by one and to get out of a split screen view. Press the Camera Select/Up Button while in MENU MODE to scroll UP.

5. AV/Zoom/Down Button

Press the AV/Zoom/Down Button to zoom in on a specific camera view. Press the AV/Zoom/Down Button while in MENU MODE to scroll DOWN.

6. Left Arrow Button

The left arrow button turns the volume down and changes functions within the MENUS.

7. Right Arrow Button

The right arrow button turns the volume up and changes functions within the MENUS.

8. CDS Sensor

The CDS Sensor has an auto dimming feature making the monitor available for night viewing.

9. Speaker

The speakers allows the Operator to hear sounds within the camera view.

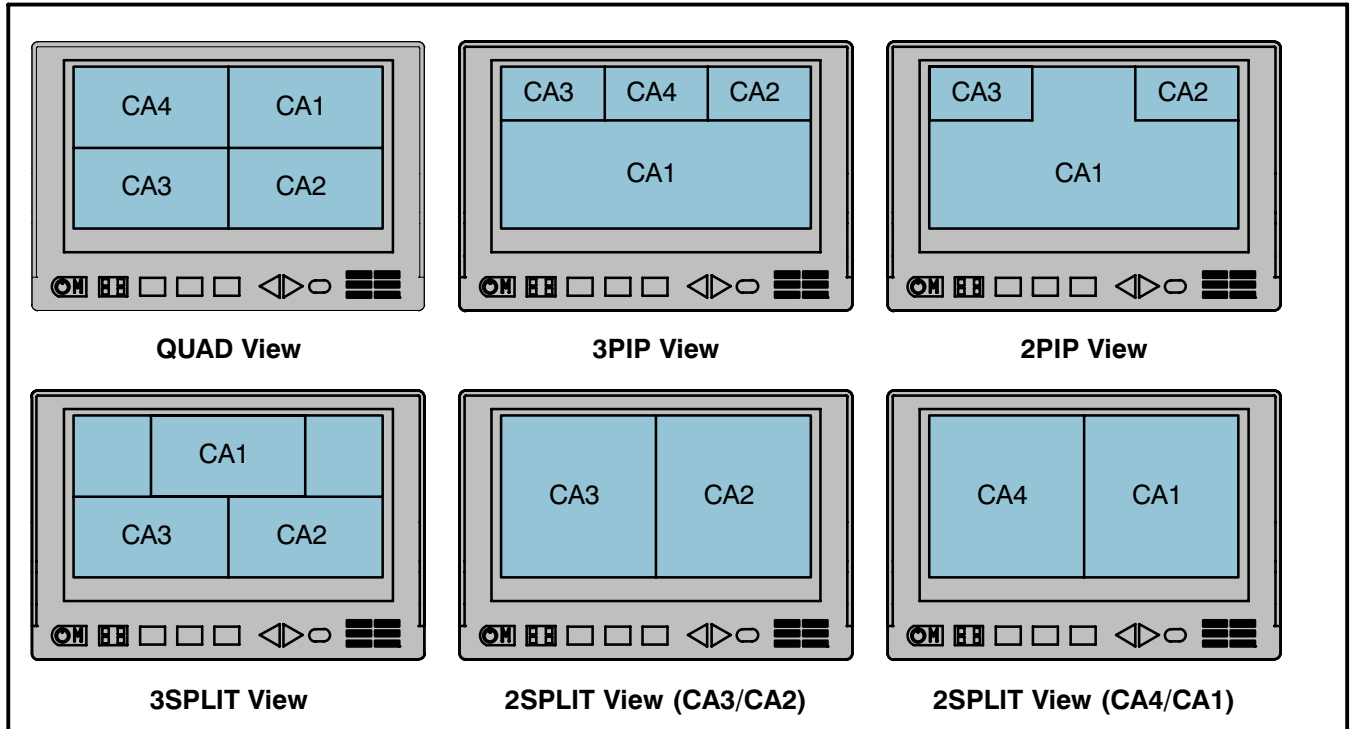


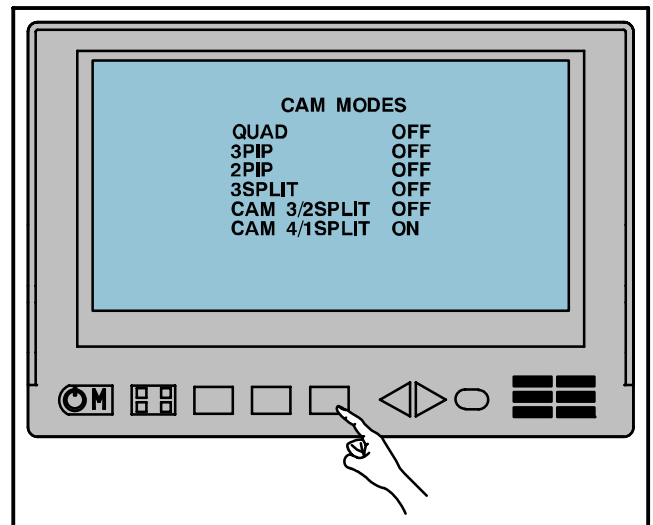
Figure 1-46
Split Screen Function

Split Screen Function

The upper camera has split screen capabilities allowing the Operator to view up to four cameras on one screen. Refer to Figure 1-46. Depending upon which split screen views are turned on, press the QUAD(PIP) Select Button to scroll through the different split screen views. To turn ON/OFF a split screen view:

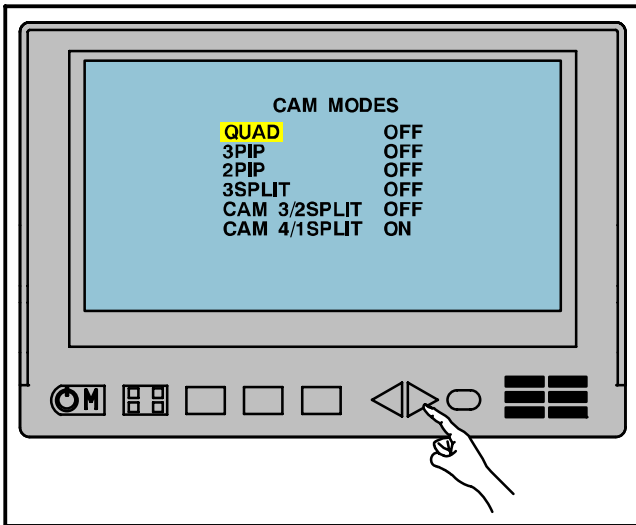
Refer to Figure 1-45.

1. Press the Power/Menu Button to enter MENU MODE.

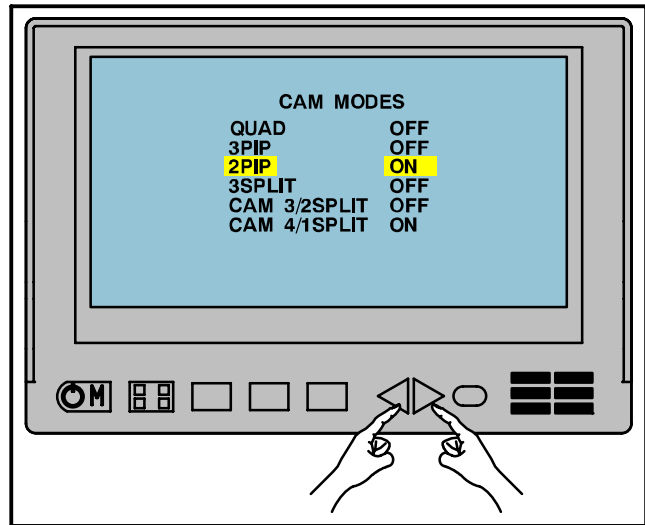


2. Press the AV/Zoom/Down Button until CAM MODES is displayed on the screen.

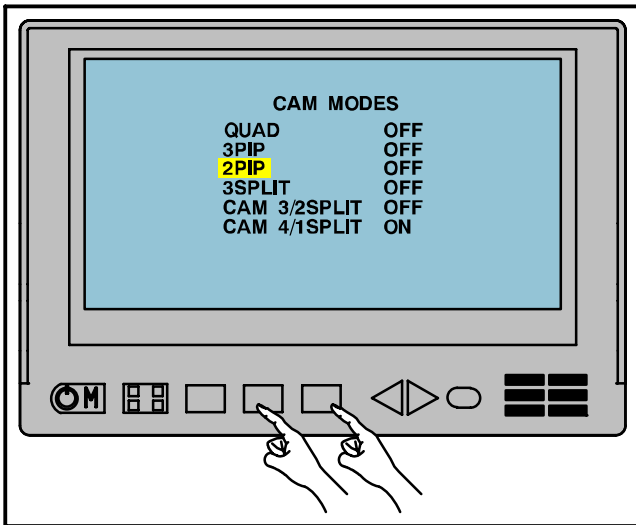
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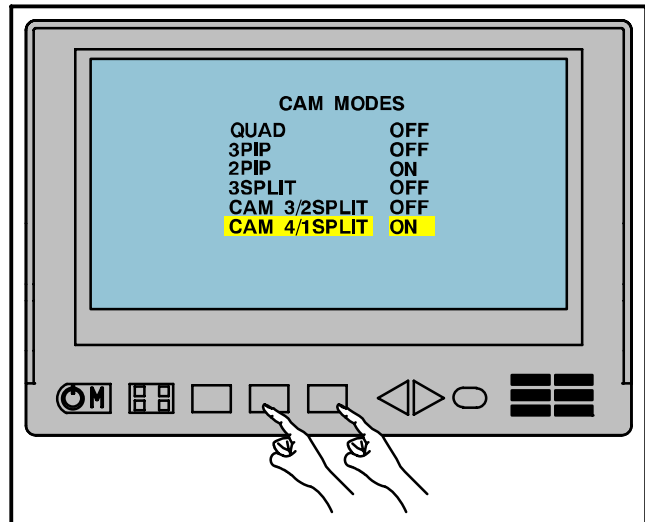
3. Press the Right Arrow Button to enter into CAM MODES.



5. When the proper split screen mode is selected press the Left Arrow or Right Arrow Button to turn it ON or OFF.

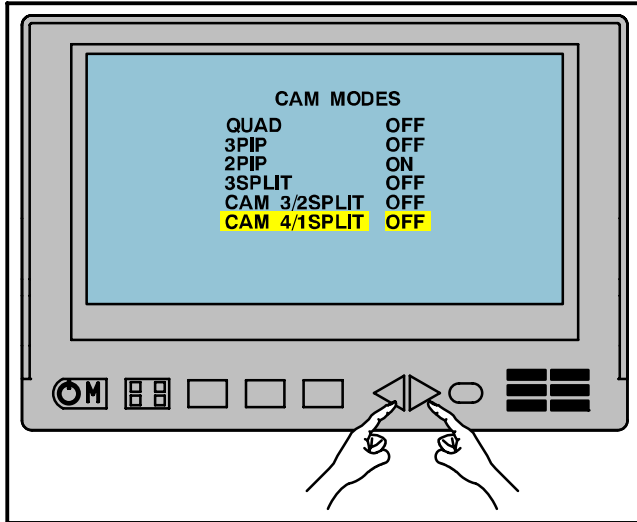


4. Press the Camera Select/Up or AV/Zoom/Down Button to scroll UP and DOWN within CAM MODES.



6. To turn ON or OFF another split screen mode press the Camera Select/Up or AV/Zoom/Down Button to scroll UP and DOWN.

Operator's Manual



7. Then press the Left Arrow or Right Arrow Button to turn it ON or OFF.
8. To go back to MENU MODE press the Power/Menu Button.

Note: If the crane is equipped with two cameras, only CAM4/1SPLIT MODE needs to be on.

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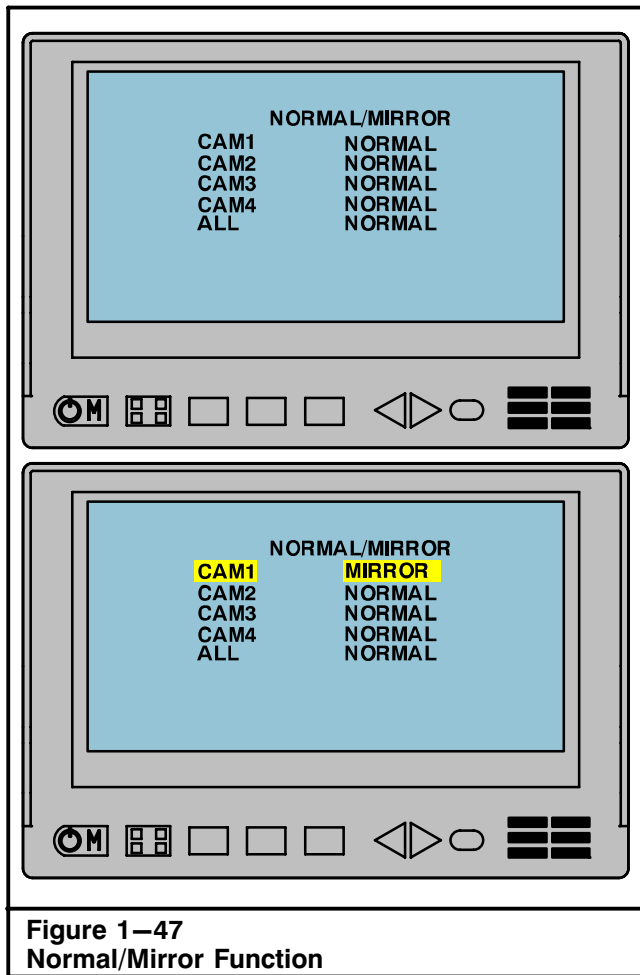


Figure 1-47
Normal/Mirror Function

NORMAL/MIRROR Function

The upper monitor has a NORMAL/MIRROR Function that allows the Operator to mirror the monitor image vertically. Refer to Figure 1-47. To change the monitor image from NORMAL to MIRROR:

Refer to Figure 1-45.

1. Press the Power/Menu Button to enter MENU MODE.
2. Press the AV/Zoom/Down Button until NORMAL/MIRROR is displayed on the screen.
3. Press the Right Arrow Button to enter into NORMAL/MIRROR.
4. Press the Camera Select/Up or AV/Zoom/Down Button to scroll UP and DOWN.
5. Press the Left Arrow or Right Arrow Button to change the camera view from NORMAL to MIRROR.
6. To go back to MENU MODE press the Power/Menu Button.

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UP/DOWN Function

The upper monitor has a UP/DOWN Function that allows the Operator to mirror the image horizontally. Refer to Figure 1–48. To change the monitor image from UP to DOWN:

Refer to Figure 1–45.

1. Press the Power/Menu Button to enter MENU MODE.
2. Press the AV/Zoom/Down Button until UP/DOWN is displayed on the screen.
3. Press the Right Arrow Button to enter into UP/DOWN.
4. Press the Camera Select/Up or AV/Zoom/Down Button to scroll UP and DOWN.
5. Press the Left Arrow or Right Arrow Button to change the camera view from UP to DOWN.
6. To go back to MENU MODE press the Power/Menu Button.

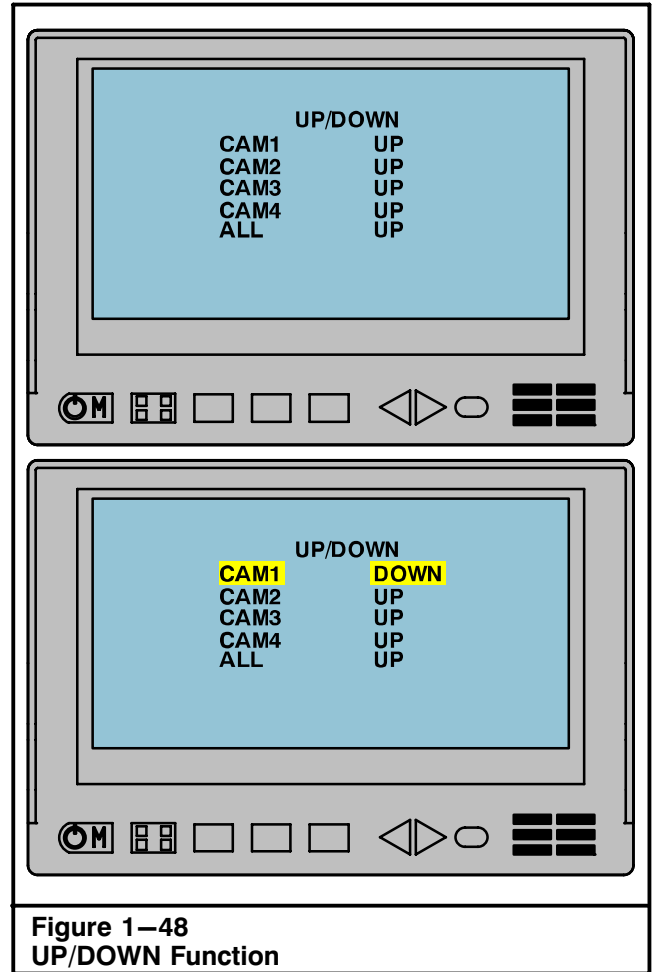


Figure 1–48
UP/DOWN Function

Operator's Manual

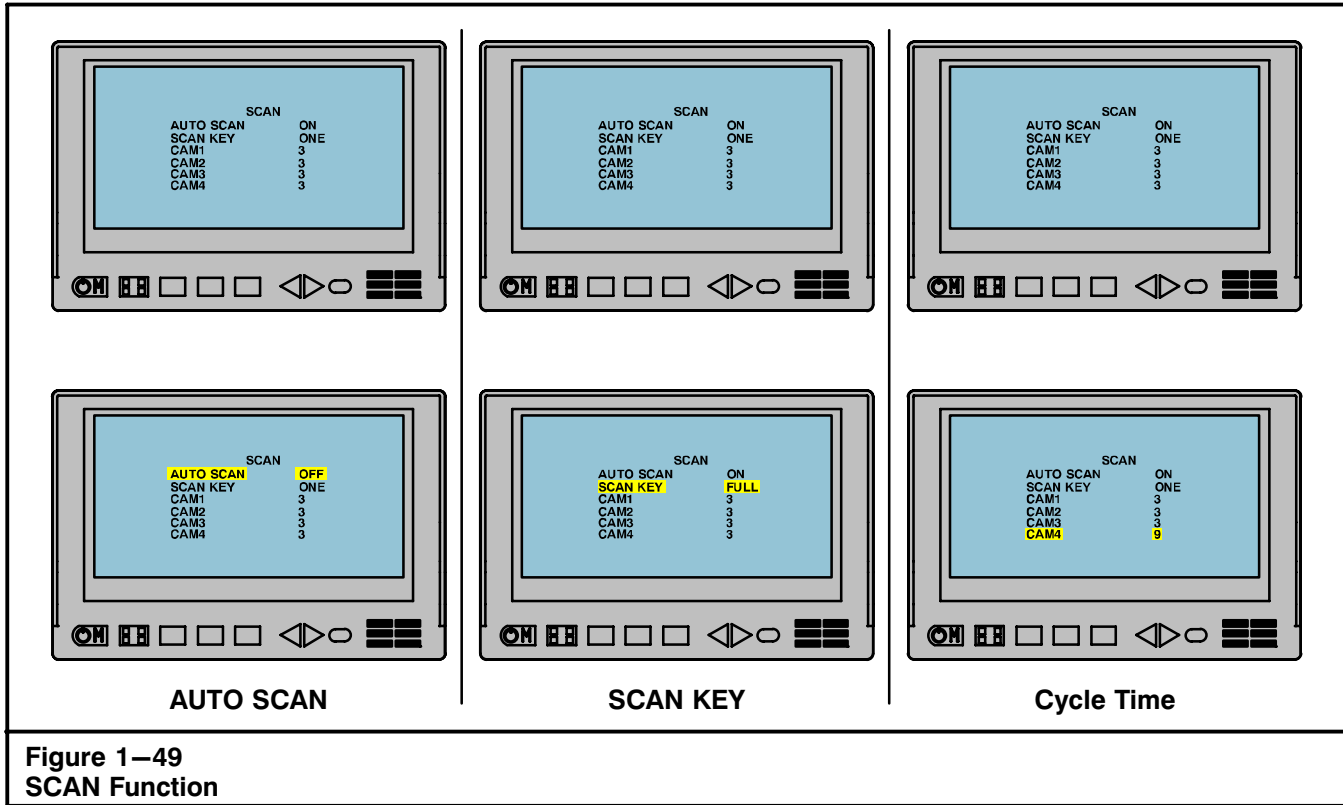


Figure 1-49
SCAN Function

SCAN Function

The upper camera has a SCAN Function that allows the monitor to automatically scan through the different camera views at the press of a button. The SCAN KEY function can be set to cycle through the camera views only one time or continuously scroll through the camera views. Refer to Figure 1-49. To start an AUTO Scan:

Refer to Figure 1-45.

1. Press the Auto Scan/Locking Button.

To turn AUTO SCAN OFF:

1. Press the Power/Menu Button to enter MENU MODE.
2. Press the AV/Zoom/Down Button until SCAN is displayed on the screen.
3. Press the Right Arrow Button to enter into SCAN.
4. Press the Camera Select/Up or AV/Zoom/Down Button to scroll UP and DOWN to AUTO SCAN.
5. Press the Left Arrow or Right Arrow Button to change AUTO SCAN from ON to OFF.
6. To go back to MENU MODE press the Power/Menu Button.

To change the SCAN KEY cycle from ONE to FULL :

1. Press the Power/Menu Button to enter MENU MODE.
2. Press the AV/Zoom/Down Button until SCAN is displayed on the screen.
3. Press the Right Arrow Button to enter into SCAN.
4. Press the Camera Select/Up or AV/Zoom/Down Button to scroll UP and DOWN to SCAN KEY.
5. Press the Left Arrow or Right Arrow Button to change SCAN KEY from ONE to FULL.
6. To go back to MENU MODE press the Power/Menu Button.

To change the SCAN cycle time:

1. Press the Power/Menu Button to enter MENU MODE.
2. Press the AV/Zoom/Down Button until SCAN is displayed on the screen.
3. Press the Right Arrow Button to enter into SCAN.
4. Press the Camera Select/Up or AV/Zoom/Down Button to scroll UP and DOWN to specific camera.
5. Press the Left Arrow or Right Arrow Button to change the time interval (1-9 seconds).
6. To go back to MENU MODE press the Power/Menu Button.

PREFERRED SETTINGS

FUNCTION	
LANGUAGE	ENGLISH
SYSTEM	NTSC/PAL
DIRECTION	0°
DIMMER	1
AUTO POWER	ON
LOGO SET	>
AV OUTPUT	LIVE
SHUTTER	ON
RESET	>

TRIGGER	
REAR SCALE	OFF
BLINK MARK	OFF
TRIG 1	CAM1
TRIG 2	CAM2
TRIG 3	CAM3
TRIG 4	CAM4
HAZARD	QUAD

CAMERA NAME	
CAM1	REAR
CAM2*	NO CAMERA
CAM3*	NO CAMERA
CAM4*	WINCH

CAM MODES	
QUAD*	OFF
3PIP*	OFF
2PIP*	OFF
3SPLIT*	OFF
CAM3/2 SPLIT*	OFF
CAM4/1 SPLIT	ON

NOR/MIR	
CAM1	NORMAL
CAM2	NORMAL
CAM3	NORMAL
CAM4	NORMAL
ALL	NORMAL

UP/DOWN	
CAM1	UP
CAM2	UP
CAM3	UP
CAM4	UP
ALL	UP

SCAN	
AUTO SCAN	OFF
SCAN KEY	ONE
CAM1	3
CAM2	3
CAM3	3
CAM4	3

*Setting may be different if equipped with a third camera.

Figure 1–50
Monitor Preferred Settings

RESET

Note: Resetting the monitor will reset it to the monitor factory settings. The monitor will then need to be set to the Link-Belt preferred settings. Refer to Figure 1–50.

To reset the monitor settings:

1. Press the Power/Menu Button to enter MENU MODE.
2. Press the AV/Zoom/Down Button until FUNCTION is displayed on the screen.
3. Press the Right Arrow Button to enter into FUNCTION.
4. Press the Camera Select/Up or AV/Zoom/Down Button to scroll UP and DOWN to RESET.
5. Press the Left Arrow or Right Arrow Button to reset the monitor.
6. The monitor will power off during reset.

Care and Maintenance

If crane has been parked in direct sunlight, allow time for the monitor to cool down.

Clean the monitor with a slightly damp cloth. Use a mild household detergent. Do not use strong solvents such as thinner or benzene as they can damage the finish of the monitor.

Contact your Link-Belt Distributor for the proper repair procedures.

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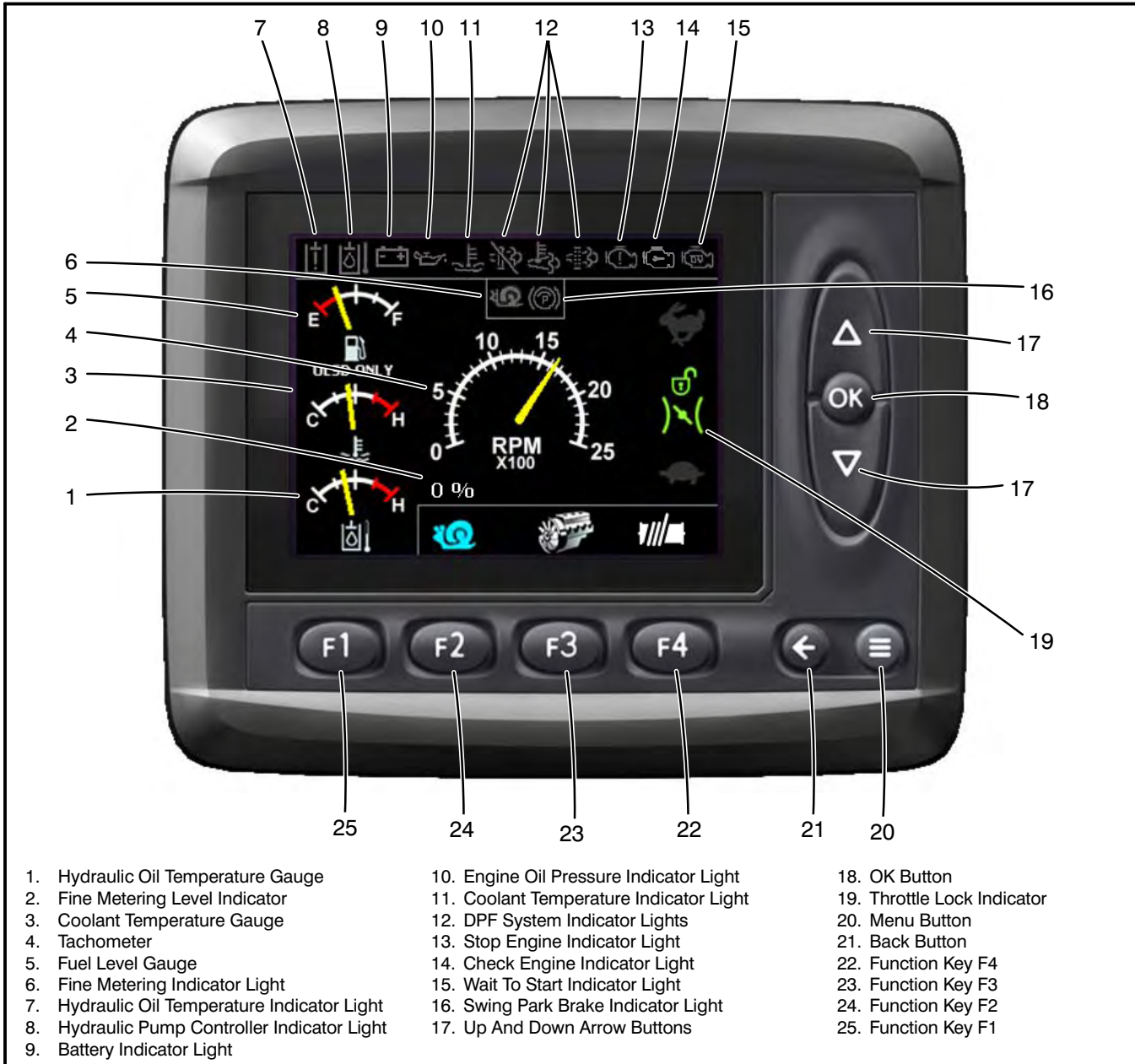


Figure 1-51
Crane Control Display (Main Working Screen Shown)

Crane Control Display

The Crane Control Display contains the following controls, gauges, and indicators and is on the Crane Control Console. Refer to Figure 1-42 and Figure 1-51.

1. Hydraulic Oil Temperature Gauge



This gauge registers the hydraulic oil temperature in the main return line. Normal operating ranges vary with the oils used in different climates. Refer to Section 2 of this Operator's Manual for proper oil viscosities and operating temperature ranges. If the hydraulic oil ex-

ceeds the maximum operating temperature, the hydraulic oil temperature indicator light will illuminate and an alarm buzzer will sound. Also the indicator light within the gauge will change from white to red. If the system overheats, shutdown the crane immediately and correct the problem.

2. Fine Metering Level Indicator



This indicator alerts the operator of the fine metering level. Refer to "Fine Metering Control" in this Section of this Operator's Manual.

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3. Coolant Temperature Gauge



This gauge registers the engine cooling system temperature. For proper cooling system operating temperature range, refer to the engine manufacturer's manual. If the cooling system overheats, reduce engine speed until the temperature returns to normal operating range. If engine temperature does not return to normal temperature, refer to engine manufacturer's manual. When the coolant temperature exceeds normal operating range an indicator light will illuminate, an alarm buzzer will sound, and the stop engine indicator light will illuminate. Also the indicator light within the gauge will change from white to red.

4. Tachometer



The tachometer registers engine speed in revolutions per minute (rpm). Refer to the engine manufacturer's manual for suggested operating speeds.

5. Fuel Level Gauge



This gauge registers the level of fuel in the fuel tank. The fuel tank capacity is 110 gal (416L). Refer to the engine manufacturer's manual for the correct grade of diesel fuel. When the fuel level reaches an eighth of a tank, the indicator light within the gauge will change from white to yellow.

6. Fine Metering Indicator Light



This indicator alerts the operator that the fine metering system has been enabled. Refer to "Fine Metering Control" in this Section of this Operator's Manual.

7. Hydraulic Oil Temperature Indicator Light



This red indicator light will illuminate along with an alarm buzzer to alert the operator that the hydraulic oil exceeds the maximum operating temperature. If the system overheats, shutdown the crane immediately and correct the problem.

8. Hydraulic Pump Controller Indicator Light



This red indicator light will illuminate along with an error message pop-up screen to alert the operator of a problem with the main hydraulic pump controller. Communicate the pump controller problem to a Link-Belt Distributor and correct the error as soon as possible.

9. Battery Indicator Light



This red indicator light will illuminate along with an alarm buzzer to alert the operator that the charge or the voltage in the battery is not within normal operating range.

10. Engine Oil Pressure Indicator Light



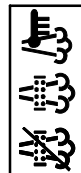
This red indicator light will illuminate along with an alarm buzzer to alert the operator that the engine oil pressure is not within normal operating range. For proper oil pressure operating range, refer to the engine manufacturer's manual. If there is no engine oil pressure after 10–15 seconds of running time, shutdown the engine immediately and repair the problem to avoid engine damage.

11. Coolant Temperature Indicator Light



This red indicator light will illuminate along with an alarm buzzer to alert the operator that the engine cooling system temperature exceeds the maximum operating temperature. For proper cooling system operating temperature range, refer to the engine manufacturer's manual. If the cooling system overheats, reduce engine speed until the temperature returns to normal operating range. If engine temperature does not return to normal temperature, refer to engine manufacturer's manual. When the coolant temperature exceeds normal operating range, the stop engine indicator light will also illuminate.

12. DPF System Indicator Lights



These indicator lights will illuminate during various DPF operations. Refer to "Diesel Particulate Filter (DPF)" in this Section of this Operator's Manual.

13. Stop Engine Indicator Light



This red indicator light will illuminate along with an alarm buzzer and an error message pop-up screen to alert the operator of major engine problems. When this light illuminates stop operations immediately and shutdown the engine. Refer to the engine manufacturer's manual and determine the problem before any further operation of the engine.

14. Check Engine Indicator Light



This yellow indicator light will illuminate along with an error message pop-up screen to make the operator aware of minor engine problems. When this light illuminates engine operation may continue. However, refer to the engine manufacturer's manual and determine the problem as soon as possible to avoid prolonged operation of the malfunctioning engine which could develop into a major problem.

Operator's Manual

15. Wait To Start Indicator Light



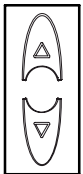
This green indicator light will illuminate in cold weather when the ignition switch is in the "ON" position to alert the operator not to crank the engine. During cold weather conditions the light illuminates and an engine air intake heater will activate to heat the air before entering the engine air intake. When the air intake is warm enough the indicator light will go out and then the engine can be started. This aids in engine start-up in cold weather conditions and reduces white smoke after starting. For additional information refer to "Cold Engine Starting" in this Section of this Operator's Manual.

16. Swing Park Brake Indicator Light



This light will illuminate anytime the swing park brake is applied and the ignition is on.

17. Up And Down Arrow Buttons



These are navigation buttons that are used to scroll through selections on a menu page.



18. OK Button



Pushing this button equals "enter". Saves the value or confirms the selection.

19. Throttle Lock Indicator



This indicator alerts the operator that the throttle lock system is locked  or unlocked . Refer to "Throttle Lock System" in this Section of this Operator's Manual.

20. Menu Button



Push this button to bring up a menu page.

21. Back Button



Push this button to return to the previous display page.

22. Function Key F4



This function key will bring up the first layer/third wrap calibration screen (if equipped). Refer to "First Layer/Third Wrap Calibration" in Section 3 of this Operator's Manual.

23. Function Key F3



This function key will bring up the engine data screen. Refer to "Engine Data Screen" in this Section of this Operator's Manual.

24. Function Key F2



This function key will bring up the fine metering screen. Refer to "Fine Metering Control" in this Section of this Operator's Manual.

25. Function Key F1



This function key has no function when the main working screen is displayed.

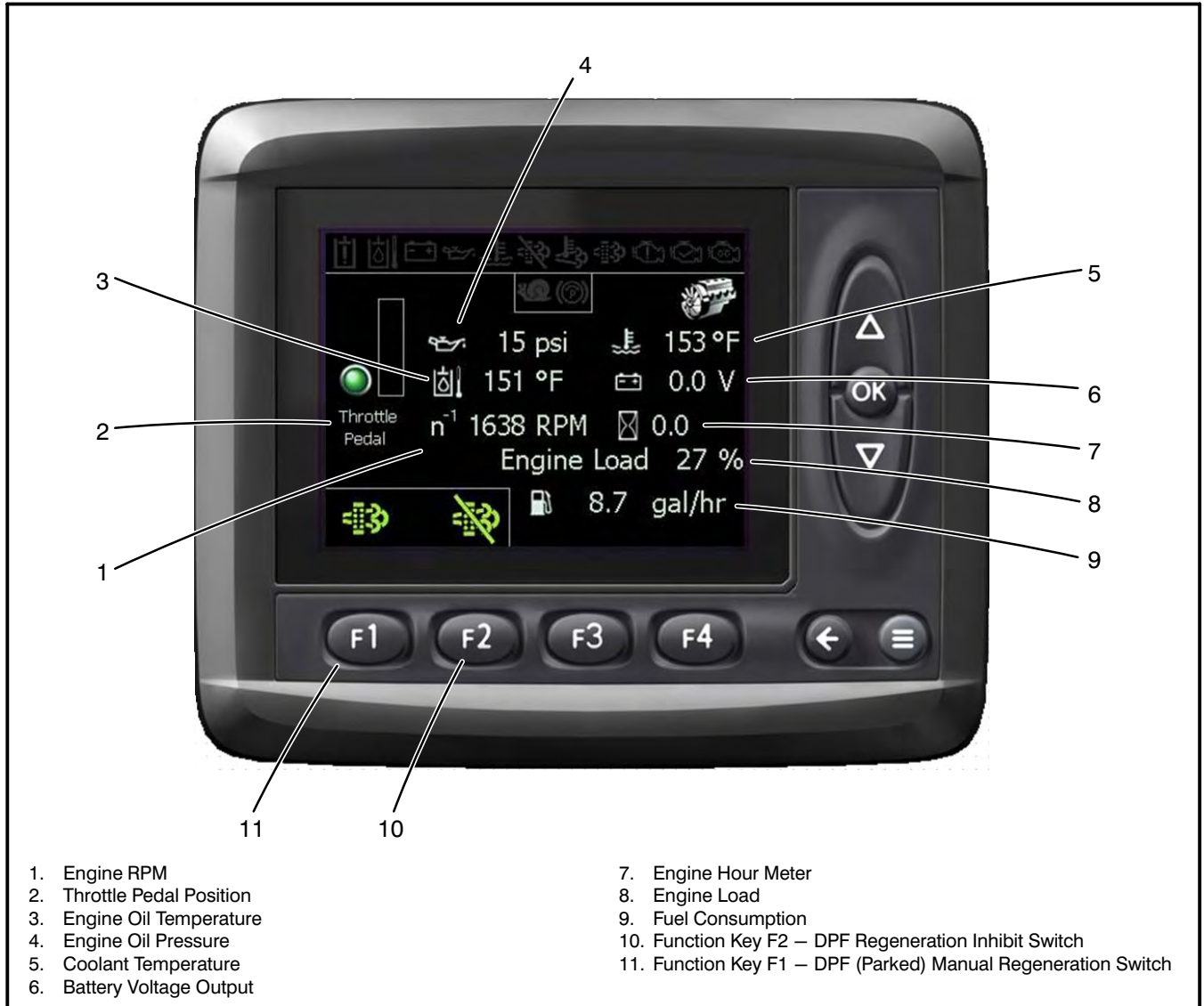



Figure 1–52
Engine Data And Aftertreatment Control Screen


Engine Data And Aftertreatment Control Screen

The engine data and aftertreatment control screen can be displayed by pressing the Function Key F3 on the Crane Control Display. Press the back button (←) to return to the main working screen. The following describes the data displayed on the engine data screen.


1. Engine RPM

 This displays the actual engine speed in revolutions per minute (rpm). Refer to the engine manufacturer's manual for suggested operating speeds.

2. Throttle Pedal Position

 This indicator light will illuminate anytime the throttle pedal is depressed and the vertical bar-graph will indicate percentage pedal is depressed.

3. Engine Oil Temperature

 This displays the actual engine oil temperature in degrees Fahrenheit (°F). For proper oil temperature operating range, refer to the engine manufacturer's manual.

Operator's Manual

4. Engine Oil Pressure



This displays the actual engine oil pressure in pounds per square inch (psi). For proper oil pressure operating range, refer to the engine manufacturer's manual.

5. Coolant Temperature



This displays the actual engine cooling system temperature in degrees Fahrenheit (°F). For proper cooling system operating temperature range, refer to the engine manufacturer's manual.

6. Battery Voltage Output



This displays the actual voltage output from the battery in volts (V).

7. Engine Hour Meter



The hour meter registers engine operating hours. It is useful in determining lubrication and maintenance schedules.

8. Engine Load



This displays the actual engine load as a percentage (%).

9. Fuel Consumption



This displays the actual fuel consumption in gallons per hour (gal/hr).

10. Function Key F2 – DPF Regeneration Inhibit Switch



The DPF Regeneration Inhibit switch declines an Active and a (parked) Manual Regeneration until turned off. Refer to "Diesel Particulate Filter (DPF)" in this Section of this Operator's Manual.

11. Function Key F1 – DPF (Parked) Manual Regeneration Switch



This switch initiates a (parked) Manual Regeneration. This switch will only be active when a manual regeneration is required (regeneration light illuminated). Refer to "Diesel Particulate Filter (DPF)" in this Section of this Operator's Manual.

Operator's Manual

Crane Control Display Brightness Adjustment



1. From the main working screen, press the menu button.



4. Press the Function Key F2 to select Backlight.



2. Press the Function Key F3 to bring up the Preferences screen.



5. Press the Up/Down Arrow buttons to adjust the display brightness.
6. Press the Function Key F1 to return to the main working screen.



3. Press the Function Key F1 to bring up the Display screen.

Operator's Manual

Diesel Particulate Filter (DPF)

The diesel particulate filter (DPF) is designed to remove diesel particulate matter or soot from the exhaust gas of the engine. The filter must be periodically regenerated to remove the accumulated soot from the filter. During normal operation, the soot in the DPF will be purged by an automatic regeneration cycle. In some cases an automatic regeneration may not occur and the regeneration cycle must be initiated manually.

Refer to engine manufacturer's manual for additional information on the regeneration process and procedures.

Engine DPF Regeneration Indicators



1. The DPF regeneration indicator light will illuminate to alert the operator that an active regeneration of the diesel particulate filter is required but cannot occur. When this light illuminates, ensure the regeneration inhibit switch is off (regeneration inhibit indicator light is off), increase upper engine load/speed to allow the engine to run until regeneration is complete, or use the engine DPF regeneration switch to initiate a (parked) manual regeneration cycle as soon as safely possible. Press the Function Key F2 OK button to return to previous screen.



2. The DPF regeneration light begins to flash alerting the operator that the soot loading in the DPF is nearly full. When this light illuminates, ensure the regeneration inhibit switch is off (regeneration inhibit indicator light is off), increase upper engine load/speed to allow the engine to run until regeneration is complete, or use the engine DPF regeneration switch to initiate a (parked) manual regeneration cycle as soon as safely possible.



3. The DPF regeneration light continues to flash and the check engine light will illuminate to alert the operator that the soot loading in the DPF is full. This condition alerts the operator that the soot loading in the DPF has reached a critical level where a (parked) manual regeneration must be performed immediately. Press the Function Key F2 OK button and initiate a (parked) manual regeneration. Refer to "DPF (Parked) Manual Regeneration" in this Operator's Manual.



4. The stop engine light will illuminate to alert the operator that the soot loading in the DPF has reached a critical level and continued operation could result in damage to the DPF. Stop the engine as soon as possible and call for service or risk damage to the DPF.



1. High Exhaust System Temperature Indicator Light

Figure 1–53
High Exhaust System Temperature Indicator Light

High Exhaust System Temperature Indicator Light

This indicator light will illuminate to alert the operator that the outlet temperature in the upper engine exhaust system is above normal. This condition can occur under normal operation or during an automatic or manual DPF regeneration cycle. No action is required.

DANGER

The temperature of the engine exhaust gas and the exhaust system components can reach up to 1200°F (650°C) during DPF regeneration. An unexpected failure of the engine or regeneration system may increase exhaust gas temperature at the particulate exhaust filter to as high as 1650°F (900°C). This may result in fire, burn, or explosion hazards, which may result in serious personal injury or death. Do not expose flammable material or explosive atmospheres to exhaust gas or to exhaust system components during DPF regeneration.

Engine DPF Regeneration Inhibit Switch

The engine DPF regeneration inhibit switch disables any automatic or manual regeneration of the upper engine diesel particulate filter. It may be used to prevent any regeneration when the crane is operating in a hazardous environment and there is a concern about high temperatures from the DPF system.



1. To access the DPF Regeneration Inhibit Switch, press the Function Key F3 from the main working screen.



2. The main screen will change to the engine data and aftertreatment control screen. From this screen, press the Function Key F2 DPF Regeneration Inhibit Switch.

Operator's Manual



3. If additional information is required, press the Function Key F4 Help to access a help pop-up menu.



5. If regeneration inhibit is not desired at this time, press Function Key F3 To to exit the Regeneration Inhibit Confirmation pop-up menu and return to previous screen.



4. If help pop-up menu was accessed, press Function Key F2 OK to exit help pop-up and return to previous screen.



6. Press the Function Key F2 Yes to confirm and activate the Regeneration Inhibit. The Regeneration Inhibit indicator light will illuminate to alert the operator that the DPF system is inhibited.
7. Press the back button (⬅️) to return to the main working screen.

Operator's Manual

DPF (Parked) Manual Regeneration

The DPF manual regeneration switch is used to start a manual regeneration only when the DPF regeneration light is illuminated.

Note: The crane must remain stationary for approximately 45 minutes to complete an engine DPF (parked) manual regeneration.

1. Park the crane in a safe location and apply the swing park brake. Ensure the regeneration inhibit switch is off (regeneration inhibit indicator light is off).
2. Engine must be at minimum operating temperature of 140°F (60°C).



3. To access the DPF Manual Regeneration Switch, press the Function Key F3 from the main working screen to enter the engine data and aftertreatment control screen.



4. The main screen will change to the engine data screen. From the engine data and aftertreatment control screen, press the Function Key F1 Manual Regeneration switch to access the Manual Regeneration Confirmation pop-up menu.

Note: Do not press the engine throttle pedal during a DPF manual regeneration cycle. Pressing the engine throttle pedal will deactivate the regeneration cycle and the engine will return to idle. The engine DPF manual regeneration cycle must be restarted.



5. If additional information is required, press the Function Key F4 Help to access a help pop-up menu.



6. If help pop-up menu was accessed, press Function Key F2 OK to exit help pop-up and return to previous screen.

Operator's Manual



7. If a manual regeneration is not desired at this time, press Function Key F3 To to exit the Manual Regeneration Confirmation pop-up menu and return to previous screen.



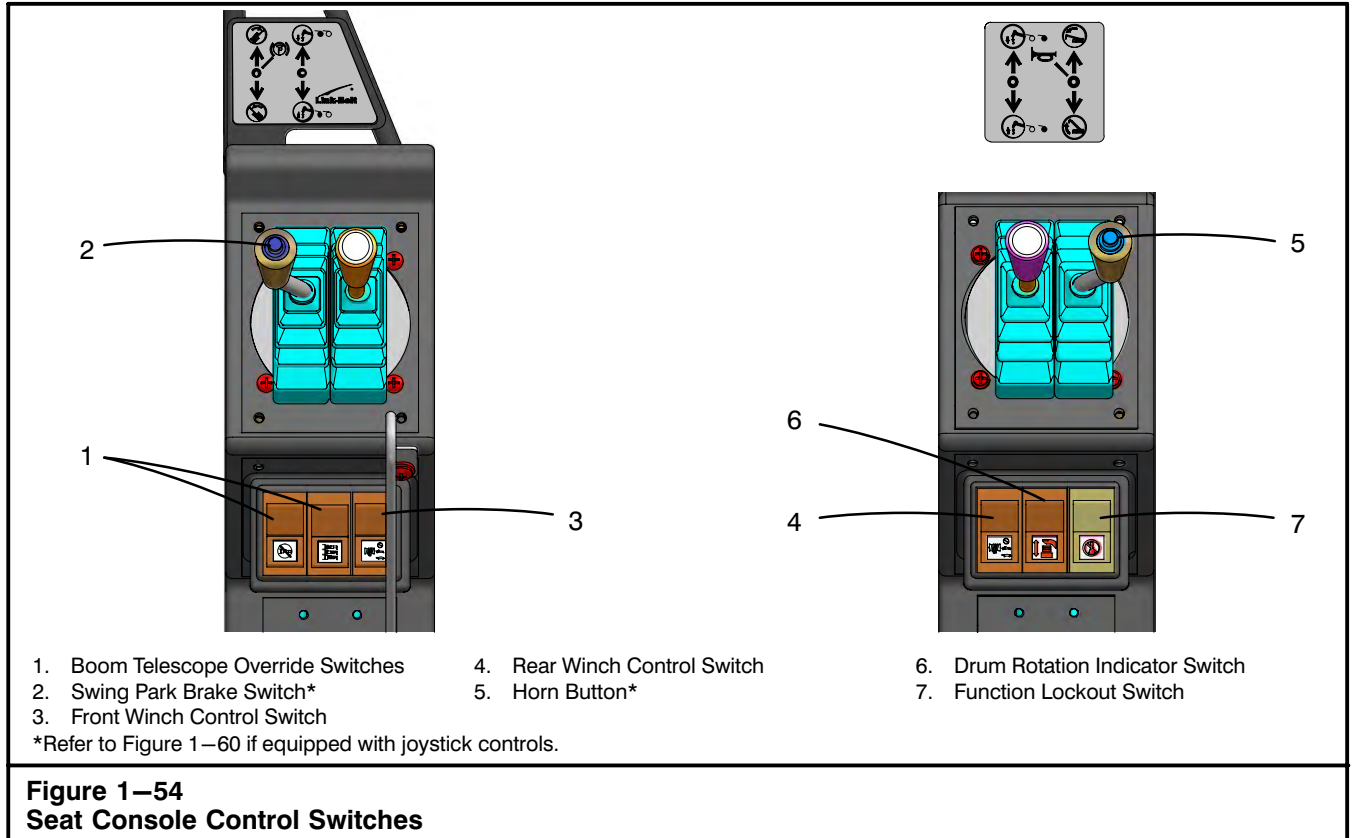
8. Press the Function Key F2 Yes to confirm and initiate a manual regeneration cycle.

The engine ECM will perform a system check for approximately 30 seconds before starting the engine DPF manual regeneration cycle; also, the engine speed will increase to 1,000–1,400 rpm. When the cycle begins, the engine DPF regeneration indicator light goes out and the high exhaust temperature indicator light illuminates. When engine DPF regeneration is complete, the upper engine will return to idle and the exhaust temperature indicator light goes out.



DANGER

The temperature of the engine exhaust gas and exhaust system components can reach up to 1,200° F (650° C) during DPF regeneration. An unexpected failure of the engine or regeneration system may increase exhaust gas temperature at the particulate exhaust filter to as high as 1,650° F (900° C). This may result in fire, burn, or explosion hazards, which may result in serious personal injury or death. Do not expose flammable material or explosive atmospheres to exhaust gas or to exhaust system components during DPF regeneration.






Seat Console Control Switches


Control switches are on the left and right consoles of the operator's seat. Refer to Figure 1-54.


1. Boom Telescope Override Switches



These switches are provided to manually override the telescope system when the boom is not extending/retracting proportionally in all boom modes. Use these switches for that purpose only. Press the  switch to enter telescope override mode. Use the  switch to select the boom sections to override as follows:

 [Top position of the switch will override the inner and center sections allowing only the tip and outer sections to extend and retract.

 [Center position of the switch will override the inner, outer, and tip sections allowing only the center section to extend and retract.

 [The bottom position of the switch will override the center, outer, and tip sections allowing only the inner section to extend and retract.

2. Swing Park Brake Switch



This switch is used to operate the swing park brake to hold the upper in any position over the lower. An indicator light on the Crane Control Display will illuminate to indicate the switch is in the ON position. Refer to "Swing System" in this Section of this Operator's Manual for complete operating procedures. (Refer to Figure 1-60 if equipped with joystick controls.)

3. Front Winch Control Switch



This switch is used to control engaging/disengaging the high speed hoist and disabling the front winch. Refer to "Wire Rope Winch System" in this Section of this Operator's Manual for complete operating procedures.

4. Rear Winch Control Switch



This switch is used to control engaging/disengaging the high speed hoist and disabling the rear winch. Refer to "Wire Rope Winch System" in this Section of this Operator's Manual for complete operating procedures.

Operator's Manual

5. Horn Button



Press this button to sound the horn. (Refer to Figure 1–60 if equipped with joystick controls.)

6. Drum Rotation Indicator Switch

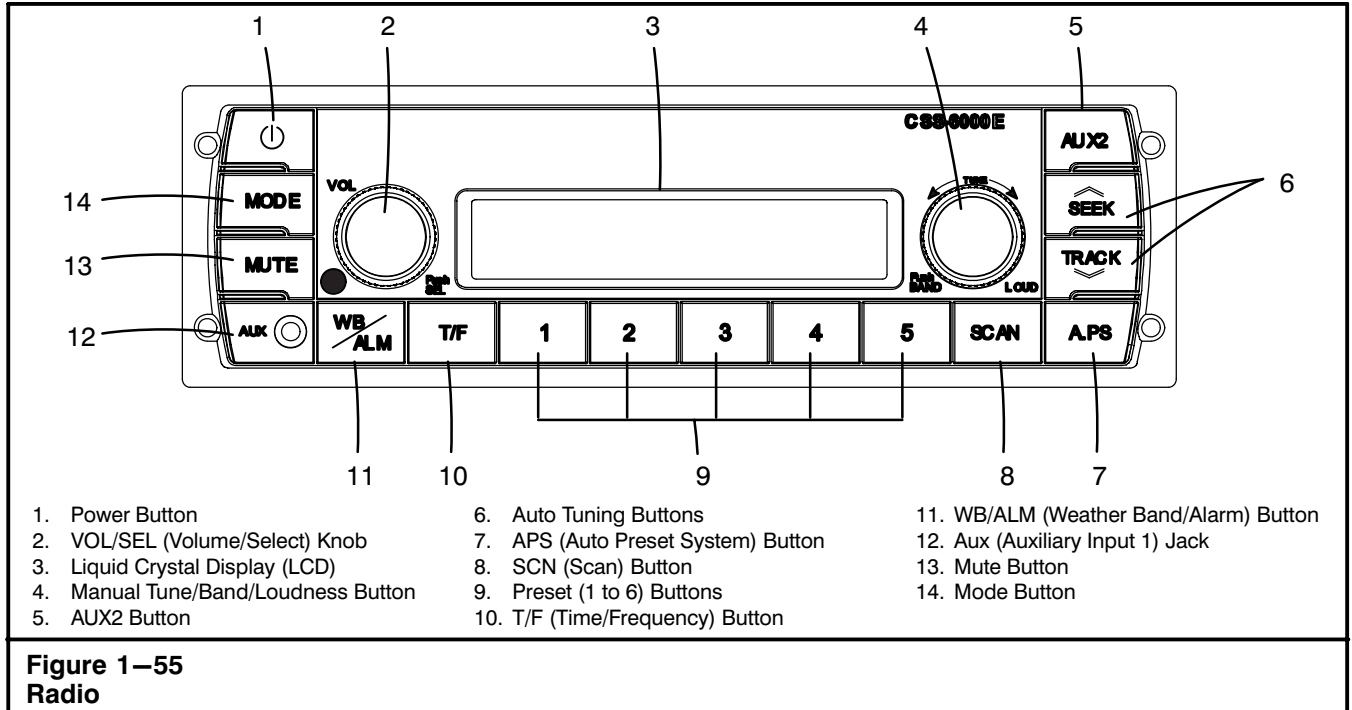


This switch is used to activate the drum rotation indicator system. To activate the system, press the bottom part of the switch. Press the top part of the switch to deactivate the system. The bottom part of the switch will illuminate to indicate the switch is in the ON position. Refer to “Drum Rotation Indicators” in this Section of this Operator’s Manual for complete operating procedures.

7. Function Lockout Switch



This switch is used to disable hydraulic functions which are operated by the control levers and boom telescope foot pedal. Press the bottom part of the switch to disable hydraulic functions and to prevent inadvertent operation of these controls. To allow normal operation of the control levers and boom telescope foot pedal, press the top part of the function lockout switch. The bottom part of the switch will illuminate to indicate the switch is in the “OPERATION” position. This switch should always be in the “DISABLE” position before entering or exiting the operator’s seat.



Radio Operation

The crane may be equipped with an AM/FM/Stereo radio. It has an electronic station search, a memory function which can store favorite stations in memory, and an auto preset store system that automatically selects and memorizes stations. The radio is equipped with a Auxiliary Input Audio jack on the front panel that allows the user to listen to external sources such as Mp3 players. Two four-pin connectors on the rear panel accept microphone inputs for public address (PA) type capabilities.

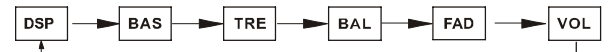
1. Power Button

Press the power button to turn the unit on; press it again to turn the unit off.

Note: Whenever the unit is powered on for the first time, it will default to Radio mode (tuner mode). After initial power, it will memorize all settings from previous mode. When ignition is turned off while radio is operating normally, the unit will automatically power on when ignition is turned on again and will have memorized all settings from previous mode.

2. VOL/SEL (Volume/Select) Knob

The volume/select knob is used to select and control all functions related to the volume and sound quality of the unit. Momentarily pressing this knob scrolls through the following functions appearing in the LCD in the order shown below:



Once you've selected the function you wish to change, you have 5 seconds to adjust the settings before it automatically switches back to the volume control (default).

3. Liquid Crystal Display (LCD)

The LCD shows the radio reception information such as the FM, AM, Stereo, Ch No., Reception frequency, Volume, Bass, Treble settings, etc.

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4. Manual Tune/Band/Loudness Button

MANUAL TUNING: To manually select a desired frequency, turn button left or right to select the desired station.

LOUDNESS: The loudness button is used to emphasize the bass and treble at low volume. To activate, press and hold the **LOUDNESS** button for 2 seconds. To cancel loudness press the button again.

RADIO BAND: During radio operation, momentarily pressing this button scrolls through the following bands, appearing in the LCD, in the order shown below:



5. AUX2 Button

When there is a Auxiliary Audio device plugged into the connector on the rear of the unit, simply press **AUX2** button to enter into **AUX2** mode.

6. Auto Tuning Buttons

To automatically select a radio station, press **SEEK UP** button or **TRACK DOWN** button. The radio will seek the next acceptable signal strength station and then stop and remain at that frequency.

7. APS (Auto Preset System) Button

Pressing this button momentarily scans the stations preset 1–5 of the current radio **BAND**. Scanning will stop at each preset station for approximately 5 seconds before continuing to the next preset station, until all 5 presets have been scanned. Press and hold this button for more than 2 seconds and it will automatically preset 5 stations into memory (presets 1 to 5) in order of strongest signal strength.

8. SCN (Scan) Button

Press the **Scan** button to start scanning the available frequencies. Scanning will pause at each available frequency for approximately 5 seconds and then continue scanning. Press the **Scan** button to stop scanning at the current broadcast.

9. Preset (1 to 5) Buttons

The preset buttons are used to store favorite radio stations into memory. 15 FM stations and 10 AM stations can be stored in memory (each button can store 6 stations). Tune the radio to a desired station then press and hold one of the preset buttons for 2 seconds. The desired station will now be stored in memory. Once you have completed storing desired radio stations, simply press each preset button momentarily to check if the correct stations have been memorized. To select a station which is stored in memory, momentarily press any one of the preset buttons 1 to 5. The station stored in the preset button will automatically be selected. The LCD will show the preset number and frequency.

10. T/F (Time/Frequency) Button

In any mode, the time display is the default indication on the LCD. When **T/F** button is pressed while time is displayed, the current frequency will appear for approximately 6 seconds and then revert to time indication.

Setting or Changing the time

Press and hold the **T/F** button until hour digit begins to flash. Rotate volume control knob clockwise to increase hours, rotate volume control knob counterclockwise to decrease the hours. Press and hold **T/F** button again until minute digit begins to flash. Rotate volume control knob clockwise to increase the minutes, rotate volume control knob counterclockwise to decrease the minutes. Once time (Hour or Minute) has been adjusted, wait 5 seconds until time stops flashing, time is now set.

11. WB/ALM (Weather Band/Alarm) Button

Press and hold this button for 2 seconds to change into **Alarm** mode. Refer to “Setting An Alarm” in this Section of this Operator’s Manual. Momentarily press the button to change to weather band, then press the preset buttons 1–5 to listen to **WB** preset stations. Refer to “Weather Band” in this Section of this Operator’s Manual.

12. Aux (Auxiliary Input 1) Jack

Activate the auxiliary input jack by pressing the Mode button until AUX In appears on the LCD. Using an Auxiliary Device with the Auxiliary Input Jack

- Obtain an audio cable with 1/8 (3.5mm) male plug at each end.
- First connect the cable to the radio's auxiliary input jack, then connect the other end to an external audio device.
- Press the MODE button until AUX In is displayed on the LCD.

Note: Before selecting AUX In mode, verify that the cable is connected to both audio device and the radio. Since audio devices vary in output volume levels, it is recommended that the auxiliary audio device not be set at max output volume. Very high output levels from audio devices may cause audio distortion to the output of the radio.

13. Mute Button

Press this button to mute audio output. Press again to enable audio output.

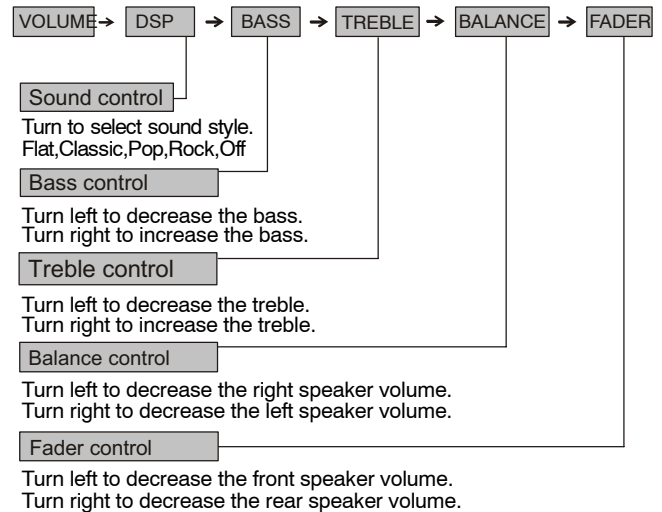
14. Mode Button

Press this button to toggle between radio mode and auxiliary mode.

Bass, Treble, Balance, And Fader Adjustment

These adjustments are controlled by pressing the Volume/Select knob.

Note: If no adjustments have been made within 5 seconds, it will automatically switch back to the Volume Control Mode.



Initial Volume Adjustment

Press and hold the Volume/Select knob until BEEP ON or BEEP 2ND appears on the LCD, release and press the Volume/Select knob again and I-VOL 30 will appear on the LCD. Now using the Volume/Select knob, adjust the Initial Volume to the desired setting. Once completed, wait 5 seconds for the unit to exit this mode.

Note: If the volume level is lower than the initial volume setting when audio unit is turned off, once the audio unit is switched back on again, the audio unit will remember the lower level and resume volume at that level.

Radio Frequency Area Selection

Different radio frequencies are used between countries. The frequency is set at the factory. In the event the frequencies are not set, use the following procedure.

- Push and hold the volume/select knob for approximately two seconds.
- Press MODE button repeatedly (3 times), until LCD shows AREA.
- Turn volume/select knob until the desired area appears in the LCD (USA or EUROPE).
- Press BAND button longer than 2 seconds, then release.

Operator's Manual

Beep ON, Beep 2ND Feature

BEEP ON: Every time you press a button, you will hear a beep sound.

BEEP 2ND: You will only hear beep sound if the button is held down for more than 2 seconds.

To change this feature, simply hold the Volume/Select knob down until BEEP ON or BEEP 2ND appears on the LCD. Within 5 seconds, turn the Volume/Select knob left or right to change the setting. Now wait 5 seconds for the unit to exit this mode.

Setting An Alarm

When the radio is off and the ignition switch is on, the alarm feature of the radio can be programmed as follows:

1. Press and hold the ALM button for about 2–3 seconds, ALARM ON or OFF appears on the LCD.
2. If the alarm is off, rotate the Volume/Select knob clockwise to turn on the alarm (ALARM ON).
3. Momentarily press the ALM button again; the hours digit flashes; rotate the Volume/Select knob to set the hours forward (clockwise) or backward (counterclockwise).
4. Momentarily press the ALM button again, the minutes digit flashes, rotate the Volume/Select knob to set the minutes forward (clockwise) or backward (counterclockwise) as desired.
5. Press the ALM button again, and ALM SET will appear on the LCD.

Weather Band

This audio unit provides access to the weather band for information purposes. When the WB button is pressed, “WB” appears on display and automatically searches and locks in the strongest signal station. When the WB button is pressed again, radio operation returns to the previous play mode.

The default mode of the WB function is seek tuning. In this mode, tuning the encoder volume button, the unit will search weather band for next strongest signal station.

Turn the TUNE button right or left to set the WB function to manual tuning.

All WB stations can be accessed by momentarily pressing one of preset buttons.

In WB mode, MODE button has no function until you exit from WB mode.

Note: In WB Mode, when the unit is in Auto tuning, the manual tuning has no effect.

Public Address (PA) Feature

The radio is equipped with two four-pin connectors on the rear panel that accept microphone inputs for public address (PA) type capabilities.

Microphone One (MIC 1)

When the microphone pres-to-talk switch is activated on microphone one (MIC 1), the current program audio output is interrupted, MIC 1 appears on the LCD and the microphone voice input can be heard through the speakers. When the microphone switch is released, the previous program audio output is restored and MIC 1 disappears from the LCD. Output level heard through the speakers is controlled with MIC 1 volume control.

Note: MIC 1 input uses CSS/CRC–103 series

Microphone Two (MIC 2)

When the microphone pres-to-talk switch is activated on microphone two (MIC 2), the current program audio output is interrupted, MIC 2 appears on the LCD and the microphone voice input can be heard through the speakers. When the microphone switch is released, the previous program audio output is restored and MIC 2 disappears from LCD. Output level heard through the speakers is controlled with the Radio volume control.

Note: MIC 2 input uses CSS/CRC–105 series and gooseneck type microphones.

MIC 2 volume levels will be memorized by the unit from previous set level during normal operation and when radio is turned off.

Operator's Manual

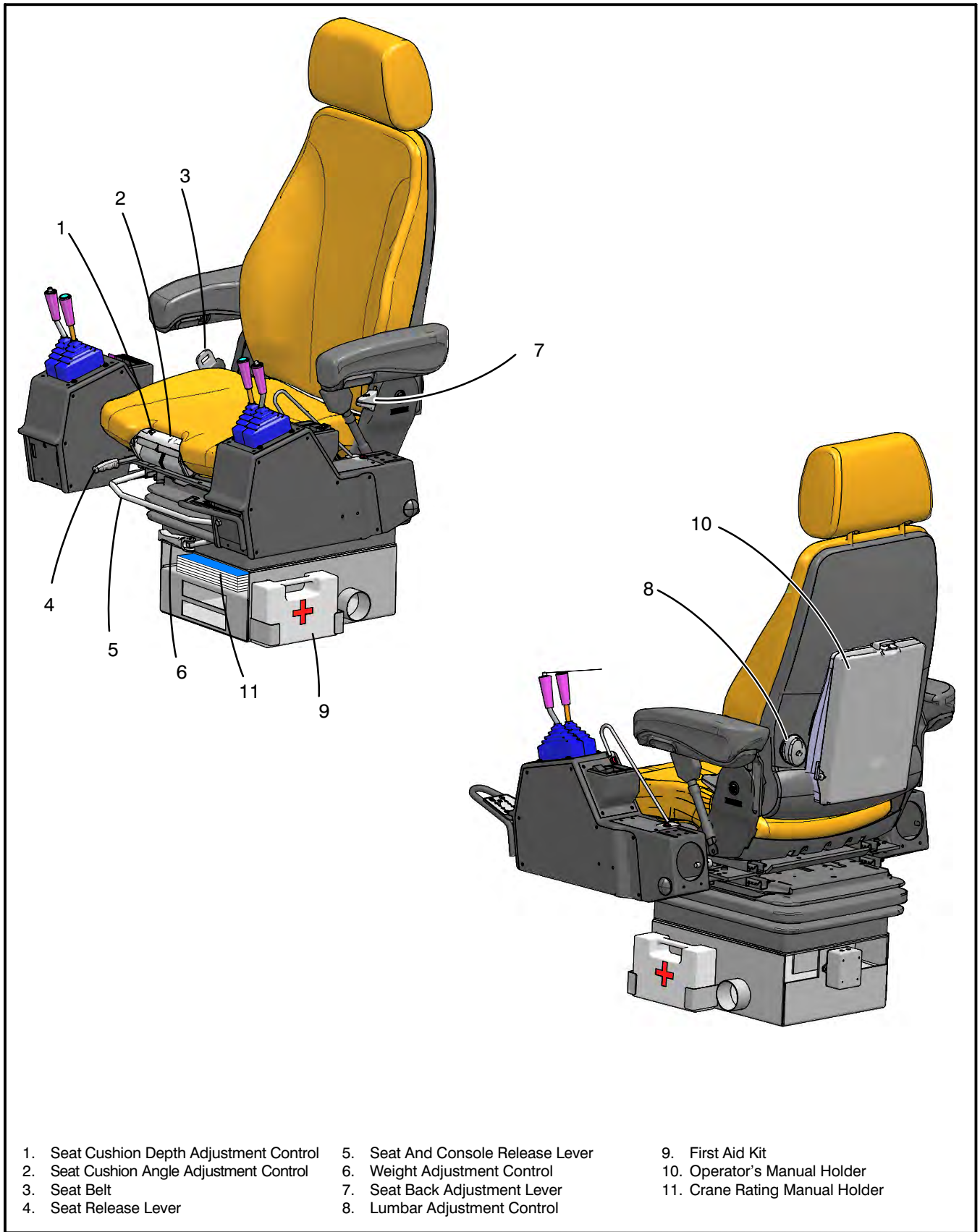


Figure 1–56
Operator's Seat

Operator's Manual

Operator's Seat

This 6-way adjustable seat is controlled by manual controls. Refer to Figure 1–56.



WARNING

Do not make seat or console adjustments while operating the crane or while crane is in motion. Discontinue operations and properly park crane before making adjustments.

Seat Height Adjustment

The seat height can be manually adjusted to three positions. With the seat in its lowest position, grab the seat and pull up until the seat latches in the first detent position. Pull it up again to latch it in the second detent position. Pull it up again and push it down to release the seat to the lowest position.

1. Seat Cushion Depth Adjustment Control

Use the seat cushion depth adjustment control to position the seat cushion to the desired depth.

2. Seat Cushion Angle Adjustment Control

Use the seat cushion angle adjustment control to position the seat cushion to the desired angle.

3. Seat Belt

A seat belt is provided and must be worn during all operations. To fasten the seat belt pull the belt out of the retractor and insert the tongue into the buckle until you hear a snap and feel the latch engage. Ensure the belt is not twisted and is fitting snugly across the hips, not around the waist.



WARNING

Always wear the seat belt while operating the crane. The seat belt must be snug and low across the hips.

4. Seat Release Lever

Pull the seat release lever up and hold. Position the seat as desired and release the lever to lock the seat in place.

5. Seat And Console Release Lever

Pull the seat and console release lever up and hold. Position the seat and console as desired and release the lever to lock the seat and console in place.

6. Weight Adjustment Control

The weight adjustment control is used to adjust the weight resistance for maximum driver comfort. Increase the weight resistance for a heavier operator or bumpy travel conditions; decrease for lighter operator or smooth travel conditions.

7. Seat Back Adjustment Lever

Raise the seat back adjustment lever and adjust the seat back to the desired position. Release the seat back adjustment lever to lock the seat back in place.

8. Lumbar Adjustment Control

Use the lumbar adjustment control to adjust the lumbar support in the lower back area of the seat.

First Aid Kit

The crane has a multi-purpose first aid kit to the left of the operator's seat. Refer to Figure 1–56.

Operator's Manual Holder

The Operator's Manual is stored on the back of the operator's seat. Refer Figure 1–56. This is a convenient storage place to ensure this Operator's Manual is kept with the crane at all times. **If this Operator's Manual becomes lost, damaged, or unreadable, it must be replaced before operating the crane.** Information contained in this Operator's Manual is important and failure to follow the information it contains could result in an accident. A replacement Operator's Manual can be ordered through a Link-Belt Distributor.

Crane Rating Manual Holder

The Crane Rating Manual is stored under the operator's seat. It is tethered to the seat to ensure it is kept with the crane at all times. **If the Crane Rating Manual becomes lost, damaged, or unreadable, it must be replaced before operating the crane.** Information contained in the Crane Rating Manual is important and failure to follow the information it contains could result in an accident. A replacement Crane Rating Manual can be ordered through a Link-Belt Distributor. Refer to "Crane Rating Manual And Serial Number" in Section 5 of this Operator's Manual for further information.

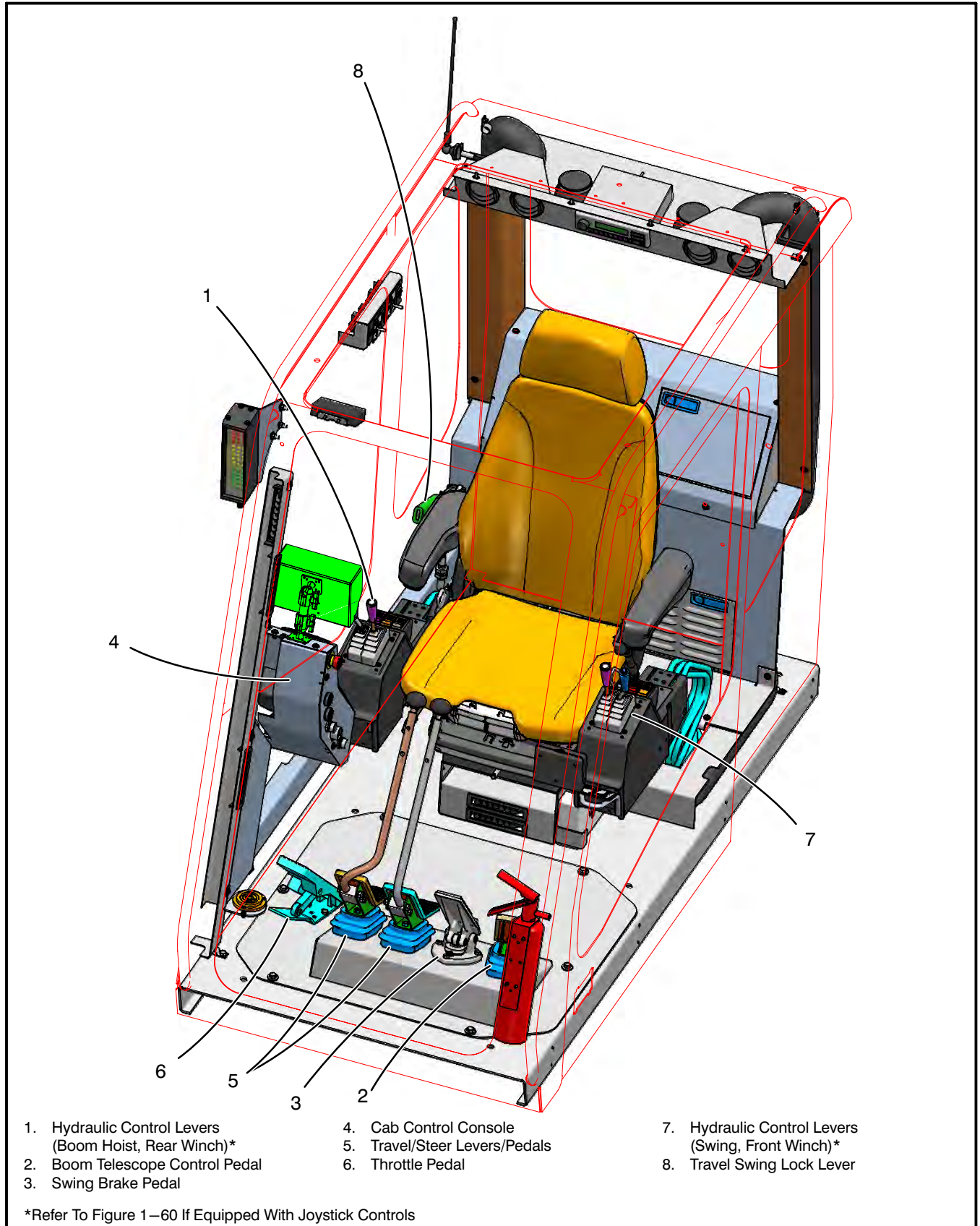


Figure 1–57
Crane System Controls

Operator's Manual



Crane System Controls

The following pages, along with Figure 1–57, give detailed instructions of individual controls related to crane operation. It is essential that the operator knows the function of each control and its duty in the overall operation of the crane.



WARNING

Read and understand all “Operating Safety” procedures as well as all other operating instructions in this Operator’s Manual before attempting to operate the crane. Operation of the crane by unqualified personnel may result in an accident.

Horn Button


The horn button is on the right control lever. Refer to Figure 1–54 or Figure 1–60 if equipped with joystick controls. To sound the horn, press the button.

Engine Throttle Controls

A foot throttle pedal is on the operator’s cab floor. To operate the foot throttle, press down to increase engine speed; release to decrease engine speed.

Throttle Lock System


The throttle lock system gives the operator the ability to set and hold a specific engine speed. Refer to Figure 1–58 for location of throttle lock controls. This provides the operator with more flexibility for certain job requirements.

With the Crane Control Display on the main working screen, lock the throttle by pressing the throttle pedal until the desired engine speed is reached and press and release the OK button. The locked  indicator should illuminate and engine should continue to run at a constant speed when the throttle pedal is released.

To increase throttle lock setting, press and hold the Up arrow button until desired engine speed is reached and release switch.

Note: With the throttle locked, the throttle pedal can still be depressed to increase engine rpm’s and will return to throttle lock setting when released.

To decrease throttle lock setting, press and hold the Down arrow button until desired engine speed is reached and release switch.

With the Crane Control Display on the main working screen, return the engine speed to idle by pressing and releasing the OK button. The unlocked  indicator should illuminate.

Note: The throttle lock system is deactivated anytime the ignition switch is turned off.

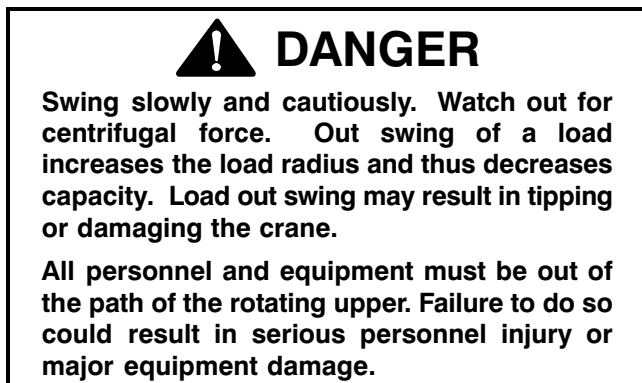


Swing System



Rotation of the upper, over the lower, is controlled by the swing system. Use the following controls to operate the swing functions of the crane.

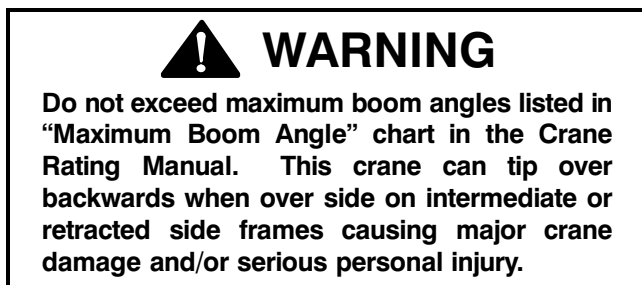
Swing Brake Pedal

The swing brake pedal is used to stop rotation of the upper over the lower. To apply the swing brake, push down on the swing brake foot pedal. To release the swing brake, release the swing brake foot pedal.



Swing Control Lever

The control lever, on the left side of the operator's seat, is used to operate the swing function of the upper. Move the control lever to the  position to swing left; move it to the  position to swing right. Anytime the swing lever is engaged, an audible alarm will sound and visual lights will flash to alert ground personnel of the swinging upper.



To Swing The Upper

1. Compare the boom configuration and length to the appropriate capacity chart in the Crane Rating Manual. Position the boom safely within the limits specified on the capacity chart.
2. Fully apply the swing brake pedal and release the swing park brake and/or travel swing lock. Check that the swing park brake indicator light on the Crane Control Display goes out.
3. Release the swing brake pedal as you begin to engage the swing control lever.

To Stop Upper Swing

1. Ease swing control lever into the neutral position.
2. Apply the swing brake to bring the upper to a complete stop.
3. Engage the swing park brake and/or travel swing lock as required. Check that the swing park brake indicator light on the Crane Control Display illuminates.
4. Check engagement of the swing park brake by trying to swing right, then left. The upper should not swing.


Travel Swing Lock

Use the travel swing lock to lock the upper directly over either the front, rear, or either side of the lower. The travel swing lock will engage in these four positions only. Use of the travel swing lock is mandatory when transporting or lifting the crane.


To Release The Travel Swing Lock

1. Fully apply the swing brake pedal.
2. Pull the travel swing lock lever up and to the left.

Note: In order to release the travel swing lock, it may be necessary to swing the upper slightly to relieve the pressure on the swing lock pin.

3. Pull the travel swing lock lever all the way up and then to the right and release. The lever should remain in the released  position.

To Engage The Travel Swing Lock

1. Position the upper directly over either the front, rear, or either side of the lower. Fully apply the swing brake pedal.
2. Pull the travel swing lock lever up and to the left. Then push the lever down and to the right to the locked  position.

Note: In order to engage the travel swing lock, it may be necessary to swing the upper slightly to align the swing lock pin and retaining ring on the lower deck.

3. Check the engagement of the travel swing lock by trying to swing the upper right, then left. The upper should not swing.

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Swing Park Brake

The swing park brake is a multiple disc type brake and is used for holding the upper, in any position, over the lower during normal crane operations. An indicator light on the Crane Control Display will illuminate when the swing park brake is applied. For switch location, refer to Figure 1–54 or Figure 1–60 if equipped with joystick controls.

To Release The Swing Park Brake

1. Fully apply the swing brake pedal.
2. Push the swing park brake switch on the left control lever. The indicator light will go out.

To Apply The Swing Park Brake

1. Rotate the upper to the desired position over the lower. Apply the swing brake pedal to bring the upper to a complete stop.
2. Push the swing park brake switch on the left control lever. Indicator light will illuminate.

CAUTION

Do not attempt to apply swing park brake with the upper in motion. This practice will result in damage to the swing mechanism. Use the swing brake pedal to stop rotation of upper.

3. Check engagement of swing park brake by trying to swing upper right, then left. Upper should not swing.

Wire Rope Winch System

This system controls raising and lowering the winch wire rope(s). The system is equipped with a two speed motor that, when activated, will approximately double winch wire rope(s) speed. The controls for the system are shown in Figure 1–54, Figure 1–57, and/or Figure 1–60 if equipped with joystick controls. Review the following for control descriptions and a brief summary of operation.

WARNING

Cold weather operation of the winch requires a warm-up procedure. Failure to properly warm-up the winch may result in brake slippage. Warm-up the winch before beginning crane operations.

Warm-Up Procedure

A warm-up procedure is recommended at each start-up and is essential at ambient temperatures below 40°F (4°C). Allow the engine to run at idle speed and the winch control lever(s) in neutral for several minutes. Once the hydraulic oil begins to warm, operate the winch at low speed, with no load, lifting and lowering only the hook block or hook ball until warm oil circulates throughout the winch.





WARNING

The weight of the load must be known before making a lift. Compare the load weight to the appropriate capacity chart in the Crane Rating Manual to ensure compliance with capacity ratings. Compare the load weight to the Wire Rope Capacity Chart in the Crane Rating Manual to determine the number of parts of line required to lift the load. Rig and set up the crane to ensure compliance with both the appropriate crane capacity chart and Wire Rope Capacity Chart in the Crane Rating Manual. Properly set the Rated Capacity Limiter to the correct crane configuration.



Do not lift a load to the point where the hook block, hook ball, or load contacts the head machinery. “Two blocking” could damage the hook block, hook ball, and/or the head machinery. Always keep the hook block, hook ball, and load a safe distance from the boom.

Front Winch Control Lever (If Equipped)

This lever controls the front winch drum. Pull this control lever back to the  position to lift the load. Push this control lever forward to the  position to lower the load. Refer to “Winch Operation” in this Section of this Operator's Manual for more specific instructions.

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Rear Winch Control Lever

This lever controls the rear winch drum. Pull this control lever back to the  position to lift the load. Push this control lever forward to the  position to lower the load. Refer to “Winch Operation” in this Section of this Operator's Manual for more specific instructions.

Winch Operation

The following is a brief description of the basic procedure for operating the wire rope winch. Crane operations are to be performed only by a qualified operator who has read and fully understands the entire content of this Operator's Manual.

To Lift A Load: Position head machinery directly above the load. Attach the hook block or hook ball to the load. Pull the control lever back, toward the operator.

Note: When both winch levers are activated simultaneously, the winch line requiring the most line pull may not function.




To Hold A Load: Return the control lever to the neutral position. The automatic brake in the winch system should hold the load in position.

To Lower A Load: Push the control lever forward. Return the control lever to neutral to stop the load.

Winch Control Switch(es)

These switches are used to control engaging/disengaging the high/low speed hoist and disabling the front or rear winch. Refer to Figure 1–54.

High Speed Hoist Or Lower

Move the control lever to the neutral position to bring the load to a complete stop. Press the winch control switch to the high speed () position. Move the control lever to the  or  position. The high speed hoist will activate after engaging the control lever.

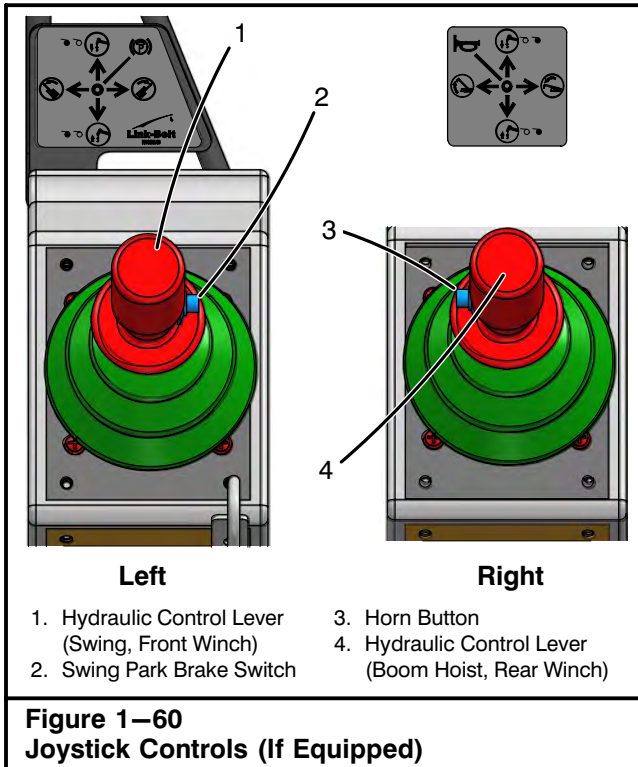
Note: Using the high speed hoist reduces the maximum line pull by approximately one half. It is recommended that the high speed hoist button be activated before engaging the winch control lever(s).



WARNING

Do not activate the high speed hoist if the line pull exceeds the available high speed winch line pull. Crane damage can occur. Always refer to the Crane Rating Manual for the winch available line pulls before lifting or lowering any load.

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To Return To Standard Winch Mode: Move the control lever to the neutral position to bring the load to a complete stop. Press winch control switch(es) to the low speed () position. Move the control lever to the () or () position. Standard winch mode will activate after engaging the control lever(s).

Winch Disable

Press the winch control switch(es) to the disable () position to disable the winch(es) to prevent inadvertent operation of the winch(es) while using the control levers to perform other operations.

Drum Rotation Indicators

This system is used to monitor winch drum speeds through the use of a mechanical signaling device mounted inside each of the winch control levers. To activate the system, push the bottom part of the drum rotation indicator switch (), on the right seat console (Refer to Figure 1-54), to the “ON” position (indicator within the switch will illuminate). Place your thumb over the end of the control lever being used. As the winch drum rotates, a mechanical signal will be felt with your thumb. The pulse rate of the mechanical signal is a direct indication of the winch drum speed. However, when the pulse rate reaches 20 per second, the signal will stop increasing. Push the top part of the drum rotation switch to deactivate the system.

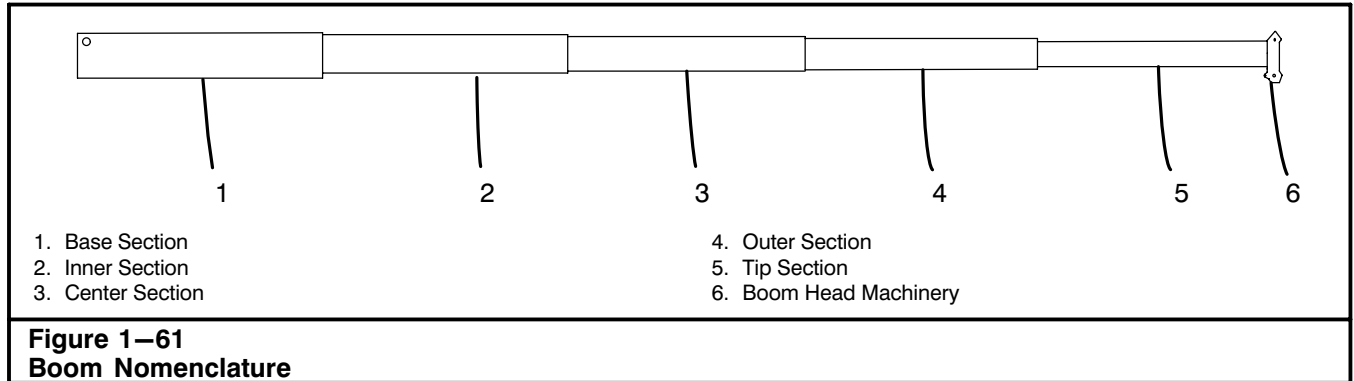
First Layer/Third Wrap Indicator (If Equipped)

The crane may be equipped with a first layer/third wrap indicator system. This system allows the operator to monitor the wire rope windings on the drum(s). When the system is enabled, the audible alarm will sound intermittently, and “First Layer” will appear in the warning message area of the RCL Display to alert the operator when the wire rope is down to the first layer on the winch drum(s). The audible alarm will sound continuously, and “Third Wrap” will appear in warning message area of the RCL Display to alert the operator when the wire rope is down to the third wrap on the winch drum(s). If enabled and activated, the winch down function will also cutout with the third wrap alarm. In order for the system to operate correctly, it must be kept calibrated. Refer to First Layer/Third Wrap Calibration in Section 3 of this Operator’s Manual for calibration procedures.



WARNING

Three (3) full wraps of wire rope must be maintained on the winch drum(s) at all times during operation. Wire rope failure may occur.




Boom Hoist System

Raising and lowering the boom is controlled by the boom hoist control lever on the right console. Refer to Figure 1–57 or Figure 1–60 if equipped with joystick controls.




WARNING

Do not exceed maximum boom angles listed in “Maximum Boom Angle” chart in the Crane Rating Manual. This crane can tip over backwards when over side on intermediate or retracted side frames causing major crane damage and/or serious personal injury.

To raise the boom (boom up): Pull the boom hoist control lever back toward the operator to the  position. (If equipped with joystick controls, move the lever to the left.)

CAUTION

When the hoist line is tied off to the crane or any solid object, the winch system can be overloaded causing major winch, wire rope, or crane damage. Do not extend, raise, or lower the boom unless wire rope is spooled off the drum(s) to prevent tension on the wire rope(s).

To Lower The Boom (Boom Down): Push the boom hoist control lever forward away from the operator to the  position. (If equipped with joystick controls, move the lever to the right.)

CAUTION

Wire rope must be spooled off the winch drum(s) as the boom is lowered. Failure to do so may cause two blocking.

To Stop The Boom: Ease the boom hoist control lever into the center (neutral) position.

Boom Telescope System

The crane is equipped with a five section full power boom. The five section boom consists of a base, inner, center, outer, and a tip section. Refer to Figure 1–61.

The telescoping feature of the boom sections is operated through the use of three hydraulic cylinders and a cable/sheave mechanism which are an integral part of the boom assembly. The boom can be extended or retracted to the desired length using the boom telescope pedal in the operator's cab. Refer to Figure 1–57. The telescope feature has three modes of operation. Refer to Figure 1–62.

Note: Boom must be fully retracted before changing boom modes.

Boom Mode “Amax1”: When using boom mode “Amax1” only the inner and center sections telescope simultaneously. This mode offers increased strength capacities. Select this mode through the RCL System.

Boom Mode “Amax2”: When using boom mode “Amax2” only the center, outer, and tip sections telescope simultaneously. This mode offers increased stability capacities. Select this mode through the RCL System.



Boom Mode “Standard”: When using boom mode “Standard” all power boom sections extend/retract simultaneously. This mode offers full boom extension. Select this mode through the RCL System.




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Boom Telescope Control Pedal

Figure 1–57 shows the location of the telescope control pedal in the operator's cab. Depress the toe of the telescope control pedal to extend the boom. Depress the heel of the telescope control pedal to retract the boom. Use the telescope mode in conjunction with the telescope control pedal to extend the boom sections to the desired length.

Boom Telescope Override Switches

Boom telescope override switches are provided to manually override the telescope system if the boom is not extending/retracting proportionally. These switches are to be used for that purpose only. Press the  switch to enter telescope override mode. For all boom modes, move the  switch to one of the three positions to override its corresponding boom section so the boom can be extended/retracted proportionally. Refer to Figure 1–54 for switch location. Each position of the switch is defined as follows:

-  Top position of the switch will override the inner and center sections allowing only the tip and outer sections to extend and retract.
-  Center position of the switch will override the inner, outer, and tip sections allowing only the center section to extend and retract.
-  The bottom position of the switch will override the center, outer, and tip sections allowing only the inner section to extend and retract.

To Extend The Boom Sections

1. Park the crane on a firm level surface.
2. Review the appropriate capacity chart in the Crane Rating Manual to establish boom length, angle, and load limitations.

Note: Boom must be fully retracted before changing boom modes.

3. Set the RCL System to the desired telescope mode.

CAUTION

When the hoist line is tied off to the crane or any solid object, the winch system can be overloaded causing major winch, wire rope, or crane damage. Do not extend boom, raise or lower the boom, or raise the crane on outriggers unless wire rope is spooled off the drum (s) to prevent tension on the wire rope(s).

4. Depress the toe of the telescope control pedal.

CAUTION

Wire rope must be spooled off the winch drum(s) as the boom is extended. Failure to do so may cause two blocking.

5. Stop the boom sections by releasing the telescope control pedal.

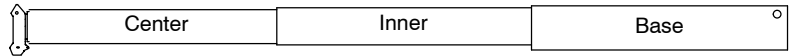
Note: The telescope control pedal is spring loaded and should return to the neutral position when released.

To Retract The Boom Sections

1. Depress the heel of the telescope control pedal.
2. Stop the boom sections by releasing the telescope control pedal.

Boom Mode “Amax1”

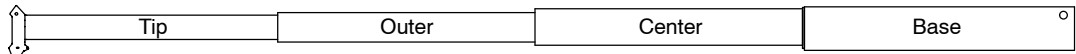
Inner (T1) and center (T2) sections telescope simultaneously.



Telescope Length (Ft.)		Boom Length (Ft.)
0	0	40
5.0	5.0	50
10.0	10.0	60
15.0	15.0	70
20.0	20.0	80
25.0	25.0	90
27.5	27.5	95

Boom Mode “Amax2”

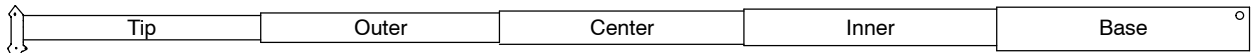
Center (T2), outer (T3), and tip (T4) sections telescope simultaneously.



Telescope Length (Ft.)			Boom Length (Ft.)
0	0	0	40
3.33	3.33	3.33	50
6.66	6.66	6.66	60
10.00	10.00	10.00	70
13.33	13.33	13.33	80
16.66	16.66	16.66	90
20.00	20.00	20.00	100
23.33	23.33	23.33	110
27.50	27.50	27.50	122.5

Boom Mode “Standard”

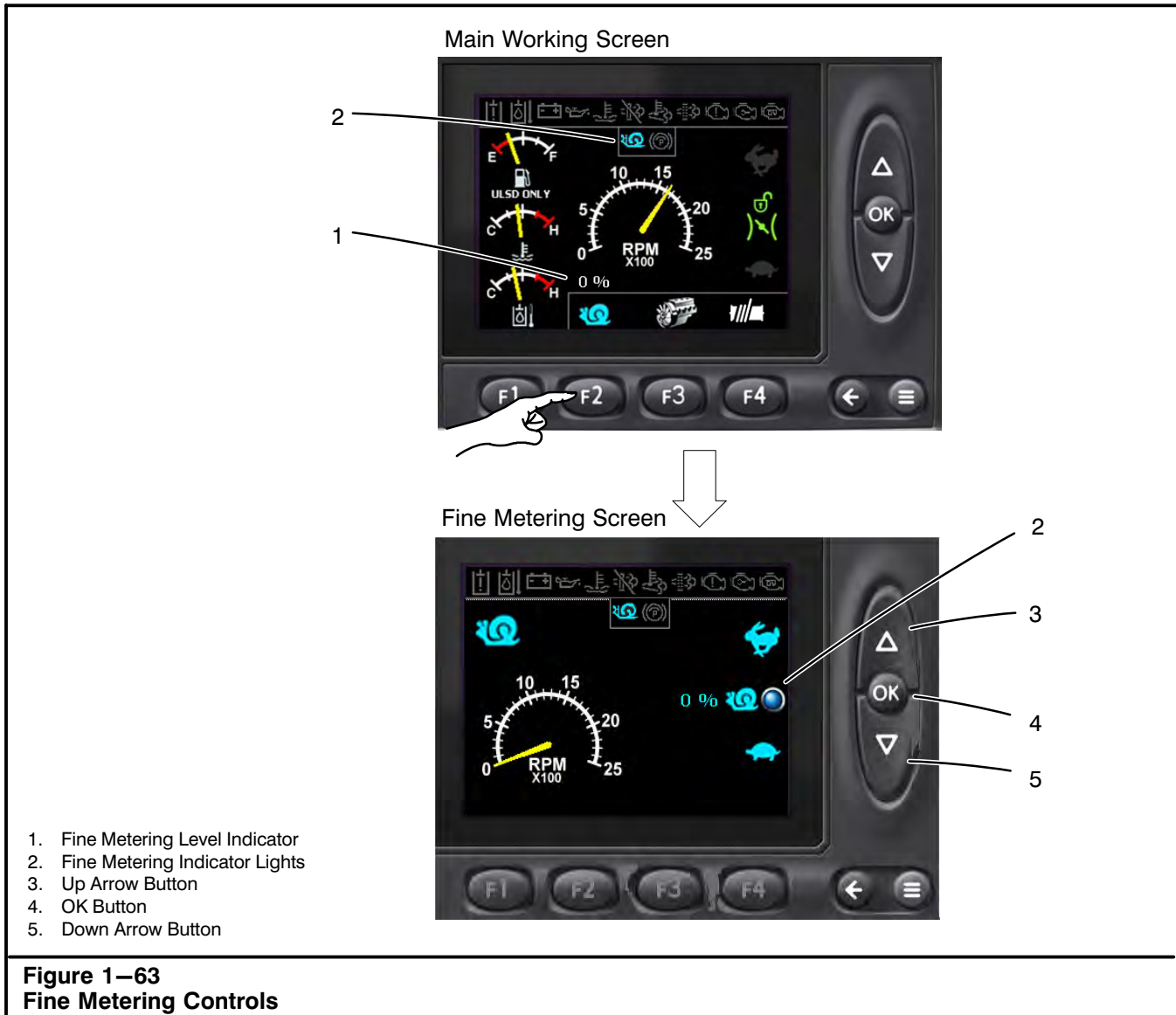
Inner (T1), center (T2), outer (T3), and tip (T4) sections telescope simultaneously.



Telescope Length (Ft.)				Boom Length (Ft.)
0	0	0	0	40
2.5	2.5	2.5	2.5	50
5.0	5.0	5.0	5.0	60
7.5	7.5	7.5	7.5	70
10.0	10.0	10.0	10.0	80
12.5	12.5	12.5	12.5	90
15.0	15.0	15.0	15.0	100
17.5	17.5	17.5	17.5	110
20.0	20.0	20.0	20.0	120
22.5	22.5	22.5	22.5	130
25.0	25.0	25.0	25.0	140
27.5	27.5	27.5	27.5	150

Figure 1–62
Boom Telescope Modes

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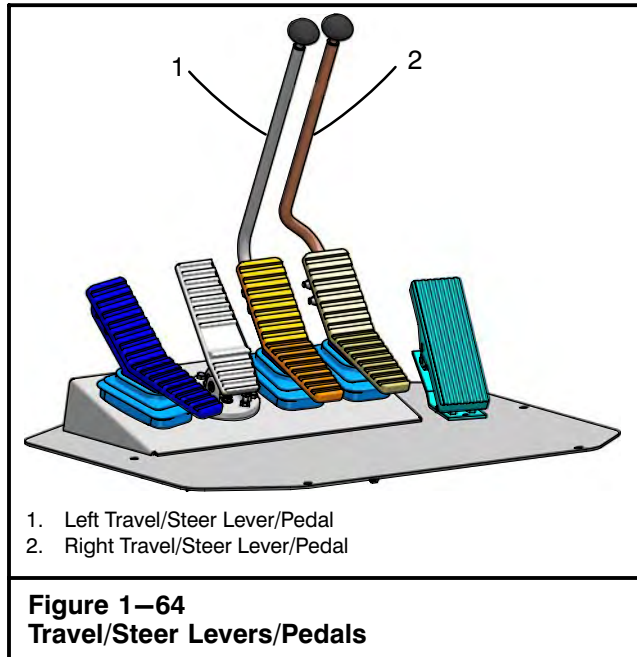


Fine Metering Control



The hydraulic control system is equipped with a fine metering mode. Refer to Figure 1-63. Fine metering allows very slow movements of the main and auxiliary winches, boom hoist, and telescope functions enabling the operator more precise movement of the load when required for precision work. Fine metering can be adjusted on a scale from 20 to 100%. An indicator light on the main working screen will illuminate to alert the operator that the fine metering system has been enabled and a level indicator alerts the operator to the set fine metering level. Use the following procedure to adjust the fine metering system.

1. From the main working screen, press the Function Key F2 to bring up the fine metering screen.

2. From the fine metering screen, press the OK button to activate the fine metering system. Indicator lights will illuminate
3. Press the Up or Down Arrow button to adjust the fine metering to the desired level.
4. Press the Back (←) button to return to the main working screen.

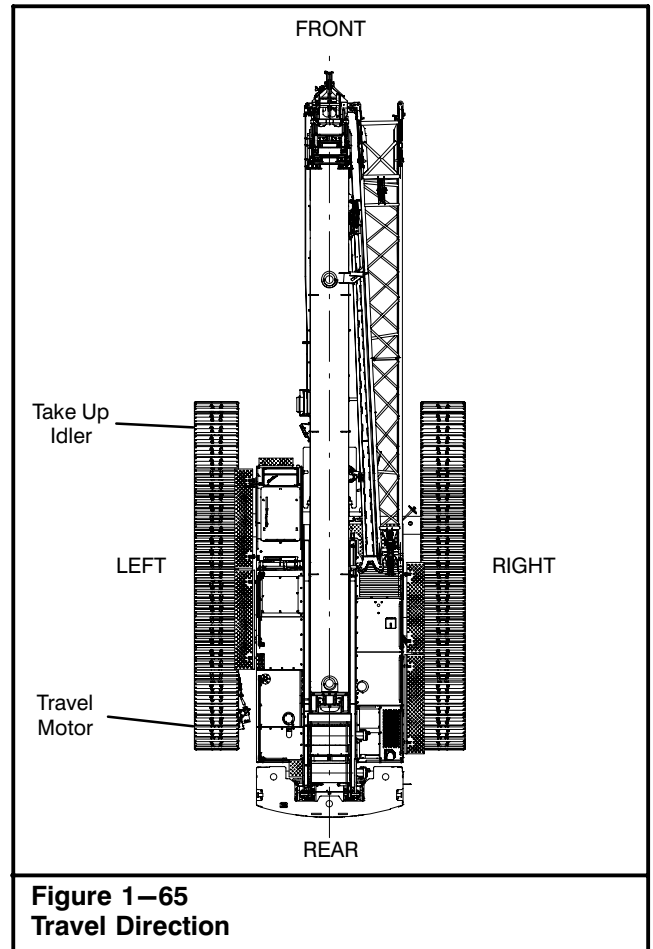


Steering And Traveling The Crane

Traveling the crane is controlled by the travel/steer levers/pedals. Refer to Figure 1-64. The sequence of engaging these controls is critical to ensure smooth travel operation. The travel control system employs a two speed travel which can be utilized to provide the operator with two speeds of crane travel. Place the travel control switch on the Crane Control Console (Figure 1-42) in the  position for high speed or in the  position for standard speed. Travel speed is proportional to lever/pedal movement with a top speed of 2.0 mph (3.2km/h). Anytime the travel lever(s)/pedal(s) is/are engaged, an audible travel alarm will sound. The travel brakes are a spring applied, hydraulically released multiple disc type which are automatically applied when the travel/steer levers/pedals are returned to the neutral position. To travel and steer the crane along a firm, level route, proceed as follows:

Note: The following instructions are based on traveling the crane with the travel motors to the rear. Directional arrows are located on each side frame to assist in determining front/rear location. When the travel motors are in front, the right and left travel/steer levers/pedals operation must be reversed.

1. Always take time to choose the safest, most level route.
2. Designate a signal person to guide the operator along the route. Ensure the travel alarm is working properly. Use the horn as a signal. Use a code such as one beep – stop, two beeps – forward, and three beeps – backward. Ensure everyone on the job site knows the codes.



3. Position the upper directly over the end of the lower and engage the travel swing lock.
4. **To travel the crane forward or backward:** Push both travel/steer levers/pedals in the desired direction simultaneously. Release of the spring loaded travel levers/pedals will automatically return the levers/pedals to the neutral position and will also apply the travel brakes.

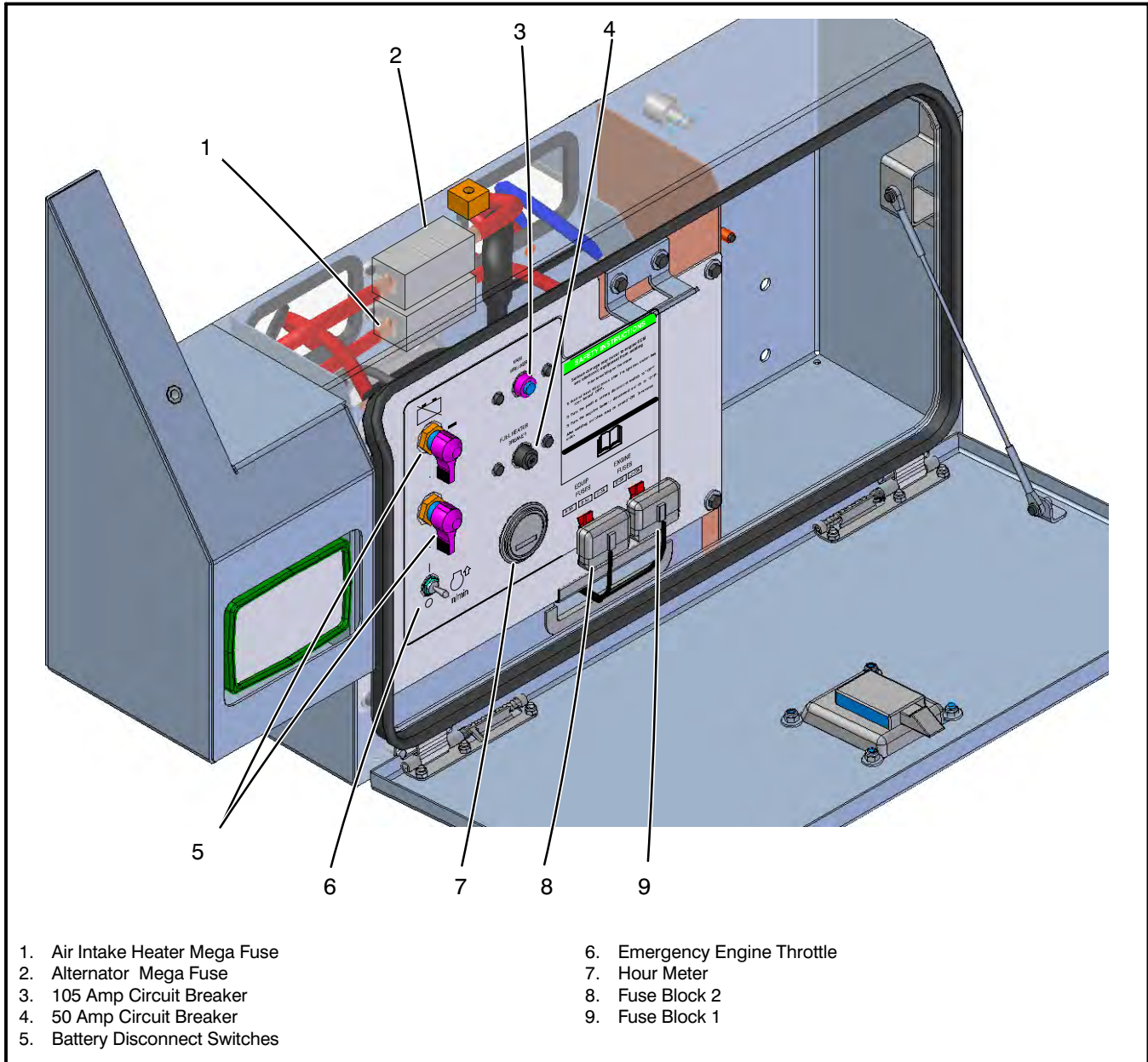
To steer the crane to the right: Push the left travel/steer lever/pedal forward while leaving the right travel/steer lever/pedal in the neutral position.

To steer the crane to the left: Push the right travel/steer lever/pedal forward while leaving the left travel/steer lever/pedal in the neutral position.

To spin turn (counter-rotate): Push one travel/steer lever/pedal forward while pulling the opposite one to the rear. The direction of rotation will depend on the direction the travel/steer levers/pedals are pushed.

To Stop: Release the travel/steer levers/pedals.

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- | | |
|--------------------------------|------------------------------|
| 1. Air Intake Heater Mega Fuse | 6. Emergency Engine Throttle |
| 2. Alternator Mega Fuse | 7. Hour Meter |
| 3. 105 Amp Circuit Breaker | 8. Fuse Block 2 |
| 4. 50 Amp Circuit Breaker | 9. Fuse Block 1 |
| 5. Battery Disconnect Switches | |

Figure 1–66
Power Panel

Power Panel

The power panel is in front of the battery box on the right front side of the crane. Refer to Figure 1–66. The power panel contains two resettable type circuit breakers that service the crane's electrical system as follows:

- 105 amp resettable circuit breaker (Main) Upper Fuses (Item 4).
- 50 amp resettable circuit breaker Fuel Heater (Item 5).

Emergency Engine Throttle

The emergency engine throttle activates when there is a loss of communication between the engine and crane control display or if there is a failure of the crane control display. When activated, the engine goes to 1300 rpm's.

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Hour Meter

The hour meter is on the power panel. Refer to Figure 1–66. The hour meter registers engine operating hours. It is useful in determining lubrication and maintenance schedules.

Battery Disconnect Switches

The battery disconnect switches are on the power panel. Refer to Figure 1–66.

CAUTION

Ignition switch should be shut off at least 60 seconds prior to turning battery disconnect switches to the "OFF" position.

Major damage may occur to the electronic equipment from welding on the crane prior to turning battery disconnect switches to the "OFF" position.

Ignition switch should be shut off at least 60 seconds prior to turning battery disconnect switches to the "OFF" position. Move the battery disconnect switches to the "OFF" position before welding on the crane to protect the crane's electronic components from damage due to an electric arc type welder. Move the positive disconnect switch to the "OFF" position first, then the negative. Reverse order to turn back on.

Note: If the batteries are disconnected, the start-up time for on-board computer systems will be longer than normal.

Fuse Blocks

There are fuse blocks on the power panel. Refer to Figure 1–66. The fuse blocks contain fuses which protect the crane's electrical system. Each fuse has a letter designation which corresponds to the upper electrical system as shown on the power panel label and the following chart.

Fuse Block Identification			
Fuse Block	Amp	Qty	Circuit
1	5	1	Engine Control Module (ECM)
	30	1	
2	5	1	Linde Hydraulic ECM
	5	1	Hour Meter
	5	1	Crane Control Module

Mega Fuses

There are two mega fuses located behind the power panel. Refer to Figure 1–66. These fuses protect the alternator and engine intake air heater electrical circuits. If these system are not functioning, check and replace these fuses as required.

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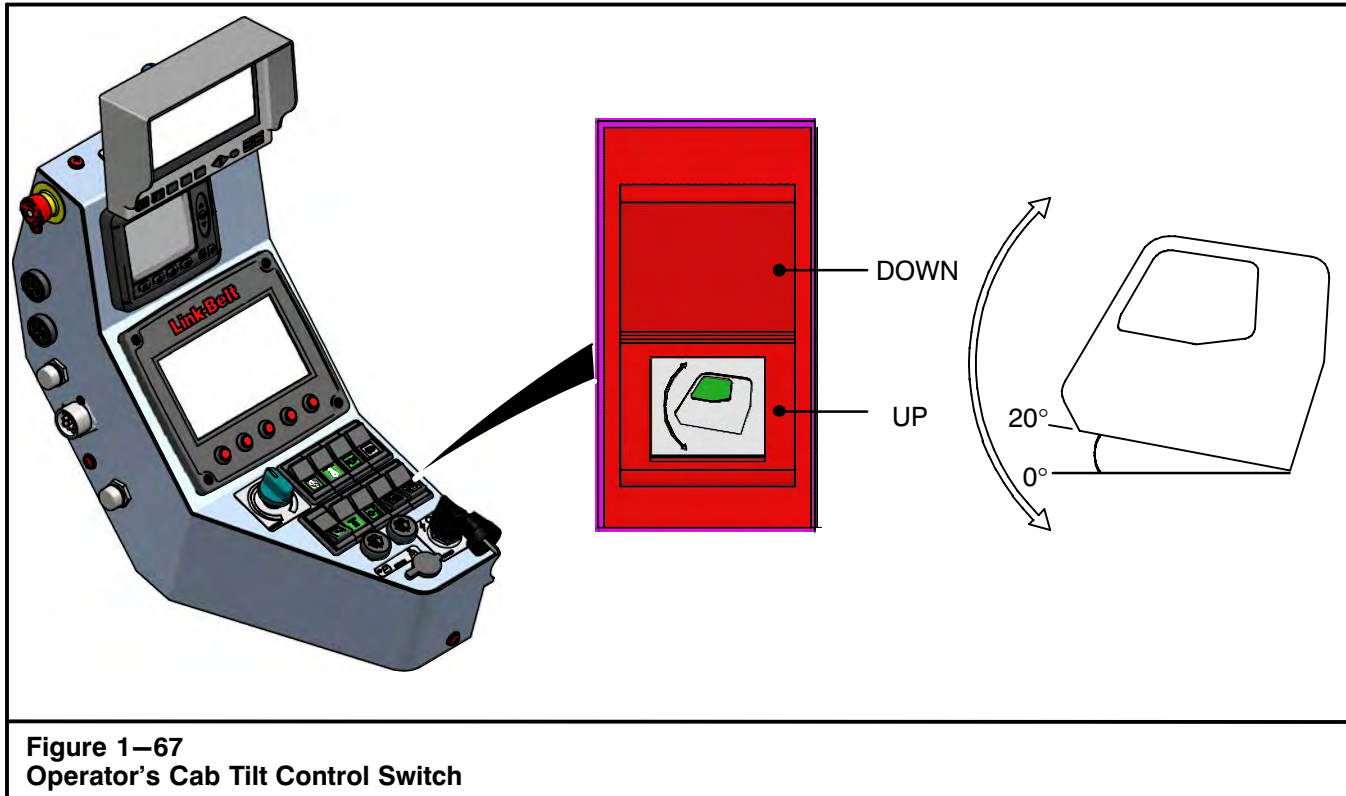


Figure 1–67
Operator's Cab Tilt Control Switch

Cab Tilt Operation

The operator's cab tilts up from 0 to 20 degrees above horizontal to improve vertical visibility and help to reduce operator fatigue due to neck strain when at high boom angles. Use the three position momentary switch on the cab control console to operate the cab tilt function. Refer to Figure 1–67.

Cab must be returned to its horizontal, 0 degree position, before exiting the cab. An alarm will sound if the left arm rest is raised and the cab is tilted above 0 degrees.

Before operating the cab tilt feature, the operator's cab door must be secured in the fully closed or fully open position.

Tilting the Upper Operator's Cab


- Push the bottom part of the switch and hold to raise the cab. Release switch to stop.
- Push the top part of the switch and hold to lower the cab. Release switch to stop.

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Operating In Wind Or Lightning

Avoid working a crane in high winds and when there is a likelihood of lightning. Rated lifting capacities do not account for the effects of wind on a suspended load or the boom. Lifting capacities should be considered acceptable for wind speeds up to 20 mph (32km/h) and appropriately reduced for wind speeds greater than 20 mph (32km/h). If you must work in a wind, reduce capacities to those listed in "Wind Restrictions Guide" in the Crane Rating Manual. Wind blowing against the load and the boom produces a side load on the boom and reduces its capacity. When lifting loads which have large surface areas in a wind, such as building panels, the movement of the load may pose a danger

to workers or building structures. Out swing of a load will increase the load radius, and may overload the crane. This could lead to boom failure or the crane tipping. Monitor the wind speed using a wind speed indicator or the "Wind Scale" chart below. Stop lifting operations, ground the load and fully retract and lower the boom to horizontal if wind speed exceeds the maximum allowed listed in "Wind Restrictions Guide" in the Crane Rating Manual. Use the following "Wind Scale" chart as a general guide.



DANGER

If there is a likelihood of lightning, immediately stop lifting operations, ground the load, and fully retract and lower the boom.

Wind Scale				
Wind Speed		Wind Strength		Inland Wind Effect
mph	km/h	Beaufort Scale	WMO* Description	
<0.6	<1	0	Calm	Calm, smoke rises vertically.
0.6 to 3.1	1 to 5	1	Light Air	Smoke drift indicates wind direction, wind vanes remain still.
3.7 to 6.8	6 to 11	2	Light Breeze	Wind felt on face, leaves rustle, wind vanes begin to move.
7.4 to 11.8	12 to 19	3	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended.
12.4 to 17.4	20 to 28	4	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move.
18.0 to 23.6	29 to 38	5	Fresh Breeze	Small trees in leaf begin to sway. Crested waves form on inland waters.
24.2 to 30.4	39 to 49	6	Strong Breeze	Larger tree branches moving. Telephone wires whistle. Umbrellas used with difficulty.
31.1 to 37.9	50 to 61	7	Near Gale	Whole trees moving. Resistance felt walking against wind.
38.5 to 46.0	62 to 74	8	Gale	Breaks twigs off trees. Resistance felt walking against wind.
46.6 to 54.1	75 to 87	9	Strong Gale	Slight structural damage. Slate blows off roofs.
54.7 to 62.8	88 to 101	10	Storm	Trees broken or uprooted. Considerable structural damage.

* World Meteorological Organization

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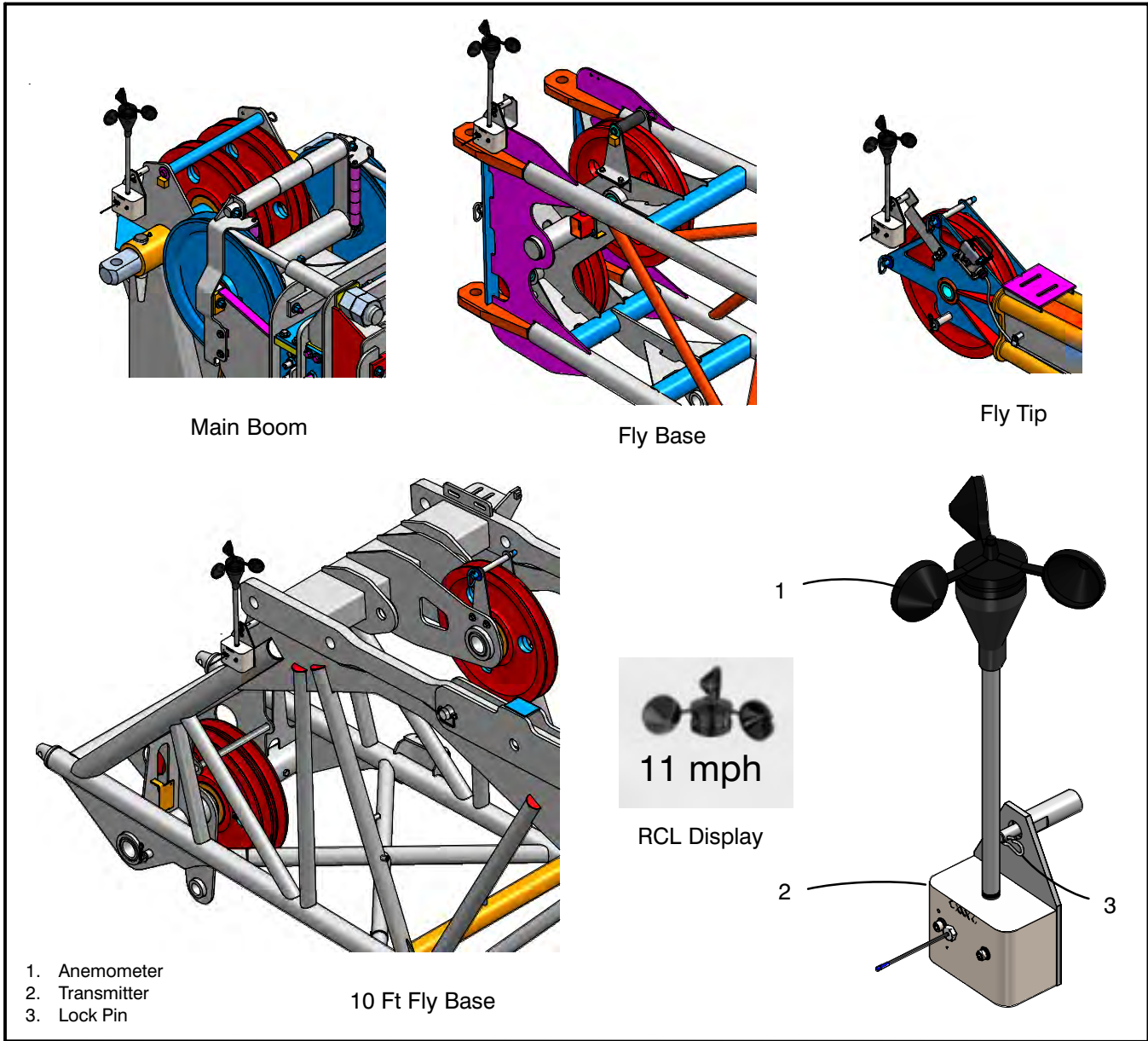


Figure 1-68
Wind Speed Indicator

Crane Monitoring System

A crane monitoring system is used for monitoring boom length, boom angle, load weight, and two block situations.

Wind Speed Indicator

The crane is equipped with a wireless wind speed indicator integrated into the Rated Capacity Limiter System. The indicator is used to monitor wind speeds at the main boom head or the fly head when erected. Refer to Figure 1-68. An anemometer mounted on the boom or fly head transmits wind speed data to the

display unit in the operator's cab. Refer to "Wind Restrictions Guide" in the Crane Rating Manual for more information on wind speed restrictions.

CAUTION

Remove the anemometer assembly from the boom and/or fly head during transport to prevent damage to the unit.

Boom Angle Indicator

A bubble type boom angle indicator is mounted to the right of the operator's cab on the base section of the boom. Refer to Figure 1–69. It must be adjusted properly and the crane must be level for the unit to accurately indicate boom angles. Even under these conditions its readings are only approximate. When making near capacity lifts, measure the load radius to determine crane capacity. Check the adjustment of the boom angle indicator daily to ensure its accuracy. Refer to “Boom Angle Indicator Adjustment” in Section 3 of this Operator's Manual.

Anti-Two Block Warning System

Integrated into the Rated Capacity Limiter System is an anti-two block (ATB) warning system. An anti-two block warning system is an electromechanical system designed to alert the operator before the hook block, hook ball, or load contacts the head machinery of the main boom, auxiliary lifting sheave, or fly. When a two block situation is imminent, an audio/visual alarm is activated to alert the operator of the pending danger. When the alarm activates it is essential that the operator discontinue operations immediately, and correct the two block situation.

Three basic components are used to make up the anti-two block system. The anti-two block weight, anti-two block switch with lockout clip, and the display unit in the operator's cab. Refer to Figure 1–70 and Figure 1–71.

An anti-two block weight is suspended from the head machinery switch(es) where lifts are to be made and is used to hold the switch(es) in the “working” position. When the anti-two block weight is lifted by the hook block, hook ball, or load, it allows the switch to activate the audio/visual alarm on the display unit in the operator's cab. In addition to the audio/visual alarm, function limiters will be activated.

CAUTION

Do not allow the load to spin out of control when hoisting. The anti-two block weight may become entangled with the wire rope and could damage the anti-two block system, wire rope, or boom. Use rotation resistant wire rope during single part line hoisting applications, especially when long fall lifts are involved.

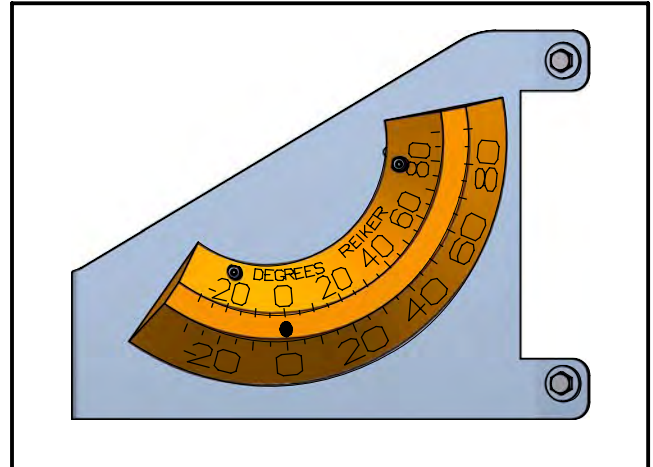


Figure 1–69
Boom Angle Indicator

The added feature of hydraulic function limiters, prevents the operator from continuing crane functions which will cause a two block situation to occur. The crane functions of winch up, boom down, and boom extend are disabled when the anti-two block weight is lifted. These functions will remain disabled until the two block situation is corrected or the “Cancel Alarm” button on the display unit is pressed and held to override the system.

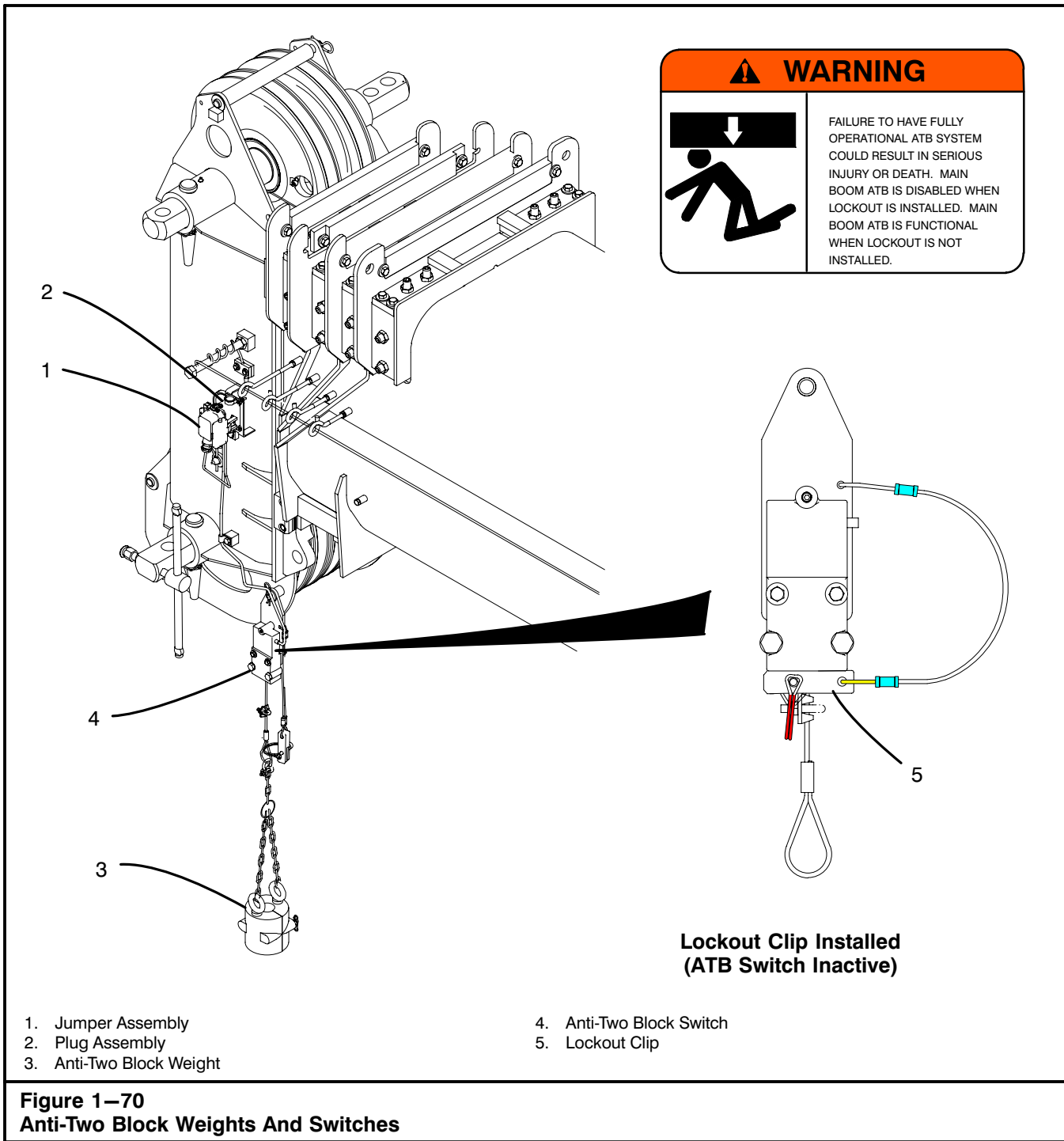
Note: Push the “Cancel Alarm” button momentarily once to silence the audible alarm. Press and hold the “Cancel Alarm” button to temporarily override the system.

The main boom head must always have an anti-two block switch. Each of the added attachments used on the crane must employ a similar head machinery switch as well, in order for that particular attachment to be monitored by the system.

The plug assembly is connected to the jumper assembly on the boom head when operating from the main boom. It is connected to the jumper assembly on the attachment when operating from that attachment.

Check that all the harness connections between the attachments are properly connected and test the system before beginning operations. Test the system by manually lifting the ATB weight and verifying that the functions of winch up, boom down, and boom extend are disabled.

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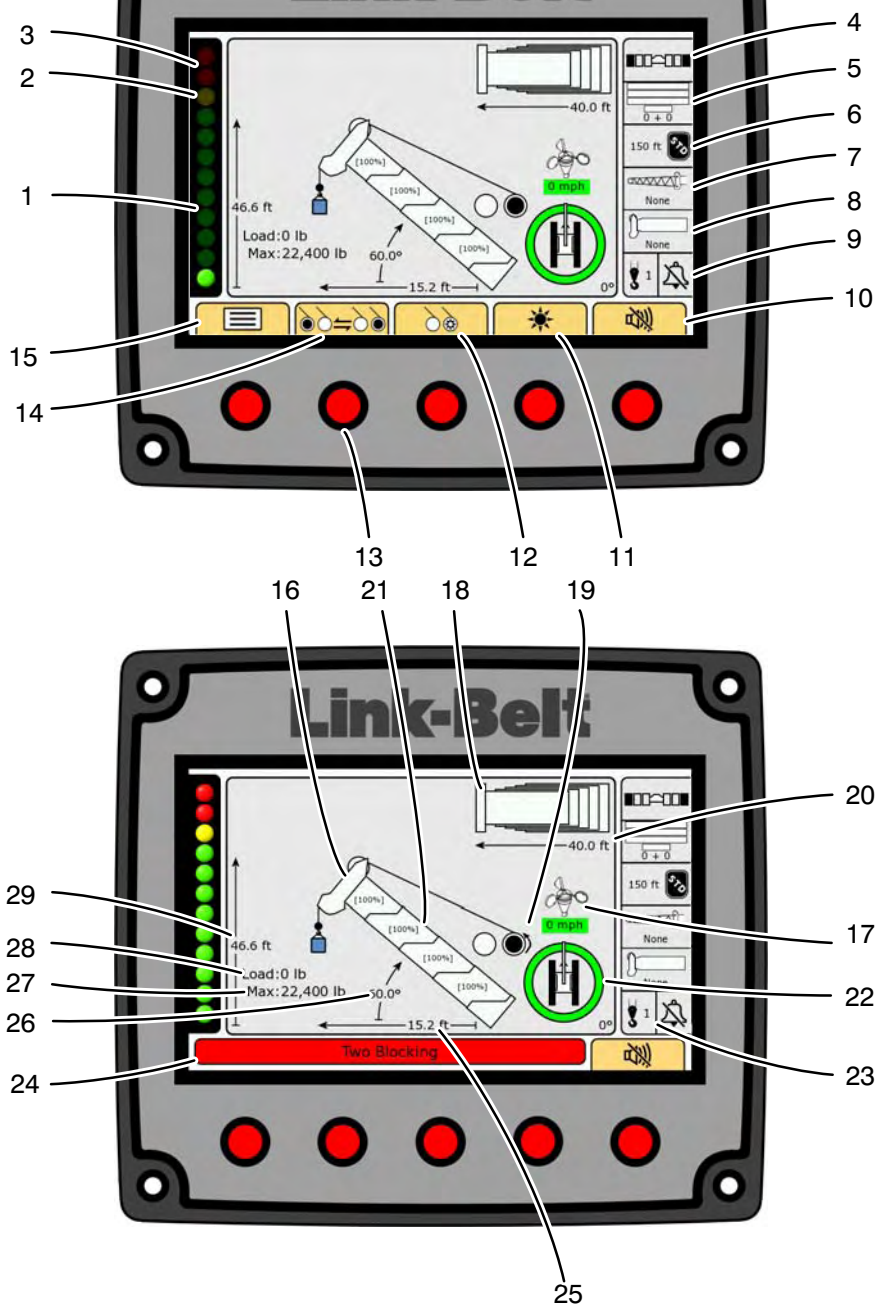
Lockout Clip

The lockout clip is used to hold the main boom anti-two block switch in the “working” position, the same as having a two block weight suspended from the switch.

When operating from the main boom the lockout clip must be removed from the anti-two block weight cable. When operating from an attachment only, the lockout clip must be installed on the anti-two block weight cable.

When both main boom and any attachment are reeved for operation, the lockout clip must be removed from the cable.

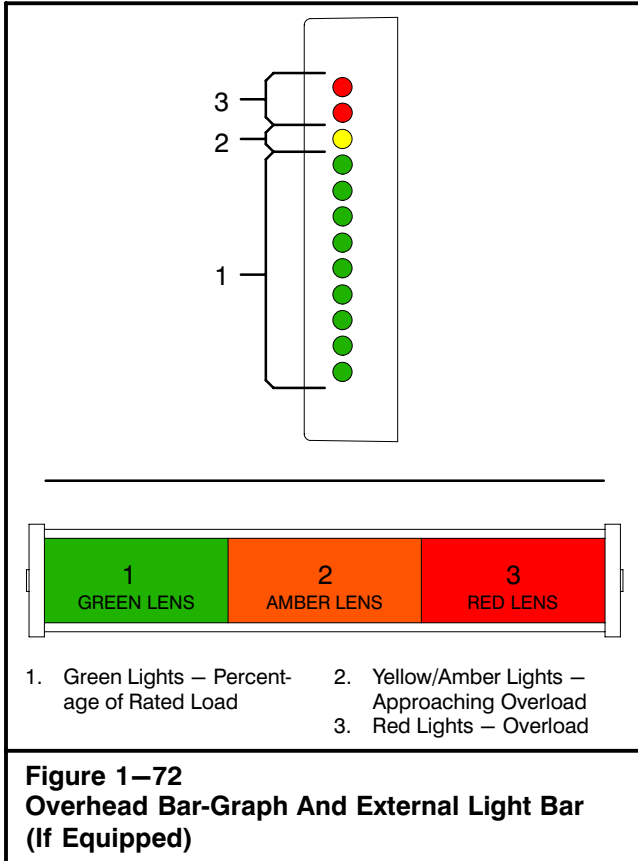
Note: When using both the main boom and any attachment, an anti-two block weight must be suspended from the anti-two block switch on the main boom and on any attachment anti-two block switch that is to be monitored.



- | | | |
|---|---|------------------------------------|
| 1. Bar-Graph | 11. Brightness Icon | 21. Boom Section Length Display |
| 2. Pre-Alarm Indicator | 12. Winch Setup Icon | 22. Working Area Display |
| 3. Overload Indicator | 13. Selection Buttons | 23. Parts Of Line Display |
| 4. Side Frame Or Lifting Jack Configuration | 14. Winch Select Icon | 24. Warning Message Area |
| 5. Counterweight Configuration | 15. Main Menu Icon | 25. Load Radius Display |
| 6. Boom Extension Mode | 16. Crane Representation Image | 26. Boom Angle Display |
| 7. Attachment Configuration | 17. Wind Speed Display | 27. Maximum Rated Capacity Display |
| 8. Stowed Attachment Configuration | 18. Boom Telescope Animation Display | 28. Actual Load Display |
| 9. Operator Alarm Indicator | 19. Winch Wire Rope Direction Indicator | 29. Boom Head Height Display |
| 10. Cancel Alarm Icon | 20. Boom Length Display | |

Figure 1-71
Rated Capacity Limiter

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Rated Capacity Limiter

The following describes the function and operation of the Rated Capacity Limiter (RCL). The system is intended to aid the operator in the efficient operation of the crane by continually monitoring the load and warning of an approach to an overload or unsafe condition.



WARNING

Although the system will alert the operator of an approaching overload or unsafe condition, it remains the responsibility of the operator to operate the crane safely at all times.

This system must never be substituted for the good judgment of the crane operator using safe operating procedures. The operator is solely responsible for safe operation of the crane.

!!THIS SYSTEM IS AN OPERATOR'S AID – NOT A SAFETY DEVICE!!

System Description

The system monitors crane functions by means of high accuracy sensors and continuously compares the load with a copy of the crane capacity chart which is stored in the computer memory. If an overload is approached, the system warns by means of audible and visual alarms and is configured to cause function limitation.

The Rated Capacity Limiter provides the operator with a continuous display of:

- Rated Capacity
- Actual Load
- Radius of the Load
- Angle of the Main Boom
- Crane Configuration
- Length of the Main Boom
- Height of the Main Boom Head Above the Ground

Note: The function of the RCL system is an operational aid to warn or to indicate to the operator when the load being lifted approaches, meets, or exceeds the rated capacity of the crane. The RCL system does not function as a scale or weighing device.

The actual load displayed by the RCL system is less accurate when the actual load lifted is a small percentage of the allowable load. This typically occurs when lifting light loads with a short boom length at high boom angles. Crane configurations of this type produce low pressures in the boom hoist cylinder resulting in less accuracy of the RCL sensors and calculated load. The RCL load accuracy improves greatly when the actual load lifted approaches the rated load (higher boom hoist cylinder pressures).

An additional feature of the system is the provision of operator alarms. These alarms, when properly set, provide a method of obstacle avoidance. This is achieved by means of maximum boom length, maximum boom angle, maximum load radius, maximum boom head height, left and right swing, and defined area alarms. These alarms can be programmed for each job site and set rapidly for the prevailing site conditions thereby aiding the operator in safe operation of the crane.

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Display Unit

The following is a description of the control buttons, indicators, and windows on the display unit. Use them along with Figure 1–71.

1. Bar-Graph

The Bar-Graph is a series of twelve colored lights which gives a visual indication of how much of the crane's capacity is being used and the rate at which an overload is being approached. Each green light represents 10% of the crane's rated capacity being used. Yellow indicates 90–99.9%, and the red lights indicate an overload.

Note: System may be equipped with an overhead bar-graph and/or an external light bar which operates similar to the bar-graph on the display. Refer to Figure 1–72.

2. Pre-Alarm Indicator

The Pre-Alarm Indicator illuminates yellow at a pre-set value of 90% of Maximum Rated Capacity and provides a visual indication of an approach to an overload.

3. Overload Indicator

The Overload Indicator illuminates red at a pre-set value of 100% of the Maximum Rated Capacity and provides a visual indication of Maximum Allowed Load. It will also illuminate whenever a wire rope limit is exceeded. Function limiters will occur simultaneously for an Overload, Wire Rope Limit, or a Two Block condition, but function limiters will not occur when exceeding an operator settable alarm. An audible alarm will sound and a message will appear in the warning message area for all 4 conditions.

4. Side Frame Or Lifting Jack Configuration

This area displays the current lower configuration. It will also display rigging and travel modes.

5. Counterweight Configuration

This area displays the current counterweight configuration.

6. Boom Extension Mode

This area displays the current boom extension mode. It also shows the maximum boom length for the current boom extension mode.

7. Attachment Configuration

This area displays the current attachment configuration.

8. Stowed Attachment Configuration

This area displays the current stowed attachment configuration.

9. Operator Alarm Indicator

This indicator will display whether or not an operator alarm is set.

10. Cancel Alarm Icon

The button below this icon can be pushed once to silence the audible alarm when the alarm has occurred as a result of either an Overload, a Two Block, or an Operator Settable alarm. It is also used to reset the function limit relay when it is necessary to by-pass a function limit which has occurred as a result of either an Overload or a Two Block alarm. This requires the button be pressed and held for 2 seconds or longer.

11. Brightness Icon

The button below this icon is used to adjust the display brightness.

12. Winch Setup Icon

The button below this icon is used to enter the active winch setup screen. The active winch setup screen allows the user to configure lift point and parts of line for the active winch.

13. Selection Buttons

The selection buttons are used to activate each of the icons at the bottom of the screen. The icons will change depending on the current menu display.

14. Winch Select Icon

The button below this icon is used to select which winch will be in use.

15. Main Menu Icon

The button below this icon navigates to the main menu. The main menu contains items such as: Crane Configuration, Operator Alarms, Diagnostics, Display Options, About, etc.

16. Crane Representation Image

This crane representation image is a generic representation of the boom, active winch configuration, auxiliary head configuration (on or off), and fly configuration (on or off). The attachment image will not change with installed attachment.

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


17. Wind Speed Display

The current wind speed is displayed here.

18. Boom Telescope Animation Display

The Boom Telescope Animation Display is a real-time visual representation of the location of the boom sections.

19. Winch Wire Rope Direction Indicator

This Winch Wire Rope Direction indicator is used to monitor Winch Up , Winch Down , and Error states .

Note: If the error state indicator appears, contact your Link-Belt Distributor or Factory for service.

20. Boom Length Display

The Boom Length Display gives a continuous indication of the boom length in feet (*m*). It is the distance from the centerline of the boom foot pin to the centerline of the boom head machinery.

21. Boom Section Length Display

The Boom Section Length Display shows the current section lengths as a percentage of their absolute maximum length (not in the current boom mode). The maximum length for each section in the current boom mode is shown in brackets.

22. Working Area Display

This area displays a graphical representation of the allowable lifting quadrant(s) based on the selected configuration. A quadrant not allowed will be filled red, an allowable quadrant will be filled green.

23. Parts Of Line Display

The Parts of Line Display shows the parts of line currently selected for the winch in use.

24. Warning Message Area

The Warning Message Area displays text messages of various alarms which may occur during normal opera-

tion of the system. When an alarm occurs, the rectangular area fills in red. The Warning Message Area will only be shown when there is an active message. Otherwise the navigation button icons will be shown. Refer to Figure 1–74. Press any of the selection buttons, except the cancel alarm button, to temporarily replace the Warning Message Area with the navigation icons.

25. Load Radius Display

The Load Radius Display gives a continuous indication of the radius of the load in feet (*m*). It is the horizontal distance from the centerline of rotation to the centerline of the hook.

26. Boom Angle Display

The Boom Angle Display gives a continuous indication of the angle of the main boom relative to horizontal.

27. Maximum Rated Capacity Display

The Maximum Rated Capacity Display is a digital display of the maximum permitted capacity. It is derived from a copy of the crane's capacity chart which is stored in the computer memory and is the reference capacity for any lifting operation. It is dependent on the configuration currently selected, which is shown in the crane configuration screen, and which determines the section of the capacity chart to be used as the rated capacity reference.

28. Actual Load Display

The Actual Load Display is a digital display of the total load suspended below the boom or fly head. It includes the load, any slings, pins, or tackle used to secure the load and the hook block or hook ball.

29. Boom Head Height Display

The Boom Head Height Display gives a continuous display of the height of the boom head or attachment head above the ground.

System Operation

The following is a list of procedures which are used to operate the multiple features of the Rated Capacity Limiter. Use these procedures in conjunction with the previous display unit control descriptions.

System Bypass

In emergency situations, the Rated Capacity Limiter computer can be bypassed. There is a RCL Status key-switch on the back of the operator's cab, to bypass the system. Refer to Figure 1–73. Move the key to the "RCL BYPASSED" position to bypass the system. For emergency use while the system is bypassed, refer to "System Inoperative or Malfunctioning" in this Section of this Operator's Manual.

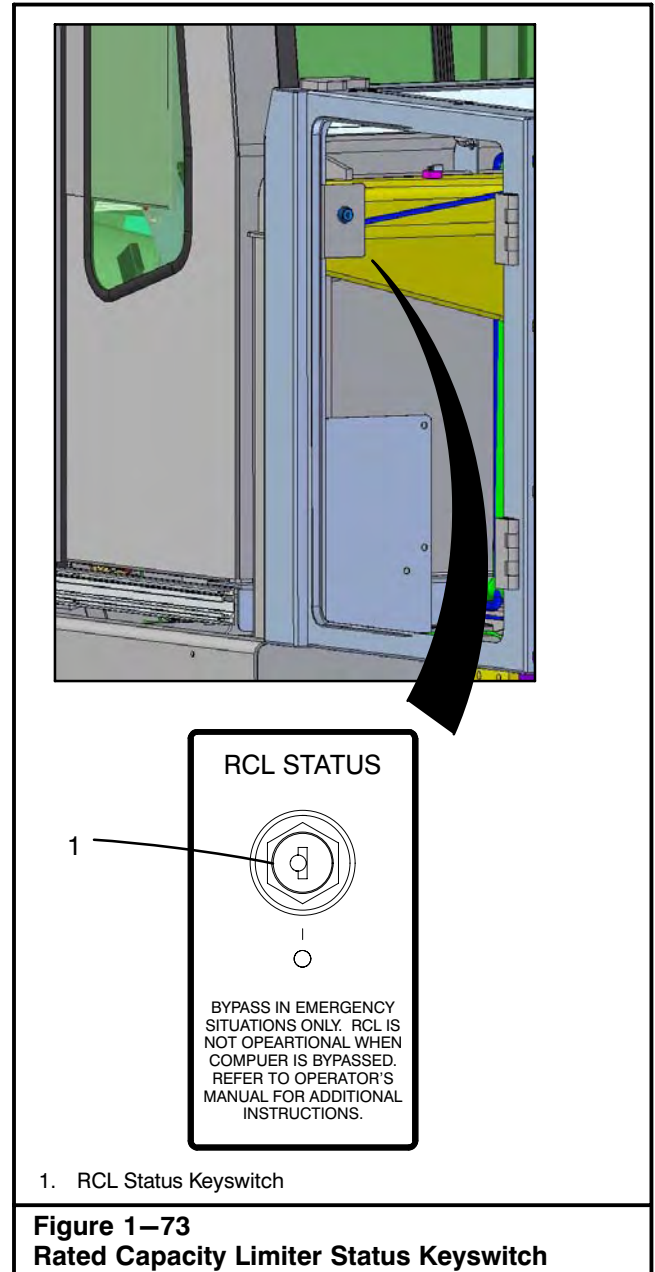
 **WARNING**

The RCL System is not operational when the computer is bypassed. Bypass the system in emergency situations only.

System Inoperative Or Malfunctioning

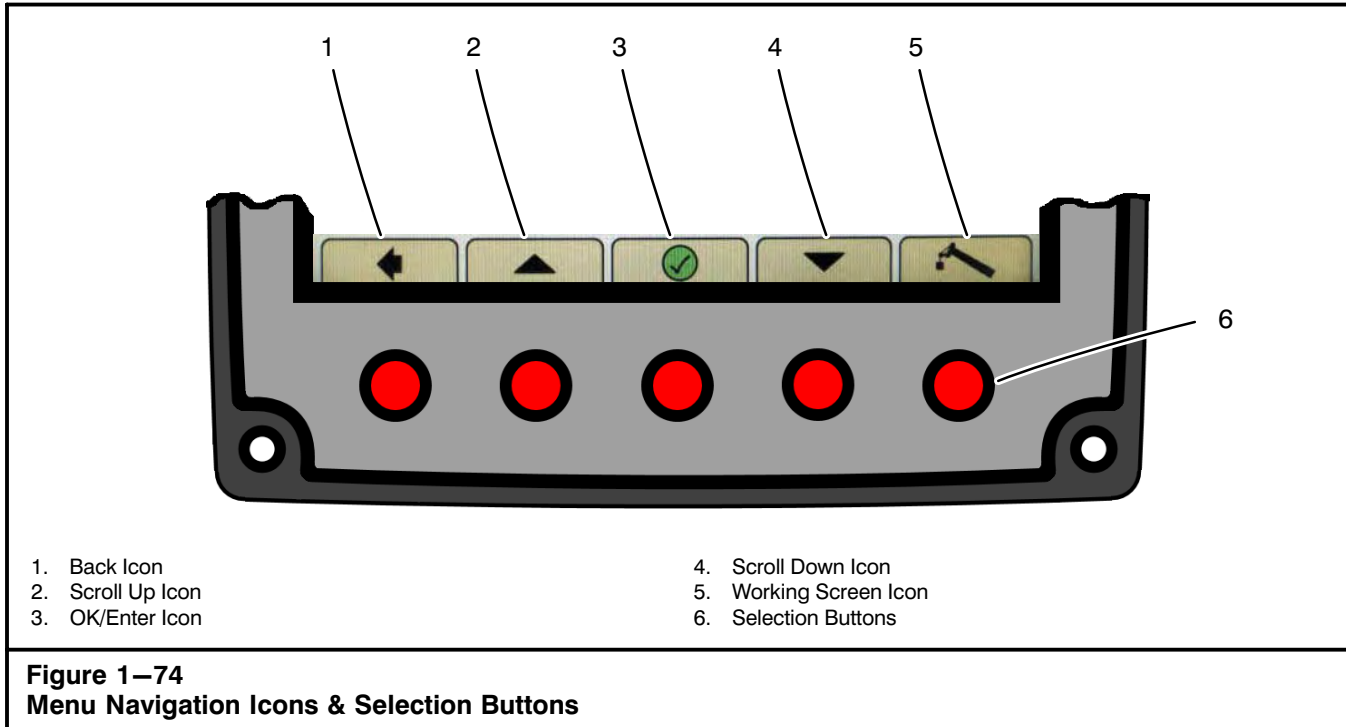
When operational aids are inoperative or malfunctioning, the following recommendations for continued use of the crane should be followed or the crane should be shutdown.

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 the 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 the anti-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. This does not apply when lifting personnel in load line supported baskets. Personnel shall not be lifted in load line supported baskets when the anti-two block devices are not functioning properly.



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 markings on the boom.
6. When a level indicator is inoperative or malfunctioning, other means shall be used to level the crane.
7. In situations where inconsistency exists, verified weights, measured radii, boom lengths, and authorized crane capacities must always take precedence over indicator readings.

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System Navigation

The RCL Display has two main display modes; the working screen and the menu. The working screen displays all information relevant to the safe operation of the crane. This includes crane configuration as well as live data such as boom length and load radius. The menu is used to navigate to various setup and diagnostic screens needed to properly setup the system. Although the five navigation icons at the bottom of the screen will change depending on what the display is currently showing, the five primary icons for menu navigation are as follows. Refer to Figure 1–74. (If a task associated with a button is not available, that button will be disabled and greyed out.)

1. Back Icon

The selection button below the Back Icon navigates back one menu.

2. Scroll Up Icon

The selection button below the Scroll Up Icon scrolls up one menu item each time it is pressed.

3. OK/Enter Icon

The selection button below the OK/Enter Icon selects the menu item currently highlighted.

4. Scroll Down Icon

The selection button below the Scroll Down Icon scrolls down one menu item each time it is pressed.

5. Working Screen Icon

The selection button below the Working Screen Icon immediately navigates to the working screen when it is pressed.

6. Selection Buttons

These buttons are used to select the function of the icon displayed above them.

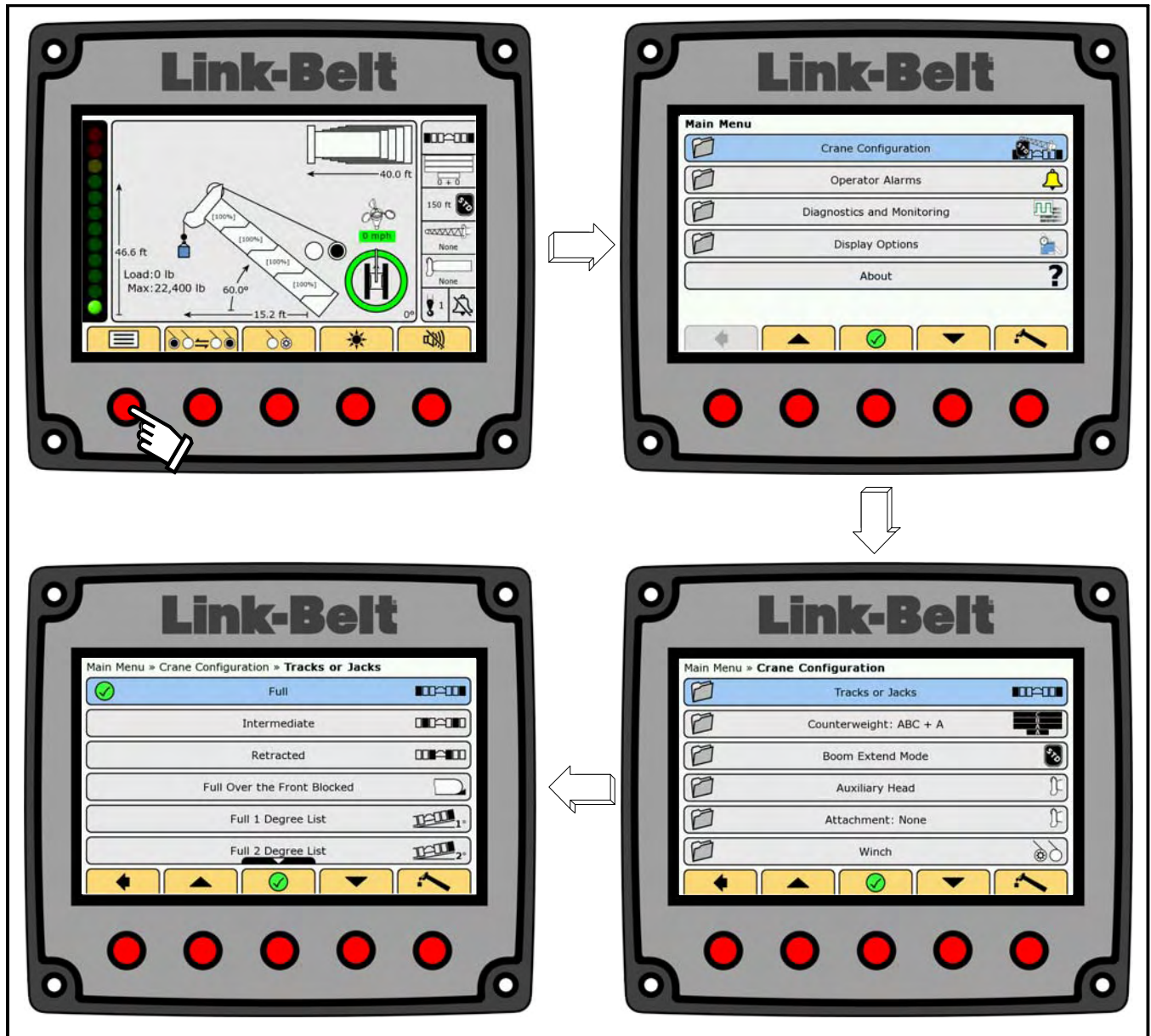





Figure 1–75
Carrier Selection

Configuration Selection

In the normal operational mode the system is programmed to remember the last configuration selected. Each time the system is powered up it will automatically default to that last configuration. Only when the crane is rigged differently must a new configuration be selected. Use the following procedure to select the crane configuration.

Note: When selecting configurations allowed on tracks, all track beams must be equally extended; all fully retracted, intermediate extended, or fully extended.

Depending on how the crane is equipped or which selections have been made, some screens shown may not appear or may not appear as illustrated. The system cannot be programmed for configurations not allowed by the capacity charts in the Crane Rating Manual.

1. From the normal working screen, press the Main Menu button .
2. Scroll to Crane Configuration, and press the OK/Enter button .
3. Scroll to Tracks or Jacks, and press the OK/Enter button . Refer to Figure 1–75.

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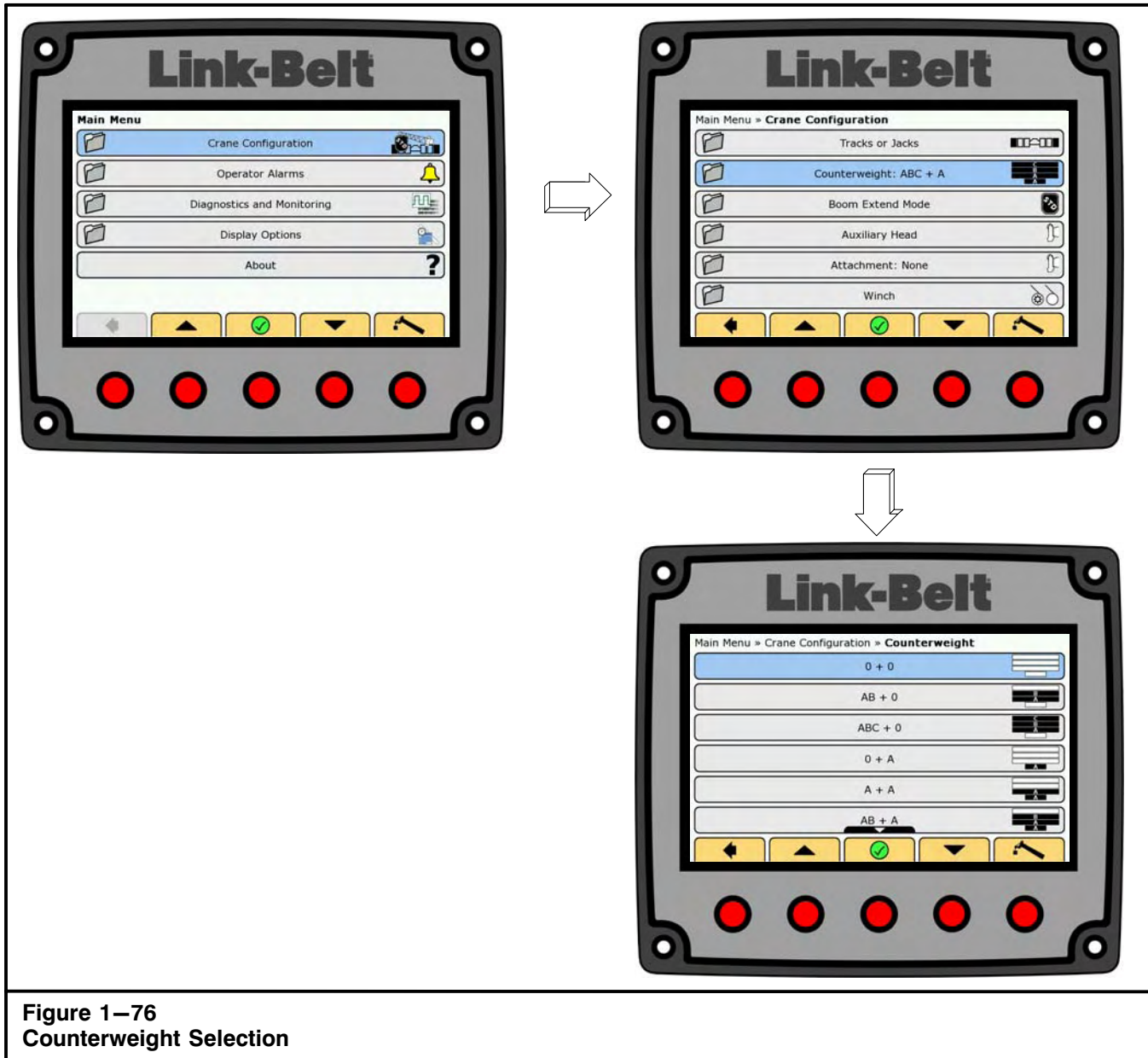





Figure 1–76
Counterweight Selection

4. The menu will change and graphically display the Lower options. Scroll to the desired lower configuration, and press the OK/Enter button .
5. After a selection is made, the display will automatically return to the Crane Configuration menu.
6. On the Crane Configuration menu, scroll to Counterweight, and press the OK/Enter button .
7. Scroll to the desired counterweight, and press the OK/Enter button . Refer to Figure 1–76.
8. After a selection is made, the display will automatically return to the Crane Configuration menu.

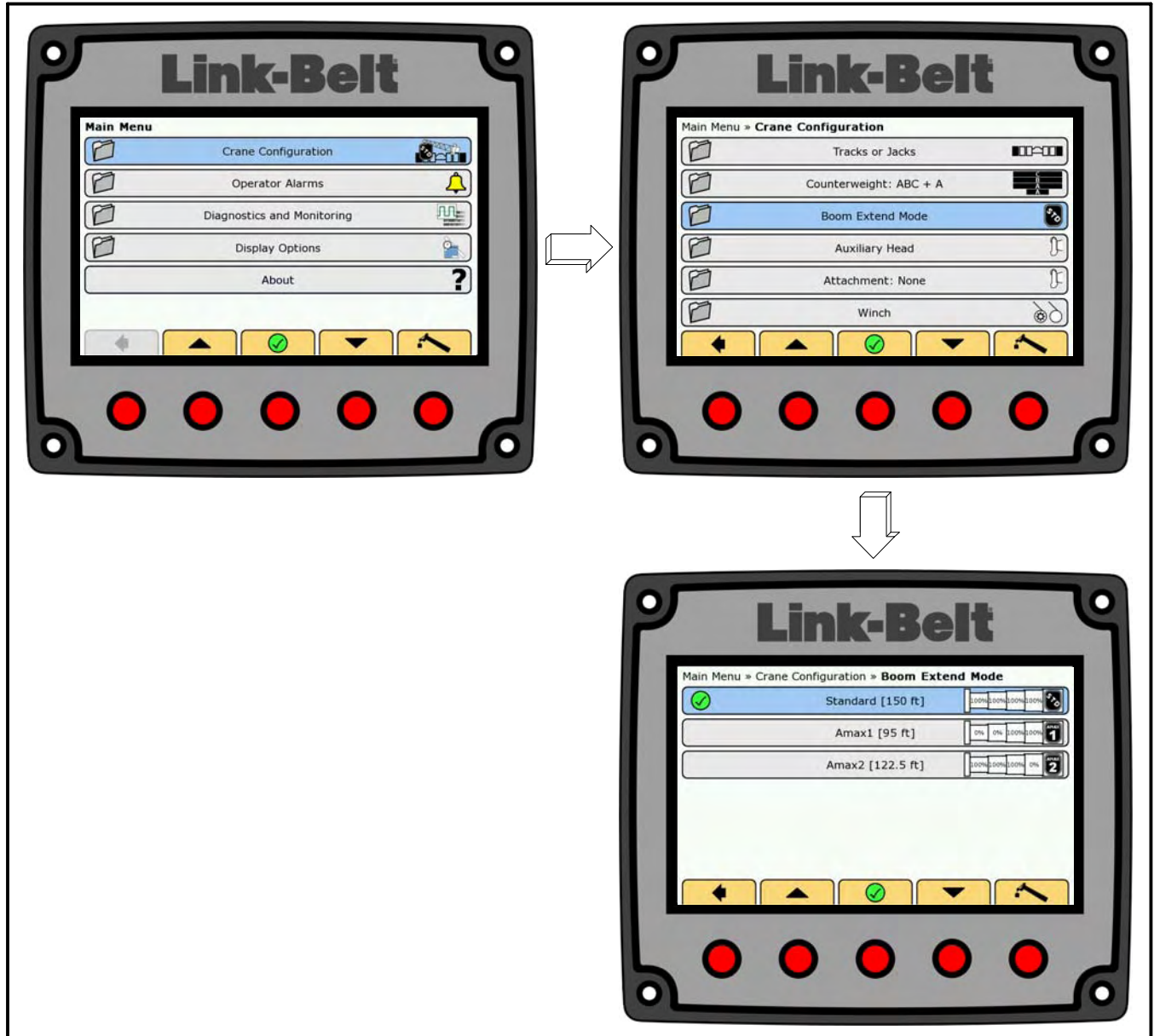


Figure 1–77
Boom Extend Mode Selection

9. On the Crane Configuration menu, scroll to Boom Extend Mode, and press the OK/Enter button . Refer to Figure 1–77.
10. Scroll to the desired boom extend mode, and press the OK/Enter button .

Note: Refer to the Crane Rating Manual to determine the best boom mode to maximize lifting capacity at working radius. Boom mode options will only be displayed when the boom is fully retracted.

11. After a selection is made, the display will automatically return to the Crane Configuration menu.

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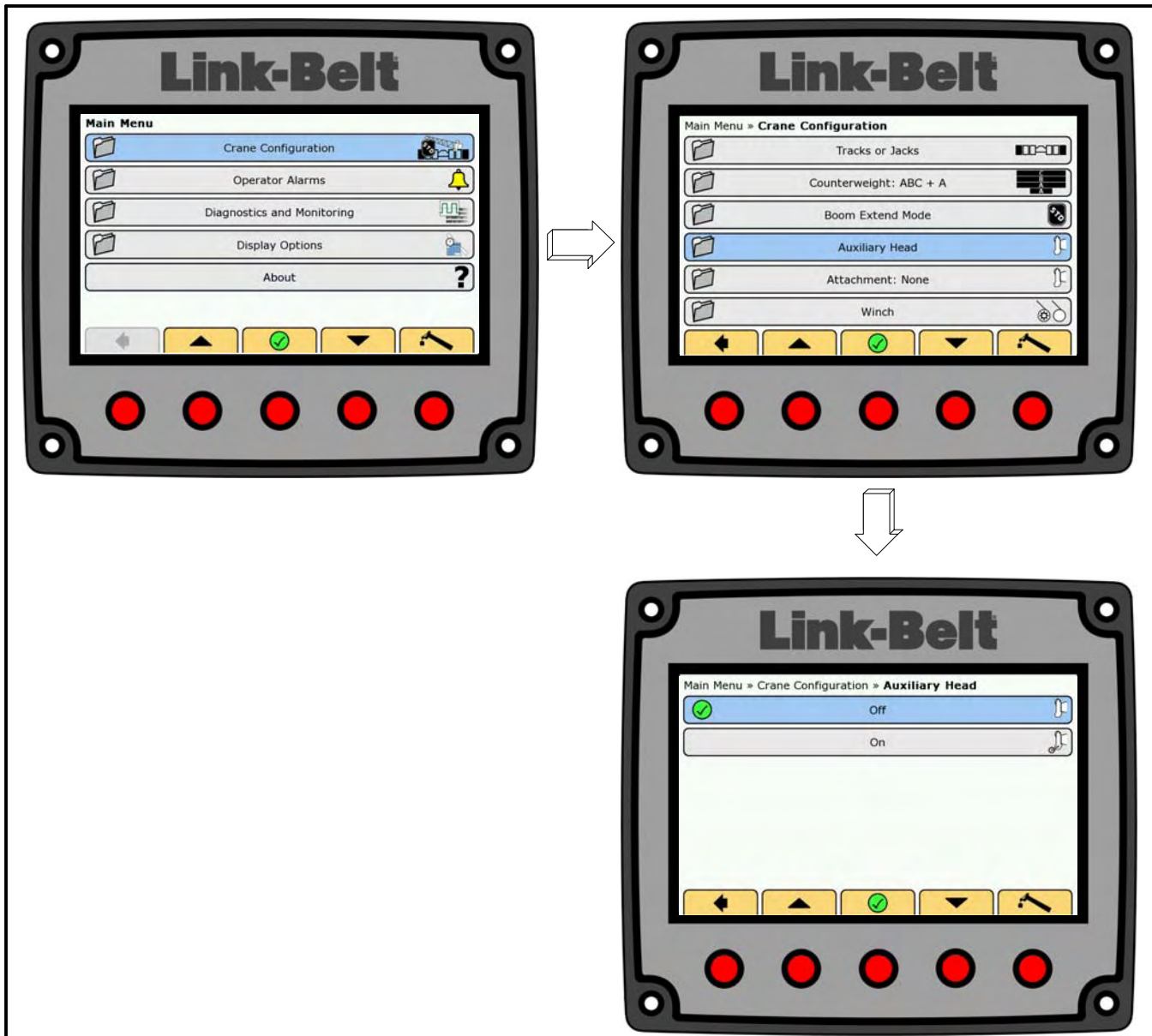








Figure 1–78
Auxiliary Head Selection

12. On the Crane Configuration menu, scroll to Auxiliary Head, and press the OK/Enter button . Refer to Figure 1–78.
 13. Scroll to the desired auxiliary head (off or on), and press the OK/Enter button .
 14. After a selection is made, the display will automatically return to the Crane Configuration menu.
 15. On the Crane Configuration menu, scroll to Attachment, and press the OK/Enter button .
 16. Scroll to Erected Attachment, and press the OK/Enter button  to display the fly options. Scroll to the desired erected fly, if required, and press the OK/Enter button . Refer to Figure 1–79.
- a. If Nothing Erected is selected, the display will automatically return to the Crane Configuration menu.
 - b. If an erected attachment is selected, the display will change and graphically display the available offsets as required.
 - c. Scroll to the desired offset angle, and press the OK/Enter button .
 - d. After a selection is made, the display will automatically return to the Crane Configuration menu.

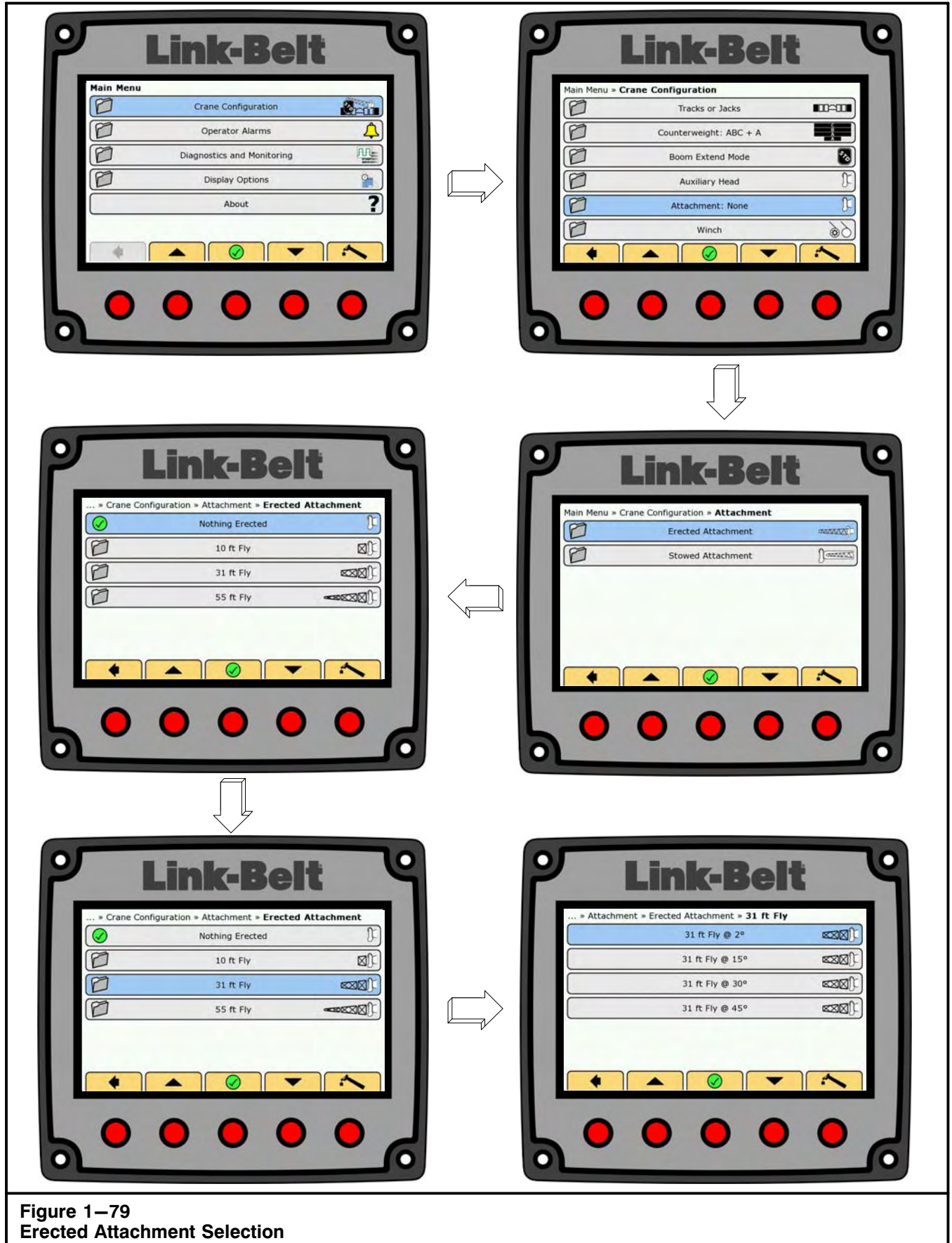


Figure 1–79
Erected Attachment Selection

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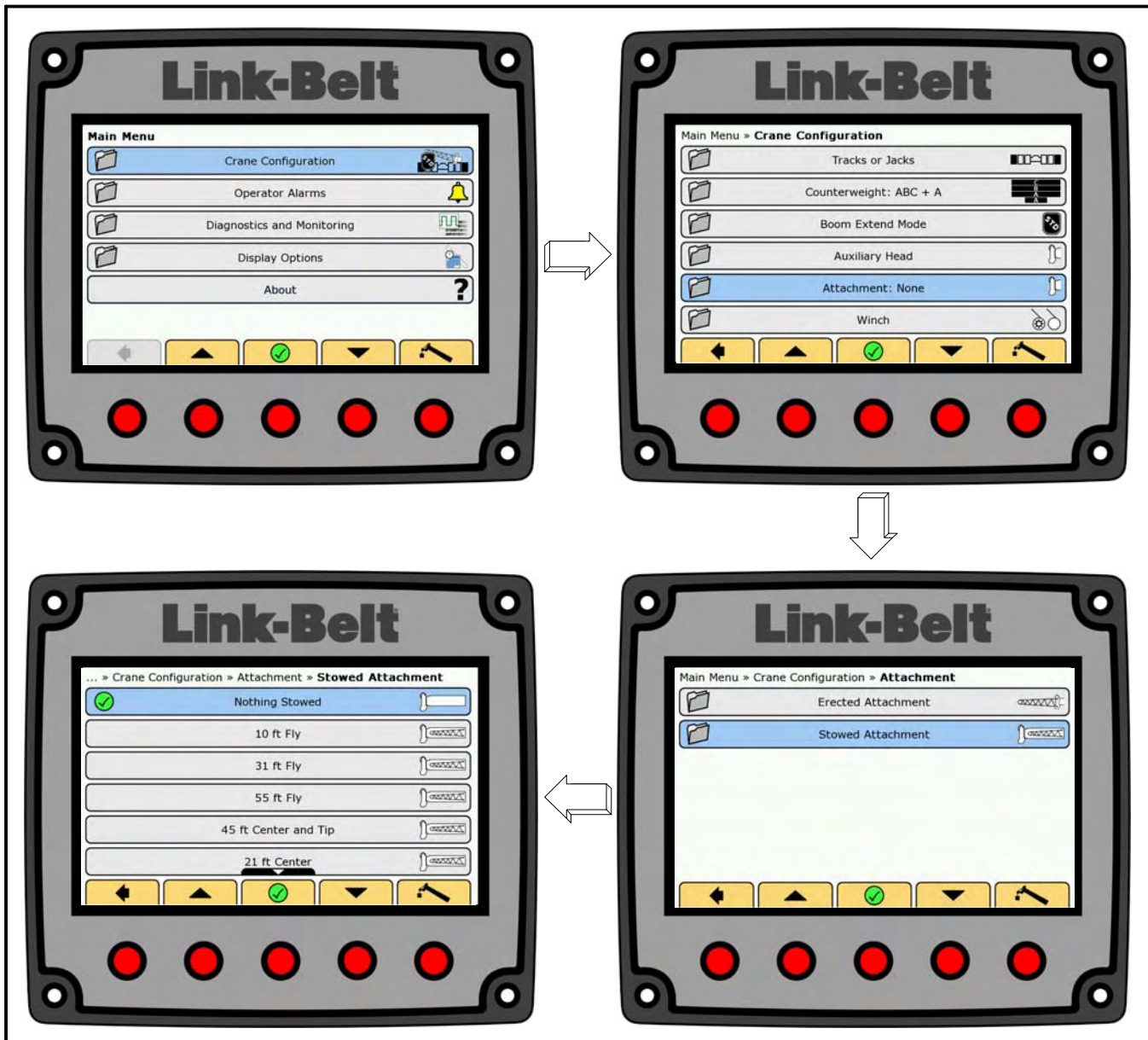



Figure 1-80
Stowed Attachment Selection

17. If the crane is equipped with a fly and was not selected as an erected attachment, on the Crane Configuration menu, navigate to Attachment » Stowed Attachment to display the stowed fly options. Scroll to the desired stowed deduct, if required, and press the OK/Enter button . Refer to Figure 1-80.

18. After a selection is made, the display will automatically return to the Crane Configuration menu.

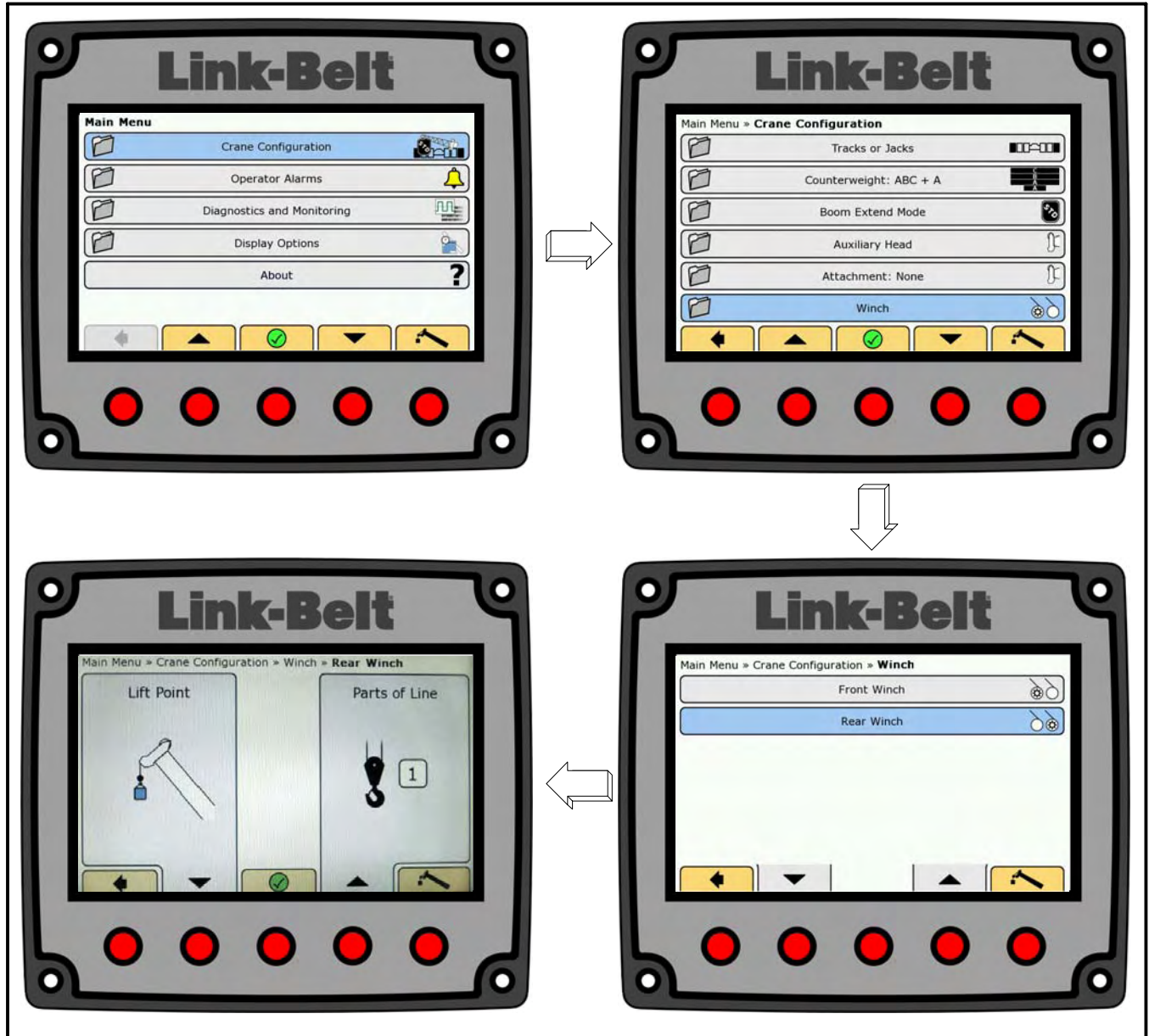




Figure 1–81
Winch Configuration

19. On the Crane Configuration menu, scroll to Winch, and press the OK/Enter button  to display the front and rear winch items. Refer to Figure 1–81.
- Scroll to the desired winch menu item, and press the OK/Enter button . This will only

configure the selected winch. The winch select button on the working screen is used to change the active winch.

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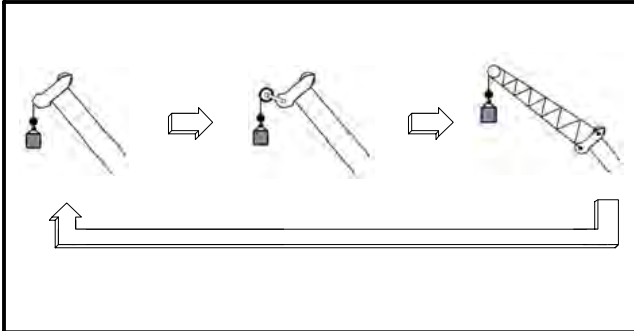






Figure 1-82
Lifting Point Selection

- b. Scroll through the available lifting points until the desired lifting point, for the winch selected, is displayed. Refer to Figure 1-82.
- c. Scroll through the available parts of line until the desired parts of line, for the winch selected, is displayed. Refer to Figure 1-83.
- d. Press the OK/Enter button  to confirm the selections for lifting point and parts of line. If the back button  or working screen button  is pressed before pressing the OK/Enter button , the changes made to lifting point and parts of line will not be saved.
- e. Repeat Steps a thru d for the other winch, if required.

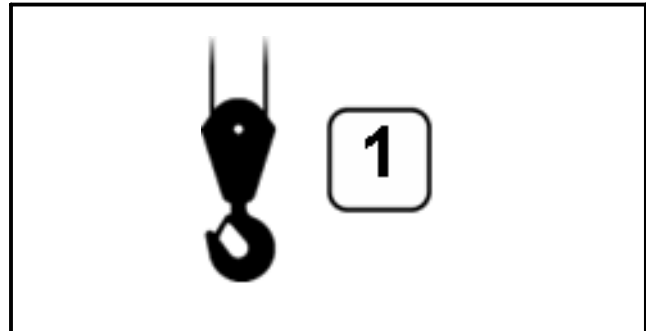

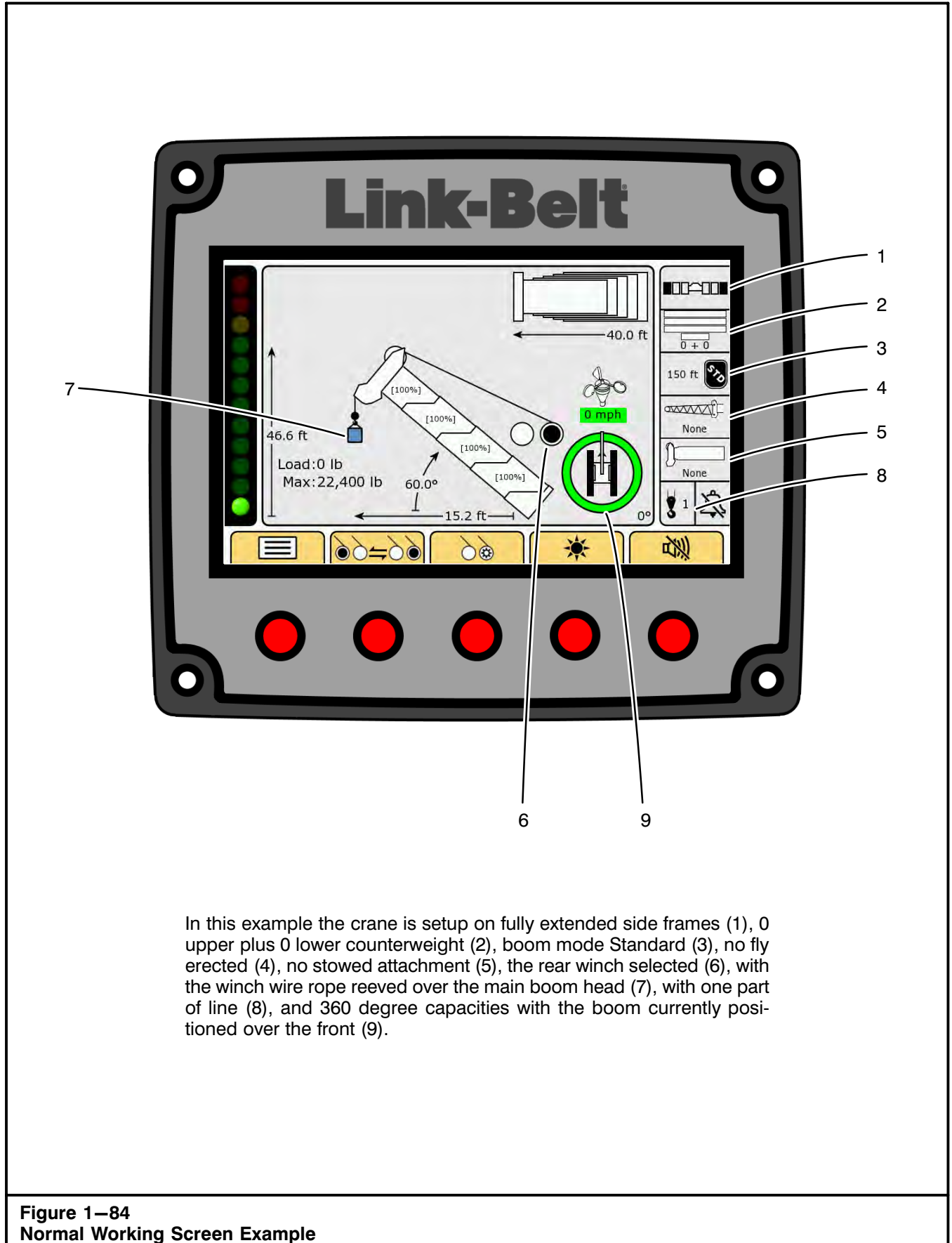


Figure 1-83
Parts Of Line Selection

20. Press the back button  to navigate back to the Crane Configuration menu.

Note: A change to any selection can be made at anytime during the configuration routine. When on the Crane Configuration menu, simply navigate to the desired configuration menu to go directly to that sub-routine.

21. Press the Working Screen button  to return to the normal working screen and graphically display the crane configuration as previously selected.



In this example the crane is setup on fully extended side frames (1), 0 upper plus 0 lower counterweight (2), boom mode Standard (3), no fly erected (4), no stowed attachment (5), the rear winch selected (6), with the winch wire rope reeved over the main boom head (7), with one part of line (8), and 360 degree capacities with the boom currently positioned over the front (9).


Figure 1–84
Normal Working Screen Example

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Figure 1-85
Cancel Alarm Button

Cancel Audible Alarm And Reset Function Limiters

The CANCEL ALARM button  is used to cancel the audible alarm when the alarm has occurred as a result of either an Overload, a Two Block alarm, or an Operator settable alarm. The audible alarm may be canceled by pressing and releasing the CANCEL ALARM button. The audible alarm remains canceled until the condition which caused the alarm has been removed. For example, if the audible alarm was canceled because of an overload condition, it will remain canceled until the overload condition is removed. However, if a different alarm, e.g. two block condition, was to occur when the audible alarm was still canceled for an earlier overload condition, the new alarm condition would cause the audible alarm to be sound.



WARNING

Once the function limiters have been by-passed, the crane is no longer protected against the condition that initially caused the function limiters to occur.

Note: The CANCEL ALARM feature is a temporary function. The audible alarm or function limit is automatically reset when the condition which caused the alarm is no longer present.

The CANCEL ALARM is also used to reset the function limiters when it is necessary to by-pass the function limiters which has occurred as a result of either an Overload, a Two Block alarm, or a Wire Rope limit. Function limiters are reset by first canceling the audible alarm (as described above) and then pressing and holding the CANCEL ALARM button, after which the function limiters will be reset to allow operation. However, should another different alarm condition occur when the function limiters had previously been over-ridden, then the newly occurring alarm condition would cause the function limiters to occur again.

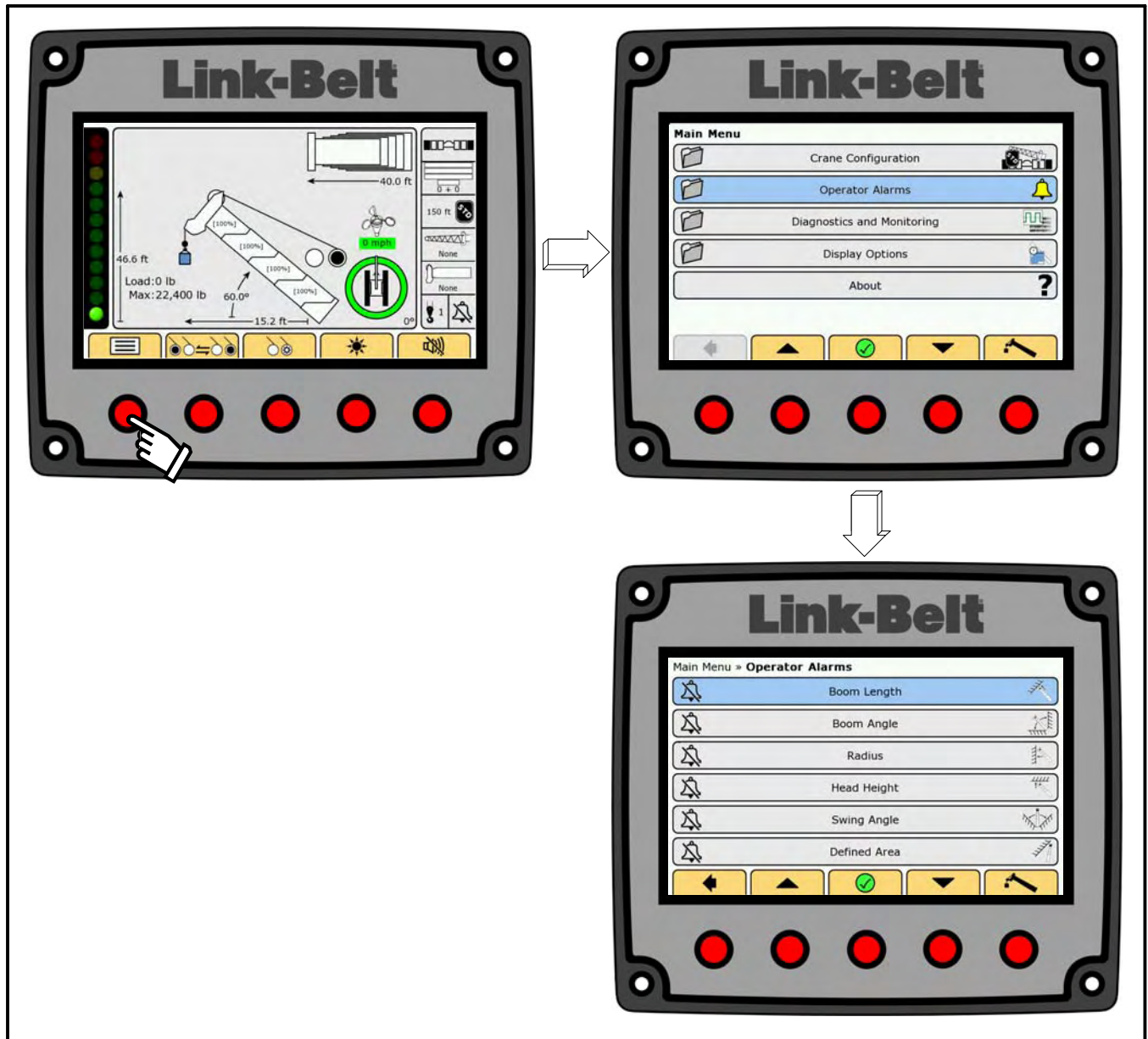


Figure 1–86
Operator Settable Alarms

Operator Settable Alarms

Some alarms occur automatically as a result of limitations imposed by the capacity chart. The operator has control over additional alarms which can be set to operate within the normal chart limitations and which are, in addition to those already set by the chart.

Operator alarms will be stored in the computer memory, even if the crane is shutdown, until they are disabled. Refer to Figure 1–86.

The following alarms are available for operator use.

Minimum Angle	Maximum Load Radius	Left and Right Swing
Maximum Angle	Maximum Boom Length	
Maximum Height	Operator Defined Area	

WARNING

The operator settable alarms are a warning device. All functions remain operational when entering the operator defined bad area. For safe operation, adequate distance must be maintained to allow for operator reaction time to avoid entering the bad area. It is the responsibility of the operator to set points which ensure that the crane's boom, attachment, load, rigging, etc. maintains a safe working distance and complies with local safety regulations.

Operator's Manual

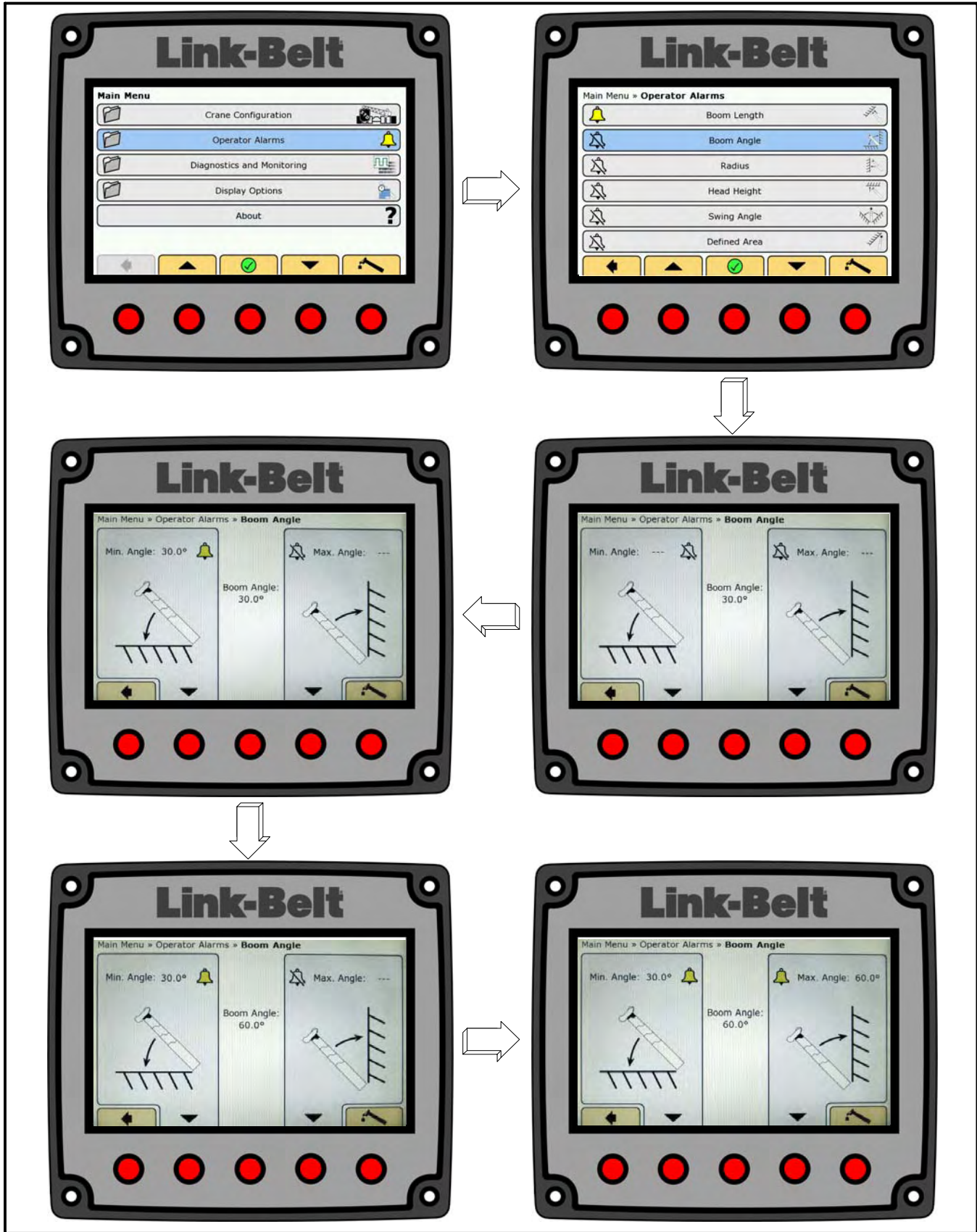





Figure 1-87
Boom Angle Alarm

Operator's Manual

Setting Angle, Length, Height, Radius, And Swing Operator Settable Alarms

1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button . Refer to Figure 1–86.
3. Scroll to the desired alarm to be set, and press the OK/Enter button .







WARNING



Avoid positioning the boom, attachment, load, rigging, etc. into the bad area when setting the alarm values.

When selecting the alarm values, ensure that the load will maintain a safe distance from the obstacle.

4. Place the crane in the desired position depending upon the alarm to be set. The numerical value for the value being set will be the current position of the crane.

Note: If an alarm had been previously set, the alarm value displayed will be the previously set alarm value and indicated by the  icon. The previous alarm must first be disabled, then set the new alarm. Alarms which are disabled are indicated by the  icon.

5. Press the corresponding selection button to set the alarm value.
6. Press the back button  to return to the Operator Alarms menu or press the Working Screen button  again to return to the normal working screen.
7. Test the alarm, with no load, to ensure the alarm points have been properly set. When approaching the alarm set point, the audible alarm will sound intermittently and a warning message will appear in the warning message area. When exceeding the alarm set point, the audible alarm will sound continuously and a warning message will appear in the warning message area.

Note: An alarm icon  will appear on the normal working screen to alert the operator that an operator alarm has been set. If no operator alarm is set, the alarm disabled icon  will appear.

8. Use the following examples to understand the use of the procedure.



WARNING

If crane or obstacle is moved or if a different size load is lifted, the alarm(s) must be reset.










WARNING

Check the crane's current configuration, capacity chart, and Working Areas chart in the Crane Rating Manual to ensure safe, stable operation under conditions described in the following examples.

To Set Minimum Angle Alarm

Example: To have an alarm whenever the boom is below a 30 degree angle, use the following procedure:

1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button . Refer to Figure 1–87.
3. Scroll to Boom Angle , and press the OK/Enter button .
4. Move the boom to a 30 degree angle.
5. Press the corresponding button for “Min. Angle” to set the alarm. The displayed value will be the alarm setting. The  will appear to indicate that the alarm is set.
6. Press the back button  to return to the Operator Alarm menu or press the Working Screen button  again to return to the normal working screen.
7. Test the alarm, with no load, to ensure the alarm points have been properly set. When approaching 30 degree boom angle, the audio will sound intermittently and “Approaching Minimum Angle” will appear in the warning message area. The audible alarm will sound continuously and “Minimum Angle” will appear in warning message area whenever the boom is lowered below 30 degrees.

Operator's Manual

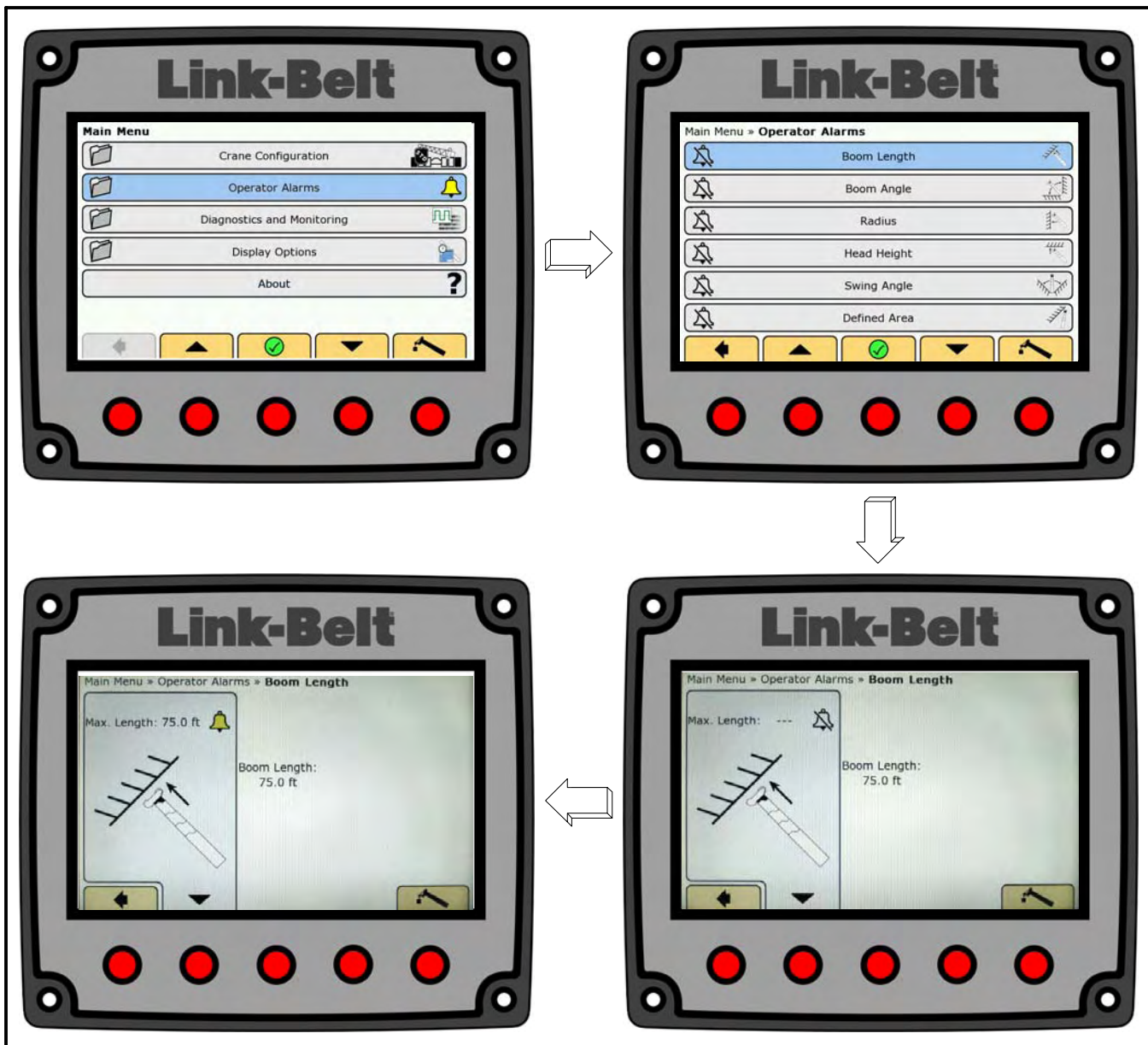









Figure 1-88
Boom Length Alarm

To Set Maximum Angle Alarm

Example: To have an alarm whenever the boom is above a 60 degree angle use the following procedure:








1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button .
3. Scroll to Boom Angle , and press the OK/Enter button .
4. Move the boom to a 60 degree angle.
5. Press the corresponding button for "Max. Angle" to set the alarm. The displayed value will be the alarm setting. The  will appear to indicate that the alarm is set.
6. Press the back button  to return to the Operator Alarms menu or press the Working Screen button  again to return to the normal working screen.

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7. Test the alarm, with no load, to ensure the alarm points have been properly set. When approaching 60 degree boom angle, the audio will sound intermittently and “Approaching Maximum Angle” will appear in the warning message area. The audible alarm will sound continuously whenever the boom is raised above 60 degrees and “Maximum Angle” will appear in warning message area.

To Set Maximum Length Alarm

Example: To have an alarm whenever the boom length exceeds 75 feet (22.8m), use the following procedure:

1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button .
3. Scroll to Boom Length , and press the OK/Enter button .
4. Extend the boom so that the length is 75 feet(22.8m).
5. Press the corresponding button for “Max. Length” to set the alarm. The displayed value will be the alarm setting. The  will appear to indicate that the alarm is set.
6. Press the back button  to return to the Operator Alarms menu or press the Working Screen button  again to return to the normal working screen.
7. Test the alarm, with no load, to ensure the alarm points have been properly set. When approaching 75 foot (22.8m) boom length, the audio alarm will sound intermittently and “Approaching Maximum Length” will appear in the warning message area. The audible alarm will sound continuously whenever the boom length exceeds 75 feet (22.8m) and “Maximum Length” will appear in the warning message area.

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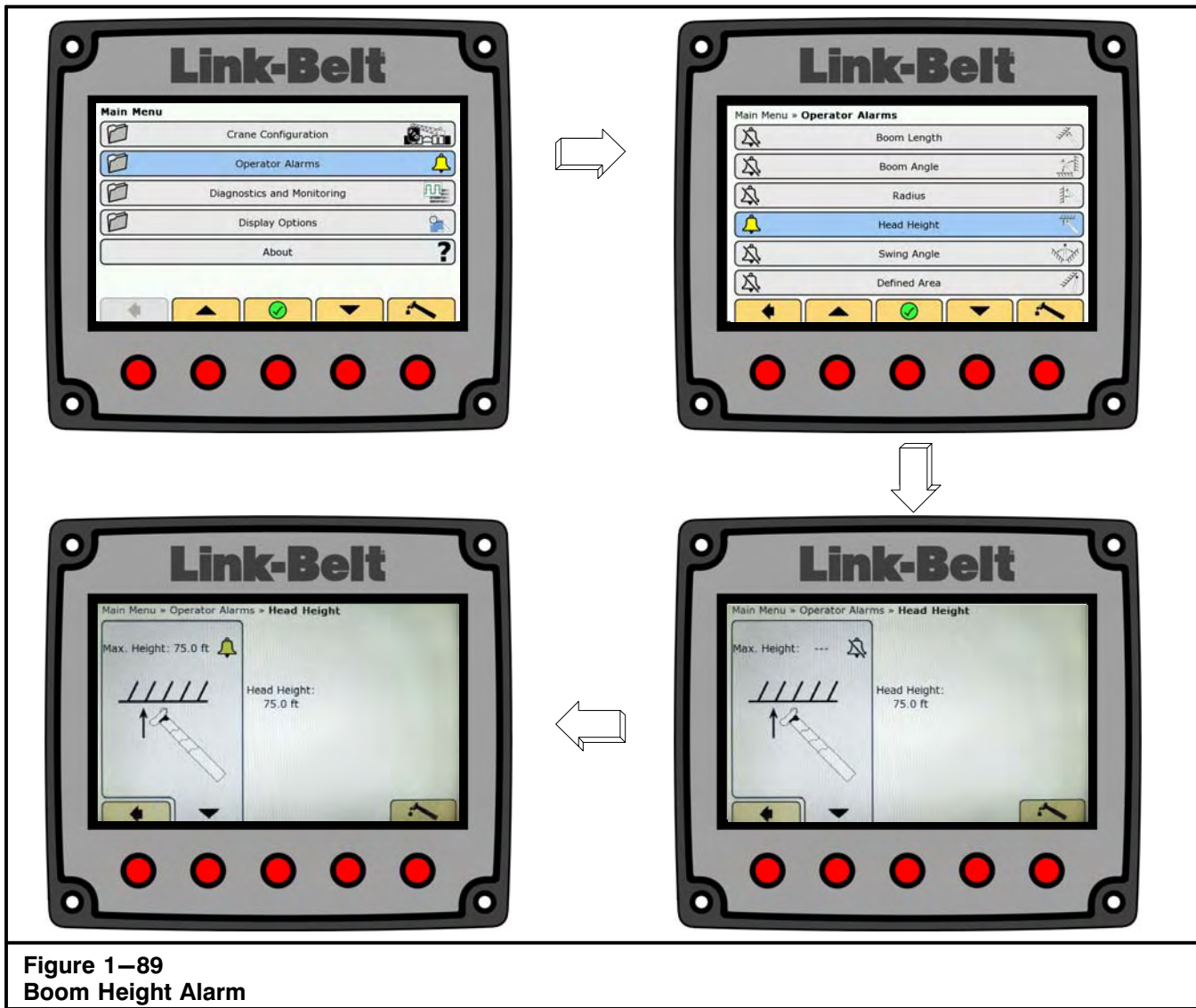







Figure 1–89
Boom Height Alarm



To Set Maximum Height Alarm

Note: The height measured here is from the carrier deck to the tip of the attachment.

Example: To have an alarm whenever the boom tip height exceeds 75 feet (22.8m), use the following procedure:

1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button .
3. Scroll to Head Height , and press the OK/Enter button .
4. Extend the boom and/or adjust the boom angle so that the head height is 75 feet (22.8m).
5. Press the corresponding button for “Max. Height” to set the alarm. The displayed value will be the

alarm setting. The  will appear to indicate that the alarm is set.

6. Press the back button  to return to the Operator Alarms menu or press the Working Screen button  again to return to the normal working screen.
7. Test the alarm, with no load, to ensure the alarm points have been properly set. When approaching 75 foot (22.8m) boom tip height, the audio alarm will sound intermittently and “Approaching Maximum Height” will appear in the warning message area. The audible alarm will sound continuously whenever the boom tip height exceeds 75 feet (22.8m) and “Maximum Height” will appear in the warning message area.

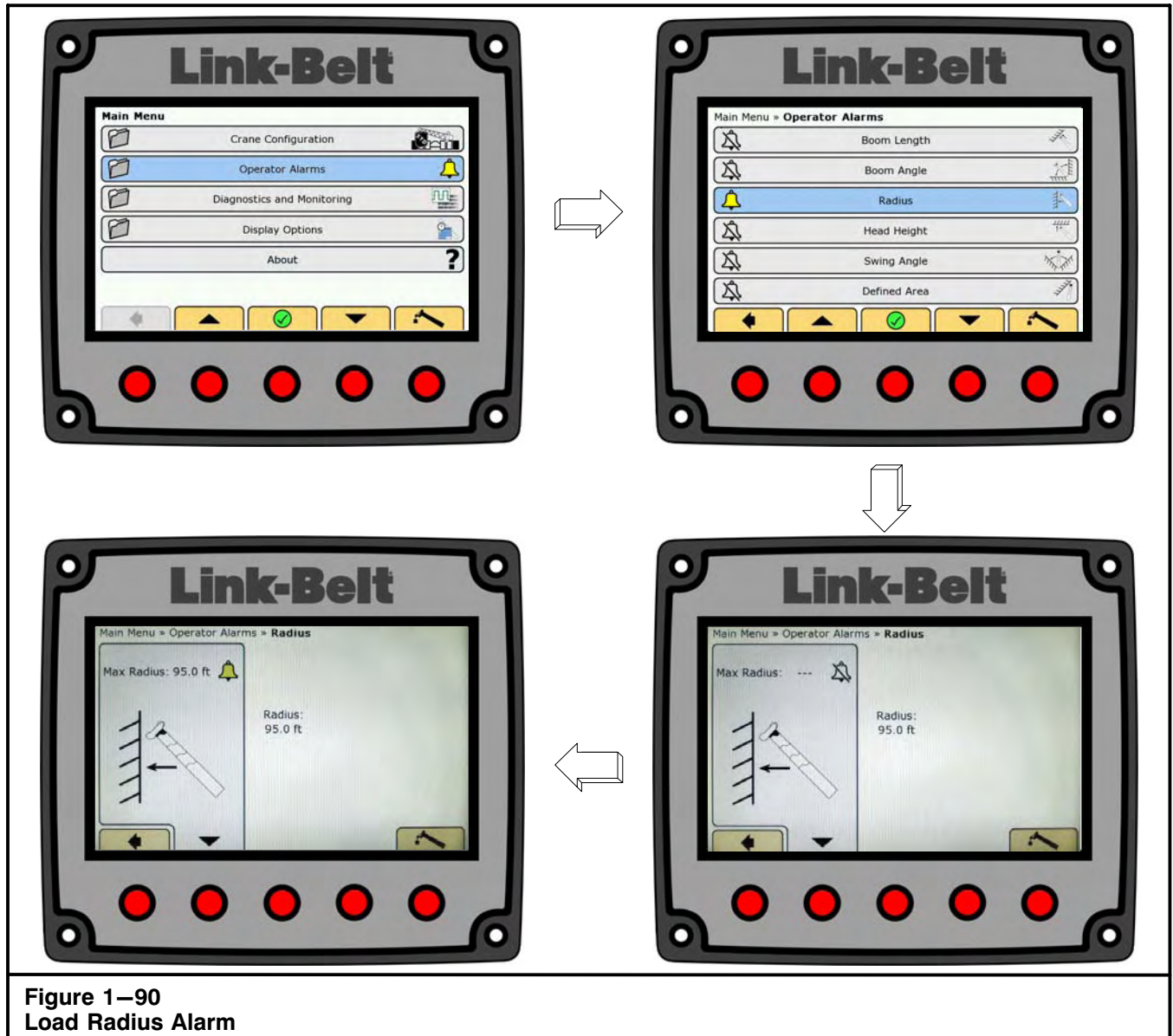









Figure 1–90
Load Radius Alarm

To Set Maximum Radius Alarm

Example: To have an alarm whenever the boom radius exceeds 95 feet (29m), use the following procedure:

1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button .
3. Scroll to Radius , and press the OK/Enter button .
4. Extend the boom and/or adjust the boom angle so that the radius is 95 feet (29m).
5. Press the corresponding button for “Max. Radius” to set the alarm. The displayed value will be the
6. alarm setting. The  will appear to indicate that the alarm is set.
6. Press the back button  to return to the Operator Alarms menu or press the Working Screen button  again to return to the normal working screen.
7. Test the alarm, with no load, to ensure the alarm points have been properly set. When approaching 95 foot (29m) boom radius, the audio will sound intermittently and “Approaching Maximum Radius” will appear in the warning message area. The audible alarm will sound continuously whenever the boom radius exceeds 95 feet (29m) and “Maximum Radius” will appear in warning message area.

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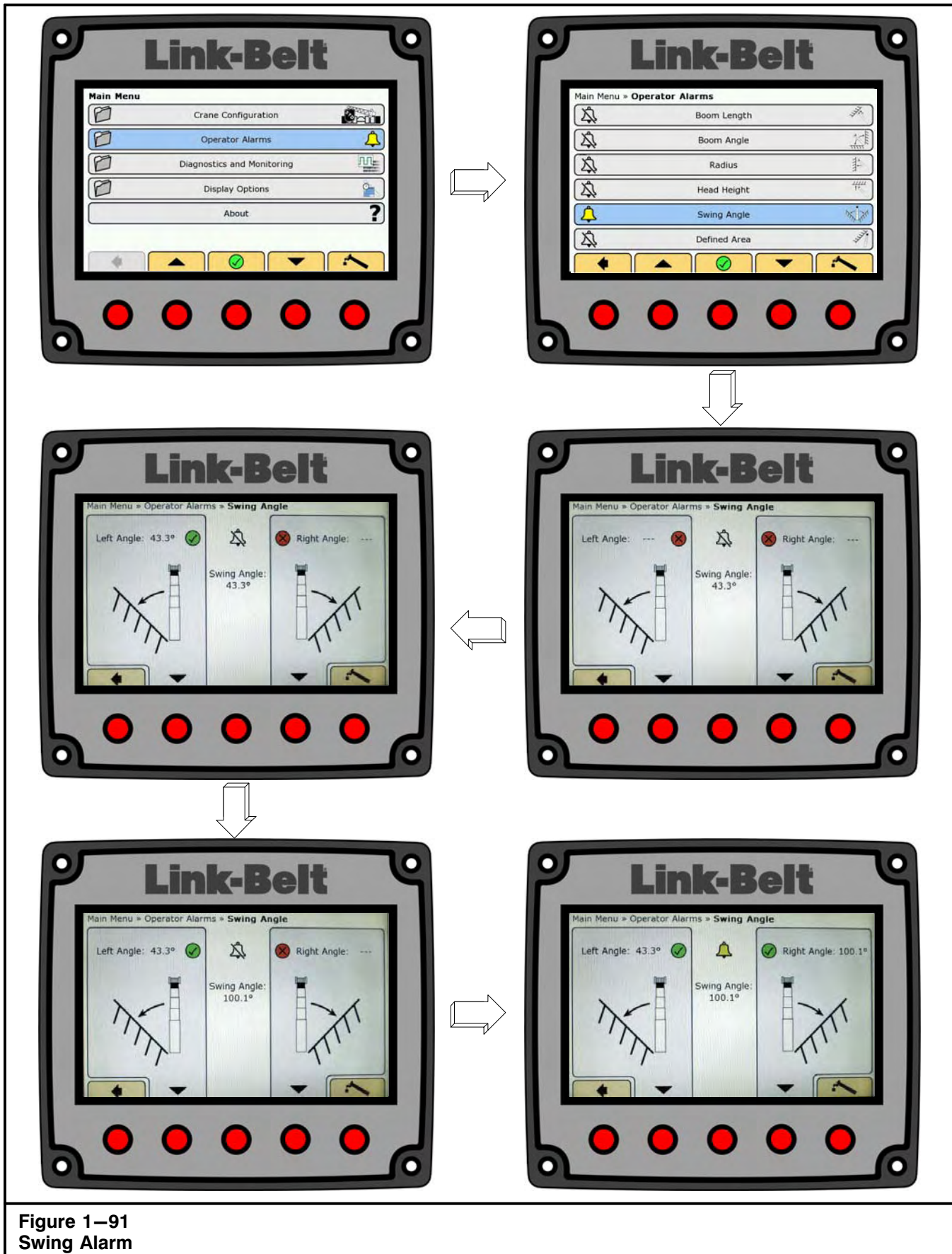











Figure 1–91
Swing Alarm

To Set Left And Right Swing Alarms

Example: To have an alarm whenever the LEFT SWING AND RIGHT SWING exceed pre-determined alarm points, use the following procedure:

1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button . Refer to Figure 1–91.
3. Scroll to Swing Angle , and press the OK/Enter button .
4. Swing the boom to the left alarm point.
5. Press the corresponding button for “Left Angle” to enter the left alarm point. The displayed value will be the left alarm setting. The  will appear to indicate that the angle is set.
6. Swing the boom to the right alarm point.
7. Press the corresponding button for “Right Angle” to enter the right alarm point. The displayed value will be the right alarm setting. The  will appear to indicate that the angle is set.
8. When both angles are set, the  will appear to indicate that the alarm is set.
9. Press the back button  to return to the Operator Alarms menu or press the Working Screen button  again to return to the normal working screen.
10. Test the alarm, with no load, to ensure the alarm points have been properly set. When approaching the set alarm point, the audio alarm will sound intermittently and “Approaching Swing Angle Limit” will appear in the warning message area. The audible alarm will sound continuously whenever the swing exceeds the alarm points and “Swing Angle Limit” will appear in warning message area.

Note: Both the left and right swing alarms must be set for the system to determine the operator set working area.

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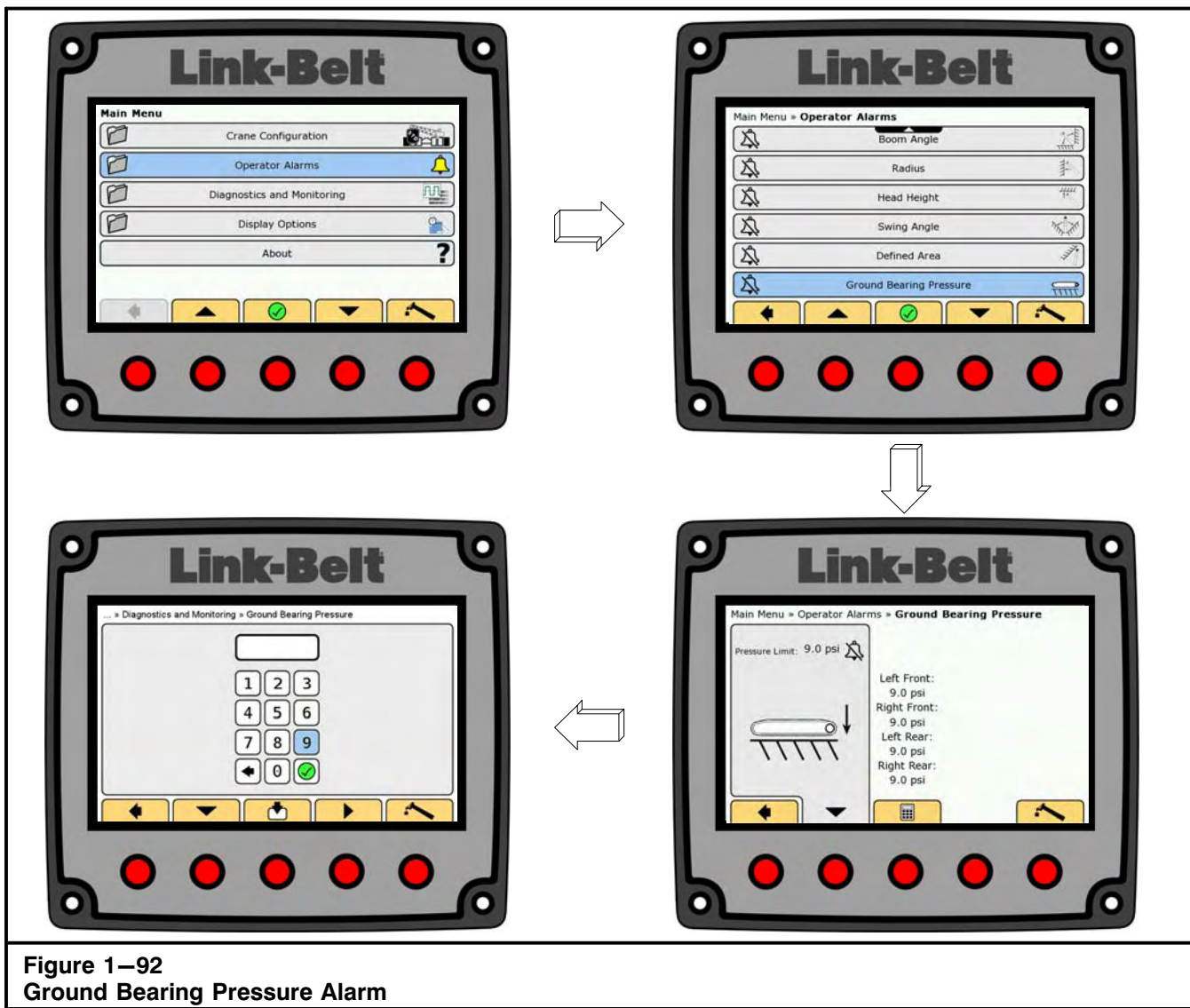















Figure 1-92
Ground Bearing Pressure Alarm

To Set Ground Bearing Pressure Alarm

Example: To have an alarm whenever the ground bearing pressure exceeds 9 psi (62.1kpa), use the following procedure:

1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button .
3. Scroll to Ground Bearing Pressure , and press the OK/Enter button . Refer to Figure 1-92.
4. Press the keypad button  to enter into keypad mode.
5. Scroll to the correct number by pressing the direction buttons  and .
6. When the correct number is highlighted press the select button .
7. With the correct number(s) entered into the keypad, scroll to the  and press the select button  to return to the Ground Bearing Pressure Screen.
8. The  will appear to indicate that the alarm is set.
9. Press the back button  to return to the Operator Alarms menu or press the Working Screen button  again to return to the normal working screen.
10. When approaching 9 psi (62.1kpa), the audio will sound intermittently and "Approaching Ground Bearing Limit" will appear in the warning message area. The audible alarm will sound continuously and "Ground Bearing Limit" will appear in warning message area whenever the pressure reaches 9 psi (62.1kpa).

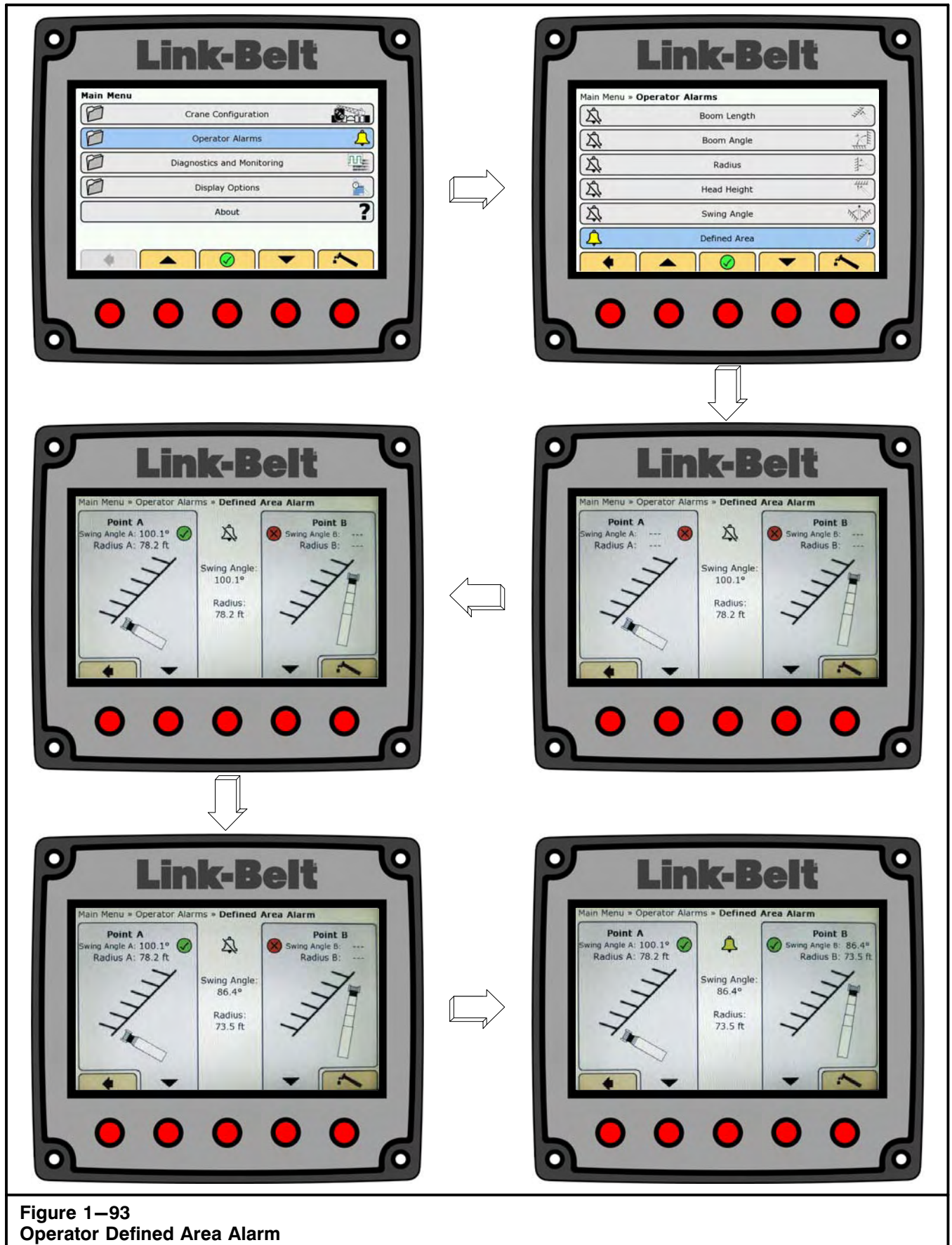


Figure 1-93
Operator Defined Area Alarm

Operator's Manual

Operator Defined Area Alarm



The operator defined area alarm, when set, will define an imaginary vertical plane between two set points to optimize the working area. When approaching the plane, the audio alarm will sound intermittently, and the message "Approaching Defined Area" will appear in the warning message area. When passing the plane, the audio alarm will sound continuously and the message "Defined Area" will appear on the warning message area. Use the following procedure, Figure 1–93, and Figure 1–94 to set the operator defined area alarm.




WARNING

The operator defined area alarm is a warning device. All functions remain operational when entering the operator defined bad area. For safe operation, adequate distance must be maintained to allow for operator reaction time to avoid entering the bad area. It is the responsibility of the operator to set points which ensure that the crane's boom, attachment, load, rigging, etc. maintains a safe working distance and complies with local safety regulations.

Setting Operator Defined Area Alarm

1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button .
3. Disable any previously set left and right swing alarms if required. Refer to "To Disable Operator Settable Alarms" in this Section of this Operator's Manual.

Note: It is recommended to clear the left and right swing alarms prior to setting the defined area alarm.



4. Scroll to Define Area , and press the OK/Enter button .





WARNING

Avoid positioning the boom, attachment, load, rigging, etc. into the bad area when setting the left or right alarm points.

When selecting the left and right alarm points, ensure that the load will maintain a safe distance from the obstacle. Also ensure that the two points are set so that the tailswing of the crane will not enter the bad area.

5. Position the boom, attachment, load, rigging, etc. to the desired Point A and press the corresponding button for "Point A" to set the first point. The displayed values for swing angle and radius will be the set point. The  will appear to indicate that Point A is set.
6. Position the boom, attachment, load, rigging, etc. to the desired Point B and press the corresponding button for "Point B" to set the second point. The displayed values for swing angle and radius will be the set point. The  will appear to indicate that Point B is set.

Note: For best results, the two points should be separated by a minimum of 10 ft (3m) or 30 degrees.







7. When both angles are set, press the back button  to return to the Operator Alarm menu or press the Working Screen button  again to return to the normal working screen.
8. Test the alarm, with no load, to ensure the alarm points have been properly set. When approaching the plane, the audio alarm will sound intermittently and the message "Bad Working Area" will appear on the warning message area. When passing the plane, the audio alarm will sound continuously and the message "Bad Working Area" will appear on the warning message area.



WARNING

If crane or obstacle is moved or if a different size load is lifted, the area alarm must be reset.

To Disable Operator Settable Alarms

1. From the normal working screen, press the Main Menu button .
2. Scroll to Operator Alarms, and press the OK/Enter button .
3. Scroll to the desired alarm to be disabled, and press the OK/Enter button .
4. Press the corresponding button for each alarm. The  icon indicates the alarm has been cleared.
5. When all desired alarms are disabled, press the back button  to return to the Operator Alarm menu or press the Working Screen button  again to return to the normal working screen.

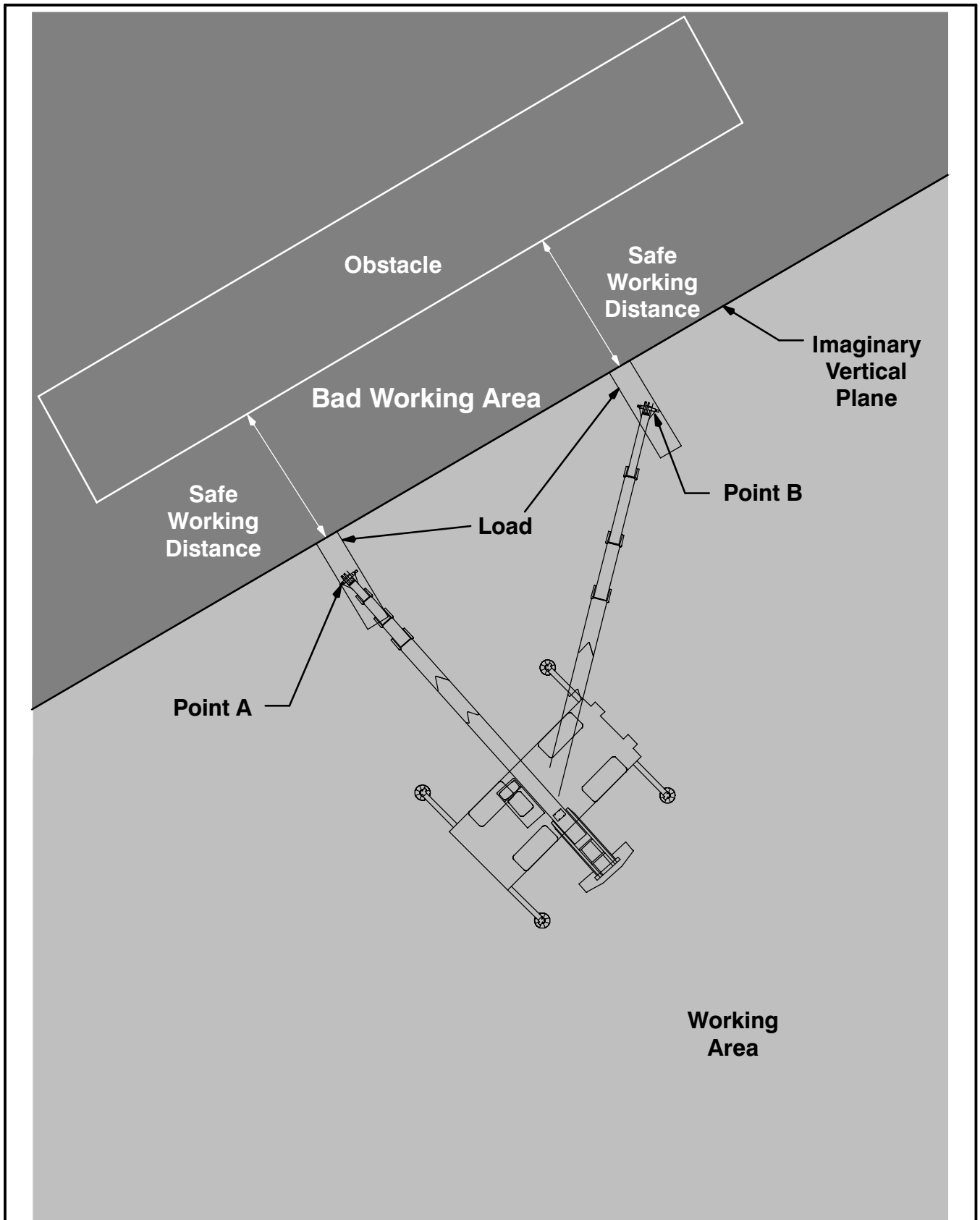


Figure 1–94
Operator Defined Area Alarm

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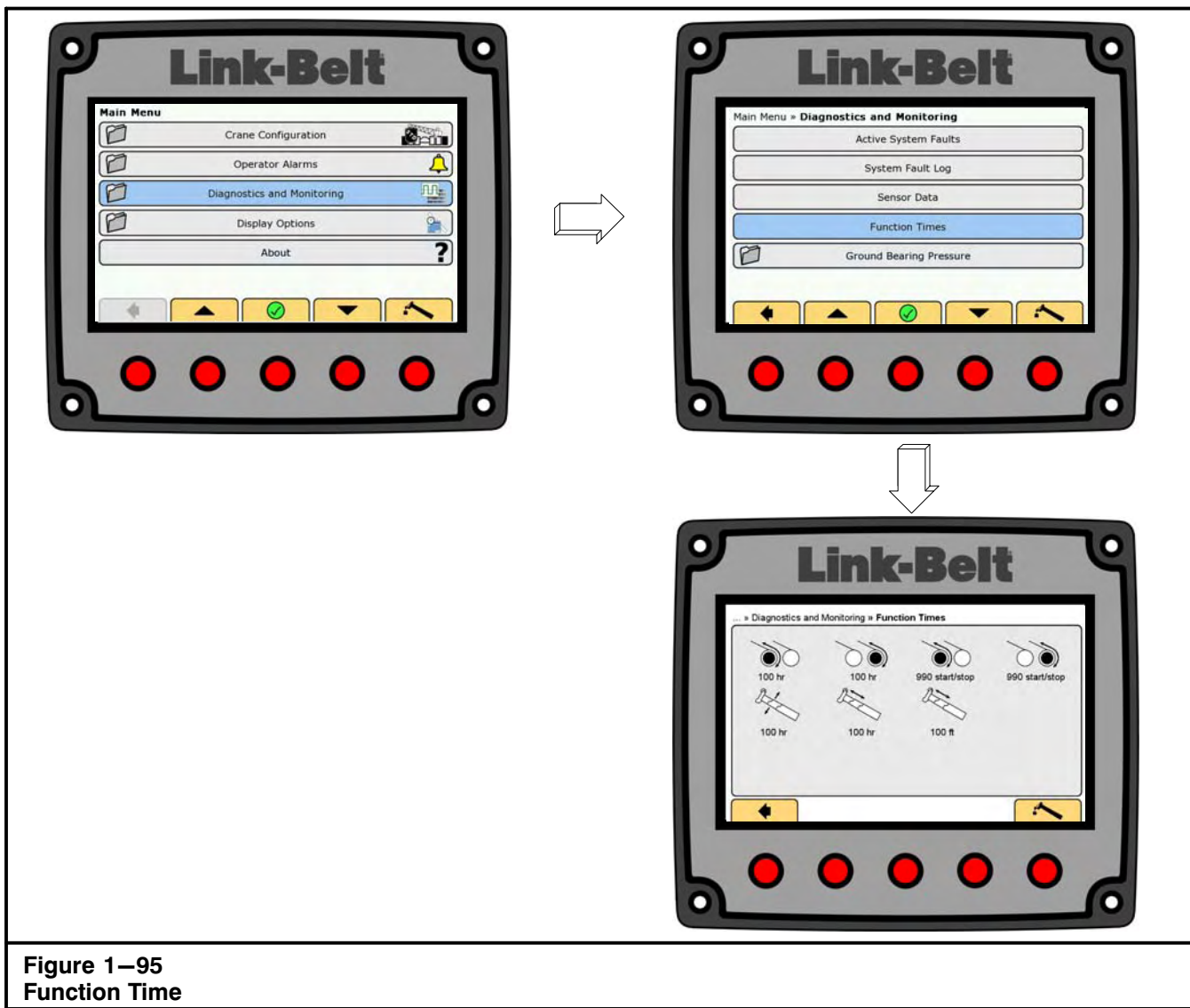







Figure 1–95
Function Time

Function Time Monitoring

The function time monitoring screen enables the operator to monitor the hours of use for the winch(s), boom hoist cylinder, and boom telescope cylinder for service purposes. The screen also displays the number of times the winch(s) has been started and stopped along with the total cumulative distance the boom has been extended and retracted.

1. From the normal working screen, press the Main Menu button .
2. Scroll to Diagnostics and Monitoring, and press the OK/Enter button .
3. Scroll to Function Time, and press the OK/Enter button . Refer to Figure 1–95.
4. From this screen, monitoring of the winch(s), boom hoist cylinder, and boom telescope cylinder can be done.
5. Press the back button  to return to the Diagnostics and Monitoring menu or press the Working Screen button  to return to the normal working screen.

Operator's Manual

Telematics

TELEMATICS - refers to the use of wireless devices and computer module technologies to transmit data in real time back to an organization.

This Link-Belt crane is equipped with one or more on-board computers that monitor and/or control the crane's performance. Crane owners may access electronic data by subscribing to the optional telematics feature offered by our telematics partner.

Specific electronic data transmitted by the onboard computers may be, but is not limited to, water temperature, oil temperature, engine rpm, fuel consumption, crane location, and other data that may be transmitted via satellite to our telematics partner. A crane owner may access this data by subscribing to the telematics feature through our telematics partner. A crane owner may then use some or all of the data transmitted from the crane's onboard computers to monitor the crane's activity, location, maintenance/service schedule, and/or other areas to assist them in managing this crane.

Note: Link-Belt recognizes that each individual crane's data transmitted via telematics is the property of the crane owner.


Data sharing is offered by Link-Belt through our telematics partner in an effort to provide Link-Belt distributors and our crane owners with overall enhanced product support through filed troubleshooting, expedited parts procurement, infield repairs and other various support outlets. Any data shared by the crane owner is a "snapshot" of the data from the crane.









Link-Belt may request the crane owner "share data". The crane owner should determine who and when specific data related to their crane is shared. Link-Belt and its representatives may be in possession of specific crane data only when the crane owner selects "share data".

Shared data received by Link-Belt is not intended to be "stored" in any permanent data file at our factory. Shared data may exist at the factory location through the normal course of business until deleted by automatic expiration.

Link-Belt reserves the right to modify this policy as required and make every reasonable attempt to notify telematics subscribers of changes to this policy.

Transmitting Data

1. From the normal working screen, press the Main Menu button .

2. Scroll to Diagnostics and Monitoring, and press the OK/Enter button .
3. Scroll to Telematics, and press the OK/Enter button . Refer to Figure 1—96.
4. Scroll to the data that you would like to send, and press the OK/Enter button .
5. A confirmation screen will pop up. Press  to send the data or press  to cancel and return to the previous screen.
6. A  will be shown beside the data selected while the data is being sent. The Telematics Module will send data every 10 seconds for 10 minutes or until ignition is turned off.
7. Press the back button  to return to the Diagnostics and Monitoring menu or press the Working Screen button  to return to the normal working screen.

Computer Return And Stored Data Disclosure

In the event the Rated Capacity Limiter (RCL), Load Moment Indicator (LMI), or other computer containing recorded/stored data on this crane is returned to Link-Belt Construction Equipment Company (LBCE) or the original equipment manufacturer (OEM) of an onboard computer, for service or replacement, the crane owner must submit a written request to have the recorded/stored data on that computer downloaded to an electronic device that is to be returned to the crane owner before any examination and/or work is started on that specific computer.

Should LBCE direct the crane owner to return an onboard computer to the OEM of that computer, LBCE recommends the crane owner submit a written request to the OEM requesting the OEM download the recorded/stored data to an electronic device and return that device to the crane owner prior to any examination and/or work being started on that specific computer.

In some instances, in order to read data recorded/stored in an onboard computer special equipment is required, and access to the crane and/or the computer is needed. Link-Belt or the OEM of the computer has the special equipment necessary to retrieve the recorded data, or directions on how the data may be retrieved. Please contact your nearest Link-Belt distributor for assistance.

It is the position of Link-Belt that the crane owner owns any data that is recorded and stored in the onboard computer system(s) installed on our cranes.

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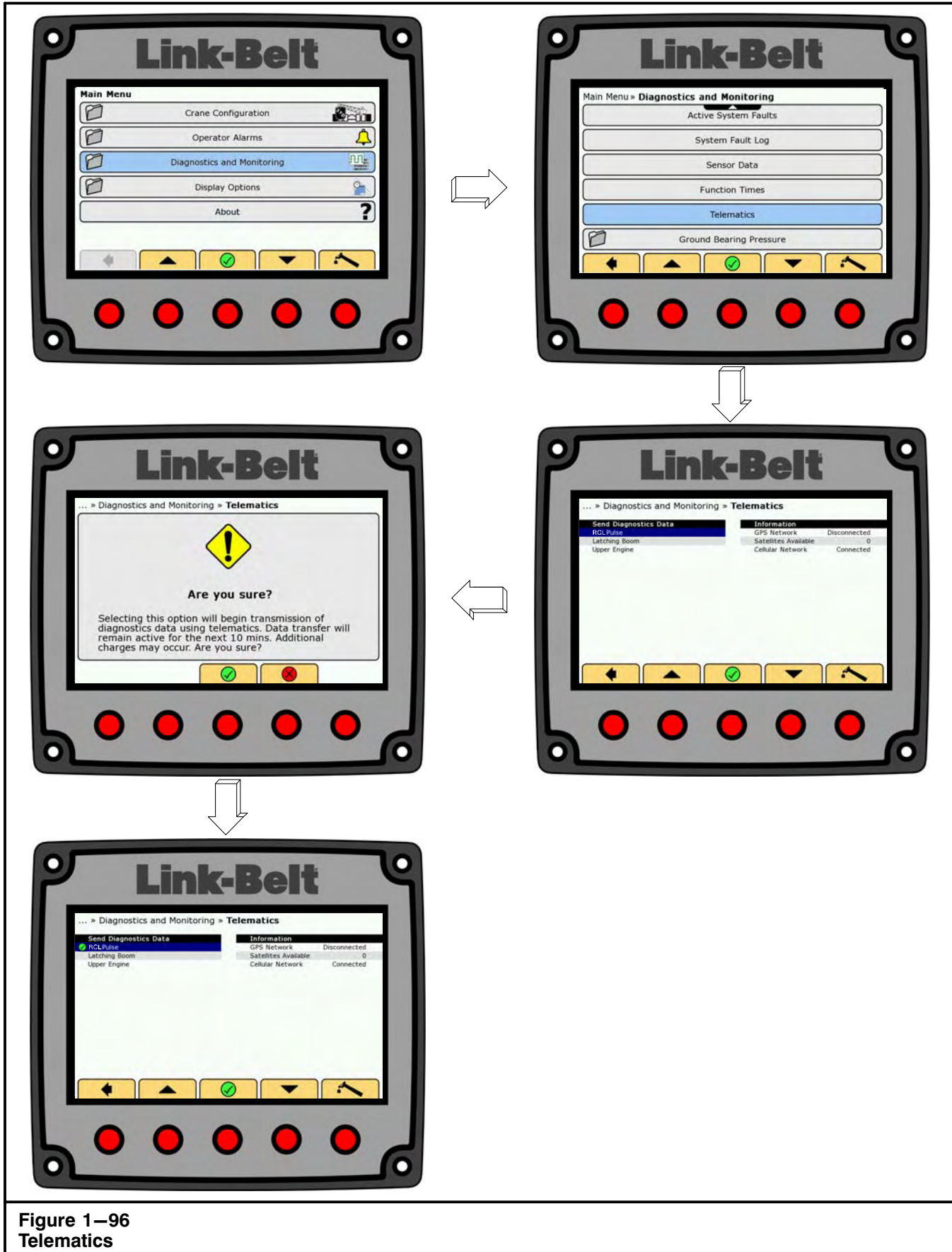


Figure 1–96
Telematics

Operator's Manual

Ground Bearing Pressure Monitoring

The ground bearing pressure screen is offered as an operator's aid in the RCL system to further assist operators in monitoring and understanding the ground bearing pressures in real time in order to lift loads safely. The operator can set up the alarms for excessive ground bearing pressure by inputting the max pressure limit in "Operator Settable Alarms" section in this Operator's Manual.

Ground bearing pressures are calculated based on surface types, crane configurations input by Operator, and readings from several sensors. Those sensors include but not limited to: boom and boom head angle sensors, boom hoist cylinder pressure sensors, boom length encoders, upper slew angle sensor, list and trim inclinometers, etc.



WARNING

No actual sensors are present for the direct measurement of the ground bearing pressures. It is operator's responsibility to input the correct crane configurations in order for the RCL system to estimate the ground bearing pressures accurately.

The ground bearing pressure monitoring system can be operated in two modes: live data and simulation modes.

Live Data

The live data screen may be used for monitoring the ground bearing pressure while lifting the load. Function limiters do not activate when ground bearing pressures are exceeded.



WARNING

The live ground bearing pressure mode must not be used to determine whether the crane will tip over or not.

Note: It is not recommended to use the live ground bearing pressure screen during lift crane operation. Use the live ground bearing pressure screen to temporarily monitor the cranes ground bearing pressure.

Simulation Mode

The simulation mode allows the operator to forecast what the ground bearing pressure would be by inputting a simulated load manually without lifting the load. Operator may then operate the crane through the motions of what the lift would be and predict whether the maximum pressures would be exceeded or not. The simulation mode can be used for lifting planning and lifting dry-runs on the job site.



WARNING

While in simulation mode, lifting a load on hook is prohibited and do not lower the boom below the minimum boom angle.

All warnings, i.e., audible and bar graph for visual, and function limiters are still active and are based on actual load on hook in both live data and simulation modes.

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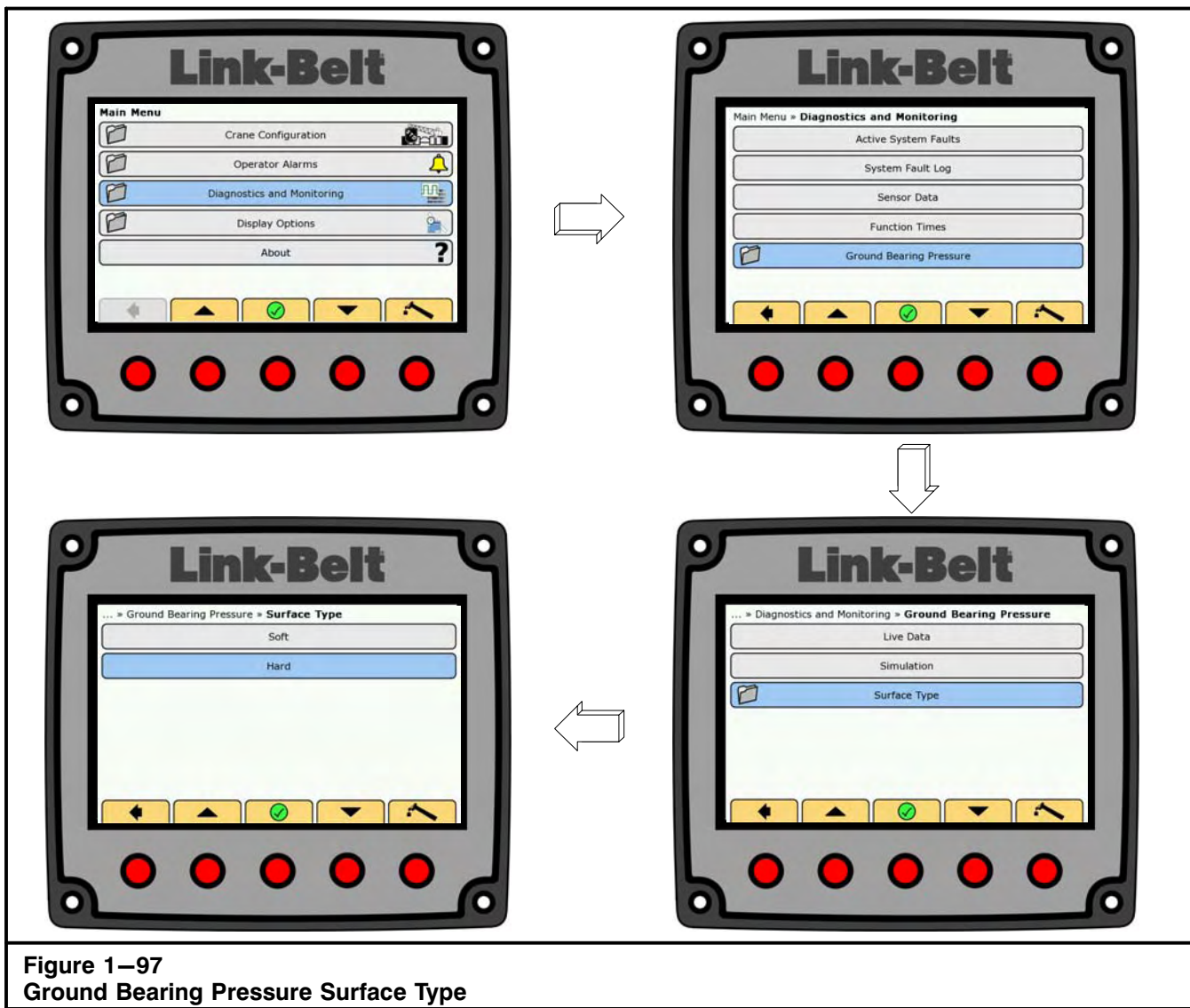












Figure 1–97
Ground Bearing Pressure Surface Type

Ground Bearing Pressure Surface Type Selection

1. From the normal working screen, press the Main Menu button .
2. Scroll to Diagnostics and Monitoring, and press the OK/Enter button .
3. Scroll to Ground Bearing Pressure, and press the OK/Enter button .
4. Scroll to the proper surface per application, and press the OK/Enter button .
5. Press the back button  to return to the Ground Bearing Pressure menu or press the Working Screen button  to return to the normal working screen.

Ground Bearing Pressure Live Data Selection

1. From the normal working screen, press the Main Menu button .
2. Scroll to Diagnostics and Monitoring, and press the OK/Enter button .

3. Scroll to Ground Bearing Pressure, and press the OK/Enter button .
4. Scroll to Live Data, and press the OK/Enter button . Refer to Figure 1–98.
5. In the Live Data screen example in Figure 1–98, the crane is setup with the upper in the 90° position or over the right of the lower. The blue bars display the pressures on each side of the lower. The pressure on the left side is 8 psi (55.2kpa) and the pressure on the right side is 12 psi (82.7kpa). The distances of 16.5 ft (5.03m), on the outsides of each track, indicate the length of each track that has a downward force on it which is creating the ground bearing pressure. The decrease in the distance of the pressure indicates the decrease in contact area between the tracks and the ground surface. The screen also includes the bar graph on the left side of the screen which indicates how much of the crane's capacity is being used and the rate at which an overload is being approached.

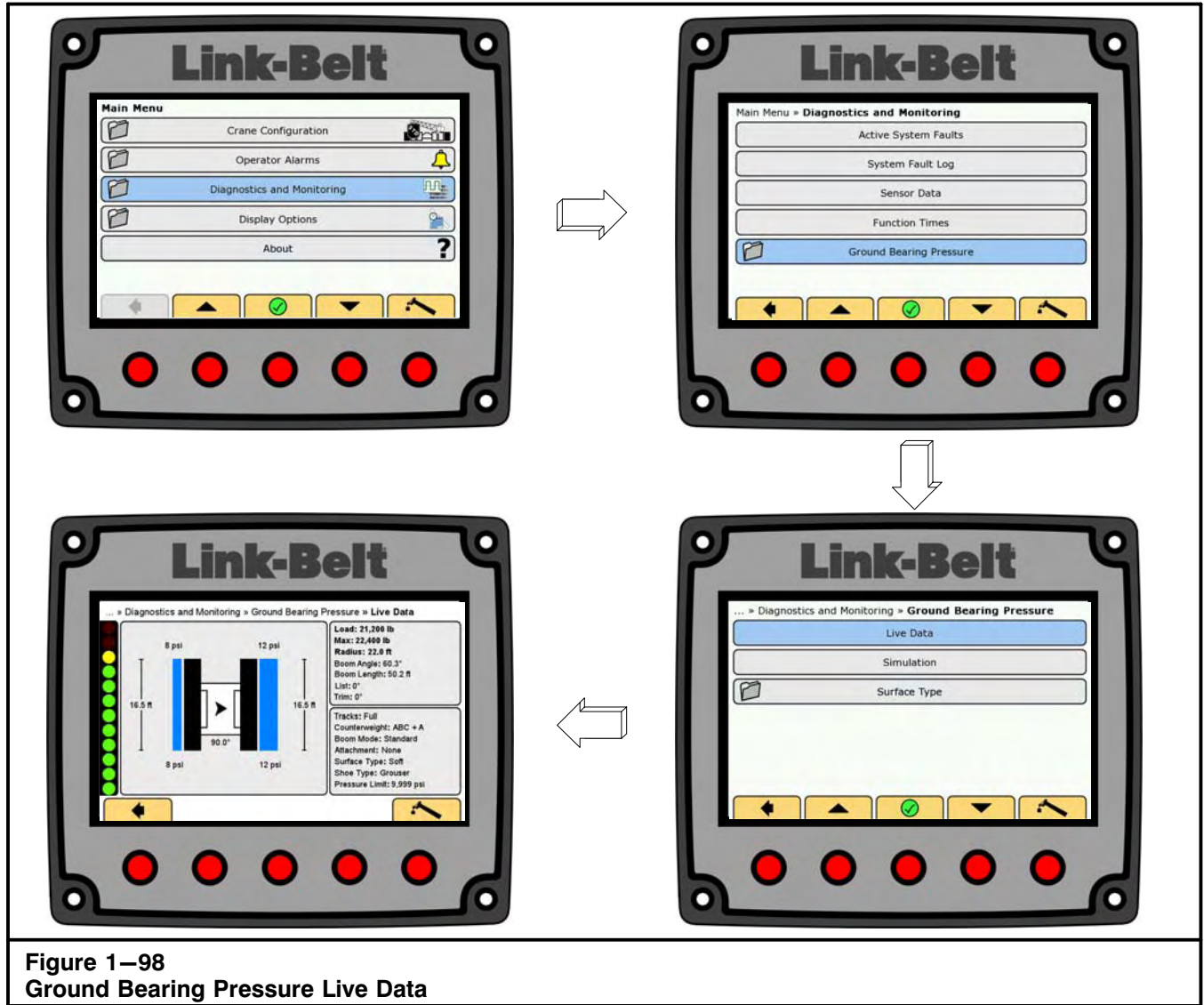












Figure 1–98
Ground Bearing Pressure Live Data

6. Press the back button  to return to the Ground Bearing Pressure menu or press the Working Screen button  to return to the normal working screen.

Ground Bearing Pressure Simulation Selection

1. From the normal working screen, press the Main Menu button .
2. Scroll to Diagnostics and Monitoring, and press the OK/Enter button .
3. Scroll to Ground Bearing Pressure, and press the OK/Enter button .
4. Scroll to Simulation, and press the OK/Enter button . Refer to Figure 1–99.
5. Press the keypad button  to enter into keypad mode.

6. Enter the weight of the simulated load, and press the OK/Enter button .
7. In Figure 1–99, a simulated weight of 21,200 lb (9 616kg) was entered.
8. In the Simulation Mode screen example in Figure 1–99, the crane is setup with the upper in the 90° position or over the right of the lower. The blue bars, which indicate the pressure on the lower, could be in a triangular shape when the upper is in other positions, i.e., 45° position or over a corner of the lower.
9. Press the back button  to return to the Ground Bearing Pressure menu or press the Working Screen button  to return to the normal working screen.

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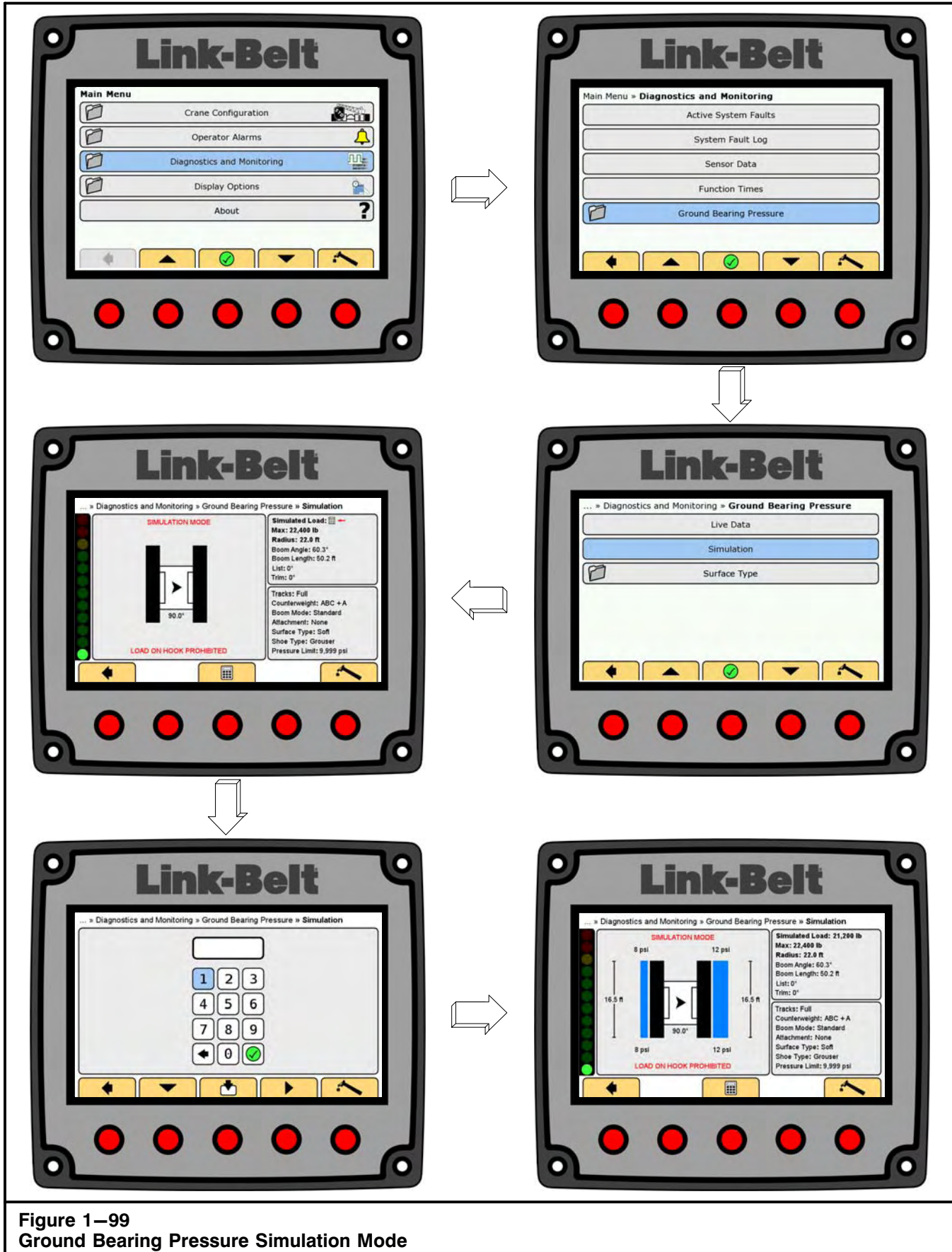


Figure 1–99
Ground Bearing Pressure Simulation Mode

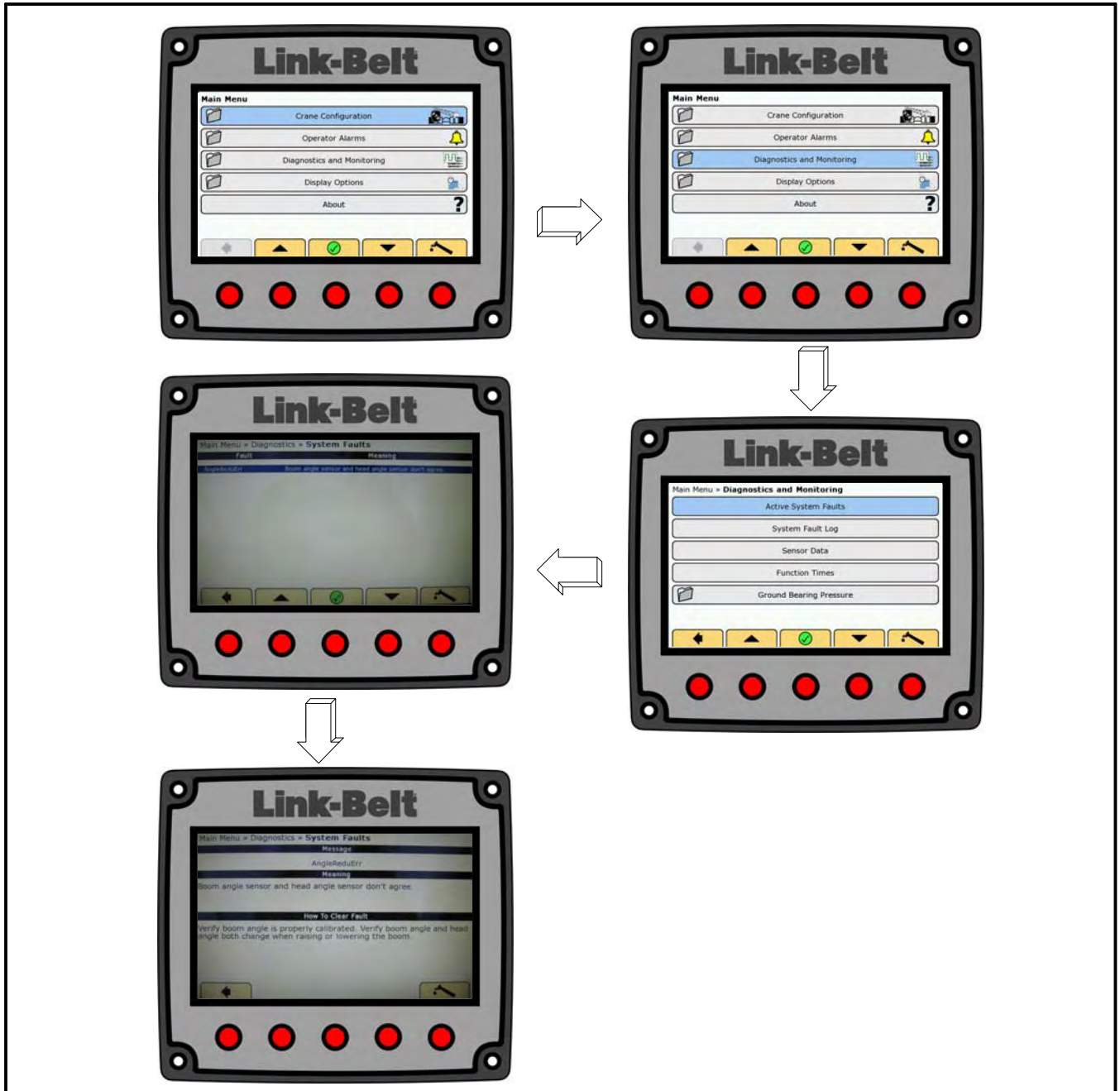








Figure 1–100
Active System Faults

Active System Faults

The Active System Faults menu displays current system faults. Refer to Figure 1–100 and the System Faults Messages chart.

1. From the normal working screen, press the Main Menu button .
2. Scroll to Diagnostics, and press the OK/Enter button .
3. Scroll to Active System Faults, and press the OK/Enter button .
4. Scroll to the fault code to be addressed, and press the OK/Enter button .
5. The message selected, meaning of the message, and how to clear the message will be displayed.
6. Press the back button  to return to the System Faults menu or press the Working Screen button  to return to the normal working screen.

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Active System Faults Messages		
Message	Meaning	How To Clear Message
DispComErr	Display communication lost.	Verify display is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.
ATBComErr	ATB switch communication lost.	Verify boom reel is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.
ATBShort	ATB switch short circuit.	Verify ATB switch is functioning properly. Check wiring between ATB switch and boom reel.
LenComErr	Boom length sensor communication lost.	Verify boom reel is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.
LenDataErr	Boom length sensor data is invalid.	Verify boom length is properly calibrated. Verify boom length value changes when extending or retracting the boom.
LenReduErr	Boom length sensor and boom controller length don't agree.	Verify boom length and boom controller are properly calibrated. Verify sensor boom length and boom controller length both change when extending or retracting the boom.
AngleComErr	Boom angle sensor communication lost.	Verify boom reel is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.
AngleDataErr	Boom angle sensor data is invalid.	Verify boom angle is properly calibrated. Verify boom angle value changes when raising or lowering the boom.
AngleReduErr	Boom angle sensor and head angle sensor don't agree.	Verify boom angle is properly calibrated. Verify boom angle and head angle both change when raising or lowering the boom.
HeadComErr	Head angle sensor communication lost.	Verify boom reel is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.
HeadDataErr	Head angle sensor data is invalid.	Verify head angle is properly calibrated. Check wiring between head angle sensor and boom reel. Verify head angle changes when raising or lowering the boom.
HPresComErr	Head pressure sensor communication lost.	Verify head pressure sensor is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.
RPresComErr	Rod pressure sensor communication lost.	Verify rod pressure sensor is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.
DispIOComErr	Display I/O communication lost.	Verify display is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.
BoomComErr	Boom controller communication lost.	Verify boom controller is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.
Telematic-sModComErr	Telematics module communication lost.	Verify telematics module is properly connected to the CAN bus. Check all CAN bus wiring including termination resistors.

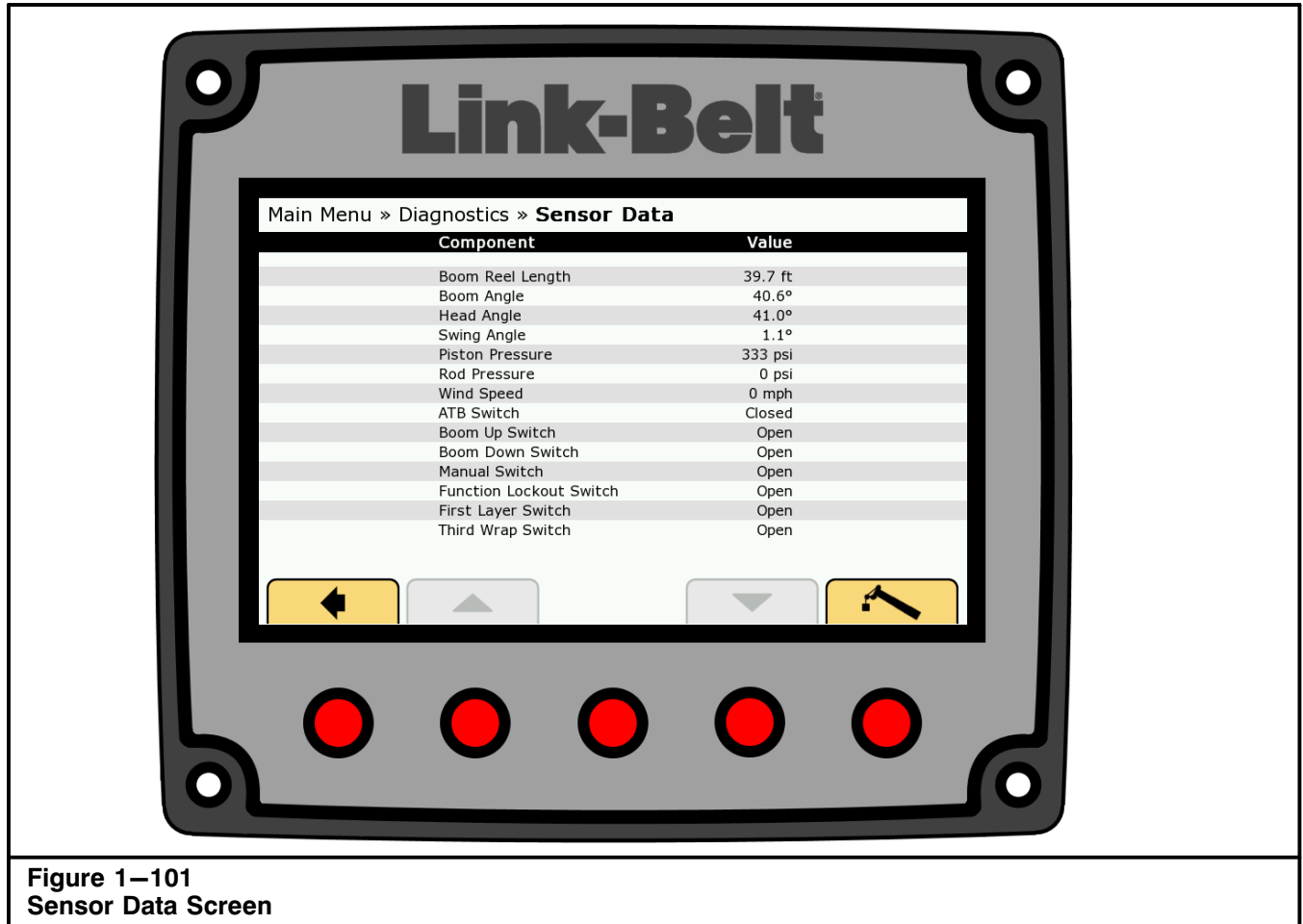







Figure 1–101
Sensor Data Screen

Sensor Data

The Sensor Data menu displays data being read by various sensors on the crane. Refer to Figure 1–101.

1. From the normal working screen, press the Main Menu button .
2. Scroll to Diagnostics, and press the OK/Enter button .
3. Scroll to Sensor Data, and press the OK/Enter button .
4. The data being generated by the various sensors will be displayed.
5. Press the back button  to return to the Diagnostics menu or press the Working Screen button  to return to the normal working screen.

Operator's Manual

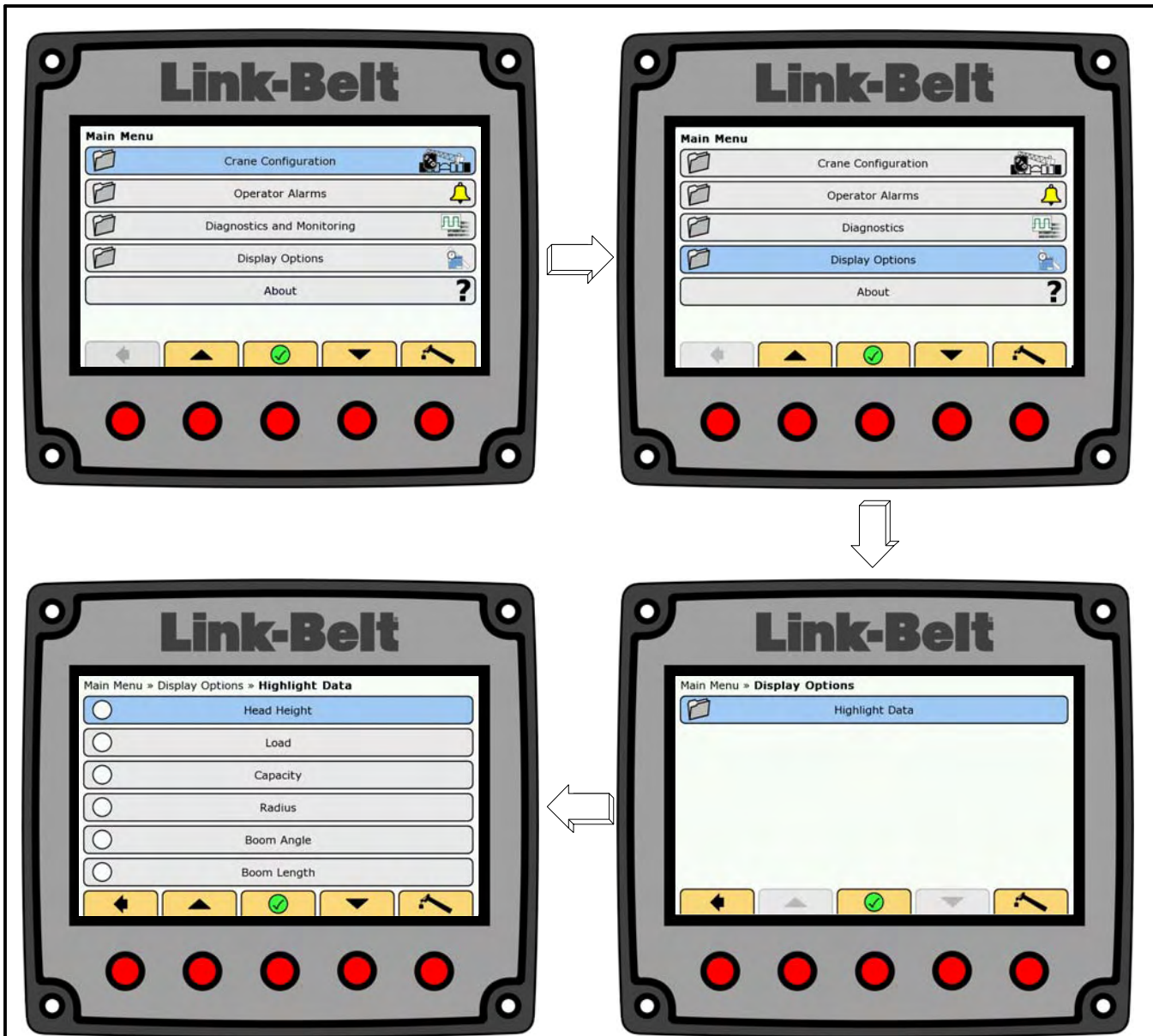









Figure 1–102
Highlight Data

Highlight Data Menu

The Highlight Data menu allows the Operator to select specific data to be highlighted on the normal working screen. The data will appear with a purple highlighting. Refer to Figure 1–102.

1. From the normal working screen, press the Main Menu button .
2. Scroll to Crane Configuration, and press the OK/Enter button .

3. Scroll to Display Options, and press the OK/Enter button .
4. Scroll to Highlight, and press the OK/Enter button .
5. Scroll to the information to be highlighted, and press the OK/Enter button .
6. Repeat Step 5 for each item to be highlighted.
7. Press the back button  to return to the Display Options menu or press the Working Screen button  to return to the normal working screen.

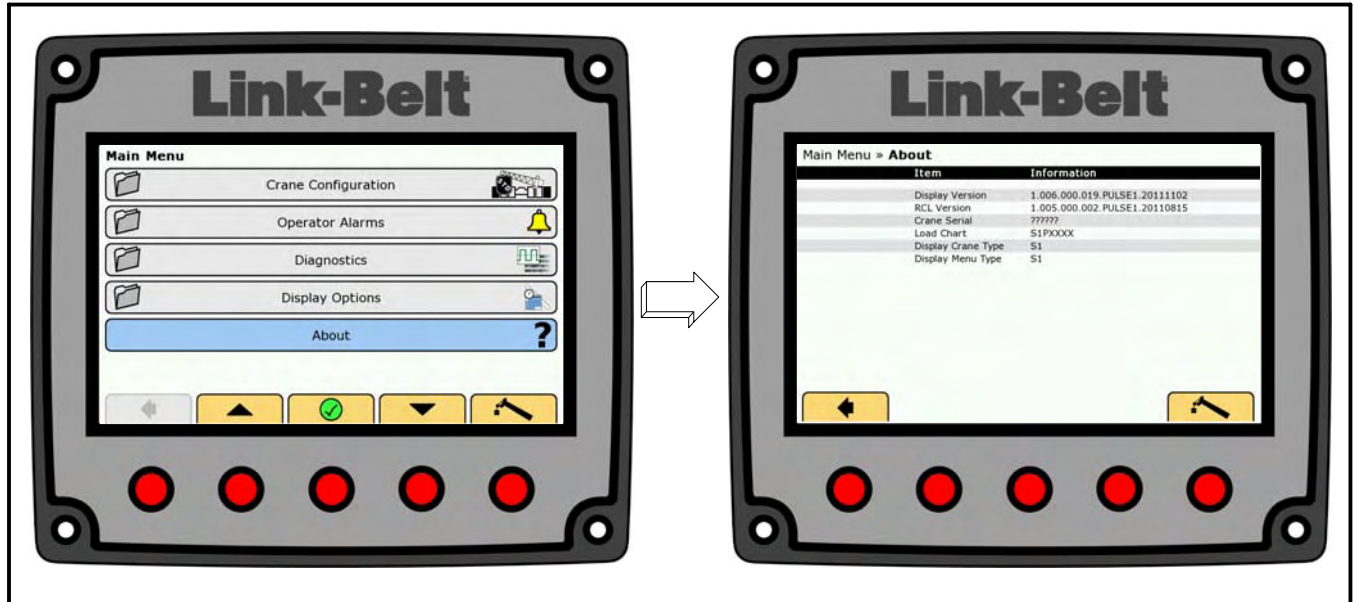






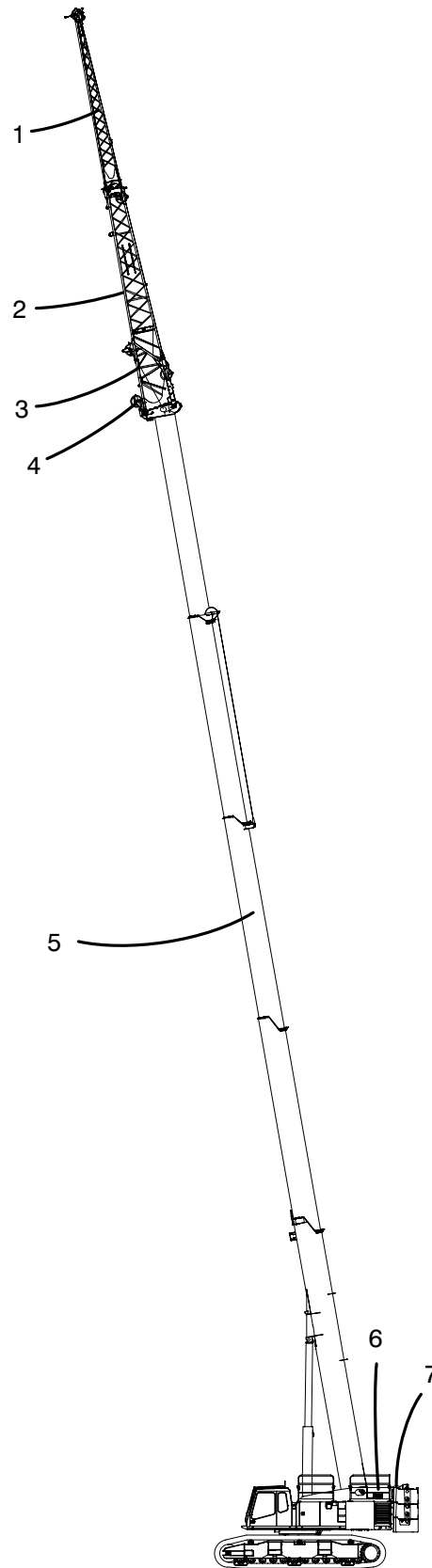
Figure 1–103
About Screen

About Menu

The About menu displays which version of the Display, ECM, and Boom Controller software is currently installed. Refer to Figure 1–103. The crane serial number is also displayed on this screen.

1. From the normal working screen, press the Main Menu button .
2. Scroll to About, and press the OK/Enter button .
3. Press the back button  to return to the Main menu or press the Working Screen button  to return to the normal working screen.

Operator's Manual



1. Offset Lattice Fly Tip Section
2. Offset Lattice Fly Center Section
3. Offset Lattice Fly Base Section
4. Auxiliary Lifting Sheave
5. Five Section Boom
6. Front Winch
7. Rear Winch

Figure 1–104
Typical Crane Attachment Setup (Provided for correct identification of attachments)

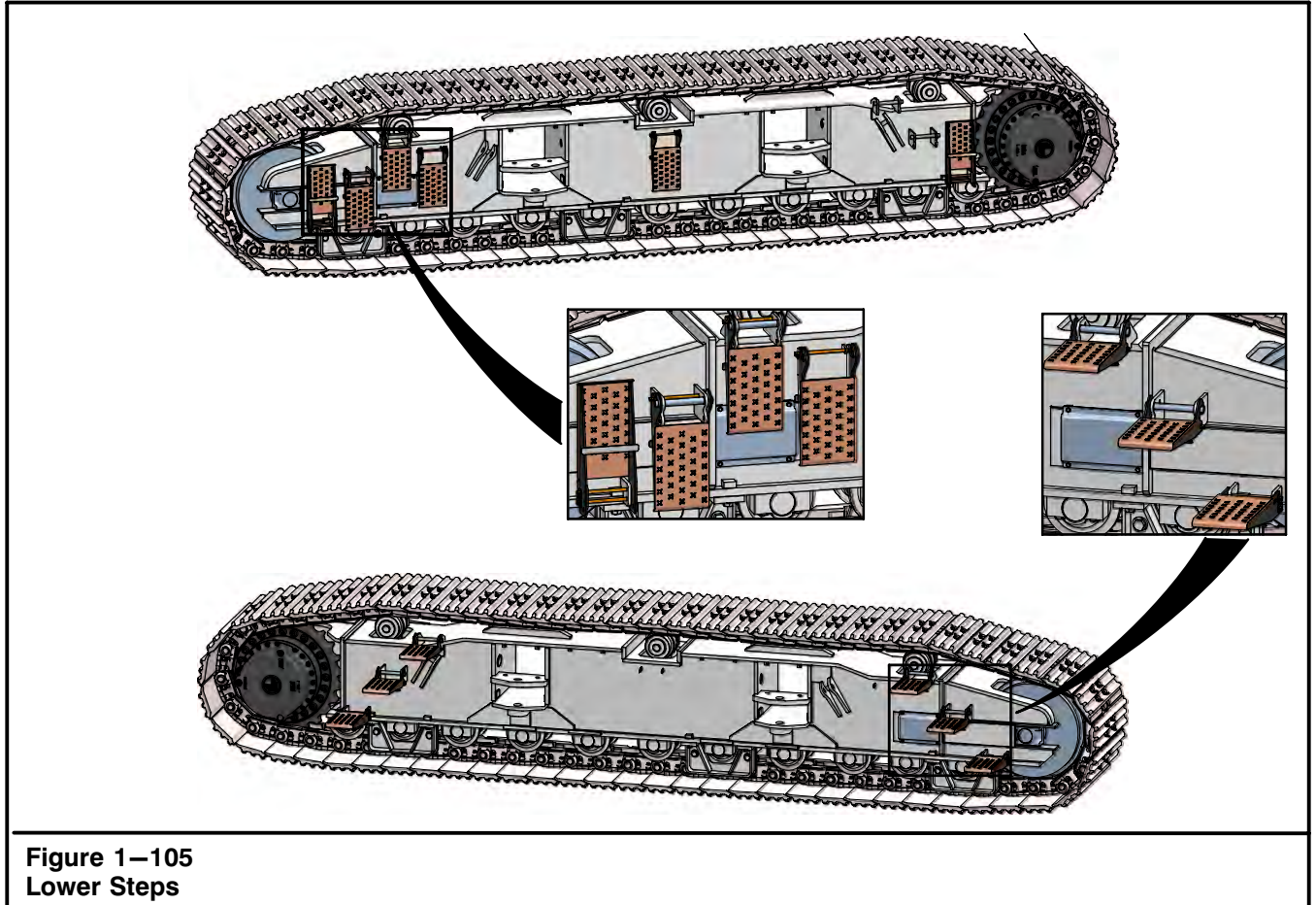


Figure 1–105
Lower Steps

Entering And Exiting The Operator's Cab

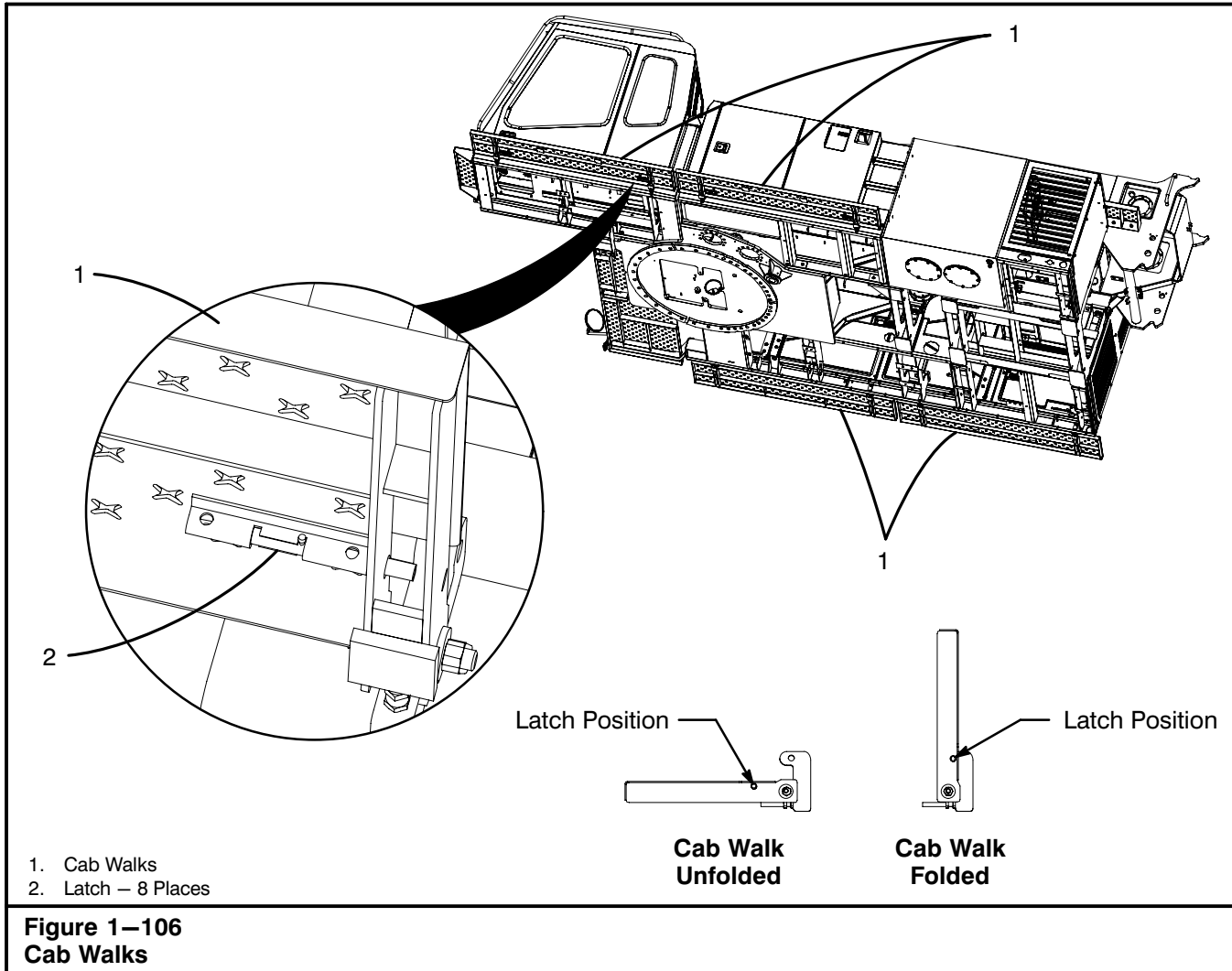
Entering or exiting the operator's cab could be hazardous if certain aspects are not taken into consideration. The elevation of the operator's cab alone could cause serious injury from a fall. For this reason steps are mounted on each side frame. Refer to Figure 1–105. Lower the steps to provide easy access to the operator's cab.

Cab walks are mounted on the crane and should be unfolded when entering/exiting the operator's cab. Refer to Figure 1–106. Release the latches to unfold the cab walks. Numerous hand grips are also attached to the operator's cab to provide safe entry to the operator's cab. Remain in three point contact with the crane at all times (two hands and one foot or two feet and one hand). Use these features to make climbing on the crane as safe as possible.

1. Function Lockout Switch

This switch is used to disable the hydraulic functions which are operated by the control levers and boom telescope foot pedal. The switch is on the right seat console. Refer to Figure 1–54. Press the bottom part of the switch to disable hydraulic functions and to prevent inadvertent operation of these controls. To allow normal operation of the control levers and boom telescope foot pedal, press the top part of the function lockout switch. The bottom part of the switch will illuminate to indicate the switch is in the "OPERATION" position. This switch should always be in the "DISABLE" position when entering or exiting the operator's seat.

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2. Movable Left Side Console

The left side console is hinged at the rear to allow the operator to lift the console up, out of the way while entering or exiting the operator's cab. A spring assists movement of the console.



WARNING

To prevent personal injury do not attempt to enter the operator's cab prior to raising the left side console.

Lifting the left side console also performs the same duty as the function lockout switch, described previously, disabling all hydraulic functions related to the control levers and boom telescope foot pedal. Lifting the left side console also automatically applies the swing park brake. Ensure the left side console is lifted up, out of the way before attempting to enter or leave the operator's cab.

One more feature which is available to ease entry and exit of the operator's cab, is the adjustable operator's seat. Lift the left arm rest up out of the way and move the seat and/or console back as required to allow safe entry. This feature also provides operator comfort during crane operation as well. Refer to "Operator's Seat" in this Section of this Operator's Manual for complete seat operating instructions.

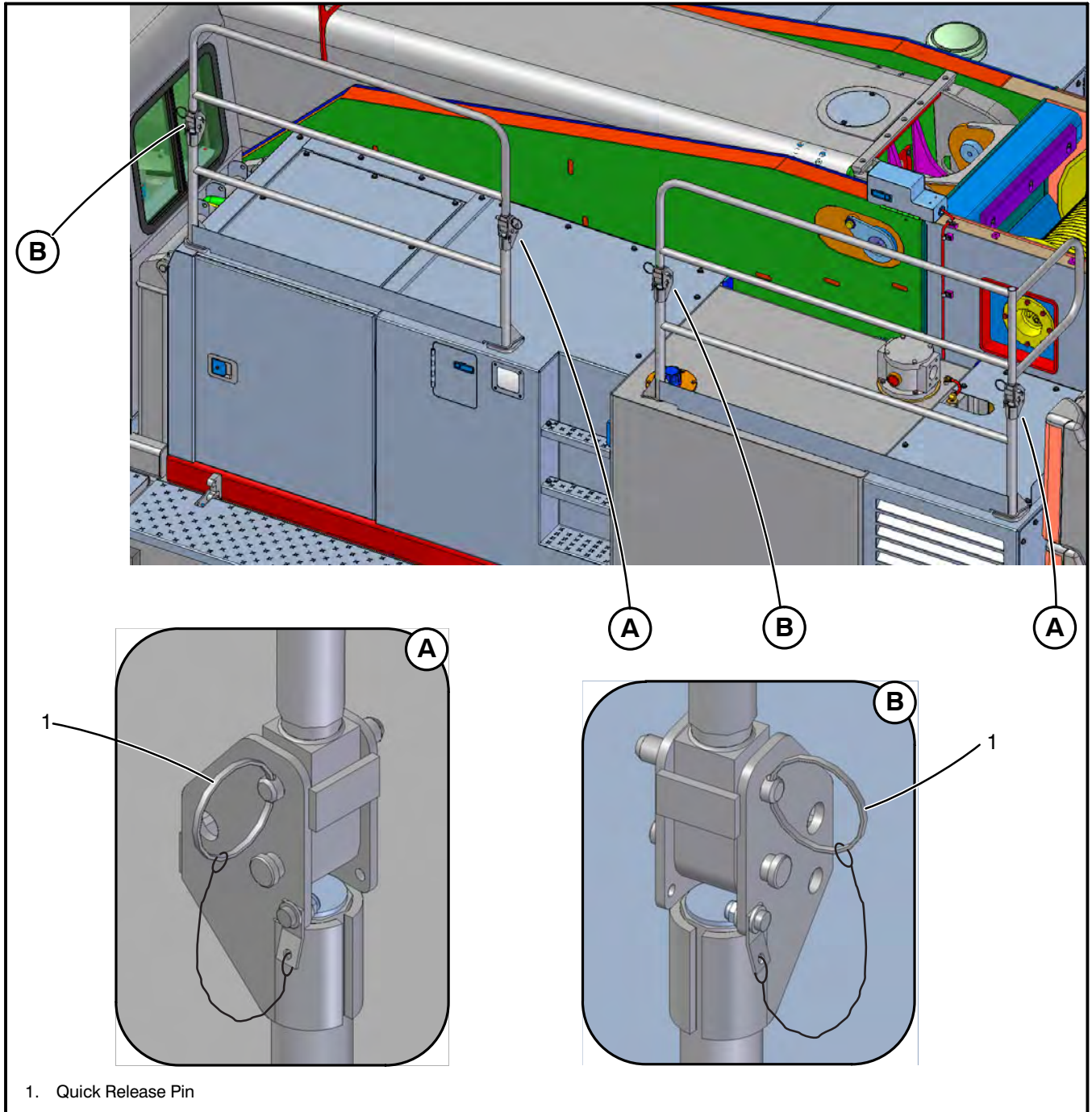


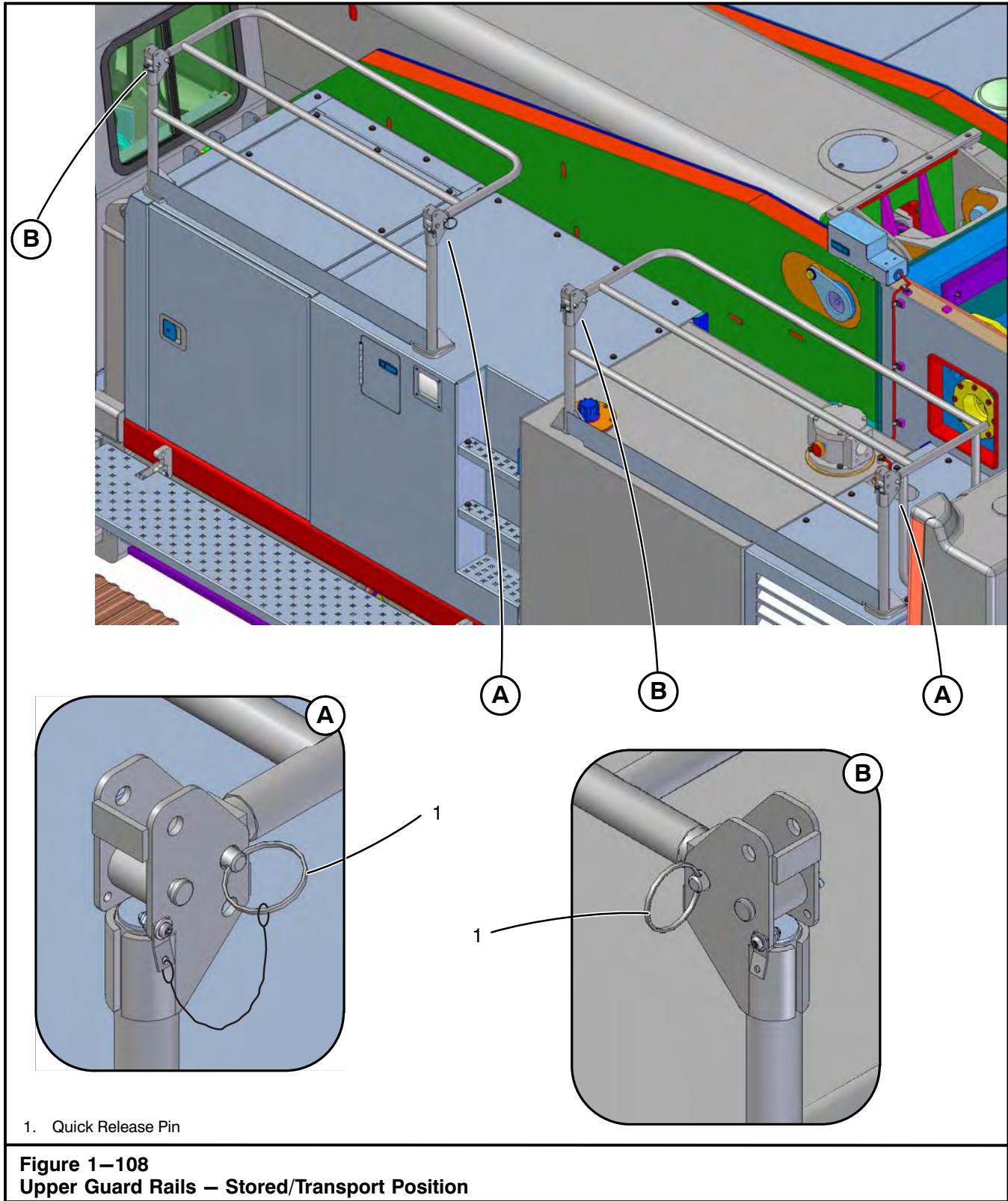
Figure 1–107
Upper Guard Rails – Working Position

Upper Guard Rails

The crane is equipped with guard rails on the upper to make access to upper components safer when servicing the crane. The rails should remain in the working

position at all times except during crane transport. Refer to Figure 1–107. Position the rails in the storage/transport position before transporting the crane. Refer to Figure 1–108.

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1. Quick Release Pin

Figure 1-108
Upper Guard Rails – Stored/Transport Position

Operator's Manual

Before Starting Operations

Before starting daily operations, make the following checks and inspections:

Engine

Check fuel, oil, and cooling systems for proper fluid levels. Check for leaks. Repair or fill as required. Refer to the engine manufacturer's manual for additional information.

Gear Cases

Visually inspect all gear cases for leaks or damage. If leaks or damage exists, repair and fill case(s) to proper lubrication level.

Hydraulic System

Check all hoses for chafing, bulging, or other damage. Replace as necessary. Inspect hydraulic system for external leaks. Repair as needed. Check hydraulic reservoir oil level. Add oil if necessary.

Lubrication

Lubricate the crane as outlined in Section 2 of this Operator's Manual.

Note: Operators may have nothing to do with lubrication or maintenance of the crane, but it could be advantageous for them to be familiar with it. Knowledge of preventive maintenance makes the operator more aware of malfunctions in the crane so repairs can be made with a minimum of downtime.

Wire Rope And Sheaves

Inspect all wire rope and sheaves for damage or deterioration. Replace as necessary.

General Inspection

Visually inspect the entire crane for loose or missing cotter pins, bolts, boom damage, or fly chord and/or lattice damage. Check for oil or fluid leaks. Make repairs as needed.

Electrical System

Check the operation of all lights, windshield wipers, horns, etc. Repair as needed.

Controls

Check all controls for proper operation and adjustment. Repair as needed.

Fire Extinguisher

A fire extinguisher is mounted in the operator's cab. It is an ABC type fire extinguisher, meaning it is capable of extinguishing most types of fires. The operator should be familiar with its location, the clamp mechanism used to secure it in place, and foremost the operation of the device. Specific instructions, regarding operation, are given on the label attached on

the fire extinguisher. A charge indicator on the fire extinguisher monitors the pressure within the tank. Check the indicator daily to ensure the fire extinguisher is adequately charged and ready for use.

Boom Distortion Due To Thermal Effects Of The Sun

The heat from the sun may have a thermal effect on the sides of telescopic booms causing the sides of the boom to expand (lengthen). The sides of the boom may not expand equally if the boom is extended for long periods of time with only one side of the boom exposed to the sun. The unequal expansion may cause boom distortion (the boom may "deflect" to one side). This is more noticeable with long boom lengths and/or long booms with long lattice flies attached to the boom. For example, a 100 ft (30.5m) main boom, with a 50°F (10°C) temperature differential between the two sides of the boom, may cause the centerline of the main boom head to "deflect" as much as 3 ft (0.9m) off the centerline of the crane. Attaching a lattice fly to the same boom may cause the centerline of the fly head to "deflect" even more off the centerline of the crane. This "deflection" to one side creates a "side load" on the boom and/or fly. Side load on a boom or fly, whether induced by the load or thermal effects, is dangerous and shall be avoided.

Prior to lifting any loads, inspect the boom or boom and fly combination to ensure they are straight. If the boom or boom and fly combination is not straight, ensure that all the boom wear pads are properly adjusted.

If the boom is distorted due to temperature differential on the sides of the boom, reposition the boom to allow the thermal effects from the sun to equalize the temperatures of the side walls of the boom to eliminate the distortion before lifting a load.

Engine Starting Procedure



WARNING

This Operator's Manual and the engine manufacturer's manual must be thoroughly read and understood by the operator before starting the engine. Serious personal injury and/or major crane damage could result from improper operating procedures.

Before attempting to start the engine, the operator should carefully read and understand the engine starting instructions in the engine manufacturer's manual and this Operator's Manual. Attempting to start or run the engine before studying these instructions may result in engine damage. With the crane fully serviced and the operator familiar with all gauges, switches, controls, and having read and fully understood this entire Operator's Manual, start the engine using the following procedures.

Operator's Manual

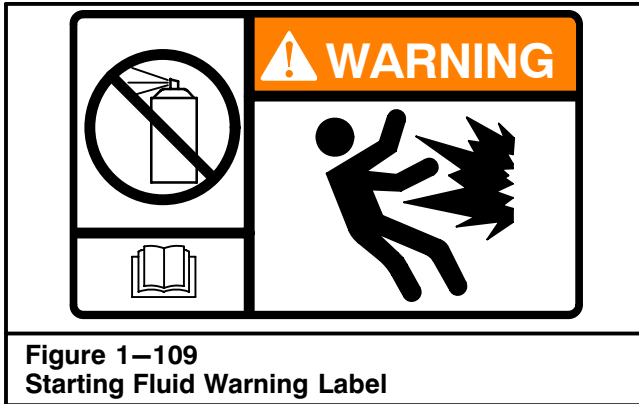
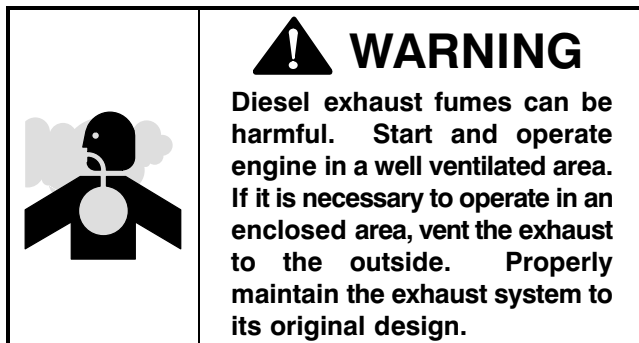




Figure 1–109
Starting Fluid Warning Label



1. Walk around the crane to verify that there are no persons under, or in close proximity to the crane.
2. Sound the horn twice in succession and wait 10–15 seconds while making a visual check to verify that there are no persons under or in close proximity to the crane.
3. Ensure the function lockout switch is in the "Disable" position and swing park brake is applied. The engine will not start if swing park brake is not applied.
4. Turn the ignition switch to the "ON" position to energize the engine electrical system.
5. If required, allow the "Wait To Start" indicator light  (on the Crane Control Display) to go out.
6. Turn the ignition switch to the "Start" position. Release the ignition switch immediately after the engine starts. If the engine fails to start in 30 seconds and the "Wait To Start" indicator light  begins to flash, release the ignition switch and allow the starter motor to cool a few minutes before trying to start the engine again. If the engine fails to start after four attempts, refer to the engine manufacturer's manual for instructions.

Note: If the ignition switch is turned to the "Start" position and nothing happens, turn the ignition switch back to the "Off" position, then back to the "Start" position.


7. Warm Up – Run the engine at low throttle with no load while the engine is warming up. Observe the following instruments for proper indications.

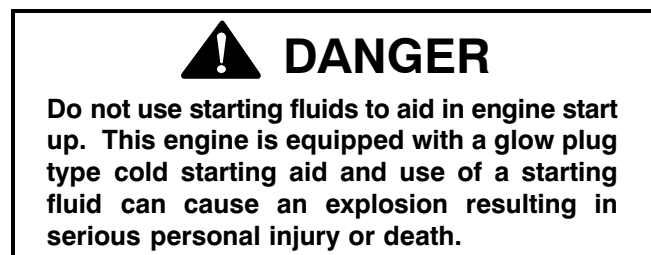
- a. Engine Oil Pressure – Observe engine oil pressure indicator light on the Crane Control Display. If light does not go out after engine runs 10–15 seconds, shutdown engine immediately and repair the problem to avoid major engine damage. Refer to the engine manufacturer's manual for proper oil pressure operating range.
 - b. Coolant Temperature Gauge – Observe the coolant temperature gauge on the Crane Control Display to ensure engine is warming up to the proper operating temperature. For proper cooling system operating temperature range, refer to the engine manufacturer's manual.
 - c. Battery Indicator Light – Observe battery indicator light on the Crane Control Display to ensure battery and electrical system is working properly.
8. When the engine has thoroughly warmed up, after all pressures and temperatures are within operating ranges, and all daily checks have been made, the crane is ready for operation.

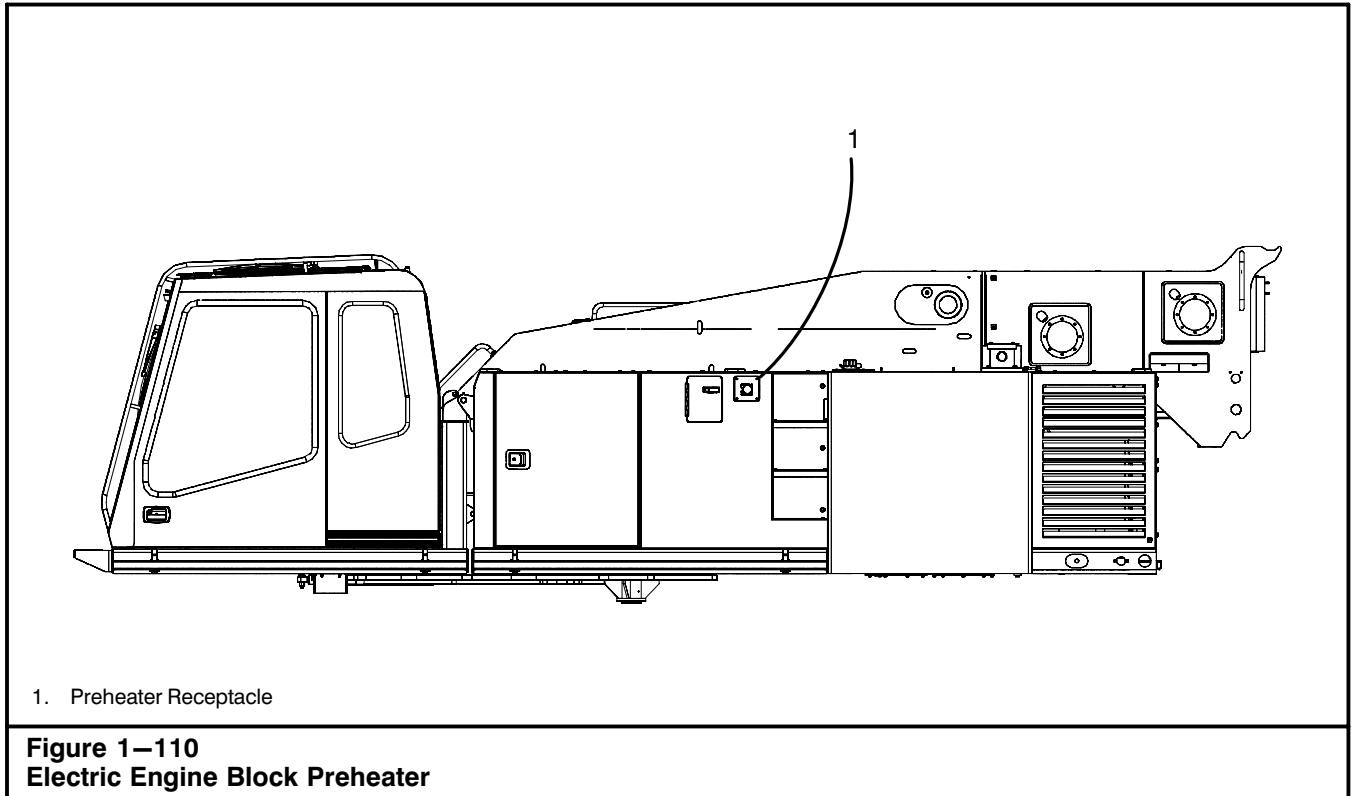
Engine Shutdown Procedure

1. Lower any load to the ground and properly secure it. Fully retract and lower the boom.
2. Engage the travel swing lock.
3. Throttle the engine back to idle.
4. Turn the ignition switch to the "OFF" position.
5. If leaving the operator's cab, press the function lockout switch to the "Disable" position and raise the left console to disable hydraulic controls.
6. Remove the ignition key from the operator's cab and lock the door if the crane is to be left unattended.

Cold Engine Starting

To help ignition in cold ambient conditions, air intake heater is used to warm the intake air prior to starting the engine. This improves combustion efficiency which aids in starting a cold engine. With the ignition switch in the on position, the ECM senses ambient air temperature then determines if the air intake must be energized to warm the intake air. A "Wait To Start" indicator light  on the Crane Control Display will illuminate to alert the operator not to crank the engine because the combustion chamber is too cold for fuel ignition. When the cylinders are warm enough to ignite the first charges of fuel, the indicator light will go out and the engine can be started.





Electric Engine Block Preheater

The electric engine block preheater uses electrical power to heat the coolant and circulate it through the engine. The electric engine block preheater receptacle is on the left side of the upper. Refer to Figure 1–110.

To Start The Electric Engine Block Preheater

1. Park the crane in a suitable area for storage, engage the travel swing lock, and shutdown the engine.

WARNING

Areas adjacent to the preheater must be clean and free of oil and debris to avoid possible fire hazard.

2. Plug an approved extension chord into the receptacle on the left side of the upper. Plug the chord into the receptacle as indicated by the identification label. Plug the other end into a 110–120V electrical source.

Note: Unplug the engine block preheater before starting the engine.

To Stop The Electric Engine Block Heater

1. Unplug the extension cord from electrical source and the preheater receptacle on the crane.
2. Properly store the extension cord.

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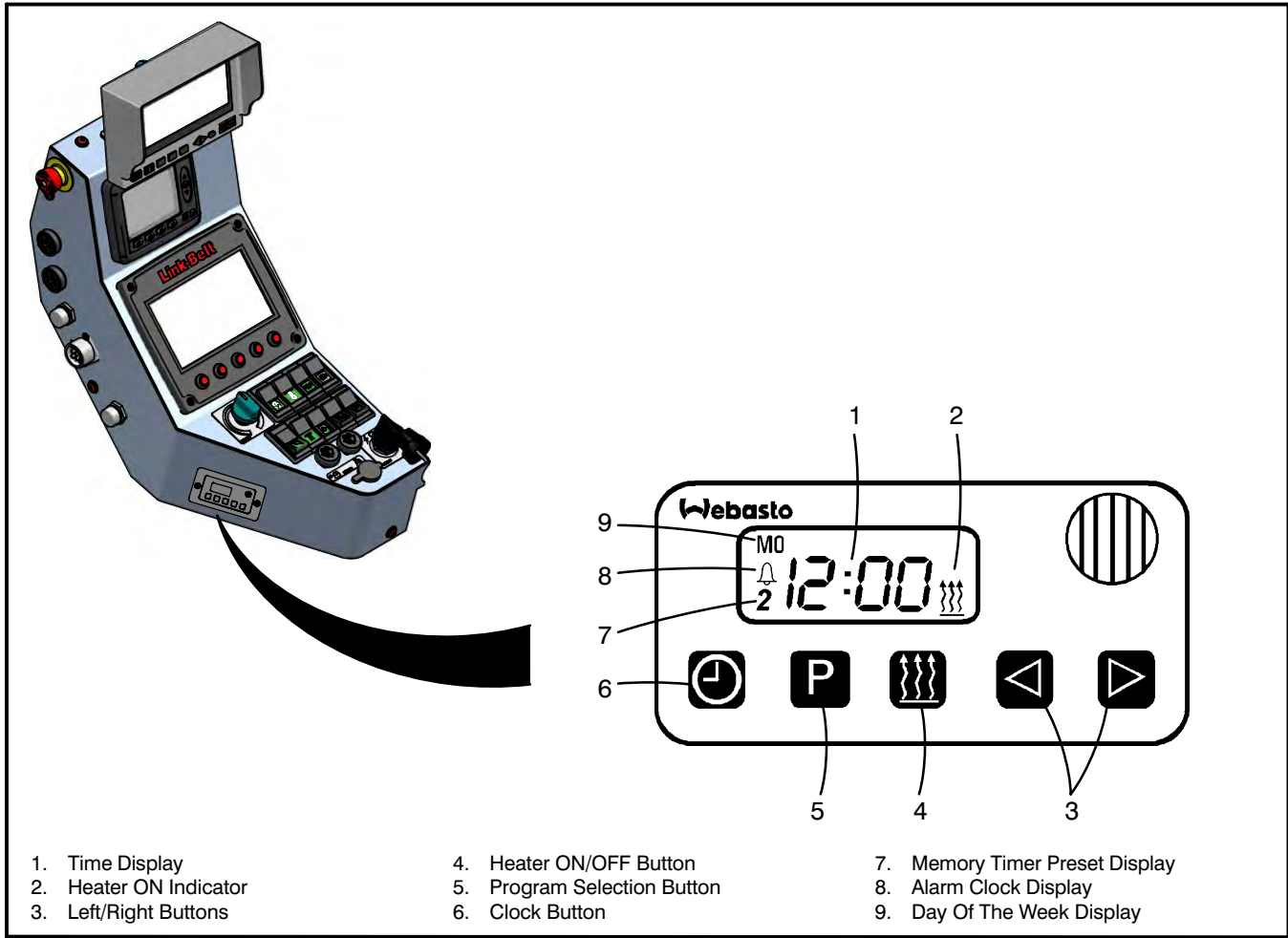


Figure 1-111
Diesel Fired Engine Block Preheater Controls

Diesel Fired Engine Block Preheater (If Equipped)

The diesel engine block preheater uses diesel fuel to power the unit and to heat the coolant and circulate it through the engine. The controls for the preheater are located on the right side control console in the operator's cab. Refer to Figure 1-111.

! WARNING

Explosion hazard!

Do not operate the preheater while refueling.


Do not operate the preheater in an area where toxic or explosive materials or fumes may be present.

! WARNING

Diesel exhaust fumes can be harmful. Start and operate engine block preheater in a well ventilated area. If it is necessary to operate in an enclosed area, vent the exhaust to the outside. Properly maintain the exhaust system to its original design.

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Starting Preheater

Manual: Press the Heater ON/OFF button  (continuous heat mode). Heater ON indicator will illuminate.


Automatic: Set the timer up to 2 hr. before you want to start the engine. The heater will start up at set time.

Note: If heater is being switched on while the engine is warm only the circulating pump will run. Coolant temperature must fall below 86°F. (30°C) before heater starts.

Startup Sequence:

1. The coolant circulating pump, ceramic igniter, and combustion air fan start operation and after approximately 60 seconds combustion starts (audible combustion sound).
2. After the coolant temperature has reached the set point of 170°F (77°C) the preheater automatically adjust its heat output to a lower operating range (part-load heat output). If the temperature of the coolant continues to rise and climb over 174°F (79°C) at the heater outlet, the heater will cycle off.
3. When the temperature falls below 149°F (65 °C) the heater will restart and repeat the heating cycle.

Stopping Preheater

Manual: Press the Heater ON/OFF button . Heater ON indicator will extinguish. Combustion is extinguished followed by an after run cycle of approximately 90 seconds.

Automatic: When the timer has reached the end of the timed cycle (up to 2 hours).





Timer Operation

The timer enables you to preset the start time of the heater up to 7 days in advance. When the heater is in operation, the display and operation buttons of the timer are illuminated.

Heater Preset Operation

The preset starting time is the time at which the timer switches the heater on automatically. Three memory preset locations numbered 1 to 3 are available. Each memory location can be assigned a given time together with the day of the week of which only one can be activated at any one time. It is recommend that memory locations 1 and 2 be used for presetting starting times within 24 hours of setting the timer. Memory location 3 can be used for a starting time within the next 7days of setting the timer.




Setting The Heater Preset Start Time

1. Press the  button. The timer memory preset location number will flash.
2. Continue to press the  button until the desired preset number 1, 2, or 3 is visible.
3. Press the  or  button to select day of the week. Heater will start on the time and day selected. Once set, wait for flashing to stop. To program the other 2 memory preset locations, repeat procedure for each location.

Operating Time Duration Operation

The period of time during which the heater is in operation is referred to as operating time. The heater remains in operation for as long as the operating time has been preset. Heater operation can be preset for any time from as little as 1 minute to a maximum of 120 minutes (factory preset is 60 minutes).



Setting The Operating Time Duration

1. The heater must be switched off. Press the  button for 3 seconds – operating time is flashing.
2. Set the desired operating time using the  and  buttons.

Remaining Operating Time Operation




The remaining operating time refers to the time the heater still continues to remain in operation after the ignition is turned off. It can only be changed while the heater is in operation and the ignition switched off.

Setting The Remaining Operating Time


Set the desired remaining operating time (1 to 120 minutes) using the  and  buttons.

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Setting The Clock And Day Of The Week





1. Press and hold the  button until time of the day starts flashing.
2. Set the clock using the  and  buttons.
3. After 5 seconds, day of the week begins flashing.
4. Set the day of the week in the same manner as the time.

Viewing The Time

The clock time can be displayed with the ignition switched off by pressing the  button.

Setting The Alarm Clock

Repeatedly press the  button until the bell symbol appears on the display. Set the desired wake up time using  the and  buttons. The alarm clock turns off after 5 minutes or when one of the buttons is pressed. The alarm time is not bound to a specific day of the week.

To recall the alarm time, repeatedly press  the button until bell symbol  appears on the display. To erase the wake up time: press  the button until the bell symbol  is no longer visible on the display.

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General Failure Symptoms		
Failure Symptom	Probable Cause	Remedy
Coolant heater switches off automatically (Fault Lockout)	No combustion after start or automatic repeat start.	Switch off heater momentarily and switch on once again.
	Flame extinguishes during operation.	Switch off heater momentarily and switch on once again.
	Heater overheats	Check coolant lines for obstructions, closed valves and kinks. Check coolant level. Allow heater to cool down, reset overheat. Limiter, switch off heater momentarily and switch on once again.
	Crane electrical system voltage too low.	Charge the battery. Switch off the heater momentarily and switch on once again.
Heater expels black fumes from exhaust	Combustion air and/or exhaust ducting blocked.	Check combustion and exhaust ducting for obstructions.

Troubleshooting

The following describes basic troubleshooting procedures for the coolant heater. Troubleshooting is normally limited to the isolation of defective components and should be done by trained, certified personnel only.

Before troubleshooting, check for and eliminate these potential component failures:

- Blown fuses
- Fuel supply (plugged fuel filter)
- corrosion on battery terminals, electrical wiring, connections, and fuses.
- loose contact on connectors
- wrong crimping on connectors

Heater Lockout Reset Procedure

The coolant heater is designed with a lockout safety feature built in to the control unit. After 3 consecutive unsuccessful startup attempts, the heater will lock itself out from any further start attempts. The heater may also enter the lockout mode after experiencing an overheat condition. The following procedure will clear the lockout mode and reset the heater for normal operation:

1. Remove the 15A fuse, refer to wiring diagram Figure 1–112 for identification. Wait 10 seconds before reinserting. This is done to prepare the control unit for resetting.
2. Wait a further 10 seconds after reinserting the 15A fuse. Turn the heater on using the On/Off button.
3. Wait 10 seconds after turning the heater on and remove 15A fuse again.

4. Wait a further 30 seconds and then turn the heater off.
5. Reinsert 15A fuse after waiting 3 to 10 seconds after shutting off the heater.
6. Wait a further 10 seconds and turn the heater back on again.

The lockout mode should now be canceled and the heater operating normally.

Maintenance

The heater requires a minimum of maintenance to keep in good operating condition. The following maintenance procedures should be performed annually before each heating season:

Annual Maintenance

Enclosure And Heater

- Clean the heater and enclosure box from any accumulated debris or dust with compressed air.
- Inspect all components for wear and damage.

Electrical System

- Check wiring harnesses for damage, repair or replace if damaged.
- Check the condition of the batteries and the connections.
- Load test the batteries and replace if required.

Note: The heater will not function properly with weak batteries.

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Combustion Air System

- Check for obstructions at air intake port.
- Check air intake tube carefully for restrictions and damage. Repair or replace as required.

Exhaust System

- Check the exhaust system carefully for restrictions or corrosion. Repair or replace as required

Fuel System

- Change fuel filter located on the left side of the fuel tank. Inspect fuel line for damage, restrictions, routing, or loose connections. Repair or replace as required.

Coolant System

- Inspect all coolant lines and clamps for leakage, restrictions, or damage. Repair or replace as required.
- Inspect coolant circulation pump for leakage. Repair or replace as required.

Operational Test

- Run the heating system for at least 15 minutes.
- Check water and fuel connections for leakage. Re-tighten hose clamps if necessary.

Note: Operate the heater at least once a month for 10 minutes.

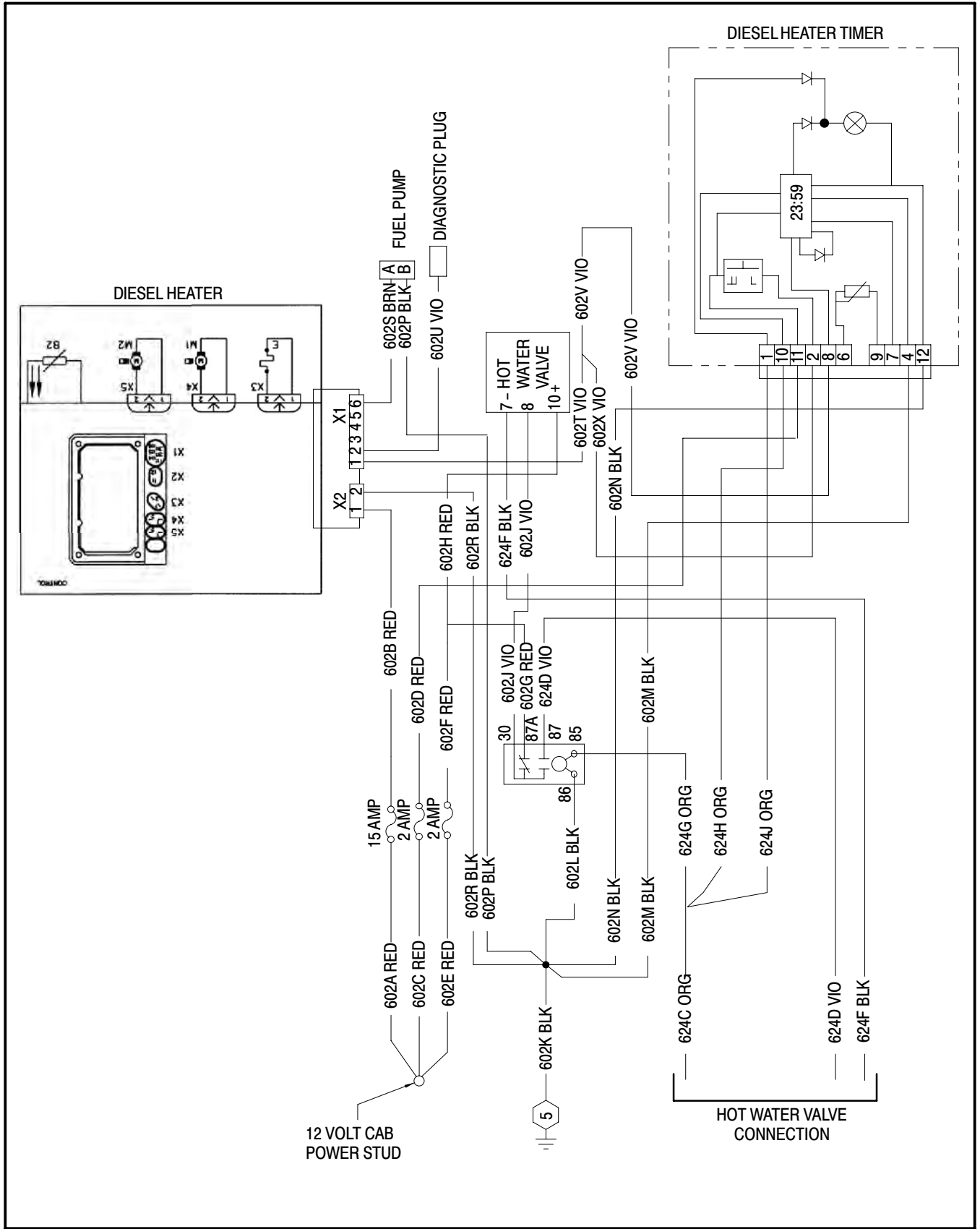
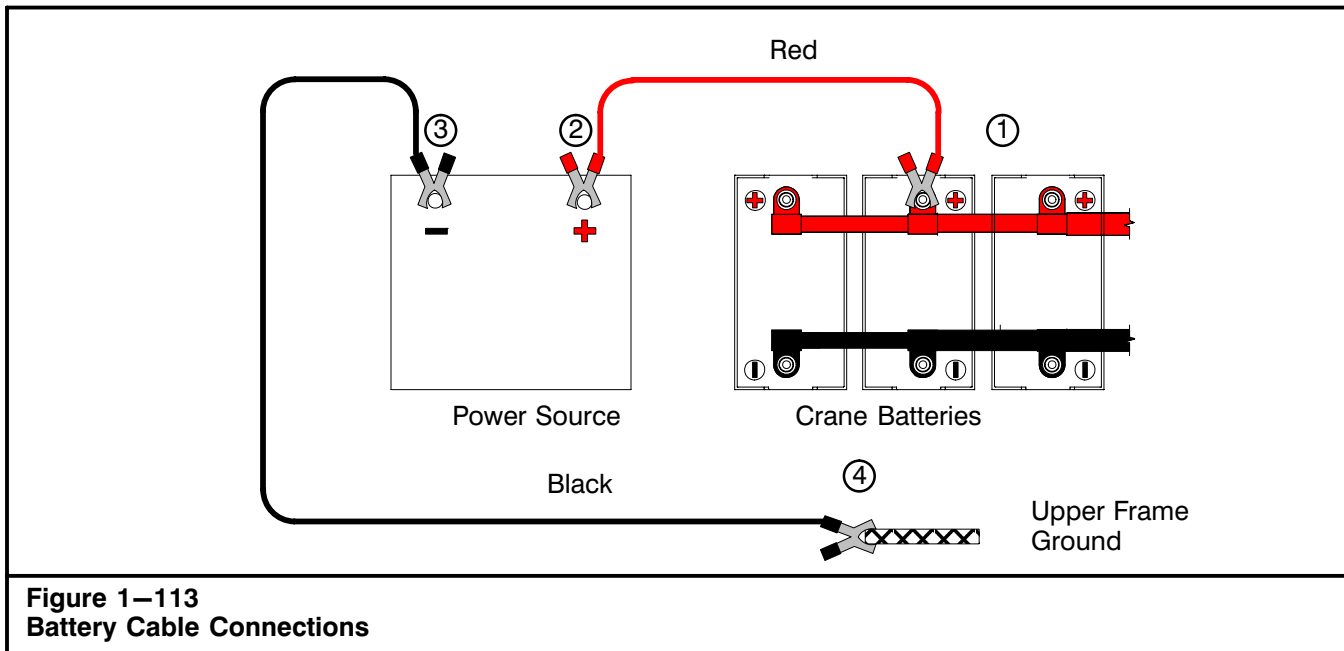


Figure 1-112
Coolant Heater Wiring Diagram

Operator's Manual



Jump Starting The Crane

The electrical system is a DC 12 volt negative (–) ground. To jump start the crane, a 12V power source and two (2) jumper cables are required.



WARNING

To avoid serious personal injury and/or major equipment damage, follow these procedures in the order they are given.

Wear protective clothing and shield your face and eyes when working around batteries. Batteries contain sulfuric acid which burns skin, eyes, and clothing.

Do not jump start a damaged battery. Ensure vent caps are tight and level. If another vehicle is used, ensure booster vehicle and crane are not touching.

The gases around the battery can explode if exposed to open flames or sparks. An explosion could result in serious personal injury and/or major equipment damage.

Battery posts, terminals, and related accessories contain lead and lead compounds. Wash hands after handling.

1. Check all battery terminals and remove any corrosion before attaching jumper cables.
2. Connect one end of the first jumper cable to the positive (+) terminal of the discharged battery.
3. Connect the other end of the first cable to the positive (+) terminal of the power source or booster battery.
4. Connect one end of the second jumper cable to the negative (–) terminal of the power source or booster battery.
5. Connect the other end of the second cable to a ground location on the upper frame as far away from crane batteries as possible.
6. If another vehicle is used to jump start the crane, start the booster vehicle. Ensure booster vehicle and crane are not touching. Run the booster vehicle's engine at a moderate speed.
7. Turn on the ignition switch and allow discharged batteries to charge for a few minutes prior to attempting to start the disabled crane.
8. Start the disabled crane. After the crane is started, remove the jumper cables in reverse order.
9. Let the crane's engine run for a few minutes to charge the discharged batteries.
10. Check the battery indicator light on the Crane Control Display.

Note: If the batteries are extremely discharged, voltage may increase slowly.

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General Operation

The following procedure contains helpful information for typical lift crane operation. This information is general in nature and is not intended to serve as a fail safe procedure for any and all situations. The operator must, at all times, be alert and fully aware of the load requirements and specific job site conditions. The operator must be ready and able to perform any change in procedure, in a moments notice, to safely operate the crane as the immediate situation changes.

Note: Before operating the crane near airports, radio and microwave towers, power lines, etc., always review and comply with all local, state, and federal laws.

Lift Crane Operation

Cranes are used primarily for making heavy lifts. In order to do this properly, certain procedures must be followed. The following is a suggested procedure for making typical lifts:

1. Determine the weight to be lifted. Add the weight of the hook block, hook ball, slings, rigging, fly, etc. Determine height to which the load must be lifted.
2. Refer to the Working Areas, Working Range, and the appropriate capacity chart in the Crane Rating Manual. Find the shortest boom length and load radius that will accomplish the job and assemble the crane accordingly.
3. Position the crane so a minimum swing is necessary.
4. The crane must be supported by a firm, level surface before starting to lift. All capacities (except list capacities) in the Crane Rating Manual are based on the crane being level in all directions. If the crane is not level, out swing or side swing of the load will greatly reduce lifting capacities and could cause crane damage or an accident. If the ground is soft, use mats.
5. Check that the proper counterweight arrangement is properly installed. Do not make lifts which exceed capacity chart specifications.
6. Check that the correct configuration has been entered in the Rated Capacity Limiter (RCL).
7. Raise the boom and swing over the load.
8. Lower the hook block or hook ball and fasten it to the load. The following points must be observed:
 - a. The boom head must be directly above the load. (Booms are made to lift, and should not be used to drag a load sideways.)

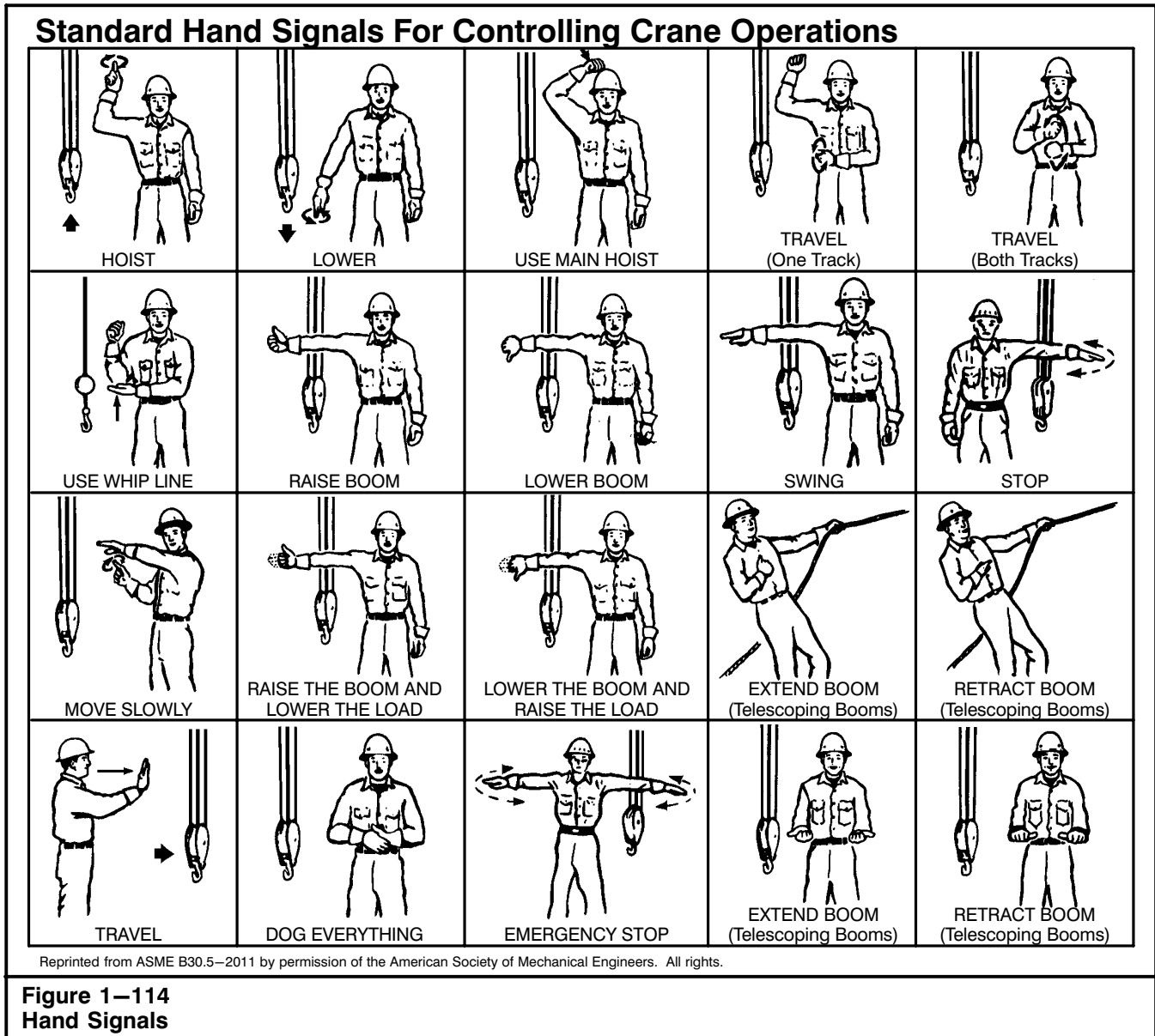
- b. Always use chains, wire ropes, and/or slings of ample size and make periodic checks of their condition.
 - c. Always use sufficient parts of line. Refer to the Wire Rope Capacity Chart in the Crane Rating Manual for the number of parts of line needed for a given lift.
 - d. When lifting loads, care should be taken to prevent sudden loading or unloading of the winch wire rope. Ease into the load. Lift the load a few inches (*centimeters*) off the ground and hold to check the winch brakes.
9. Boom to the desired angle. Lift the load to the desired height. Be careful when booming down or swinging the load, as these increase the load radius and result in a decrease in capacity. Ensure the load being lifted remains within the lifting capacity of the crane for the boom length, radius, and working area being used.
 10. Control the load at all times. Use hand lines to guide the load. Do not guide loads into place with your hands. Swing slowly and smoothly. Avoid jerks when starting or stopping swings.

During Operation

The operator must remain alert to possible malfunctioning of the crane while operating. If the crane does malfunction, lower the load and shutdown the crane until the problem is found and corrected. During operation, the operator must:

1. Remain alert to any noise, loss of power, or bad response to control of the crane. Watch the engine oil pressure indicator light and coolant temperature gauges for proper operating ranges.
2. Watch the hydraulic system oil temperature gauge. If the temperature exceeds maximum temperature, shutdown the crane until the problem is corrected. (Refer to Section 2 of this Operator's Manual for the maximum temperature for each viscosity of hydraulic oil.)
3. Listen for any unusual noises in the hydraulic system, power train, and gear boxes. If any, correct problem.
4. Watch for oil leaks or any loss of control. If any develop, correct before continuing operation.
5. Ensure all controls work freely and easily, with no sticking or binding. Lubricate or adjust as necessary.
6. Periodically check to confirm the crane is level and stable.
7. Heed all DANGER, WARNING, and CAUTION labels. Observe good safety practices at all times.

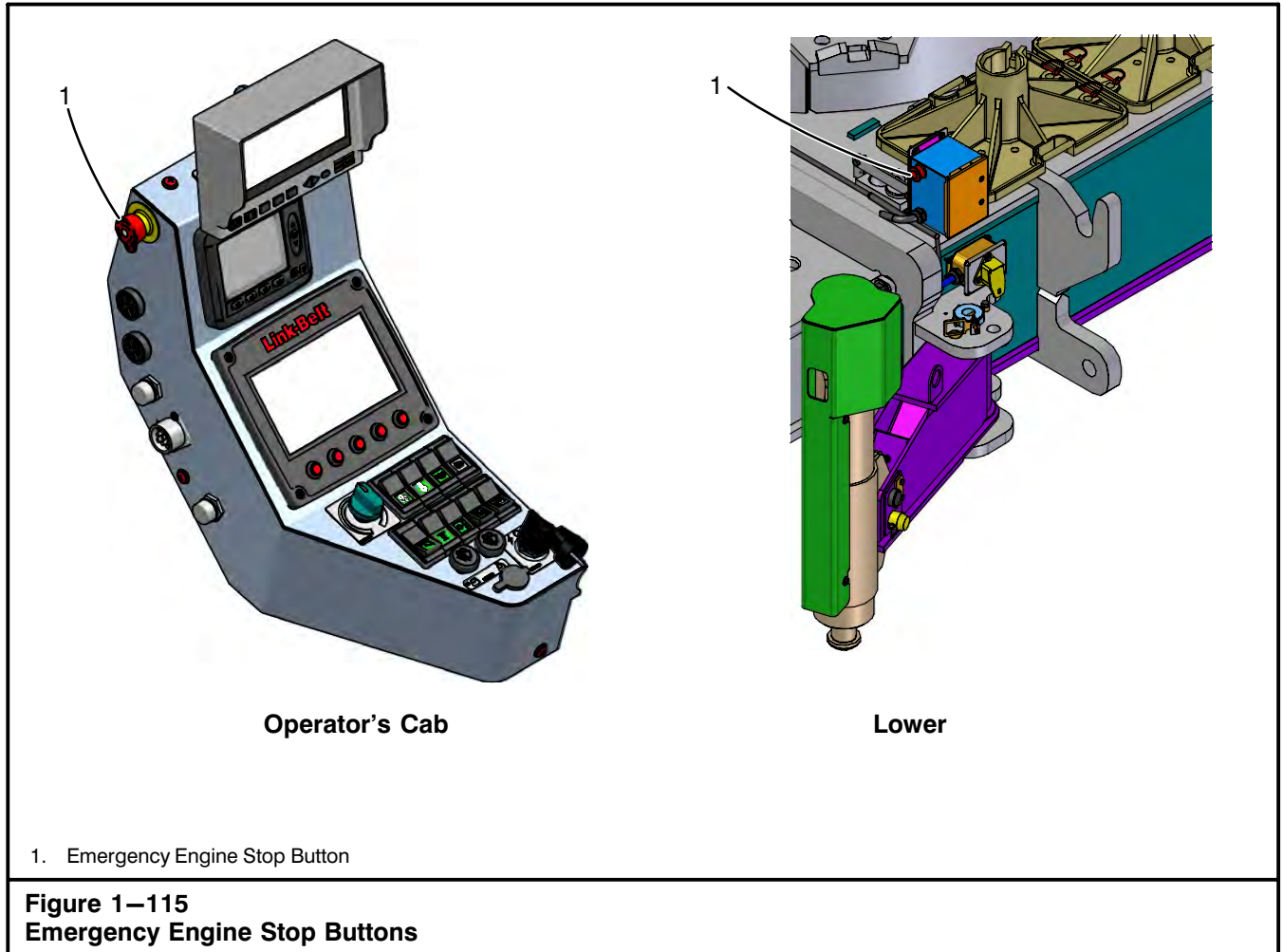
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Hand Signals

Hand Signals are important for communications between the designated signal person and the operator. A Hand Signals Chart, Figure 1-114, is included in this Section of this Operator's Manual. A copy is also on the right side window in the operator's cab and on the left rear of the upper.

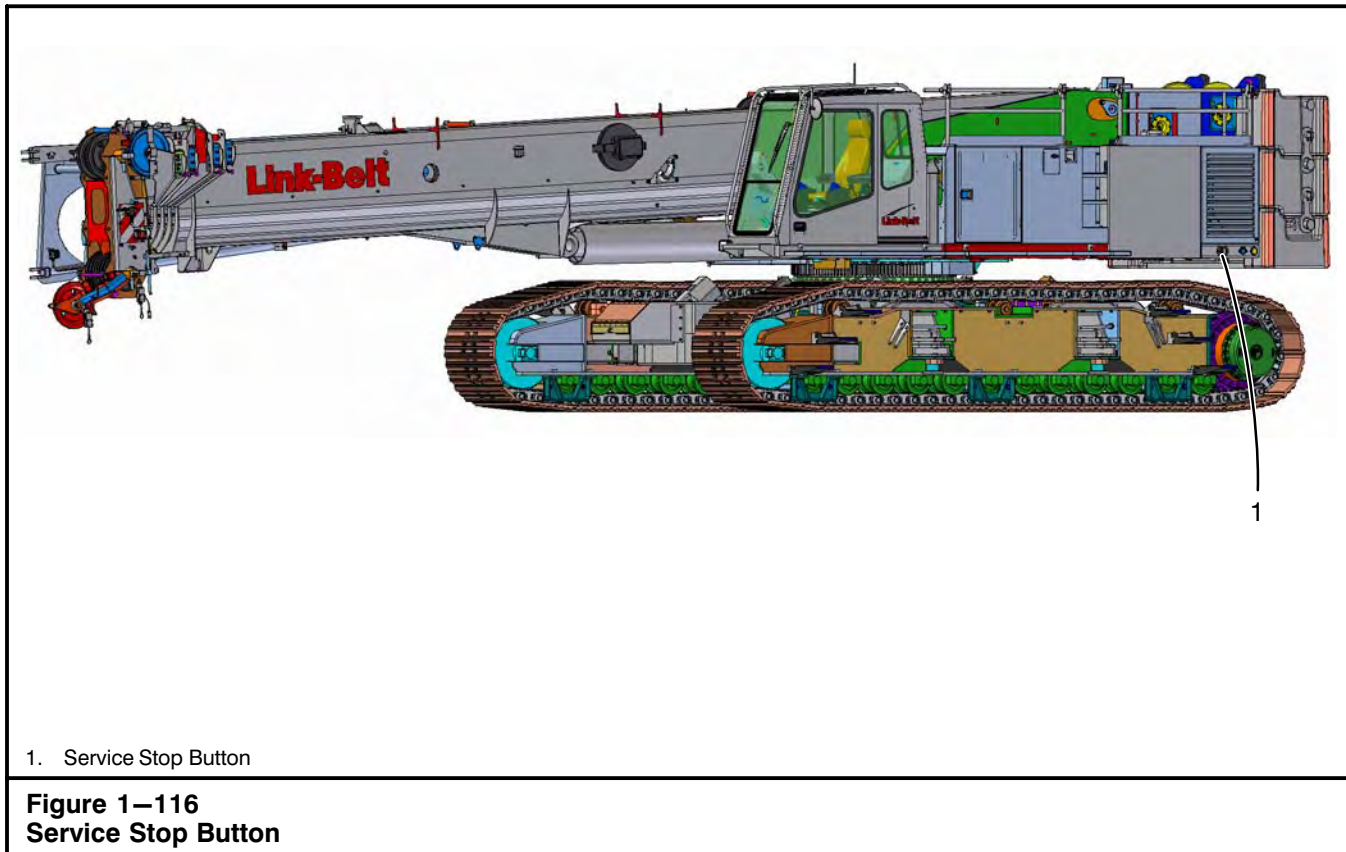
These signals should be used at all times unless voice instructions with a radio or telephone are being used. One person should be designated as a signal person and their signals obeyed by the operator. Obey a stop signal from anyone.



Emergency Engine Stop Buttons

There are two emergency engine shutdown buttons on the crane. One is mounted in the operator's cab and the other is mounted on the right front of the lower. Refer to Figure 1-115. Either of the emergency engine shutdown buttons can be used to shutdown the engine in emergency situations. Press an emergency engine stop button to shutdown the crane in an emergency situation. Reset the operator's cab button by turning it counterclockwise. Reset the lower button by pulling it out.

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Service Stop Button



DANGER

Pressing the service stop button disables pilot control functions. It does not stop the engine. Precautions must be taken before servicing, assembling, or disassembling the crane. Serious personal injury may result.

There is a service stop button on the left rear of the upper. Refer to Figure 1–116. Press this button before entering the crane to connect the counterweight hydraulic hoses. Pressing this button will stop all crane functions (except counterweight cylinders for raising and lowering the counterweight) by disabling pilot control oil pressure. The message area of the RCL Display will alert the operator that control function are disabled when this button is pressed. Pull the button out to restore crane functions.

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Crane Assembly And Disassembly

When transporting, the crane may require disassembly. When at the job site, it will require reassembly. The following instructions are recommended, safe procedures for assembling and disassembling the crane. Due to job site conditions and the availability of auxiliary equipment, other methods may be used only if they are proven, safe methods. If any questions exist about the safety of any procedure, contact a Link-Belt Distributor.

Crane Assembly

Note: When using the crane boom for lifting during all self assembly procedures, use the “Standard” boom mode and a fully retracted boom.

1. Unload the crane from the transport vehicle. Refer to “Unloading The Crane” in this Section of this Operator's Manual.
2. Install the lower counterweights if required. Refer to “Lower Counterweight Installation” in this Section of this Operator's Manual.

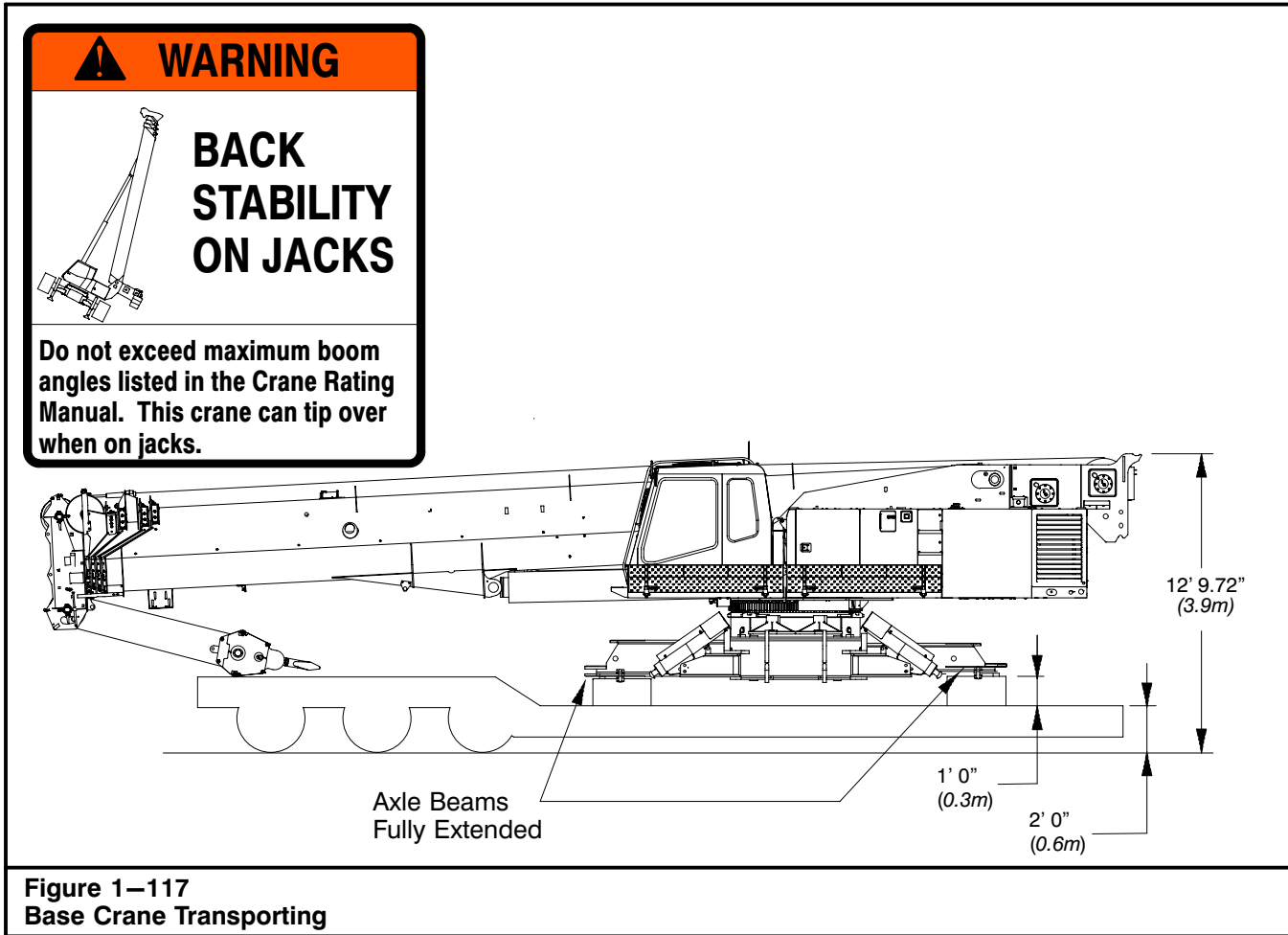
3. Install the side frames. Refer to “Side Frame Installation” in this Section of this Operator's Manual.
4. Install the upper counterweights. Refer to “Upper Counterweight Installation” in this Section of this Operator's Manual.

Crane Disassembly

Note: When using the crane boom for lifting during all self disassembly procedures, use the “Standard” boom mode and a fully retracted boom.

1. Extend the side frames to the fully extended position. Refer to “Extending The Side Frames” in this Section of this Operator's Manual.
2. If equipped, store or remove the fly. Refer to Section 4 of this Operator's Manual.
3. Remove the upper counterweights. Refer to “Counterweight Installation And Removal” in this Section of this Operator's Manual.
4. Remove the side frames. Refer to “Side Frame Removal” in this Section of this Operator's Manual.
5. Remove the lower counterweights. Refer to “Lower Counterweight Removal” in this Section of this Operator's Manual.
6. Load the crane onto the transport vehicle. Refer to “Loading The Crane” in this Section of this Operator's Manual.

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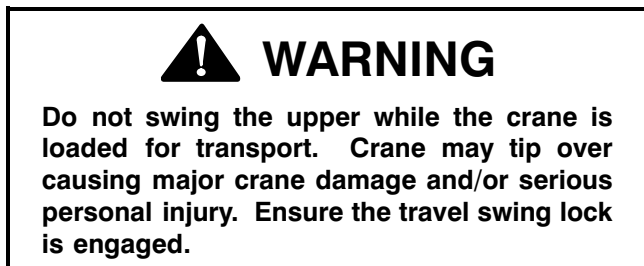


Unloading The Crane

1. Park the transport vehicle on a firm level surface.

Note: A firm level surface is required to support the weight of the crane on jacks while unloading the crane. Use matting under the pontoons as required to support the weight of the crane.

2. Check that the boom is at 0° boom angle or less.
3. Check that all control levers are in the neutral position.
4. Check that the travel swing lock is engaged.



5. Position the lifting jacks and beams to the self-assembly position. Refer to "Lifting Jack Operation" in this Section of this Operator's Manual and Figure 1-118.
6. Lower the jacks until they contact the ground.
7. Remove all tie downs that secure the crane to the transport vehicle
8. Raise the crane on jacks until there is enough clearance (approximately 1–2 in. [2.54–5.08cm]) between the deck of the transport vehicle and the bottom of the lower frame to allow the transport vehicle to be driven from under the crane. Refer to "Lifting Jack Operation" in this Section of this Operator's Manual and Figure 1-118.

Note: Place matting under each pontoon, as required to provide enough clearance between the deck of the transport vehicle and the bottom of the lower frame to drive the transport vehicle from under the crane.

9. Carefully and slowly drive transport vehicle from under the crane.
10. Set the Rated Capacity Limiter (RCL) to the current crane configuration. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual.

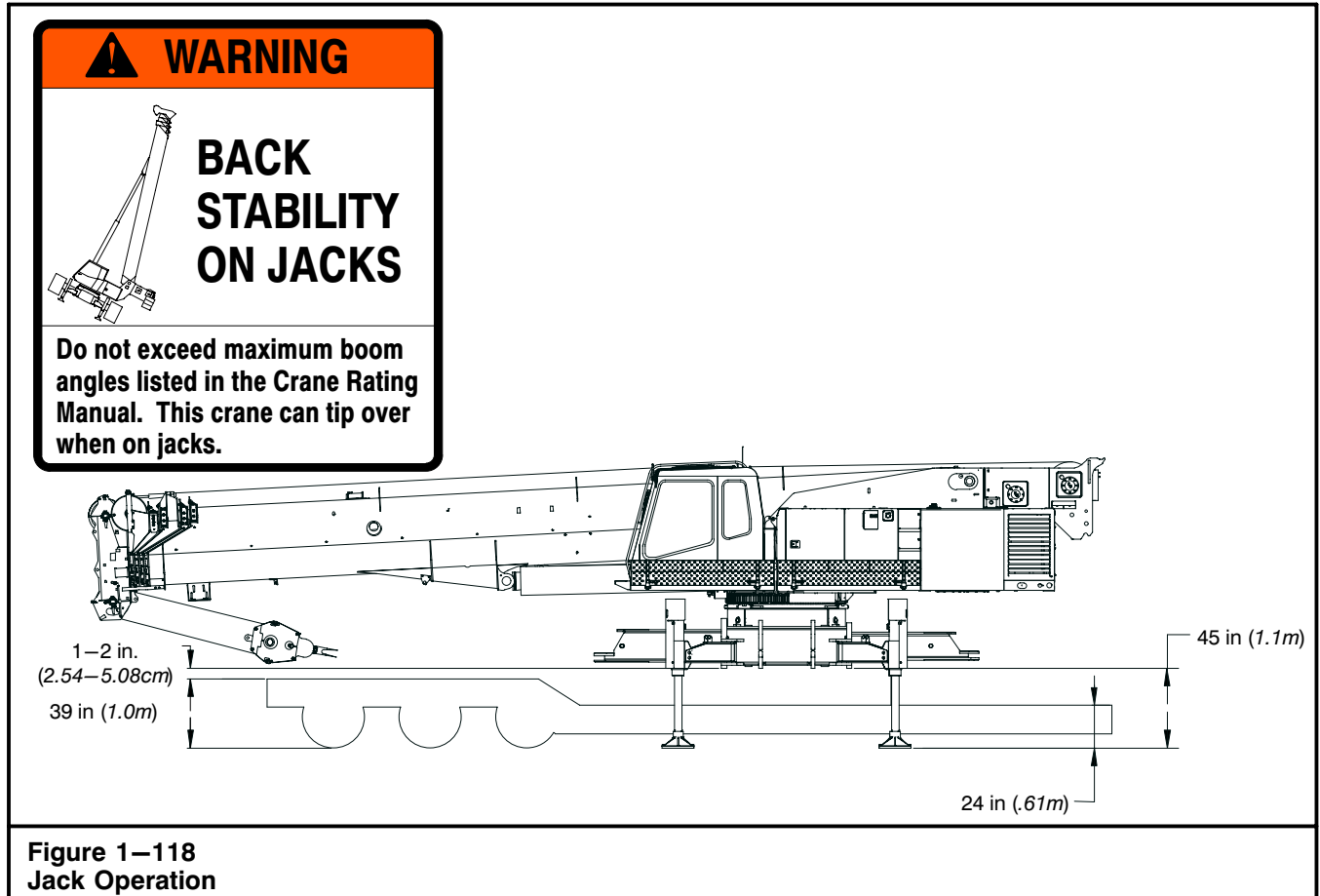


Figure 1-118
Jack Operation

Loading The Crane

1. Park the crane on a firm level surface.

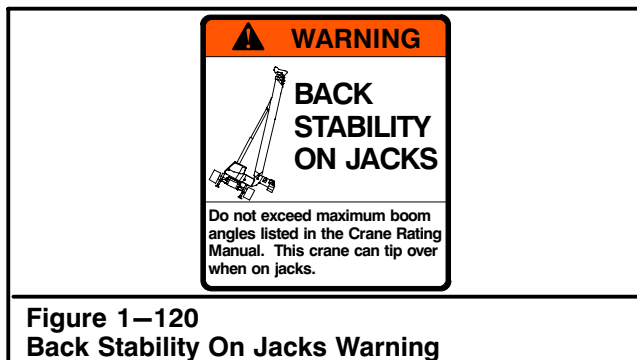
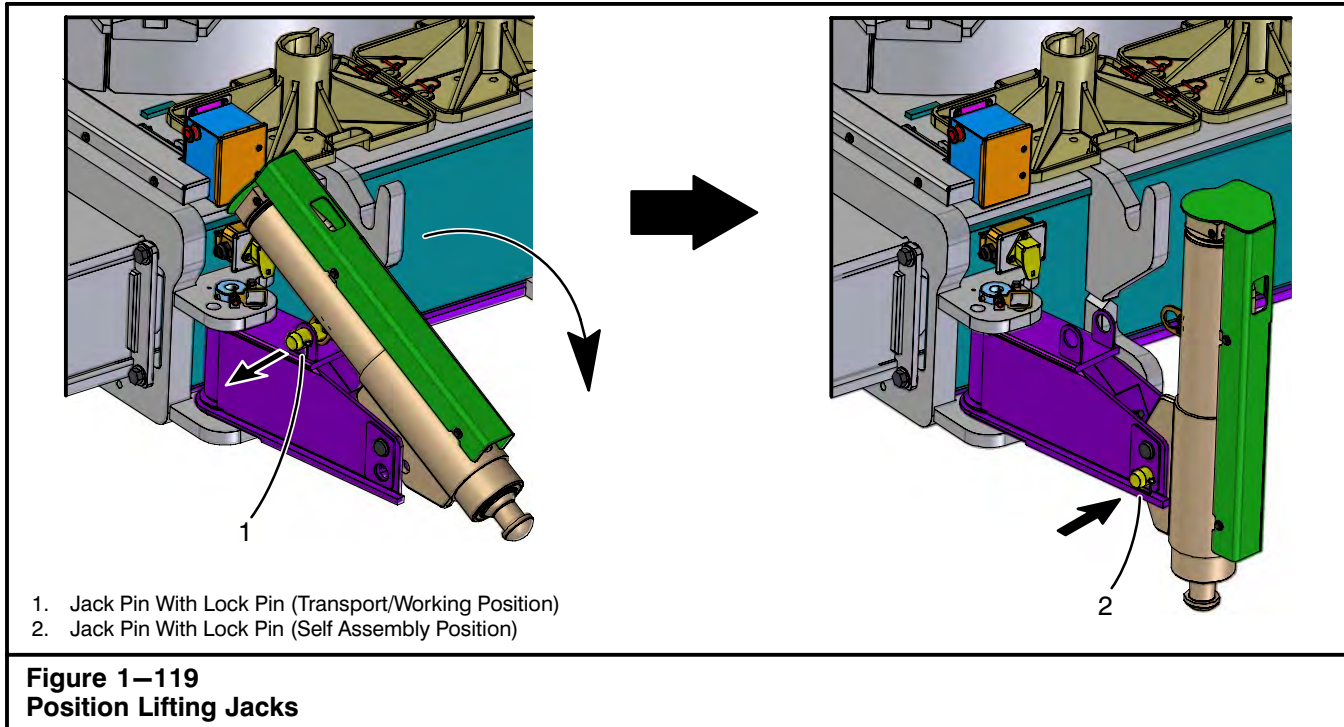
Note: The surface must be firm and level to support the weight of the crane on jacks while loading the crane. Use matting under the pontoons as required to support the weight of the crane.

2. Extend the side frames. Refer to “Extending Side Frames” in this Section of this Operator’s Manual.
3. Remove upper counterweights. Refer to “Upper Counterweight Removal” in this Section of this Operator’s Manual.
4. Remove side frames. Refer to “Side Frame Removal” in this Section of this Operator’s Manual.
5. Remove lower counterweights. Refer to “Lower Counterweight Removal” in this Section of this Operator’s Manual.
6. Swing the upper directly over the side of the lower (boom parallel to the axles) and engage the travel swing lock.
7. Fully retract and position the boom at 0° boom angle or less.
8. Raise the crane on jacks until there is enough clearance (approximately 1–2 in. [2.54–5.08cm]) between the deck of the transport vehicle and the bottom of the lower frame to allow the transport vehicle to be driven under the crane. Refer to “Lifting Jack Operation” in this Section of this Operator’s Manual and Figure 1–118.

Note: Place matting under each pontoon, as required to provide enough clearance between the deck of the transport vehicle and the bottom of the lower frame to drive the transport vehicle under the crane.

9. Carefully and slowly back transport vehicle under the crane.
10. Use blocking as required under the axles and/or lower frame to prevent the crane from rocking once it is set on the transport vehicle.
11. Carefully and slowly retract the jacks to lower crane onto transport vehicle. Refer to “Lifting Jack Operation” in this Section of this Operator’s Manual.
12. Properly tie down the crane to the transport vehicle.

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Lifting Jack Operation

The lifting jacks are used to assist in self assembly of the crane and to extend and retract the side frames. Use the following procedures to operate the lifting jacks.

WARNING

The crane must be on a firm, level, supporting surface before operating jacks. Use matting under the pontoons as required to support the weight of the crane. Failure to do so may result in serious personal injury and/or major equipment damage.

Operate the jacks within a range so that the crane tilt angle does not exceed 1°. If the tilt angle exceeds 1° the crane may tip over resulting in serious personal injury and/or major crane damage.

Engage the travel swing lock.

Perform operating functions by using the switches on the remote control box. Controls on the lower should only be used in emergency situations.

Do not lift loads with the crane raised on jacks with both side frame installed. No capacities are listed for this configuration as crane damage may occur. Lower crane on side frames and refer to the Crane Rating Manual for lifting capacities.

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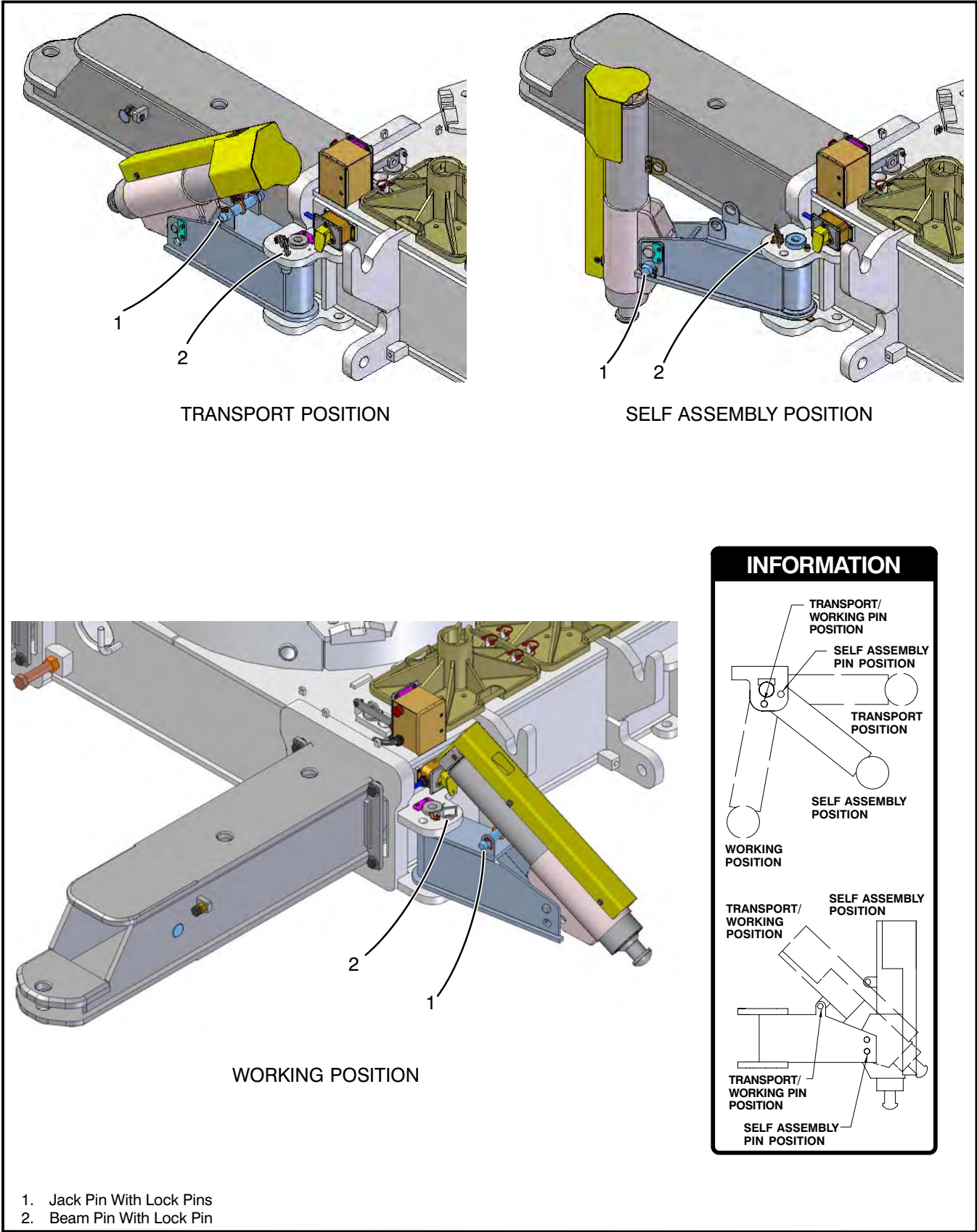
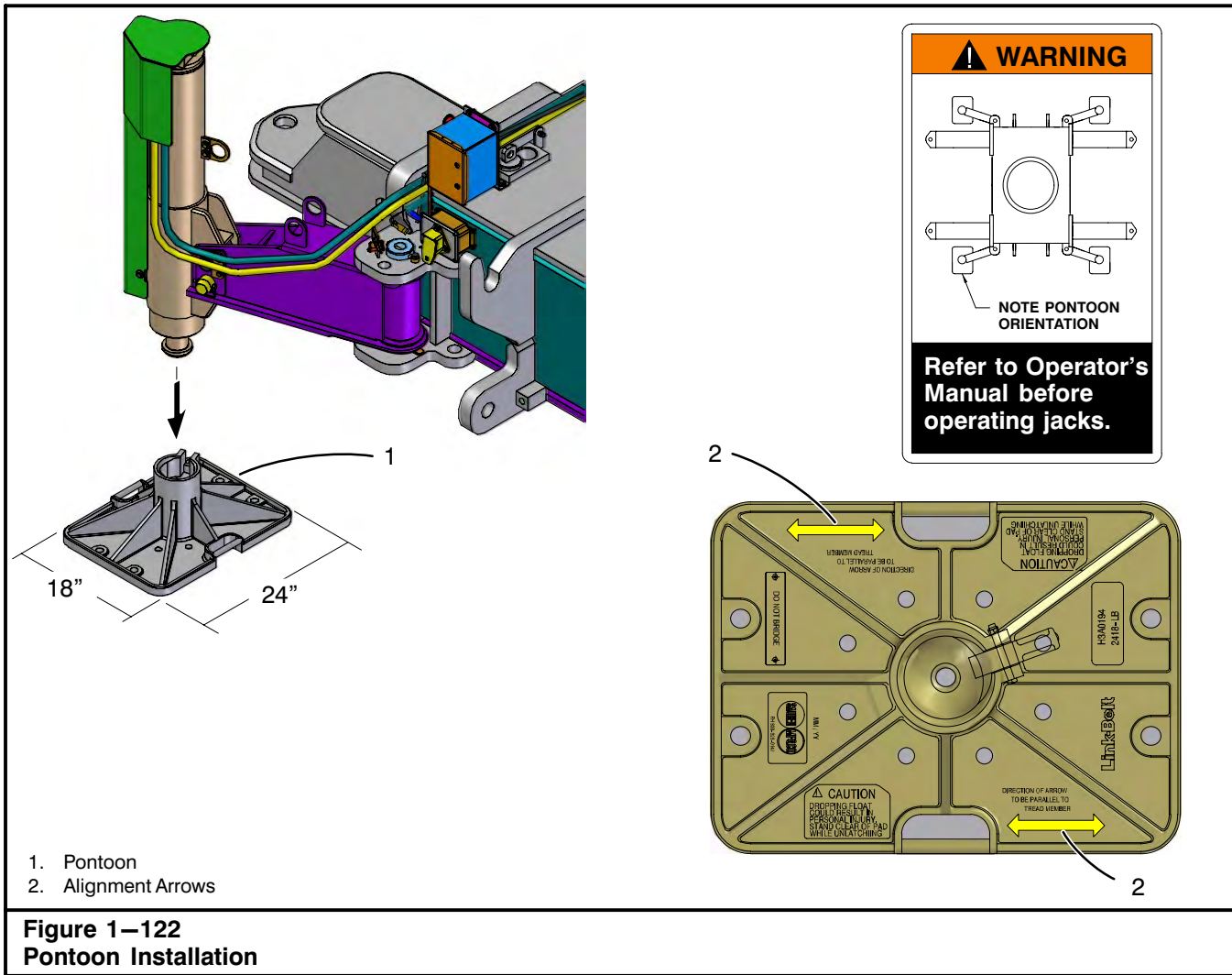


Figure 1-121
Position Jack Beam

Operator's Manual



Raising The Crane

1. Park the crane on a firm level surface. Position the upper directly over the end of the lower and engage the travel swing lock.
2. Fully retract and position the boom to 0° boom angle or less.
3. Remove the jack pin securing the jack cylinder in the transport/working position. Refer to Figure 1–119. Tilt the jack cylinder to the self assembly position. Secure the jack cylinder in the self assembly position by installing the jack pin. Secure the jack pin with lock pins. Repeat for the remaining jacks.
4. Remove the beam pin securing the lifting jack beam in the transport/working position. Refer to Figure 1–121. Swing jack beam to the self assembly position. Secure beams in the self assembly position by installing the beam pin. Secure the beam pin with lock pin. Repeat for the remaining beams.

5. Remove pontoons from storage. The contact surface of the pontoons is 18 x 24 inches (.46 x .61m). Place the pontoons on the ground with the 24" (.61m) length parallel to the side frame.

Note: There are alignment arrows on the pontoons. Direction of arrows must be parallel to the side frame.

6. Place matting under each pontoon as required to support the weight of the crane.

Note: The surface must be firm and level to support the weight of the crane on jacks. Use matting under the pontoons as required to support the weight of the crane.

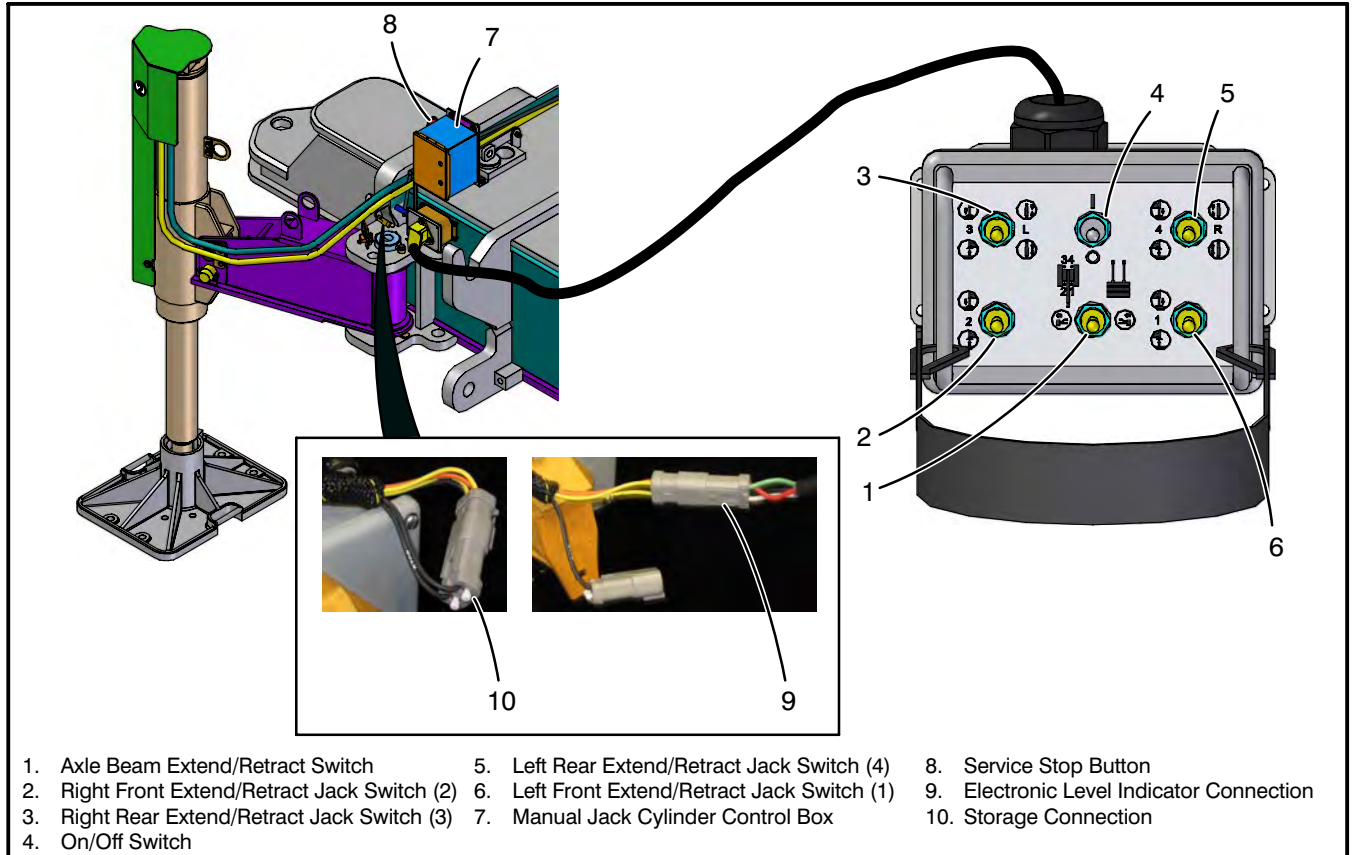


Figure 1-123
Install Remote Control Box

7. Properly start the engine.

Note: The engine can be started using the engine ignition switch in the manual jack cylinder control box. Refer to Figure 1-124. Refer to “Engine Starting Procedure” in this Section of this Operator’s Manual for safety procedures when starting the engine.

8. Connect the remote control box to the lower frame. Refer to Figure 1-123. Move the power switch on the remote control box to the “ON” position.

Note: Manual jack cylinder control switches are mounted on the right front of the lower frame. These switches can be used if there is a malfunction with the remote control box. If manual controls are used, a signal person must be used to assist in the lifting jack procedure.

9. Extend jack cylinders to the pontoons. Latch pontoons to cylinder rods.

Note: Each jack cylinder is labeled with a number that corresponds to numbers on the jack cylinder controls.

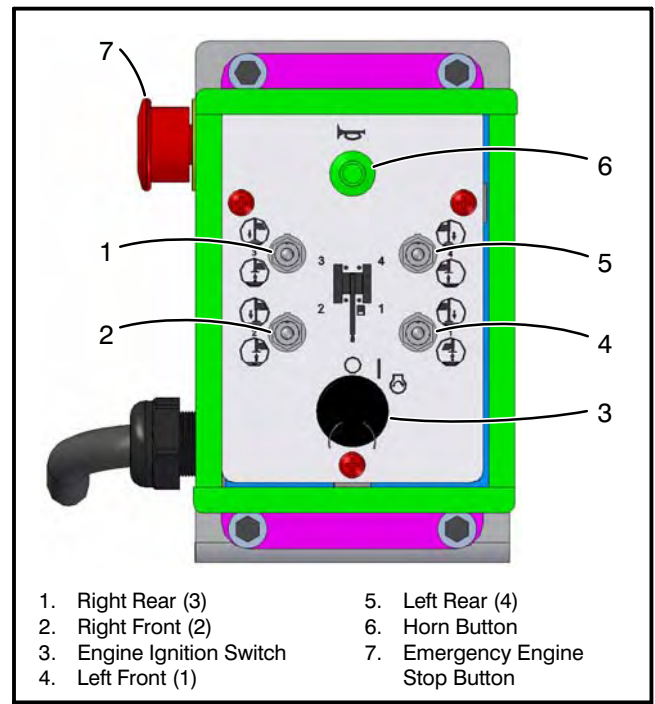
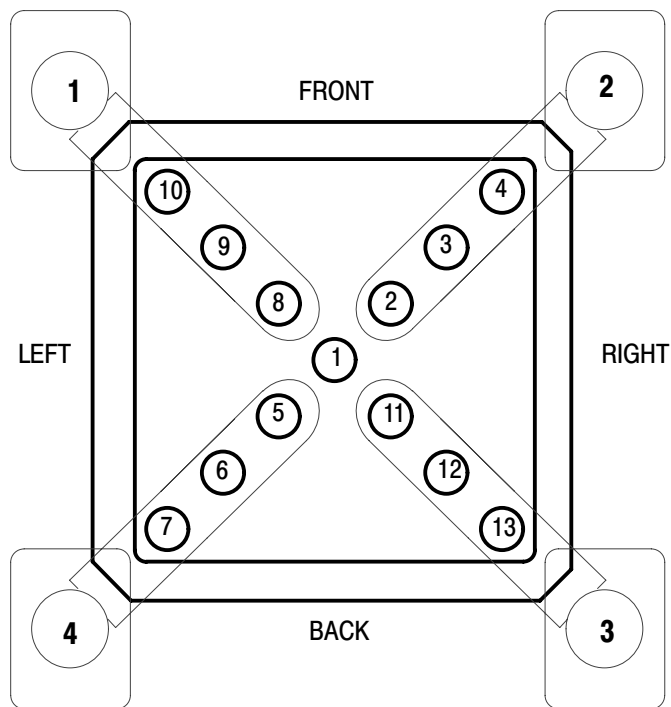


Figure 1-124
Manual Jack Cylinder Control Box

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- RED LED's Correspond To The Four Labeled Lifting Jacks
- GREEN Center LED 1 Is Activated When Crane Is Level.
- RED LED's 2, 5, 8, And 11 Correspond To Tilt Angles Of 1 To 2 Degrees
- RED LED's 3, 6, 9, And 12 Correspond To Tilt Angles Of 2 To 3 Degrees
- RED LED'S 4, 7, 10, And 13 Correspond To Tilt Angles Greater Than 3 Degrees
- Extend Jack 1 If Any RED LED's 8–10 Are Activated.
- Extend Jack 2 If Any RED LED's 2–4 Are Activated.
- Extend Jack 3 If Any RED LED's 11–13 Are Activated.
- Extend Jack 4 If Any RED LED's 5–7 Are Activated.

Figure 1–125
Electronic Level Indicator

10. Extend the jack cylinders until crane begins to raise. Level the crane before continuing. Connect the electronic level indicator. Figure 1–123. Use the electronic level indicator to assist in leveling the crane. Refer to Figure 1–125. After crane is level, extend jack cylinders (keeping crane level within 1° tilt angle) to the desired height. Use the electronic level indicator to assist in maintaining the 1° tilt angle.

Note: Use the bubble level mounted on the lower frame as a backup if required to determine when the crane is level.

11. Move the power switch on the remote control box to the "OFF" position.

12. Disconnect and store the remote control box and electronic level. Place the connector in the storage connection position. Refer to Figure 1–123.
13. Move the engine ignition switch in the manual jack cylinder control box to the "Off" position to shut-down the engine. Refer to Figure 1–124.
14. Start the engine from the operator's cab and set the RCL System to the current crane configuration. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual.

Lowering The Crane

WARNING

The crane must be on a firm, level, supporting surface before operating jacks. Use matting under the pontoons as required to support the weight of the crane. Failure to do so may result in serious personal injury and/or major equipment damage.

Operate the jacks within a range so that the crane tilt angle does not exceed 1°. If the tilt angle exceeds 1° the crane may tip over resulting in serious personal injury and/or major crane damage.

Engage the travel swing lock.

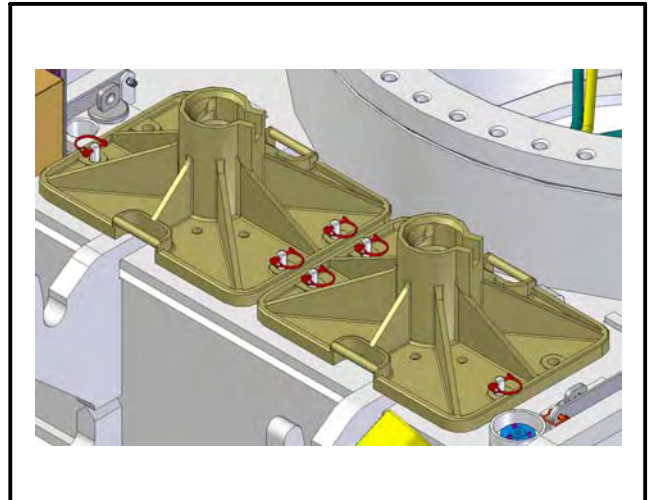
Perform operating functions by using the switches on the remote control box. Controls on the lower should only be used in emergency situations.

1. Properly start the engine.

Note: The engine can be started using the engine ignition switch in the manual jack cylinder control box. Refer to Figure 1–124. Refer to “Engine Starting Procedure” in this Section of this Operator’s Manual for safety procedures when starting the engine.

2. Ensure that the travel swing lock is engaged and the boom is positioned to 0° boom angle or less.
3. Ensure the RCL System is set to the current crane configuration.
4. Connect the remote control box to the lower frame. Refer to Figure 1–123. Move the power switch on the remote control box to the “ON” position.

Note: Manual jack cylinder control switches are mounted on the right front of the lower frame. These switches can be used if there is a malfunction with the remote control box. If manual controls are used, a signal person must be used to assist in the lifting jack procedure.



**Figure 1–126
Pontoon Storage**

5. Slowly retract the jack cylinders (keeping crane level within 1° tilt angle) as it is lowering. Connect the electronic level indicator. Refer to Figure 1–123. Use the electronic level indicator to assist in maintaining the 1° tilt angle. Refer to Figure 1–125.

Note: Use the bubble level mounted on the lower frame as a backup if required to determine when the crane is level.

Note: Each jack cylinder is labeled with a number that corresponds to numbers on the jack cylinder controls.

6. Slowly continue to retract the jack cylinders (keeping crane level within 1°) until the side frames are resting on the ground.
7. Fully retract the jack cylinders to allow for removal of the pontoons. Remove the pontoons from the jack cylinders and properly store them. Move jacks and beams to the transport/working position. Refer to Figure 1–121.
8. Move the power switch on the remote control box to the “OFF” position.
9. Disconnect and store the remote control box and electronic level. Place the connector in the storage connection position. Refer to Figure 1–123.
10. Move the engine ignition switch in the manual jack cylinder control box to the “Off” position to shut-down the engine. Refer to Figure 1–124.
11. Start the engine from the operator’s cab and set the RCL System to the current crane configuration. Refer to “Rated Capacity Limiter” in this Section of this Operator’s Manual.

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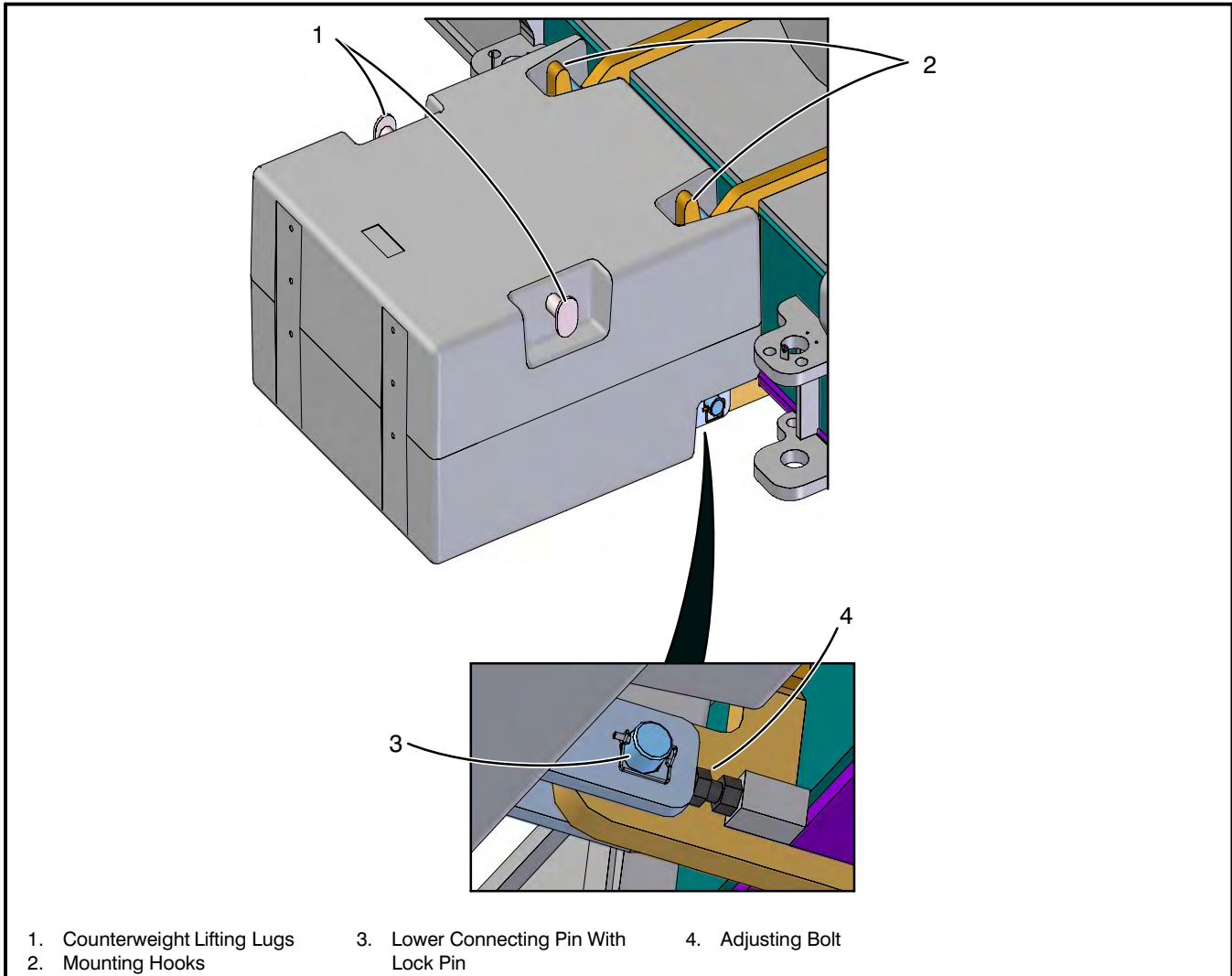


Figure 1–127
Lower Counterweight Installation

Lower Counterweight Installation And Removal

Lower Counterweight Installation

1. Install a sling on one of the lower counterweights.



WARNING

When using the crane's boom to handle the lower counterweights, always refer to the appropriate capacity chart in the Crane Rating Manual to ensure lifting capacities are not exceeded.

2. When using the crane to install the lower counterweights, always refer to the Crane Rating Manual to ensure capacities are not exceeded. Using the crane's boom or an auxiliary lifting device of suitable size and strength, slowly lift the lower counterweight. Lower counterweight weighs approximately 12,500 lb (5 670kg).
3. Align the counterweight with the mounting hooks on the lower frame and slowly lower the lower counterweight onto the mounting hooks. Refer to Figure 1–127. Continue to lower until the lower connecting pin holes are aligned.
4. Install the lower connecting pins and secure with the lock pins.

Note: If the lower connecting pins are difficult to install due to the alignment of the pin holes, use the adjusting bolt to align the holes.

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5. Repeat Steps 1 through 4 for the other lower counterweight.
6. Set the RCL System to the current crane configuration. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual.

Lower Counterweight Removal

1. Remove the lower connecting pins. Refer to Figure 1–127.
2. Install a sling on one of the lower counterweights.



WARNING

When using the crane's boom to handle the lower counterweights, always refer to the appropriate capacity chart in the Crane Rating Manual to ensure lifting capacities are not exceeded.

3. When using the crane to install the lower counterweights, always refer to the Crane Rating Manual to ensure capacities are not exceeded. Using the crane's boom or an auxiliary lifting device of suitable size and strength, slowly lift the lower counterweight. Lower counterweight weighs approximately 12,500 lb (5 670kg).
4. Repeat Steps 1 through 3 for the other lower counterweight.
5. Set the RCL System to the current crane configuration. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual.

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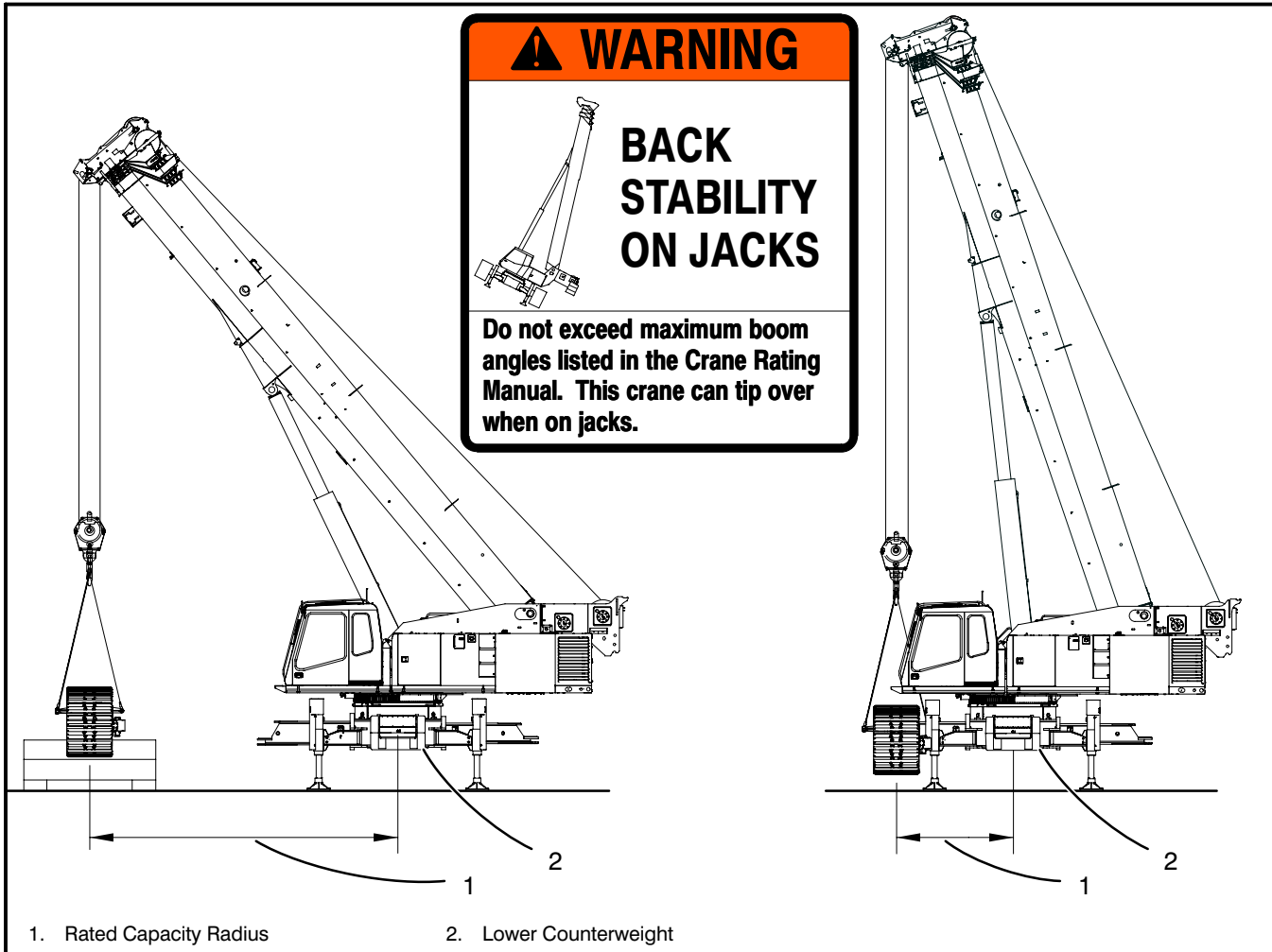


Figure 1-128
Side Frame Installation And Removal

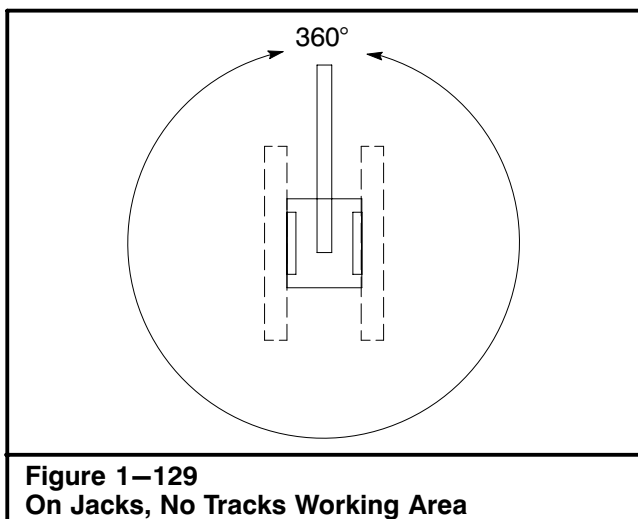


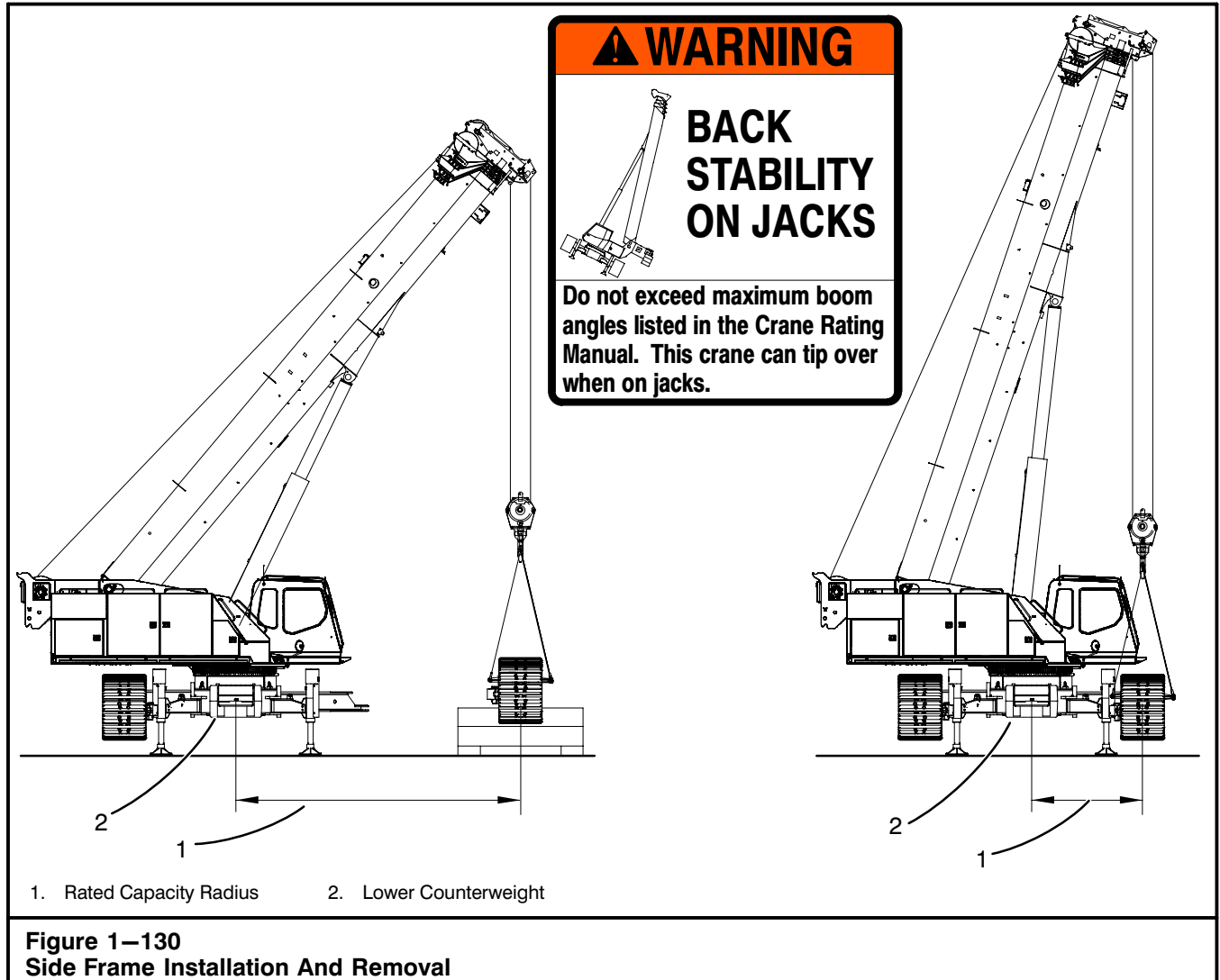
Figure 1-129
On Jacks, No Tracks Working Area

Side Frame Installation And Removal

Side Frame Installation



1. Unload the crane from the transport vehicle. Refer to "Unloading The Crane" in this Section of this Operator's Manual.
2. Install lower counterweights if required. Refer to "Lower Counterweight Installation" in this Section of this Operator's Manual.
3. Remove axle beam covers. Refer to Figure 1-131.
4. Ensure the RCL System is set to the current crane configuration.



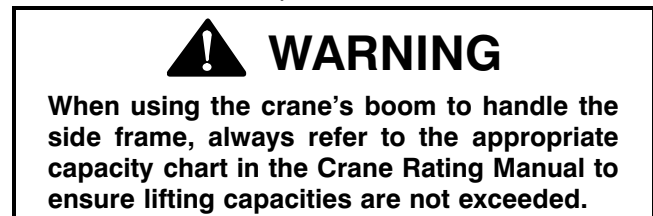
5. Maneuver transport vehicle, which contains the first side frame to be installed, to position the side frame within rated capacity radius and within the on jacks, no tracks working area shown on the RCL Display. Refer to Figure 1–128 and Figure 1–129.

Note: Travel motors on the side frames must be positioned inside and to the rear of the lower frame. The manual jack cylinder controls are mounted on the front of the lower frame.

6. Using the crane's boom or an auxiliary lifting device of suitable size and strength, rig the nylon tri-sling (provided) to the side frame. The side frames weigh approximately 28,750 lb (13 041kg) each with 36" (.91m) track shoes or 31,000 lb (14 062kg) each with 44" (1.12m) track shoes.

Note: Take precautions to prevent hydraulic hoses from being damaged during installation.

7. When using the crane to install the side frames, always refer to the Crane Rating Manual to ensure capacities are not exceeded. Slowly lift the side frame off the transport vehicle.



8. Carefully position the side frame onto the end of the lower axle beams.

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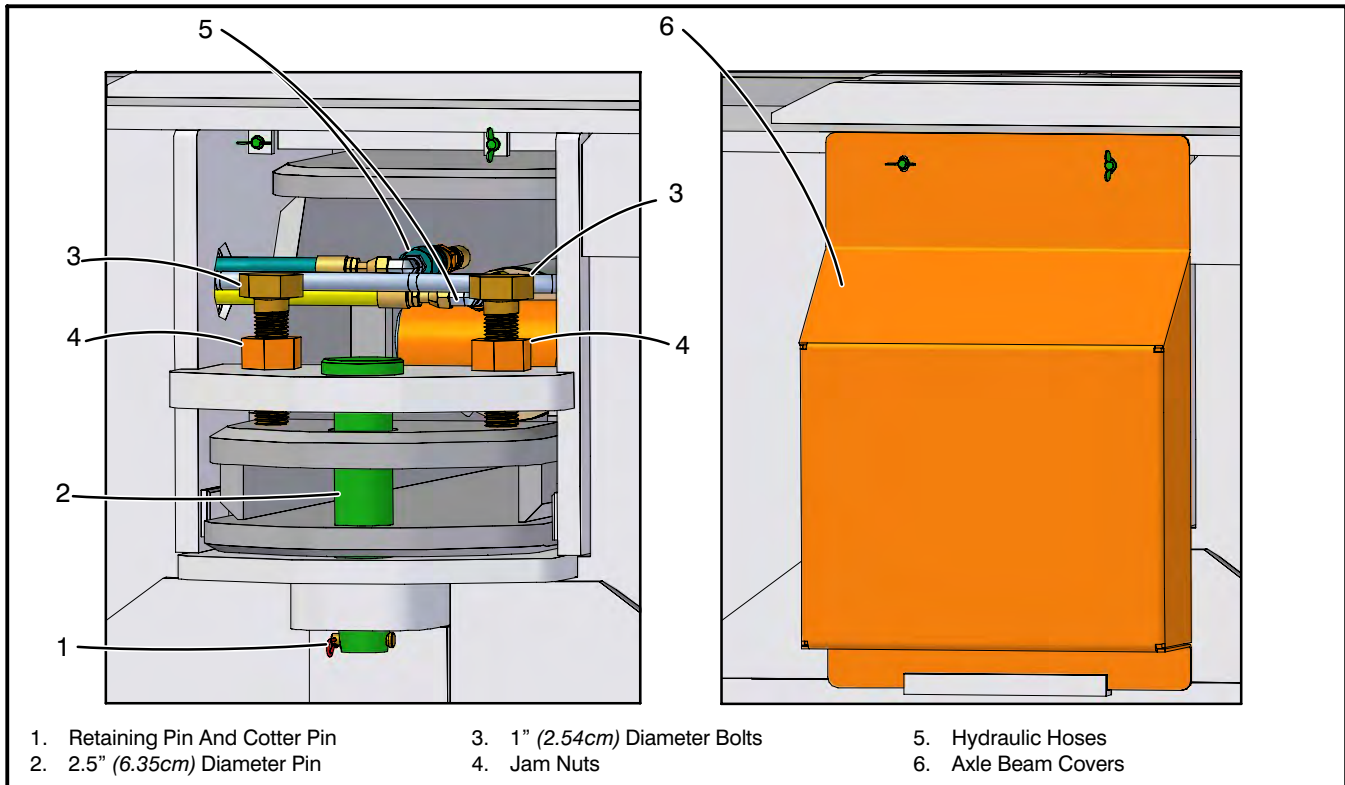


Figure 1-131
Side Frame Connection

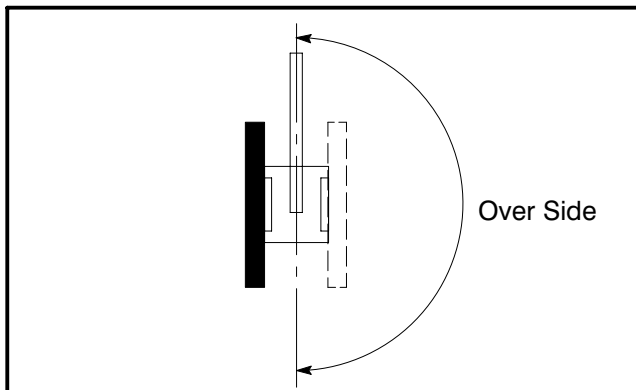
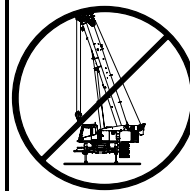


Figure 1-132
On Jacks, One Track Working Area

9. Connect side frame to axle beams using the 2.5 in (6.35cm) diameter pins. Refer to Figure 1-131. Remove tri-sling.
10. Position the boom at or below maximum angle listed at right. Slowly swing the upper over the side opposite the installed side frame.



WARNING



Do not exceed maximum boom angle before swinging the rear of the upper over the same side as the first installed side frame while on jacks. Crane may turn over backwards. Boom must be positioned at or below the maximum angle listed below before swinging the upper.

Track Shoes	Counterweight Upper + Lower	Max Boom Angle
36"	0+0	62°
	0+A	72.5°
44"	0+0	58°
	0+A	68°

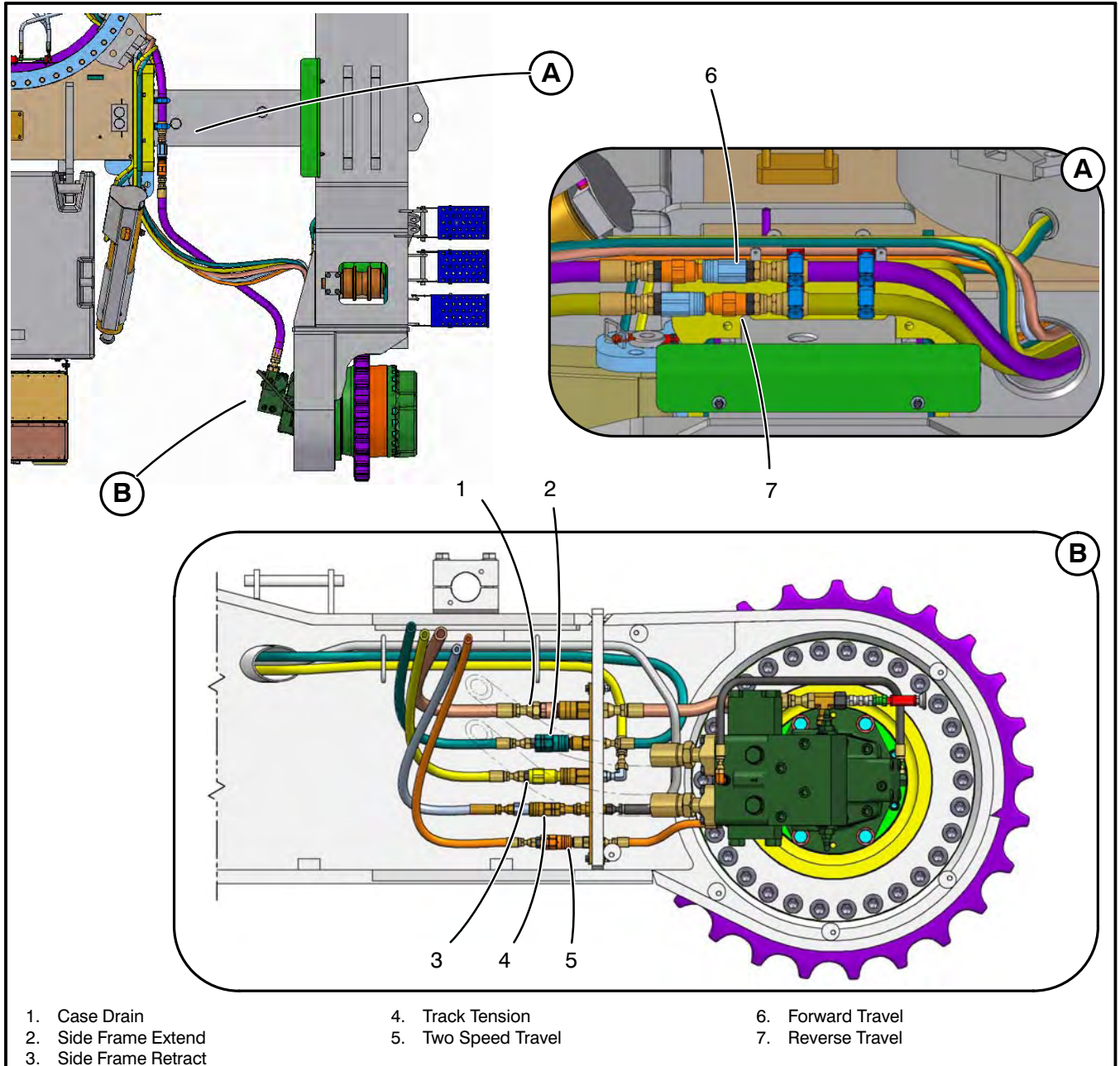


Figure 1–133
Hydraulic Hose Connections

11. Maneuver transport vehicle, which contains the second side frame to be installed, to the side opposite the installed side frame. Position the transport vehicle so the side frame is within the radius listed on

the following page and within on jacks, one track working area shown on the RCL Display. Refer to Figure 1–130 and Figure 1–132.

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Track Shoes	Counterweight Upper+Lower	Radius
36"	0+0	13–16 Ft (4.0–4.9m)
	0+A	13–18 Ft (4.0–5.5m)
44"	0+0	13–15 Ft (4.0–4.6m)
	0+A	13–17 Ft (4.0–5.2m)

Note: Travel motors on the side frames must be positioned inside and to the rear of the lower frame. The manual jack cylinder controls are mounted on the front of the lower frame.

12. Repeat Steps 6 through 9 to install the other side frame.
13. Fully retract the jack cylinders to lower the side frames to the ground. Do not exceed 1° tilt angle during the lowering process. Refer to “Lifting Jack Operation” in this Section of this Operator’s Manual.
14. Loosen the jam nuts on the 1” (2.54cm) diameter bolts. Refer to Figure 1–131. Tighten the bolts against the axle beam and tighten the jam nuts to secure side frame to axle beam. Install retaining pins and cotter pins into the 2.5 in (6.35cm) diameter pins. Repeat for the other axle beam. Refer to Figure 1–131.
15. Connect side frame to axle beam hydraulic hoses.
16. Connect the hydraulic hoses for the travel motor lines, side frame extend/retract lines, 2-speed travel line, drain line, and the track tension line (four places). Refer to Figure 1–133. Do this on both side frames.
17. Install drive motor covers.
18. Set the RCL System to the current crane configuration. Refer to “Rated Capacity Limiter” in this Section of this Operator’s Manual.


Side Frame Removal

 **WARNING**

Do not place your body between the side frame and lower frame during the removal process. Serious personal injury may result.

1. Park the crane on a firm level surface.
2. Extend the side frames to their fully extended position. Refer to “Extending Side Frames” in this Section of this Operator’s Manual.
3. Remove the upper counterweights. Refer to “Upper Counterweight Removal” in this Section of this Operator’s Manual.
4. Slowly swing upper over the side of the lower. Apply the swing park brake.
5. Maneuver transport vehicle to the left or right side of the lower. Position the transport vehicle so the side frame is within the radius listed below and within on jacks, one track working area shown on the RCL Display during removal of the first side frame. Refer to Figure 1–130 and Figure 1–132.

Track Shoes	Counterweight Upper+Lower	Radius
36"	0+0	13–16 Ft (4.0–4.9m)
	0+A	13–18 Ft (4.0–5.5m)
44"	0+0	13–15 Ft (4.0–4.6m)
	0+A	13–17 Ft (4.0–5.2m)

 **WARNING**

When using the crane’s boom to handle the side frame, always refer to the appropriate capacity chart in the Crane Rating Manual to ensure lifting capacities are not exceeded.


6. Disconnect the hydraulic hoses for the travel motor lines, side frame extend/retract lines, 2-speed travel line, drain line, and the track tension line (four places). Refer to Figure 1–133. Do this on both side frames.

Note: Take precautions to prevent hydraulic hoses from being damaged during removal.

7. Remove all axle beam covers from both side frames.


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8. Loosen the jam nuts on the 1" (2.54cm) diameter bolts. Refer to Figure 1–131. Loosen the bolts from the axle beam. Bolts should be flush with the bottom of plate. Remove retaining the pin and cotter pin from the bottom of the 2.5 in (6.35cm) diameter pins. Repeat for the other axle beam.
9. Move the jacks and jack beams to the self assembly position. Raise the crane on jacks until the side frames just clear the ground. Refer to "Lifting Jack Operation" in this Section of this Operator's Manual.
10. Set the RCL System to the current crane configuration. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual.
11. Disconnect side frame from the axle beams by removing the 2.5 in (6.35cm) diameter pins. Refer to Figure 1–131.
12. When using the crane to remove the side frames, always refer to the Crane Rating Manual to ensure capacities are not exceeded. Using the crane's boom or an auxiliary lifting device of suitable size and strength, rig the nylon tri-sling (provided) to the side frame. The side frames weigh approximately 28,750 lb (13 041kg) each with 36" (.91m) track shoes or 31,000 lb (14 062kg) each with 44" (1.12m) track shoes.
13. Release swing park brake.

 **WARNING**

When using the crane's boom to handle the side frame, always refer to the appropriate capacity chart in the Crane Rating Manual to ensure lifting capacities are not exceeded.

14. Slowly lift the side frame off the axle beam.

 **WARNING**

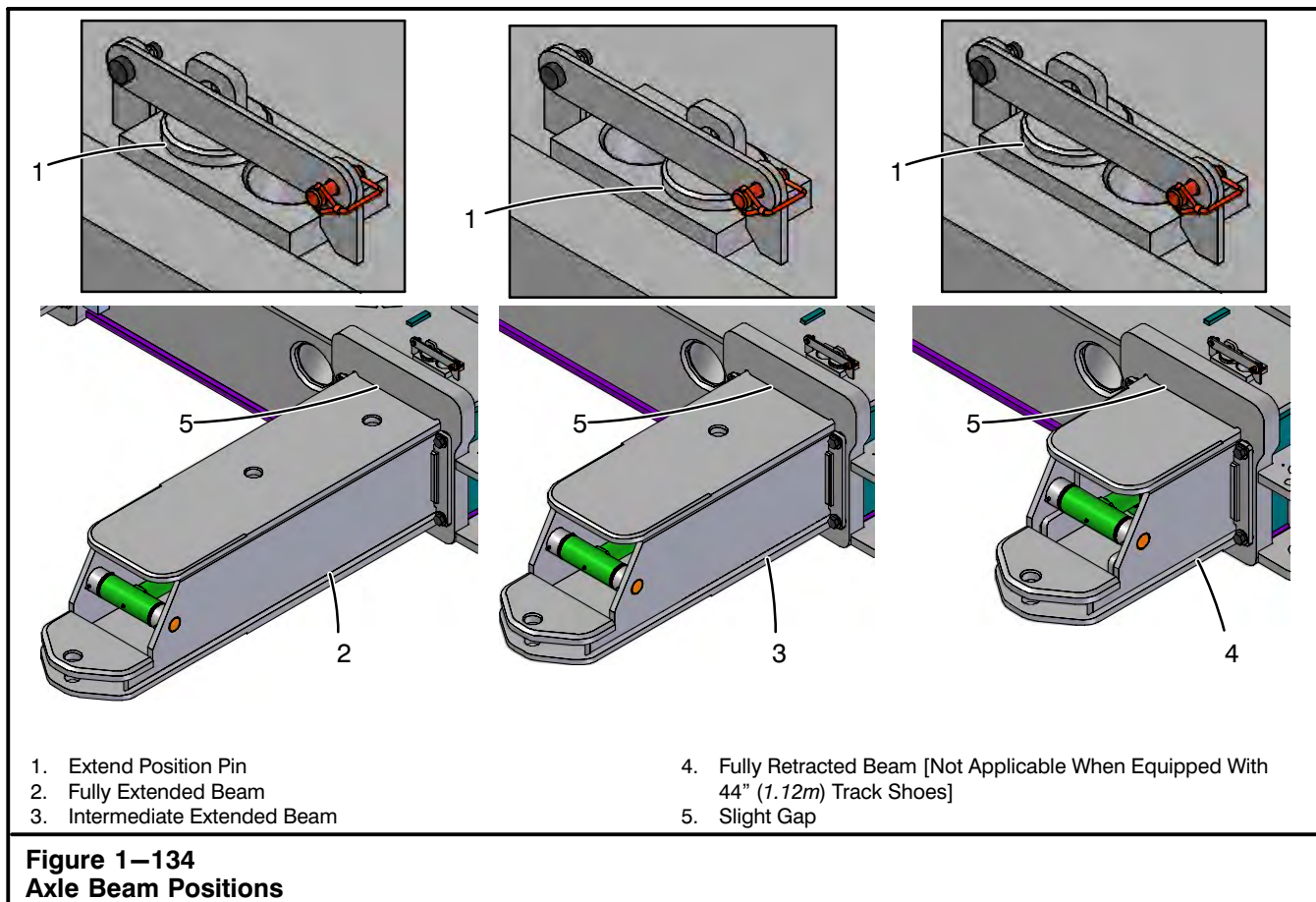


Do not exceed maximum boom angle before swinging the rear of the upper over the same side as the first installed side frame while on jacks. Crane may turn over backwards. Boom must be positioned at or below the maximum angle listed below before swinging the upper.

Track Shoes	Counterweight Upper + Lower	Max Boom Angle
36"	0+0	62°
	0+A	72.5°
44"	0+0	58°
	0+A	68°

15. Slowly lower the boom at or below maximum boom angle listed above and position the side frame onto the transport vehicle. Remove the tri-sling.
16. With the boom at or below maximum angle listed above, slowly swing the upper directly over the same side as the remaining side frame. Apply the swing park brake.
17. Maneuver transport vehicle, to load the second side frame to be removed, to position the transport vehicle so the side frame is within rated capacity radius and within on jacks, no tracks working area shown on the RCL Display. Refer to Figure 1–128 and Figure 1–129.
18. Repeat Steps 11 through 14 for the second side frame.
19. Position the side frame onto the transport vehicle.

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Extending And Retracting The Side Frames

The side frames can be used in any one of three positions when equipped with 36" (091m) track shoes; fully retracted, intermediate extended, or fully extended. [The fully retracted position is not applicable when equipped with 44" (1.12m) track shoes.] The side frame extend and retract function is controlled by a switch in the operator's cab (Refer to Figure 1-42) or the switch on the remote control box (Refer to Figure 1-124) and the extend position pins on the lower (Refer to Figure 1-134). The extend position pins control the extend length of the beams. They allow for beams to be fully extended, or limits them to intermediate extended length(s) based on the selected position of the extend position pins. The side frames must be pinned at equal extension for all lifting operations on the side frames.



Extending Side Frames

1. Park the crane on a firm, level supporting surface and position the upper over the end of the lower. Engage the travel swing lock.
2. Fully retract and position boom at approximately 45 degrees.
3. Remove the upper counterweights from the upper. Refer to "Upper Counterweight Removal" in this Section of this Operator's Manual.
4. Position the lifting jacks in the self assembly position and the jack beams in the working position. Raise the crane on jacks until the weight of the crane is lifted off the axle beams, evidenced by a slight gap between the top of the axle beams and the wrapper on the lower frame. (Do not raise the crane too high as this will create a loading between the bottom of the axle beams and the wrapper on the lower frame.) Refer to "Lifting Jack Operation" in this Section of this Operator's Manual and Figure 1-134.
5. Remove the extend position pins from the right side axle beams. Refer to Figure 1-134.



WARNING

When making lifts on side frames, all axle beams must be equally extended; all fully retracted [fully retracted position is not applicable when equipped with 44" (1.12m) track shoes], all intermediate extended, or all fully extended. Failure to do so will cause a loss of stability and possible crane damage and/or personal injury.

6. Push the side frame extend switch to the "Extend"  position and hold until the right side axle beams are extended to desired position. Release the switch.
7. Install the extend position pins in the appropriate extended position. Refer to Figure 1–134.
8. Remove the extend position pins from the left side axle beams. Refer to Figure 1–134.
9. Push the side frame extend switch to the "Extend"  position and hold until the left side axle beams are extended to desired position. Release the switch.
10. Install the extend position pins in the appropriate extended position. Refer to Figure 1–134.
11. Lower the crane and completely retract lifting jack cylinders. Properly remove and store pontoons and position jack cylinders and beams in the working position. Refer to "Lifting Jack Operation" in this Section of this Operator's Manual.
12. Configure upper counterweights to an allowable configuration per the current side frame position. Refer to the Crane Rating Manual to determine the allowable counterweight combinations. Install upper counterweights. Refer to "Upper Counterweight Installation" in this Section of this Operator's Manual.
13. Set the RCL System to the current crane configuration. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual.

Retracting Side Frames



1. Park the crane on a firm, level supporting surface and position the upper over the end of the lower. Engage the travel swing lock.
2. Properly store the fly if equipped. Refer to Section 4 of this Operator's Manual.
3. Remove the upper counterweights from the upper. Refer to "Upper Counterweight Removal" in this Section of this Operator's Manual.
4. Fully retract and position boom at approximately 45 degrees.

5. Position the lifting jacks in the self assembly position and the jack beams in the working position. Raise the crane on jacks until the weight of the crane is lifted off the axle beams, evidenced by a slight gap between the top of the axle beams and the wrapper on the lower frame. (Do not raise the crane too high as this will create a loading between the bottom of the axle beams and the wrapper on the lower frame.) Refer to "Lifting Jack Operation" in this Section of this Operator's Manual and Figure 1–134.
6. Remove the extend position pins from the right side axle beams. Refer to Figure 1–134.

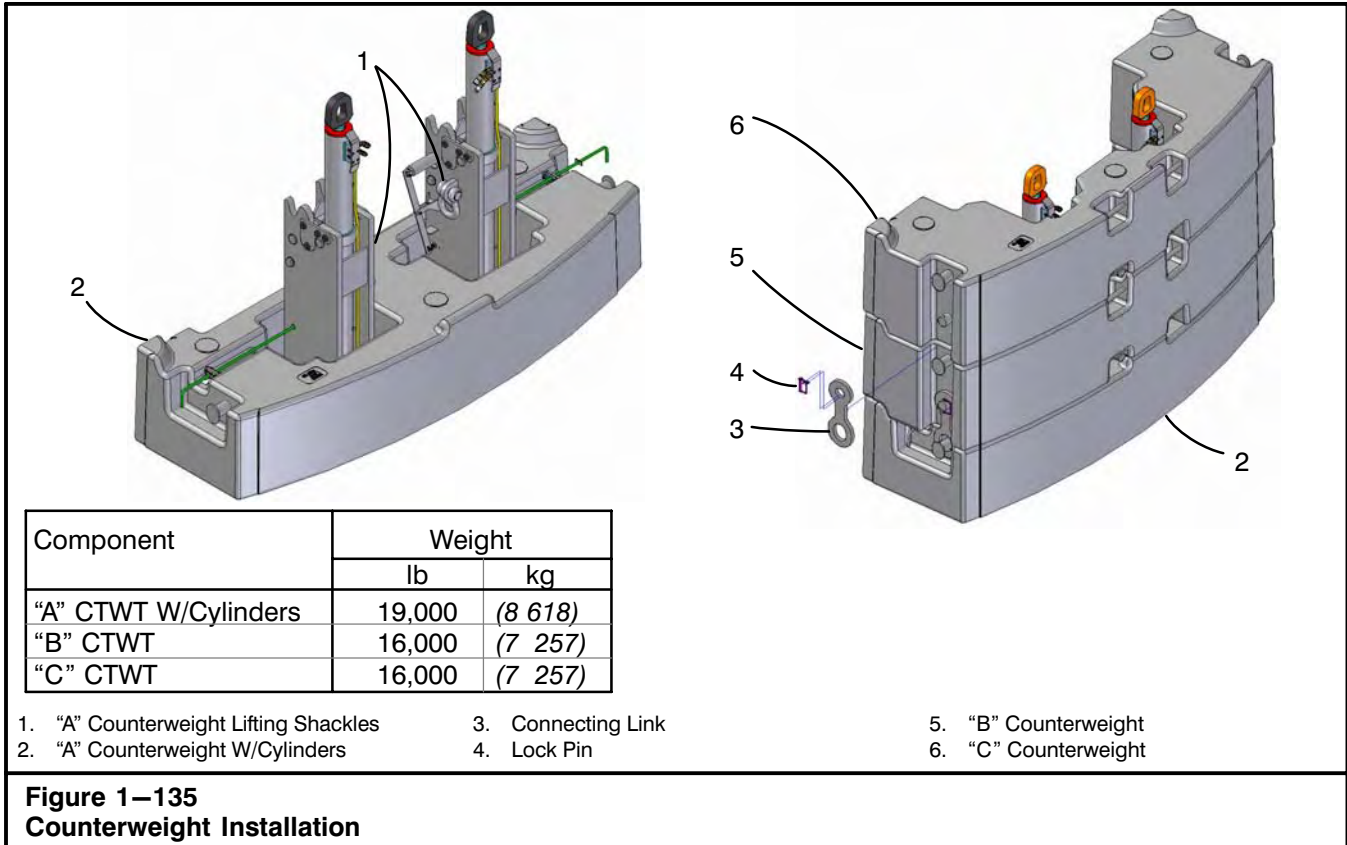


WARNING

When making lifts on side frames, all axle beams must be equally extended; all fully retracted [fully retracted position is not applicable when equipped with 44" (1.12m) track shoes], all intermediate extended, or all fully extended. Failure to do so will cause a loss of stability and possible crane damage and/or personal injury.

7. Push the side frame extend switch to the "Retract"  position and hold until the right side axle beams are retracted to desired position. Release the switch.
8. Install the extend position pins in the appropriate position. Refer to Figure 1–134.
9. Remove the extend position pins from the left side axle beam. Refer to Figure 1–134.
10. Push the side frame extend switch to the "Retract"  position and hold until the left side axle beams are retracted to desired position. Release the switch.
11. Install the extend position pins in the appropriate position. Refer to Figure 1–134.
12. Lower the crane and completely retract lifting jack cylinders. Properly remove and store pontoons and position jack cylinders and beams in the working position. Refer to "Lifting Jack Operation" in this Section of this Operator's Manual.
13. Configure upper counterweights to an allowable configuration per the current side frame position. Refer to the Crane Rating Manual to determine the allowable counterweight combinations. Install the upper counterweights. Refer to "Upper Counterweight Installation" in this Section of this Operator's Manual.
14. Set the RCL System to the current crane configuration. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual.

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Upper Counterweight Assembly, Installation, And Removal

The upper counterweights can be assembled with the crane. They are installed and removed using the coun-

terweight installation/removal cylinders. They can be installed to the upper in "A", "AB", or "ABC" combinations depending upon the desired capacities. Refer to the Crane Rating Manual to determine the allowable counterweight combinations.

Upper Counterweight Assembly

Assemble the upper counterweights on a firm level surface. The crane can be used to assemble the upper counterweights. When using the crane to handle the upper counterweights, ensure the RCL System is set to the current crane configuration and always refer to the Crane Rating Manual to ensure capacities are not exceeded.

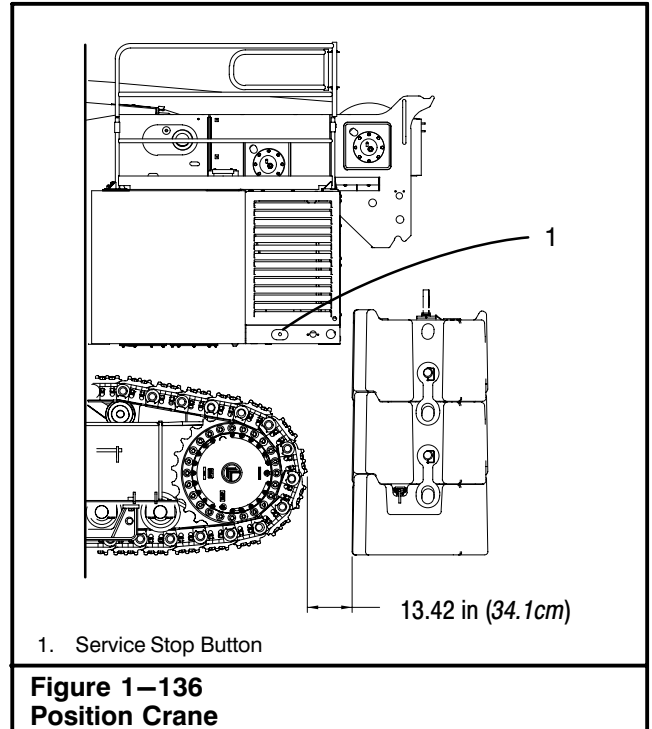


WARNING

Lift the "A", "B", and "C" counterweights separately when assembling and disassembling the counterweights. Do not lift the "ABC" counterweights together. Major crane damage and/or serious personal injury may result. Use the "A" counterweight lifting shackles to lift the "A" counterweight with cylinders only.

Assemble the counterweights for the "A", "AB", or "ABC" combination as required per the following:

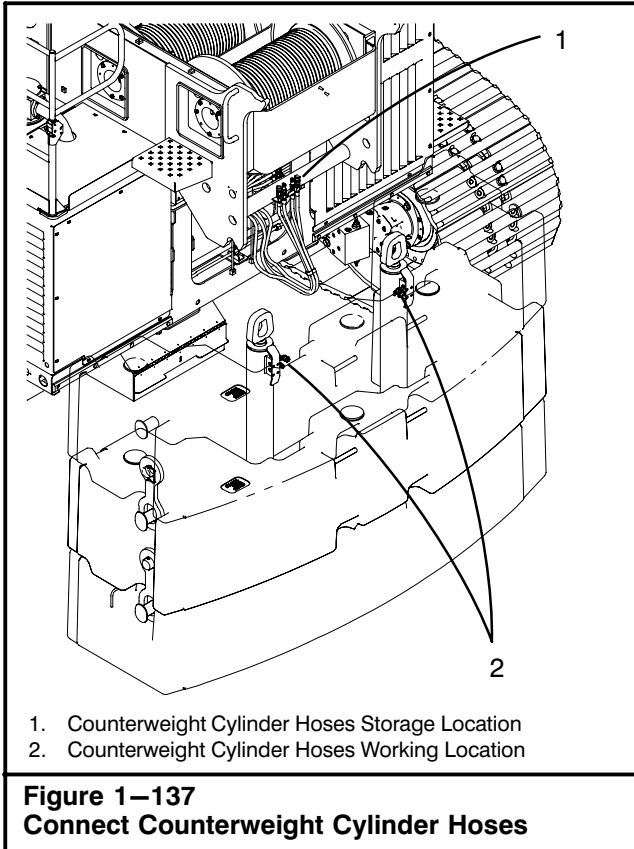
1. Lift the "A" counterweight with cylinders off the transport vehicle and set on a firm level surface.
2. Position the "B" counterweight onto the "A" counterweight. Secure the counterweights with the connecting links. Secure connecting links with the lock pins.
3. Position the "C" counterweight onto the "B" counterweight. Secure the counterweights with the connecting links. Secure connecting links with the lock pins.



Upper Counterweight Disassembly

1. Remove lock pins and "C" counterweight connecting links.
2. Carefully lift "C" counterweight off the "AB" counterweight stack and onto transport vehicle.
3. Remove lock pins and "B" counterweight connecting links.
4. Carefully lift "B" counterweight off the "A" counterweight and onto transport vehicle.
5. Lift the "A" counterweight with cylinders onto transport vehicle.

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5. If required, assemble the upper counterweight. Refer to “Upper Counterweight Assembly” in this Section of this Operator’s Manual.
6. Position the crane and/or upper counterweight so upper counterweight can be lifted with the counterweight installation/removal cylinders as shown.
7. Set the engine throttle to the low idle position.
8. Connect the remote control box to the rear of the upper. Move the power switch to the “ON” position to provide power to the control box.

Note: Manual counterweight control switches are at the top left side of the frame. These switches can be used if there is a malfunction with the remote control box. If manual controls are used, a signal person must be used to assist in the counterweight installation procedure.

9. Press the Service Stop Button (on the left rear of the upper) and raise the left seat console. Counterweight controls will not function until the left seat console is raised.
10. Connect the counterweight cylinder hoses to the quick disconnects on the counterweight cylinders.

Note: If hydraulic hoses are difficult to connect, it may be necessary to relieve pressure within the circuit. To relieve the pressure, move the counterweight cylinder control switch to the extend/retract position momentarily.

Upper Counterweight Installation

Observe the following working conditions for installing the upper counterweights:

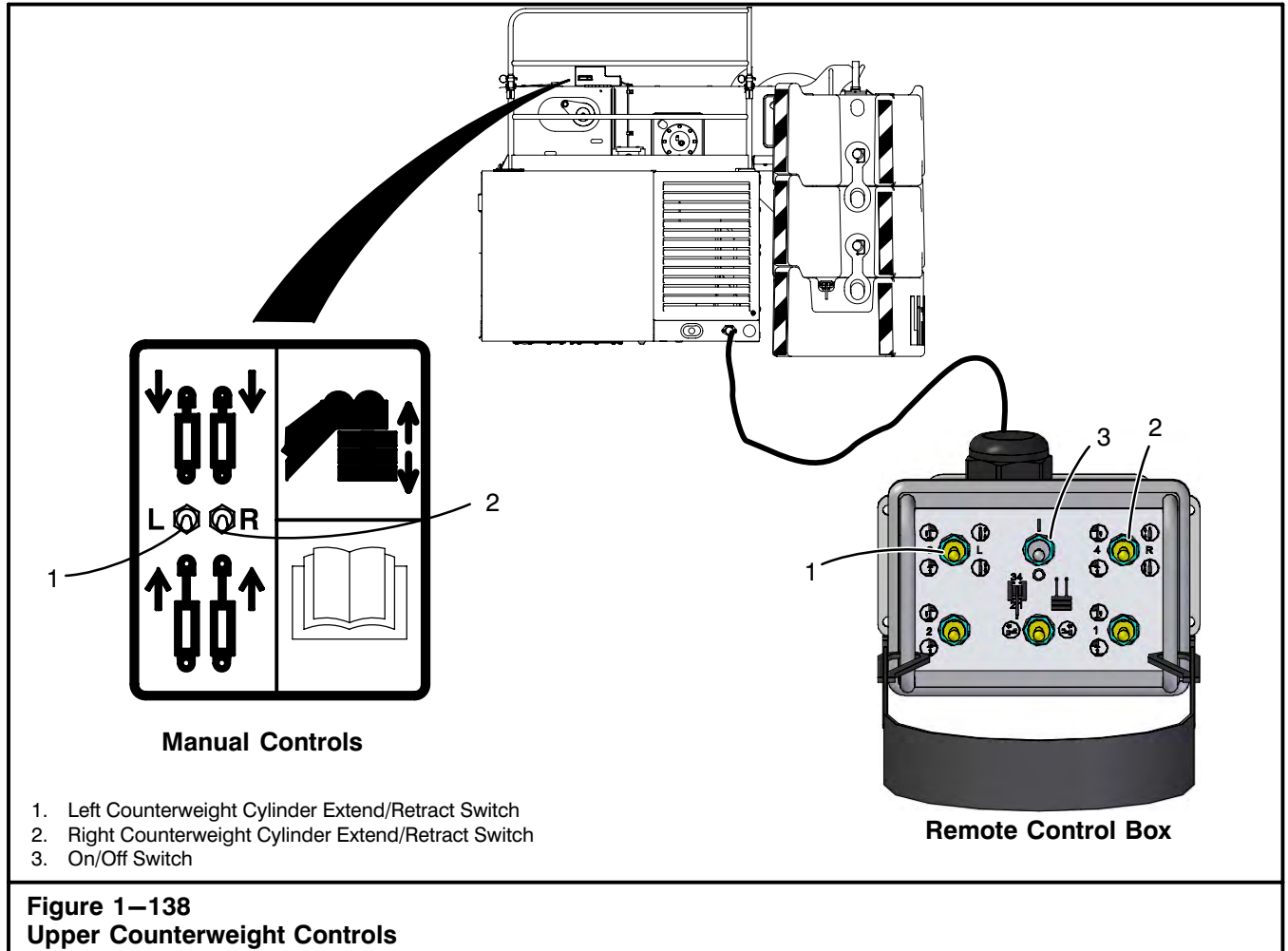
1. Park the crane on a firm supporting surface and position the upper over either end of the lower. Engage the travel swing lock.
2. Fully retract boom and boom down to 0 degrees.
3. The side frames must be locked in the fully extended position.
4. A 2° maximum side to side angle is permissible.



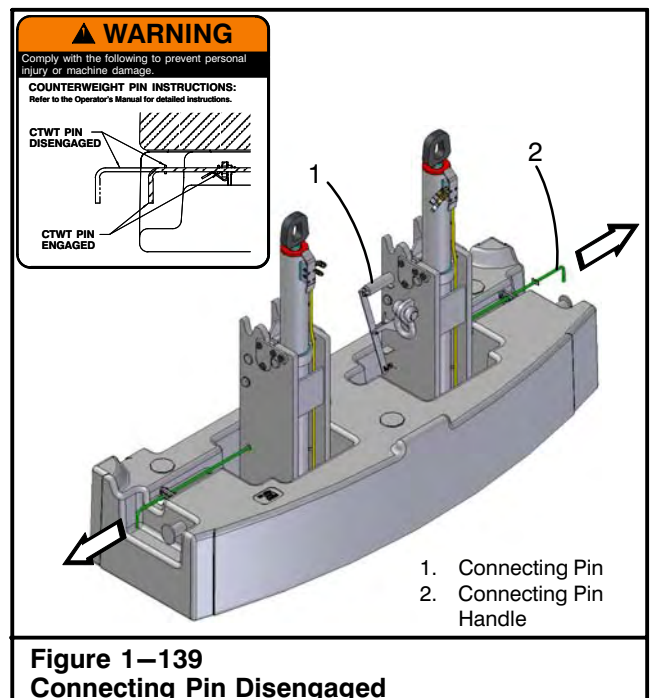
WARNING

Counterweight installation and removal must be done on firm level ground.

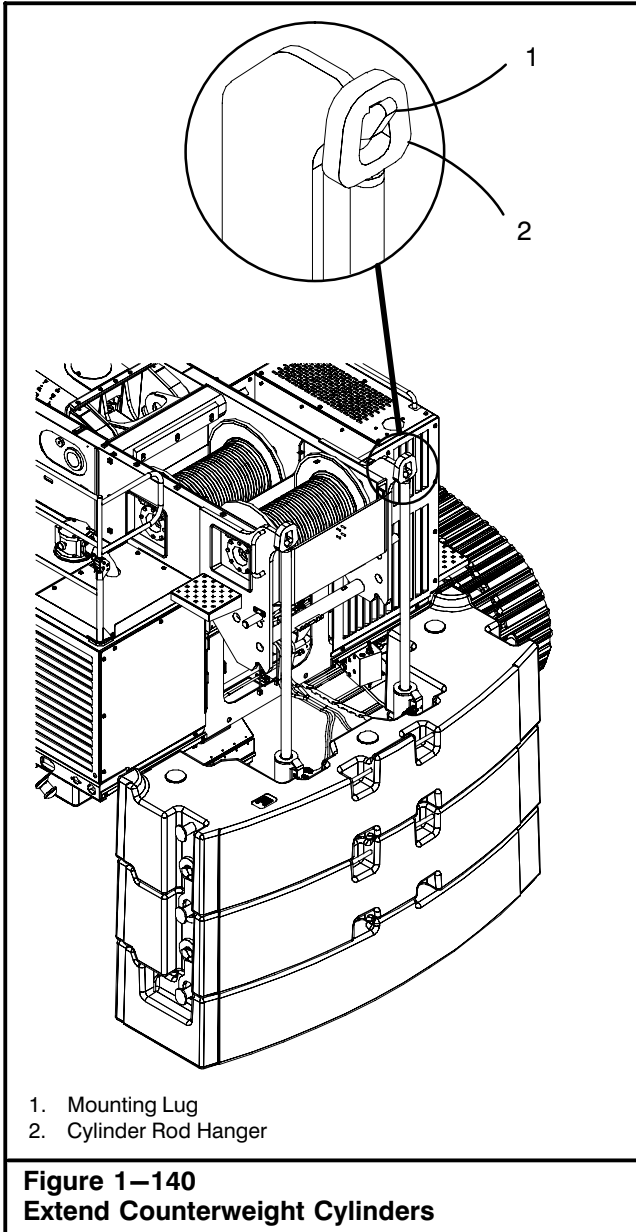
Do not swing the crane with the “ABC” counterweight installed, when the side frames are retracted. It may cause the crane to tip over. Place the upper parallel with the side frames and engage the travel swing lock. Refer to the Crane Rating Manual for allowable crane configurations and maximum boom angles.



11. Ensure that the connecting pin is disengaged from the counterweight cylinder assembly on both sides of the upper counterweight. Connecting pin handle should be pulled out to the limit of its travel.



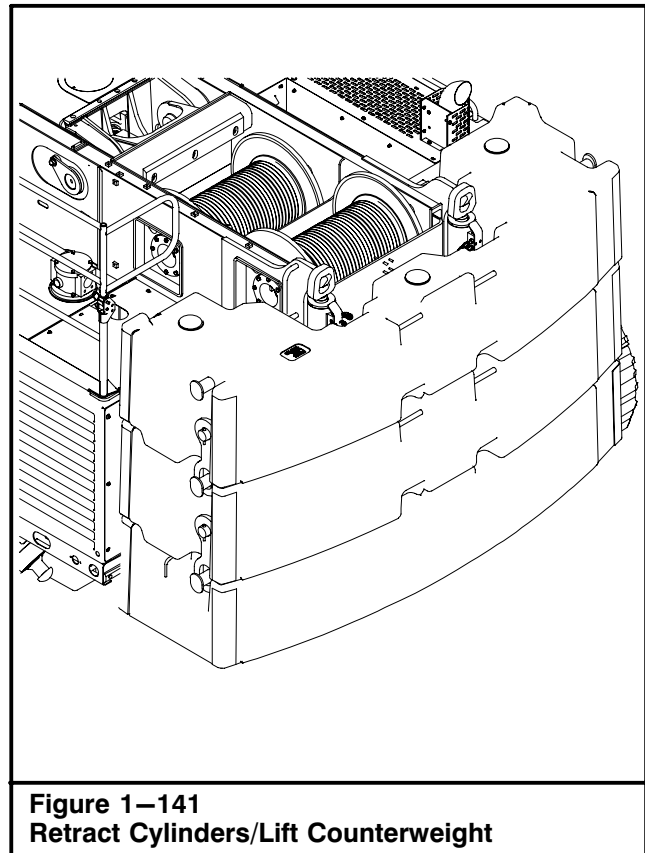
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WARNING

Ensure the cylinder rod hangers are fully seated in the mounting lugs on the upper before attempting to lift the upper counterweight. The counterweight could fall causing serious personal injury and/or major crane damage.

12. Fully extend the counterweight installation/removal cylinders. Align and retract the cylinder until the cylinder rod hangers on the end of the cylinder rods are fully seated in the mounting lugs on the upper frame.



DANGER

Stay clear of the counterweight during the raising procedure. Failure to do so could result in serious personal injury if the counterweight was to fall or move suddenly. All personnel and equipment must be out of the path of the counterweight.

13. Simultaneously retract the cylinders to lift the upper counterweight into position. As the counterweight is raised, operate one control switch at a time if required to keep the counterweight parallel to the bottom of the upper as it moves upward.

14. Push the connecting pin handle in to install the counterweight connecting pins and attach the upper counterweight to the upper frame. Ensure the handle is latched all the way into place. Do this on both sides of the upper counterweight.
15. Slightly extend the cylinders to transfer the weight to the connecting pins.
16. Move the power switch of the remote control box to the "OFF" position and disconnect it from the upper. Properly store the remote control box.
17. If necessary, reset the Service Stop Button.

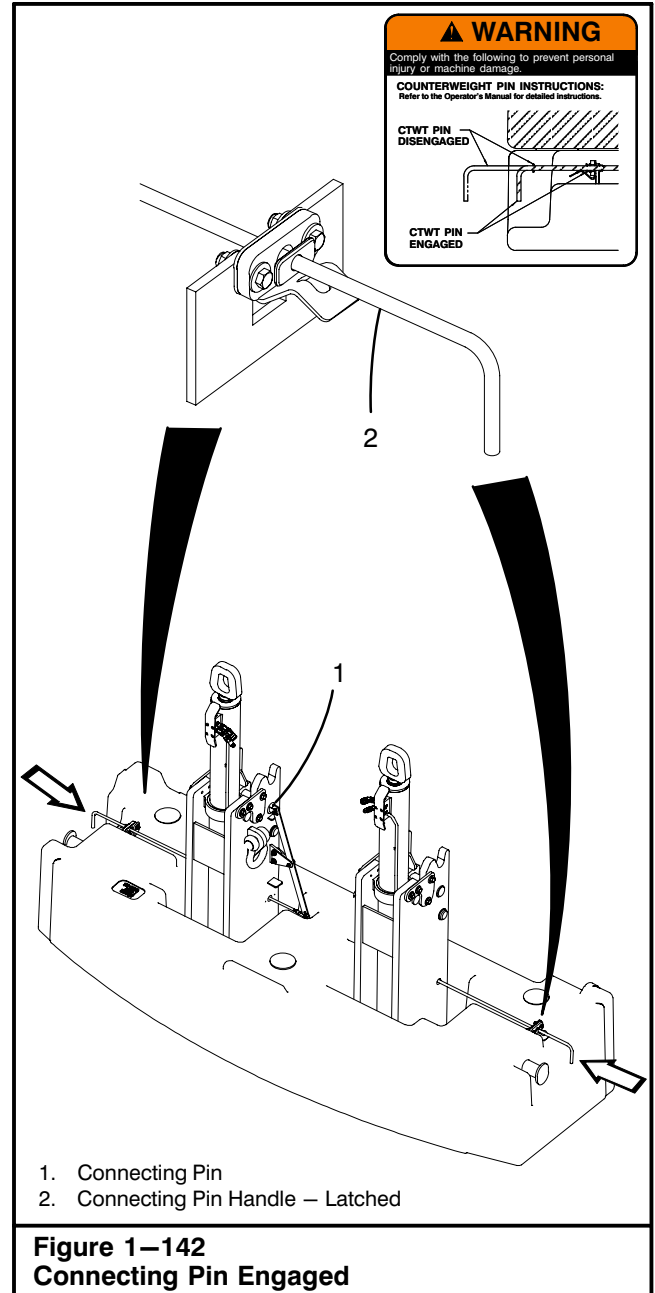


WARNING

Counterweight installation and removal must be done on firm level ground.

Do not swing the crane with the "ABC" counterweight installed, when the side frames are retracted. It may cause the crane to tip over. Place the upper parallel with the side frames and engage the travel swing lock. Refer to the Crane Rating Manual for allowable crane configurations and maximum boom angles.

18. Set the RCL System to the current crane configuration. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual.



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Upper Counterweight Removal

Observe the following working conditions for removing the upper counterweights:

1. Park the crane on a firm supporting surface and position the upper over either end of the lower. Engage the travel swing lock.
2. Properly store the fly if equipped. Refer to Section 4 of this Operator's Manual.
3. A 2° maximum side to side angle is permissible.
4. The side frames must be locked in the fully extended position.

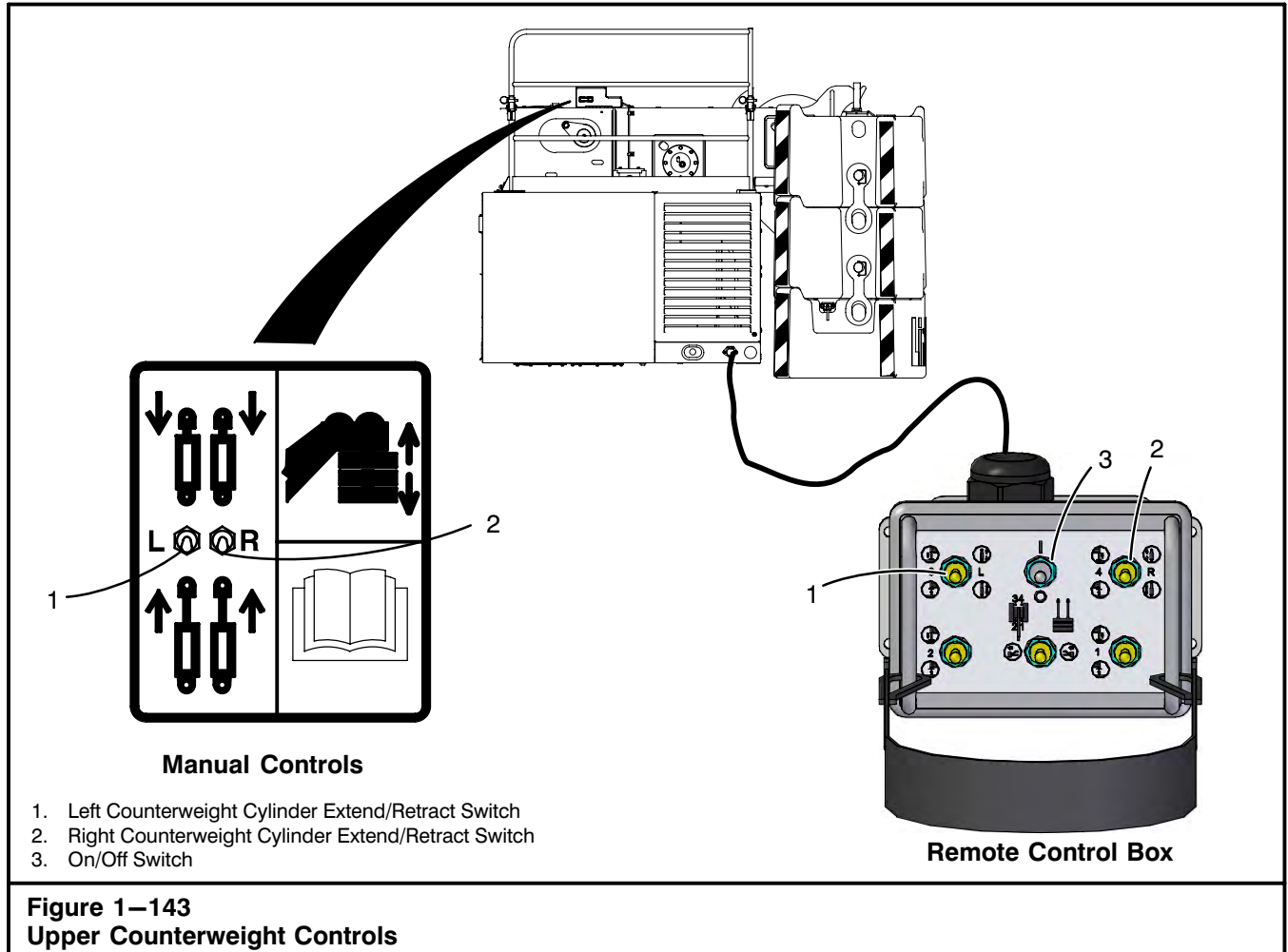


WARNING

Counterweight installation and removal must be done on firm level ground.

Do not swing the crane with the "ABC" counterweight installed, when the side frames are retracted. It may cause the crane to tip over. Place the upper parallel with the side frames and engage the travel swing lock. Refer to the Crane Rating Manual for allowable crane configurations and maximum boom angles.

5. Fully retract the boom and boom down to 0 degrees.
6. Press the Service Stop Button (on the left rear of the upper, refer to Figure 1–136) and raise the left seat console. Counterweight controls will not function until the left seat console is raised.
7. If not already connected, connect the counterweight cylinder hoses to the quick disconnects on the counterweight cylinders. Refer to Figure 1–137.



8. Connect the remote control box to the rear of the upper. Move the power switch to the "ON" position to provide power to the control box.

Note: Manual counterweight control switches are at the top left side of the frame. These switches can be used if there is a malfunction with the remote control box. If manual controls are used, a signal person must be used to assist in the counterweight removal procedures.

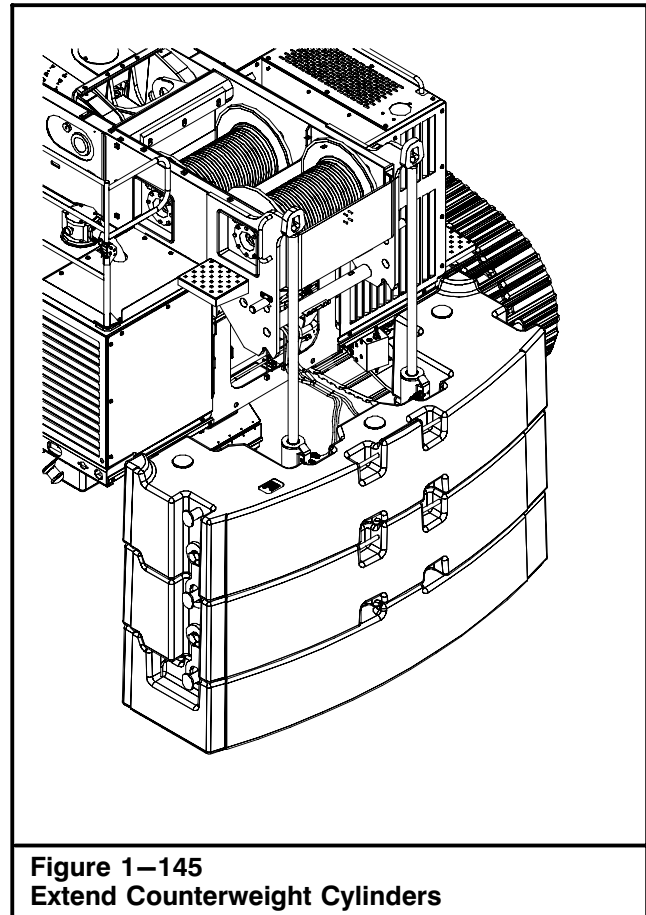
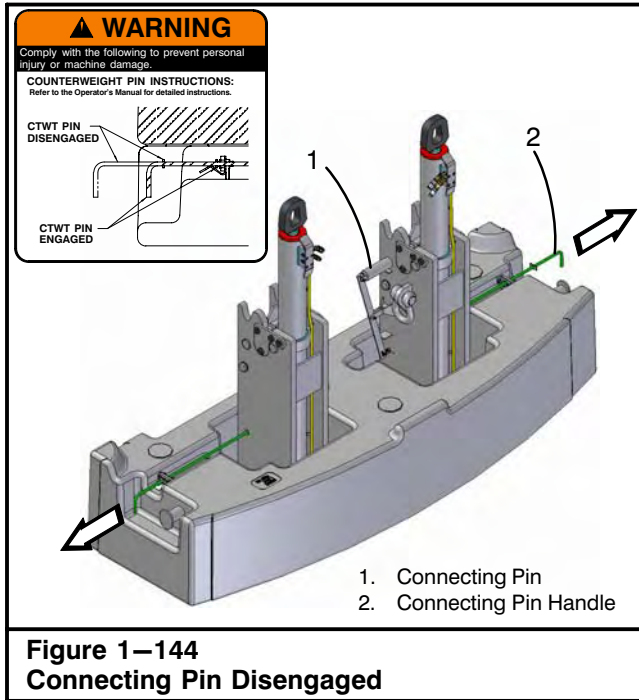
9. Move back away from the counterweight and visually check that the counterweight cylinder rod hangers are fully seated in the mounting lugs on the upper frame. Raise counterweight (retract cylinders) slightly to relieve pressure on the connecting pins.
10. Disengage the counterweight connecting pins that attach the upper counterweight to the upper frame. Do this on both sides of the upper counterweight.



WARNING

Ensure the cylinder rod hangers are fully seated in the mounting lugs on the upper before attempting to lift the upper counterweight. The counterweight could fall causing serious personal injury and/or major crane damage.

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DANGER

Stay clear of the counterweight during the lowering procedure. Failure to do so could result in serious personal injury if the counterweight was to fall or move suddenly. All personnel and equipment must be out of the path of the counterweight.

11. Simultaneously extend the counterweight cylinders to lower the upper counterweights to the ground. As the counterweights are lowered, operate one control switch at a time if required, to keep the counterweights parallel to the ground as they move downward.

CAUTION

Do not allow one side of the counterweight to contact the ground before the other. Failure to do so could cause crane damage. The entire bottom surface of the counterweight must contact the ground simultaneously.

12. Extend the counterweight cylinders until the mounting lugs can pass freely through the cylinder rod hangers. Slowly travel the crane away from upper counterweights just enough so the mounting lugs clear the cylinder rod hangers.
13. Fully retract the counterweight cylinders.

14. Disconnect the counterweight cylinder hoses from the quick disconnects on the counterweight cylinders.

Note: If counterweight cylinders have been fully retracted, relieve hydraulic pressure within the circuit by moving the cylinder control switches back and forth several times. This will ease hose removal during counterweight removal process.

15. Move the power switch on the remote control box to the "OFF" position. Disconnect the remote control box from the rear of the upper. Properly store the remote control box.
16. If necessary, reset the Service Stop Button on the left rear of the upper.
17. Set the RCL System to the current crane configuration. Refer to "Rated Capacity Limiter" in this Section of this Operator's Manual.
18. If required, disassemble the upper counterweight. Refer to "Upper Counterweight Disassembly" in this Section of this Operator's Manual.

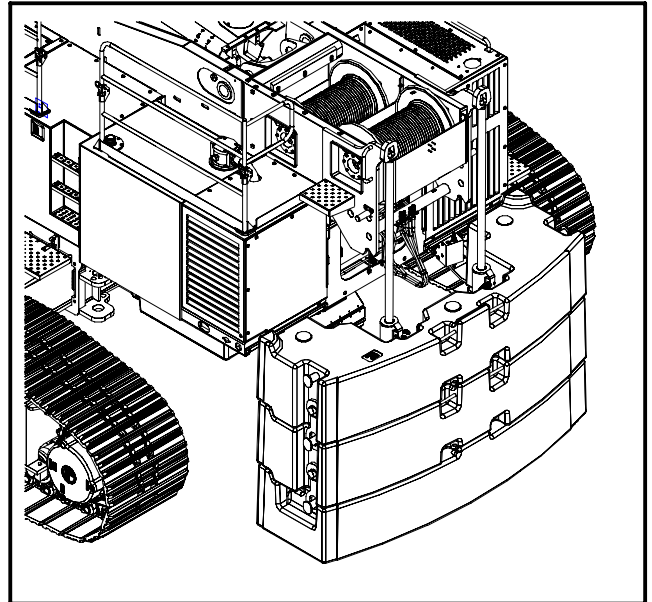
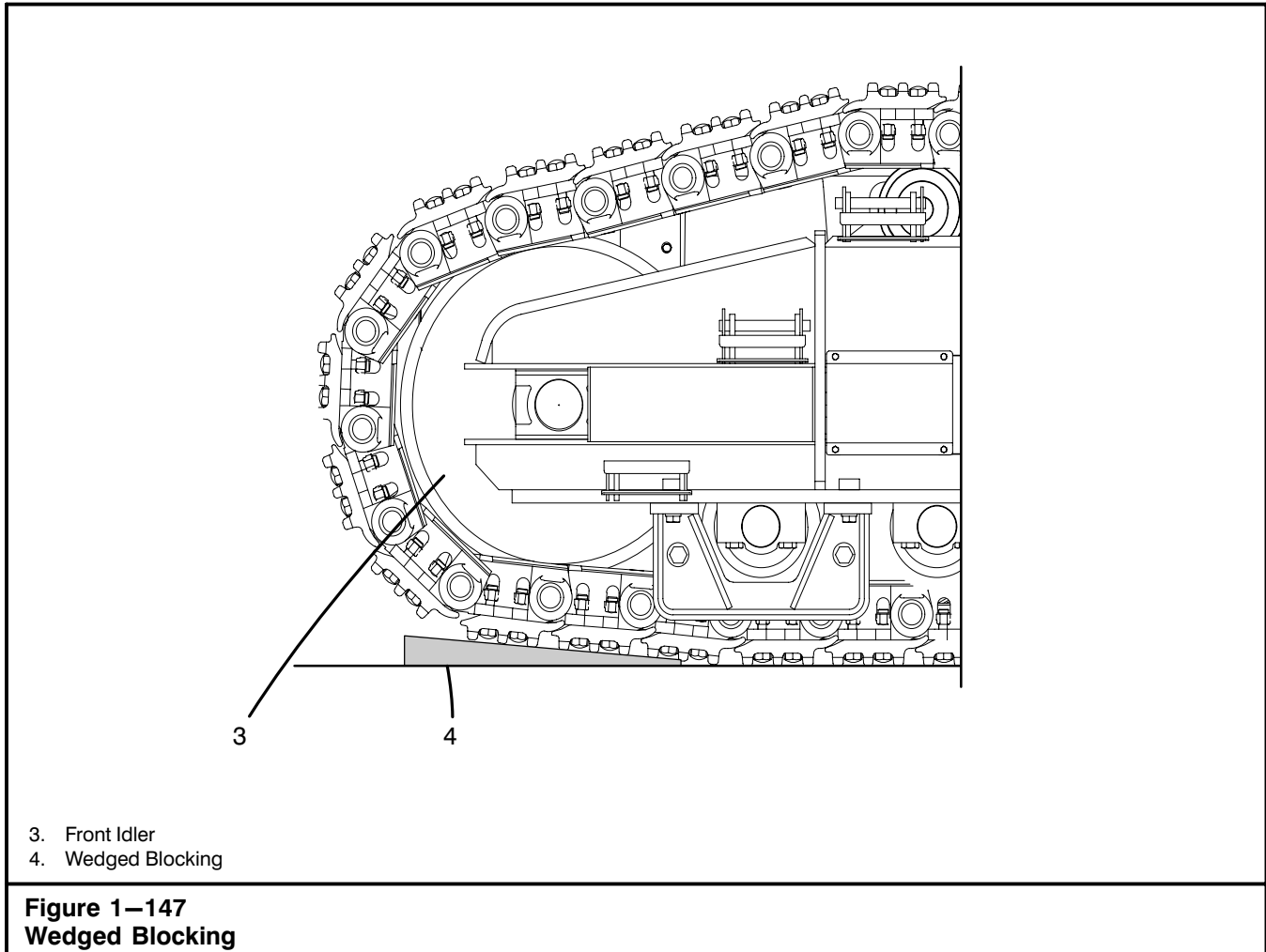


Figure 1–146
Disconnect Counterweight Cylinder Hoses

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Wedged Blocking (For Over The Front Lifting)

The crane has over front lifting capacities when wedged blocking is placed under the side frame idlers to prevent rocking.

1. Place the wedged blocking under the front end of the tracks that the load is being lifted, as shown in Figure 1–147.

2. Move the crane up onto the wedged blocking. Ensure blocking is evenly positioned under the end of each side frame.



WARNING

Ensure that the faces of the wedged blocking and the track shoes contact evenly. If surfaces do not contact evenly, wedged blocking may be damaged.

Traveling The Crane

The following information outlines the recommended procedures necessary for safe travel of this crane with or without a load, or when traveling on a slope. Depending upon job site conditions these procedures can be modified using only known, proven, and safe procedures.

Regardless of the specific method used to travel the crane, certain procedures must be followed to prevent damaging the crane. Wreckless travel of the crane can lead to crane damage, serious personal injury, and/or death.

Any questions regarding safe travel procedures should be directed to a Link-Belt Distributor.

Traveling Without A Load

The crane can be traveled on the job site with the boom in the air provided the following precautions for safe job site travel are met.

1. Terrain must be smooth and solid. If not, grade and compact the area before moving the crane.
2. Tie down the hook block and/or hook ball to prevent them from swinging.
3. Engage the swing park brake and if possible the travel swing lock.
4. The boom must be positioned at a boom angle for which a capacity is given in the Crane Rating Manual. All other boom angles are considered outside the allowable working range of the crane and travel is not allowed.
5. If the fly is erected, the boom must be fully retracted and the fly at the 2 degree offset position. The boom must be positioned at a boom angle for which a capacity is given in the Crane Rating Manual for the fly. All other boom angles are considered outside the allowable working range of the crane and travel is not allowed.
6. Position the boom at an angle that provides the best visibility out the right side window of the operator's cab while remaining within Step 4 and/or Step 5 guidelines above.
7. The boom should be positioned over the front of the lower. Certain job site conditions may make this impossible. (Travel with the boom positioned over the side will be allowed only when conditions prevent traveling with the boom straight over the front.)
8. Post a signal person to guide you. Ensure the travel alarm is working properly. Use the horn as a signal. Use a code such as one beep – stop, two beeps – forward, and three beeps – backward. Ensure everyone on the job site knows the code.
9. Travel slowly and cautiously in order to avoid any shock loading on the boom, fly, or crane. Use the travel control switch to reduce travel speed if necessary.

Traveling On A Slope (Without A Load Only)

Travel on a slope is allowed up to a grade of 40%. The crane should be traveled straight up or down the slope with the "heavy" end of the crane facing uphill. (The heavy end of the crane will normally be the counterweight end of the crane.) With less counterweight installed, the boom end of the crane may be the "heavy" end. If possible, position the boom at a high enough boom angle so that the counterweight end of the crane is the "heavy" end of the crane and travel with the boom facing downhill. Certain job site conditions may make this impossible. Traveling on a slope (without a load) with the boom positioned over the side will be allowed only when conditions prevent traveling with the boom straight over the end. The following precautions must be followed.

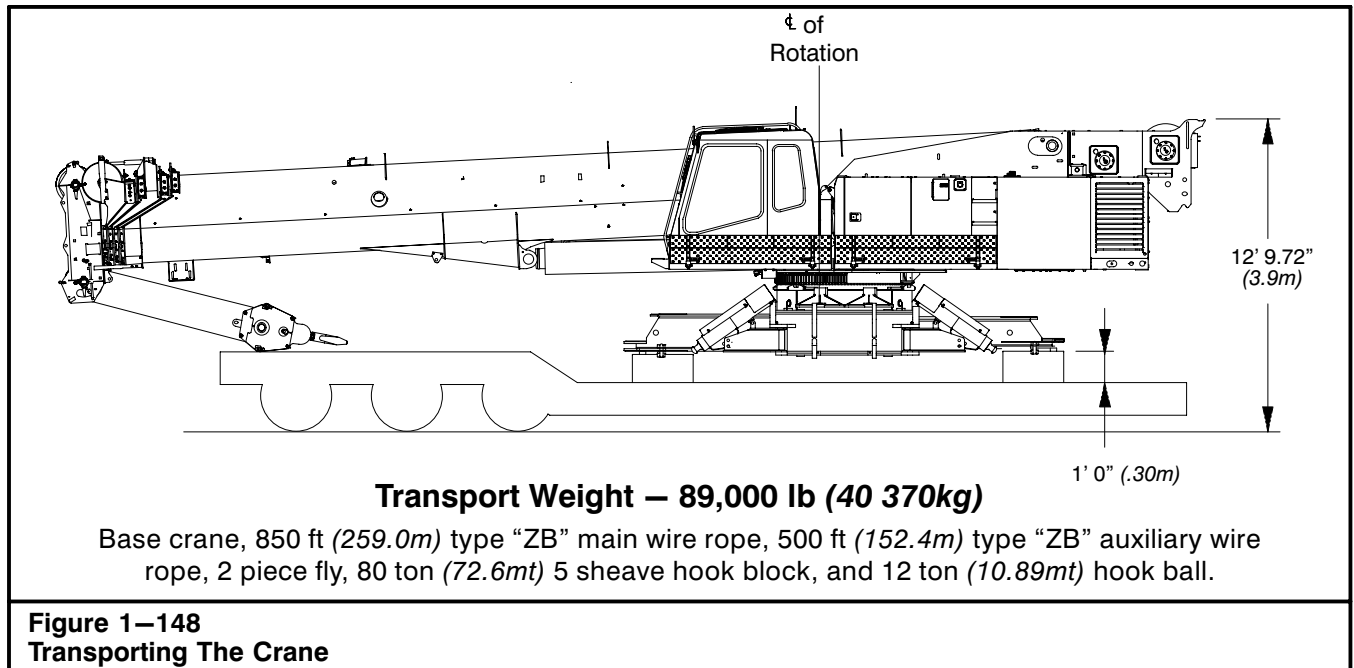
1. Fully extend side frames. Engage the swing park brake and if possible the travel swing lock.
2. Properly store the fly base and tip, if equipped.
3. When traveling on a slope, always face the lower straight up or down the slope.
4. Fully retract and position the boom at an angle that provides the best visibility out the right side window of the operator's cab.
5. Post a signal person to assist in traveling the crane. Ensure the travel alarm is working properly. Use the horn as a signal. Use a code such as one beep—stop, two beeps—forward, and three beeps—backward. Ensure everyone on the job site knows the code.
6. Always travel in a slow, cautious manner when traveling on a slope. Use the travel control switch to reduce travel speed if necessary.
7. Do not travel with a load on a slope. Major boom off lead and/or side load will result, which will greatly increase the loading into the boom structure.
8. Watch the engine service monitor. Be alert to the engine service monitor while traveling on a slope. All lamps should be off under normal operation. If an engine service monitor lamp comes on while traveling on a slope, the slope may be too great for the crane to traverse. Limited travel will be allowed only to travel the crane off the slope. Continued operation with an engine service monitor light on may result in engine damage.
9. Avoid steering on a slope. Steer only as required to travel straight up or down the slope. Always travel straight up or down the slope. Avoid traveling with a side to side slope. Grade the path to eliminate any side to side slope.
10. Maintain gradual approach and departure angles. Grade the top and bottom ends of a slope to form a gentle break-over angle. This will prevent the crane from lunging when the center of gravity crosses over the top of the slope.

Operator's Manual

Traveling With A Load (Pick & Carry)

The Crane Rating Manual lists the allowable capacities for traveling with a load (pick and carry) operations. Use these capacities only for all pick and carry operations. The boom should be positioned over the front of the lower. If the load was lifted over the side, swing the load over the front before traveling. Certain job site conditions may make this impossible. (Pick and carry with the boom positioned over the side will be allowed only when conditions prevent traveling with the boom straight over the front.) The following precautions must be followed while traveling with a load.

1. Engage the swing park brake and if possible the travel swing lock.
2. Travel only on a smooth level surface. If a smooth level route is not available, don't travel with a suspended load. Grade and compact the route to provide a firm, smooth, and level path. If it is not possible to grade the route, move the load by stepping. Park the crane on a level area, lift the load, swing around, and set it down ahead of the crane. Travel the unloaded crane beyond the load, level the crane, lift the load, swing, and set it down farther along the route. Continue this procedure until the load is at its destination.
3. Boom must be extended in accordance with "Standard" or "A-Max" boom modes.
4. Use hand lines to control the load and reduce load swing.
5. Carry loads as close to the ground as possible.
6. Do not allow side swing of load.
7. Don't attempt to carry loads which exceed the crane's rating.
8. Don't travel with a load on soft ground. If the crane sinks into the ground, stability can be affected to the point of tipping the crane.
9. Keep all personnel clear of the crane and load. Be prepared to set the load down quickly at anytime in case of an emergency.
10. Position the boom at a boom angle/boom length that will give the greatest margin of safety. If the load was lifted at a long radius and the load is at or near capacity for that radius, boom up/retract boom to obtain a greater lifting capacity (and thus a greater margin of safety) before starting travel.
11. Position the boom at an angle that provides the best visibility out the right side window of the operator's cab while remaining within Step 10 guidelines above.
12. Position a signal person to assist in traveling the crane. Ensure the travel alarm is working properly. Use the horn as a signal. Use a code such as one beep – stop, two beeps – forward, and three beeps – backward. Ensure everyone on the job site knows the code.
13. Travel slowly and cautiously in order to avoid shock loading on the boom, fly, or crane. Use the travel control switch to reduce travel speed if necessary. Do not let the load swing out or to the side. The load must be kept directly under the boom point at all times.



Transporting The Crane

When transporting the crane, precautions should be taken in securing the crane to the trailer, barge, or other means of conveyance. The lower cross axles are the recommended tie down points.

CAUTION

If chains are wrapped around the cross axles, be certain the chains will not damage any lines or components.

Always exercise safety and follow all local codes when loading, unloading, or transporting the crane.

If the boom must be removed from the crane for transport, refer to the crane's Shop Manual for the correct procedure. However, do not transport the crane with the upper over the end, on retracted side frames with the boom removed with “AB” or more upper counterweight.

Prepare crane as follows before transporting it:

1. Properly disassemble the crane as required to meet all road weight restrictions. Refer to the applicable Sections of this Operator's Manual for the correct procedures.
2. Load the crane onto the transport vehicle. Refer to “Loading the Crane” in this Section of this Operator's Manual. Axle beams must be in the fully extended position.
3. The upper must be positioned directly over the side of the lower with the travel swing lock engaged.

4. All control levers in operator's cab must be in neutral and the function lockout switch in the “DISABLE” position.
5. Remove the keys from the crane. Lock all windows and doors.
6. Fold the upper guard rails to the transport position. Refer to .
7. Fold up the left and right side cab walks. Refer to Figure 1–106.
8. Fold up the lower steps on the side frames. Refer to Figure 1–105.
9. Securely cover the exhaust to prevent air being forced into the exhaust. Covering the exhaust will also help prevent any water or other contamination from entering the exhaust which could also damage the turbocharger.

CAUTION

When a turbocharged engine is not running, air forced into the exhaust will cause the turbocharger impeller to spin. Without the engine running, the turbocharger bearing is not lubricated. When transporting the crane and the exhaust is facing in a direction such that the travel speed continually forces air into the exhaust, it may cause major damage to, or total destruction of the turbocharger.

10. Depending on the specific situations, further preparations may be needed to protect the crane from the environment or vandalism. See “Crane Storage” in this Section of this Operator's Manual for further suggestions.

Operator's Manual

Towing The Crane

Always use good judgment and reliable equipment when towing the crane. When making connections between the crane and towing vehicle, ensure none of the connections will cause damage to either vehicle. The tow lugs are the recommended connection points on the crane. Refer to Figure 1–149.

Always exercise safety when towing the crane. Prepare the crane as follows before towing it.

1. If equipped, store the fly base and tip on the boom.
2. Swing the upper over the end of the lower and engage the travel swing lock.
3. All boom sections must be fully retracted with the boom at a 0° angle. Secure the hook block and/or hook ball to prevent excessive swinging.
4. The engine must be running and the travel levers engaged to assist in towing the crane.

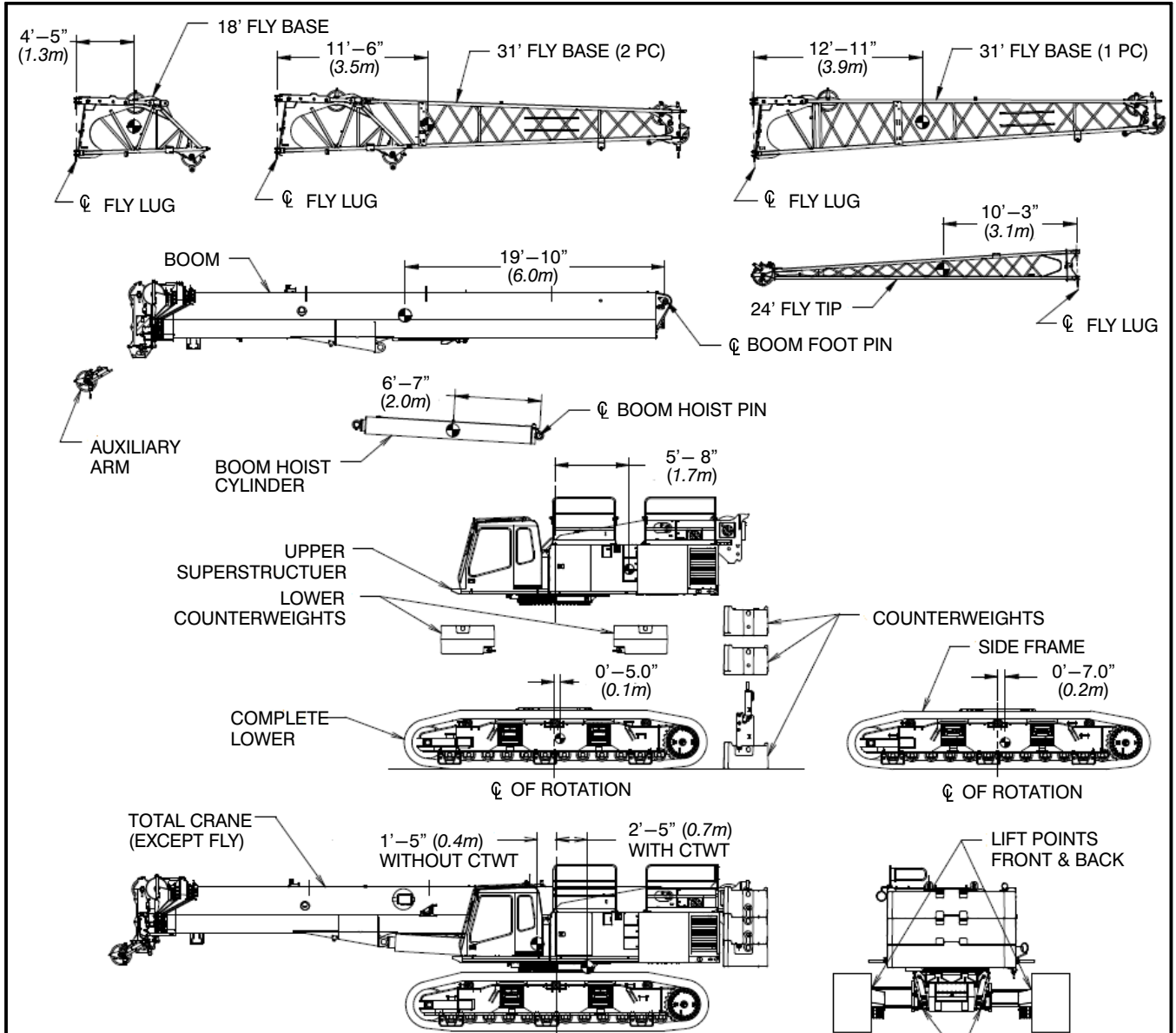
Lifting The Crane

The entire crane (except the fly) can be lifted or the components may be removed from the crane and lifted individually. Refer to Figure 1–149 for the center of gravity (CG) and weights for the entire crane and the individual components. The following conditions and precautions must be met before lifting the crane or removing any component.

1. The crane must be parked on a firm level surface with the travel swing lock engaged. The swing park brake and 360° swing lock, if equipped, must be released.

2. Use lifting equipment, shackles, slings, chains, etc. of suitable size and strength. All lifting equipment must be inspected before lifting the crane. The inspection must be recorded and dated in accordance with current regulations.
3. Fold up the left and right side cab walks. Refer to Figure 1–106.
4. When lifting the entire crane (without fly), extend the side frames to the intermediate position and install slings around the beams. Protect slings from any sharp edges.
5. The weights and locations of all CG's include all possible options (heaviest crane) except the fly base and fly tip. Use the CG's as a starting point. Center hoist line on the CG, lift a few inches (*centimeters*) and adjust the hoist line to keep the crane/components level at all times.
6. Removal of any components from the crane will shift the CG of the entire crane. Adjust hoist line to account for the removal of any component.
7. Do not lift crane with fly attached to boom. Damage to the fly may result. Remove the fly from the crane before lifting. Refer to Section 4 of this Operator's Manual for the correct procedures for removing the fly.
8. Use only properly attached nylon straps to lift fly base or fly tip to prevent damage to the component. Refer to Figure 1–10. Protect the straps from sharp edges.
9. Do not allow the hoist lines to contact boom while lifting crane. Damage to the boom may result.

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DESCRIPTION	WEIGHT	
LOWER	80,980 lb	(36 732kg)
SIDE FRAMES	57,478	(26 072kg)
UPPER	29,702 lb	(13 473kg)
BOOM HOIST CYLINDER	4,413 lb	(2 002kg)
BOOM W/FOOT PIN	26,190 lb	(11 880kg)
AUXILIARY ARM	120 lb	(54kg)
HOOK BALL & BLOCK	2,133 lb	(968kg)
FLY BASE 10FT	1,496 lb	(679kg)
FLY BASE 31FT (1 pc)	1,999 lb	(907kg)
FLY BASE 31FT (2 pc)	2,667 lb	(1 210kg)
FLY TIP 24 FT	810 lb	(367kg)
UPPER COUNTERWEIGHT	51,006 lb	(23 136kg)
LOWER COUNTERWEIGHT	25,029 lb	(11 353kg)
TOTAL CRANE	222,380 lb	(100 870kg)
TOTAL CRANE W/O CTWT & FLY	143,536 lb	(65 107kg)
TOTAL CRANE W/O CTWT, FLY & SIDE FRAMES	86,058 lb	(39 035kg)

Note: Total crane weight includes load handling equipment at the front tie-down point and every option including 31 ft (1pc) fly base and 24 ft fly tip specified above.

Figure 1-149
Lifting The Crane

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Crane Storage

Any time the crane is going to be left unattended, it should be prepared so that it will not be damaged by the elements, be an attraction to vandals, or a plaything for children.

Short Term Storage

1. Do not leave the crane where it will be a traffic hazard.
2. Lower all loads to the ground.
3. The boom can be left in the air provided that the "Wind Restriction Guide" in the Crane Rating Manual is adhered to. If the wind velocity exceeds the Link-Belt guidelines at any time during crane storage, fully retract the boom and store the boom in the fully lowered position. Do not take chances. Refer to the Crane Rating Manual for wind speed and other applicable restrictions.
4. The travel swing lock must be engaged.
5. Tie off the hook block and/or hook ball to keep the winch wire ropes snug.
6. All control levers must be in the neutral position with the function lockout switch in the "DISABLE" position.
7. Block the tracks to prevent the crane from rolling.
8. In cold weather, locate the crane where it will not freeze to the ground.
9. To preserve battery life, move the battery disconnect switches to the off position.
10. Remove the keys from the crane. Lock all windows and doors.
11. Prepare the engine as per the engine manufacturer's manual. Ensure antifreeze protection is sufficient to prevent the engine from freezing. If antifreeze protection is not adequate, completely drain the engine block.

Long Term Storage

1. Store the crane inside a building if possible.
2. The boom can be left in the air provided that the "Wind Restriction Guide" in the Crane Rating Manual is adhered to. If the wind velocity exceeds the Link-Belt guidelines at any time during crane storage, fully retract the boom and store the boom in the fully lowered position. Do not take chances. Refer to the Crane Rating Manual for wind speed and other applicable restrictions.

3. Thoroughly clean the crane.
4. Touch up any spots where paint has chipped. This will prevent rusting.
5. Lubricate the entire crane as per the Lubrication Chart. Ensure all gear cases are filled to their proper oil level.
6. If possible, block the crane up so the tracks clear the ground. Ensure the blocking is placed so the crane cannot fall off it. If this is not possible, set the crane on planks so the track will not sink in the ground. Block the track to prevent the crane from rolling.
7. Fully retract all hydraulic cylinders. Cover all cylinder rods, machined, and unpainted surfaces with a coat of grease.
8. The travel swing lock must be engaged.
9. Tie off the hook block and/or hook ball to keep the winch wire ropes snug.
10. All control levers must be in the neutral position with the function lockout switch in the "DISABLE" position.
11. Cover all open areas around the engine and operator's cab to prevent entry of water. Cover the entire engine area with a tarp if possible.
12. Prepare the engine as per the engine manufacturer's manual. Ensure antifreeze protection is sufficient to prevent the engine from freezing. If antifreeze protection is not adequate, completely drain the engine block.
13. To preserve battery life, move the battery disconnect switches to the off position.
14. If in a location where vandalism may occur, remove the keys from the crane and lock the operator's cab doors. Cover all operator's cab glass with plywood or sheet metal to prevent glass breakage. Provide a means of locking the engine access doors, fuel tank, and hydraulic reservoir.
15. Store the crane so it does not provide a plaything for children. Such a unit can be an "attractive nuisance" for children to play on. If they fall off it or get entangled, serious injury may result.
16. While in storage, the crane should be "exercised" every 60 days to ensure the working condition of the crane. Remove all covers from around the engine. Start the engine and operate all switches, control cables, and hydraulic functions several times to circulate lubricants and to keep all mechanisms and linkages operative.
17. A crane that has been in storage shall have a thorough inspection prior to returning the crane to service.

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General Lubrication Information

The crane should be regularly and systematically lubricated in accordance with the Lubrication Chart shown on the following pages. Refer to Figure 2–1. Another copy of the chart is on the left side of the crane behind the fuel tank access door. The time intervals shown on the Lubrication Chart are intended as a guide only. Under unusual working conditions, such as working in dry, dusty conditions, in water or mud, or around a corrosive atmosphere, more frequent lubrication could be necessary. In these cases, the oiler must use his best judgment and establish a lubrication schedule.

In addition to the points on the Lubrication Chart, all movable linkages and control cables should be periodically lubricated to resist wear.

There are practical reasons for lubricating and lubricant changes. Lubricants serve more than one purpose. They not only lubricate, but also transport chemically reactive additives, wash away minute wear particles, serve as a corrosion inhibitor, and act as a heat transfer medium. Draining and refilling any gear unit with a fresh supply of oil also assists in eliminating wear particles not trapped by magnetic plugs.



WARNING

Shutdown the engine before fueling or lubricating crane. To avoid a fire hazard, do not smoke or handle fuel around an open flame. To avoid crane damage and to prevent serious injury, do not lubricate gears or any assemblies while they are in motion.

The following procedures are important for proper lubrication of the crane:

1. Wipe the grease gun nozzle and grease fittings clean before lubricating. This will help keep dirt and grit from entering the bushing or bearing.
2. Keep all grease and oil cans and containers clean. Wipe off oil can covers before using. Always replace the lid on containers when finished to prevent entry of foreign materials.
3. Drain oil cases when oil is hot to drain off accumulated sludge.
4. Watch for signs of incorrect lubrication such as failure of clean grease to purge the old grease.
5. Bleed off hydraulic pressure before opening or removing a line or fitting.
6. Replace all guards before starting crane.
7. Use a clean funnel equipped with a strainer for pouring lubricants.
8. Clean the area around check and fill plugs before removing them to prevent entry of foreign particles.



DANGER

When it is required to operate the crane during maintenance and/or adjustments, use extreme caution as service personnel may have to work near and/or under moving machinery. Serious personal injury and/or death may result. Always remain in visual and/or verbal contact to ensure the safety of service personnel. Use a signal person if necessary.

Note: See specific instructions in this Section of this Operator's Manual for lubrication check and change procedures on all gear compartments.

Keep grease, oil containers, and guns clean. Clean all fittings before lubrication. Block the tracks and shutdown the engine before working on the crane. Replace all guards and panels before operating the crane.

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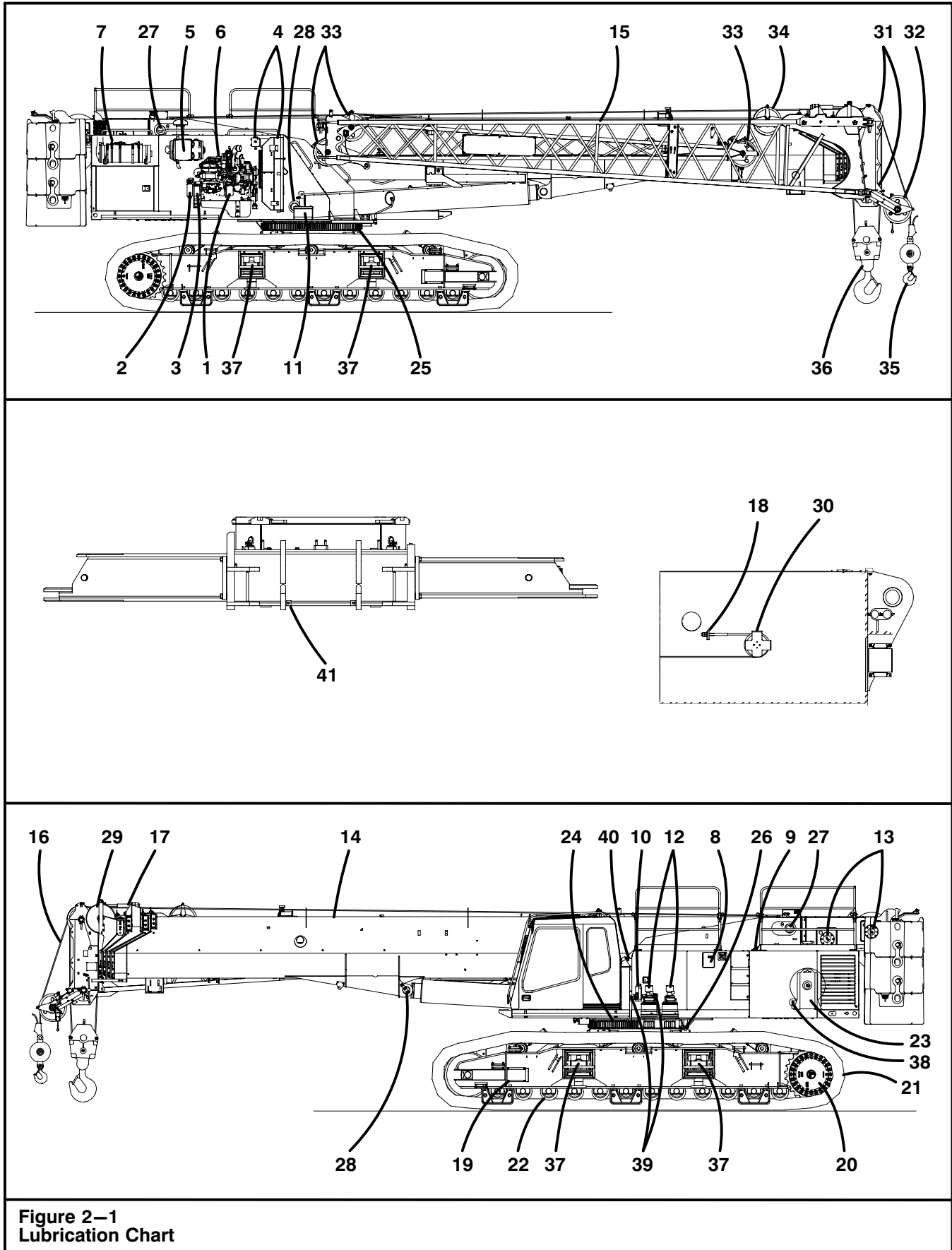


Figure 2-1
Lubrication Chart

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KEY						CAPACITY																																																																																																																																																																																																																																																							
<p>1. SYMBOLS:</p> <ul style="list-style-type: none"> * Check fluid level and fill as required. 0 Inspect, lubricate, adjust, repair or replace as required. + Change oil (and filter if applicable). # Change filter only. @ Clean filter/strainer as necessary. X Clean fins if needed. \$ Drain water. N/A Not applicable. <p>A,E,H, etc. are lubrication codes. Refer to the Lubrication Code Identification on this chart. Link-Belt recommends the lubrication codes on this chart, however if an equivalent is to be used refer to the Operator's Manual for detailed specifications to ensure a correct equivalent is used.</p> <p>2. Refer to engine manufacturer's manuals for proper maintenance, lubrication, fuel or coolant grade, and additional information.</p> <p>3. Refer to the Operator's Manual for additional information.</p> <p>4. Lubricate the turntable bearing through the grease fittings on the front of the upper frame. Use a low pressure handgun and pump grease until clean grease comes out. Rotate the upper a few degrees and pump grease until clean grease comes out again. Repeat throughout the 360° cycle.</p>						<table border="1"> <thead> <tr> <th>Location</th> <th>Gallons</th> <th>Liters</th> </tr> </thead> <tbody> <tr> <td>Winch Drums (each)</td> <td>5.50</td> <td>20.8</td> </tr> <tr> <td>Swing Speed Reducers (each)</td> <td>0.40</td> <td>1.5</td> </tr> <tr> <td>Windshield Washer Reservoir</td> <td>1.00</td> <td>3.8</td> </tr> <tr> <td>Engine Coolant</td> <td>13.90</td> <td>62.5</td> </tr> <tr> <td>Engine Oil</td> <td>6.00</td> <td>22.7</td> </tr> <tr> <td>Travel Reduction Units (each)</td> <td>6.60</td> <td>25.0</td> </tr> <tr> <td>Hydraulic Reservoir</td> <td>250.00</td> <td>946.4</td> </tr> <tr> <td>Hydraulic System</td> <td>375.00</td> <td>1419.5</td> </tr> <tr> <td>Fuel Tank</td> <td>110.00</td> <td>416.4</td> </tr> </tbody> </table>						Location	Gallons	Liters	Winch Drums (each)	5.50	20.8	Swing Speed Reducers (each)	0.40	1.5	Windshield Washer Reservoir	1.00	3.8	Engine Coolant	13.90	62.5	Engine Oil	6.00	22.7	Travel Reduction Units (each)	6.60	25.0	Hydraulic Reservoir	250.00	946.4	Hydraulic System	375.00	1419.5	Fuel Tank	110.00	416.4																																																																																																																																																																																																																				
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2	#	1,2,3	N/A	N/A	Diesel Particulate Filter	7	Key 2	@	1,2,3	N/A	N/A	Fuel Tank	8	10	*	1,2,3	Key 2	Key 2	Hydraulic Reservoir	9	10	*, \$	1,3	Key 3	Key 3			500	#	1,3	Key 3	Key 3			2000	+	1,3	Key 3	Key 3	Windshield Washer Reservoir	10	10	*	1,3	Key 3	Key 3	Batteries	11	50	0	1	N/A	N/A	Swing Speed Reducers	12	50	*	1,3	E	LL			1000	+	1,3	E	LL	Winch Drums	13	50	*	1,3	HH	QQ			1000	+	1,3	HH	QQ	Boom	14	10	0	1,3	N/A	N/A	Fly	15	10	0	1,3	N/A	N/A	Wire Rope	16	10	0	1,3	Key 3	Key 3	Boom Extend Wire Rope Anchor	17	250	0	1,3	N/A	N/A	Boom Retract Wire Rope Anchor	18	250	0	1,3	N/A	N/A	Track Tension	19	10	0	1,3	N/A	N/A	Travel Reduction Units	20	250	*	1,3	E	TT			1000	+	1,3	E	TT	Track Shoes	21	10	0	1	N/A	N/A	Track Rollers	22	10	0	1,3	N/A	N/A	Hose Reel	23	250	0	1,3	N/A	N/A
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<p>Figure 2-2 Lubrication Chart</p>																																																																																																																																																																																																																																																													

Operator's Manual

Lubrication Specifications

The following specifications are approved for use in Link-Belt cranes. The specifications are identified by a code letter. When a code letter appears on the lubrication or maintenance chart, it is referring to one of the lubricants as described on the following pages. These lubricants are listed by specifications and by one brand name. Most reputable oil companies can provide a lubricant to match a particular specification. It may then be used in the crane no matter what the brand name. When using other brand names, the user assumes all responsibility for product and patent liability.

Type A

Grease, NLGI Grade No. 2

A mineral oil based, multipurpose lithium complex extreme pressure (EP) grease. Composed of a lithium complex soap, compounded with highly refined paraffinic base oils and formulated with a special additive package to provide rust and corrosion protection, resistance to water washout, oxidation stability, and wear protection under high loads. It meets the requirements of ASTM D4950 GC-LB covering wheel bearing and chassis greases. Recommended for use as a multipurpose industrial grease, particularly where temperature operation is of concern.

Typical Characteristics:

Appearance	Blue, Tacky
Lithium Complex Soap, wt %	10
Penetration, D 217, Worked 60 X	280
D 217, Worked 10,000 X % Change	10
Dropping Point, Mettler, °F (°C)	450+ (232+)
Mineral Oil Viscosity, D 445	
cSt at 104°F (40 °C)	150–205
cSt at 112°F (100 °C)	14.5–18
Rust Protection, D 1743	Pass
Copper Corrosion, D 4048	1B
Timken, OK Load, lbs, D 2509	40
Four-Ball EP, D 2596	
Load Wear Index, kgf	46
Weld Point, kgf	250
Four-Ball Wear, mm, D 2266	0.4
1 hr, 167°F (75 °C), 1200 rpm, 40 kg	
Water Washout, wt % loss at	
100°F (38 °C) D 1264	4
Grease Mobility, U.S. Steel Method g(l)/min	
–30°F (34 °C)	0.0 (0)
–20°F (29 °C)	0.5(1.9)
0°F (–17 °C)	5.5(20.8)
20°F (7 °C)	30(113.6)
Guide to Usable Temperature	
Min., °F (°C)	–20 (–29)
Continuous Service, Max, °F (°C)	325 (163)
Short Exposure, Max, °F (°C)	450 (232)

Shell Code 70311 – ALBIDA LC or Equivalent.

Type E

Extreme Pressure Gear Lubricant, 80W/90

An extreme pressure gear lubricant containing anti-foam protection, oxidation stability, anti-rust, and anti-corrosion qualities. Contains sulfur and phosphorus additive materials but no zinc in compliance with Eaton, General Motors, and International Harvester truck driving axle requirements.

Must meet or exceed military specification MIL-PRF-2105E, and is suitable for API service designations GL3, GL4, MT-1, and GL5, with a rating of 10 as determined in the shock load test CRC-L-42.

Used in hoist reducer, swing reducer, driving axles, and drop transmissions.

Physical Properties:

Appearance	Very Dark Red, Dark
Gravity, °API	25.7–27
Flash, COC, (Min) (°F) (°C)	375 (191)
Pour Point, (Max) (°F) (°C)	–20 (–29)
Viscosity, Max @ 100°F (38 °C) SUS	829
Viscosity, Max @ 210°F (99 °C) SUS	72.5
Viscosity Index	95–100
Sulfur	2.37
Ash (%)	None
CU Corr 3 Hours 250°F (121 °C)	1 b
Channel Point, Max (°F) (°C)	0 (–17)
Timken Test Lever Load lb (Min)	50
Phosphorus (%)	12

Shell 59210 Spirax HD 80W/90 or Equivalent.

Type H

Grease (Summer Grade)

For open gear applications. Satisfactory down to -40°F (-40°C) on dry gears. Good adhesiveness on open gears at 73°F (22.7°C) and good retention. The grease with use will become tacky and will resist leaking. Used on cast tooth gears and ring gear teeth. Extremely resistant to water washing.

Physical Properties:

Mineral Oil Component:

Viscosity at 100°F (38°C) SUS	4545
Viscosity at 210°F (99°C) SUS	170
Load Wear Index	56
Penetration, Worked at 77°F (25°C) (60 Strokes)	280
Dropping Point, Min ($^{\circ}\text{F}$) ($^{\circ}\text{C}$)	222(105)
Soap Base — Calcium (%) with 22% graphite and 3% Molybdenum Disulfide	9.0
Water (%)	0.5
Recommended Max Temperature ($^{\circ}\text{F}$) ($^{\circ}\text{C}$)	175 (79)
Consistency	Buttery Grease
Color	Black—Gray

Shell 71228 — Rhodina SDX Grease 2 or Equivalent.

Type HH

Gear Lubricant

This gear lubricant is suitable for use in a wide variety of mobile equipment gear and brake applications. Has good oxidation and thermal stability, is non-corrosive to most gear and bearing materials, and is inhibited to provide good foam resistance and water separation characteristics. Has moderate concentration of EP additives.

Must meet performance requirements of AGMA Specification 250.04 for extreme pressure lubricants. Is suitable for API service designations of GL2 and GL3.

Typical Characteristics:

Appearance	Very Dark Red
Gravity, $^{\circ}\text{API}$	26.7—29
Flash, COC, Min $^{\circ}\text{F}$ ($^{\circ}\text{C}$)	410 (210)
Pour Point, Max $^{\circ}\text{F}$ ($^{\circ}\text{C}$)	-10 (-23)
Viscosity cSt @ 104°F (40°C)	150
Viscosity cSt @ 212°F (100°C)	14.4
Viscosity SUS @ 100°F (38°C)	796
Viscosity SUS @ 210°F (99°C)	76
Viscosity Index	95—100
Sulfur, %	0.66
Phosphorous, %	0.03
Timken OK Load, Lbs (Min)	60
AGMA No. EP	4

Shell 65104, OMALA 150 or Equivalent.

Operator's Manual

Type KK

Grease, NLGI Grade No. 1

Low temperature, extreme pressure, synthetic all purpose grease made from a low pour point synthetic hydrocarbon lubricant, thickened with lithium or clay. The grease is fortified with an extreme pressure additive and a rust inhibitor to provide even better equipment protection.

A multi-purpose grease that can be pumped from normal grease dispensing equipment at temperatures down to a -55°F (-48°C). Good for heavy duty operation.

Recommended for use in centralized lube systems, wheel bearings, chassis bearings, universal joints, and all other applications requiring a grease of this type. Offers full protection regardless of the season. Pumpable at -55°F (-48°C), even in a hand grease gun. Excellent anti-wear and load carrying ability, stays in place better than lighter greases, waterproof to resist washout, good shear stability. Assures good high temperature performances. Compatibility of this grease with ordinary greases presents no problems.

Physical Properties:

Thickener	Lithium or Clay
Penetration worked @ 77°F (25°C) (ASTM D217)	
60 strokes	315–325
Texture	Smooth
Dropping Point, ($^{\circ}\text{F}$) ($^{\circ}\text{C}$)	
(ASTM D2265) Max	+500 (260)
Viscosity (ASTM D445) cSt	
104 $^{\circ}\text{F}$ (40 $^{\circ}\text{C}$)	26.2–32
212 $^{\circ}\text{F}$ (100 $^{\circ}\text{C}$)	5.08–5.2
Rust Properties (ASTM D1743)	Pass
Four Ball, EP (ASTM D2596)	
Wear, mm, Max	0.7
Weld, kg, Min	250
Color	Red or Brown

Exxon Mobil Mobiltemp SHC 32 or Equivalent.

Type LL

Extreme Pressure Gear Oil, 75W/90

A synthetic, extreme pressure gear oil designed for cold weather operation in hypoid, spiral bevel, and planetary gear axles. Must meet the requirements of Military Specification MIL-PRF-2105E. Meets API GL-5 and MT-1 performance ratings

Physical Properties:

Gravity, $^{\circ}\text{API}$ (ASTM D-1298)	25.2–33.3
Kinematic Viscosity, (ASTM D-443)	
Min @ 212 $^{\circ}\text{F}$ (100 $^{\circ}\text{C}$), cSt	15.5
Max @ 104 $^{\circ}\text{F}$ (40 $^{\circ}\text{C}$)	126
Apparent Viscosity, (ASTM 2983) (Brookfield)	
Max @ -40°F (-40°C), ml	150,000
Flash Point (ASTM D-92)	
Min $^{\circ}\text{F}$ ($^{\circ}\text{C}$)	400 (204)
Pour Point (ASTM D-97)	
Max $^{\circ}\text{F}$ ($^{\circ}\text{C}$)	-49 (-45)
Viscosity Index (ASTM D-2270)	140–151
Copper Corrosion, (ASTM D-130)	
3 hrs. @ 250 $^{\circ}\text{F}$ (121 $^{\circ}\text{C}$) Max	3
Foaming Characteristics (ASTM D-892)	
(Foam readings taken immediately after 5 minutes aeration)	
Max @ 75 $^{\circ}\text{F}$ (24 $^{\circ}\text{C}$), ml	20
Max @ 200 $^{\circ}\text{F}$ (94 $^{\circ}\text{C}$), ml	50
Storage Stability, % Max	
(FTMS 791B Method 3440)	0.25
Compatibility	
(FTMS 791B Method 3430)	Note 1

The latest revision of all referenced specifications and test methods shall be used.

FTMS= Federal Test Method Standard.

Note 1: Use approved per Eaton PS-163 and Mack GO-J Plus.

Mobil Oil Molilube SHC 75W/90, Code No. 51100-6 or Equivalent.

Type QQ

Synthetic Gear Oil – Grade 150

A specially formulated lubricant for applications where service conditions are severe because of high operating and bulk oil temperatures. Typical applications are spur, helical, herringbone, bevel, and planetary gears and gear boxes with multiple disc brakes. Lubricant is derived from synthetic based oils that are more resistant to thermal and oxidation degradation. Can offer advantages of extension of lubricant life and reduced risk of damage to crane elements.

Typical Characteristics:

AGMA Grade No.	4 EP
Gravity, °API	25.5–34.4
ISO Viscosity Grade	150
Viscosity, Cst (ASTM D–445)	
@ 104°F (40 °C)	140
@ 212°F (100 °C), Cst	14.0
Viscosity, SUS (ASTM D–2161)	
@ 100°F (38 °C)	737
@ 210°F (99 °C)	75–100
Viscosity Index	96–150
Pour Point,	
(ASTM D–97) °F (°C)	–23 (–10)
Flash Point, COC, (ASTM D–92)	
°F (°C)	229–460
Rust Test, Distilled Water,	
(ASTM D–665)	Pass
Copper Corrosion Test	
24 hr. –30 hr. @ 212°F (100 °C)	1b
Timken Extreme Pressure Test	
(ASTM D–2782) Pass Value (lbs)	60
FZG Test, Stages, Pass	12
Phosphorus, Wt. %	0.005–0.03

Mobil SHC 629 or Equivalent.

Type TT

Synthetic Gear Oil – Grade 220

A specially formulated lubricant for applications where service conditions are severe because of high operating and bulk oil temperatures. The high viscosity index allows the oil to flow at low temperatures and maintain viscosity at high temperatures. Typical applications are spur, helical, herringbone, bevel, planetary gears, and gear boxes with multiple disc brakes. This lubricant is derived from synthetic based oils that are more resistant to thermal and oxidative degradation. It can offer advantages of extension of lubricant life and reduced risk of damage to crane elements.

Physical Properties:

Gravity, °API	32.5, 32.4
ISO Viscosity Grade	220
Viscosity, cSt (ASTM D–445)	
@ 104°F (40 °C)	228 – 210
@ 212°F (100 °C)	28.8 – 27.1
Viscosity Index (ASTM D–2270)	163 – 165
Pour Point (ASTM D–97)	
(°F)	–45 – 49
(°C)	–40 – 45
Flash Point, COC (ASTM D–92)	
(°F)	482 – 520
(°C)	250 – 271
Rust Test, Distilled Water (ASTM D–665) ..	Pass

Mobil Oil Company – Mobilgear SHC 220 – or Equivalent.

Operator's Manual

Hi Performance Hydraulic Oil

Important

Use only pre-filtered hydraulic oil. Warranty is void if incorrect oil is used. Incorrect oil may result in damage to hydraulic components. Hi Performance Hydraulic Oil is available through a Link-Belt Distributor in the following grades and quantities.

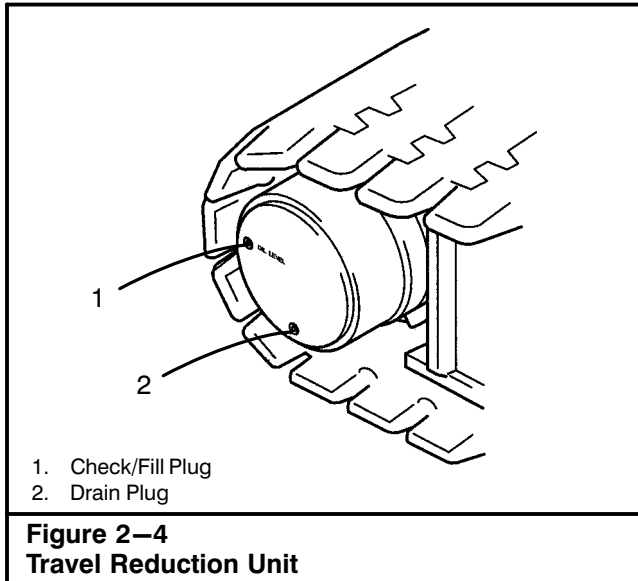
ISO Grade	Temperature Range		Container Capacity		Part Number
	Ambient Temperature Use	Maximum Hydraulic System Temperature	Gallons	Liters	
Grade 22	-45°F to +80°F -43°C to 27°C	150°F 66°C	5 55	18.9 208.0	830666001 830666002
Grade 46	10°F to 100°F -12°C to 30°C	195°F 91°C	5 55	18.9 208.0	830663001 830663002
Grade 46 All Temperature	-40°F to 100°F -40°C to 38°C	200°F 93°C	5 55	18.9 208.2	830348001 830348002

Disposal Of Used Lubricants, Fluids, Etc.

Properly dispose of used lubricants and filters. Every drop of misplaced oil damages the environment. Each year literally thousands of gallons of used oil is dumped into our fields and streams or buried in community landfills. These methods of disposal permanently damage the world around us. You can see that the oil you use is properly disposed of by sending it to a recycling center. Most local automobile service stations are happy to receive used oil and will see to it that the oil is recycled. Refer to the latest EPA, state, and local regulations regarding proper disposal.



**Figure 2-3
Please Don't Do It!**

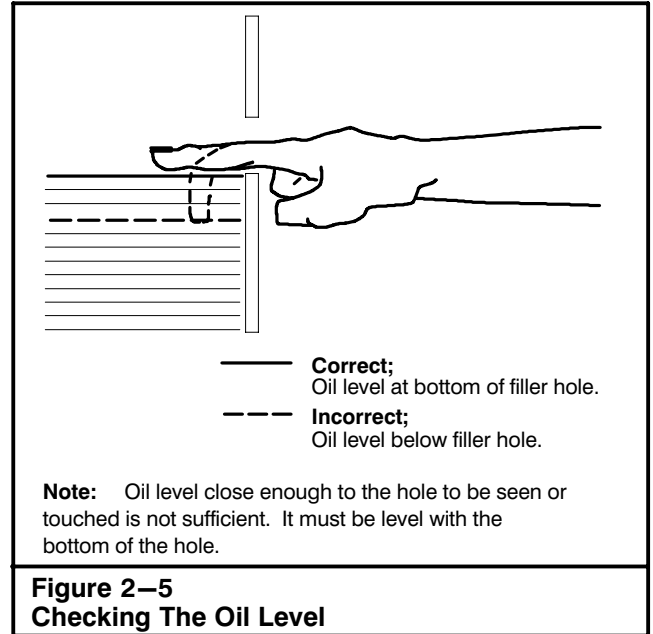


Travel Reduction Unit Lubrication

Check oil level in travel reduction unit after every 250 hours of operation. The oil, in a new or rebuilt gear case or planetary, should be changed after the initial 250 hours of operation. Thereafter, change the oil with each 1,000 hours of operation or 6 months, whichever occurs first.

Travel Unit Oil Level Check

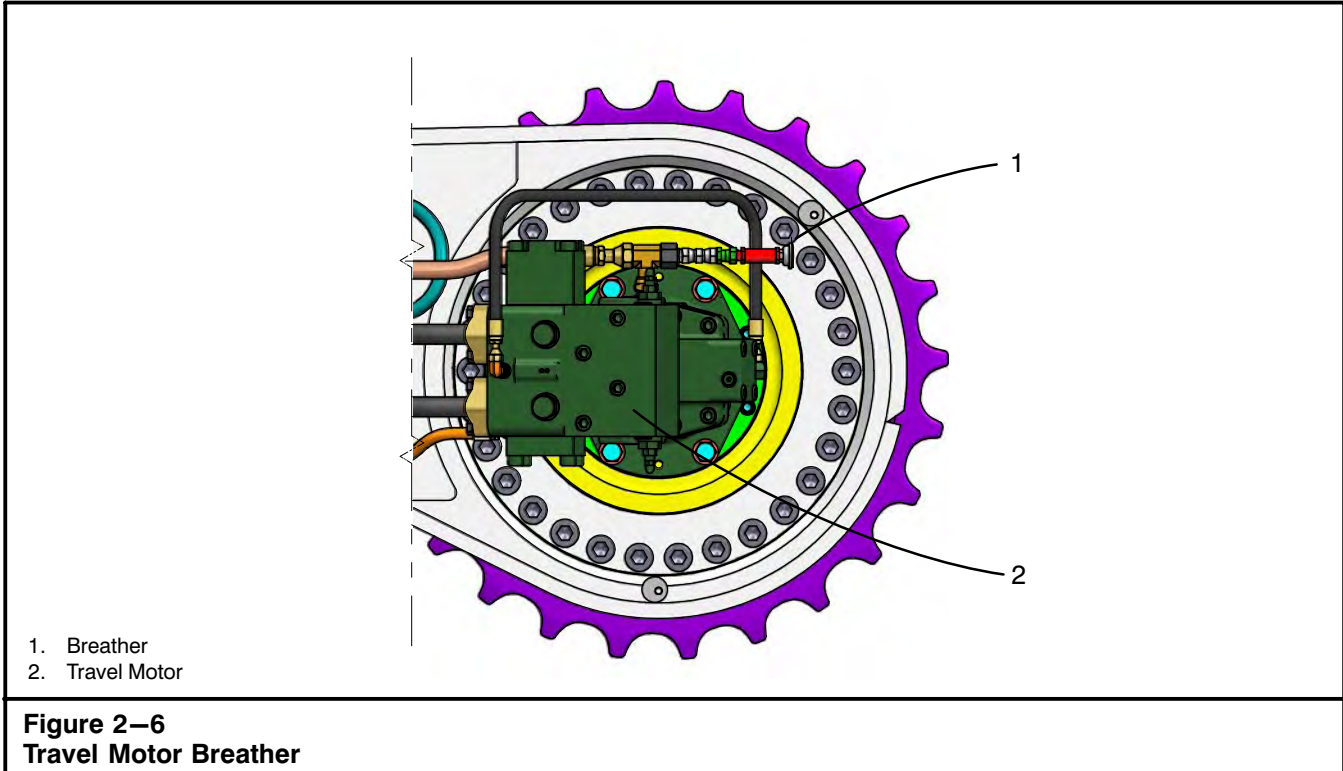
1. Crane must be on a firm level surface. Travel the crane until the drain plug is positioned on the bottom vertical centerline of the travel reduction unit. Refer to Figure 2-4.
2. Position upper facing directly over the end of the lower, engage the travel swing lock, and shutdown the engine.
3. Thoroughly clean the exterior surface of the gear case around the check/fill plug to prevent contamination from entering the unit.
4. Remove the check/fill plug. Oil should be level with the bottom of check hole. Refer to Figure 2-5.
5. If necessary, add oil through the check/fill plug hole until it begins to flow from the check/fill plug hole. Refer to the Lubrication Chart for the correct grade of oil.
6. Clean and install the check/fill plug.
7. Repeat procedure for the other travel reduction unit.



Travel Reduction Unit Oil Change

1. Crane must be on a firm level surface. Travel the crane for several minutes, without a load, to agitate and warm the oil within the gear case. Travel the crane until the drain plug is positioned on the bottom vertical centerline of the travel reduction unit. Refer to Figure 2-4.
2. Position the upper facing directly over the end of the lower, engage the travel swing lock, and shutdown the engine.
3. Thoroughly clean the exterior surface of the gear case around the check/fill and drain plugs to prevent contamination from entering the unit. Refer to Figure 2-4.
4. Remove the check/fill and drain plugs and allow the oil to drain into a suitable container.
5. After the oil has thoroughly drained, clean and install the drain plug.
6. Fill the unit with oil until it begins to flow from the check hole. Refer to Figure 2-5. Refer to the Lubrication Chart for the correct grade and quantity of oil.
7. Clean and install the check/fill plug. Properly dispose of the used oil.
8. Repeat procedure for the other travel reduction unit.

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Travel Motor Breather

A breather is mounted in the travel motor hydraulic circuit. Refer to Figure 2–6. This breather should be periodically inspected and cleaned or replaced as required.

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower and engage the travel swing lock.

2. Remove the travel motor cover.
3. Thoroughly clean the exterior surface of the breather connection to prevent contamination from entering the system.
4. Remove the breather and inspect.
5. Clean or replace breather as required.
6. Repeat procedure for the other travel motor breather.

Engine Cooling System

The coolant in the engine cooling system must be maintained at the proper level and proper concentration levels to adequately keep the engine operating at safe temperatures.

Antifreeze must be used in all climates for both freezing and boiling protection. It broadens the operating temperature range by lowering the coolant freezing point and by raising its boiling point. Refer to engine manufacturer's manual for proper coolant selection.



WARNING

Avoid prolonged and repeated skin contact with antifreeze. Such prolonged, repeated contact can cause skin disorders or other bodily injury. Keep out of reach of children.

Coolant is toxic. Keep away from children and pets. If not reused, dispose of in accordance with local environmental regulations.

Cooling System Test

Check the antifreeze concentration and the freezing point protection as outlined in the engine manufacturer's manual.

Testing the engine coolant is important to ensure that the engine is protected from internal cavitation and from corrosion. Refer to engine manufacturer's manual for additional information on coolant system analysis.

Cooling System Level Check

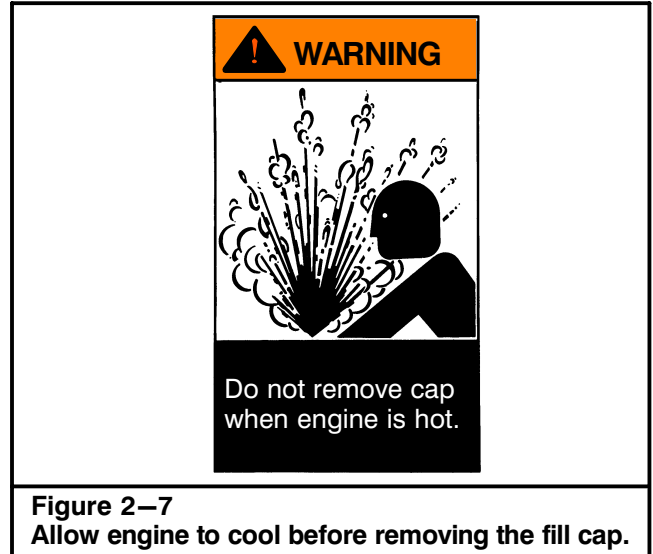
Check the coolant level in the surge tank every 10 hours of operation. Check the protection level per the maintenance interval schedule in the engine manufacturer's manual.

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Engage the travel swing lock and shutdown the engine.
3. Check that the coolant level in the surge tank is at least up to the "Full-Cold" level in the sight gauge on the side of the surge tank. Refer to Figure 2-8.



WARNING

Engine cooling system is pressurized. Do not remove fill cap from a hot engine. Heated coolant spray or steam can cause personal injury. Wait until the engine has cooled before slowly removing fill cap.



4. If coolant must be added, allow the engine to cool until the the coolant temperature is below 122°F (50°C).

CAUTION

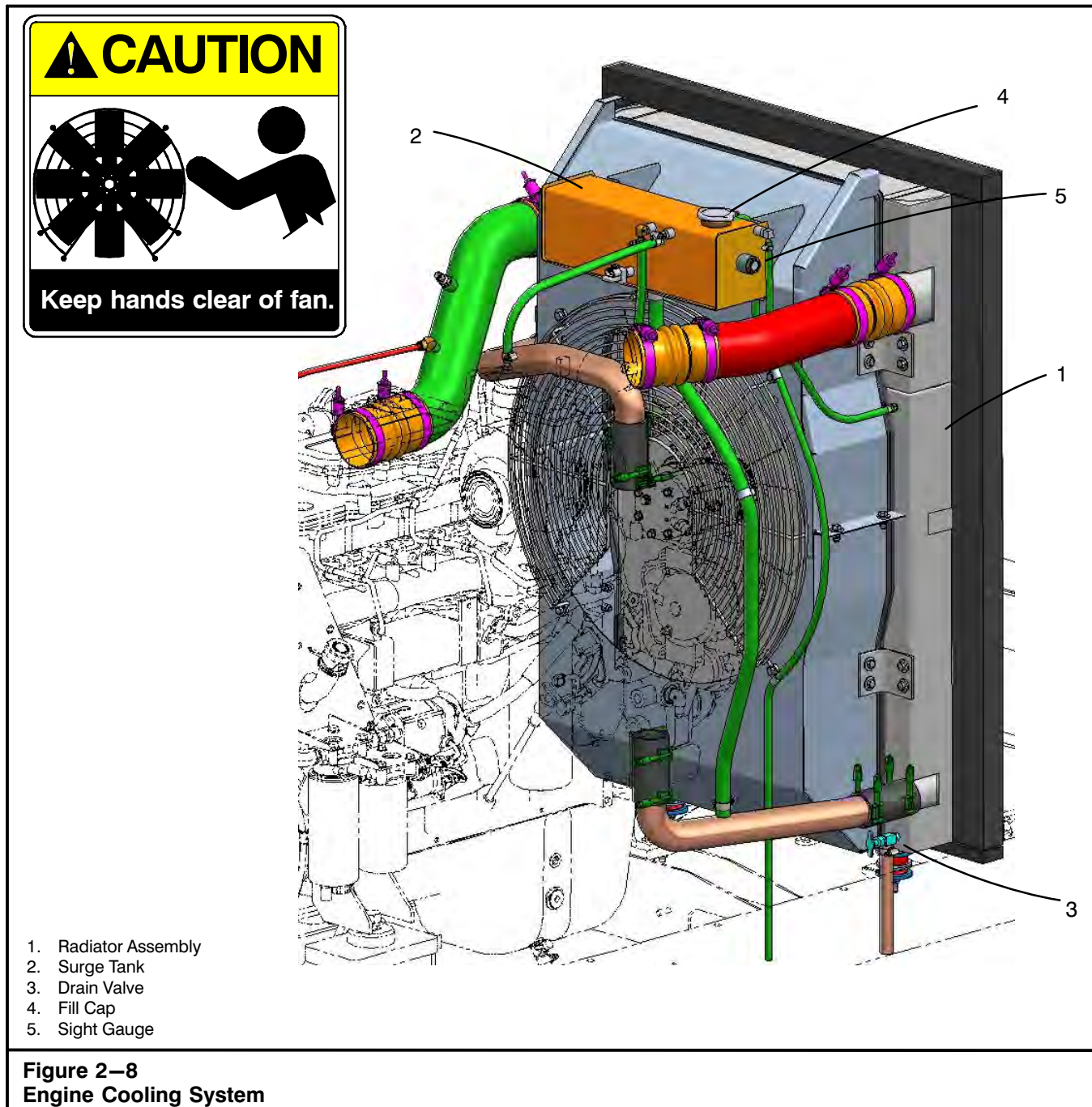
Do not add cold coolant to a hot engine. Engine castings can be damaged. Allow the engine to cool until the coolant temperature is below 122°F (50°C) before adding coolant.

Do not use a sealing additive to stop leaks in the cooling system. This can result in cooling system plugging and inadequate coolant flow, causing the engine to overheat.

If additional coolant must be added, it must be pre-mixed before being added to the system. Since the ability of antifreeze to remove heat from the engine is not as good as water, pouring antifreeze into the system first could contribute to an overheated condition before the liquids are completely mixed.

5. Slowly remove the fill cap. Add coolant, as required, until it is to the "Full-Cold" level in the sight gauge on the side of the surge tank. Use a pre-mixed solution per the engine manufacturer's specification. Refer to engine manufacturer's manual for proper coolant selection.
6. Replace fill cap. Start the engine and let it run until it reaches normal operating temperature. Shutdown the engine and repeat Step 3.

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Cooling System Coolant Change

Drain, flush, and fill the engine cooling system at the intervals outlined in the engine manufacturer's manual. Use a pre-mixed solution per the engine manufacturer's specification. Refer to engine manufacturer's manual for proper coolant selection.

CAUTION

Protect the environment: Handling and disposing of used antifreeze is subject to federal, state, and local regulations. Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze. If in doubt, contact your local authorities or the EPA for guidance as to proper handling of used antifreeze.

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Engage the travel swing lock and shutdown the engine.
3. Allow the engine to cool until the coolant temperature is below 122°F (50°C).



WARNING

Engine coolant may be hot and could cause burns. Avoid prolonged and repeated skin contact with antifreeze. Such prolonged, repeated contact can cause skin disorders or other bodily injury. Keep out of reach of children.

Coolant is toxic. Keep away from children and pets. If not reused, dispose of in accordance with local environmental regulations.

4. Drain the cooling system by opening the drain valve on the radiator and engine block. Allow the coolant to drain into a suitable container. Properly dispose of used antifreeze. Refer to Figure 2-8.
5. Check for damaged hoses and hose clamps. Hoses must be firm to the feel. If they are soft and spongy they must be replaced. Replace as required. Check the radiator for leaks, damage, and build up of dirt. Clean and replace as required.

6. Close the drain valve on the radiator and engine block.

CAUTION

During filling, air must be vented from the engine coolant passages. Wait 2 to 3 minutes to allow air to be vented. Air trapped in the system may cause damage to the engine.

7. Inspect and clean any debris from the radiator fins.
8. Remove the fill cap from the surge tank.
9. Flush the system as outlined in the engine manufacturer's manual. If the engine is warm, fill slowly to prevent the rapid cooling and distortion of the metal castings.
10. Flush the system as many times as required until the water is clean.
11. Add coolant, as required, until coolant is visible within the sight gauge on the surge tank. Use a pre-mixed solution per the engine manufacturer's specification. Refer to engine manufacturer's manual for proper coolant selection. Do not install the fill cap.
12. Start the engine and let it run at low idle. Increase engine to 1,500 rpm. Run the engine at high idle for approximately 1 minute to purge trapped air from the system. Shutdown the engine.
13. Check the coolant level to ensure that the coolant level has risen at least to the "Full-Cold" level in the sight gauge on the side of the surge tank. Refer to "Cooling System Level Check" in this Section of this Operator's Manual.
14. Install the fill cap on the surge tank.

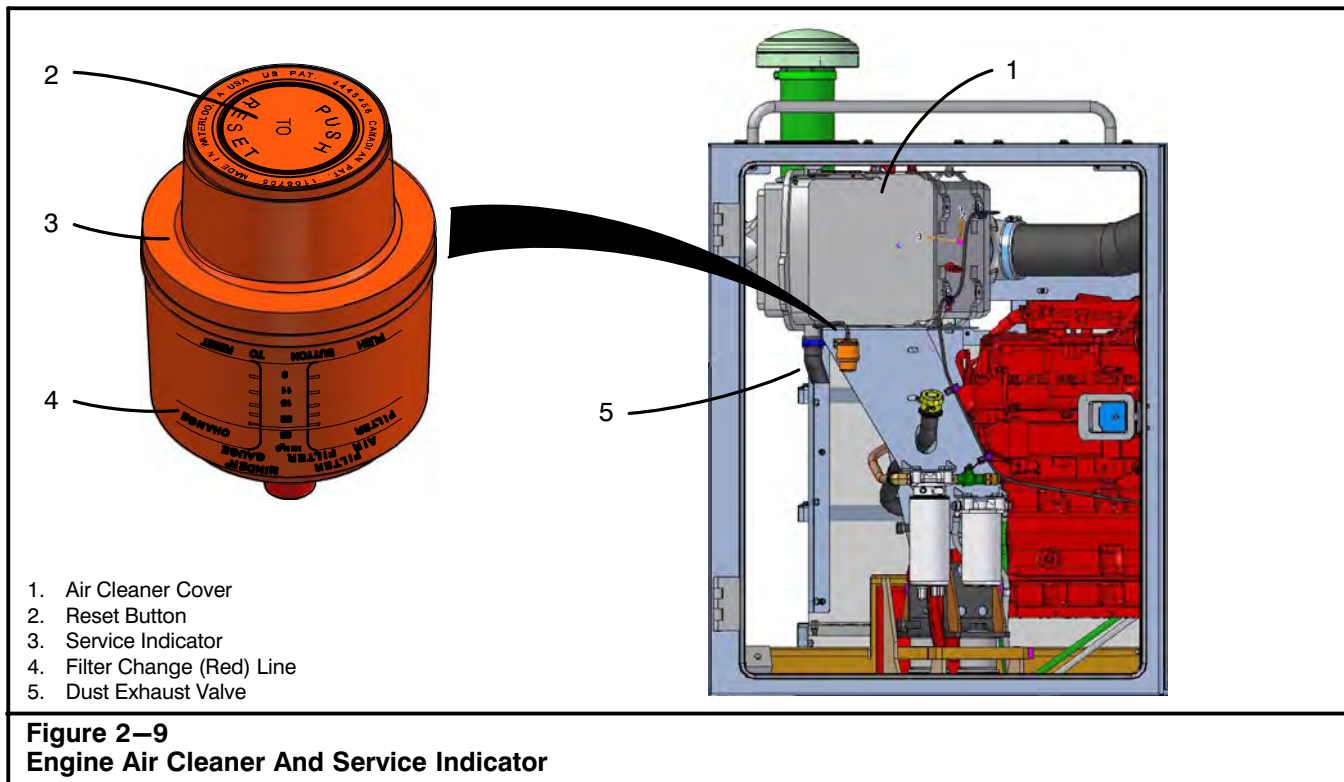


WARNING

Engine cooling system is pressurized. Do not remove fill cap from a hot engine. Heated coolant spray or steam can cause personal injury. Wait until the engine has cooled before slowly removing fill cap.

15. Start the engine. Check system for leaks and for proper operating temperature.

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Engine Air System Inspection

In addition to servicing the air cleaner, it is also recommended that the engine air system be inspected every 250 hours or 3 months. Inspect the air system pipes, hoses, air compressor, and turbocharger systems, as equipped. (Inspect all the pipes and hoses associated with the air compressor, turbocharger, air cleaner, and air intake.) Check for any cracks, corrosion, loose clamps, wear points, leaks, or punctures which can allow contaminants to enter the system and damage air system components and/or the engine. All hoses should be kept free of oil contaminants, both internally and externally. Disassemble and clean as required. Tighten or replace parts as necessary to ensure that the air system does not leak.

Engine Air Cleaner

Variations in job site conditions prevent establishing a set interval for air cleaner servicing. For this reason a vacuum operated service indicator is mounted on the air cleaner to assist in determining the condition of the air cleaner element. Refer to Figure 2-9. Anytime the yellow indicator reaches the red line, service the air cleaner immediately. Clean or replace the air cleaner element as often as required. Replace the air cleaner element after the sixth cleaning or annually, whichever occurs first. Service the engine air cleaner as follows.

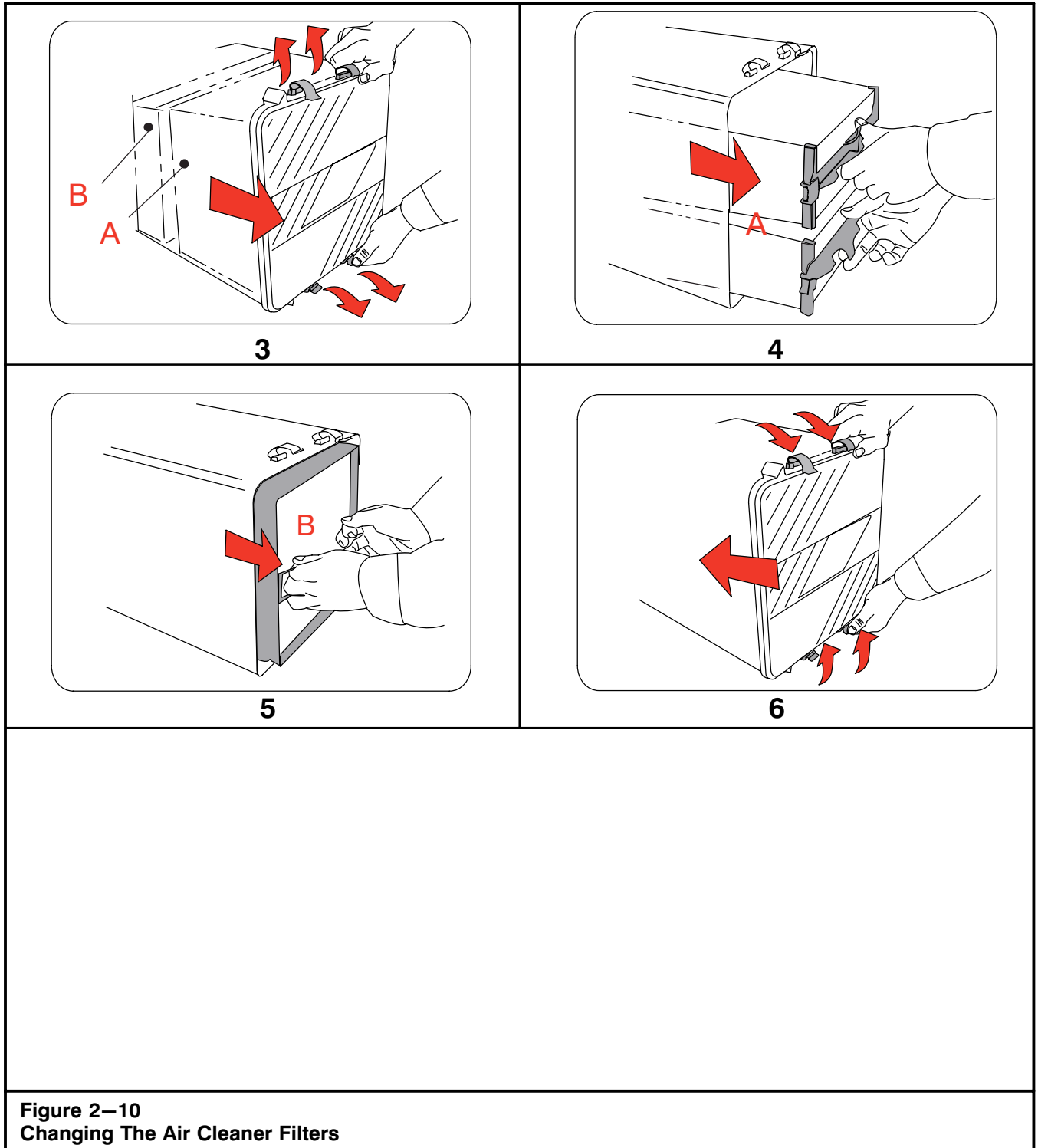
Changing The Air Cleaner Filter

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower and engage the travel swing lock.
2. Inspect the service indicator to see if the yellow indicator has reached the filter change (red) line. If the yellow indicator has reached the filter change (red) line, proceed with the following steps. If it has not reached the red line, there is no reason to service the air cleaner.

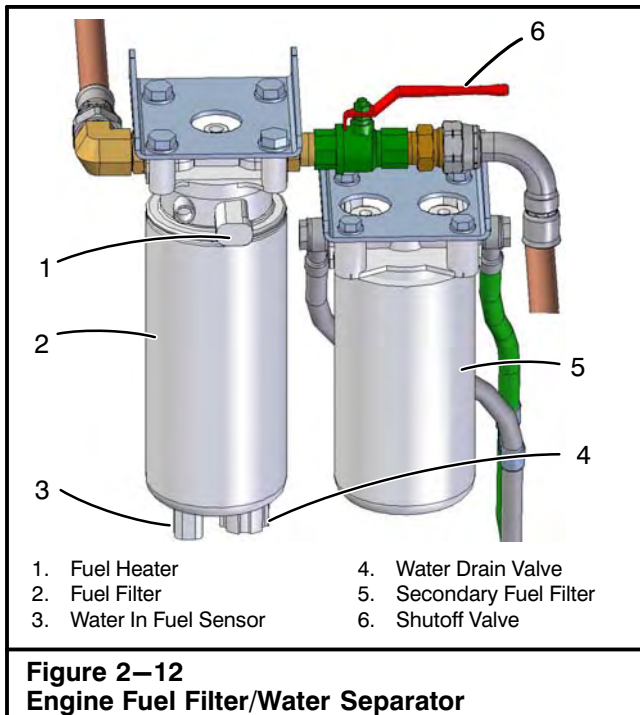
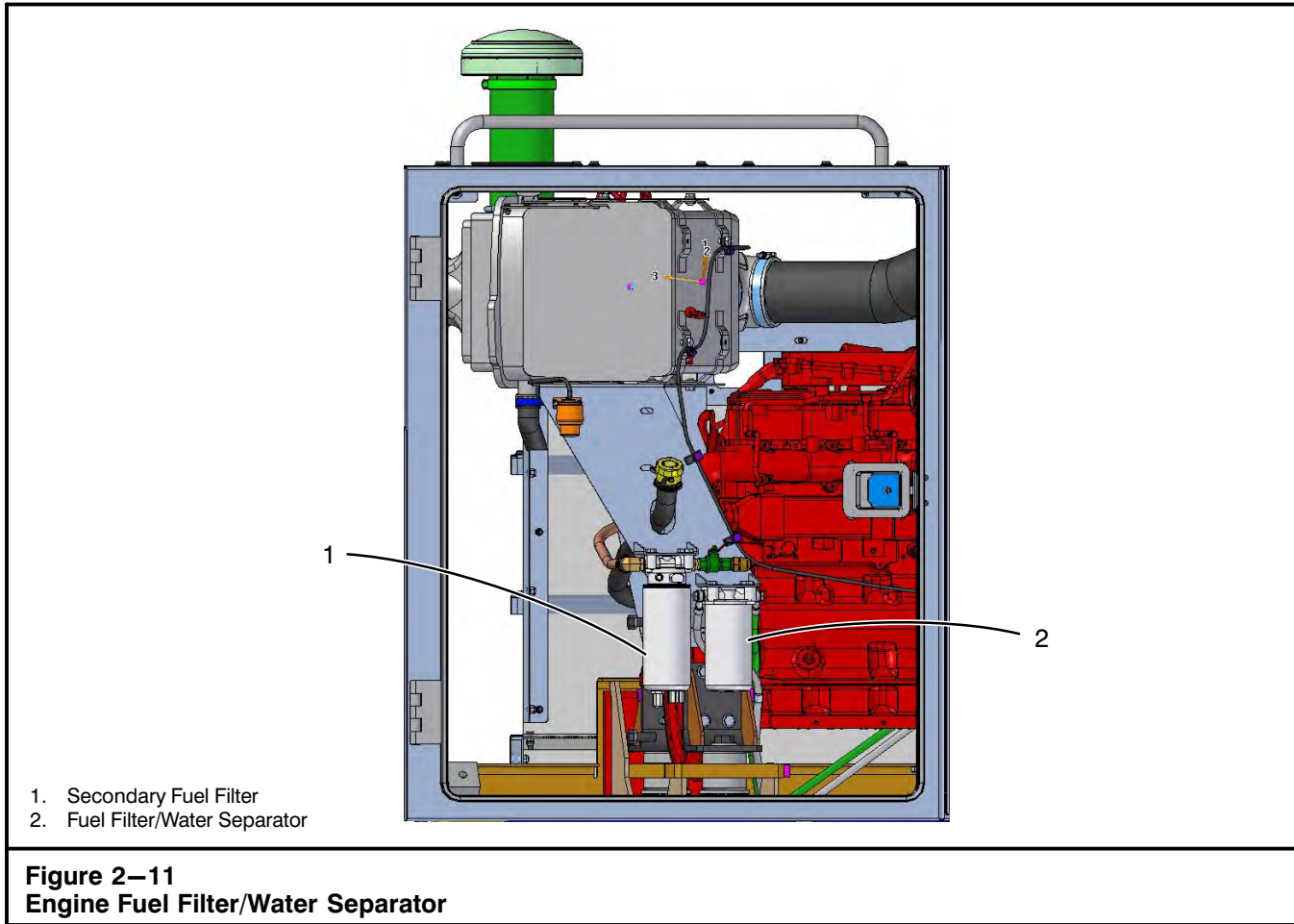
Refer to Figure 2-10

3. Unlatch and remove the service cover from the air cleaner body.
4. Remove primary filter from the air cleaner body.
5. Remove secondary filter from the air cleaner body.
6. Install secondary and primary filters in same order and latch service cover.
7. Remove the dust exhaust valve and inspect it for damage or wear. Replace it if required. Refer to Figure 2-9.
8. Reset the service indicator by pressing the button on top of it.

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Engine Fuel Filters

Two spin-on type filters are used, a primary fuel filter/water separator and a secondary fuel filter. (Refer to Figure 2-11.) The function of the filters is to remove water and contaminants from the fuel before they enter the fuel system. Removal of water and contaminants is important for troublefree operation and long life of the fuel system. Water should be drained daily before start-up. Change the filters every 500 hours of operation. Use the following procedures along with Figure 2-12.

Fuel Filter Water Drain

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Engage the travel swing lock and shutdown the engine.

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CAUTION

The engine must be shutdown when draining water from the fuel filter to prevent water from being drawn into the fuel system.

3. Place a suitable container under the water drain valve. Turn the drain valve counterclockwise approximately 1 and 1/2 to 2 turns until draining occurs.
4. Continue draining until clean fuel is visible.

CAUTION

Do not over-tighten the valve. Over-tightening the drain valve can damage the threads.

5. Close the water drain valve.
6. Properly dispose of contaminated fuel.

Primary Fuel Filter Change

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Engage the travel swing lock and shutdown the engine.
3. Disconnect the engine batteries.
4. Clean the area around the filter head.
5. Turn the shutoff valve to the "Closed" position (perpendicular to the valve).
6. Disconnect the wire harness from the fuel heater and the fuel in water sensor.
7. Place a suitable container under the water drain valve. Open the drain valve. Drain all fuel from filter.
8. Remove the filter from the filter head. Ensure the seal ring does not stick to the filter head.
9. Lubricate a new seal ring with clean engine oil. Install the new filter onto the filter head by hand.

CAUTION

To prevent fuel leaks, confirm that the filter is installed tightly but do not over-tighten. Mechanical tightening will damage the filter.

10. Connect the wire harness to the fuel heater and the fuel in water sensor.
11. Turn the shutoff valve to the "Open" position (in line with the valve).
12. Reconnect the engine batteries.

13. Prime the fuel system as follows:
 - a. Turn the ignition key switch to the ON position but do not start the engine. This will cause the ECM to operate the fuel lift pump through a priming cycle which will last at least 30 seconds.
 - b. When the lift pump completes its priming cycle, turn the key to the OFF position for 10 seconds.
 - c. Perform two or three more 30 second lift pump cycles.
14. Start the engine and check for leaks. Slowly increase engine speed to allow air to be purged from the fuel system.
15. Properly dispose of contaminated fuel and filter.

Secondary Fuel Filter Change

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Engage the travel swing lock and shutdown the engine.
3. Clean the area around the filter head.
4. Turn the shutoff valve to the "Closed" position (perpendicular to the valve).
5. Remove the filter from the head.
6. Fill a new filter with clean fuel and thoroughly lubricate the o-ring with clean engine oil.
7. Install new filter on filter head and tighten by hand.

CAUTION

To prevent fuel leaks, ensure the filter is installed tightly but do not over-tighten. Mechanical tightening will damage the filter.

8. Turn the shutoff valve to the "Open" position (in line with the valve).
9. Prime the fuel system as follows:
 - a. Turn the ignition key switch to the ON position but do not start the engine. This will cause the ECM to operate the fuel lift pump through a priming cycle which will last at least 30 seconds.
 - b. When the lift pump completes its priming cycle, turn the key to the OFF position for 10 seconds.
 - c. Perform two or three more 30 second lift pump cycles.
10. Start the engine and check for leaks. Slowly increase engine speed to allow air to be purged from the fuel system.
11. Properly dispose of contaminated fuel and filter.

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Hydraulic Hose Assembly Inspection

The frequency of inspection and replacement of hose assemblies should be determined by the operating environment, the potential risk from a hose failure, and past experience of hose failures in the application and environment.



WARNING

Always wear safety glasses when working with or inspecting pressurized hose assemblies. Do not search for leaks by running your hand or finger along a hydraulic hose. Hot hydraulic oil, under high pressure leaking through a small pinhole in a hose, can puncture gloves, your skin, and penetrate several inches (*centimeters*) into soft body tissue causing serious personal injury.

A daily visual inspection is recommended for all hose assemblies in service.

1. Check all hose end fittings for cracks, crushing, corrosion, slippage on the hose, leakage, or any other damage.
2. Check all hoses for cracks, exposed reinforcement, chafing, bulging, loose covers, or any other damage.
3. Check the installation of all hose assemblies for any kinked, crushed, flattened, or twisted hoses.
4. Replace any damaged hose assemblies, hose end mating fittings, and seals as required.

Hydraulic Reservoir

The hydraulic reservoir is used to store and supply hydraulic oil needed to operate all hydraulic functions of the crane. The hydraulic reservoir, as shown in Figure 2–13, is equipped with a sight gauge for checking the oil level.

A filter housing is mounted on the top of the tank. It has a contamination indicator which signals when the filter is being bypassed. Drain any water from the hydraulic reservoir, check the oil level, and inspect the contamination indicator daily. Operating the crane with the oil level below the full mark or with the filter element bypassed can lead to hydraulic component failure. Refer to the following procedures when servicing the hydraulic reservoir.

Water Drain

Drain the water from the hydraulic reservoir daily before start-up. Contaminated oil will damage the hydraulic components.

1. Relieve any trapped hydraulic system pressure by loosening the breather/filler cap, on the hydraulic reservoir, 1/4 turn until pressure is fully relieved. Refer to Figure 2–13.



WARNING

All trapped hydraulic pressure must be exhausted from the system before removing any plug or cover. A sudden release of hot oil could cause burns or other serious injury.

2. Loosen the water drain plug and allow the water to drain into a suitable container. The water drain plug is slotted and does not need to be completely removed to drain the water.
3. When a clean flow of hydraulic oil begins to drain from the water drain plug, tighten the plug.
4. Check the oil level in the hydraulic reservoir before beginning operation of the crane. Add oil if necessary. Refer to “Adding Oil To The Hydraulic Reservoir” in this Section of this Operator’s Manual. Properly dispose of the contaminated oil.

Hydraulic Reservoir Oil Level Check

Check the oil level in the hydraulic reservoir daily before start-up. Operating the crane with the oil level below the full mark can lead to hydraulic component failure.

1. With all hydraulic cylinders fully retracted except the side frame extend/retract cylinders, park the crane on a firm level surface, and shutdown the engine.
2. With the hydraulic oil cold (approximately 62°F 17°C), check its level through the sight gauge on the front of the hydraulic reservoir. Refer to Figure 2–13. The proper level must be maintained at all times. Add hydraulic oil as necessary to bring the oil level between the “HIGH” and “LOW” marks. Refer to “Adding Oil To The Hydraulic Reservoir” in this Section of this Operator’s Manual. Use only Hi Performance Hydraulic Oil or an approved substitute. Do Not Overfill.

Adding Oil To The Hydraulic Reservoir

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Engage the travel swing lock and shutdown the engine.
3. Relieve any trapped hydraulic system pressure by loosening the breather/filler cap, on the hydraulic reservoir, 1/4 turn until pressure is fully relieved. Refer to Figure 2–13.

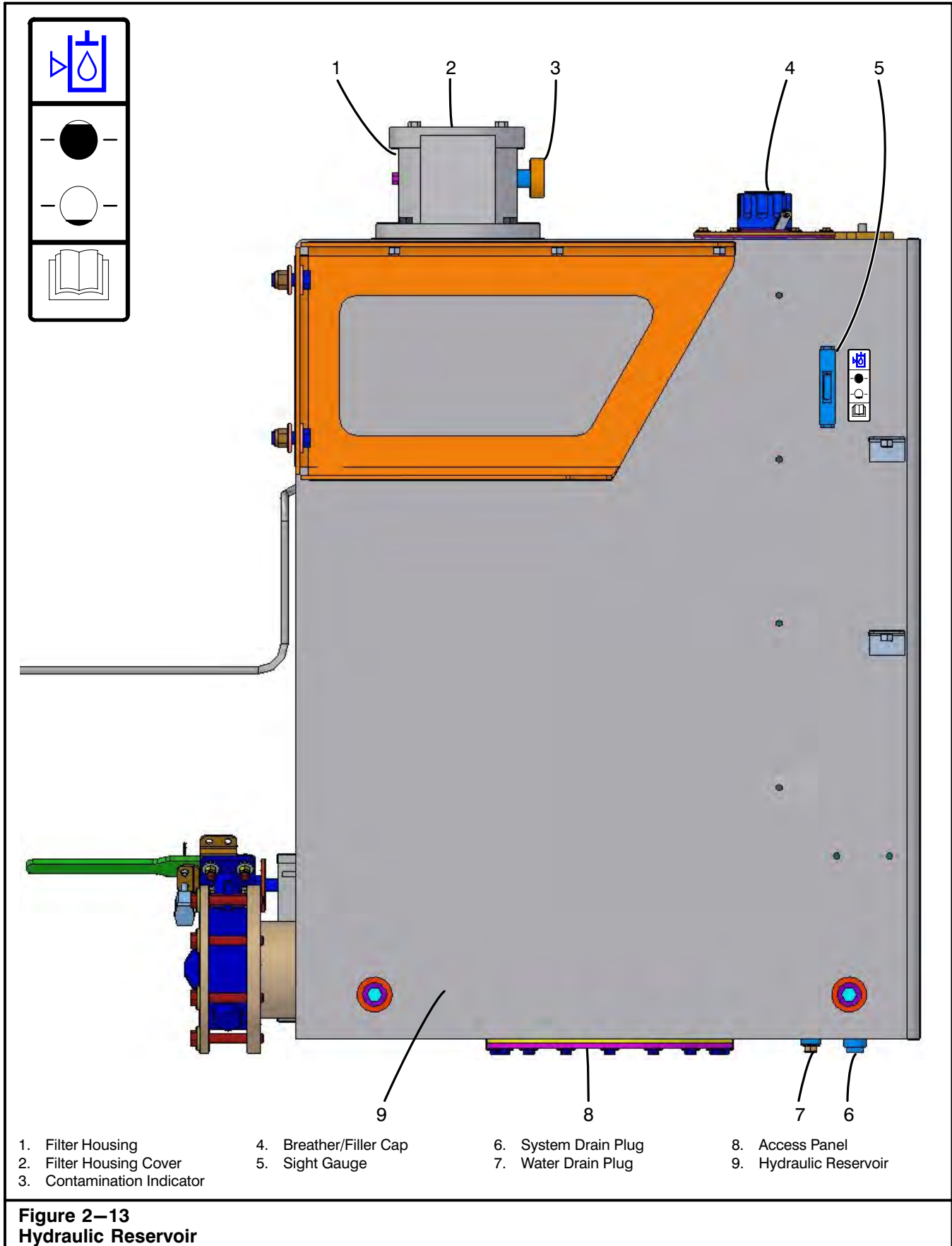


WARNING

All trapped hydraulic pressure must be exhausted from the system before removing any plug or cover. A sudden release of hot oil could cause burns or other serious injury.

4. Clean the top of the hydraulic reservoir, the breather/filler cap, and breather/filler cover to prevent foreign material from entering the hydraulic system.
5. Remove the breather/filler cap.
6. Add oil as required to bring the oil level to the “FULL” mark.
7. Install breather/filler cap.

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Hydraulic Reservoir Oil Change

The hydraulic reservoir oil should be changed every 2,000 hours of operation or seasonally, whichever occurs first. Change the hydraulic reservoir oil at the end of a working day when any foreign particles will be suspended in the warm oil. If this is not possible, cycle the crane until the oil is warm and proceed as follows:

1. With all hydraulic cylinders fully retracted except the side frame extend/retract cylinders, park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Engage the travel swing lock and shutdown the engine.
3. Relieve any trapped hydraulic system pressure by loosening the breather/filler cap, on the hydraulic reservoir, 1/4 turn until pressure is fully relieved. Refer to Figure 2–13.



WARNING

All trapped hydraulic pressure must be exhausted from the system before removing any plug or cover. A sudden release of hot oil could cause burns or other serious injury.

4. Thoroughly clean the exterior surface of the hydraulic reservoir to prevent foreign materials from entering the system, once the access panels and filter housing are opened.
5. Remove the filter housing cover and pump the hydraulic oil into suitable containers. Refer to the Lubrication Chart to determine the volume of oil to be removed.



WARNING

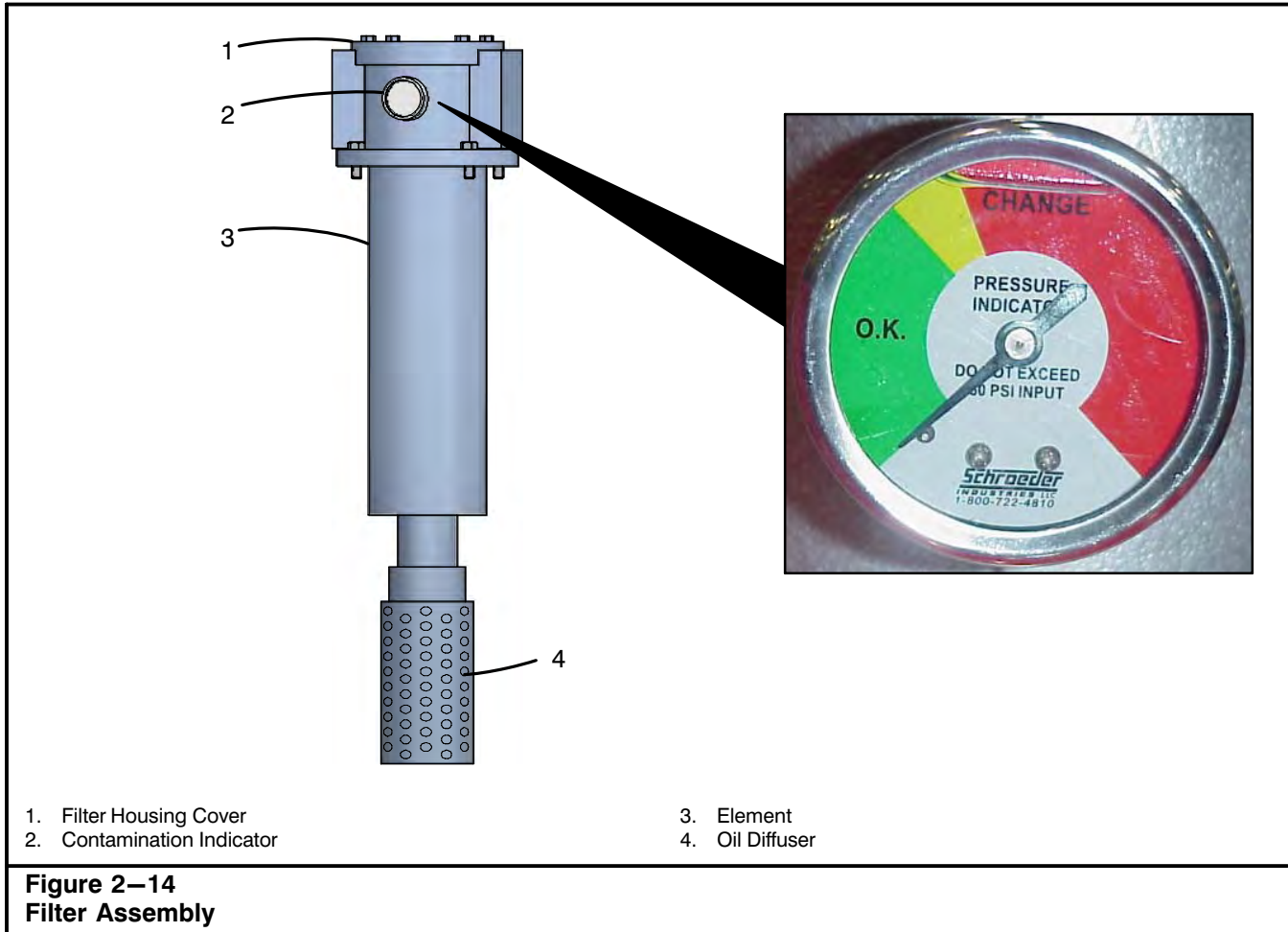
Do not remove the bottom access panel before the hydraulic reservoir has completely drained. A large volume of hot oil may suddenly be released resulting in personal injury and/or property damage. Drain the oil from the hydraulic reservoir before removing the bottom access panel.

Note: If a pump is not available to remove the oil from the reservoir, place a suitable container under the system drain plug. Open the plug and drain one container full at a time, until the oil has thoroughly drained from the reservoir. Do not remove bottom access panel to drain reservoir.

6. Remove the bottom access panel, filter housing cover, and the filter element. Properly dispose of the filter element.
7. Clean any old gasket material off the access panels and hydraulic reservoir.
8. Remove and clean the oil diffuser in the bottom of the filter housing.
9. Clean the interior of the hydraulic reservoir with clean diesel fuel or kerosene.
10. Allow the diesel fuel or kerosene to drain into a suitable container until the hydraulic reservoir is thoroughly drained. Inspect the interior of the hydraulic reservoir for foreign material and wipe clean.
11. Clean and install the system drain plug.
12. Clean the filter housing. Install oil diffuser in the bottom of filter housing. Install a new filter element.
13. Install the access panels, using new gaskets.
14. Using clean, uncontaminated oil, fill the reservoir through the filter element until it reaches the full mark in the sight gauge.
15. Install the filter housing cover.
16. Remove the breather/filler cap from the breather/filler cover. Clean or replace the sponge filter inside the breather/filler cap.
17. Install the breather/filler cover on the reservoir.
18. Start the engine. Allow the engine to idle several minutes to ensure oil is being cycled properly. Check for any leaks.
19. Check the oil level in the hydraulic reservoir for proper level. Refer to “Hydraulic Reservoir Oil Level Check” in this Section of this Operator’s Manual. Add oil if necessary. Refer to “Adding Oil To The Hydraulic Reservoir” in this Section of this Operator’s Manual. Properly dispose of the used oil.

Note: In case of hydraulic system component failure, a more thorough oil change procedure is required. Contact a Link-Belt Distributor for this procedure.

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1. Filter Housing Cover
2. Contamination Indicator

3. Element
4. Oil Diffuser

Figure 2-14
Filter Assembly

Hydraulic Reservoir Filter Change

Change hydraulic reservoir filter element after the initial 50 hours of operation and every 500 hours of operation thereafter. Change the filter element immediately if the contamination indicator is in the “Change” position after the oil has reached operating temperature.

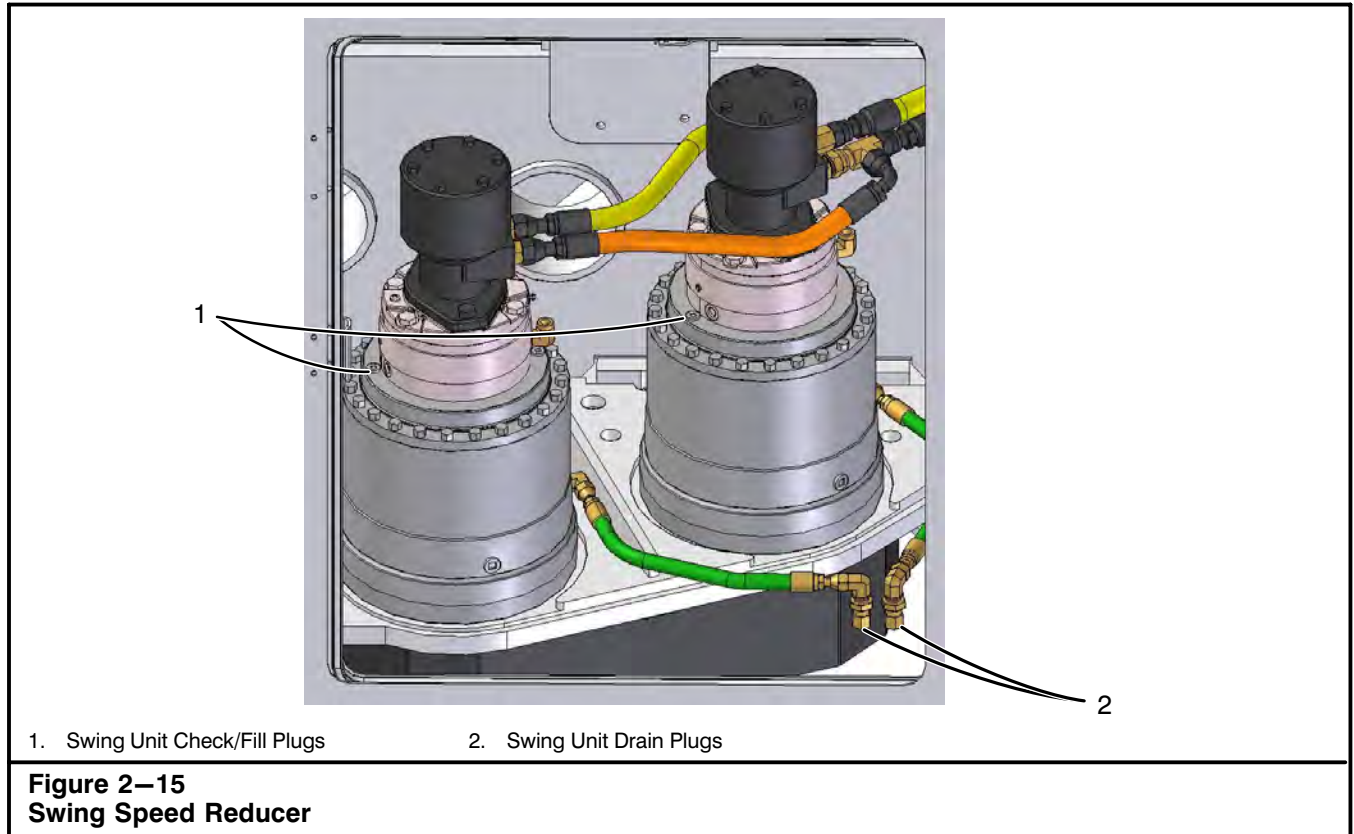
1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Engage the travel swing lock and shutdown the engine.
3. Relieve any trapped hydraulic system pressure by loosening the breather/filler cap, on the hydraulic reservoir, 1/4 turn until pressure is fully relieved. Refer to Figure 2-13.

4. Clean the top of the hydraulic reservoir, the filter housing, and filter housing cover to prevent foreign material from entering the hydraulic system.
5. Remove the filter housing cover.
6. Remove the filter element and inspect it for contamination. Any dirt or foreign particles on the filter element may indicate excessive system contamination or imminent system component failure. Once the filter has been thoroughly inspected, dispose of it properly.
7. Install new filter element and filter housing cover.
8. Start engine and check the filter housing for leaks.
9. Check the hydraulic reservoir oil level. Refer to “Hydraulic Reservoir Oil Level Check” in this Section of this Operator’s Manual. Add oil if necessary. Refer to “Adding Oil To The Hydraulic Reservoir” in this Section of this Operator’s Manual.



WARNING

All trapped hydraulic pressure must be exhausted from the system before removing any plug or cover. A sudden release of hot oil could cause burns or other serious injury.



Swing Speed Reducer Lubrication

Check the oil level in the swing speed reducer after every 50 hours of operation. The oil in a new or rebuilt swing speed reducer should be changed after the initial 200 hours of operation. Thereafter, change the oil with each 1,000 hours of operation or seasonally, whichever occurs first.

Swing Speed Reducer Oil Level Check

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Engage the travel swing lock and shutdown the engine.
3. Clean the speed reducer around the check/fill plug to prevent contamination from entering the system. Remove the check/fill plug. Refer to Figure 2–15.
4. Oil should be within 0.5 in (12.7mm) of the bottom of the threads. Add oil as required to bring the oil to the proper level. Refer to the Lubrication Chart for the correct grade of oil.
5. Clean and install the check/fill plug.
6. Repeat for the other swing speed reducer

Swing Speed Reducer Oil Change

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower.
2. Fully extend the side frames and swing the upper for several minutes to agitate and warm the oil within the swing speed reducer.
3. Engage the travel swing lock, fully lower the boom, and shutdown the engine.
4. Thoroughly clean the exterior surface of the swing speed reducer around the check/fill and drain plugs to prevent contamination from entering the unit. Refer to Figure 2–15.
5. Remove the check/fill and drain plugs and allow the oil to drain into a suitable container. The drain plug is magnetic and should be inspected for large quantities of metal particles. After the initial oil change, this is a sign of damage or extreme wear within the unit, and a complete internal inspection may be necessary.
6. After the oil has thoroughly drained, clean and install the drain plug.
7. Fill the unit with oil through the check/fill plug hole, until the oil is within 0.5 in (12.7mm) of the bottom of the threads. For the correct grade and quantity of oil, refer to the Lubrication Chart.
8. Clean and install the check/fill plug. Properly dispose of the used oil.
9. Repeat for the other swing speed reducer.

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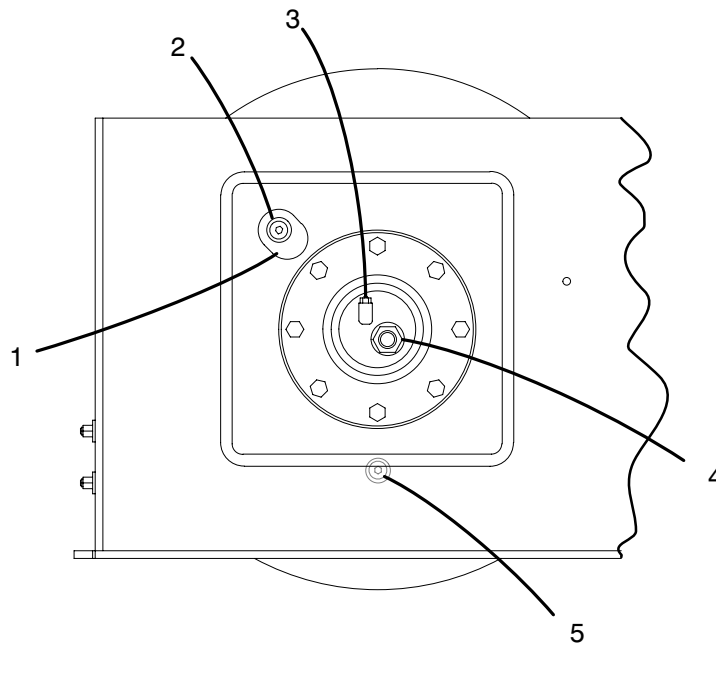


Figure 2–16
Winch Drum Lubrication

Winch Drum Lubrication

For maximum operating efficiency and service life of the winch drum(s), check oil level after every 50 hours of operation. The oil, in a new or rebuilt winch drum, should be changed after the initial 100 hours of operation. Thereafter, change oil with each 1,000 hours of operation or seasonally, whichever occurs first. It is also recommended that every 2,000 hours of operation, the winch should be disassembled and thoroughly inspected for damaged or worn parts. Replace damaged or worn parts as required.

Winch Drum Oil Level Check

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower and engage the travel swing lock.
2. Observe the oil level within the sight gauge. Oil should be visible within the sight gauge. Refer to Figure 2–16. Add oil as required to bring the oil to the proper level. Refer to the Lubrication Chart for the correct grade of oil.

Winch Drum Oil Change

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower and engage the travel swing lock.

2. Cycle the winch for several minutes, without a load, to agitate and warm the oil within the winch drum.
3. Rotate winch drum until the fill/drain plug is aligned with the fill alignment hole in the side support. Refer to Figure 2–16.
4. Engage the travel swing lock and shutdown the engine.
5. Thoroughly clean the exterior surface of the winch around the vent and fill/drain plugs to prevent contamination from entering the unit.
6. Remove the fill/drain and vent plugs.
7. Position a suitable container under the winch drum.
8. Start the engine. Rotate the drum until the fill/drain port is in the drain position and allow the oil to drain into a suitable container.
9. After the oil has thoroughly drained, start the engine and rotate the drum until the fill/drain port is aligned with the fill alignment hole in the side support. Shutdown the engine.
10. Fill the unit with oil through the fill/drain port, until oil is visible within the sight gauge. For the correct grade and quantity of oil, refer to the Lubrication Chart.
11. Clean and install the vent and fill/drain plugs. Properly dispose of the used oil.
12. Repeat procedure for the other winch drum if equipped.

Boom Inspection And Lubrication



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

Before putting hands or tools inside a boom section, ensure the engine is shutdown and operator has properly vacated the operator's cab. Movement of the boom could cause serious injury.

Do not use a crane that has a damaged boom. The structural integrity of the boom is lost and could collapse with any load. Use the crane only after the boom has passed a thorough inspection. Contact a Link-Belt Distributor for the proper inspection procedures.

To prevent movement of the individual boom sections, shutdown the engine and ensure that the operator has vacated the operator's cab before putting your hands or tools inside the boom. Unexpected movement of the boom section could sever fingers, hands, arms, etc.

The boom wear shoes are equipped with teflon inserts that self-lubricate the boom. Therefore, the boom wear shoe areas require no lubrication. However, visually inspect all boom sections daily for damaged or cracked members or welds. If any dents, bends, cracked welds, etc. are found, do not use the crane. Contact a Link-Belt Distributor for repair procedures. Check for damaged or leaking hoses, fittings, valves, cylinders, etc. Repair as necessary. At 250 hour intervals, check all boom wear shoes for proper adjustment. See "Boom Wear Shoe Adjustment" in Section 3 of this Operator's Manual for further details.

Inspect for wear on the wire rope deflector bar at the top front of each boom section. Reverse or replace the wear bars as required.



Figure 2-17
Do not climb on boom or attachments.

Lubricate the boom extend and retract sheaves at 50 hour intervals. It is also recommended that every 4,000 hours of operation the boom should be disassembled and the extend and retract wire ropes inspected, lubricated, and/or replaced as required. See "Boom Extend And Retract Wire Rope Inspection And Adjustment" in Section 3 of this Operator's Manual, "Wire Rope Lubrication" found later in this Section of this Operator's Manual, and "Wire Rope Inspection And Replacement Recommendations" in Section 5 of this Operator's Manual.

Lubricate the boom foot pin and boom hoist cylinder pins daily.

Lubricate the boom head sheaves and auxiliary head sheaves if equipped, every 50 hours of operation.

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Fly Inspection & Lubrication



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

Do not use a fly which has been damaged. The structural integrity of the fly is lost and the attachment could collapse with any load. Use the fly only after it has passed a thorough inspection.

Inspect all parts of the fly daily. Pay particular attention to the chords and lattice. If any dents, bends, cracked welds, etc. are found, do not use the fly. Contact a Link-Belt Distributor for repair procedures.

Lubricate the fly head sheaves and deflector sheave(s) every 50 hours of operation.

Wire Rope Lubrication

Inspect wire ropes daily to ensure they are not damaged.

Wire rope is like a machine. Each time a wire rope bends over a sheave or straightens from a slack position many wires move against each other. Lubrication is necessary to help prevent wear caused by this movement. Lubrication also helps prevent deterioration of wire rope due to rust and corrosion.



WARNING

Rusty wire rope is dangerous since there is no way to determine its remaining strength. Do not use rusty wire rope.

Most wire ropes are lubricated during manufacture, but the lubricant does not last the life of the wire rope. The lubricant is squeezed out of the wire rope as it runs over sheaves under tension, or is washed off by rain.

For the above reasons, wire rope **MUST BE** periodically lubricated. Crude or used oils and grease should not be used as lubricants because they may be grit or acid laden. Either of these conditions can cause damage to the wire rope.

No set rule can be given for lubrication frequency. This will depend on the type of conditions under which the wire rope is used. A wire rope used in wet conditions would need to be lubricated more often than one used in dry conditions, to prevent rust and corrosion.

Lubricants used for wire rope lubrication should have the following properties:

1. They must have enough adhesive strength to stay on the wire rope.
2. They must be able to penetrate between the wires and strands.
3. They must have high film strength.
4. They must resist oxidation.
5. They must remain soft and pliable.

Application Of Wire Rope Lubricant

Wire ropes that have been in service should be cleaned before re-lubricating them. Use a wire brush and compressed air to clean the wire rope. All possible foreign material and old lubricant should be removed from the wire rope before re-lubricating it. Use one of the following methods to apply the lubricant.

1. Continuous Bath

Run the wire rope through a container filled with lubricant. A sheave mounted in the center of the container will hold the wire rope submerged as it passes through the container. Use swabbing to remove excess lubricant as the wire rope leaves the container.

2. Dripping

Place a container above a sheave so a spigot can be opened to drip oil on the wire rope as it passes through the sheave groove.

3. Swabbing And Painting

Two fast methods are swabbing the lubricant on with rags or painting it on with a brush.

4. Spraying

Light lubricants may be applied with a spray gun. Aerosol cans of lubricant are also available.

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Hook Block, Hook Ball, And Swivel Inspection And Maintenance

1. All nuts, setscrews, pins, bolts, and retainers should be checked for tightness every 14 to 30 days, depending on the operating conditions and the product involved.
2. Inspect the components carefully at least once a month.

Swivels: Check for excessive gap distance between the rotating parts. Check threaded parts that are installed together to see that they are secure and tight. Check all setscrews to see that they are tight and staked.

Hook Blocks: Check all pins and bolts for tightness, spreading of side plates, weld cracks, sheave wear, bearing wear, spreading of hook, and that setscrews are tight and staked. Check that hook latch is operative.

Hook Balls: Check pin, nut, and washer to ensure ball halves are held securely together. Check lo-

ading pin for excessive wear. Inspect swivel parts as specified previously. Check that hook latch is operative.

3. If a swivel is constantly overloaded, it will cause damage to the unit. The first sign of damage is often bearing brinelling (dimpling of the bearing races). This condition is determined by spinning the swivel by hand. If the motion is rough or has a ratchet-like effect, the bearing has been damaged and should be replaced.
4. The distance between the swivel barrel and shank or rotating members are pre-set with a factory clearance of 0.020–0.050 in (0.5–1.2mm). If this distance increases more than 0.060 in (1.5mm) over the above distance, it is a good indication of bearing fatigue and the unit should be removed from service.

Item	Under Intermittent Operating Conditions	Under Continuous Operating Conditions
Swivels, Swivel Overhaul Balls, Swivel Hook Balls	14 days	24 hours
Hook Blocks with Bronze Bushed Sheaves	14 days	8 hours
Hook Blocks with Roller Bearing Sheaves	14 days	24 hours

Chart A – Hook Block, Hook Ball, & Swivel Lubrication Frequency

Item	Frequency	What to Check For	Appropriate Action
Swivels	14 days under continuous operation 30 days under intermittent operation	End play or gap of more than 0.06 in (1.5mm) along the axis.	Remove from service immediately.
		Rough turning.	Defective bearing. Remove from service immediately.
		Elongated eye holes, bent clevis pins.	Indicates overload. Remove for repairs.
Sheaves	14 days under continuous operation 30 days under intermittent operation	Misalignment, as evidenced by wobble or uneven groove flange wear.	Indicates major bearing wear. Remove from service. Check for wear in bronze spacers where used.
		Striations or corrugations in sheave groove.	Result of wire rope wear. If major, replace.
Hook Latch	When Used	Missing, off center, bent, broken spring, or defective.	Replace immediately
Hooks	Daily or When Used	Permanent deformation or stretching.	An indication of overload. If major, replace. Any suspicion of fractures calls for an immediate investigation and, if necessary, replacement of part.
		Crack or other defects.	Hooks should be tested at least once a year by magnafluxing, x-ray, or other qualified method. Intermittent tests can be conducted by a less accurate oil stain method.

Chart B – Hook Block, Hook Ball, & Swivel Inspection Frequency

Operator's Manual

Turntable Bearing Capscrew Torque

Maintaining the proper torque on turntable bearing mounting capscrews is critical. If the bearing has been replaced or the crane undecked for any reason, capscrews should be replaced. Reuse of turntable bearing mounting capscrews is not recommended.

Turntable Bearing Capscrew Inspection Schedule

Capscrews should be inspected and/or torqued after the initial 250 hours of operation of any new crane or if the crane has been undecked for any reason. Inspect and/or torque capscrews per the Turntable Bearing Capscrew Torque Inspection Schedule, thereafter. Torque capscrews to 2,120–2,335 ft lb (2 875–3 166Nm).

CAUTION

Turntable bearing capscrews use Loctite® 571 Pipe Sealant or equivalent. The sealant or coating is used to protect the threads of the capscrews from rust and corrosion. Unprotected capscrews will not maintain the proper torque. Always use sealant or coating when installing turntable bearing capscrews.

Turntable Bearing Capscrew Torque Inspection Schedule		
Schedule	Interval	Requirements
A	500 Hrs	<ul style="list-style-type: none"> Perform an initial torque of the capscrews after the first 250 hours of operation of a new crane, or if the crane has been undecked for any reason, to establish capscrew torque baseline. <p>Note: Use the minimum applicable torque value when checking.</p>
		<ul style="list-style-type: none"> After the next 500 hours of operation, if any of the capscrew torques have degraded, tighten capscrews to the proper torque. <p>Note: Use the minimum applicable torque value when checking.</p>
		<ul style="list-style-type: none"> If the crane is utilized for duty cycle work, Schedule A must be continuously maintained during duty cycle applications.
		<ul style="list-style-type: none"> Inspection Schedule A must be maintained until such a time that no capscrews require tightening after 500 hours of operation. Schedule B can then be followed.
		<ul style="list-style-type: none"> The minimum applicable torque value is acceptable for the turntable bearing capscrew torque inspection.
B	Annually	<ul style="list-style-type: none"> If the capscrew torque has degraded at any annual check, Torque Inspection Schedule A must be followed until such time that no loss of capscrew torque is observed.
		<ul style="list-style-type: none"> The minimum applicable torque value is acceptable for the turntable bearing capscrew torque inspection.

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Crane Monitoring System

Maintenance of the Rated Capacity Limiter System consists of the following daily inspection prior to the first operation:

1. Check that the system is operating normally as described in Section 1 of this Operator's Manual.
2. Check the electrical cables connecting the various parts of the system.
3. Check insulation on the boom reeling drum cable.
4. Check boom reeling drum cable for proper tension.
5. Check all anti-two block switches for freedom of movement.
6. Check that the anti-two block weights are installed and working properly with the anti-two block switches.
7. Inspect the pressure transducers at the back of the operator's cab and check the connecting hoses for oil leaks.
8. Test that the function limiters activate properly by simulating a two-block condition. (Do this by manually lifting the ATB weight.)
9. Using a known test weight, check that the displayed weight agrees with the test load. The displayed load includes the hook block, hook ball,

and any lifting equipment such as slings, pins, shackles, etc.

10. If crane capacities are rated for specific areas e.g. side, front, or rear, check the system by swinging the boom into the permitted areas and checking that the Rated Capacity Limiter reading agrees with the crane capacities as listed in the Crane Rating Manual.
11. Check for erratic readings on the boom angle, the boom length, and the operating radius displays. Check the boom angle, boom length, and the operating radius for accuracy every 30 days.



WARNING

Any unusual or erratic system operation must be investigated and corrected immediately. If any problem is found with any of the above inspection steps, the problem must be corrected/repared as soon as possible. If necessary to continue crane operations, refer to "System Inoperative Or Malfunctioning" in Section 1 of this Operator's Manual.

Operator's Manual

Paint Maintenance

Knowledgeable equipment owners realize the value of periodic preventative maintenance and responsible care. A regular surface care program should be followed to protect the equipment's paint finish and maintain a like-new appearance. There is no one correct/ultimate procedure since the uniqueness of every crane's operating environment and owner/operator maintenance habits differ. However, it is important to remove surface contaminants before they have time to bond or etch into the paint finish.

The crane has non-skid materials in certain areas to assist operators and service personnel with safe access/egress to/from the crane. Do not paint or wax non-skid materials. Paint or wax will cause the non-skid materials to become slick, reducing their effectiveness for safety while walking on the crane. If any non-skid materials become ineffective due to wear, age, or destroyed in any way, they must be replaced.



WARNING

Do not apply paint or wax over non-skid materials. Keep all non-skid materials clean and free of all contaminants. All walking surfaces on the crane should be cleaned to eliminate any contaminants. Paint, wax, or other contaminants will reduce the effectiveness of the materials. Ineffective materials can create unsafe access/egress to/from the crane leading to serious personal injury. Mask off and/or cover non-skid materials prior to painting or waxing areas around any non-skid material(s). Contact a Link-Belt Distributor for information regarding the replacement or repair of any non-skid material(s).

Regular Preventative Maintenance

1. Regular washing is the best way to remove surface contaminants.
2. Always use mild cleaners and soaps, and rinse thoroughly after washing. Do not use harsh detergents, such as household laundry detergents, or cleaners that contain phosphates, as they will "burn" the paint, strip off protective coating, diminish the gloss and accelerate the contamination process.
3. Periodic waxing will enhance the luster and protect the paint surface.

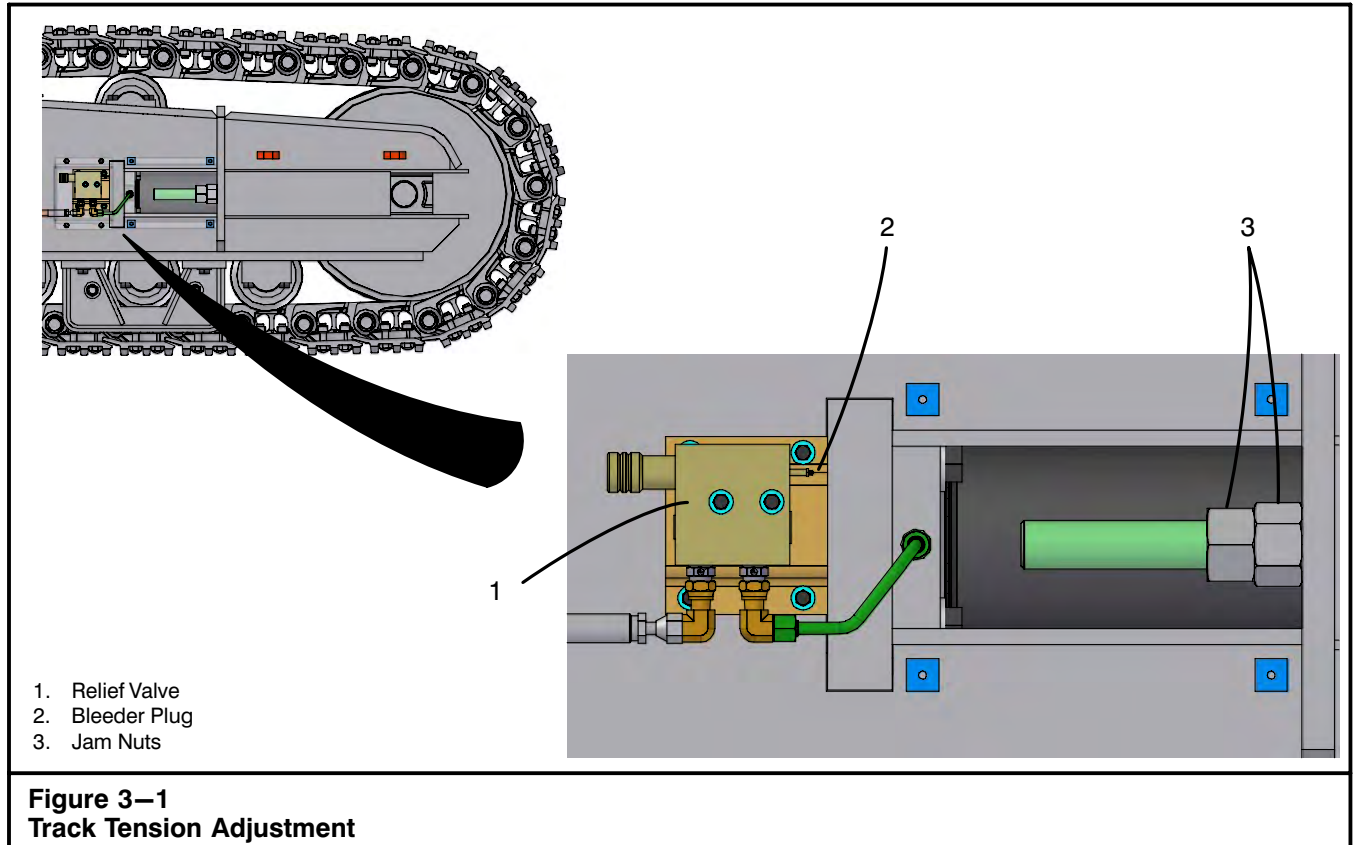
If environmental damage to the paint finish is detected (loss of some of its luster due to lack of or inability to maintain as recommended) the paint finish can be restored to near-new appearance by following a simple polishing and waxing procedure.

Polishing And Waxing Procedure

1. Clean surface thoroughly by hand washing or power washing with a mild detergent. Rinse thoroughly with water before buffing.
2. Apply a polishing compound, such as Meguiar's M8432, or equivalent, to a surface area approximately two feet by two feet (.6m by .6m) at a time. Ensure the compound is applied liberally to entire area and work on only that area with the buffing wheel.
3. Buff surface with an electric or air buffer at 1,000 rpm using a 3M Superbuff polishing pad, or equivalent, with light to medium pressure until a uniform high gloss is obtained. Hand wipe with a clean cloth.
4. After surface has been buffed, apply a quality automotive wax such a Meguiar's M-26 Hi-Tech Yellow Wax, or equivalent, and hand buff until the cloth moves freely. The original luster of coating should be restored.

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Track Tension Adjustment

Excessively tight track shoes may cause unnecessary wear on track components. Excessively loose track shoes can cause the drive sprockets to climb on the shoe lugs or the track shoes to come off the track rollers while steering. Adjust the track tension whenever necessary.

To Set Track Tension

1. Park the crane on a firm level surface. Position the upper facing directly over the front or rear of the lower and engage the travel swing lock.
2. Fully loosen all the jam nuts on both side frames. The jam nuts are on the right and left side frames on the inner and outer side of the shoes. Refer to Figure 3-1.
3. Move the travel levers forward and backward to supply oil to the cylinders. This will tighten the track tension.
4. Tighten all the inner jam nuts evenly on both sides until they come in contact with the side frames.
5. Shutdown the engine.
6. Tighten all the inner jam nuts one more turn. Tighten all the outer jam nuts to lock them on the inner jam nuts.

To Decrease Track Tension

1. Park the crane on a firm level surface. Position the upper facing directly over the front or rear of the lower and engage the travel swing lock.
2. Shutdown the engine.
3. Remove the cap from the bleeder plug on the check valve on one side frame. Install tubing on the bleeder plug.
4. Place a suitable container under the tubing.



WARNING

Oil in relief valve may be under high pressure. A sudden release of oil could cause serious injury.

5. Carefully loosen the bleeder plug on the relief valve. Drain oil as required until there is a $\frac{1}{4}$ in (6.3mm) gap between the locking nut and the side frame.
6. Repeat Steps procedure for the other side frame.
7. Adjust track tension per "To Set Track Tension" in this Section of this Operator's Manual.

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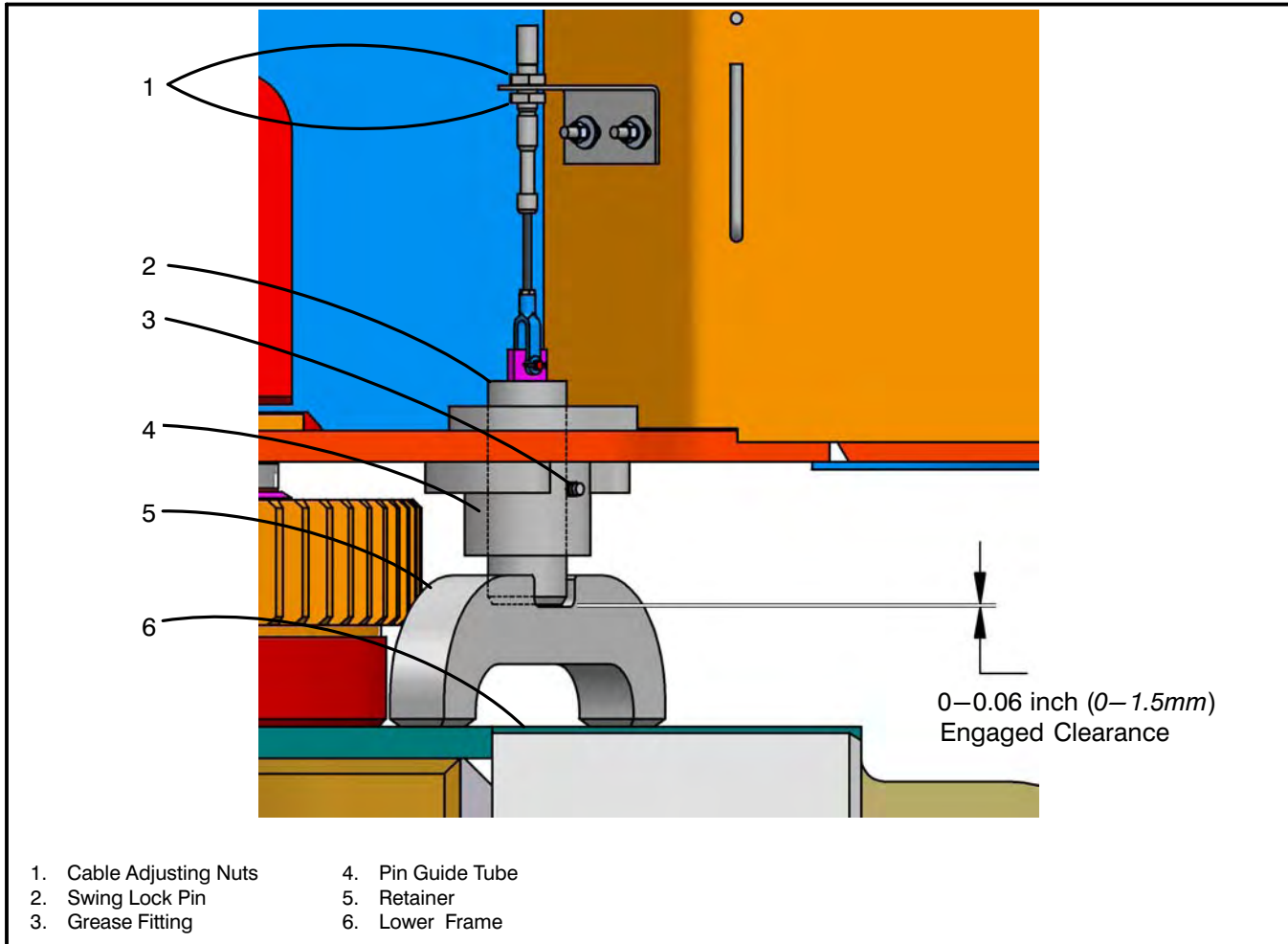


Figure 3-2
Travel Swing Lock Adjustment

Travel Swing Lock Adjustment

The travel swing lock is a four position, positive lock of the upper over the lower to prevent swinging of the upper. For the travel swing lock to operate properly, it must be adjusted correctly.

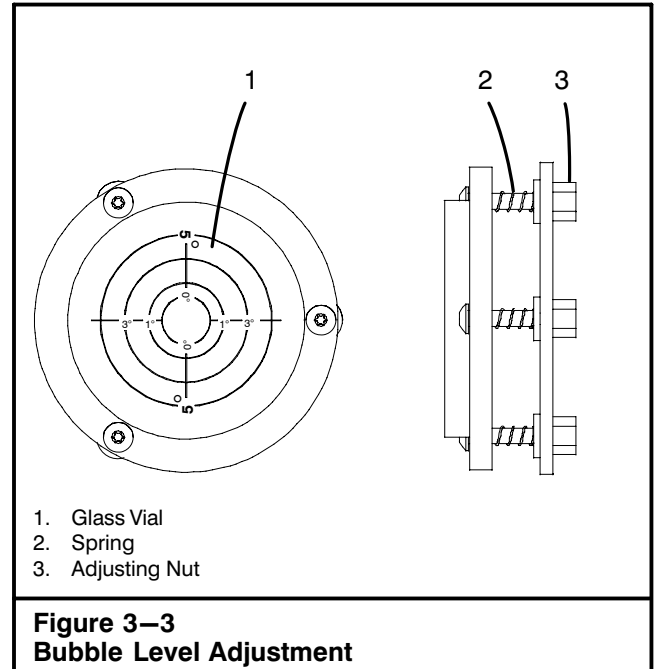
1. Park the crane on a firm level surface. Position the upper facing directly over the front or rear of the lower, engage the travel swing lock, and shutdown the engine.
2. Check the engagement of the swing lock pin in the retainer on the lower frame. The pin should extend in the retainer to within 0-0.06 inch (0-1.5mm) from the bottom of the retainer slot. Refer to Figure 3-2.
3. Adjust the stroke of the swing lock pin as required by using the cable adjusting nuts.
4. Test the swing lock in each working position before operating the crane.

Bubble Level Adjustment

A bubble level, to assist in determining when the crane is level, is mounted in the operator's cab on the lower right side. It should be checked periodically to ensure proper adjustment.

1. Park the crane on a firm level surface.
2. Fully extend the side frames. Position the upper facing directly over the front of the lower and engage the travel swing lock. Fully retract the boom. Position boom at a 45° angle.
3. Verify the crane is level by placing a carpenter's level across the front of upper frame. Check that the crane is level with the upper over the front, rear, and both sides of the crane. Install cribbing under the tracks as required until crane is level side to side and front to rear.
4. Rotate the adjustment nuts as required until the bubble is centered within the vial. Refer to Figure 3–3.

Note: Do not flatten out the springs under the bubble level. Loosen rather than overtighten the adjustment nuts to gain the necessary adjustment.

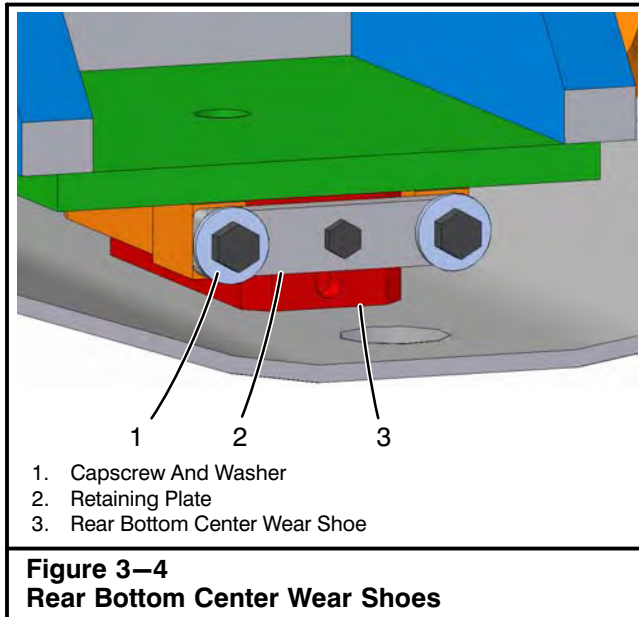


Rated Capacity Limiter

A properly calibrated Rated Capacity Limiter is critical for safe crane operation. The boom angle and length are crucial factors in determining crane capacities. The Rated Capacity Limiter must be checked for accuracy on a daily basis and calibrated as needed. Refer to “Crane Monitoring System” in Section 2 of this Operator's Manual for the daily check list for the system.

The Rated Capacity Limiter should be calibrated by a qualified technician only. Contact a Link-Belt Distributor to arrange for a qualified technician to perform the calibration procedures when required.

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Boom Wear Shoe Adjustment

Boom wear shoes are provided as a means of keeping the boom working smoothly. They must be adjusted periodically to prevent excessive deflection of the boom sections. Refer to Figure 3-6.

1. Park the crane on a firm level surface.
2. Fully extend the side frames. Position the upper facing directly over the front of the lower and engage the travel swing lock. Lower the boom and extend each boom section as required to gain access to each wear shoe.

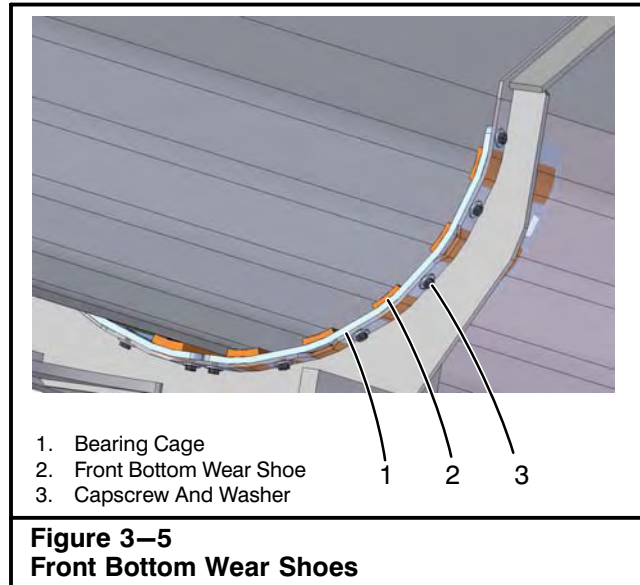


WARNING

To avoid personal injury, do not climb, stand, or walk on the boom. Use a ladder or similar device to reach necessary areas.

To prevent movement of individual boom sections, shutdown the engine and ensure that the operator has properly vacated the operators cab before putting hands or tools inside the boom. Unexpected movement of the boom sections could sever fingers, hands, arms, etc.

3. Check the thickness of the rear bottom center wear shoes. Refer to Figure 3-4 and Figure 3-6.
 - a. The rear bottom center wear shoes are not adjustable. For inspection or replacement, access to the retaining plates for these wear shoes is gained through holes in the sides of the external boom section when the boom is extended.
 - b. To check the thickness of the wear shoe without removal of the wear shoe, the clearance



between the external shell and the retaining pocket can be measured. To get an accurate measurement the internal section must be resting on the rear bottom center wear shoe. An appropriate lifting device must be used to lift the front of the internal section to put pressure on the rear bottom center wear shoe.

Minimum allowable distance is $\frac{1}{4}$ in (6.35mm). The wear shoe must be replaced if the clearance is measured less than this. This can be measured with a gauge made of a stack of shims or other material.

- c. If the wear shoe is removed for inspection, minimum wear shoe thickness is 1.25 in (3.2cm) for the center wear shoes. Wear shoes worn to less than this dimension must be replaced.
 - d. Removal of the rear bottom center wear shoe for all sections is easily done through holes in the sides of the external boom section when the boom is extended.
 - e. If wear shoe was replaced, apply Loctite[®] 242 to the capscrews before installing.
4. Check the thickness of the front bottom wear shoes. The wear shoes are to be replaced when the bottom most wear pads reach a minimum thickness of $\frac{1}{2}$ in (1.3cm). To replace these shoes, extend the internal section out 3 ft, remove the front top wear shoes, lift up on the internal section, remove the capscrews holding the bearing cages, and slide the shoes and bearing cages out of the boom section. The shoes come out the back of the bearing cages for replacement. Reinstall the bearing cages with new shoes and apply Loctite[®] 242 to the capscrews. Lower the internal section back down, reinstall and adjust the front top wear shoes.

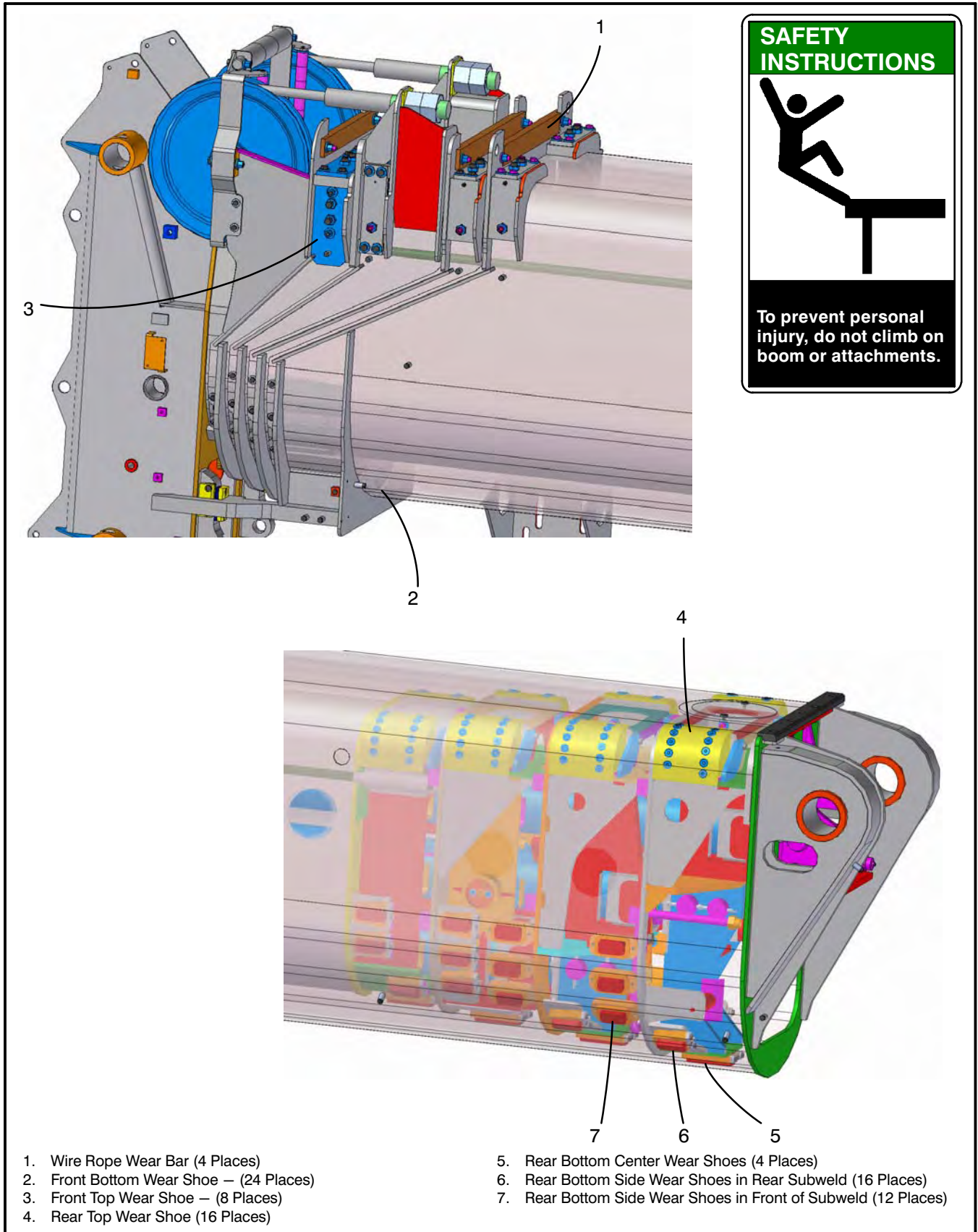
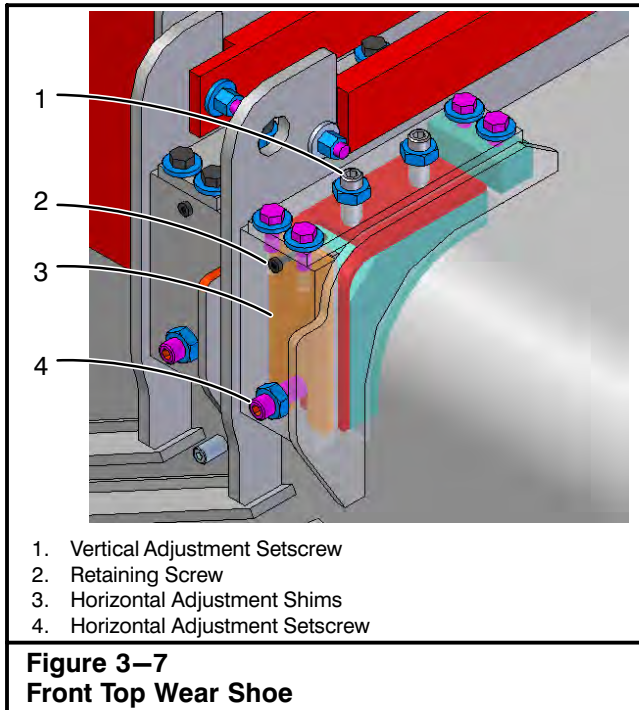


Figure 3–6
Boom Wear Shoe Adjustment And Inspection

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5. Adjust the following wear shoes to ensure the boom is straight and each boom section is centered within the next.

- a. Front Top Wear Shoes

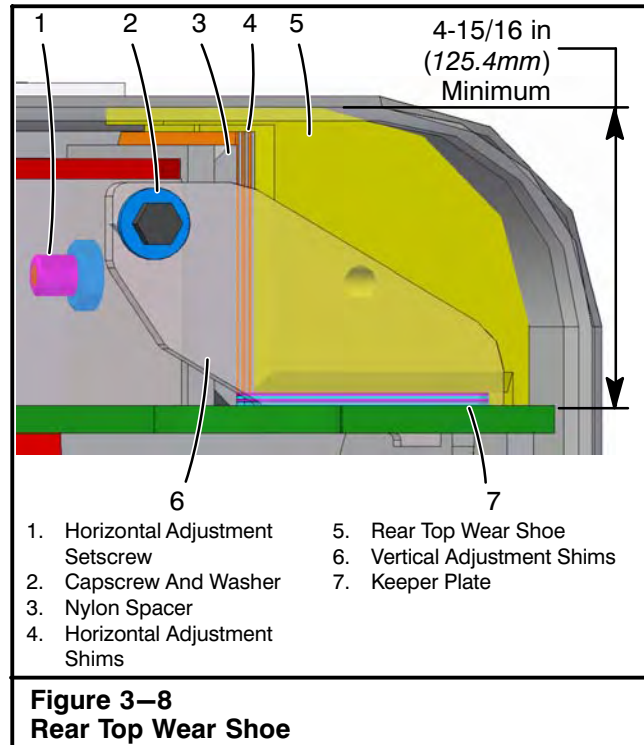
(Refer Figure 3-6 and Figure 3-7)

1. The front top wear shoes are adjustable in both horizontal and vertical directions. The horizontal adjustment is used to center one boom section inside the other. Measure the clearance between sections on each side and space them equally. The wear shoes should contact the inside section on both sides. No clearance between wear shoe and boom section is required.

Note: The base, inner and center sections have shims for taking the load on the horizontal adjustment.

For base and inner sections, install as many horizontal shims as possible between the wear shoe backer plate and the boom plate. Attach the shims to the boom plate with the retaining screw. Back off the adjustment setscrews one complete turn and torque the jam nuts to 150-175 ft lb (204-237Nm).

On the center section install enough shims to match the height of the setscrews on the wear shoe retainer plate after adjusting. Back off the adjustment setscrews one complete turn and torque the jam nuts to 150-175 ft lb (204-237Nm).



2. Vertical adjustment is used to hold the wear shoe down against the top of the inside boom section. Adjust these so that there is no clearance between wear shoes and boom section. Torque the jam nuts to 150-175 ft lb (204-237Nm).
3. Replace when shoe is worn to 0.375 in (0.95cm) minimum thickness or when adjustment is used up whichever comes first.
- b. Rear Top Wear Shoes
(Refer to Figure 3-6 and Figure 3-8)
 1. There is a pair of rear top wear shoes on the side of each boom section. Adjustment of these wear shoes is accomplished through holes in the side and top of the adjacent boom section. Extend only the boom sections required, and just far enough, until the rear top wear shoe adjustment setscrews are accessible through the hole in the top of the adjacent section. Leave the other inner sections fully retracted at this point.
 2. For proper inspection, the rear top wear shoes must be removed and measured. Access through the sides of the boom and remove the capscrews and washers which secure the rear top wear shoes keeper plates. Remove the keeper plates.
 3. Loosen the jam nuts on the adjustment setscrews and back off the adjustment setscrews and remove shims as needed.

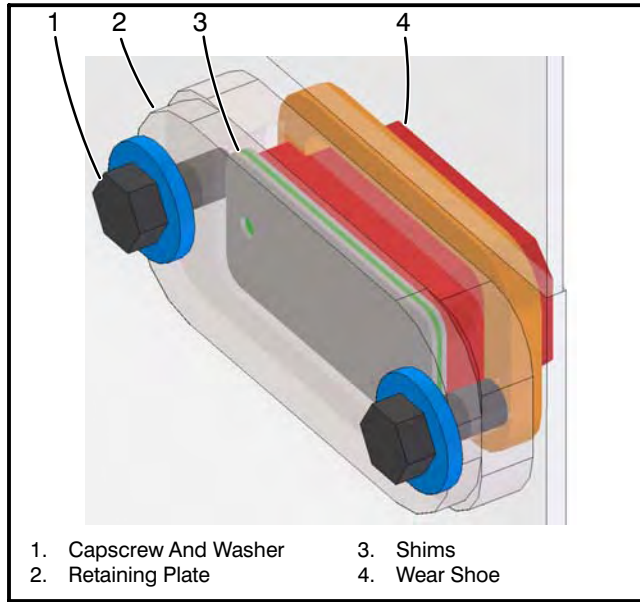


Figure 3-9
Rear Bottom Side Wear Shoe in Front of Subweld

4. Remove and inspect the height of the rear top wear shoes. Minimum wear shoe height is 4-15/16 in (125.4mm). Wear shoes worn to less than this dimension must be replaced.

Note: It will be necessary to lift the extended boom sections, with an appropriate auxiliary lifting device, in order to relieve pressure on the wear shoe for removal and adjustment.

5. Install the rear top wear shoes back into their proper location. Note the orientation of the wear shoes with the large chamfers towards either end. If new wear shoes are being installed, the adjustment setscrews may need to be loosened further and/or horizontal shims removed to allow room for the larger new shoes.
6. Vertical adjustment of the rear top wear shoes is accomplished by installing vertical shims under the wear shoe. Vertical shims should be added so there is no clearance between wear shoe and boom section.
7. Horizontal adjustment of the rear top wear shoes is accomplished with the adjustment setscrews. This adjustment is used to align one section inside another. The straightness of the boom is dependent on this adjustment. Small holes in the sides of the boom sections allow measurements between sections. Set the gap between the sections equal on both sides to ensure boom straightness.

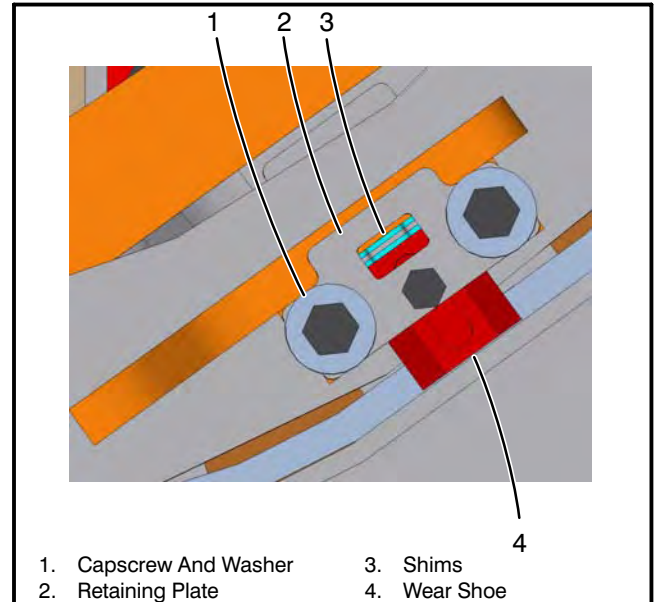


Figure 3-10
Rear Bottom Side Wear Shoe in Rear Subweld

8. Install as many horizontal shims to fill the gap between the nylon spacer plate and the wear shoes on both sides of the boom. Back off the adjustment setscrews one complete turn and torque the jam nuts to 150-175 ft lb (204-237Nm).
 9. Apply Loctite® 242 to the cap screws used to secure the keeper plates.
 10. Install the keeper plates and secure them with the cap screws and washers.
- c. Rear Bottom Side Wear Shoes (Refer to Figure 3-6 and Figure 3-10)
1. The rear bottom side wear shoes are adjustable. Shims should be added to the side wear shoes until the wear shoes are tight against the larger outer section.
 2. For inspection, access to the retaining plates for these wear shoes is gained through holes in the sides of the external boom section when the boom is extended. Some wear shoes are in the rear subweld of the section and some are just in front of it.
 3. For proper inspection, the bottom rear side wear shoes must be removed. Remove the cap screws and washers which secure the retaining plates. Remove the Retaining plates. For wear shoes in front of the rear subwelds a rag or piece of cloth can be put below the wear pads to keep loose parts from falling down into the boom.

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4. Remove shims and wear shoes to inspect the thickness. Minimum wear shoe thickness is 1.25 in (3.8cm) for the side wear shoes. Wear shoes worn to less than this dimension must be replaced.
 5. Install the rear bottom wear shoes back into their pockets and install shims until the wear shoes are tight against the larger outer section.
 6. Apply Loctite® 242 to the capscrews used to secure the retaining plates.
 7. Install the retaining plates and secure them with the capscrews and washers.
6. After adjusting the boom wear shoes, boom up to a 60° angle and fully extend the boom. Confirm that the boom is straight and the sections are centered within each other.

Note: External effects such as sun and wind on one side of the boom or having the crane out of level can make the boom appear to not be aligned. Negate these effects as much as possible when checking boom straightness. Refer to “Boom Distortion Due To Thermal Effects Of The Sun” in Section 1 of this Operator’s Manual.

Boom Extend And Retract Wire Rope Inspection And Adjustment

The boom extend and retract wire ropes must be inspected and the rope anchors torqued periodically to compensate for stretching of the extend and retract wire ropes. Refer to Figure 3–11.

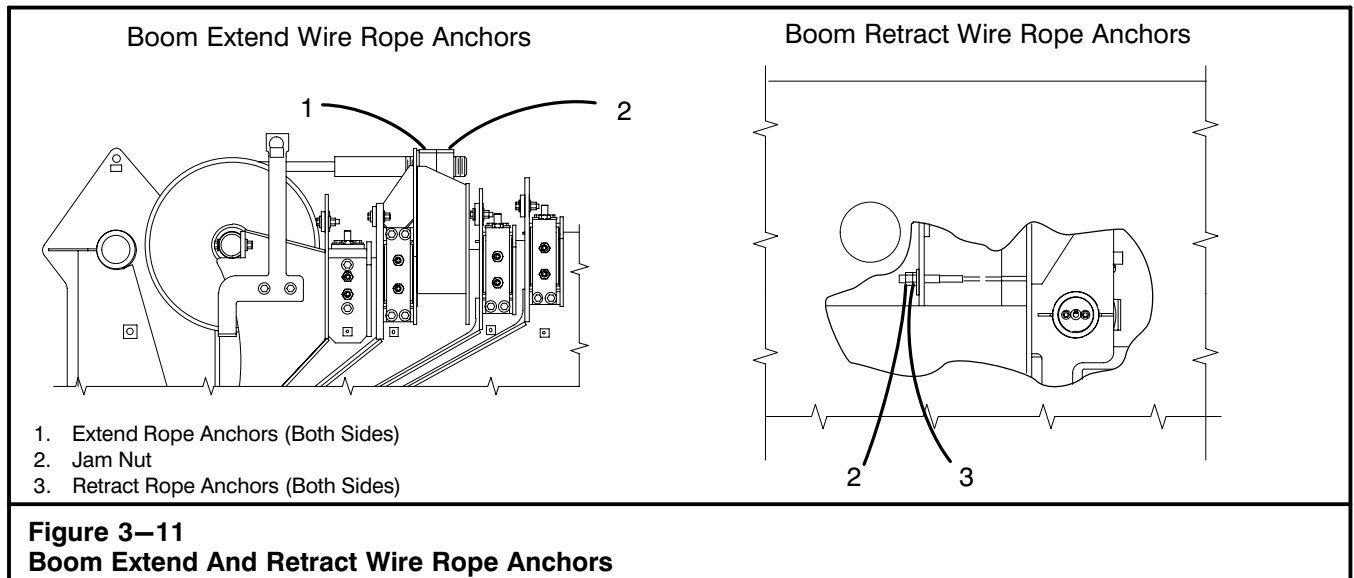


WARNING

To avoid personal injury, do not climb, stand, or walk on the boom. Use a ladder or similar device to reach necessary areas.

Extend/Retract Wire Rope Inspection

1. Fully extend the side frames. Position the upper facing directly over the front or rear of the lower and engage the travel swing lock.
2. Fully extend the boom in “Amax2” mode. Retract the sections approximately 1 ft (30.5cm) to remove the load from the extend wire ropes and allow them to sag



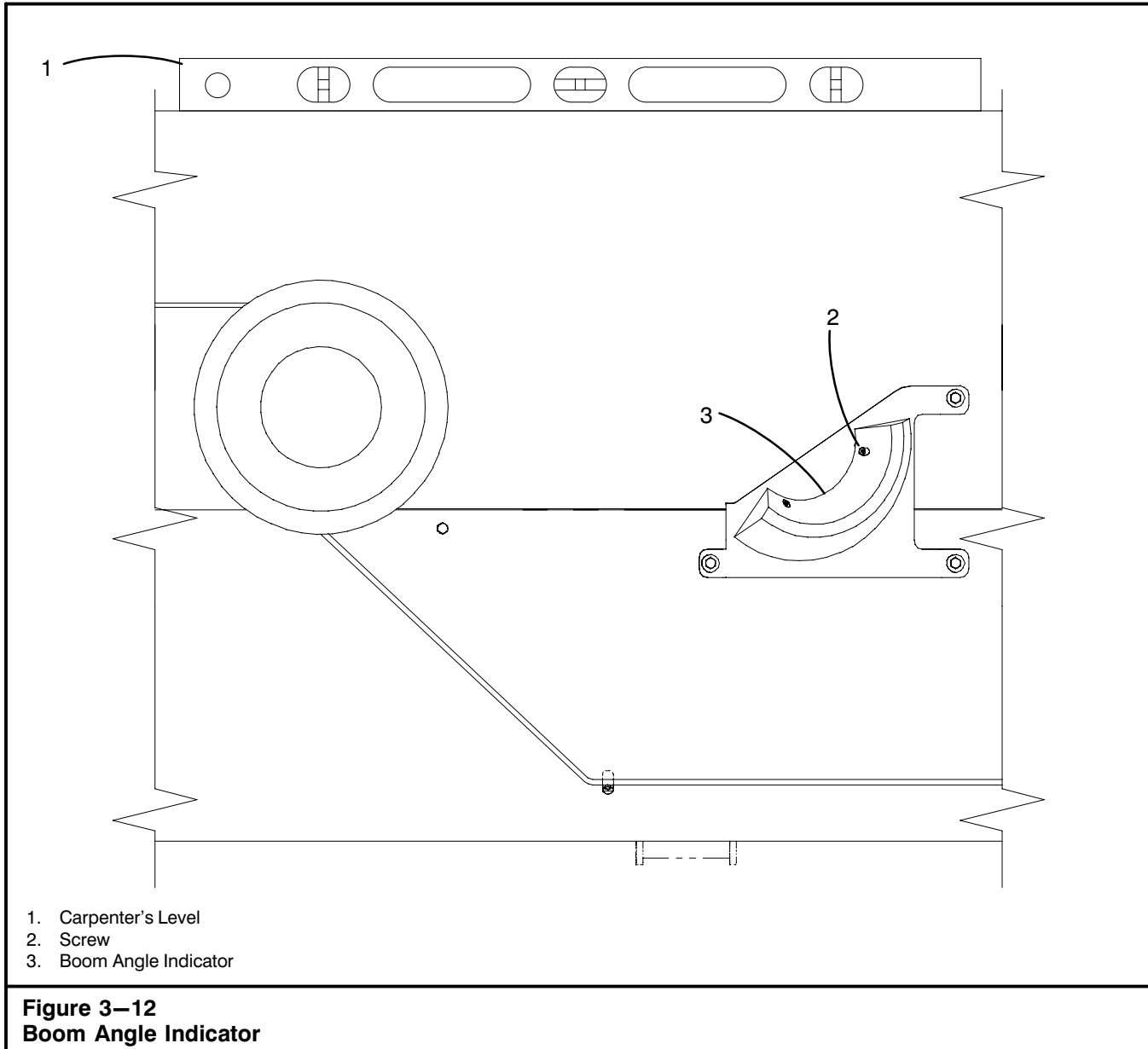
3. If the extend wire ropes sag more than 4 in (10.2cm) or if there is a difference of more than 1/2 in (1.3cm) of sag between the left and the right extend wire ropes, the extend wire ropes must be adjusted. Refer to "Extend And Retract Wire Rope Adjustment".
4. Fully retract the boom. The tip section must touch the stops on the base section and also must have 1/8-3/16 in (3-5mm) gap to the outer section stops.
5. Inspect extend/retract wire rope for wear. Refer to "Wire Rope Inspection And Replacement Recommendations" in Section 5 of this Operator's Manual.
6. Lubricate the extend/retract wire ropes. Refer to "Wire Rope Lubrication" in Section 2 of this Operator's Manual.
3. Tighten the retract cable. The tip will retract 0.1" per turn of the cable nut.
4. Fully retract the boom and check the clearance between the boom head and the outer section stops. The clearance must be 1/8-3/16 in (3-5mm). Repeat steps 2 and 3 until the clearance is to spec. The extend cables may have to be loosened up to get the tip to pull in.
5. Fully retract boom and extend again in "Amax2" mode. Then retract approximately 1 ft (0.3m).
6. Tighten the extend cables at the top front of the center section until there is 1-2 in (2.5-5.1cm) of sag at the center of the rope and equal sag between the left and right ropes.
7. Fully retract boom and verify that the tip section is still has 1/8-3/16 in (3-5mm) clearance to outer section.

Extend/Retract Wire Rope Adjustment

1. Fully extend the side frames. Position the upper facing directly over the front or rear of the lower and engage the travel swing lock.
2. The retract cable is adjusted through access holes in the side plates that line up when the following conditions are met. With the boom mode set to "Amax2", extend the boom out to 85 feet while overriding the T2 section to keep it retracted until the retract cable adjustment nuts are visible in the hole in the side of the outer. To remove tension on the retract cable the last movement of the boom must be extending. Remove the retract shims from the back of the boom head.
8. If the tip section gap to outer section is not spec. then loosen the extend cables slightly and repeat the process of tightening the retract cable and then the extend cables until the tip section gap to the outer section is acceptable when fully retracted and the sag in the extend cables is acceptable.
9. Reinstall retract stop shims as required to fill the space between the base section stops and the dead end lugs on the boom head. Always round up on the number of shims needed to fill the space. Example: If 3.5 shims would fit, put 4 shims in.

Note: A special wrench is provided to aid in the adjustment of the extend wire rope nuts.

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Boom Angle Indicator Adjustment

A bubble type boom angle indicator is mounted on the base section of the boom to the right of the operator's cab. Refer to Figure 3–12. It must be adjusted properly and the crane must be level for the unit to accurately indicate boom angles. Check the adjustment of the boom angle indicator daily to ensure its accuracy.

1. Fully extend the side frames. Position the upper facing directly over the front or rear of the lower and engage the travel swing lock
2. Fully retract the boom. Boom down to 0° angle.
3. Verify the crane is level by placing a carpenter's level across the front of upper frame. Check that the crane is level with the upper over the front and over the side of the crane. Install cribbing under the tracks as required until crane is level side to side and front to rear.
4. Once the crane is level, verify that the boom is at 0° angle by placing carpenter's level on top of the boom. Refer to Figure 3–12. Adjust the boom as necessary.
5. If necessary, loosen the screw and adjust the angle indicator until the bubble within the vial is located under the 0° mark. Tighten the screw.

Hydraulic System Relief Valve Adjustment

The following instructions pertain to checking and setting all relief valve pressures in the hydraulic system. All cranes are tested and properly adjusted before leaving the factory and should not need checking when first put into operation. Each 250 hours of operation, the relief valve pressure settings should be checked. A drop in relief valve pressure setting may be noticed the first time checked. This is normal and is probably due to lessening of spring tension or stress relief in relief valve parts.

If a new or rebuilt pump is installed, all relief valve pressures must be backed off and reset, as outlined in this Section of this Operator's Manual before putting the crane back in operation. The purpose of this is to avoid the possibility of damaging the new pump from overpressurization if relief valves are set incorrectly. Do not operate the crane over relief pressures for extended periods of time to avoid overheating of hydraulic oil.



DANGER

When it is required to operate the crane during maintenance and/or adjustments, use extreme caution as service personnel may have to work near and/or under moving machinery. Serious personal injury and/or death may result. Always remain in visual and/or verbal contact to ensure the safety of service personnel. Use a signal person if necessary.

CAUTION

Relief valves are provided to protect the hydraulic system. Do not increase relief valve pressures above specifications or hydraulic system damage may occur.

Preparing The Crane For Checking Relief Pressures

1. Park the crane on a firm level surface. Position the upper directly over the front or rear of the lower and engage the travel swing lock.
2. Operate the hydraulic functions as required to bring the hydraulic oil temperature to its normal operating range. Refer to Section 2 of this Operator's Manual for oil operating temperature ranges.
3. Fully retract and lower the boom. Shutdown the engine.

Note: Checking relief valve pressures is simplified by using two persons, one in the operator's cab to operate the controls and one to check and adjust the relief valves.

Relief Valve Pressure Checking Instructions

Refer to Figure 3–13 and Figure 3–14 for relief valve and quick disconnect fitting locations.

1. Use a gauge of known accuracy. Have the gauge calibrated if necessary. Use a snubber or gate valve to reduce shock loading in the gauge.
2. Release the hydraulic system precharge pressure by loosening the breather/filler cap on the hydraulic reservoir 1/4 turn until pressure is fully relieved.
3. Turn the ignition key to the "ON" position but do not start the engine and work the control or switch, for the circuit being checked, back and forth to relieve any trapped hydraulic pressure.



WARNING

All trapped hydraulic pressure must be exhausted from the system before installing a gauge in any quick disconnect. A sudden release of hot oil could cause burns or other serious injury.

4. Install the pressure gauge on the quick disconnect fitting.
5. Refer to the Figure 3–13 to determine the correct pressure setting for the circuit being checked. Also, review the procedure for checking that particular circuit.
6. Start the engine.
7. If applicable, fully engage the control for the circuit being checked and hold it in that position.
8. With the engine running at the speed specified, check the gauge for the correct reading, adjust as required.

Note: Obtain each final pressure by bringing the pressure up to the proper setting, not by backing down to it.

9. Allow the engine to return to idle before shutting it down.
10. Release the hydraulic system precharge pressure and work the control back and forth to relieve any hydraulic pressure before removing pressure gauge from the quick disconnect fitting.

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Hydraulic Pressure Settings

Valve	Hydraulic Circuit	Quick Disconnect & Adjustment Location	Relief Valve Setting*
1	Pilot Control	Figure 3–14 & Figure 3–15	500 psi +0 –50 psi (3 448kPa) (+0 –344kPa)
2	Side Frame Extend/Retract Counterweight Retract	Figure 3–14 & Figure 3–16	3,500 psi (24 132kPa)
	Swing	Figure 3–14 & Figure 3–16	2,600 psi (17 927kPa)
3	Counterweight Extend	Figure 3–14 & Figure 3–17	1,500 psi (10 342kPa)
4	Travel	Figure 3–14 & Figure 3–18	5,000 psi (34 475kPa)
	Boom Hoist		
	Extend	Figure 3–14 & Figure 3–18	3,900 psi (26 890kPa)
	Retract		2,500 psi (17 237kPa)
	Boom Telescope		
	Extend	Figure 3–14 & Figure 3–18	3,000 psi (20 685kPa)
	Retract Inner Center Outer/Tip		4,700 psi (32 406kPa) 4,600 psi (31 717kPa) 4,500 psi (31 027kPa)
	Front & Rear Winch	Figure 3–14 & Figure 3–18	4,150 psi (28 614Pa)
5	Hydraulic Oil Cooler Fan Motor	Figure 3–14 & Figure 3–19	2,900 psi (19 995kPa)

***Adjust All Pressures to Within ± 50 psi (± 344 kPa) Except Where Noted.**

**Figure 3–13
Relief Valves Pressures & Adjusting Procedures**

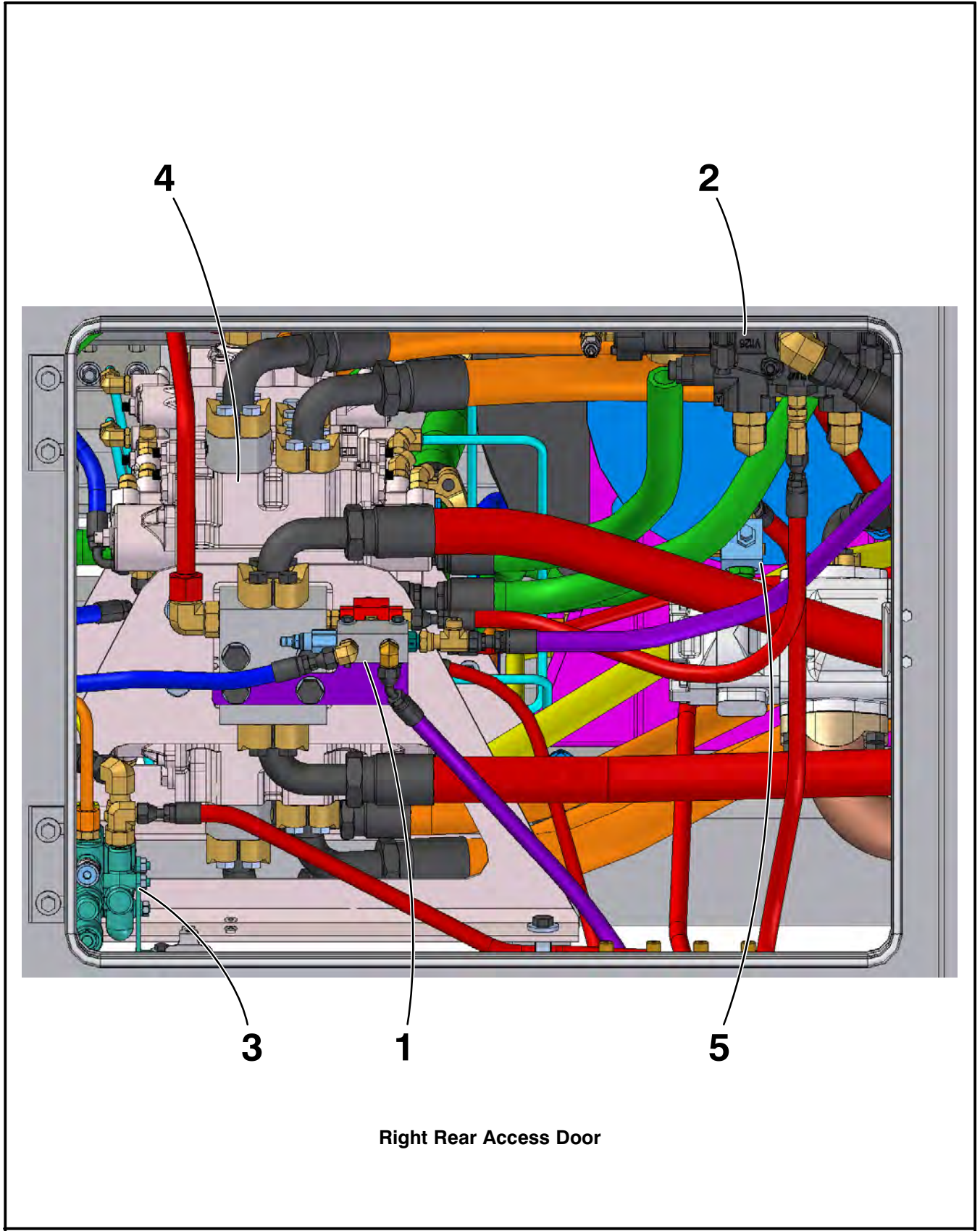
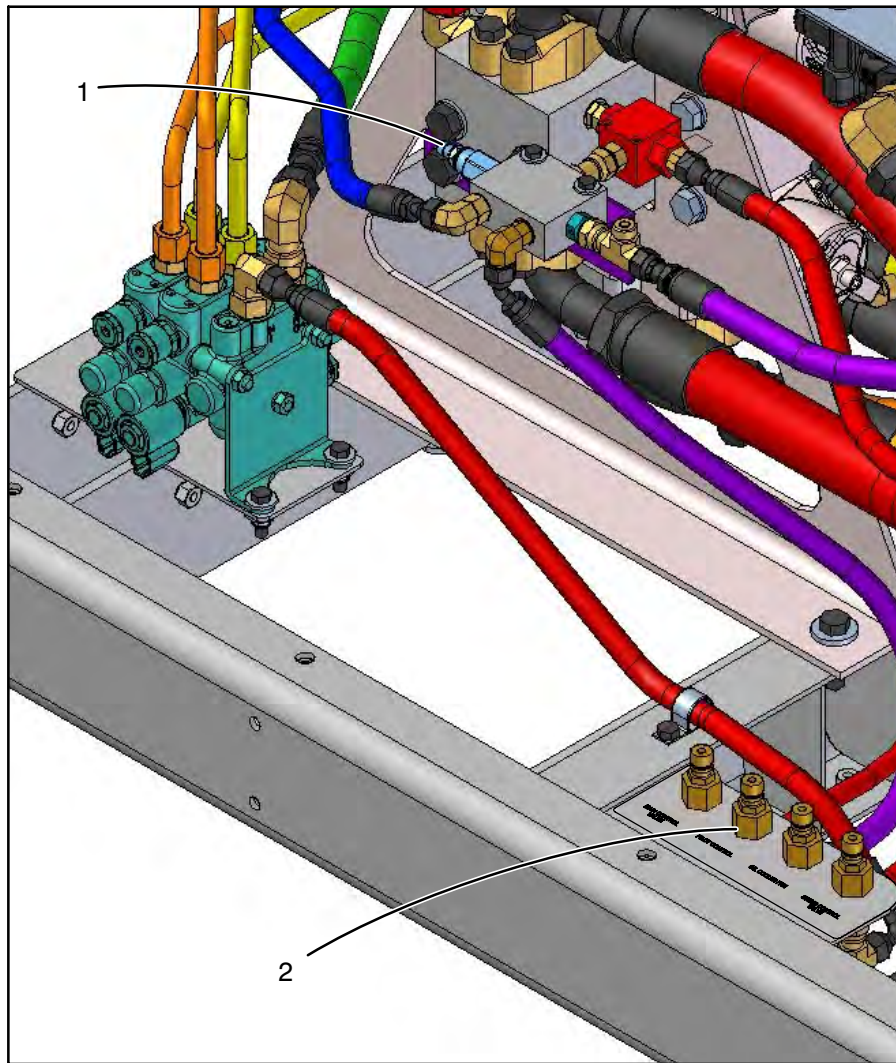


Figure 3–14
Relief Valves

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1. Relief Valve Adjuster
2. Quick Disconnect Fitting

Figure 3–15
Relief Valve 1 – Pilot Control Circuit

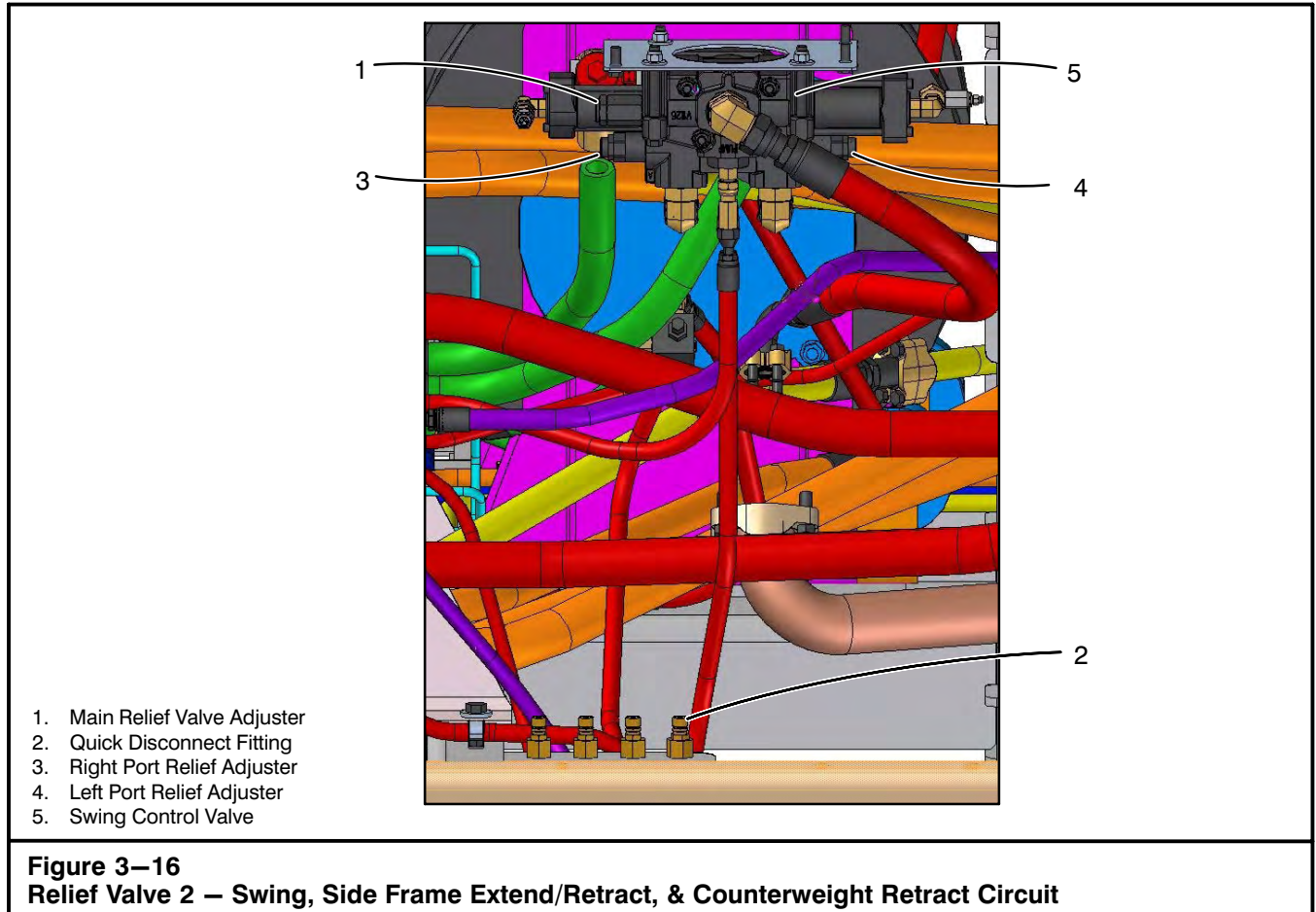
Pilot Control Adjusting Procedure

1. Review all the general instructions in this Section of this Operator's Manual per "Preparing The Crane For Checking Relief Pressures" and "Relief Valve Pressure Checking Instructions".

Note: Idle speed must be maintained in order to obtain an accurate reading.

2. Install the pressure gauge on the quick disconnect fitting.

3. Start the engine and maintain idle speed.
4. Hold any hydraulic function over relief and check pressure. Adjust pressure as required to 500 psi $+0 -50$ psi (3 448kPa $+0 -344$ kPa).
5. Shutdown the engine.
6. Relieve hydraulic system pressure.
7. Remove the pressure gauge from the quick disconnect fitting.



Swing Circuit Adjusting Procedure

1. Review all the general instructions in this Section of this Operator's Manual per "Preparing The Crane For Checking Relief Pressures" and "Relief Valve Pressure Checking Instructions".

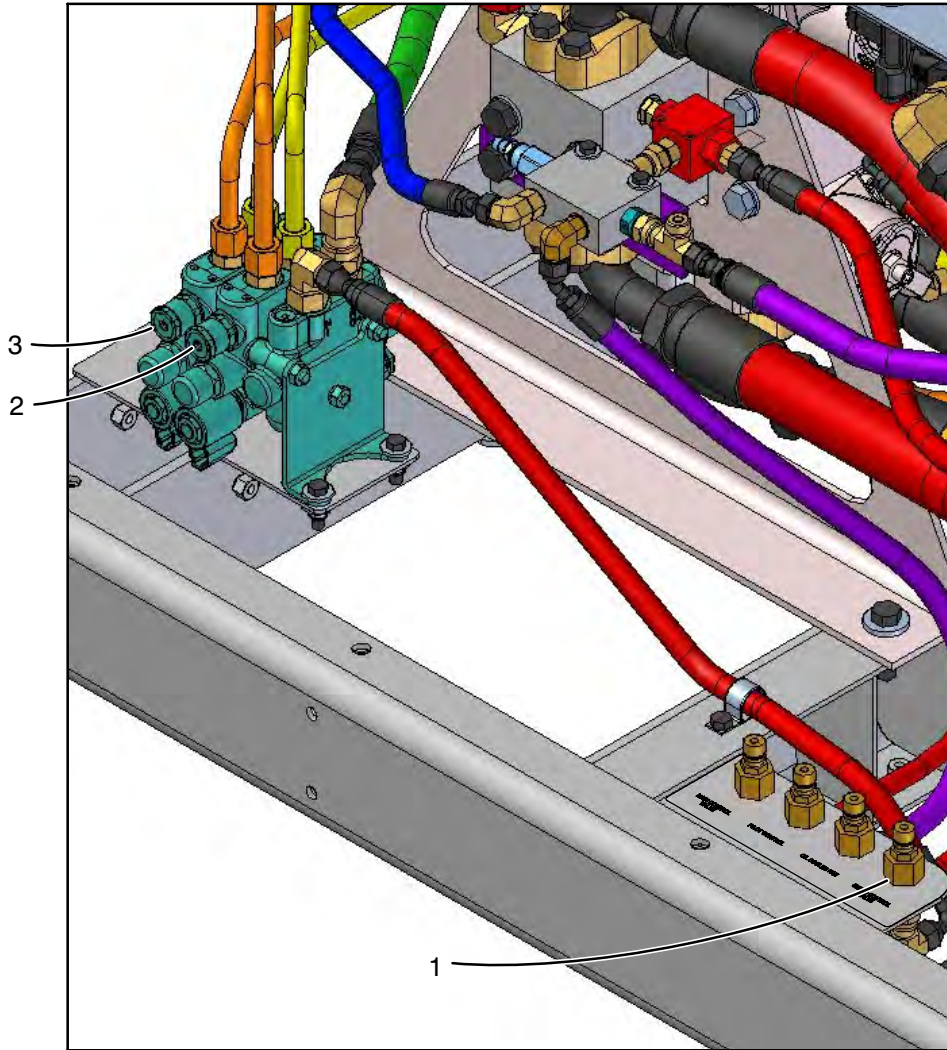
Note: Idle speed must be maintained in order to obtain an accurate reading.

2. Install the pressure gauge on the quick disconnect fitting.
3. Start the engine and maintain idle speed.
4. Engage the swing park brake.
5. Move the swing control lever to the swing left position and hold. Check pressure.
6. Adjust left port relief pressure as required to 2,600 psi (17 927kPa).
7. Move the swing control lever to the swing right position and hold. Check pressure.
8. Adjust right port relief pressure as required to 2,600 psi (17 927kPa).
9. Shutdown the engine.
10. Relieve hydraulic system pressure.
11. Remove the pressure gauge from the quick disconnect fitting.

Side Frame Extend/Retract & Counterweight Retract Circuit Adjusting Procedure

1. Review all the general instructions in this Section of this Operator's Manual per "Preparing The Crane For Checking Relief Pressures" and "Relief Valve Pressure Checking Instructions".
2. Install the pressure gauge on the quick disconnect fitting.
3. Start the engine and gradually increase the engine speed to full throttle.
4. Engage the counterweight control in the retract position or the side frame control in the extend or retract position and hold. Check pressure.
5. Adjust main relief pressure on the swing control valve as required to 3,500 psi (24 132kPa).
6. Return engine to idle speed and shutdown.
7. Relieve hydraulic system pressure.
8. Remove the pressure gauge from the quick disconnect fitting.

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1. Counterweight Cylinder Extend Port Relief Quick Disconnect Fitting
2. Right Cylinder Port Relief Adjuster
3. Left Cylinder Port Relief Adjuster

Figure 3–17
Relief Valve 3 – Counterweight Extend Circuit

Counterweight Extend Circuit Adjusting Procedure

1. Review all the general instructions in this Section of this Operator's Manual per "Preparing The Crane For Checking Relief Pressures" and "Relief Valve Pressure Checking Instructions".

Note: Idle speed must be maintained in order to obtain an accurate reading.

2. Install the pressure gauge on the counterweight cylinder port relief quick disconnect fitting (fitting marked Swing Control Valve).

3. Start the engine and maintain idle speed.
4. Engage the left counterweight control in the extend position and hold. Check pressure.
5. Adjust the left cylinder port relief adjuster as required to 1,500 psi (10 342kPa).
6. Engage the right counterweight control in the extend position and hold. Check pressure.
7. Adjust the right cylinder port relief adjuster as required to 1,500 psi (10 342kPa).
8. Shutdown the engine, relieve hydraulic system pressure, and remove the pressure gauge.

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Travel Circuit Adjusting Procedure

Refer to Figure 3–18.

1. Review all the general instructions in this Section of this Operator's Manual per "Preparing The Crane For Checking Relief Pressures" and "Relief Valve Pressure Checking Instructions".
2. Remove and plug the brake line to the travel motor.
3. Install the pressure gauge on the quick disconnect fitting marked "Main Control Valve".
4. Start the engine and gradually increase the engine speed to full throttle.
5. Engage a travel control and hold. Check pressure.
6. Adjust pressure as required to 5,000 psi (34 475kPa).
7. Return engine to idle speed and shutdown.
8. Relieve hydraulic system pressure.
9. Remove the pressure gauge from the quick disconnect fitting.
10. Remove the plug and install brake line to the travel motor.

Boom Hoist Circuit Adjusting Procedure

Refer to Figure 3–18.

1. Review all the general instructions in this Section of this Operator's Manual per "Preparing The Crane For Checking Relief Pressures" and "Relief Valve Pressure Checking Instructions".
2. Install the pressure gauge on the quick disconnect fitting marked "Main Control Valve".
3. Start the engine and gradually increase the engine speed to full throttle.
4. Move the boom hoist control lever to the boom up position and hold. Check pressure.
5. Adjust boom up port relief pressure as required to 3,900 psi (26 890kPa).
6. Move the boom hoist control lever to the boom down position and hold. Check pressure.
7. Adjust boom down port relief pressure as required to 2,500 psi (17 237kPa).
8. Return engine to idle speed and shutdown.
9. Relieve hydraulic system pressure.
10. Remove the pressure gauge from the quick disconnect fitting.

Boom Telescope Circuit Adjusting Procedure

Refer to Figure 3–18.

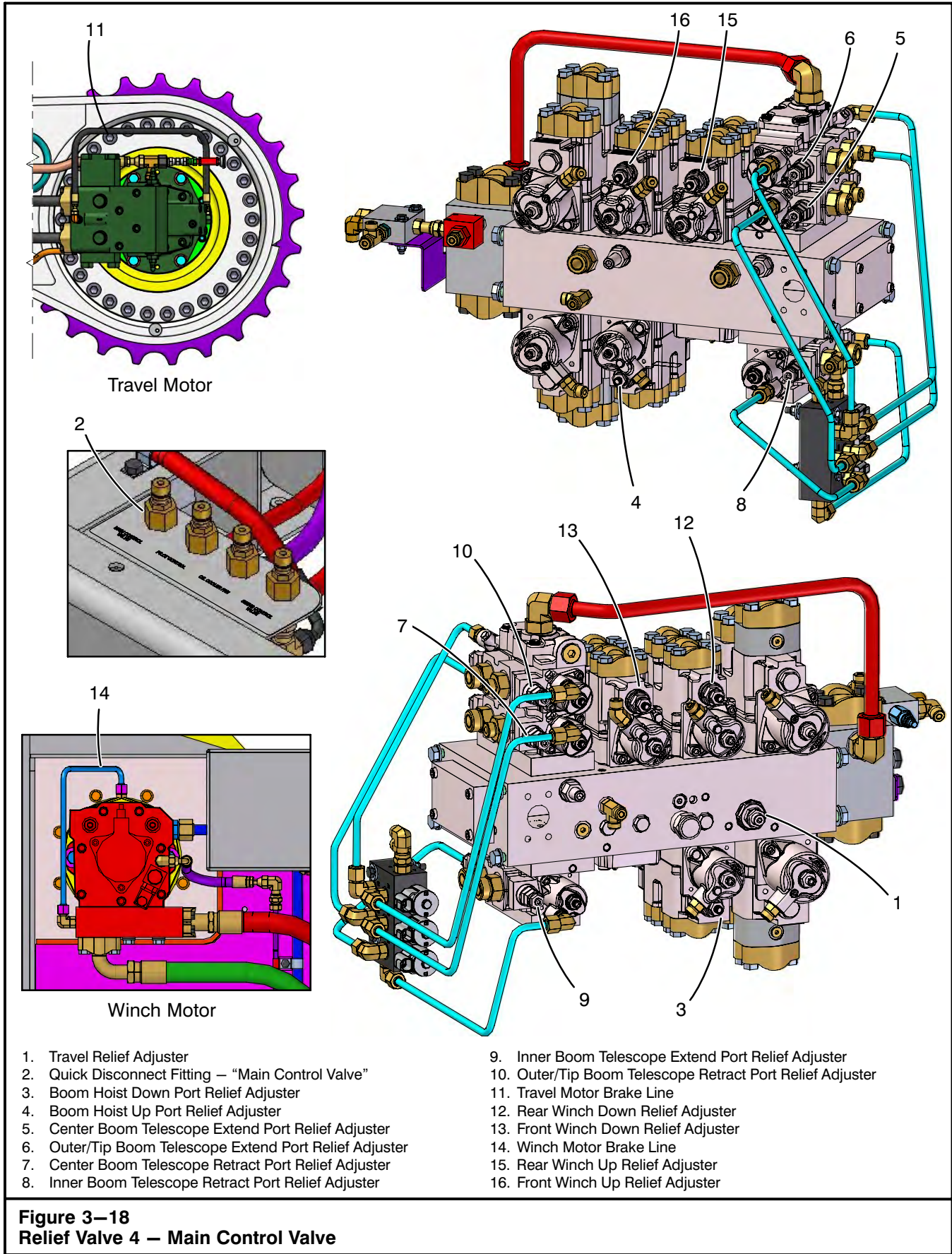
1. Review all the general instructions in this Section of this Operator's Manual per "Preparing The Crane For Checking Relief Pressures" and "Relief Valve Pressure Checking Instructions".
2. Install the pressure gauge on the quick disconnect fitting marked "Main Control Valve".
3. Start the engine and gradually increase the engine speed to full throttle.
4. Using the telescope override switch, extend each boom section and hold. Check pressure.
5. Adjust inner, center, and outer/tip extend port relief pressures as required to 3,000 psi (20 685kPa).
6. Move the boom telescope control lever to the retract position and hold. Adjust the center and outer/tip retract port relief pressures above 4,700 psi (32 406kPa).
7. Adjust inner retract port relief pressure as required to 4,700 psi (32 406kPa), then adjust center retract port relief pressure as required to 4,600 psi (31 717kPa), then adjust outer/tip retract port relief pressure as required to 4,500 psi (31 027kPa).
8. Return engine to idle speed and shutdown.
9. Relieve hydraulic system pressure.
10. Remove the pressure gauge from the quick disconnect fitting.

Winch Circuit Adjusting Procedure

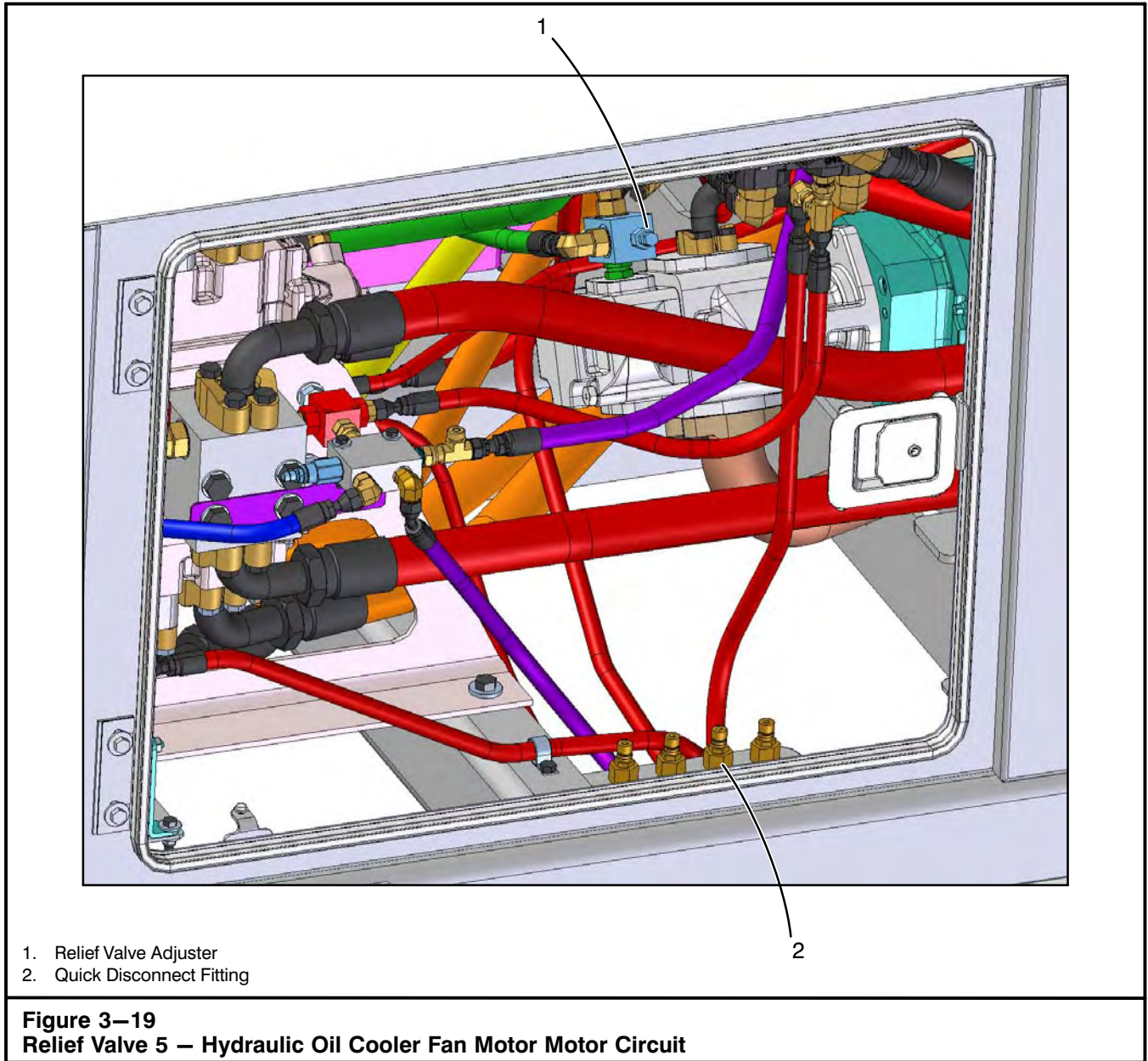
Refer to Figure 3–18.

1. Review all the general instructions in this Section of this Operator's Manual per "Preparing The Crane For Checking Relief Pressures" and "Relief Valve Pressure Checking Instructions".
2. Remove and plug the brake line to the winch motor.
3. Install the pressure gauge on the quick disconnect fitting marked "Main Control Valve".
4. Start the engine and gradually increase the engine speed to full throttle.
5. Move the winch control lever to the down position. Check pressure.
6. Adjust winch down pressure as required to 4,150 psi (28 614Pa).
7. Return engine to idle speed and shutdown.
8. Relieve hydraulic system pressure.
9. Remove the pressure gauge from the quick disconnect fitting.
10. Remove the plug and install brake line to the winch motor.
11. Repeat procedure for the other winch if equipped.

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- | | |
|---|---|
| <ul style="list-style-type: none"> 1. Travel Relief Adjuster 2. Quick Disconnect Fitting – “Main Control Valve” 3. Boom Hoist Down Port Relief Adjuster 4. Boom Hoist Up Port Relief Adjuster 5. Center Boom Telescope Extend Port Relief Adjuster 6. Outer/Tip Boom Telescope Extend Port Relief Adjuster 7. Center Boom Telescope Retract Port Relief Adjuster 8. Inner Boom Telescope Retract Port Relief Adjuster | <ul style="list-style-type: none"> 9. Inner Boom Telescope Extend Port Relief Adjuster 10. Outer/Tip Boom Telescope Retract Port Relief Adjuster 11. Travel Motor Brake Line 12. Rear Winch Down Relief Adjuster 13. Front Winch Down Relief Adjuster 14. Winch Motor Brake Line 15. Rear Winch Up Relief Adjuster 16. Front Winch Up Relief Adjuster |
|---|---|



Hydraulic Oil Cooler Fan Motor Motor Circuit Adjusting Procedure

1. Review all the general instructions in this Section of this Operator's Manual per "Preparing The Crane For Checking Relief Pressures" and "Relief Valve Pressure Checking Instructions".
2. Unplug solenoid on fan motor.
3. Ensure the hydraulic oil temperature is 50–100°F (10–38 °C)
4. Install the pressure gauge on the quick disconnect fitting.
5. Start the engine and gradually increase the engine speed to full throttle.
6. Loosen the jam nut on the relief valve adjuster and back off the relief valve adjuster approximately one turn. Turn in the relief valve adjuster until pressure stops rising or has reached 3,000 psi (20 685kPa), whichever comes first, and then turn the relief valve adjuster in one-half turn and tighten the jam nut. The pressure should read approximately 2,900 – 3,000 psi (19 995 – 20 685kPa). Adjust as required.
7. Return engine to idle speed and shutdown.
8. Relieve hydraulic system pressure.
9. Remove the pressure gauge from the quick disconnect fitting.
10. Reconnect plug to fan motor solenoid.

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First Layer/Third Wrap Calibration (If Equipped)

The crane may be equipped with a first layer/third wrap warning system. This system allows the operator to monitor the wire rope windings on the drum(s). In order for this system to function correctly, it must be properly calibrated using the controls on the Crane Control Display. Refer to Figure 3–20. Calibrate the system anytime wire rope is installed on the winch drum(s) or the live end of the wire rope is wound past the winch drum(s).

Note: When the first layer/third wrap is enabled, first layer and third wrap warning indicators on the calibration screen will illuminate when either of these conditions are met. Warning indicators will also be displayed on the RCL screen.



WARNING

The first layer/third wrap system will not function properly if the live end of the hoist wire rope is wound past the winch drum(s). Wire rope failure may occur. Recalibrate the first layer/third wrap system so that three (3) full wraps of wire rope are maintained on the winch drum(s) at all times during operation.

1. Park the crane on a firm level surface.
2. Set the RCL System to Rigging Mode.



WARNING

The RCL is not operational when in the Rigging Mode. Return the RCL to normal operation before operating the crane.

3. Wind wire rope off the rear drum until only four full wraps are left on the drum. Or if installing wire rope on the drum, properly install the drum wedge to anchor the wire rope to the drum. Refer to “Anchoring Wire Rope To Drum” and “Winding Wire Rope On Drum” in Section 5 of this Operator’s Manual for instructions. Properly wind four full wraps on the drum.
4. Visually verify that four full wraps are on the rear drum before proceeding.
5. From the Main Working Screen, press the Function Key F4 to bring up the First Layer/Third Wrap Calibration Screen. Refer to Figure 3–20.

6. Press and hold the Function Key F3 to calibrate third wrap for the rear drum until a confirmation pop-up window appears.
7. Press Function Key F2 (Yes) to confirm or Function Key F3 (No) to cancel. Blue indicator light illuminates to confirm third wrap for the rear drum is calibrated.
8. Wind wire rope onto the rear drum until the first layer is wound fully onto the drum. Visually verify that one full layer is spooled correctly on the drum before proceeding.
9. Press and hold the Function Key F4 to calibrate first layer for the rear drum until a confirmation pop-up window appears.
10. Press Function Key F2 (Yes) to confirm or Function Key F3 (No) to cancel. Blue indicator light illuminates to confirm first layer for the rear drum is calibrated.
11. Properly wind the remaining wire rope on the rear drum. Refer to “Winding Wire Rope On Drum” in Section 5 of this Operator’s Manual.
12. Wind wire rope off the front drum (if equipped) until only four full wraps are left on the drum. Or if installing wire rope on the drum, properly install the drum wedge to anchor the wire rope to the drum. Refer to “Anchoring Wire Rope To Drum” and “Winding Wire Rope On Drum” in Section 5 of this Operator’s Manual. Properly wind four full wraps on the drum.
13. Visually verify that four full wraps are on the front drum before proceeding.
14. Press and hold the Function Key F1 to calibrate third wrap for the front drum until a confirmation pop-up window appears. Refer to Figure 3–20.
15. Press Function Key F2 (Yes) to confirm or Function Key F3 (No) to cancel. Blue indicator light illuminates to confirm third wrap for the front drum is calibrated.
16. Wind wire rope onto the front drum until the first layer is wound fully onto the drum. Visually verify that one full layer is spooled correctly on the drum before proceeding.
17. Press and hold the Function Key F2 to calibrate first layer for the front drum until a confirmation pop-up window appears.
18. Press Function Key F2 (Yes) to confirm or Function Key F3 (No) to cancel. Blue indicator light illuminates to confirm first layer for the front drum is calibrated.
19. Properly wind the remaining wire rope on the front drum. Refer to “Winding Wire Rope On Drum” in Section 5 of this Operator’s Manual.
20. Return RCL System to the normal operating mode.

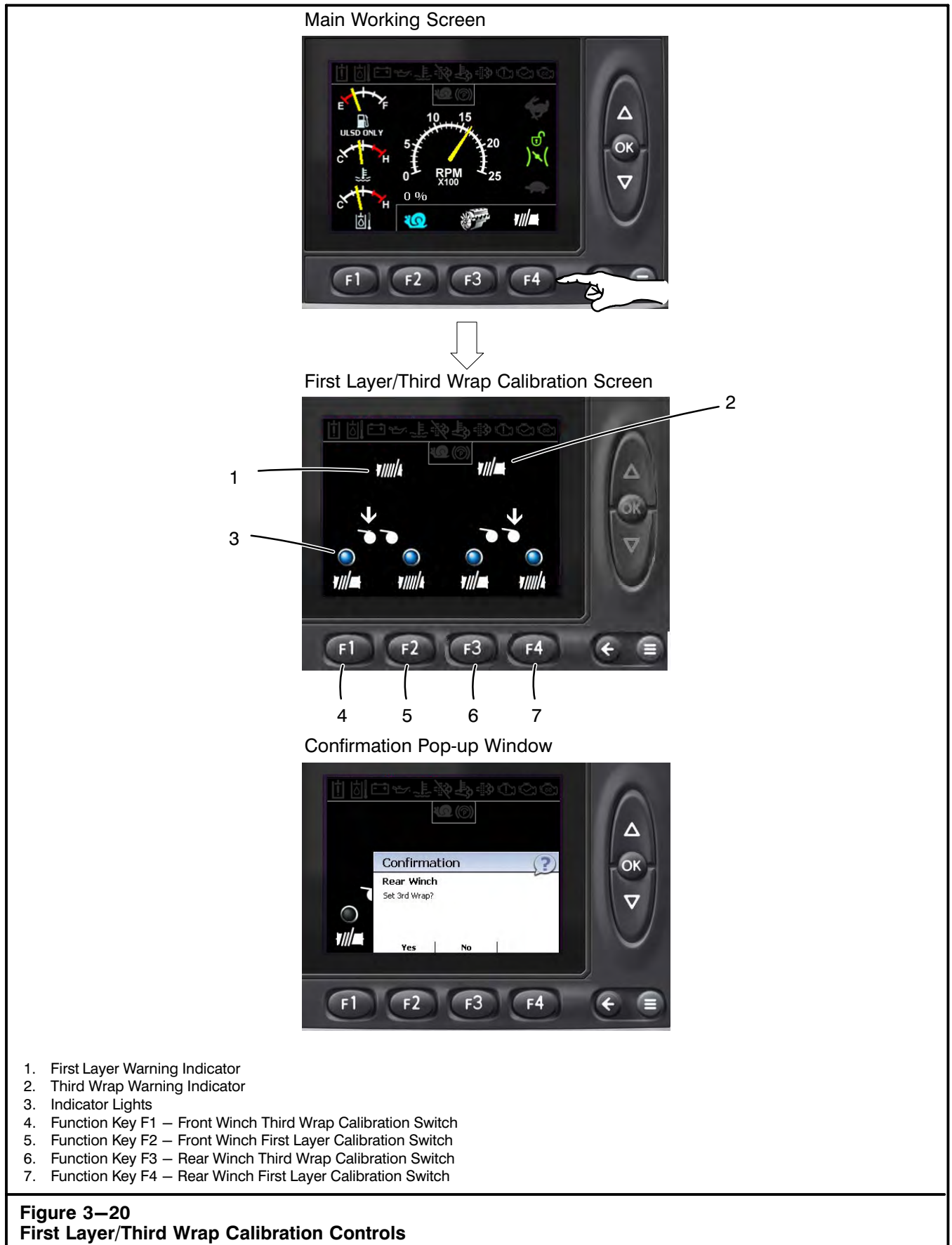
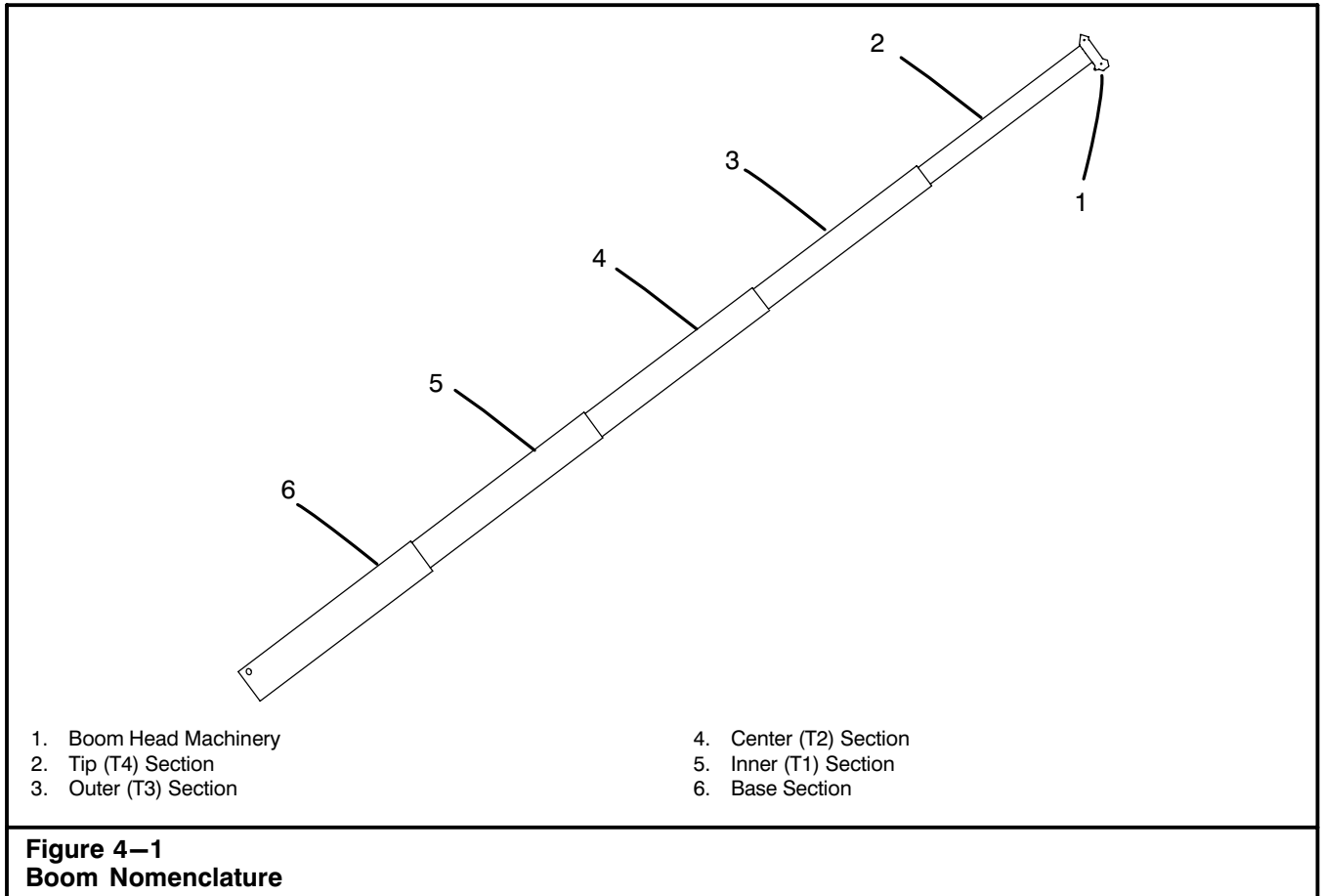


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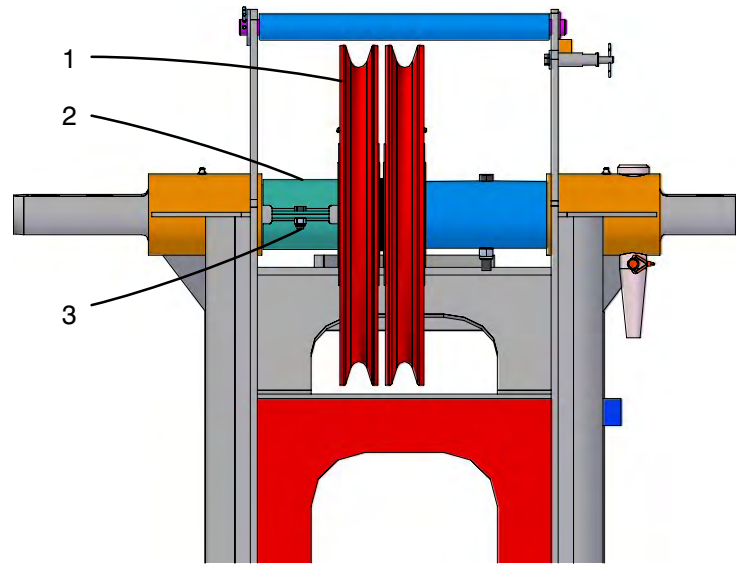


Boom

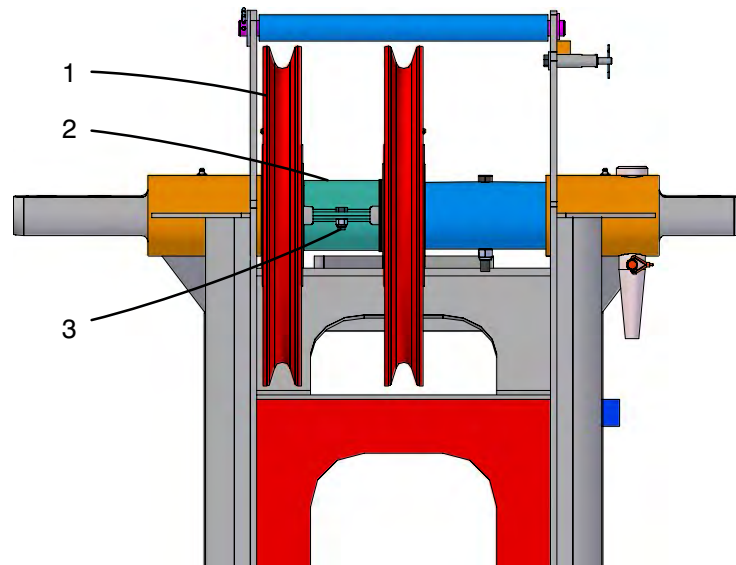
The crane is equipped with a five section full power boom. It consists of five basic parts: a base, inner (T1), center (T2), outer (T3), and a tip (T4) section. Refer to Figure 4–1. The base section is connected to the upper revolving frame. The boom is raised and lowered by the boom hoist cylinder.

The telescoping feature of the boom sections is operated through the use of three hydraulic cylinders and a cable sheave mechanism which are an integral part of the boom assembly. The T1, T2, T3, and T4 sections of the boom are “power sections”. Power sections can be extended or retracted to any desired length using the boom telescope control in the operator’s cab. Refer to Section 1 of this Operator’s Manual for complete operating instructions.

Operator's Manual



Center Position



Far Right Position

1. Adjustable Right Deflector Sheave
2. Split Spacer
3. Capscrew And Locknut

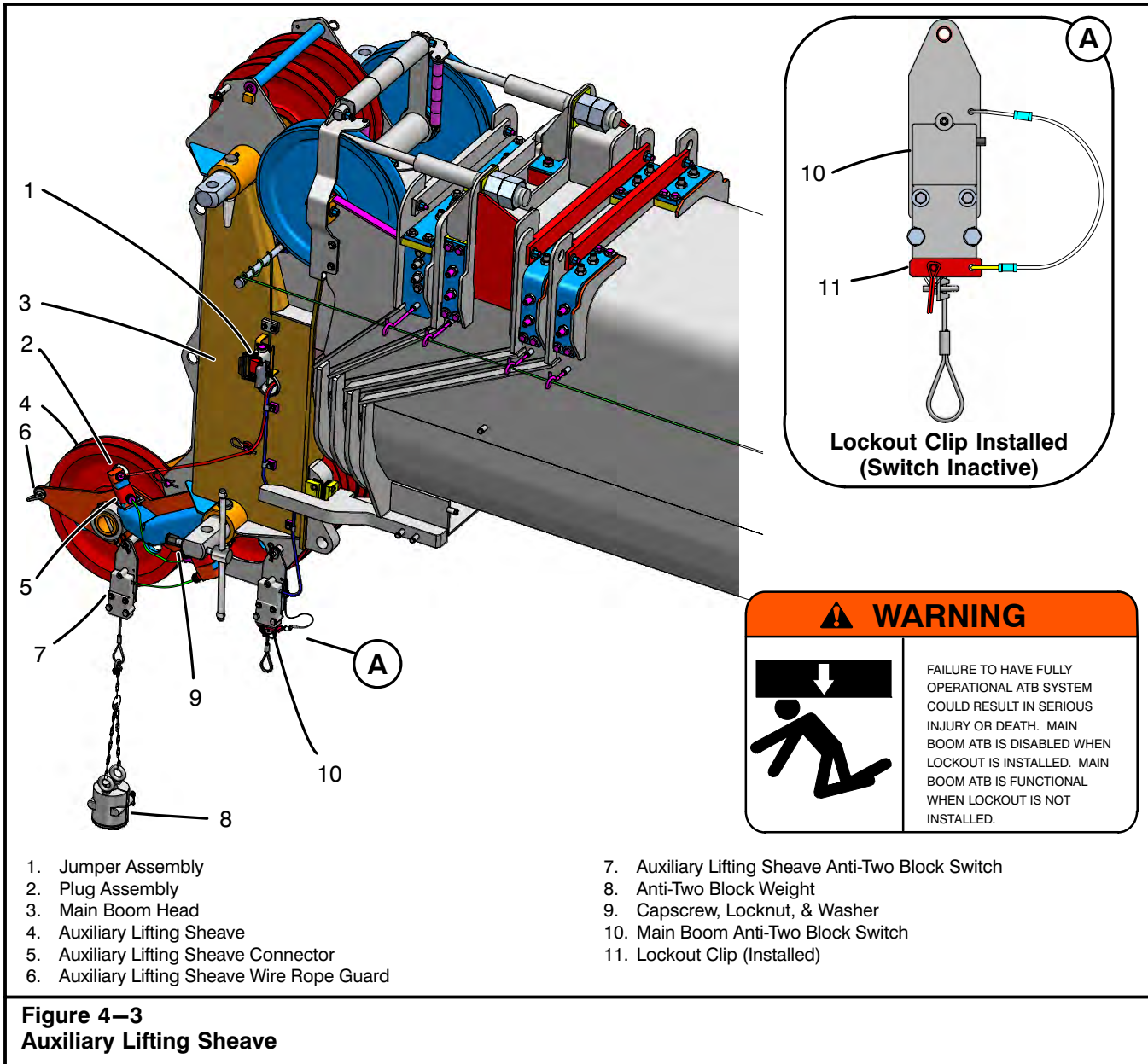
**Figure 4-2
Adjustable Boom Head Deflector Sheave**

Adjustable Boom Head Deflector Sheave

The position of the right deflector sheave on the boom head machinery is adjustable. Refer to Figure 4–2. The purpose is to keep the wire rope(s) as near the center of the boom as possible to reduce side pull on the boom.

In general the sheave should be kept in the position nearest the center of the boom. If 4 or more parts of line are reeved on the main boom head, the top right sheave can be moved to the right side of the boom head by removing the capscrew and locknut from the split spacer on the top head shaft. Slide the sheave to the right and then install the split spacer between the sheaves. Secure split spacer with the capscrew and locknut.

Operator's Manual



Auxiliary Lifting Sheave

The auxiliary lifting sheave connects to the boom head machinery. It is used for reeving winch wire rope for the second winch drum. Once installed, it may be left in place without interfering with installation, erection, or storage of other boom attachments.

! WARNING

The auxiliary lifting sheave adds weight to the boom which must be considered in lifting capacities. When making lifts from the main boom or fly with the auxiliary lifting sheave installed, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities.

Operator's Manual

Installation Of Auxiliary Lifting Sheave

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.
2. Boom down and/or extend the boom as required, to ease access to the boom head machinery.
3. Adequately support the auxiliary lifting sheave with an appropriate lifting device. It weighs approximately 120 lb (54kg). Position the auxiliary lifting sheave frame under the boom head machinery cross shaft. Align the holes in the auxiliary lifting sheave frame with the lugs in the main boom and install capscrews, locknuts, and washers. Refer to Figure 4–3.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom. Use a ladder or similar device as required to reach necessary areas.

4. Remove the wire rope guards from the boom deflector sheaves and the auxiliary lifting sheave. Reeve the winch wire rope on the center boom deflector sheave, then over the head sheave on the auxiliary lifting sheave. Install all wire rope guards.

CAUTION

All wire rope guards must be in proper position during operation.

5. Disconnect plug assembly from jumper assembly on the main boom head and connect it to the auxiliary lifting sheave connector.
6. Install the anti-two block weight to the auxiliary lifting sheave anti-two block switch.
7. Properly install lockout clip on the main boom anti-two block switch weight cable.

Note: When the lockout clip is installed, the anti-two block switch is inactive.

When both main boom and auxiliary sheave are reeved for operation, the lockout clip must be removed and properly stored and an anti-two block weight must be suspended from each anti-two block switch.

8. Check the Crane Rating Manual in the operator's cab for necessary deductions with the auxiliary lifting sheave installed before continuing operations.
9. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.

Removal Of Auxiliary Lifting Sheave

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.
2. Boom down and/or extend the boom as required to ease access to the boom head machinery.

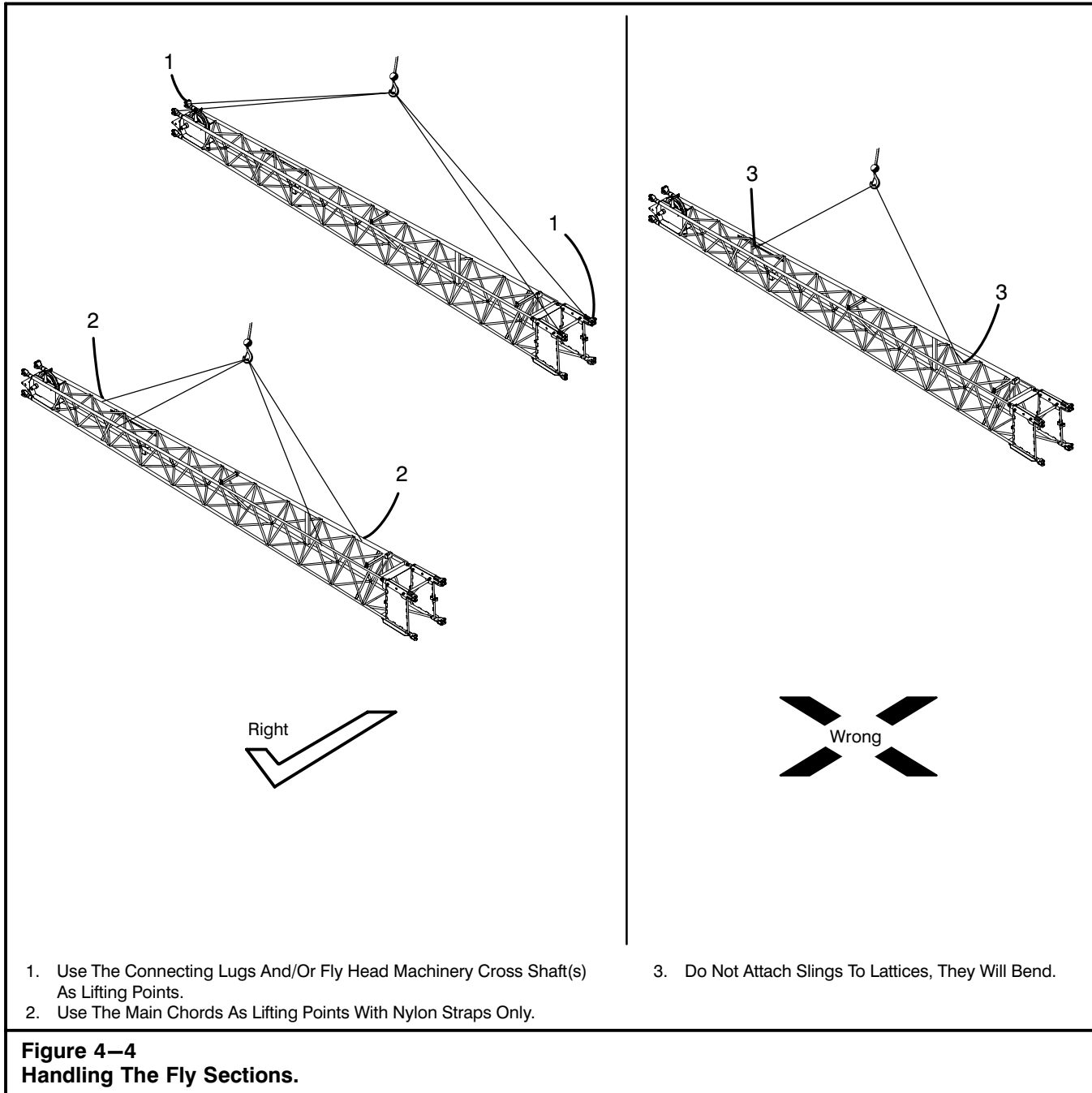


WARNING

To avoid personal injury, do not climb, stand, or walk on the boom. Use a ladder or similar device to reach necessary areas.

3. Disconnect the plug assembly from the auxiliary lifting sheave and connect it to the jumper assembly on the main boom head. Refer to Figure 4–3.
4. Remove the lockout clip from the main boom head anti-two block switch weight cable.
5. Remove the anti-two block weight from the auxiliary lifting sheave and install it on the main boom anti-two block switch.
6. Remove the wire rope guard from the auxiliary lifting sheave. Remove the winch wire rope and install the auxiliary lifting sheave wire rope guard for storage.
7. Adequately support the auxiliary lifting sheave. It weighs approximately 120 lb (54kg). Remove the capscrews, locknuts, and washers. Remove the auxiliary lifting sheave.
8. Properly store the auxiliary lifting sheave, the capscrews, locknuts, and washers, and the winch wire rope which was used on the auxiliary lifting sheave.

Operator's Manual



Offset Lattice Fly

The crane may be equipped with a 31–55 ft offset lattice fly or a 10 ft, 31–55 ft offset lattice fly. See “31–55 Ft Offset Lattice Fly” or “10 Ft, 31–55 Ft Offset Lattice Fly” in this Section of this Operator's Manual for instructions on these arrangements.

Safety Instructions

The following points must be observed while performing any fly assembly or disassembly:

1. Read and understand the instructions in this Operator's Manual before attempting to assemble or disassemble the fly.
2. Do not stand inside, on top, or under the fly at any time while assembling, storing, erecting, or disassembling the fly.

Operator's Manual

3. To avoid personal injury, do not climb, stand, or walk on the fly. Use a ladder or similar device to reach necessary areas.
4. Use care handling the fly section(s) when loading, transporting, and unloading. Damage that occurs during these operations can go undetected and could result in failure of the attachment, once subjected to loading. Do not attach slings to the lattices, when lifting the fly, as they will bend. It is recommended that the connecting lugs and/or fly head machinery cross shaft(s) be used as the lifting points. However, it is permissible to attach nylon straps around all four main chords. Refer to Figure 4–4.
5. Each individual fly section must be adequately supported before attempting to disassemble the fly. Removing the connecting pins from the fly before it is supported, may allow the fly to fall.
6. Fully retract the boom and position it to 0° angle before swinging any fly section(s) around to the side of the boom/fly sections during fly erection and/or fly storage. Fly and/or boom damage could occur.
7. Use a hand line to control fly section(s) swing while swinging fly section(s) during erection and storage procedures.
8. The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.
9. Before operating or traveling the crane, ensure all fly connecting pins and storage mechanisms are properly installed. The fly could fall causing serious personal injury, and/or major fly and/or boom damage.
10. Stay clear of pinch points when aligning fly section connecting points. Never place your fingers in connecting pin holes.
11. Fully assemble the fly before installing it on the boom.

31–55 Ft Offset Lattice Fly

The crane may be equipped with either a one or two piece offset lattice fly. The offset lattice fly, as shown in Figure 4–6, connects to the main boom head. It can be used in one of four offset positions: 2°, 15°, 30°, or 45°. The fly extends the boom length for greater heights. The tip section of the fly extends its overall length from 31 ft (9.4m) to 55 ft (16.8m). Once installed, the offset lattice fly can be stored on the right side of the boom base section.

31–55 Ft Offset Lattice Fly Installation

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Install the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode “Standard”, the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. Check that the fly adaptor lug and offset connecting pins are installed in the 2° offset position. Refer to Figure 4–7.
3. Pin the fly base and tip together on secure blocking. Refer to Figure 4–5. The fly base section weighs approximately 3,322 lb (1 507kg) and the fly tip section approximately 816 lb (370kg).

Note: Fly base section may be installed by itself if desired.

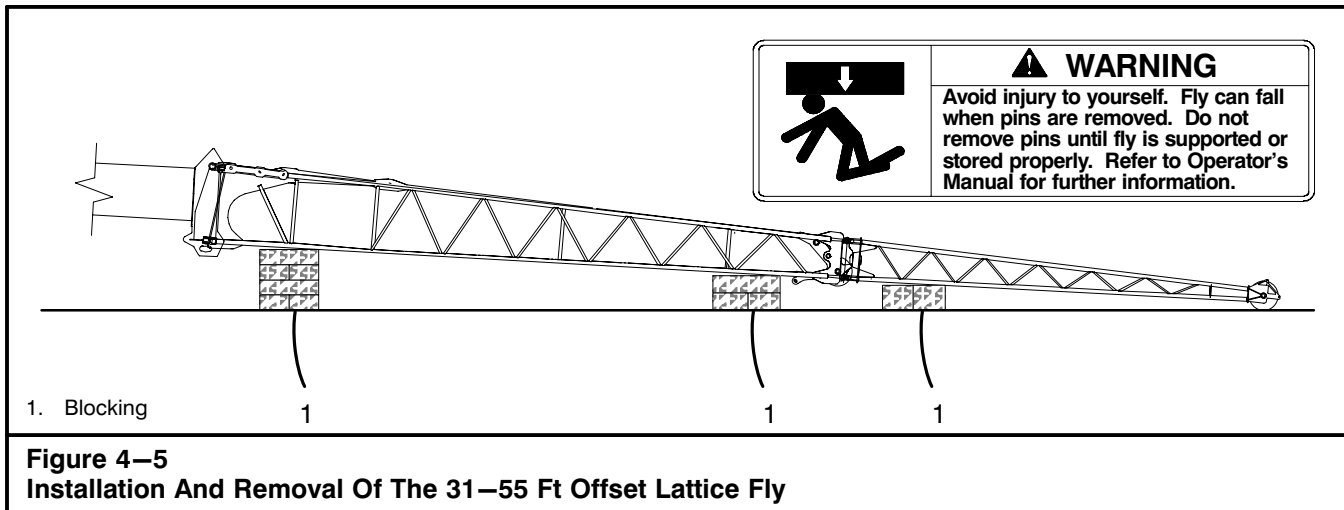


WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

4. Remove the winch wire rope from the main boom head machinery or the auxiliary lifting sheave, whichever is to be used on the fly, and lay it aside to prevent damage to it during installation of the fly.
5. Lower the boom and extend it to the fly. Slowly raise or lower the boom to engage the fly lugs with the boom head machinery cross shafts.
6. Remove the four fly connecting pins from the storage rings at the rear of the fly base section. Refer to Figure 4–6. Install all four pins to connect the fly lugs to the boom head machinery cross shafts on the right side of the boom. Refer to Right Side Fly Base Connecting Pin Label, refer to Figure 4–10. (Install the pins with the head on top and keeper on the bottom.) Install the pin keepers.

Operator's Manual



- Remove the two fly connecting pins from the boom head machinery cross shafts on the left side of the boom head. Refer to Left Side Fly Base Connecting Pin Label, Figure 4–11 and Figure 4–6. Install the top pin to connect the fly lug to the boom head machinery cross shaft on the left side of the boom head. Turn the t-handle as required to push and align the bottom left fly lug and the bottom boom head machinery cross shaft. Install the bottom left fly connecting pin. (Install the pins with the head on top and keeper on the bottom.) Install the pin keepers. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained.

- Disconnect plug assembly from jumper assembly on the main boom head and connect it to the offset lattice fly base section connector. Refer to Figure 4–3. Ensure all necessary anti-two block harness connections are made to the appropriate section(s).
- Install the anti-two block weight on the appropriate offset lattice fly anti-two block switch.
- Properly install lockout clip on the main boom anti-two block switch weight cable.

Note: When the lockout clip is installed, the anti-two block switch is inactive.

When both main boom and fly are reeved for operation, the lockout clip must be removed and properly stored and an anti-two block weight must be suspended from each anti-two block switch.

WARNING

All fly tip and base connecting pins must be properly installed before operating the crane with the fly erected. Serious personal injury or damage to the fly and/or boom could occur if all connecting pins are not properly installed.

- Remove the wire rope guards from the fly base deflector sheave and boom head deflector sheaves. Reeve the winch wire rope over the boom deflector sheave, then over the fly base deflector sheave.
- Remove the wire rope guard(s) from the fly base and/or fly tip head sheaves. Reeve the winch wire rope over the appropriate sheave(s) and install all wire rope guard(s).

CAUTION

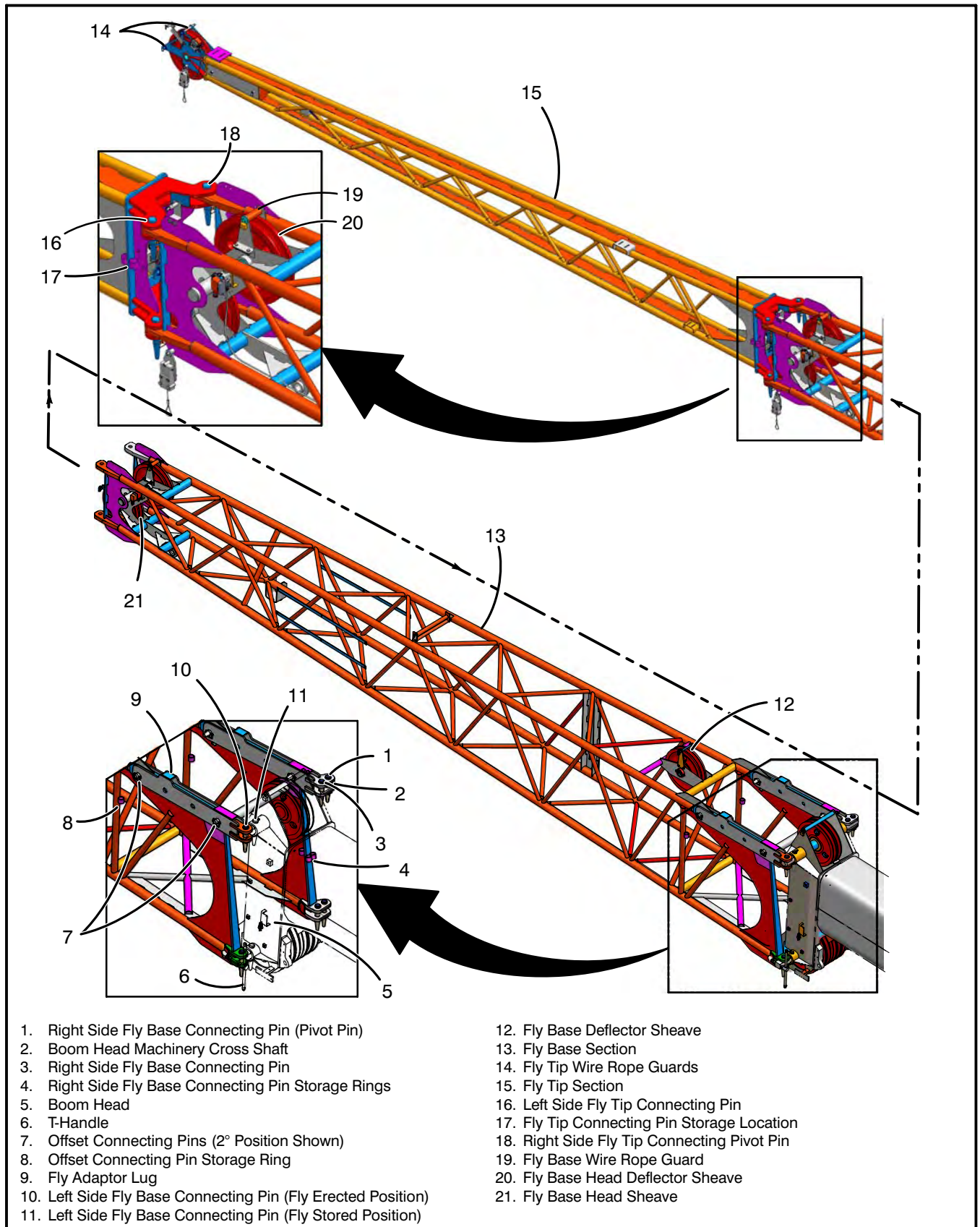
All wire rope guards must be in proper position during operation.

- Properly connect the anti-two block system as follows:

- Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
- Check the Crane Rating Manual for necessary capacity deductions with the fly installed before continuing operations.

WARNING

The fly adds weight to the boom which must be considered in lifting capacities when the fly is erected. When making lifts from the main boom or auxiliary lifting sheave with the fly erected, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities. Use the offset lattice fly only when the crane is level on fully extended side frames.



- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Right Side Fly Base Connecting Pin (Pivot Pin) 2. Boom Head Machinery Cross Shaft 3. Right Side Fly Base Connecting Pin 4. Right Side Fly Base Connecting Pin Storage Rings 5. Boom Head 6. T-Handle 7. Offset Connecting Pins (2° Position Shown) 8. Offset Connecting Pin Storage Ring 9. Fly Adaptor Lug 10. Left Side Fly Base Connecting Pin (Fly Erected Position) 11. Left Side Fly Base Connecting Pin (Fly Stored Position) | <ol style="list-style-type: none"> 12. Fly Base Deflector Sheave 13. Fly Base Section 14. Fly Tip Wire Rope Guards 15. Fly Tip Section 16. Left Side Fly Tip Connecting Pin 17. Fly Tip Connecting Pin Storage Location 18. Right Side Fly Tip Connecting Pivot Pin 19. Fly Base Wire Rope Guard 20. Fly Base Head Deflector Sheave 21. Fly Base Head Sheave |
|---|--|

Figure 4-6
31-55 Ft Offset Lattice Fly

Operator's Manual

31–55 Ft Offset Lattice Fly Removal

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Remove the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. If the fly is not in the erected position, erect it per "Erection Of The 31 Ft Fly Base Section From The Stored Position" or "Erection Of The 31 Ft Fly Base And 24 Ft Tip Sections From The Stored Position" as applicable, in this Section of this Operator's Manual.
3. Check that the fly adaptor lug and offset connecting pins are installed in the 2° offset position. Refer to Figure 4–7. If necessary, change the fly offset to the 2° position. Refer to "Changing The 31–55 Ft Fly Offset Angle" in this Section of this Operator's Manual for detailed instructions.
4. Boom down fully.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

5. Properly change the anti-two block system connections as follows:
 - a. Remove the lockout clip from the main boom anti-two block switch weight cable. Refer to Figure 4–3. Ensure all necessary anti-two block harness connections have been disconnected.

- b. Remove the anti-two block weight from the offset lattice fly and install it on the main boom head anti-two block switch.
 - c. Remove the plug assembly from the offset lattice fly base and connect it to the jumper assembly on the main boom head.
6. Remove all fly base and/or tip wire rope guards as applicable. Remove boom head and fly deflector sheave wire rope guards and lay the winch wire rope aside to prevent damage to it during removal of the fly.
 7. Install all fly base and tip wire rope guards for storage. Install the boom head and deflector sheave wire rope guards for storage.
 8. Extend the boom until the fly tip head sheave or fly base head sheave, as applicable rests on the ground.
 9. Securely block up the fly section(s) to support it (them). Refer to Figure 4–5. The fly base section weighs approximately 3,322 lb (1 507kg) and the fly tip section approximately 816 lb (370kg).



WARNING

Use extreme care when removing the tapered fly connecting pins. They could pop out suddenly and cause serious personal injury.

10. Remove the six fly connecting pins and store four of the pins and keepers in the storage rings at the rear of the fly. Install the remaining two pins and keepers in the storage holes on the left side of the boom head machinery cross shafts to prevent the shafts from rotating. Refer to Figure 4–6.

Note: If only the fly tip section is to be removed, remove the connecting pins from the fly tip lugs only.

11. Retract the boom away from the fly or the fly base away from the fly tip, as applicable.
12. Properly reeve or secure the winch wire rope which was used on the fly.
13. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
14. Properly store fly section(s) to prevent damage to it (them).

Operator's Manual

Changing The 31–55 Ft Fly Offset Angle

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Change the offset fly angle with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode “Standard”, the upper directly over the front or rear of the lower, and the travel swing lock engaged.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result serious personal injury, major crane damage, and/or the crane tipping.

2. If the fly is not in the erected position, erect it per “Erection Of The 31 Ft Fly Base Section From The Stored Position” or “Erection Of The 31 Ft Fly Base And 24 Ft Tip Sections From The Stored Position” as applicable, in this Section of this Operator's Manual.

CAUTION

Do not extend the boom or boom down to the point of over stressing the offset lattice fly. Structural damage to the fly could occur if care is not taken. Use a signal person to aid the operator in lowering the fly head sheave to the ground.

3. Carefully extend and/or lower the boom until the fly tip head sheave or fly base head sheave, as applicable, is resting on the ground. Use a signal person to alert the operator when the sheave is resting on the ground.

Note: If the crane is not equipped with the fly tip section or the fly tip section is not erected, lower or extend the boom until the fly base head sheave is resting on the ground.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

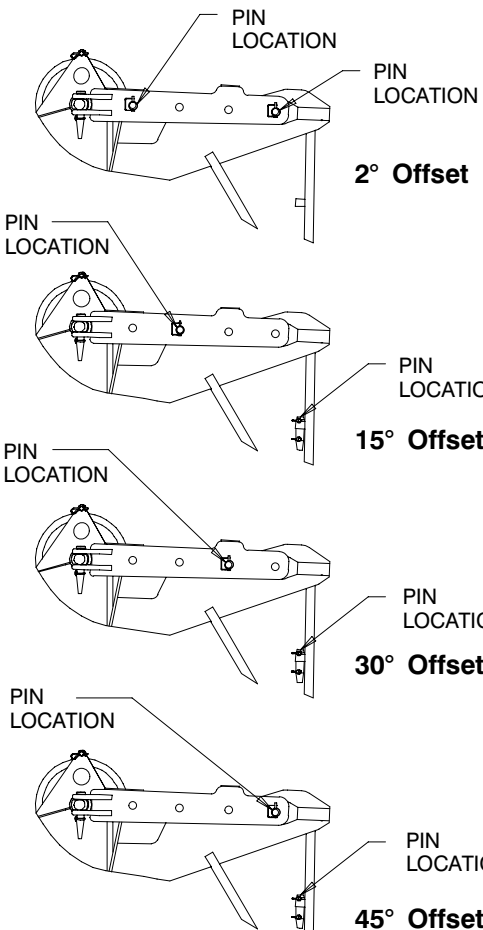
4. Remove the offset connecting pins from the fly adaptor lugs as required.
5. Install the offset connecting pins in the correct location for the desired offset angle. Use the information label, on the offset lattice fly, to determine the correct offset connecting pin locations for the desired offset angle of the fly. Refer to Figure 4–7.
6. Confirm that the offset connecting pins are properly located on both sides of the fly and ensure that the keeper pins are securely installed.
7. Slowly boom up to allow the fly section to adjust itself to the desired offset angle.
8. Properly set the Rated Capacity Limiter to the correct crane configuration before continuing operations. Refer to Section 1 of this Operator's Manual.
9. Check the Crane Rating Manual for necessary capacity deductions with the fly installed before continuing operations.



WARNING

The fly adds weight to the boom which must be considered in lifting capacities when the fly is erected. When making lifts from the main boom or auxiliary lifting sheave with the fly erected, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities. Use the offset lattice fly only when the crane is level on fully extended side frames.

Operator's Manual



PIN LOCATION

PIN LOCATION

2° Offset

PIN LOCATION

PIN LOCATION

15° Offset

PIN LOCATION

PIN LOCATION

30° Offset

PIN LOCATION

PIN LOCATION

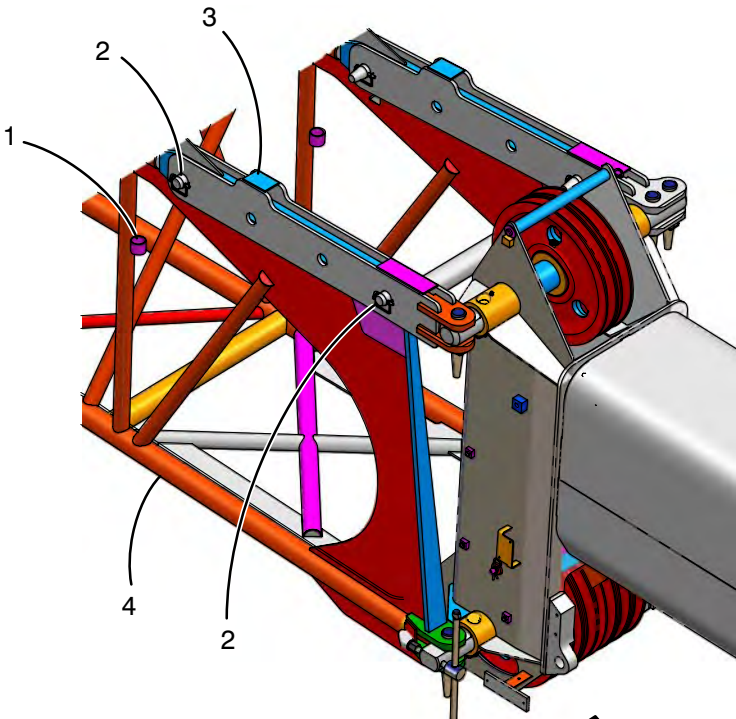
45° Offset

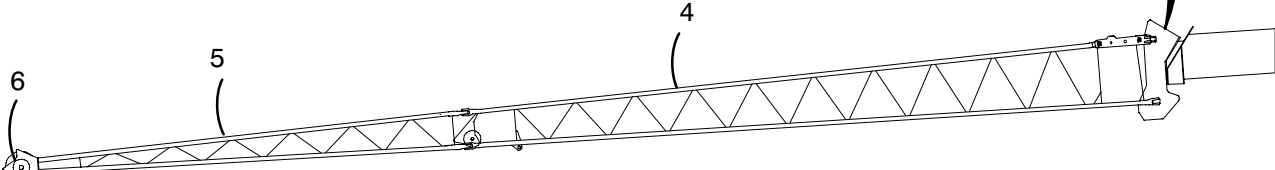
⚠ WARNING

Comply with the following to prevent personal injury or crane damage. Pins must be properly installed on both sides of fly.

Rest fly sheave on ground before changing offsets.

Install pins per 2° offset to install, erect, store, or remove the fly.





<ol style="list-style-type: none"> 1. Offset Connecting Pin Storage Ring 2. Offset Connecting Pins (2° Position Shown) 3. Fly Adaptor Lug 	<ol style="list-style-type: none"> 4. Offset Lattice Fly Base Section 5. Offset Lattice Fly Tip Section 6. Fly Tip Head Sheave
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Figure 4-7
Changing The 31-55 Ft Fly Offset Angle

Operator's Manual

Storage Of The 31 Ft Fly Base Section From The Erected Position

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Store the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. Check that the fly adaptor lug and offset connecting pins (2) are installed in the 2° offset position. Refer to Figure 4–7. If necessary change the fly offset to the 2° position. Refer to "Changing The 31–55 Ft Fly Offset Angle" in this Section of this Operator's Manual for detailed instructions.
3. Position the boom above 50° boom angle and fully retract the boom.
4. Lower the boom to 0° boom angle.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

5. Properly change the anti-two block system connections as follows:
 - a. Remove the plug assembly from the offset lattice fly base and connect it to the jumper assembly on the main boom head. Refer to Figure 4–3. Ensure all necessary anti-two block harness connections have been disconnected.
 - b. Remove the lockout clip from main boom head anti-two block switch weight cable.
 - c. Remove the anti-two block weight from the fly base section and install it on the main boom anti-two block switch.

6. Remove wire rope guards from fly base head sheaves, fly base deflector sheave, the boom head sheave and boom deflector sheave. Refer to Figure 4–6. Remove the winch wire rope and lay it aside. Install all wire rope guards at all sheaves for storage.
7. Properly store winch wire rope which was used on fly.
8. Attach a hand line to the tip of the fly base.



WARNING

Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

Use extreme care when removing the tapered fly connecting pins. They could pop out suddenly causing serious personal injury.

9. Remove the bottom left fly base connecting pin on the left side of the fly using the t-handle to assist in relieving the load on the pin. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained. Remove the top left fly base connecting pin. Store connecting pins in the storage holes (11) on the boom head machinery cross shafts (2) on the left side of the boom to prevent the shafts from rotating.
10. Remove the inside bottom right fly base connecting pin on the right side of the fly. Refer to Figure 4–6. To reduce loading and ease pin removal, push the fly slightly right or left. Remove the inside top right fly base connecting pin on the right side of the fly. To reduce loading and ease pin removal push the fly slightly left or right. Store the two pins and keepers in the storage rings (4) on the rear of the fly base section (13).
11. Fully retract the boom and position it to 0° angle.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.



WARNING

Use a hand line to control fly swing. Fly could swing around the boom rapidly. Keep all personnel clear of swing path to avoid injury.

Operator's Manual

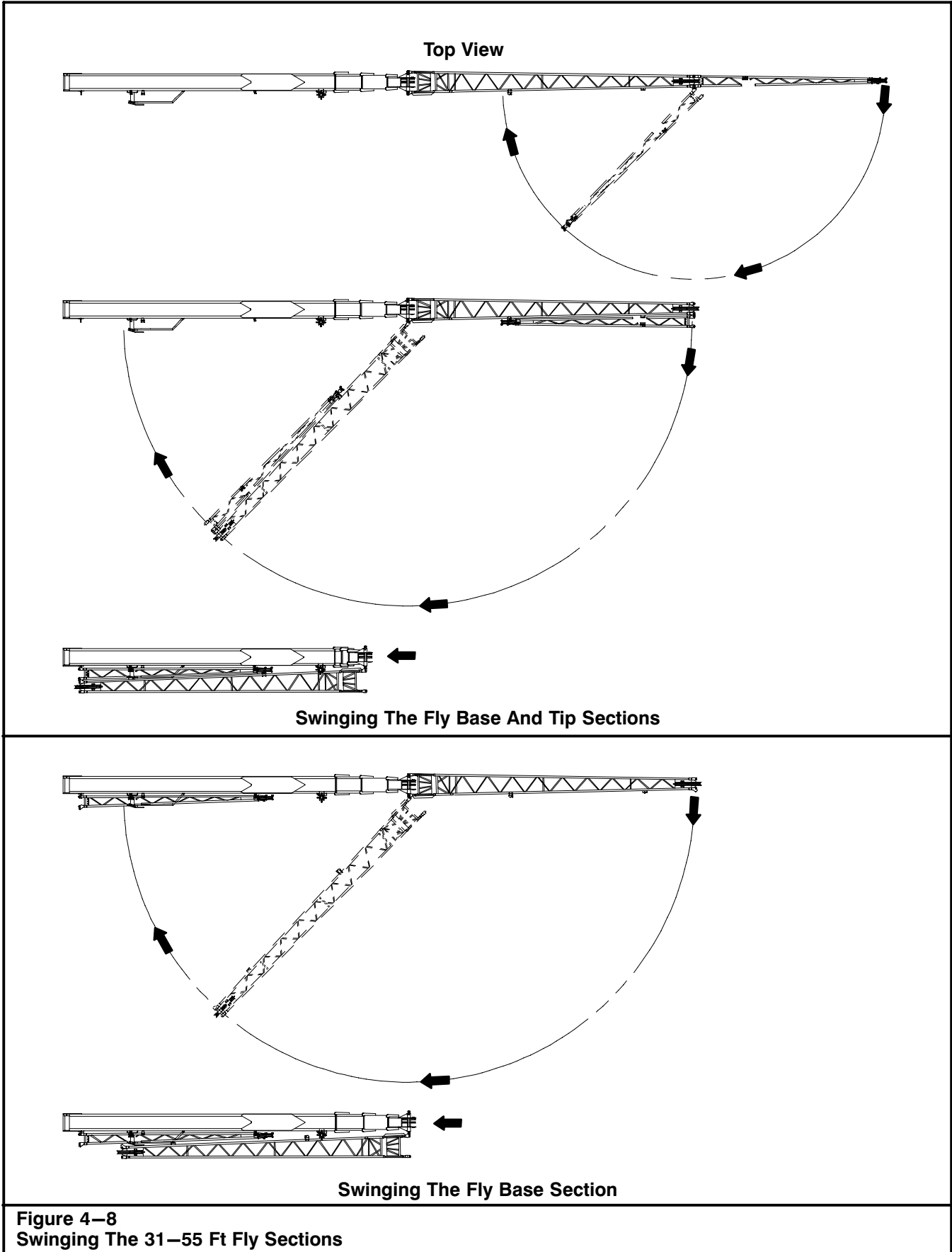


Figure 4-8
Swinging The 31-55 Ft Fly Sections

Operator's Manual

12. Slowly swing the fly base section around to the right side of the boom. Slowly boom up to 50°. Refer to Figure 4–8.
13. Using the boom override switch, extend the inner boom section until the fly can swing completely against the storage bracket.
14. Slowly fully retract the boom while maintaining 50° boom angle to slide the storage lug on the rear of the fly base into the slot on the rear fly storage bracket (10). Refer to Figure 4–12. At the same time, the bullet lug and the square lug on the front fly storage bracket (14) should engage through the holes on the rear of the fly base. Also if the fly tip section is stored on the boom, the fly base and fly tip lugs must engage. Install two right side fly base pins to attach the fly base to the fly tip lugs.
15. Boom down low enough to reach retaining pins. Pull and rotate retaining pin to the engaged position (4). Refer to Figure 4–13. Push retaining pin to engage the pin through the square lug on the front storage bracket.



WARNING

Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

16. Remove two fly base connecting pivot pins (1) from the right side of the boom. Refer to Figure 4–6. Store pins and keepers in storage rings (4) on the rear of the fly base section (13).
17. Remove and store the hand line from the tip of the fly base section.



WARNING

Before operating or traveling the crane ensure the right side fly connecting pins are properly stored in their storage rings, and the left side connecting pins are stored in their storage holes in the boom head machinery cross shafts to prevent the shafts from rotating. Serious personal injury or damage could result to the fly and/or boom if fly connecting pins are not properly stored.

18. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
19. Check the Crane Rating Manual for lifting capacities with the fly in the stored position before continuing operations.

Storage Of The 31 Ft Fly Base And 24 Ft Tip Sections From The Erected Position

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Store the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. Check that the fly adaptor lug and offset connecting pins (2) are installed in the 2° offset position. Refer to Figure 4–7. If necessary change the fly offset to the 2° position. Refer to "Changing The 31–55 Ft Fly Offset Angle" in this Section of this Operator's Manual for detailed instructions.
3. Position the boom above 50° boom angle and fully retract the boom.
4. Lower the boom to 0° boom angle.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

5. Properly change the anti-two block system connections as follows:
 - a. Remove the plug assembly from the offset lattice fly base and connect it to the jumper assembly on the main boom head. Refer to Figure 4–3. Ensure all necessary anti-two block harness connections have been disconnected.
 - b. Remove the lockout clip from main boom head anti-two block switch weight cable.
 - c. Remove the anti-two block weight from the fly base section and install it on the main boom anti-two block switch.

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6. Remove wire rope guards from fly tip head sheave, fly base head sheave, fly base deflector sheave, the boom head sheave, and boom deflector sheave. Refer to Figure 4–6. Remove the winch wire rope and lay it aside. Install all wire rope guards at all sheaves for storage.
7. Properly store winch wire rope which was used on fly.
8. Attach a hand line to the tip of the fly tip section.



WARNING

Do not remove fly tip connecting pivot pins on the right side of the fly until the fly tip is pinned to the storage brackets. Fly tip could fall causing serious personal injury and/or crane damage.

Use extreme care when removing the tapered fly connecting pins. They could pop out suddenly causing serious personal injury.

9. Remove the bottom and then the top fly tip connecting pins (16) on the left side of the fly tip section (15). Refer to Figure 4–6. To ease pin removal, relieve the loading on the pins by pushing the fly tip from side to side. Store pins and keepers in the storage location (17) on the rear of the fly tip section.
10. Ensure the boom is fully retracted and at 0° boom angle.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.



WARNING

Use a hand line to control fly swing. Fly tip could swing around fly base rapidly. Keep all personnel clear of swing path to avoid injury.

11. Using the hand line attached to the fly tip section, slowly swing the fly tip section around to the right side of the fly base section. Refer to Figure 4–8.
12. Align the storage bracket on the fly tip section with the storage bracket on the fly base section. Refer to Figure 4–13. Install the hitch pin (2) through the storage brackets and secure the hitch pin.



WARNING

Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

Use extreme care when removing the tapered fly connecting pins. They could pop out suddenly causing serious personal injury.

13. Remove the hand line from the tip of the fly tip and attach it to the tip of the fly base.
14. Remove the bottom left fly base connecting pin on the left side of the fly using the t-handle to assist in relieving the load on the pin. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained. Remove the top left fly base connecting pin. Store connecting pins in the storage holes (11) on the boom head machinery cross shafts (2) on the left side of the boom to prevent the shafts from rotating. Refer to Figure 4–6.
15. Remove the inside bottom right fly base connecting pin on the right side of the fly. To reduce loading and ease pin removal, push the fly slightly right or left. Refer to Figure 4–6. Remove the inside top right fly base connecting pin on the right side of the fly. To reduce loading and ease pin removal push the fly slightly left or right. Store the two pins and keepers in the storage rings (4) on the rear of the fly base section (13).
16. Fully retract the boom and position it to 0° angle.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.



WARNING

Use a hand line to control fly swing. Fly could swing around the boom rapidly. Keep all personnel clear of swing path to avoid injury.

17. Using the hand line attached to the fly base section, slowly swing the fly base section around to the right side of the boom. Slowly boom up to 50°. Refer to Figure 4–8.

- Using the boom override switch, extend the inner boom section until the fly can swing completely against the storage bracket.
- Slowly fully retract the boom while maintaining 50° boom angle to slide the storage lug on the rear of the fly base into the slot on the rear fly storage bracket (10). Refer to Figure 4–12. At the same time, the bullet lug and the square lug on the front fly storage bracket (14) should engage through the holes on the rear of the fly base.
- Boom down low enough to reach retaining pins. Pull and rotate retaining pin to the engaged position (4). Refer to Figure 4–13. Push retaining pin to engage the pin through the square lug on the front storage bracket.

WARNING


Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

- Remove two fly base connecting pivot pins (1) from the right side of the boom. Refer to Figure 4–6. Store pins and keepers in storage rings (4) on the rear of the fly base section (13).
- Store one pin in the top left fly tip connecting lug storage hole on the rear of the fly tip section. Refer to Fly Tip Storage Label, Figure 4–9 and Figure 4–12. Install the other pins in their storage locations.
- Remove and store the hand line from the tip of the fly base section.

WARNING

Before operating or traveling the crane ensure the right side fly connecting pins are properly stored in their storage rings, and the left side connecting pins are stored in their storage holes in the boom head machinery cross shafts to prevent the shafts from rotating. Serious personal injury or damage could result to the fly and/or boom if fly connecting pins are not properly stored.

- Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
- Check the Crane Rating Manual for lifting capacities with the fly in the stored position before continuing operations.

 **WARNING**

Comply with the following to prevent personal injury or machine damage.

Stored Fly Tip: (shown)
Install one pin in top left side lug closest to boom.
Install other 3 pins in storage.
Refer to Operator's Manual for detailed instructions.

Fly Tip Stored on Boom

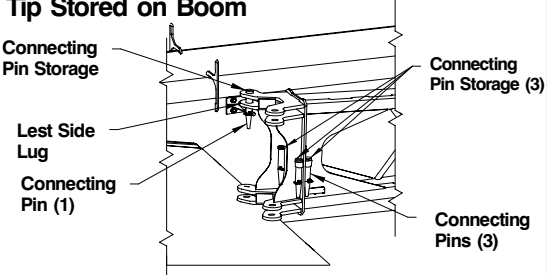


Figure 4–9
Fly Tip Storage Label

Erection Of The 31 Ft Fly Base Section From The Stored Position

- Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.

WARNING

Erect the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

- If the fly tip is stored on the boom, check that the fly tip connecting pins are in the stored position. Refer to Fly Tip Storage Label, Figure 4–9 and Figure 4–12. Ensure the two connecting pins are removed from the pivot holes in the fly tip section so the fly tip is not connected to the fly base section.
- Check that the fly adaptor lug and offset connecting pins (2) are installed in the 2° offset position. Refer to Figure 4–7.

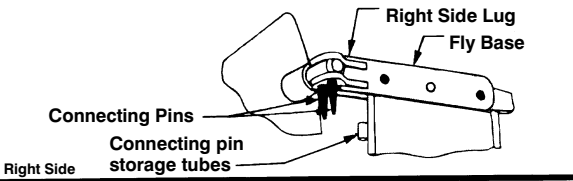
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⚠ WARNING

Comply with the following to prevent personal injury or machine damage.

Connecting Pins must be properly installed in both top and bottom lugs, as follows:
Lifting Loads:
Install 2 pins in each right side lug (total of 4 pins on right side.)
Fly Not Erected:
Install pins in storage tubes on fly.
Refer to Operator's Manual for detailed instructions.

Fly Base Connecting Pin Placement



The diagram shows a side view of the fly base assembly. It labels the 'Right Side Lug' and 'Fly Base'. Two 'Connecting Pins' are shown being inserted into 'Connecting pin storage tubes' on the 'Right Side' of the boom.

**Figure 4–10
Right Side Fly Base Connecting Pin Label**

4. Position the boom above 50° boom angle. Extend the boom to at least 62 ft (19m) and lower the hook ball, to be used on the fly, to the ground. This will allow enough wire rope length to ease reeving of the fly.
5. Fully retract the boom to engage the fly lugs with the boom head machinery cross shafts on the right side of the boom. Fully lower the boom.

⚠ WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

6. Remove two fly connecting pins from the storage rings on the rear of the fly base section. Install them through the fly base pivot lugs (15) on the right side of the boom. Refer to Figure 4–12. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
7. Remove the winch wire rope from the boom head machinery or the auxiliary lifting sheave, whichever is to be used on the fly, and lay it aside to prevent damage to it during erection of the fly.

⚠ WARNING

Check that the fly base connecting pins are installed on the right side of the boom in the fly base pivot holes before disconnecting the fly from the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

8. Pull the retaining pin (4) to disengage the pin from the square lug on the front storage bracket. Refer to Figure 4–13. Rotate and release the retaining pin to lock it in the disengaged position (5).

⚠ WARNING

Use a hand line to control fly swing. Fly could swing around the boom rapidly. Keep all personnel clear of the swing path to avoid injury.

9. Attach a hand line to the tip of the fly base and boom up to 20°. Using the boom override switch, slowly extend the inner boom section approximately 2–2.5 ft (0.61–0.76m) to slide the fly off the storage brackets.

CAUTION

Do not extend boom more than 2.5 ft (0.76m). Damage to the fly may occur.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.

10. Slowly boom down to allow the fly to swing out slightly from the storage brackets and then fully retract the boom.
11. Continue to lower the boom to 0° angle. Use the hand line attached to the fly base to swing the fly base around the boom head until the fly lugs engage with the boom head machinery cross shafts on the left side of the boom. Refer to Figure 4–8.
12. Remove the two connecting pins from the storage rings (11) on the rear of the fly base section and install them in the boom head machinery cross shafts (20) on the right side of the boom. Refer to Right Side Fly Base Connecting Pin Label, Figure 4–10 and Figure 4–12. Install the inside top right pin first. Swing the fly base to the left or right to get the pin to drop in the hole. Install the inside bottom right pin. Swing the fly base to the right or left to get the pin to drop in the hole. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.

13. Remove the two fly connecting pins from the storage location (21) on the boom head machinery cross shafts on the left side of the boom. Refer to Left Side Fly Base Connecting Pin Label, Figure 4–11 and Figure 4–12. Install one left side fly base connecting pin (18) through the top fly lug on the left side of the boom. Turn the t-handle to push and align the bottom left fly lug and the bottom boom head machinery cross shaft. Install the bottom left fly connecting pin. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained.

WARNING

All six fly base connecting pins must be properly installed before operating the crane with the fly base erected. Serious personal injury or damage to the fly and/or boom could occur if all connecting pins are not properly installed.

14. Remove the wire rope guard from the fly base head and deflector sheaves. Refer to Figure 4–6. Reeve the winch wire rope on the boom deflector sheave then over the fly deflector and head sheaves. Install all wire rope guards.

CAUTION

All wire rope guards must be in proper position during operation.

15. Properly change the anti-two block system connections as follows:
 - a. Disconnect the plug assembly from the jumper assembly on main boom head and connect it to the fly base section. Refer to Figure 4–3. Ensure all necessary anti-two block harness connections have been made.
 - b. Install the anti-two block weight on the fly base section anti-two block switch.
 - c. Properly install lockout clip on main boom head anti-two block switch cable.

Note: When the lockout clip is installed, the anti-two block switch is inactive.

When both main boom and fly are reeved for operation, the lockout clip must be removed and properly stored and an anti-two block weight must be suspended from each anti-two block switch.

WARNING

Comply with the following to prevent personal injury or machine damage.

Connecting Pins must be properly installed in both top and bottom lugs, as follows:

Lifting Loads:

Install pins in working position (as shown).
Verify pin placement on opposite side of boom below lifting loads.

Fly Not Erected: Install pins in boom headshaft storage to prevent headshafts from turning.

Refer to Operator's Manual for detailed instructions.

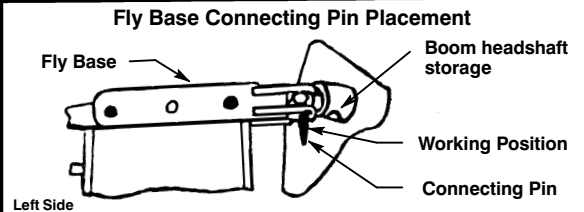


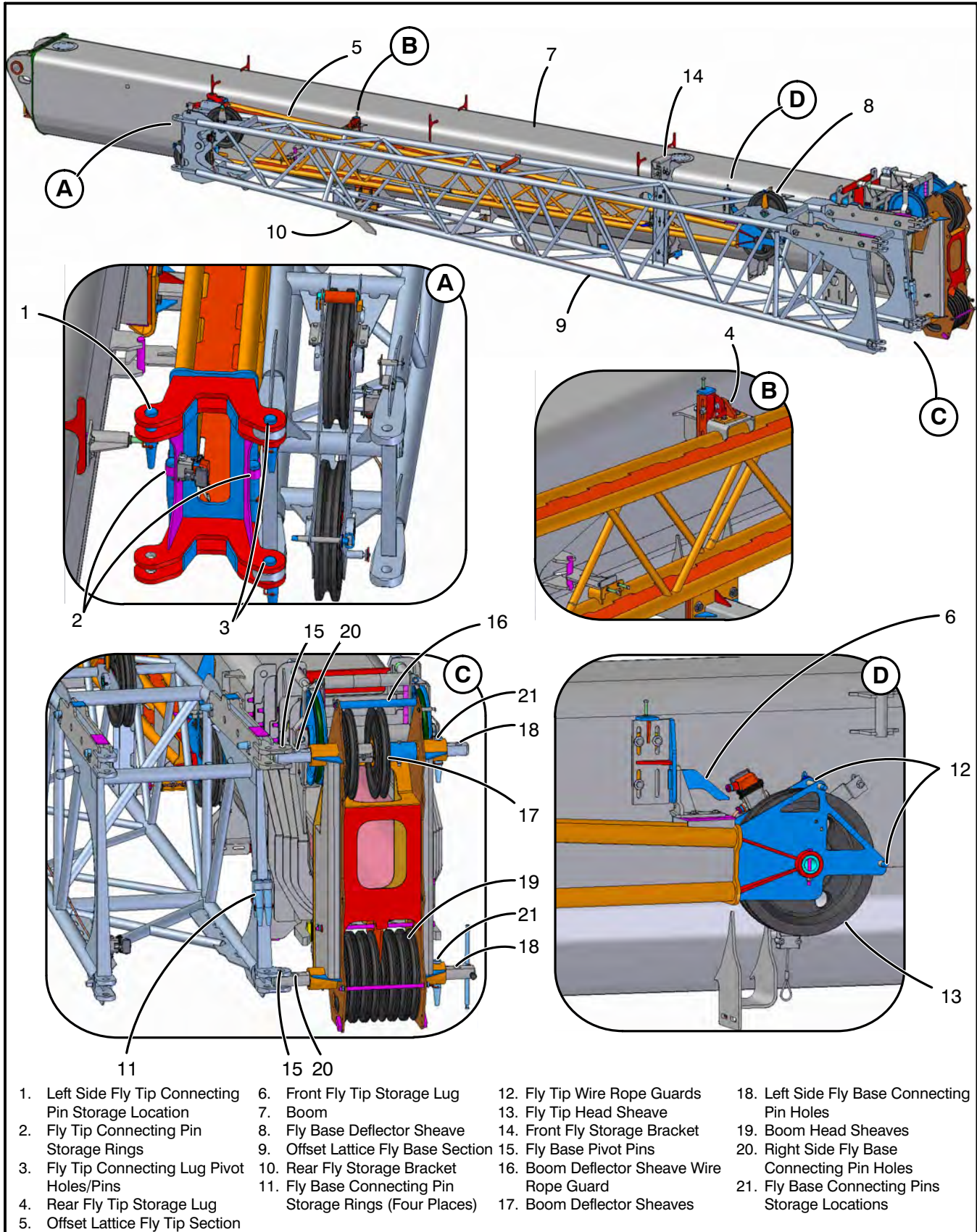
Figure 4–11
Left Side Fly Base Connecting Pin Label

16. Remove and store the hand line from the tip of the fly base section.
17. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
18. Check the Crane Rating Manual for lifting capacities with the fly installed before continuing operations.

WARNING

The fly adds weight to the boom which must be considered in lifting capacities when the fly is erected. When making lifts from the main boom or auxiliary lifting sheave with the fly erected, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities. Use the offset lattice fly only when the crane is level on fully extended side frames.

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- | | | | |
|--|---|---|--|
| 1. Left Side Fly Tip Connecting Pin Storage Location | 6. Front Fly Tip Storage Lug | 12. Fly Tip Wire Rope Guards | 18. Left Side Fly Base Connecting Pin Holes |
| 2. Fly Tip Connecting Pin Storage Rings | 7. Boom | 13. Fly Tip Head Sheave | 19. Boom Head Sheaves |
| 3. Fly Tip Connecting Lug Pivot Holes/Pins | 8. Fly Base Deflector Sheave | 14. Front Fly Storage Bracket | 20. Right Side Fly Base Connecting Pin Holes |
| 4. Rear Fly Tip Storage Lug | 9. Offset Lattice Fly Base Section | 15. Fly Base Pivot Pins | 21. Fly Base Connecting Pins Storage Locations |
| 5. Offset Lattice Fly Tip Section | 10. Rear Fly Storage Bracket | 16. Boom Deflector Sheave Wire Rope Guard | |
| | 11. Fly Base Connecting Pin Storage Rings (Four Places) | 17. Boom Deflector Sheaves | |

Figure 4-12
31-55 Ft Fly Erection And Storage

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Erection Of The 31 Ft Fly Base And 24 Ft Tip Sections From The Stored Position

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Erect the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. Check that the fly adaptor lug and offset connecting pins (2) are installed in the 2° offset position. Refer to Figure 4-7.
3. Position the boom above 50° boom angle. Extend the boom to at least 86 ft (26m) and lower the hook ball, to be used on the fly, to the ground. This will allow enough wire rope length to ease reeving of the fly.
4. Fully retract the boom to engage the fly lugs with the boom head machinery cross shafts on the right side of the boom. Fully lower the boom.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

5. Remove two fly connecting pins from the storage rings (11) on the rear of the fly base section. Install them through the fly base pivot lugs (15) on the right side of the boom. Refer to Figure 4-12. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
6. Ensure the two right side fly tip connecting pins are installed through the fly tip connecting pivot lugs (3) to connect the fly base and fly tip. (Install the pins with the head on top and the keeper on the

bottom.) Install the pin keepers. Remove the connecting pin and keeper from the top fly tip connecting lug (1) on the left side of the fly tip section. Refer to Figure 4-12.

7. Remove the winch wire rope from the boom head machinery or the auxiliary lifting sheave, whichever is to be used on the fly, and lay it aside to prevent damage to it during erection of the fly.
8. Check that the hitch pin (2) is installed through the lugs on the fly tip and base sections. Refer to Figure 4-13.



WARNING

Check that the fly base and tip connecting pins are installed in the pivot holes before disconnecting the fly from the storage brackets. Also check that the hitch pin is installed through the lugs on the fly tip and base sections. The fly could fall causing serious personal injury and/or crane damage.

9. Pull the retaining pin (4) to disengage the pin from the square lug on the front storage bracket. Refer to Figure 4-13. Rotate and release the retaining pin to lock it in the disengaged position (5).



WARNING

Use a hand line to control fly swing. Fly could swing around the boom rapidly. Keep all personnel clear of the swing path to avoid injury.

10. Attach a hand line to the tip of the fly base and boom up to 20°. Using the boom override switch, slowly extend the inner boom section approximately 2-2.5 ft (0.61-0.76m) to slide the fly off the storage brackets.

CAUTION

Do not extend boom more than 2.5 ft (0.46m). Damage to the fly may occur.

11. Slowly boom down to allow the fly to swing slightly out from the storage brackets and then fully retract the boom.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.

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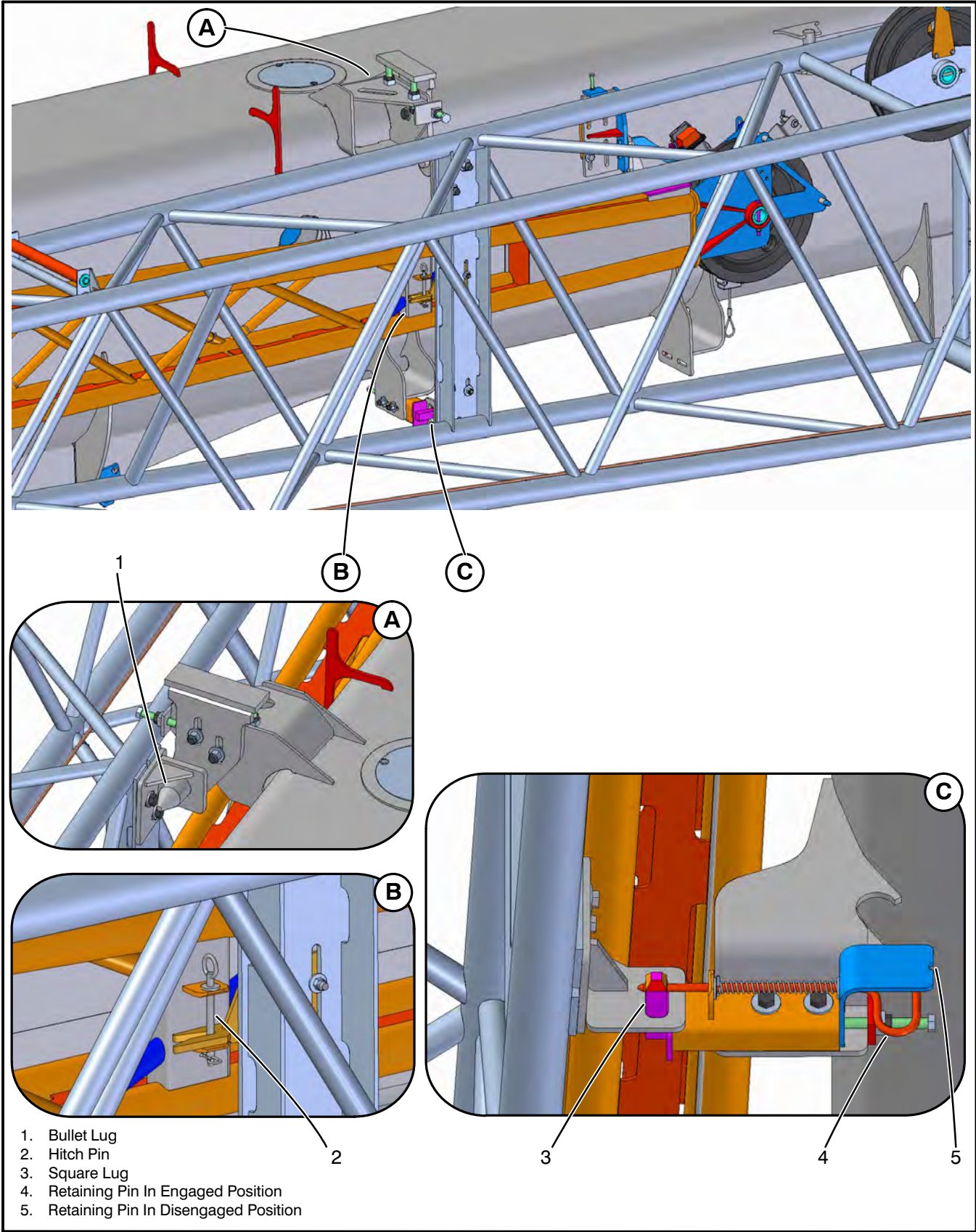


Figure 4-13
Front Storage Bracket

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12. Continue to lower the boom to 0° angle. Use the hand line attached to the fly base to swing the fly base and tip around the boom head until the fly base lugs engage with the boom head machinery cross shafts on the left side of the boom. Refer to Figure 4–8.
13. Remove the two connecting pins from the storage rings (11) on the rear of the fly base section and install them in the boom head machinery cross shafts (20) on the right side of the boom. Refer to Right Side Fly Base Connecting Pin Label, Figure 4–10 and Figure 4–12. Install the inside top right pin first. Swing the fly base to the left or right to get the pin to drop in the hole. Install the inside bottom right pin. Swing the fly base to the right or left to get the pin to drop in the hole. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
14. Remove the two fly connecting pins from the storage location (21) on the boom head machinery cross shafts on the left side of the boom. Refer to Left Side Fly Base Connecting Pin Label, Figure 4–11 and Figure 4–12. Install one left side fly base connecting pin (18) through the top fly lug on the left side of the boom. Turn the t-handle to push and align the bottom left fly lug and the bottom boom head machinery cross shaft. Install the bottom left fly connecting pin. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained.



WARNING

All six fly base connecting pins must be properly installed before operating the crane with the fly base erected. Serious personal injury or damage to the fly and/or boom could occur if all connecting pins are not properly installed.

15. Remove the hand line from the tip of the fly base section and attach it to the tip of the fly tip section. Remove the hitch pin which connects the fly tip section to the fly base section. Refer to Figure 4–13. Store the hitch pin back in the lug on the fly tip section once it is erected.



WARNING

Use a hand line to control fly swing. Fly could swing around the boom rapidly. Keep all personnel clear of the swing path to avoid injury.

16. Ensure the boom is fully retracted. Use the hand line attached to the fly tip section and slowly swing the fly tip section around the fly base section until the fly tip lugs engage with the fly base lugs on the left side of the fly.
17. Remove the left side fly tip connecting pins from the storage rings on the rear of the fly tip section. Install them through the fly tip connecting lugs on the left side of the fly. Install the top left pin and then the bottom left. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.



WARNING

All four fly tip connecting pins must be properly installed before operating the crane with the fly tip erected. Serious personal injury or damage to the fly and/or boom could occur if all connecting pins are not properly installed.

18. Remove the wire rope guards from the fly base head and deflector sheaves and fly tip head sheave. Refer to Figure 4–6. Reeve the winch wire rope on the boom deflector sheave then over the fly base deflector and head sheaves and fly tip head sheave. Install all wire rope guards.

CAUTION

All wire rope guards must be in proper position during operation.

19. Properly change the anti-two block system connections as follows:
 - a. Disconnect the plug assembly from the jumper assembly on main boom head and connect it to the fly base section. Refer to Figure 4–3. Ensure all necessary anti-two block harness connections have been made.
 - b. Install the anti-two block weight on the fly base section anti-two block switch.
 - c. Properly install lockout clip on main boom head anti-two block switch cable.

Note: When the lockout clip is installed, the anti-two block switch is inactive.

When both main boom and fly are reeved for operation, the lockout clip must be removed and properly stored and an anti-two block weight must be suspended from each anti-two block switch.

20. Remove and store the hand line from the tip of the fly tip section.

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21. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
22. Check the Crane Rating Manual for lifting capacities with the fly installed before continuing operations.



WARNING

The fly adds weight to the boom which must be considered in lifting capacities when the fly is erected. When making lifts from the main boom or auxiliary lifting sheave with the fly erected, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities. Use the offset lattice fly only when the crane is level on fully extended side frames.

10 Ft, 31–55 Ft Offset Lattice Fly

The crane may be equipped with either a one, two, or three piece offset lattice fly. The offset lattice fly section, as shown in Figure 4–15, connects to the main boom head. It can be used in one of four offset positions: 2°, 15°, 30°, or 45°. The fly extends the boom length for greater heights. The fly center section extends the fly from 10 ft (3.0m) to 31 ft (9.4m). The tip section of the fly extends its overall length from 31 ft (9.4m) to 55 ft (16.8m). Once installed, the offset lattice fly section(s) can be stored on the right side of the boom base section.

10 Ft, 31–55 Ft Offset Lattice Fly Installation

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Install the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. Check that the fly adaptor lug and offset connecting pins are installed in the 2° offset position. Refer to Figure 4–16.
3. Pin the fly base, fly center, and fly tip together on secure blocking. Refer to Figure 4–14. The fly base section weighs approximately 1,393 lb (632kg), the fly center section approximately 1,937 lb (879kg), and the fly tip section approximately 797 lb (362kg).

Note: The fly base section connects to the fly center with two connecting pins at the top and two connecting hitch pins at the bottom.

Note: Fly base may be installed without the fly center section and/or the fly base and fly center sections may be installed without the fly tip section, if desired.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

4. Remove the winch wire rope from the main boom head machinery or the auxiliary lifting sheave, whichever is to be used on the fly, and lay it aside to prevent damage to it during installation of the fly.
5. Lower the boom and extend it to the fly. Slowly raise or lower the boom to engage the fly lugs with the boom head machinery cross shafts.
6. Remove the four fly connecting pins from the storage rings at the right rear of the fly base section. Refer to Right Side Fly Base Connecting Pin Label, Figure 4–10 and Figure 4–15. Install all four pins to connect the fly lugs to the boom head machinery cross shafts on the right side of the boom. (Install the pins with the head on top and keeper on the bottom.) Install the pin keepers.
7. Remove the two fly connecting pins from the boom head machinery cross shafts on the left side of the boom head. Refer to Left Side Fly Base Connecting Pin Label, Figure 4–11 and Figure 4–15. Install the top pin to connect the fly lug to the boom head machinery cross shaft on the left side of the boom head. Turn the t-handle as required to push and align the bottom left fly lug and the bottom boom head machinery cross shaft. Install the bottom left fly connecting pin. (Install the pins with the head on top and keeper on the bottom.) Install the pin keepers. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained.

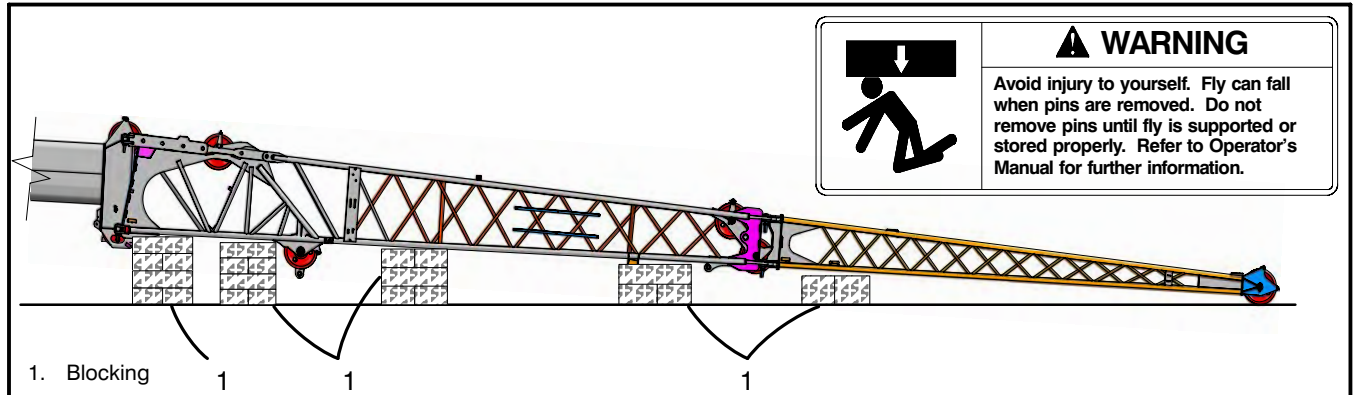


Figure 4–14
Installation And Removal Of The 10 Ft, 31–55 Ft Offset Lattice Fly

WARNING

All fly tip, center, and base connecting pins must be properly installed before operating the crane with the fly erected. Serious personal injury or damage to the fly and/or boom could occur if all connecting pins are not properly installed.

8. Remove the wire rope guards from the fly base and boom head deflector sheaves. Reeve the winch wire rope over the boom deflector sheave, then on the fly base deflector sheave.
9. Remove the wire rope guards from the fly base deflector, fly center, or fly tip head sheaves, as applicable. Reeve the winch wire rope over the appropriate deflector and head sheave(s) as applicable and install all wire rope guards.

CAUTION

All wire rope guards must be in proper position during operation.

10. Properly change anti-two block system connections as follows:
 - a. Disconnect the plug assembly from the jumper assembly on main boom head and connect it to the fly base section. Refer to Figure 4–3. Ensure all necessary anti-two block harness connections have been made.

- b. Install the anti-two block weight on the appropriate fly section anti-two block switch.
- c. Properly install lockout clip on main boom head anti-two block switch cable.

Note: When the lockout clip is installed, the anti-two block switch is inactive.

When both main boom and fly are reeved for operation, the lockout clip must be removed and properly stored and an anti-two block weight must be suspended from each anti-two block switch.

11. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
12. Check the Crane Rating Manual for necessary capacity deductions with the fly installed before continuing operations.

WARNING

The fly adds weight to the boom which must be considered in lifting capacities when the fly is erected. When making lifts from the main boom or auxiliary lifting sheave with the fly erected, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities. Use the offset lattice fly only when the crane is level on fully extended side frames.

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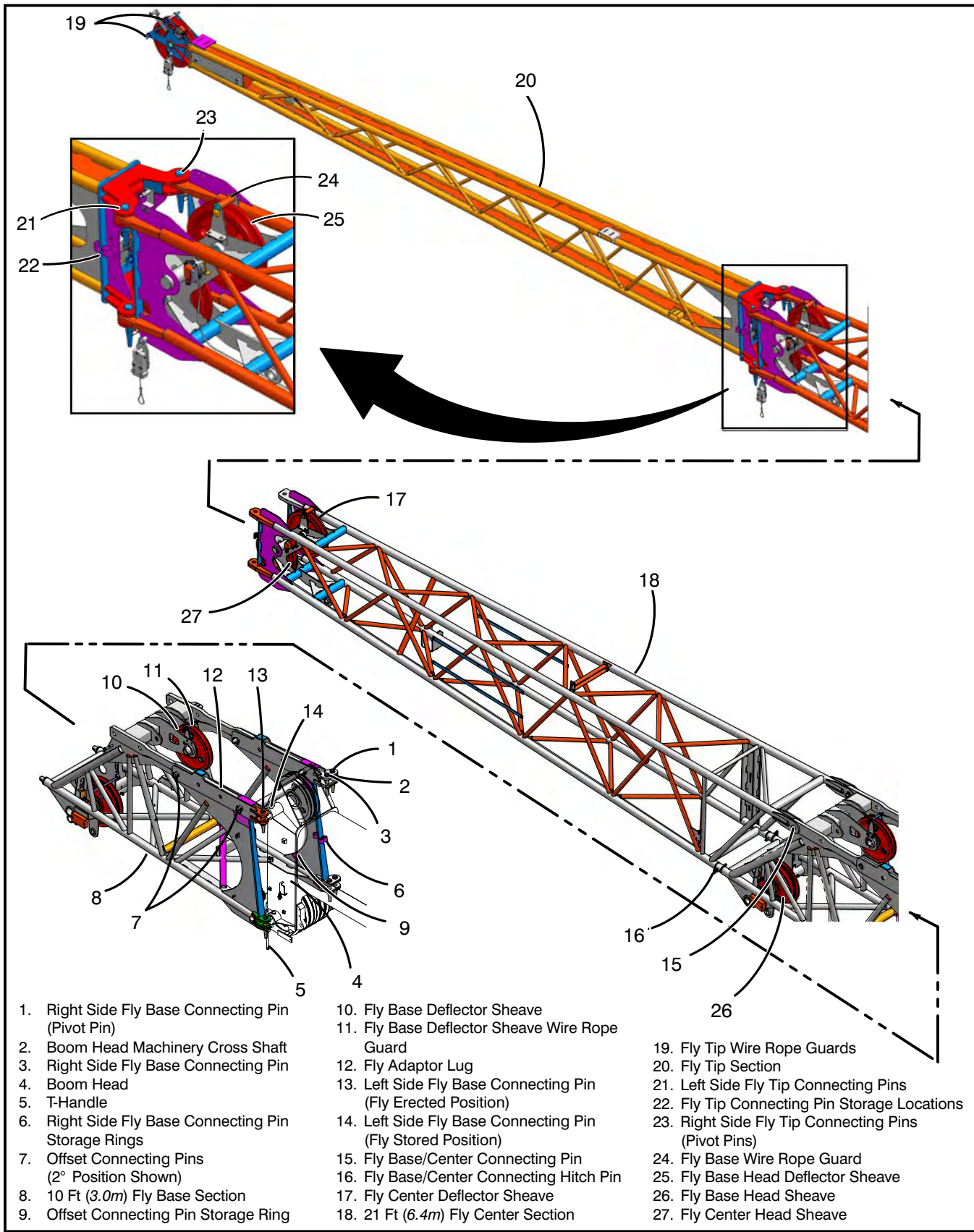


Figure 4-15
10 Ft, 31-55 Ft Offset Lattice Fly

10 Ft, 31–55 Ft Offset Lattice Fly Removal

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Remove the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode “Standard”, the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. If the fly is not in the erected position, erect it per “Erection Of The 10 Ft Fly Base From The Stored Position”, “Erection Of The 10 Ft Fly Base And 21 Ft Fly Center Sections From The Stored Position”, or “Erection Of The 10 Ft Fly Base, 21 Ft Fly Center And 24 Ft Fly Tip Sections From The Stored Position”, as applicable, in this Section of this Operator's Manual.
3. Check that the fly adaptor lug and offset connecting pins are installed in the 2° offset position. Refer to Figure 4–7. If necessary, change the fly offset to the 2° position. Refer to “Changing The 10 Ft, 31–55 Ft Fly Offset Angle ” in this Section of this Operator's Manual for detailed instructions.
4. Boom down fully.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

5. Properly change the anti-two block system connections as follows:
 - a. Remove lockout clip on the main boom head anti-two block switch cable. Refer to Figure 4–3.

- b. Remove the anti-two block weight from the offset lattice fly and install it on the main boom head anti-two block switch.
- c. Remove the plug assembly from the offset lattice fly and connect it to the jumper assembly on the main boom head. Ensure all necessary anti-two block connections are disconnected.

6. Remove all fly base, fly center, and/or fly tip wire rope guards, as applicable. Remove boom head and deflector sheave wire rope guards and lay the winch wire rope aside to prevent damage to it during removal of the fly.
7. Install all fly base, fly center, and fly tip wire rope guards at the deflector and head sheaves for storage, as applicable. Install the boom head and deflector sheave wire rope guards.
8. Extend the boom until the fly tip sheave, fly center sheave, or fly base sheave, as applicable, rests on the ground.
9. Securely block up the fly section(s) to support it (them). Refer to Figure 4–14. The fly base section weighs approximately 1,393 lb (632kg), the fly center section approximately 1,937 lb (879kg), and the fly tip section approximately 797 lb (362kg).



WARNING

Use extreme care when removing the tapered fly connecting pins. They could pop out suddenly and cause serious personal injury.

10. Remove the six fly connecting pins and store four of the pins and keepers in the storage rings at the rear of the fly. Install the remaining two pins and keepers in the storage holes on the left side of the boom head machinery cross shafts to prevent the shafts from rotating. Refer to Figure 4–15.

Note: If only the fly tip section is to be removed, remove the connecting pins from the fly tip lugs only. If only the fly tip and fly center sections are to be removed, remove the connecting pins and connecting hitch pins from the fly center lugs only.

11. Retract the boom away from the fly, the fly base away from the fly center, or the fly center away from the fly tip, as applicable.
12. Properly reeve or secure the winch wire rope which was used on the fly.
13. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
14. Properly store fly section(s) to prevent damage to it (them).

Operator's Manual

Changing The 10 Ft, 31–55 Ft Fly Offset Angle

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Change the offset fly angle with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode “Standard”, the upper directly over the front or rear of the lower, and the travel swing lock engaged.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. If the fly is not in the erected position, erect it per “Erection Of The 10 Ft Fly Base From The Stored Position”, “Erection Of The 10 Ft Fly Base And 21 Ft Fly Center Sections From The Stored Position”, or “Erection Of The 10 Ft Fly Base, 21 Ft Fly Center And 24 Ft Fly Tip Sections From The Stored Position”, as applicable, in this Section of this Operator's Manual.

CAUTION

Do not extend the boom or boom down to the point of over stressing the offset lattice fly. Structural damage to the fly and/or boom could occur if care is not taken. Use a signal person to aid the operator in lowering the fly head sheave to the ground.

3. Carefully extend and/or lower the boom until the fly tip, fly center, or fly base head sheave, as applicable is resting on the ground. Use a signal person to alert the operator when the sheave is resting on the ground.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

4. Remove the offset connecting pins from the fly adaptor lugs as required.
5. Install the offset connecting pins in the correct location for the desired offset angle. Use the information label, on the offset lattice fly, to determine the correct offset connecting pin locations for the desired offset angle of the fly. Refer to Figure 4–16.
6. Confirm that the offset connecting pins are properly located on both sides of the fly and ensure that the keeper pins are securely installed.
7. Slowly boom up to allow the fly section to adjust itself to the desired offset angle.
8. Properly set the Rated Capacity Limiter to the correct crane configuration before continuing operations. Refer to Section 1 of this Operator's Manual.
9. Check the Crane Rating Manual, in the operator's cab, for deductions to the lifting capacities with the fly installed before continuing operations.



WARNING

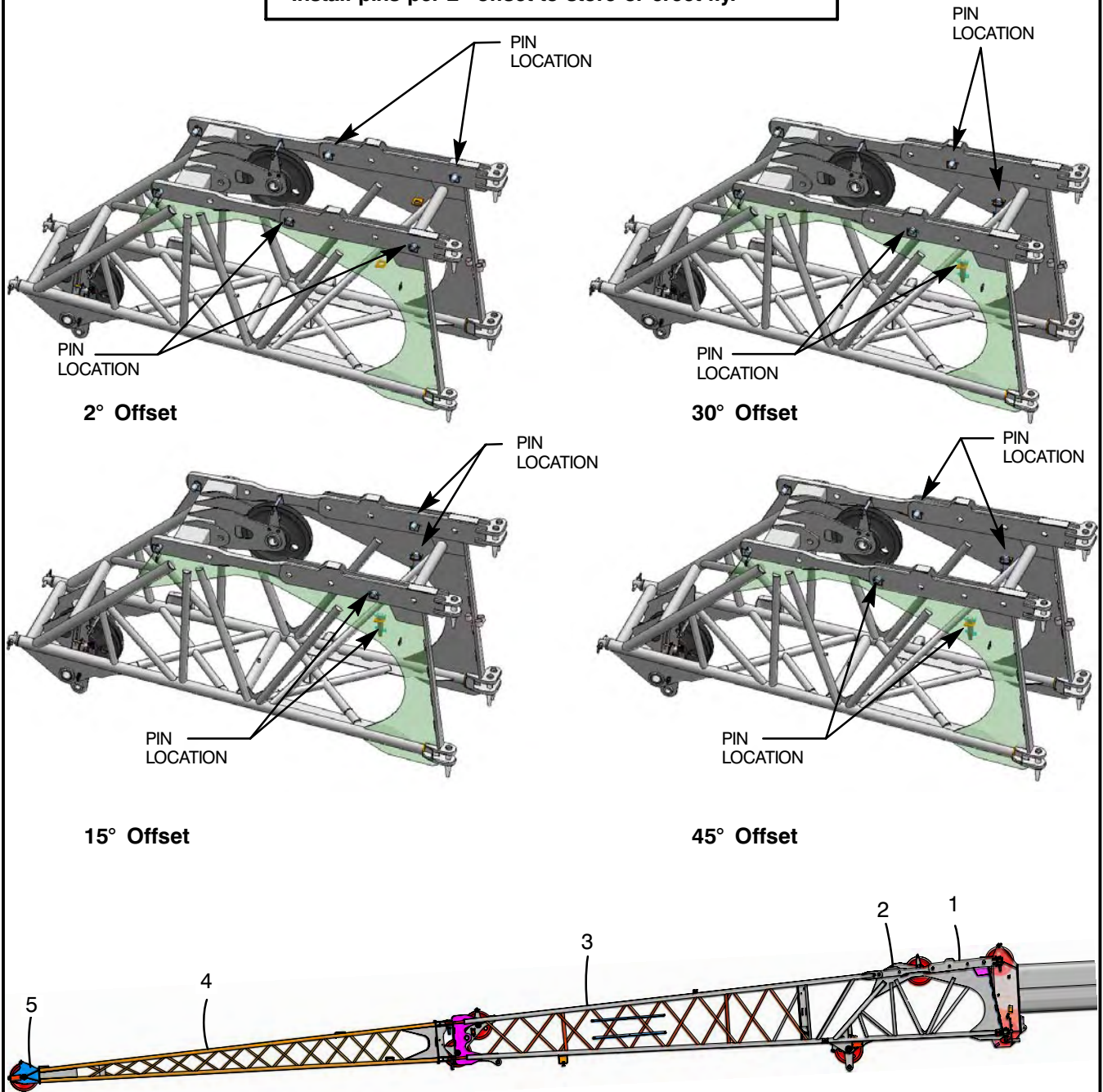
The fly adds weight to the boom which must be considered in lifting capacities when the fly is erected. When making lifts from the main boom or auxiliary lifting sheave with the fly erected, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities. Use the offset lattice fly only when the crane is level on fully extended side frames.



WARNING

Comply with the following to prevent personal injury or crane damage.

Pins must be properly installed on both sides of fly.
Rest fly sheave on ground before changing offsets.
Install pins per 2° offset to store or erect fly.



- | | |
|--|---|
| <ul style="list-style-type: none"> 1. Fly Adaptor Lug 2. 10 Ft Offset Lattice Fly Base Section 3. 21 Ft Offset Lattice Fly Center Section | <ul style="list-style-type: none"> 4. 24 Ft Offset Lattice Fly Tip Section 5. Fly Tip Head Sheave |
|--|---|

Figure 4–16
Changing The 10 Ft, 31–55 Ft Fly Offset Angle

Operator's Manual

Storage Of The 10 Ft Fly Base Section From The Erected Position

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Store the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. Check that the offset connecting pins are installed in the 2° offset position. Refer to Figure 4–16. If necessary change the fly offset to the 2° position. Refer to "Changing The 10 Ft, 31–55 Ft Fly Offset Angle" in this Section of this Operator's Manual for detailed instructions.
3. Position the boom above 50° boom angle and fully retract the boom.
4. Lower the boom to 0° boom angle.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

5. Properly change the anti-two block system connections as follows:
 - a. Disconnect plug assembly from fly base and connect it to the jumper assembly on the main boom head. Refer to Figure 4–3. Ensure all necessary anti-two block connections are disconnected.
 - b. Remove lockout clip on the main boom head anti-two block switch cable.
 - c. Remove the anti-two block weight from the fly base section and install it on the main boom anti-two block switch.
6. Remove wire rope guards from fly base head sheave, fly base deflector sheave, the boom head sheave and

boom deflector sheave. Refer to Figure 4–15. Remove the winch wire rope and lay it aside. Install wire rope guards at all sheaves for storage.

7. Properly store winch wire rope which was used on fly.
8. Attach a hand line to the tip of the fly base.



WARNING

Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

Use extreme care when removing the tapered fly connecting pins. They could pop out suddenly causing serious personal injury.

9. Remove the bottom left fly base connecting pin on the left side of the fly using the t-handle to assist in relieving the load on the pin. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained. Remove the top left fly base connecting pin. Store connecting pins in the storage holes on the boom head machinery cross shafts (25) on the left side of the boom to prevent the shafts from rotating. Refer to Figure 4–17.
10. Remove the inside bottom right fly base connecting pin on the right side of the fly. To reduce loading and ease pin removal, push the fly slightly right or left. Refer to Figure 4–15. Remove the inside top right fly base connecting pin on the right side of the fly. To reduce loading and ease pin removal push the fly slightly left or right. Store the two pins and keepers in the storage rings (6) on the right rear of the fly base section (8).
11. Fully retract the boom and position it to 0° angle.

CAUTION

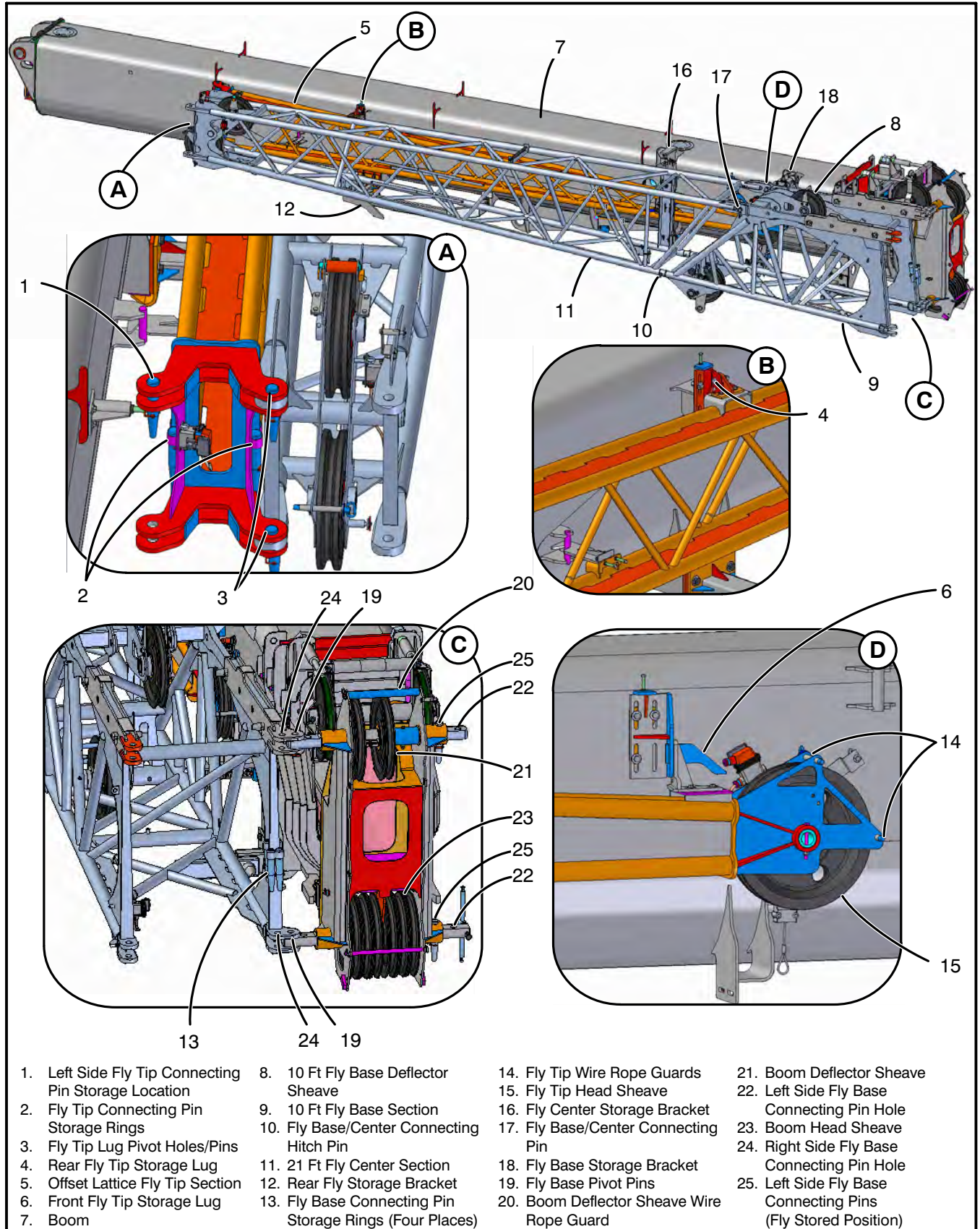
Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.



WARNING

Use a hand line to control fly swing. Fly could swing around the boom rapidly. Keep all personnel clear of swing path to avoid injury.

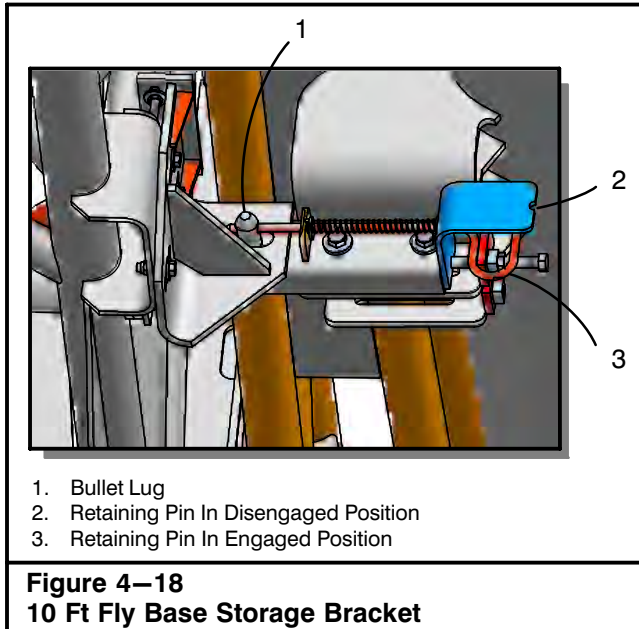
12. Use the hand line attached to the fly base section and slowly swing the fly base section around to the right side of the boom. Slowly boom up to 50°. Refer to Figure 4–8.



- | | | | |
|--|---|---|--|
| 1. Left Side Fly Tip Connecting Pin Storage Location | 8. 10 Ft Fly Base Deflector Sheave | 14. Fly Tip Wire Rope Guards | 21. Boom Deflector Sheave |
| 2. Fly Tip Connecting Pin Storage Rings | 9. 10 Ft Fly Base Section | 15. Fly Tip Head Sheave | 22. Left Side Fly Base Connecting Pin Hole |
| 3. Fly Tip Lug Pivot Holes/Pins | 10. Fly Base/Center Connecting Hitch Pin | 16. Fly Center Storage Bracket | 23. Boom Head Sheave |
| 4. Rear Fly Tip Storage Lug | 11. 21 Ft Fly Center Section | 17. Fly Base/Center Connecting Pin | 24. Right Side Fly Base Connecting Pin Hole |
| 5. Offset Lattice Fly Tip Section | 12. Rear Fly Storage Bracket | 18. Fly Base Storage Bracket | 25. Left Side Fly Base Connecting Pins (Fly Stored Position) |
| 6. Front Fly Tip Storage Lug | 13. Fly Base Connecting Storage Rings (Four Places) | 19. Fly Base Pivot Pins | |
| 7. Boom | | 20. Boom Deflector Sheave Wire Rope Guard | |

Figure 4-17
10 Ft, 31-55 Ft Offset Fly Erection And Storage

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- Using the boom override switch, extend the inner boom section until the fly can swing completely against the storage bracket.
- Slowly fully retract the boom while maintaining 50° boom angle to engage the bullet lug on the 10 ft fly base storage bracket. Refer to Figure 4-17.

Note: If the fly center section is stored on the boom, ensure top and bottom chords engage. Secure base section to center section with two connecting pins at the top and two connecting hitch pins at the bottom.

- Boom down low enough to reach retaining pins. Pull and rotate retaining pin (3). Refer to Figure 4-18. Push retaining pin to engage the pin through the bullet lug on the 10 ft fly base storage bracket.

WARNING

Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

- Remove two fly base connecting pivot pins (1) from the right side of the boom. Refer to Figure 4-15. Store pins and keepers in storage rings (6) on the rear of the fly base section (8).

WARNING

Before operating or traveling the crane ensure the right side fly connecting pins are properly stored in their storage rings, and the left side connecting pins are stored in their storage holes in the boom head machinery cross shafts to prevent the shafts from rotating. Serious personal injury or damage could result to the fly and/or boom if fly connecting pins are not properly stored.

- Remove and store the hand line from the tip of the fly base section.
- Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
- Check the Crane Rating Manual for lifting capacities with the fly in the stored position before continuing operations.

Storage Of The 10 Ft Fly Base And 21 Ft Fly Center Sections From The Erected Position

- Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.

WARNING

Store the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

- Check that the offset connecting pins are installed in the 2° offset position. Refer to Figure 4-16. If necessary change the fly offset to the 2° position. Refer to "Changing The 10 Ft, 31-55 Ft Fly Offset Angle" in this Section of this Operator's Manual for detailed instructions.

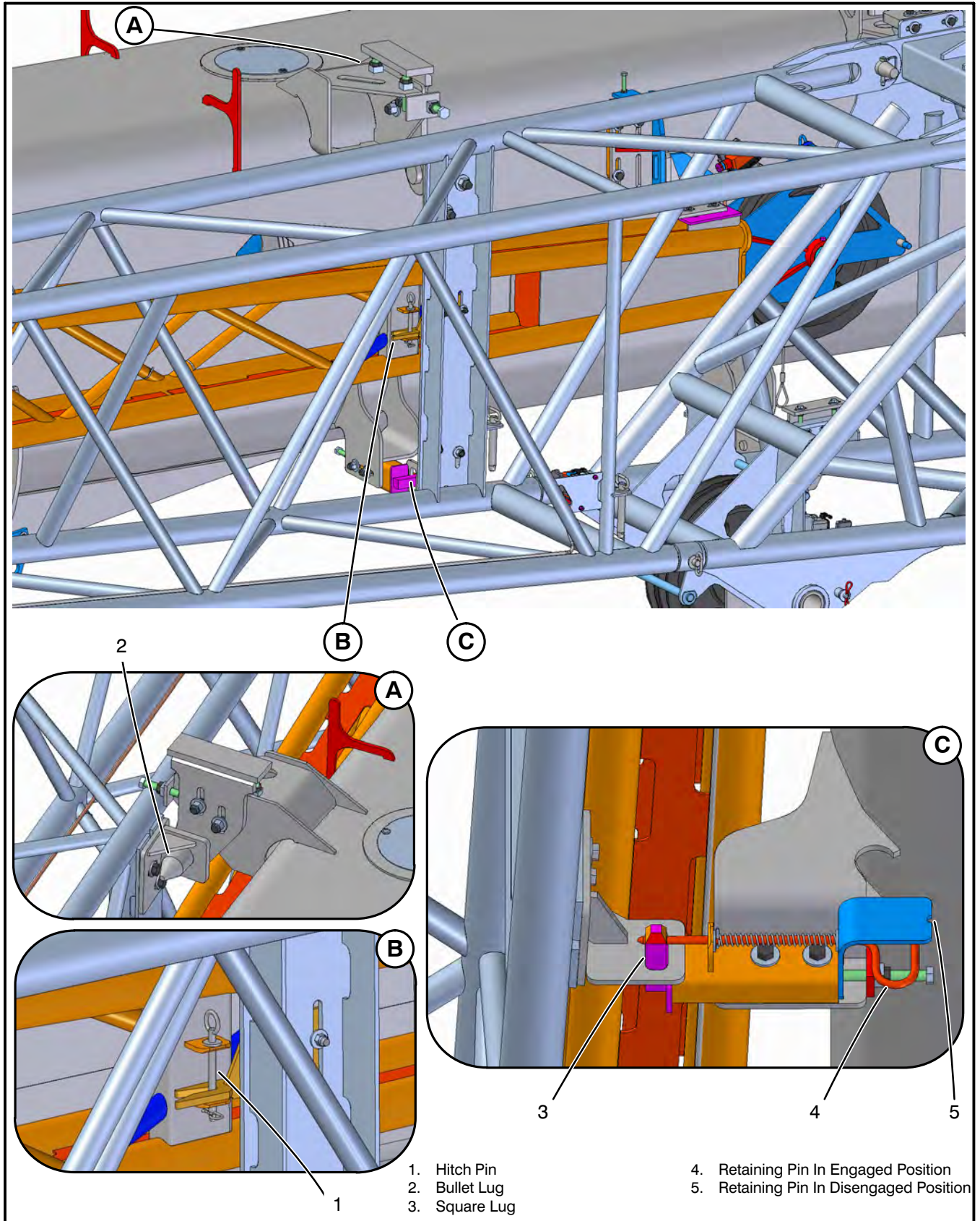


Figure 4-19
10 Ft, 31-55 Ft Fly Center Storage Bracket

- 1. Hitch Pin
- 2. Bullet Lug
- 3. Square Lug
- 4. Retaining Pin In Engaged Position
- 5. Retaining Pin In Disengaged Position

Operator's Manual

3. Position the boom above 50° boom angle and fully retract the boom.
4. Lower the boom to 0° boom angle.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

5. Properly change the anti-two block system connections as follows:
 - a. Disconnect plug assembly from fly base and connect it to the jumper assembly on the main boom head. Refer to Figure 4–3. Ensure all necessary anti-two block connections are disconnected.
 - b. Remove lockout clip on the main boom head anti-two block switch cable.
 - c. Remove the anti-two block weight from the fly base section and install it on the main boom anti-two block switch.
6. Remove wire rope guards from fly center head sheaves, fly base deflector sheave, the boom head sheave and boom deflector sheave. Refer to Figure 4–15. Remove the winch wire rope and lay it aside. Install wire rope guards at all sheaves for storage.
7. Properly store the winch wire rope which was used on the fly.
8. Attach a hand line to the tip of the fly center section.



WARNING

Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

Use extreme care when removing the tapered fly connecting pins. They could pop out suddenly causing serious personal injury.

9. Remove the bottom left fly base connecting pin on the left side of the fly using the t-handle to assist in relieving the load on the pin. Refer to Figure 4–15. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained. Remove the top left fly base connecting pin. Store connecting pins in the storage holes on the boom head machinery cross shafts (2) on the left side of the boom to prevent the shafts from rotating.

10. Remove the inside bottom right fly base connecting pin on the right side of the fly. To reduce loading and ease pin removal, push the fly slightly right or left. Refer to Figure 4–15. Remove the inside top right fly base connecting pin on the right side of the fly. To reduce loading and ease pin removal push the fly slightly left or right. Store the two pins and keepers in the storage rings (6) on the right rear of the fly base section (8).

11. Fully retract the boom and position it to 0° angle.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.



WARNING

Use a hand line to control fly swing. Fly could swing around the boom rapidly. Keep all personnel clear of swing path to avoid injury.

12. Use the hand line attached to the fly center section and slowly swing the fly base and center sections around to the right side of the boom. Slowly boom up to 50°. Refer to Figure 4–8.
13. Using the boom override switch, extend the inner boom section until the fly can swing completely against the storage bracket.
14. Slowly fully retract the boom while maintaining 50° boom angle to slide the storage lug on the rear of the fly center into the slot on the rear storage bracket (12). Refer to Figure 4–17. At the same time, the bullet lug and the square lug on the fly center storage bracket should engage through the holes on the rear of the fly center section. Refer to Figure 4–19. Also the bullet lug on the fly base storage bracket on the boom base section should engage the fly base storage bracket on the fly base section. Refer to Figure 4–18. Also, if the fly tip is stored on the boom, the tip and center sections must engage. Install two right side fly tip connecting pins to connect the fly center to the fly tip section.
15. Boom down low enough to reach retaining pins. Pull and rotate the fly center retaining pin (4). Refer to Figure 4–19. Push retaining pin to engage the pin through the square lug on the front storage bracket. Pull and rotate the fly base retaining pin (3). Refer to Figure 4–18. Push retaining pin to engage the pin through the bullet lug on the 10 ft fly base storage bracket.

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WARNING

Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

16. If the fly tip is stored on the side of the boom, install the hitch pin (1) through the storage bracket on the fly tip section and the storage bracket on the fly center section and secure the hitch pin. Refer to Figure 4–19.
17. Remove two fly base connecting pivot pins (1) from the right side of the boom. Refer to Figure 4–15. Store pins and keepers in storage rings (6) on the rear of the fly base section (8).



WARNING

Before operating or traveling the crane ensure the right side fly connecting pins are properly stored in their storage rings, and the left side connecting pins are stored in their storage holes in the boom head machinery cross shafts to prevent the shafts from rotating. Serious personal injury or damage could result to the fly and/or boom if fly connecting pins are not properly stored.

18. Remove and store the hand line from the tip of the fly base section.
19. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
20. Check the Crane Rating Manual for lifting capacities with the fly in the stored position before continuing operations.

Storage Of The 10 Ft Fly Base, 21 Ft Fly Center, And 24 Ft Fly Tip Sections From The Erected Position

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Store the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. Check that the offset connecting pins (2) are installed in the 2° offset position. Refer to Figure 4–16. If necessary change the fly offset to the 2° position. Refer to "Changing The 10 Ft, 31–55 Ft Fly Offset Angle" in this Section of this Operator's Manual for detailed instructions.
3. Position the boom above 50° boom angle and fully retract the boom.
4. Lower the boom to 0° boom angle.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

5. Properly change the anti-two block system connections as follows:
 - a. Disconnect plug assembly from fly base and connect it to the jumper assembly on the main boom head. Refer to Figure 4–3. Ensure all necessary anti-two block connections are disconnected.
 - b. Remove lockout clip on the main boom head anti-two block switch cable.
 - c. Remove the anti-two block weight from the fly section and install it on the main boom anti-two block switch.
6. Remove wire rope guards from fly tip head sheave, fly center deflector sheave, fly base deflector sheave, boom head sheaves, and boom deflector sheave. Refer to Figure 4–15. Remove the winch wire rope and lay it aside. Install wire rope guards at all sheaves for storage.

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⚠ WARNING

Comply with the following to prevent personal injury or machine damage.

Stored Fly Tip: (shown)
Install one pin in top left side lug closest to boom.
Install other 3 pins in storage.
Refer to Operator's Manual for detailed instructions.

Fly Tip Stored on Boom

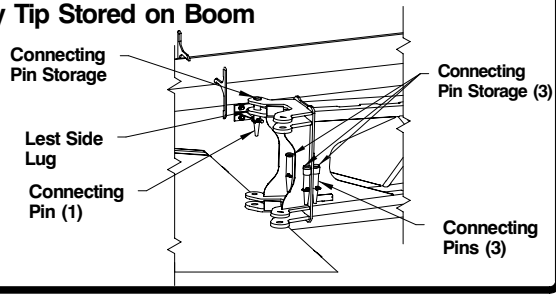


Figure 4–20
Fly Tip Storage Label

7. Properly store the winch wire rope which was used on the fly.
8. Attach a hand line to the tip of the fly tip section.

⚠ WARNING

Do not remove fly tip connecting pivot pins on the right side of the fly until the fly is pinned to the storage brackets. Fly tip could fall causing serious personal injury and/or crane damage.

Use extreme care when removing the tapered fly connecting pins. They could pop out suddenly causing serious personal injury.

9. Remove the bottom and then the top fly tip connecting pins (21) on the left side of the fly tip section (20). Refer to Figure 4–15. To ease pin removal, relieve the loading on the pins by pushing the fly tip from side to side. Store pins and keepers in the storage location (22) on the rear of the fly tip section.
10. Ensure the boom is fully retracted.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.

⚠ WARNING

Use a hand line to control fly swing. Fly tip could swing around fly base rapidly. Keep all personnel clear of swing path to avoid injury.

11. Using the hand line attached to the fly tip section, slowly swing the fly tip section around to the right side of the fly center section. Refer to Figure 4–8.
12. Align the storage bracket on the fly tip section with the storage bracket on the fly center section. Refer to Figure 4–19. Install the hitch pin (1) through the storage brackets and secure the hitch pin.

⚠ WARNING

Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

Use extreme care when removing the tapered fly connecting pins. They could pop out suddenly causing serious personal injury.

13. Remove the bottom left fly base connecting pin on the left side of the fly using the t-handle to assist in relieving the load on the pin. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained. Remove the top left fly base connecting pin. Store connecting pins in the storage holes (14) on the boom head machinery cross shafts (2) on the left side of the boom to prevent the shafts from rotating. Refer to Figure 4–15.
14. Remove the hand line from the tip of the fly tip section and attach it to the tip of the fly center section.
15. Remove the inside bottom right fly base connecting pin on the right side of the fly. To reduce loading and ease pin removal, push the fly slightly right or left. Refer to Figure 4–15. Remove the inside top right fly base connecting pin on the right side of the fly. To reduce loading and ease pin removal push the fly slightly left or right. Store the two pins and keepers in the storage rings (6) on the right rear of the fly base section (8).
16. Fully retract the boom and position it to 0° angle.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.



WARNING

Use a hand line to control fly swing. Fly could swing around the boom rapidly. Keep all personnel clear of swing path to avoid injury.

17. Use the hand line attached to the center section and slowly swing the fly base and center sections around to the right side of the boom. Slowly boom up to 50°. Refer to Figure 4–8.
18. Using the boom override switch, extend the inner boom section until the fly can swing completely against the storage bracket.
19. Slowly fully retract the boom while maintaining 50° boom angle to slide the storage lug on the rear of the fly center into the slot on the rear storage bracket (12). Refer to Figure 4–17. At the same time, the bullet lug and the square lug on the fly center storage bracket should engage through the holes on the rear of the fly center section. Refer to Figure 4–19. Also the bullet lug on the fly base storage bracket on the boom base section should engage the fly base storage bracket on the fly base section. Refer to Figure 4–18.
20. Boom down low enough to reach retaining pins. Pull and rotate the fly center retaining pin (4). Refer to Figure 4–19. Push retaining pin to engage the pin through the square lug on the fly center storage bracket. Pull and rotate the 10 ft fly base retaining pin (3). Refer to Figure 4–18. Push retaining pin to engage the pin through the bullet lug on the 10 fly base storage bracket.



WARNING

Do not remove the fly connecting pivot pins on the right side of the boom until the fly is pinned to the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

21. Remove two fly base connecting pivot pins (19) from the right side of the boom. Refer to Figure 4–17. Store pins and keepers in storage rings (13) on the rear of the 10 ft fly base section (9).



WARNING

Before operating or traveling the crane ensure the right side fly connecting pins are properly stored in their storage rings, and the left side connecting pins are stored in their storage holes in the boom head machinery cross shafts to prevent the shafts from rotating. Serious personal injury or damage could result to the fly and/or boom if fly connecting pins are not properly stored.

22. Install a fly tip connecting pin in the top left fly tip connecting lug. Refer to Figure 4–17 and Fly Tip Storage Label, Figure 4–20.
23. Remove and store the hand line from the tip of the fly center section.
24. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
25. Check the Crane Rating Manual for lifting capacities with the fly in the stored position before continuing operations.

Erection Of The 10 Ft Fly Base Section From The Stored Position

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Erect the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

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- If the fly center and/or the fly tip sections are stored on the boom, check that the fly center and/or fly tip section connecting pins are in the stored position. Refer to Figure 4–17, Figure 4–19, and Figure 4–20.
- Check that the offset connecting pins (2) are installed in the 2° offset position. Refer to Figure 4–16. If necessary change the fly offset to the 2° position. Refer to “Changing The 10 Ft, 31–55 Ft Fly Offset Angle ” in this Section of this Operator's Manual for detailed instructions.
- Position the boom above 50° boom angle. Extend the boom to at least 62 ft (19m) and lower the hook ball, to be used on the fly, to the ground. This will allow enough wire rope length to ease reeving of the fly.
- Fully retract the boom to engage the fly lugs with the boom head machinery cross shafts on the right side of the boom. Fully lower the boom.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

- Remove two fly connecting pins from the storage rings on the rear of the fly base section. Install them through the fly base pivot lugs (19) on the right side of the boom. Refer to Figure 4–17. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
- Remove the winch wire rope from the boom head machinery or the auxiliary lifting sheave whichever is to be used on the fly and lay it aside to prevent damage to it during erection of the fly.



WARNING

Check that the fly base connecting pins are installed on the right side of the boom in the pivot holes before disconnecting the fly from the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

- Pull the retaining pin to disengage the pin from the bullet lug on the 10 ft fly base storage bracket. Refer to Figure 4–18. Rotate and release the retaining pin to lock it in the disengaged position.

Note: If fly center section is stored on the boom, remove two connecting pins from the top of the center section and two connecting hitch pins from the bottom of the center section that connects the base section to the center section.

- Attach a hand line to the tip of the 10 ft fly base and boom up to 20°.
- Using the boom override switch, slowly extend the inner boom section approximately 1–1.5 ft (0.3–0.46m) to slide the 10 ft fly base off the storage brackets.

CAUTION

Do not extend boom more than 1.5 ft (0.46m). Damage to the fly and/or boom may occur.

- Slowly boom down to allow the fly base to swing out slightly from the storage bracket and then fully retract the boom.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.



WARNING

Use a hand line to control fly swing. The fly could swing around the boom rapidly. Keep all personnel clear of the swing path to avoid injury.

- Continue to lower the boom to 0° angle. Use the hand line attached to the fly base and swing the fly base around the boom head until the fly base lugs engage with the boom head machinery cross shafts on the left side of the boom. Refer to Figure 4–8.
- Remove the two connecting pins from the storage rings (13) on the rear of the fly base section and install them in the boom head machinery cross shafts (24) on the right side of the boom. Refer to Figure 4–17. Install the inside top right pin first. Swing the fly base to the left or right to get the pin to drop in the hole. Install the inside bottom right pin. Swing the fly base to the right or left to get the pin to drop in the hole. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
- Remove the two fly connecting pins from the storage location (25) on the boom head machinery cross shafts on the left side of the boom. Refer to Figure 4–17. Install one left side fly base connecting pin through the top fly lug on the left side of the boom. Turn the t-handle to push and align the bottom left fly lug and the bottom boom head machinery cross shaft. Install the bottom left fly con-

necting pin. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained.

WARNING

All six fly base connecting pins must be properly installed before operating the crane with the fly base erected. Serious personal injury or damage to the fly and/or boom could occur if all connecting pins are not properly installed.

15. Remove the wire rope guard from the fly base head and deflector sheaves. Refer to Figure 4–15. Reeve the winch wire rope on the boom deflector sheave then over the fly base deflector and head sheaves. Install all wire rope guards.

CAUTION

All wire rope guards must be in proper position during operation.

16. Properly change the anti-two block system connections as follows:
 - a. Disconnect the plug assembly from the jumper assembly on main boom head and connect it to the fly base section. Refer to Figure 4–3. Ensure all the necessary anti-two block harness connections are made.
 - b. Install the anti-two block weight on the offset fly base section.
 - c. Properly install lockout clip on main boom head anti-two block switch cable.

Note: When the lockout clip is installed, the anti-two block switch is inactive.

When both main boom and fly are reeved for operation, the lockout clip must be removed and properly stored and an anti-two block weight must be suspended from each anti-two block switch.

17. Remove and store the hand line from the tip of the fly base section.
18. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
19. Check the Crane Rating Manual for lifting capacities with the fly installed before continuing operations.

WARNING

The fly adds weight to the boom which must be considered in lifting capacities when the fly is erected. When making lifts from the main boom or auxiliary lifting sheave with the fly erected, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities. Use the offset lattice fly only when the crane is level on fully extended side frames.

Erection Of The 10 Ft Fly Base And 21 Ft Fly Center Sections From The Stored Position

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.

WARNING

Erect the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. Check that the offset connecting pins (2) are installed in the 2° offset position. Refer to Figure 4–16. If necessary change the fly offset to the 2° position. Refer to "Changing The 10 Ft, 31–55 Ft Fly Offset Angle" in this Section of this Operator's Manual for detailed instructions.
3. Check that the fly tip connecting pins are in the stored position. Refer to Figure 4–17.
4. Position the boom above 50° boom angle. Extend the boom to at least 62 ft (19m) and lower the hook ball, to be used on the fly, to the ground. This will allow enough wire rope length to ease reeving of the fly.

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5. Fully retract the boom to engage the fly lugs with the boom head machinery cross shafts on the right side of the boom. Fully lower the boom.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

6. Remove two fly connecting pins from the storage rings on the rear of the fly base section. Install them through the fly pivot lugs (19) on the right side of the boom. Refer to Figure 4–17. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
7. Remove the winch wire rope from the boom head machinery or the auxiliary lifting sheave, whichever is to be used on the fly, and lay it aside to prevent damage to it during erection of the fly.



WARNING

Check that the fly base connecting pins are installed on the right side of the boom in the pivot holes before disconnecting the fly from the storage brackets. The fly could fall causing serious personal injury and/or crane damage.

8. Pull the retaining pin to disengage the pin from the bullet lug on the 10 ft fly base storage bracket. Refer to Figure 4–18. Rotate and release the retaining pin to lock it in the disengaged position.
9. Pull the retaining pin to disengage the pin from the square lug on the fly center storage bracket. Refer to Figure 4–19. Rotate and release the retaining pin to lock it in the disengaged position.

Note: Check that all four pins connecting the base section to the center section (two connecting pins and two connecting hitch pins) are installed and secured.

10. Remove the two fly tip connecting pins (3) from the fly tip lug pivot holes. Refer to Figure 4–17. Ensure the top left side fly tip connecting pin is in the proper storage location (1) Figure 4–17. Check that the remaining 3 fly tip section connecting pins are properly stored in the storage rings (3).
11. Attach a hand line to the tip of the fly center section.
12. Fully retract the boom and boom up to 20°. Using the boom override switch, slowly extend the inner boom section approximately 2–2.5 ft (0.61–0.76m) to slide the fly base and center sections off the storage brackets.

CAUTION

Do not extend boom more than 2.5 ft (0.76m). Damage to the fly and/or boom may occur.

13. Slowly boom down to allow the fly base and center sections to swing out slightly from the storage bracket and then fully retract the boom.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause boom and/or fly damage.



WARNING

Use a hand line to control fly swing. The fly could swing around the boom rapidly. Keep all personnel clear of the swing path to avoid injury.

14. Continue to lower the boom to 0° angle. Use the hand line attached to the fly center section to swing the fly base and center sections around the boom head until the fly lugs engage with the boom head machinery cross shafts on the left side of the boom. Refer to Figure 4–8.
15. Remove the two connecting pins from the storage rings (13) on the rear of the fly base section and install them in the boom head machinery cross shafts (24) on the right side of the boom. Refer to Right Side Fly Base Connecting Pin Label, Figure 4–10 and Figure 4–17. Install the inside top right pin first. Swing the fly base to the left or right to get the pin to drop in the hole. Install the inside bottom right pin. Swing the fly base to the right or left to get the pin to drop in the hole. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
16. Remove the two fly connecting pins from the storage location (25) on the boom head machinery cross shafts on the left side of the boom. Refer to Left Side Fly Base Connecting Pin Label, Figure 4–11 and Figure 4–17. Install one left side fly base connecting pin through the top fly lug on the left side of the boom. Turn the t-handle to push and align the bottom left fly lug and the bottom boom head machinery cross shaft. Install the bottom left fly connecting pin. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained.



WARNING

All six fly base connecting pins must be properly installed before operating the crane with the fly base erected. Serious personal injury or damage to the fly and/or boom could occur if all connecting pins are not properly installed.

17. Remove the wire rope guard from the fly base deflector sheave and fly center head sheave. Refer to Figure 4–15. Reeve the winch wire rope on the boom deflector sheave then over the fly base deflector and fly center section head sheaves. Install all wire rope guards.

CAUTION

All wire rope guards must be in proper position during operation.

18. Properly change the anti-two block system connections as follows:
 - a. Disconnect the plug assembly from the jumper assembly on main boom head and connect it to the fly base section. Refer to Figure 4–3. Ensure all the necessary anti-two block harness connections are made.
 - b. Install the anti-two block weight on the offset fly base section.
 - c. Properly install lockout clip on main boom head anti-two block switch cable.

Note: When the lockout clip is installed, the anti-two block switch is inactive.

When both main boom and fly are reeved for operation, the lockout clip must be removed and properly stored and an anti-two block weight must be suspended from each anti-two block switch.

19. Remove and store the hand line from the tip of the fly center section.
20. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
21. Check the Crane Rating Manual for lifting capacities with the fly installed before continuing operations.



WARNING

The fly adds weight to the boom which must be considered in lifting capacities when the fly is erected. When making lifts from the main boom or auxiliary lifting sheave with the fly erected, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities. Use the offset lattice fly only when the crane is level on fully extended side frames.

Erection Of The 10 Ft Fly Base, 21 Ft Fly Center, And 24 Ft Fly Tip Sections From The Stored Position

1. Park the crane on a firm, level surface. Fully retract the boom and position the upper directly over the front or rear of the lower. Engage the travel swing lock.



WARNING

Erect the offset fly with the crane on a firm level surface, the side frames fully extended, ABC+A counterweight installed, boom mode "Standard", the upper directly over the front or rear of the lower, and the travel swing lock engaged.

The fly adaptor lug and offset connecting pins must be in the 2° offset position to install, remove, erect, or store, the offset fly.

Refer to the Crane Rating Manual for the maximum boom length the fly can be raised/lowered to/from the ground.

Failure to do the above could result in serious personal injury, major crane damage, and/or the crane tipping.

2. Check that the offset connecting pins (2) are installed in the 2° offset position. Refer to Figure 4–16. If necessary change the fly offset to the 2° position. Refer to "Changing The 10 Ft, 31–55 Ft Fly Offset Angle" in this Section of this Operator's Manual for detailed instructions.
3. Position the boom above 50° boom angle. Extend the boom to at least 86 ft (26m) and lower the hook ball. to be used on the fly, to the ground. This will allow enough wire rope length to ease reeving of the fly.
4. Fully retract the boom to engage the fly lugs with the boom head machinery cross shafts on the right side of the boom. Fully lower the boom.

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WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas.

5. Remove two fly connecting pins from the storage rings (13) on the rear of the fly base section. Install them through the fly base pivot lugs (19) on the right side of the boom. Refer to Figure 4–17. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
6. Remove the connecting pin and keeper from the left top fly tip connecting lug (1) on the left side of the fly tip section. Refer to Figure 4–17. Ensure two connecting pins are installed through the fly tip pivot lugs (3). (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
7. Remove the winch wire rope from the boom head machinery or the auxiliary lifting sheave, whichever is to be used on the fly, and lay it aside to prevent damage to it during erection of the fly.
8. Check that the hitch pin (1) is installed through the lugs on the fly tip and fly center sections. Refer to Figure 4–19.

Note: Check that all four pins connecting the base section to the center section (two connecting pins and two connecting hitch pins) are installed and secured.



WARNING

Check that the fly base and tip connecting pins are installed in the pivot holes before disconnecting the fly from the storage brackets. Also check that the hitch pin is installed through the lugs on the fly tip and base sections. The fly could fall causing serious personal injury and/or crane damage.

9. Pull the retaining pin (3) to disengage the pin from the bullet lug on the 10 ft fly base storage bracket. Refer to Figure 4–18. Rotate and release the retaining pin to lock it in the disengaged position (2).
10. Pull the retaining pin (4) to disengage the pin from the square lug on the fly center storage bracket. Refer to Figure 4–19. Rotate and release the retaining pin to lock it in the disengaged position (5).
11. Attach a hand line to the tip of the fly center section.
12. Fully retract the boom and boom up to 20°. Using the boom override switch, slowly extend the inner boom section approximately 2–2.5 ft (0.61–0.76m) to slide the fly tip, fly center, and fly base off the storage brackets.

CAUTION

Do not extend boom more than 2.5 ft (0.76m). Damage to the fly and/or boom may occur.

13. Slowly boom down to allow the fly to swing slightly out from the storage brackets and then fully retract the boom.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.



WARNING

Use a hand line to control fly swing. The fly could swing around the boom rapidly. Keep all personnel clear of the swing path to avoid injury.

14. Continue to lower the boom to 0° angle. Use the hand line attached to the fly center section to swing the fly base, center, and tip around the boom head until the fly base lugs engage with the boom head machinery cross shafts on the left side of the boom. Refer to Figure 4–8.
15. Remove the two connecting pins from the storage rings (6) on the rear of the fly base section and install them in the boom head machinery cross shafts (2) on the right side of the boom. Refer to Right Side Fly Base Connecting Pin Label, Figure 4–10 and Figure 4–15. Install the inside top right pin first. Swing the fly base to the left or right to get the pin to drop in the hole. Install the inside bottom right pin. Swing the fly base to the right or left to get the pin to drop in the hole. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.
16. Remove the two fly connecting pins from the storage location (25) on the boom head machinery cross shafts on the left side of the boom. Refer to Left Side Fly Base Connecting Pin Label, Figure 4–11 and Figure 4–17. Install one pin through the top fly lug (22) on the left side of the boom. Turn the t-handle to push and align the bottom left fly lug and the bottom boom head machinery cross shaft. Install the bottom left fly connecting pin. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers. Back off the t-handle until at least a 1/2 in (1.3cm) clearance from the fly lug is obtained.

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WARNING

All six fly base connecting pins must be properly installed before operating the crane with the fly base erected. Serious personal injury or damage to the fly and/or boom could occur if all connecting pins are not properly installed.

17. Remove the hand line from the tip of the fly center section and attach it to the tip of the fly tip section. Remove the hitch pin which connects the fly tip section to the fly center section. Refer to Figure 4–19. Store the hitch pin back in the lug on the fly tip section once it is erected.
18. Ensure the boom is fully retracted and at 0° angle.

CAUTION

Fully retract the boom before swinging the fly. Failure to do so could cause fly and/or boom damage.



WARNING

Use a hand line to control fly swing. The fly could swing around the boom rapidly. Keep all personnel clear of the swing path to avoid injury.

19. Use the hand line attached to the fly tip section and slowly swing the fly tip section around the fly center section until the fly tip lugs engage with the fly center lugs on the left side of the fly center section.
20. Remove the fly tip connecting pins from the storage holes on the rear of the fly tip section. Install them through the fly tip connecting lugs on the left side of the fly. Install the inside top left pin first. Swing the fly tip to the left or right to get the pin to drop in the hole. Install the inside bottom left pin. Swing the fly tip to the right or left to get the pin to drop in the hole. (Install the pins with the head on top and the keeper on the bottom.) Install the pin keepers.



WARNING

All six fly tip connecting pins must be properly installed before operating the crane with the fly tip erected. Serious personal injury or damage to the fly and/or boom could occur if all connecting pins are not properly installed.

21. Remove the wire rope guards from the fly base deflector sheave, fly center deflector sheave, and fly tip head sheaves. Refer to Figure 4–15. Reeve the winch wire rope on the boom deflector sheave then over the fly base and fly center deflector sheaves, and fly tip head sheave. Install all wire rope guards.

CAUTION

All wire rope guards must be in proper position during operation.

22. Properly change the anti-two block system connections as follows:
 - a. Disconnect the plug assembly from the jumper assembly on main boom head and connect it to the fly base section. Refer to Figure 4–3. Ensure all the necessary anti-two block harness connections are made.
 - b. Install the anti-two block weight on the appropriate fly section.
 - c. Properly install lockout clip on main boom head anti-two block switch cable.

Note: When the lockout clip is installed, the anti-two block switch is inactive.

When both main boom and fly are reeved for operation, the lockout clip must be removed and properly stored and an anti-two block weight must be suspended from each anti-two block switch.

23. Remove and store the hand line from the tip of the fly tip section.
24. Properly set the Rated Capacity Limiter to the correct crane configuration. Refer to Section 1 of this Operator's Manual.
25. Check the Crane Rating Manual for lifting capacities with the fly installed before continuing operations.



WARNING

The fly adds weight to the boom which must be considered in lifting capacities when the fly is erected. When making lifts from the main boom or auxiliary lifting sheave with the fly erected, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities. Use the offset lattice fly only when the crane is level on fully extended side frames.

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10 Ft Offset Fly Base Panel Lifting

The 10 ft offset fly base can be used for pre-cast panel lifting applications, as well as general lifting applications. During the panel lifting applications, a single load is allowed on both the main boom and 10 ft offset fly base hoist lines at the same time provided that all panel lifting guidelines are adhered to.

Before making any lifts with the 10 ft offset fly base, refer to the Crane Rating Manual to ensure the load is within the rated capacity for the 10 ft offset fly base.

The 10 ft offset fly base adds weight to the boom which must be considered in the lifting capacities. When making lifts from the main boom hoist line with the 10 ft offset fly base installed, refer to the Crane Rating Manual for the appropriate deductions from lifting capacities.



WARNING

Do not simultaneously lift separate loads with the 10 ft offset fly base and the main boom. Lifting two loads at the same time may cause boom failure leading to major equipment damage and/or serious personal injury.

In the panel lifting application, if both the main boom and 10 ft offset fly base hooks are attached to a single panel, this is considered one load.

Panel Lifting Guidelines

Certain guidelines must be followed when using 10 ft offset fly base in panel lifting applications. The following are the guidelines that must be followed unless otherwise stated in the Crane Operator's or Crane Rating Manual:

1. A single panel with two hooks (main boom and 10 ft offset fly base hooks) attached is considered one load for this application.
2. Follow all 10 ft offset fly base notes for General Operation listed in the Crane Rating Manual.
3. The Rated Capacity Limiter (RCL) and anti-two block (ATB) systems shall remain fully functional at all times. Select the 10 ft offset fly base as the hook being used. The RCL will display approximately the total load lifted (the sum of the two lines) and will also display the 10 ft offset fly base load radius and rated capacity.
4. The total load on both hooks (the sum of the two lines), including hook blocks, hook balls, slings, and rigging, etc. must not exceed the allowable lifting capacity of the main boom or the 10 ft offset fly base, whichever is less. (The main boom capacity in this condition will be the main boom rated load less the deduct for "10 ft offset fly base erected but not used" to account for the 10 ft offset fly base and its load handling equipment.)
5. Lifting and placement of panels with two hooks is more complex than typical lift crane service. The crane operator and rigging personnel shall be experienced with and qualified for two hook panel lifting and placement applications.
6. Load shift while lifting with two hooks may be more unpredictable than typical single hook lift work. Extra precautions must be taken to avoid accidents. A qualified person on the ground shall be designated as the primary signal person.
7. When rigging two hooks on a panel, each hook or rigging device shall be capable of handling the entire weight of the panel being lifted.
8. Both load lines must remain in the vertical plane of the crane boom (no side load). The panel being lifted must also be in the same vertical plane as the crane boom.
9. The off-lead angle of the wire rope from true vertical must be minimized when initially lifting a panel with two hooks. The head height of the boom shall be a minimum of three times the horizontal distance between the two hook points on the panel being lifted.

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Crane Rating Manual And Serial Number

The Crane Rating Manual is attached under the operator's seat. The Crane Rating Manual has the crane serial number on it. The serial number is also stamped on the top right side of the lower frame and on the right side of the upper frame just above the boom hoist cylinder lug. The serial number must be used with any correspondence with a Link-Belt Distributor or Factory concerning parts or warranty. The Crane Rating Manual also lists the maximum allowable lifting capacities for the crane. The Crane Rating Manual should be checked for the proper lifting capacities before making any lifts.

If the Crane Rating Manual becomes lost, damaged, or unreadable, it must be replaced before operating the crane. Information contained in the Crane Rating Manual is important and failure to follow the information it contains could result in an accident. A replacement Crane Rating Manual can be ordered through a Link-Belt Distributor.



WARNING

The Crane Rating Manual in the crane is the only authorized listing of lifting capacities for the crane. It supersedes any other printed literature which lists lifting capacities. It alone is to be used for determining crane capacities.

Wire Rope Capacity Chart

The Wire Rope Capacity Chart gives the maximum lifting capacities based on wire rope strength. A typical example is shown in Figure 5–1. The actual chart is in the Crane Rating Manual. It lists the maximum load that should be lifted with different sizes and types of wire rope. The weights shown are based on wire rope strength alone. Exceeding these load weights may result in wire rope damage or failure.

Before making a lift, compare the weight being lifted (remember to add the weight of the hook block, hook ball, slings, and riggings to the actual load weight) with the Wire Rope Capacity Chart in the Crane Rating Manual.

Check the chart for the number of parts of line required to make the lift. Use at least that number of parts of line to make the lift. When making a lift with more parts of line than is needed to make the lift, remember to add the weight of the extra wire rope required to reeve the extra parts of line to the actual load weight. The extra parts of line act as additional load weight. Refer to the Wire Rope Capacity Chart in the Crane Rating Manual for the correct weight per foot (*meter*) of wire rope.



WARNING

Do not exceed the capacities listed for wire rope strength or crane capacity, whichever is less, when making a lift. Serious personal injury or major crane damage may result.

Wire Rope Specifications

The specifications for the wire rope used on this crane are on the Wire Rope Capacity Chart in the Crane Rating Manual. Refer to Figure 5–1 for a typical example. Always refer to the Wire Rope Capacity Chart in the Crane Rating Manual and the crane Parts Manual when ordering replacement wire rope.

Wire Rope Diameter

In standard practice, the nominal diameter of wire rope is the minimum acceptable diameter. It is always made larger, not smaller, than the nominal diameter according to the allowable tolerances shown in the following chart:

Nominal Wire Rope Diameter	Allowable Limits	
Thru 1/8" (3.2mm)	–0	+8%
Over 1/8" (3.2mm) thru 3/16" (4.8mm)	–0	+7%
Over 3/16" (4.8mm) thru 5/16" (8.0mm)	–0	+6%
Over 5/16" (8.0mm)	–0	+5%

Wear and stress tend to reduce the diameter. It should be measured periodically and replaced if the size is below the nominal size of the wire rope being used as shown in the chart on page 5–4. It should always be measured across the largest diameter that will fit inside a true circle. Refer to Figure 5–2.

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Wire Rope Capacity		
Parts of Line	0.75"	
	Type RB	Type ZB
1	12,920	15,600
2	25,840	31,200
3	38,760	46,800
4	51,680	62,400
5	64,600	78,000
6	77,520	93,600
7	90,440	109,200
8	103,360	124,800
9	116,280	140,400
10	129,200	156,000
11	142,120	171,600
12	155,040	187,200
Wire Rope Wt./Length [lb/ft]	1.10	1.14
LBCE Type	Description	
RB	19 x 19 Rotation Resistant – Extra Extra Improved Plow Steel – Preformed – Right Lay – Regular Lay. Swaged	
ZB	34 X 7 Non-Rotating – Extra Improved Plow Steel – Right Regular or Right Lang Lay	
<p>Capacities shown are in pounds and working loads must not exceed the ratings on the capacity charts in the Crane Rating Manual.</p> <p>Study Operator's Manual for wire rope inspection procedures and single part of line applications.</p> <p>Note: The Wire Rope Capacity Chart depicted above is shown as an example only. Use the official Wire Rope Capacity Chart in the Crane Rating Manual. Use it to determine the correct parts of line required for the given wire rope type and diameter.</p> <p>Note: Always refer to the crane Parts Manual when ordering wire rope.</p>		
<p>Figure 5–1 Typical Wire Rope Capacity Chart (Example Only)</p>		

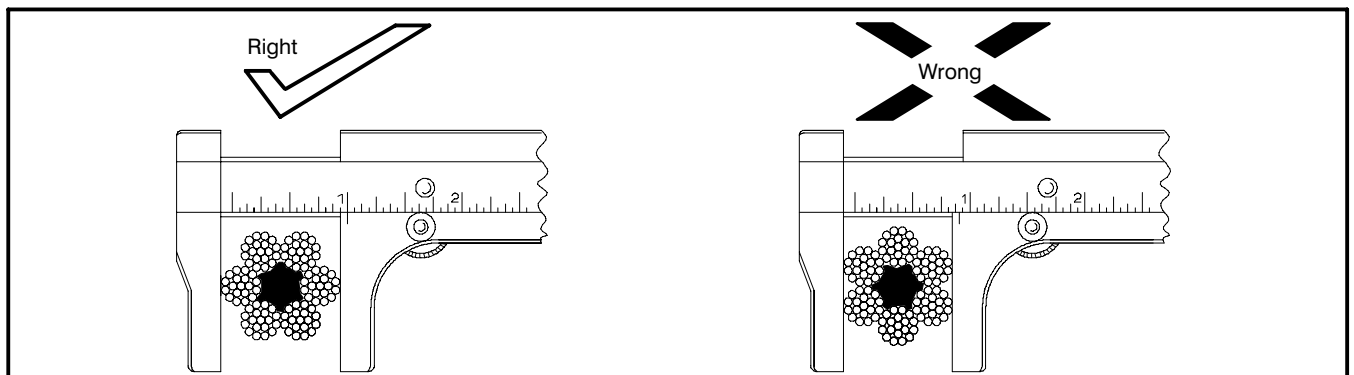


Figure 5–2
Measuring Wire Rope Diameter

WIRE ROPE INSPECTION REPORT

Crane S/N _____ Owned By _____ Crane Location _____

Date of Inspection _____ Wire Rope Application _____ Wire Rope Description _____

Manufacturer's I.D. No. _____ Applicable Standards _____

Criteria for Removal				1/3 of Outside Wire Dia.	1						
Location on Wire Rope	Measured Diameter	Broken Wires		Excessive wear	End Attachments			Rope Damage	Sheave Condition	Drum Condition	Rope Lay Measurement
		In 1 Rope Lay	In 1 Strand of 1 Lay		Broken Wires	Corrosion of Rope	Fitting Condition				

Signature: _____

Figure 5–3
Typical Wire Rope Inspection Report

Wire Rope Inspection And Replacement Recommendations

The three basic reasons for deterioration of wire rope are abrasion, corrosion, and damage caused by fatigue bending, crushing, kinking, and forces or abuse, acting against the wire rope during normal usage.

When wire rope is replaced, use the type specified on the Wire Rope Capacity Chart in the Crane Rating Manual. Cranes are designed to use a specific type and size of wire rope. Using wire ropes other than those recommended may result in short life or even failure of the wire rope.

According to ASME standards, all wire ropes in active service must be visually inspected daily. A qualified, trained person should be appointed to conduct the inspection. Also on a monthly basis, that person is required to inspect all wire ropes and keep a dated, written record noting any damage, and recording when wire ropes are replaced.

These inspections should be done to determine the degree of deterioration of the wire rope at any given section (refer to the following on wire rope replacement). This will determine the suitability of the wire rope for continued service. A sample inspection report is shown in Figure 5–3. (It can be reproduced and used if desired.)

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Wire Rope Inspection

Any of the following are reasons to question wire rope safety:

1. More than one broken wire in any one strand should be cause for caution. Breaks that occur on the worn crowns of the outside wires usually indicate normal deterioration. Breaks that occur in the valleys between strands can indicate an abnormal condition, possibly fatigue, and breakage of other wires that are not readily visible. One or more valley breaks should be cause for replacement.
2. Wire breaks generally occur in those portions of wire rope which pass over sheaves, wind onto drums, or receive mechanical abuse. Breaks that occur near attached fittings usually result from fatiguing stresses concentrated in these localized sections. Breaks of the latter type should be cause for replacement of the wire rope or renewal of the attachment to eliminate the locally fatigued area. When running wire ropes over nylon sheaves, inspect the wire rope where it travels over the point sheaves. Inspect for a loss of diameter and then bend the wire rope to inspect the internal wires for breaks and wear.
3. Heavy wear, or broken wires, may occur in sections under equalizer sheaves or other sheaves where wire rope travel is limited, or in contact with saddles. Particular care should be taken to inspect wire rope at these points. If wire rope wear is detected at these locations, these wear points can be shifted by removing the wire rope from the drum and cutting a 20 ft (6.1m) section off at the drum end. This may assist in extending the wire rope life.
4. Wire rope stretch is generally greatest during initial stages of operation when the strands are becoming adjusted and seated. This is accompanied by some reduction in wire rope diameter.
5. Time for wire rope replacement is indicated by the extent of abrasion, scrubbing, and peening on the outside wires, broken wires, evidence of pitting or major corrosion, kink damage, or other mechanical abuse resulting in distortion of the wire rope structure.
6. Sheaves, guards, guides, drums, flanges, and other surfaces contacted by wire rope during operation should be examined at the time of inspections. Any condition harmful to the wire rope in use at the time should be corrected. The same equipment, and particularly sheave and drum grooves, should be inspected and placed in proper condition before a new wire rope is installed.

Wire Rope Replacement

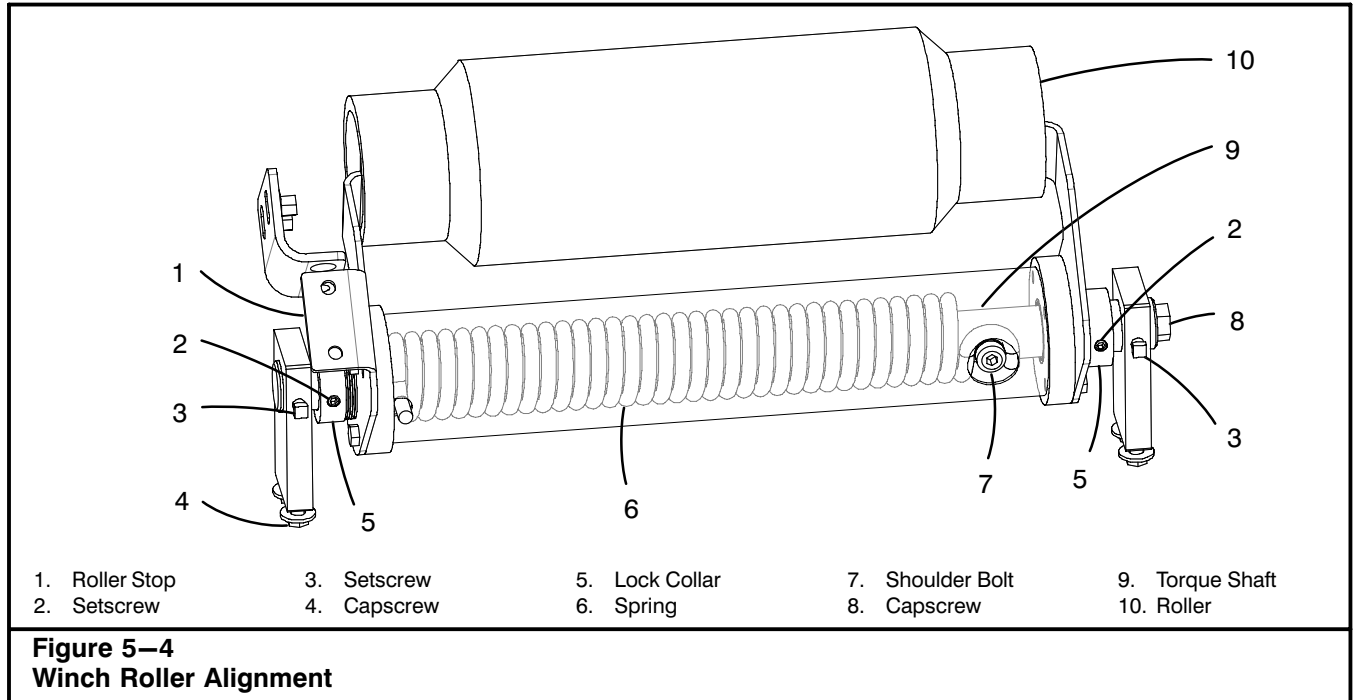
Any of the following are reasons for wire rope replacement:

1. In running wire ropes, six randomly distributed broken wires in one wire rope lay, or three broken wires in one strand in one wire rope lay.

For rotation resistant wire ropes, two randomly distributed broken wires in six wire rope diameters, or four randomly distributed broken wires in thirty wire rope diameters.
 2. In pendants or standing wire ropes, evidence of more than two broken wires in one lay in sections beyond end connections or more than one broken wire in one wire rope lay at end connection.
 3. One outer wire broken at the contact point with the core of the wire rope which has worked its way out of the wire rope structure and protrudes or loops out from the wire rope structure.
 4. Abrasion, scrubbing, or peening causing loss of more than 1/3 the original diameter of individual wires.
 5. Evidence of wire rope deterioration from corrosion.
 6. Kinking, crushing, "bird caging", or other damage resulting in distortion of the wire rope structure.
 7. Evidence of any heat damage.
 8. Marked reduction in diameter indicates deterioration of the core resulting in lack of proper support for the load carrying strands. Excessive wire rope stretch or elongation may also be an indication of internal deterioration. Reduction from nominal diameter or more than that shown in the chart below:
- | Reduction of | Nominal Wire Rope Diameters |
|---------------|-----------------------------------|
| 1/64" (.4mm) | up to and including 5/16" (8mm) |
| 1/32" (.79mm) | over 5/16" (9.5mm) to 1/2" (13mm) |
| 3/64" (1.2mm) | over 1/2" (13 mm) to 3/4" (19mm) |
| 1/16" (1.6mm) | over 3/4" (19mm) to 1-1/8" (29mm) |
| 3/32" (2.4mm) | over 1-1/8" (29mm) |
9. Noticeable rusting or development of broken wires in the area of connections.

Wire Rope Installation

When installing wire rope, the primary concern is getting the wire rope onto the drum without trapping any twist that may have been induced during handling. Use the following procedures to install the wire rope on the crane.



Winch Roller Adjustment

Before installing wire rope on the drum, adjust the drum roller if equipped. Refer to Figure 5-4. If the roller is not aligned to the drum, it may cause excessive wear on the wire rope, winch roller, or impede spooling of the wire rope on the drum. To adjust the roller, loosen the capscrews (4) and adjust roller assembly as required to align the roller parallel to the drum. Roller should lay flat across each full layer of wire rope on the drum and be centered between the drum flanges. Center the roller between the drum flanges by loosening the setscrews (2) in the lock collars (5), centering the roller (10), and tightening the setscrews (2). After roller is aligned and centered, preload the spring using the following procedure.



WARNING

Do not attempt to service winch roller before properly relieving torsion spring tension. If proper directions are not followed, the torsion spring could rapidly and forcefully uncoil. This may result in serious personal injury and component damage. Always release tension on torsion spring before attempting any winch roller repair.

1. Properly release torsion spring (6) tension as follows.

This procedure is greatly simplified by using two service technicians. One to hold the breaker bar/wrench, the other to loosen and tighten setscrews.

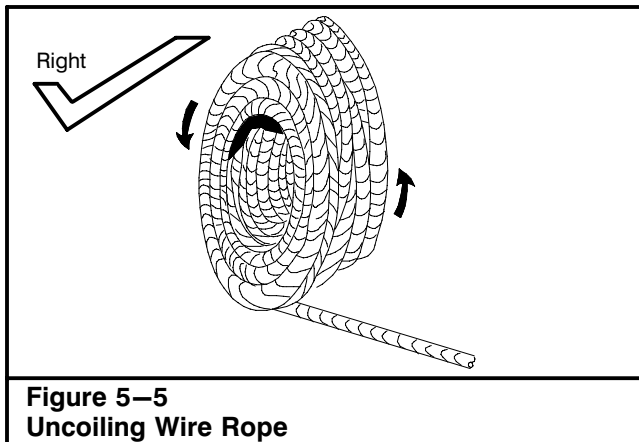
- a Ensure capscrew (8) is tightened securely in torque shaft (9).
 - b Using a breaker bar or long handle wrench, hold tension on torsion spring (6) while loosening the setscrews (3) on both ends of torque shaft (9).
 - c Allow torque shaft (9) to rotate counterclockwise, as far as possible while maintaining control of the torque shaft (9), then securely tighten setscrews (3).
 - d Reposition breaker bar or wrench on capscrew (8).
 - e Repeat Steps b through d until tension is fully relieved from torsion spring (6).
2. Turn the capscrew (8), which will rotate the torque shaft (9), until the bolt (7) through the torque shaft contacts the spring (6).

CAUTION

Do not overtighten the spring. Damage to the wire rope may occur.

3. With the roller stop (1) resting against the drum flange or with the roller resting evenly on the first layer of wire rope on the drum, use 105 ft lb (142Nm) of torque to rotate the spring not to exceed one revolution (360°).
4. Tighten setscrews (3). The roller should roll freely when the drum rotates.

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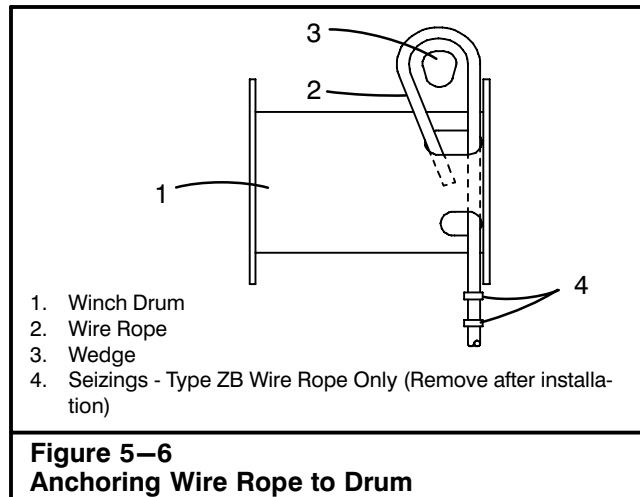


Uncoiling Wire Rope

1. To avoid twists, unreel the entire wire rope on the ground in line with the boom deflector sheave and drum. Set the reel up horizontally so it can rotate as the wire rope is reeled off. Refer to Figure 5-5. Reel the wire rope off slowly, so the reel won't tend to "throw" the wire rope off. If the new wire rope cannot be laid out on the ground, further steps are necessary:
 - a. Mount the reel on a shaft through flange holes and on jack stands, making sure the reel is set to be unreeled over the top. Do not allow the reel to "free-wheel". Brake the reel by applying pressure to a flange. Do not apply braking pressure to the wire rope on the reel or pass wire rope between blocks of wood or other material.
2. Reeve the wire rope over the boom deflector sheave and anchor it to the drum.

Note: When replacing wire rope, the sheaves and grooves in drums should be checked for wear or damage and replaced if necessary. Damaged, worn, or undersized sheaves will damage the wire rope. On older equipment, remember that new wire rope is usually larger in diameter than the worn wire rope it replaces. The sheave grooves may be worn to the smaller diameter of the old wire rope.

A new wire rope should be broken in by running it slowly through its working cycle for a short period under a light load. Refer to "Wire Rope Break-In" in this Section of this Operator's Manual.



Anchoring Wire Rope To Drum

CAUTION

The ends of type ZB wire rope must be fuse welded. Failure to do so may cause the core to slip and/or the strands to loosen causing major wire rope damage.

If crane is equipped with type ZB wire rope, attach two seizings (hose clamps are an effective and efficient alternative if traditional seizings are not available) about 24 inches (61cm) from the end with a 3 inch (7.62cm) space between them. Refer to Figure 5-6. The seizings will prevent any looseness of the outer strands from traveling up the wire rope during installation. Insert the free end of the wire rope into the small opening of the anchor pocket. Loop the wire rope and push the free end about 3/4 of the way back through the pocket. Install the wedge, then pull the slack out of the wire rope. If using type ZB wire rope, remove the seizings after the wire rope is secured in the drum. Keep tension on the wire rope to prevent the wire rope from becoming slack and forming loops or kinks and also to allow uniform winding on the drum.

Winding Wire Rope On Drum

Proper winding of the first layer of wire rope on a multiple wrap drum is important. If the first layer is properly wound, succeeding layers will be easier to control.

Note: If crane is equipped with a first layer/third wrap warning system, it must be calibrated while winding wire rope on the drum. Refer to "First Layer/Third Wrap Calibration" in Section 3 of this Operator's Manual

This is especially important on ungrooved drums. When starting new wire rope on such drums, drive each wrap of the first layer lightly with a wooden mallet so each wrap barely contacts the preceding one. Keep tension on the wire rope to prevent the wire rope from becoming slack and forming loops or kinks and also to allow uniform winding on the drum. It is important that original wire rope lay is maintained at all times.

It's important to apply a tensioning load while spooling the wire rope on the drum. (If not, the lower layers may be loose enough that the upper layers become wedged into the lower layers under load, which can cause major damage to the wire rope.) The tensioning load should range from 1 to 2% of the wire rope's nominal strength.

Wire Rope Reeving

Hook blocks should be reeved correctly so they hang straight and do not cause excessive wear on the wire rope and sheaves. Refer to Figure 5-7.



WARNING

To avoid personal injury, do not climb, stand, or walk on the boom or fly. Use a ladder or similar device to reach necessary areas when reeving the crane.

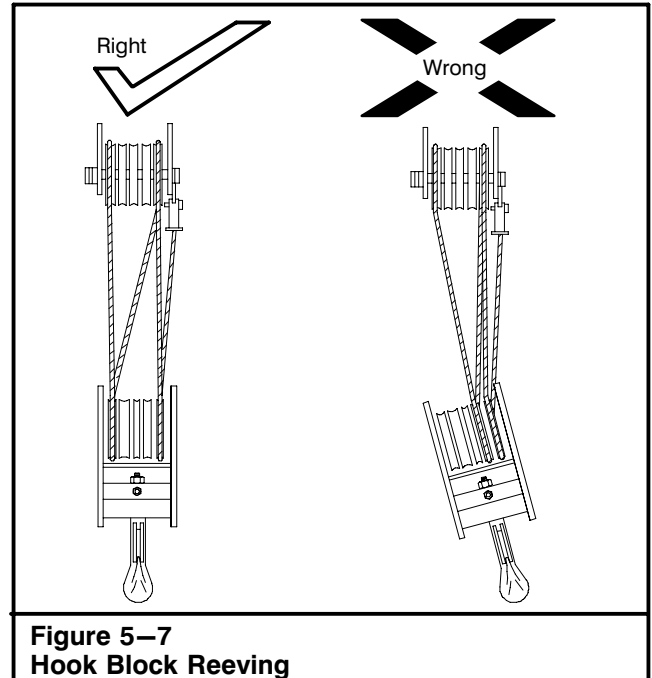
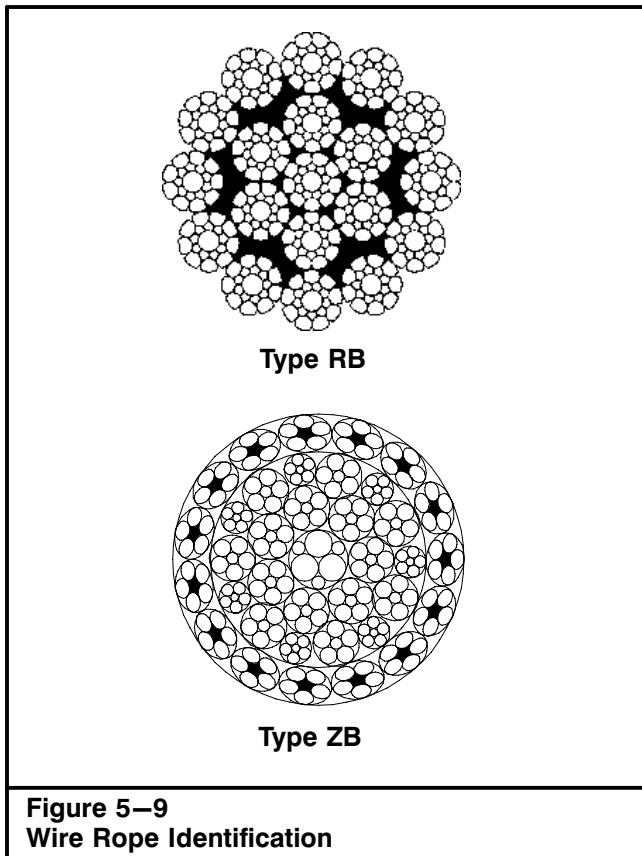
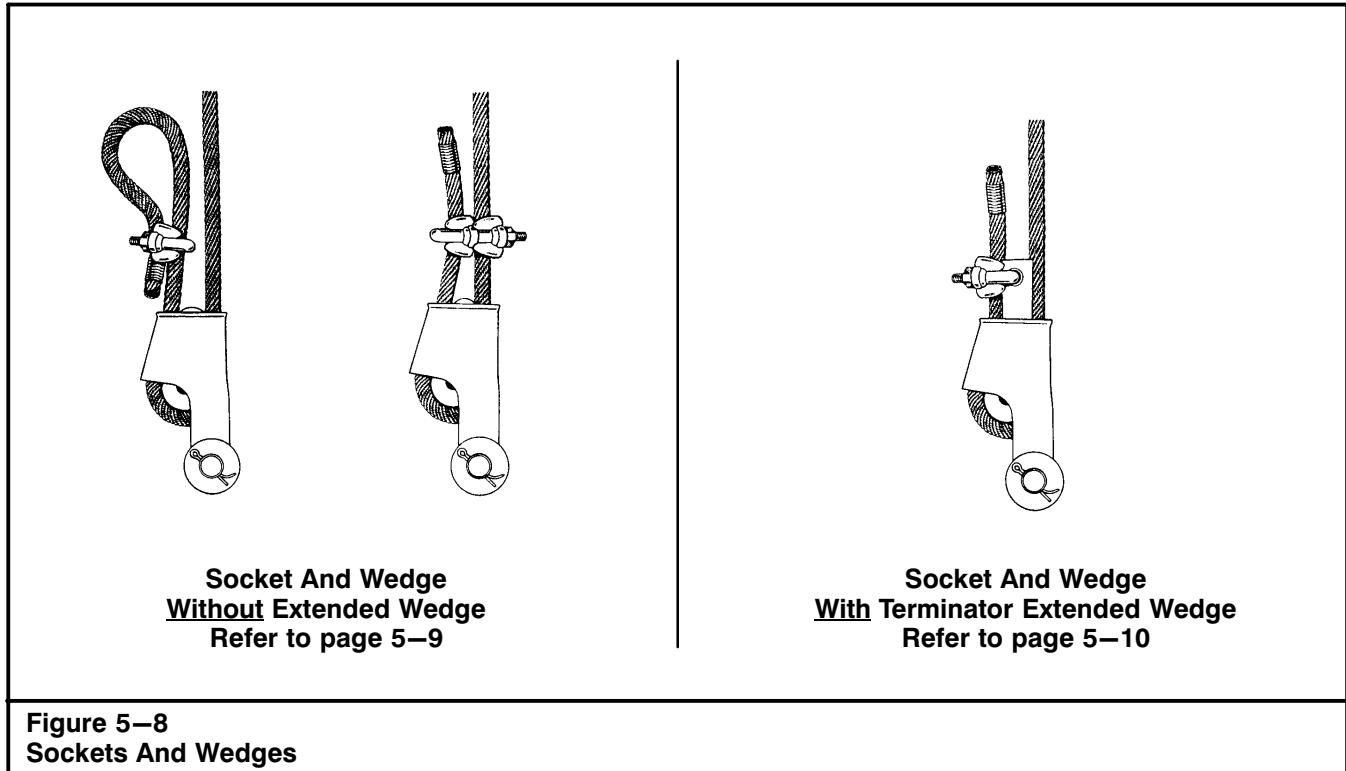


Figure 5-7
Hook Block Reeving

The crane can use multiple parts of line when reeving the main winch depending on the lift being made and the number of sheaves available. When reeving the main winch, odd parts of line dead end at the hook block and even parts dead end at the boom head. The auxiliary lifting sheave may be reeved with either one or two parts of line. The fly section may be reeved with two parts of line for better line control. Figure 5-18 and Figure 5-20 gives the proper reeving for various parts of line. The reeving patterns illustrated must be used at all times. To determine how many parts of line to use for a particular lift, check the Wire Rope Capacity Chart, and the Winch Performance Chart, in the Crane Rating Manual.

Note: Wire rope guards must always be used during operations. They must be pinned in place to prevent wire rope from jumping off the sheaves.

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Socket And Wedge Assemblies

This crane may be equipped with either of two styles of sockets and wedges. One style socket uses a “terminator” extended wedge and the other does not. The wedges for each style are installed differently. Refer to Figure 5-8 to determine which style your crane has and where to find the appropriate information for use and installation.

WARNING

Do not interchange sockets and wedges. Loads may slip or fall if socket and wedge are not properly matched. Use a “terminator” wedge with a socket for a “terminator” wedge and a non-“terminator” wedge with a non-“terminator” socket.

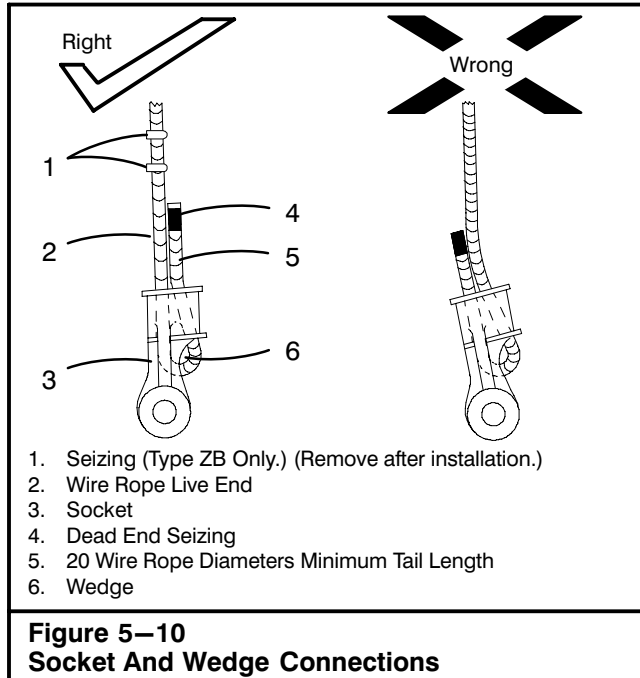


Figure 5-10
Socket And Wedge Connections

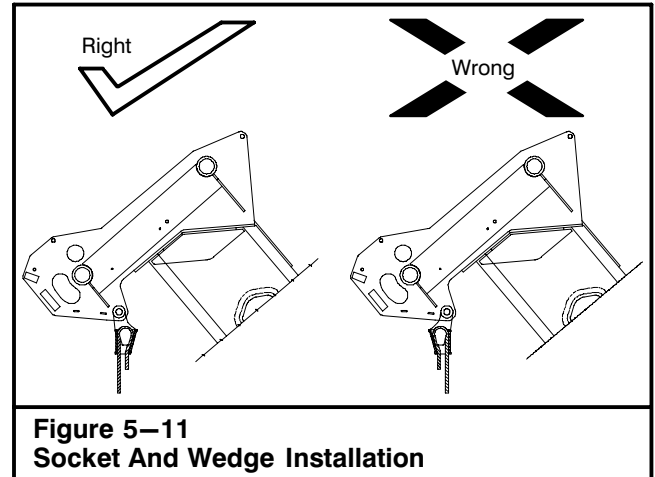
Socket And Wedge Assembly – Without Extended Wedge

CAUTION

Use the proper size wedge with a wire rope socket or lagging. The use of an off-size wedge in a socket or lagging is dangerous as it may not hold. Wedges and sockets shipped from the factory are stamped with size and type identification. A lagging or socket may be stamped for two or more sizes of wire rope and a wedge for one or two. The size on the lagging, socket, and wedge must correspond with the size of wire rope being used.

The correct and incorrect methods of attaching a socket and wedge to wire rope are shown in Figure 5-10. The dead end of the wire rope must always be on the sloped portion of the socket. The load line must be in a straight line pull with the eye of the socket. If the wire rope is installed wrong as shown in Figure 5-10, a permanent set will develop at the point where the wire rope enters the socket.

Before installing type ZB wire rope into a socket or wedge attach two seizings (hose clamps are an effective and efficient alternative if traditional seizings are not available) approximately 3-4 ft (0.9-1.2 m) from the end with a 3 in (76.2 mm) space between them. Refer to Figure 5-10.



The dead end must also be seized and a minimum tail length of 20 wire rope diameters [15" (.38m) for 3/4" (19mm) wire rope] is required. The seizings will help prevent core slippage and any looseness of the outer strands from traveling up the wire rope during installation while still allowing the wire rope strands to be free to adjust. If using type ZB wire rope, remove seizings from the live end after wire rope is securely installed into the socket.

Note: Refer to Figure 5-9 to identify which type of wire rope is installed on the crane.

CAUTION

The ends of type ZB wire rope must be fuse welded and the tail length of the dead end must be a minimum of 20 wire rope diameters [15" (.38m) for 3/4" (19mm) wire rope]. Failure to do the above may cause the core to slip and/or the strands to loosen causing major wire rope damage.

When anchoring the socket to the boom head, ensure the flat face is facing out as shown in Figure 5-11. If socket is not installed correctly structural damage to the boom head may occur.

It is recommended that the wire rope socket and wedge connection be reestablished on an annual basis. This can be accomplished by cutting the wire rope 6 in (0.15m) above the socket and wedge connection. See "Cutting Wire Rope" in this Section of this Operator's Manual. Install the socket and wedge connection as shown in Figure 5-10.

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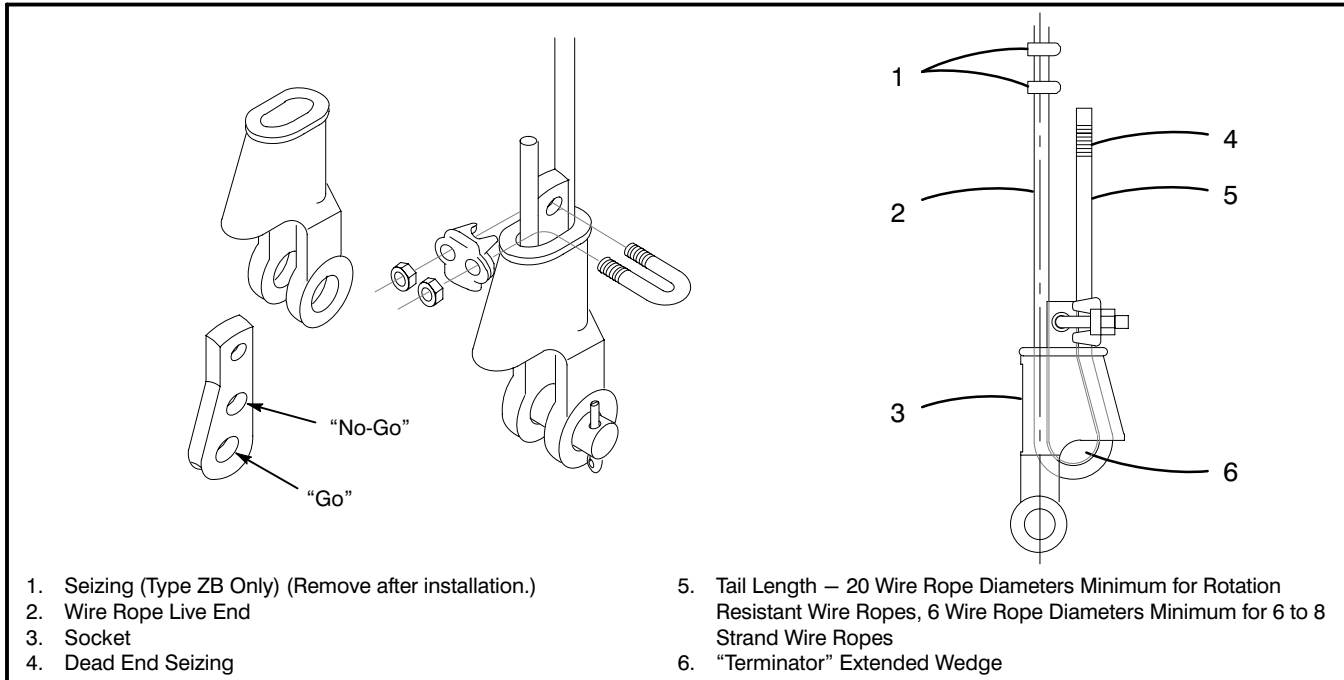


Figure 5–12
Socket & Wedge Assembly – With Extended Wedge

Socket And Wedge Assembly – With “Terminator” Extended Wedge

WARNING

Use the proper size wedge with a wire rope socket or drum. The use of an incorrect size, type, or brand of wedge in a socket or drum is dangerous as it may not hold. Wedges and sockets shipped from the factory are stamped with size and type identification. A drum or socket may be stamped for two or more sizes of wire rope and a wedge for one or two. The size on the drum, socket, and wedge must correspond with the size of wire rope being used.

WARNING

Do not interchange sockets and wedges. Loads may slip or fall if socket and wedge are not properly matched. Use a “terminator” wedge with a socket for a “terminator” wedge and a non-“terminator” wedge with a non-“terminator” socket.

The correct and incorrect methods of attaching a wedge and socket to wire rope are shown in Figure 5–12 and Figure 5–13. The dead end of the wire rope must always be on the sloped portion of the socket. The load line must be in a straight line pull with the eye of the socket. If the wire rope is installed wrong as shown in Figure 5–13, a permanent set will develop at the point where the wire rope enters the socket. This permanent set will weaken the wire rope and accelerate wear at this point.

Before installing type ZB wire rope into a socket or wedge attach two seizings (hose clamps are an effective and efficient alternative if traditional seizings are not available) approximately 3–4 ft (0.9–1.2 m) from the end with a 3 in (76.2 mm) space between them. Refer to Figure 5–10.

Wedges and sockets shipped from the factory are stamped with size and type or pair identification. A socket or wedge may be stamped for two or more sizes of wire rope. The size on the socket and wedge must correspond with the size of wire rope being used. The wedge also has a “go”/“no-go” feature cast into the wedge to assist in determining the proper size wire rope that can be used with that particular socket and wedge. Refer to Figure 5–12. The proper size wire rope is determined when: 1) the wire rope passes through the “go” hole in the wedge, and 2) the wire rope does not pass through the “no-go” hole in the wedge. The part number may also be stamped on the socket and wedge. Refer to the Parts Manual for confirmation. If there is any doubt as to the mating of the socket and wedge, contact a Link-Belt Distributor.

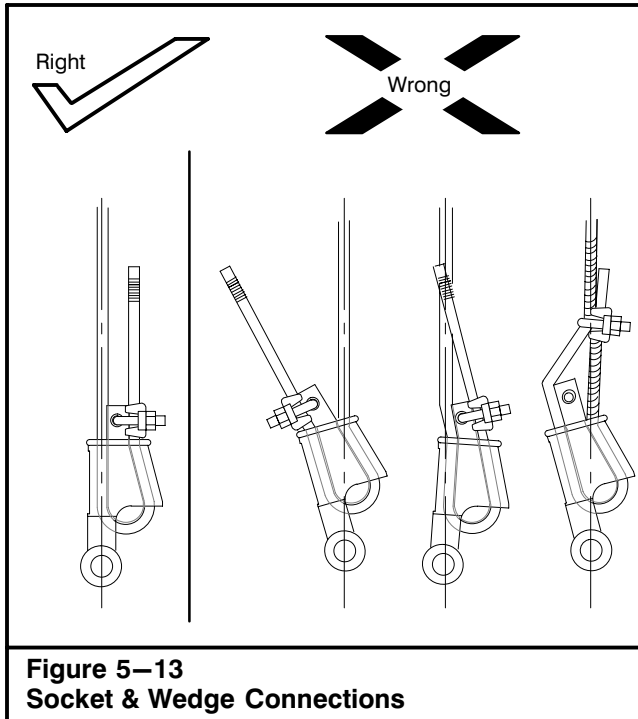


Figure 5-13
Socket & Wedge Connections

The dead end must also be seized and a minimum tail length of 20 wire rope diameters [15" (.38m) for 3/4" (19mm) wire rope] for rotation resistant wire ropes and 6 wire rope diameters minimum for 6 to 8 strand wire rope is required. Refer to Figure 5-12.

Note: Refer to Figure 5-9 to identify which type of wire rope is installed on the crane.

Use a wooden mallet to seat the wedge and wire rope into the socket before applying first load. Lift the first load a few inches (*centimeters*) from the ground to fully seat the wedge and wire rope in the socket. This load should be of equal or greater weight than loads expected in use.

Secure the dead end section of the wire rope by installing the clip through the wedge as shown in Figure 5-12. Tighten the nuts on the clip to the recommended torque as shown on the table in Figure 5-16.

When anchoring the socket to the boom head, ensure the flat face is facing in as shown in Figure 5-14. If socket is not installed correctly, damage to the boom head may occur.

It is recommended that the wire rope socket and wedge connection be reestablished on an annual basis. This can be accomplished by cutting the wire rope 6 in (0.15m) above the socket and wedge connection. See "Cutting Wire Rope" in this Section of this Operator's Manual. Install the socket and wedge connection as shown in Figure 5-13.

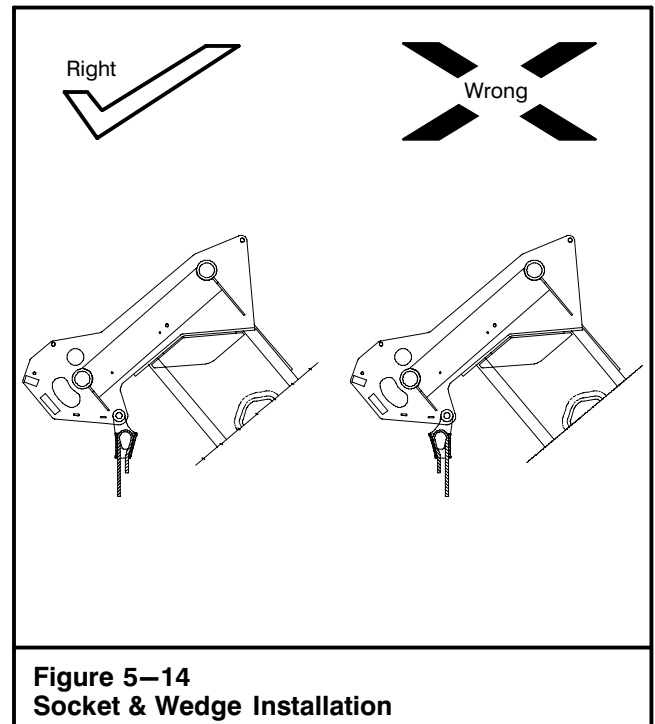


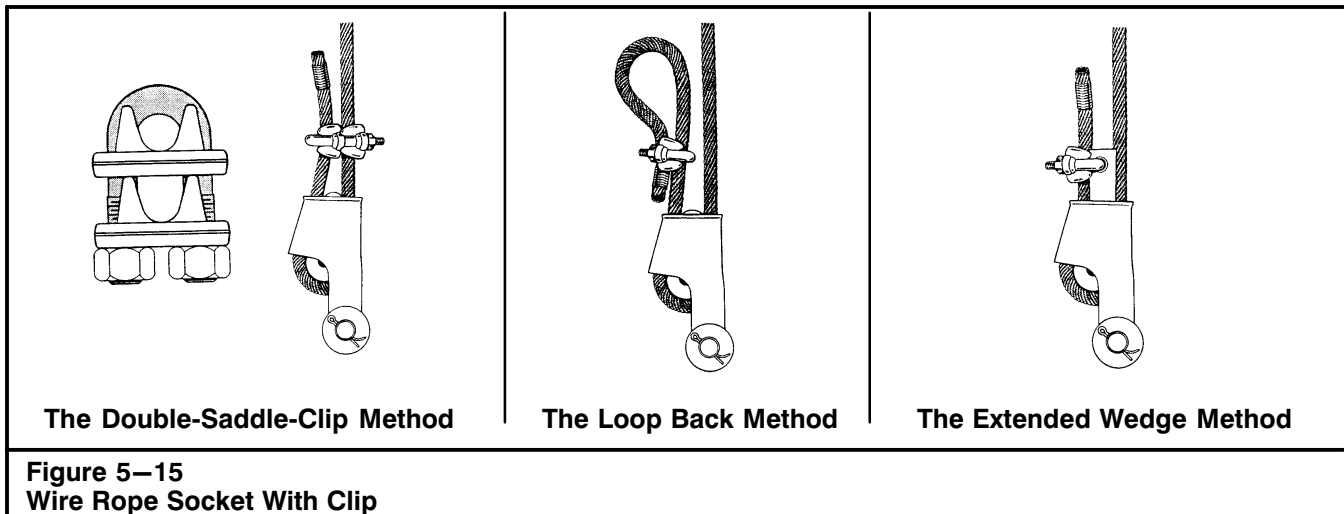
Figure 5-14
Socket & Wedge Installation

Wire Rope Break-In

After the wire rope has been installed and the ends secured in the correct manner, the new wire rope must be run through a break-in period. This allows the component parts of the new wire rope to gradually adjust to actual operating conditions.

1. Level the crane on fully extended side frames. Swing the upper over the end of the lower and engage the travel swing lock.
2. Fully raise and fully extend the boom. Attach a light load at the hook and raise it a few inches (*centimeters*) off the ground. Allow to stand for several minutes.
3. Run the wire rope through a cycle of operation at very slow speeds. During this trial operation, a very close watch should be kept on all working parts—sheaves, drums, roller, etc. to make certain that the wire rope runs freely and without any possible obstructions as it makes its way through the system.
Note: Run these loads with reeving that places the loads on the hook with all wire rope off the drum except the last three wraps. If this is not possible, alternate methods must be used to assure proper tensioning of the wire rope on the drum.
4. If no problems appear in running the wire rope, repeat procedure with an increased load.

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Single Part Line Hoisting

Non-rotating, rotation resistant, or spin resistant wire ropes are recommended for single part of line applications. This is of utmost importance for long fall hoist line applications. Link-Belt type “RB”, “ZB”, and “GC” are examples of wire ropes recommended for single part hoisting. See the Wire Rope Capacity Chart in the Crane Rating Manual for the specific types of rotation resistant wire rope recommended for your crane.

The use of non-rotation resistant wire rope is **not** recommended for long falls of single part of line hoisting since the wire rope and load may spin. If the crane operator allows either the load or the wire rope to rotate, the crane or wire rope can be damaged. The anti-two block weight may also become entangled with the wire rope and could damage the anti-two block system, wire rope, and/or head machinery.

Hook Ball Usage With Rotation Resistant Wire Rope

The rotation resistant characteristic is achieved by laying the outer strands around an independent wire rope that is wound in the opposite direction. When the wire rope has tension on it, opposing rotational forces are created between the core and outer strands. If a swivel hook ball is utilized with rotation resistant wire rope, the wire rope is allowed to twist. The outer strands unwind and get longer while the inner core is forced to rotate in the same direction and shortens in length. As a result of this treatment, the inner core sees a disproportionately greater load, and core damage may occur due to shock loading or overloading. A rotating load on an unrestrained, non-swivel hook ball without a tagline, affects the internal loading of the wire rope in this manner. This practice, or

any other which allows the wire rope to rotate while in service, leads to unbalanced loading between the inner and outer layer of strands, which may result in core failure. Wire rope manufacturer's testing has shown that rotation resistant wire rope utilized with a swivel hook ball has reduced the breaking strength by as much as 50% if excessive rotation occurs.

Non-Swivel Usage

A non-swivel hook ball, in conjunction with a tagline or other device to control load spin, should be used when the crane is equipped with rotation resistant wire rope. This is to avoid unrestrained rotation of the wire rope.

Swivel Usage

A swivel hook ball can be used with rotation resistant wire rope if:

1. The wire rope is not shock loaded or overloaded.
2. Wire rope working strength is reduced to maintain original design factors.
3. The wire rope is inspected frequently as outlined below.

Wire Rope Inspection

Marked reduction in diameter indicates deterioration of the core resulting in lack of proper support for the load carrying strands. Excessive wire rope stretch or elongation may also be an indication of internal deterioration.

Major concerns and replacement recommendations include:

1. Loss of wire rope diameter (in excess of those listed in the table in “Wire Rope Replacement” in this Section of this Operator's Manual), abnormal lengthening of wire rope lay, or protrusion of wires between the outer strands.
2. 2 randomly distributed broken wires in 6 wire rope diameters, or 4 randomly distributed broken wires in 30 wire rope diameters.

Clip Size		Minimum No. Of Clips	Amount Of Wire Rope To Turn Back*		Torque	
Inches	mm		Inches	mm	ft lb	Nm
1/4	3.2	2	3-1/4	82.5	---	---
3/16	4.7	2	3-3/4	95.2	---	---
1/4	6.3	2	4-3/4	120.6	15	20.0
5/16	7.9	2	5-1/4	133.3	30	40.7
3/8	9.5	2	6-1/2	165.1	45	60.1
7/16	11.1	2	7	177.8	65	86.8
1/2	12.7	3	11-1/2	292.1	65	86.8
9/16	14.3	3	12	304.8	95	126.9
5/8	15.9	3	12	304.8	95	126.9
3/4	19.0	4	18	457.2	130	173.6

* If a greater number of clips are used than shown in this table, the amount of wire rope turnback should be increased proportionally.

Figure 5–16
Wire Rope Clip Application Recommendation

Wire Rope Sockets With Clips

Some codes require the use of a wire rope clip in conjunction with a socket and wedge connection. Figure 5–15 illustrates some typical methods of clip installation with sockets. In some cases, particularly in wrecking ball work, there is a chance that the wedge can loosen, releasing the socket from the wire rope. This could be caused by the banging action and alternate loading and unloading of the wire rope that occurs during this type work.



WARNING

Regularly inspect the integrity of the wire rope at the point of exit at the dead end side. High velocity spin of wire rope when loading and unloading can cause the wire rope to flip-flop, fatigue, and finally break off.

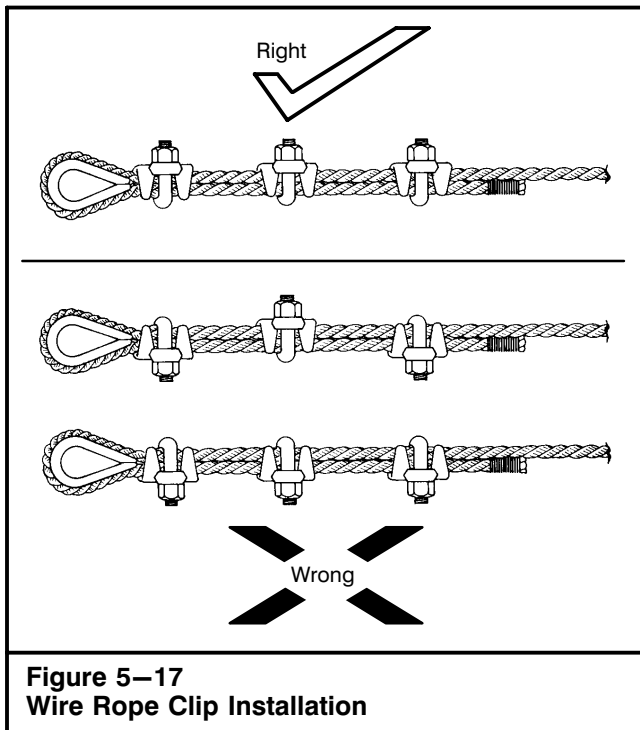
The use of wire rope clips with a socket and wedge connection can weaken the connection if done improperly. Do not attach the dead end of the wire rope to the live side with the clip as this will weaken the connection. The clip may ultimately take the load and may deform or break the wire rope.

If using the loop back method, the loop formed must not be allowed to enter the wedge, or the connection will be weakened. The tail length of the dead end must be a minimum of 20 wire rope diameters [15" (.38m) for 3/4" (19mm) wire rope].

CAUTION

The ends of type ZB wire rope must be fuse welded and the tail length of the dead end must be a minimum of 20 wire rope diameters [15" (38cm) for 3/4" (19mm) wire rope]. Failure to do so may cause the core to slip and/or the strands to loosen causing major wire rope damage.

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Wire Rope Clip Installation

The correct method of installing wire rope clips is shown in Figure 5-17. The u-bolt must always be over the short end of the wire rope and the base must always contact the long end.

Clips should not be staggered, that is u-bolt of one clip over short end and u-bolt of next clip over long end. This practice will not only distort the wire rope excessively, but will prevent maximum strength of this type fastening. Placing all clips with the u-bolt over the long end of the wire rope will damage strands and result in an unsafe condition.

The distance between clips should be not less than six times the wire rope diameter. In relation to size of wire rope, the minimum number of clips recommended for

safe connections and the torque for the nuts on the clips is also listed in Figure 5-16.

CAUTION

Apply the initial load and retighten nuts to the recommended torque. Wire rope can stretch and reduce in diameter when loads are applied. Inspect periodically and retighten as required.

Cutting Wire Rope

CAUTION

The ends of type ZB wire rope must be fuse welded. Failure to do so may cause the core to slip and/or the strands to loosen causing major wire rope damage.

When wire rope is to be cut, seizings should be placed on each side of the point where the wire rope is to be cut, to keep the strands in place. On preformed wire rope such as type RB, one seizing on each side of the cut is enough. On non-preformed wire rope less than 7/8 inch (23mm) diameter such as type ZB, two seizings are recommended. On non-preformed wire rope over 7/8 inch (23mm) diameter, three seizings are recommended. Original wire rope lay must be maintained at all times.

Three Basic methods of cutting wire rope are recommended:

1. Abrasive cutting tools.
2. Shearing tools. (Wire cutters on small wire rope, a wire rope cutter, and hammer for larger wire ropes.)
3. Oxy/acetylene fuel torch. This is the only suggested method for cutting type ZB wire rope.

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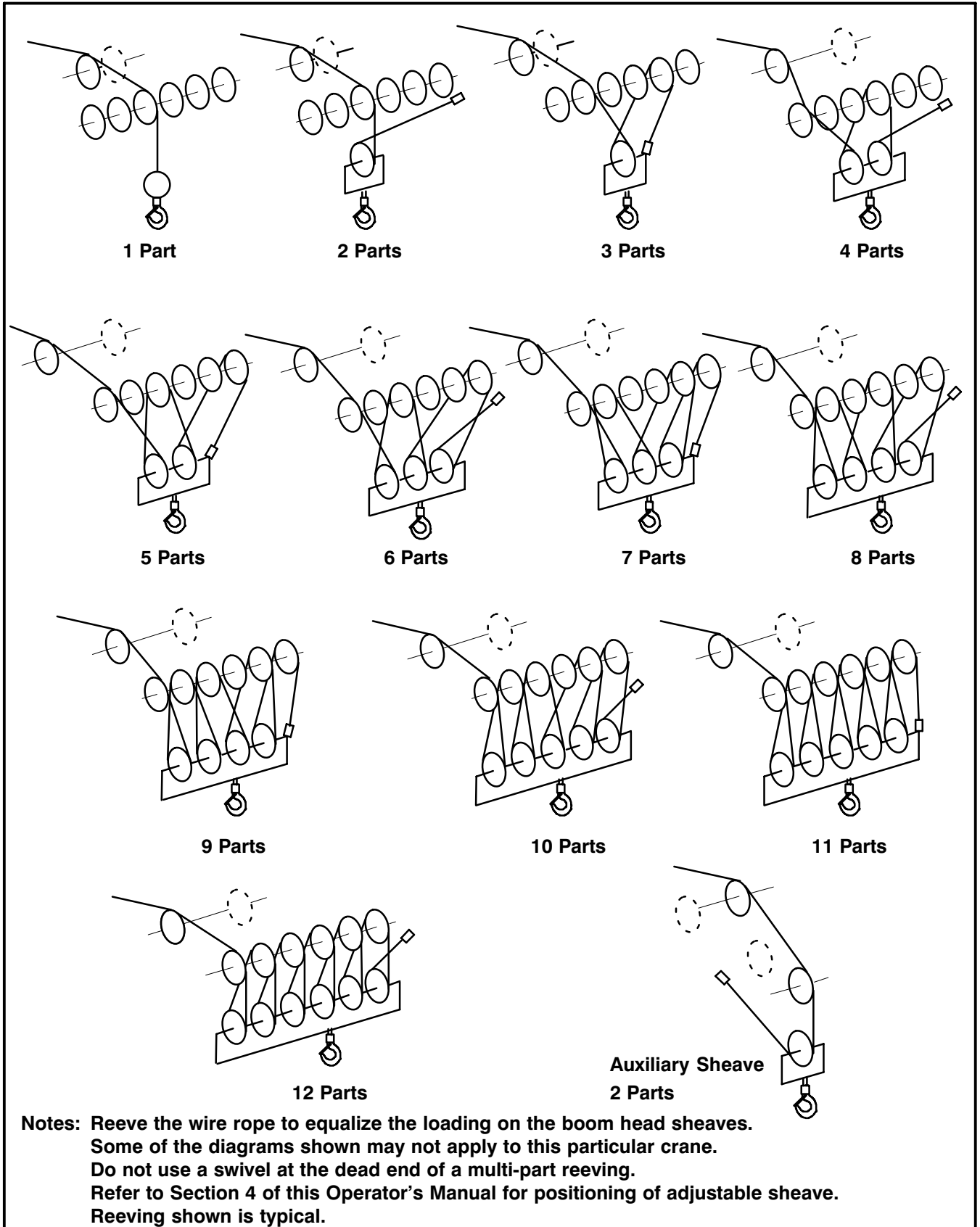
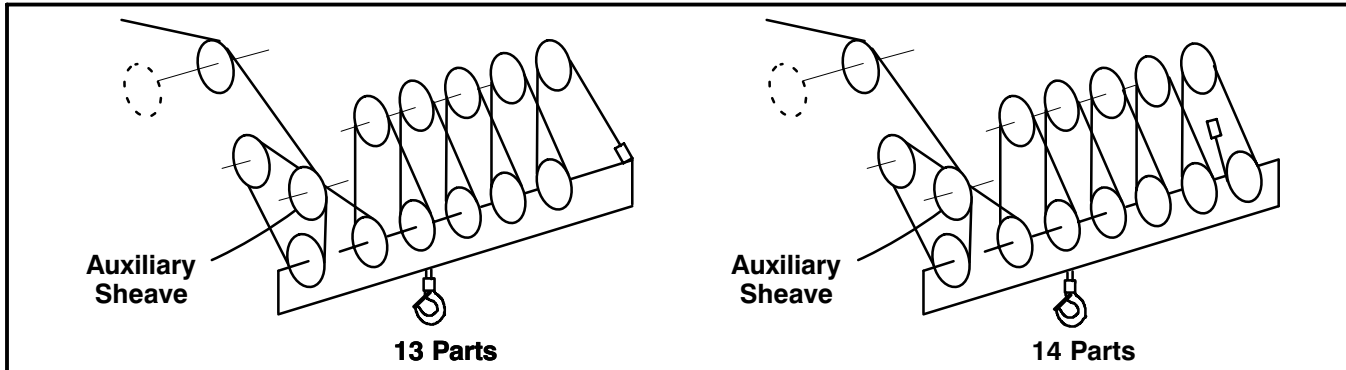


Figure 5-18
Wire Rope Reaving Diagrams

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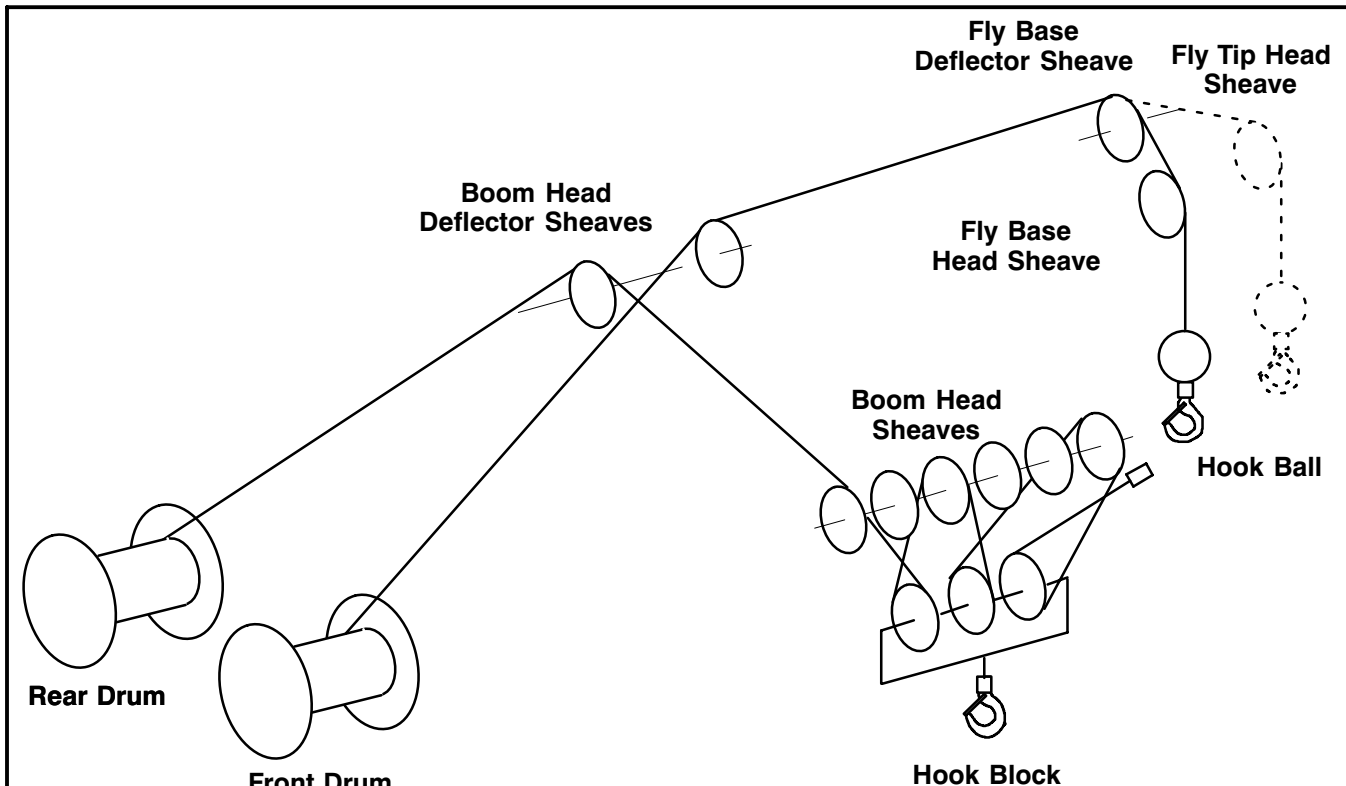


CAUTION

These reevings are only applicable for maximum rated capacity lifts that require additional parts of line to maintain the required wire rope safety factor.

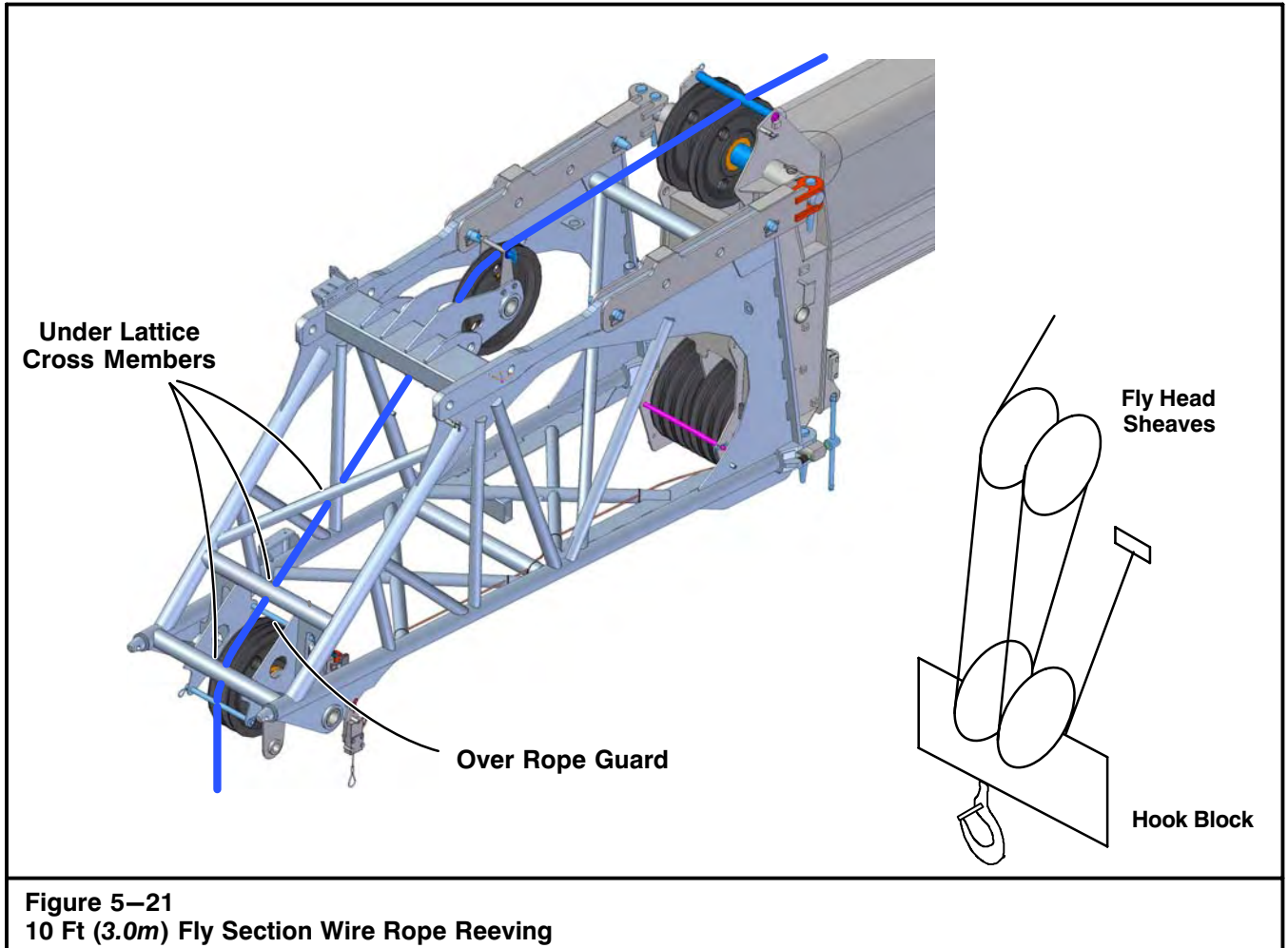
Notes: Reeve the wire rope to equalize the loading on the boom head sheaves. Some of the diagrams shown may not apply to this particular crane. Do not use a swivel at the dead end of a multi-part reeving. Refer to Section 4 of this Operator's Manual for positioning of adjustable sheave. Reeving shown is typical.

Figure 5-19
Wire Rope Reeving Diagrams



Note: Reeving shown is typical. Either drum may be reeved over boom sheaves or fly sheaves.

Figure 5-20
Wire Rope Reeving Diagrams



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Event Data Recording

This Link-Belt crane is equipped with one or more computers that monitor and/or control the crane's performance. This crane uses computer modules to monitor and retain crane operation, crane configuration, and as well as crane functions. These modules may aid the operator in the operation of the crane. The modules may also store data to help the Link-Belt dealer/distributor technician service the crane.

Event Data Recorder

This Link-Belt crane has an Event Data Recorder (EDR) system. The main purpose of the EDR is to record data relating to the crane operation and configuration that will assist in understanding how the crane's operating systems perform. The EDR is designed to record data related to crane dynamics and safety systems for a short period of time. The EDR in this crane is designed to record such data as:

- How various systems in the crane were operating
- How the crane was configured (counterweight, boom length, operational mode, etc.)
- What control functions were being used

This data will help provide valuable information as to how the crane was functioning and/or being operated.

Data And Recording Privacy

Important: EDR data is recorded in the crane only if a non-trivial situation occurs; no data is recorded by the EDR under normal operating conditions and no personal data (e.g., name, gender, age, or crane location) is recorded. However, other parties, such as law enforcement, or similar government offices, could combine the EDR data with the type of personal identifying data routinely acquired during a crane accident investigation.

To read data recorded by this EDR system, special equipment is required, and access to the crane and/or the EDR is needed. Link-Belt has the special equipment necessary to retrieve the recorded data.

It is the position of Link-Belt that the crane owner owns any data that is recorded and stored in the EDR or other onboard computer system(s). Link-Belt will not access this data, interpret data, or share the data with others, except by written request from the crane owner(s). The request by the crane owner may be due to an official request of police or similar government offices; as part of Link-Belt's defense of litigation through the discovery process; or as required by law. Data that Link-Belt retrieves may also be used for Link-Belt or component manufacturers for research purposes, where a need is shown and data is not tied to a specific crane or crane owner.

Link-Belt will retrieve crane data only by written request from the crane owner. The Electronic Data Recorder Request Form found at the end of this Operator's Manual can be used for this purpose.

Crane Specifications

The following information is general in nature and is used for reference purposes only. Depending upon the vintage of the crane, some features may no longer be available. Standard and optional features may vary from crane to crane. Contact the factory to verify the specific information if required.

Upper Structure

Frame

All welded steel frame with precision machined surfaces for mating parts.

Turntable Bearing

- Inner race is bolted to upper frame
- Outer race with external swing gear is bolted to lower frame

Engine

Engine

Full pressure lubrication, oil filter, air cleaner, hour meter, throttle, and electric control shutdown.

Specification	Cummins QSL
Numbers of Cylinders	6
Cycle	4
Bore and Stroke: inch (mm)	4.49 x 5.69 (114 x 145)
Piston Displacement: in ³ (L)	543 (8.9)
Max. Brake Horsepower: hp (kW)	320 (239) @ 1,800 rpm
Peak Torque: ft lb (Nm)	1,000 (1 356) @ 1,400 rpm
Alternator: volts – amps	12 – 160
Crankcase Capacity: qt (L)	24 (22.7)

- Hydraulic driven fan and thermostatically controlled radiator

Fuel Tank

One 110 gal (416L) capacity fuel tank.

Hydraulic System

Hydraulic Pumps

The pump arrangement is designed to provide hydraulically powered functions allowing positive, precise control with independent or simultaneous operation of all crane functions.

- Two variable displacement pumps provide independent control for hoist drums, boom hoist, boom extend, and right & left travel.
- Two gear type pumps are used for the swing, retract cylinders & operator's controls, and hydraulic oil cooling fan.

Hydraulic Reservoir

250 gal (946L) capacity equipped with sight level gauge. Diffusers built in for deaeration.

Filtration

One 10 micron, full flow return line filter. Accessible for easy filter replacement.

Counterbalance Valves

All hoist motors are equipped with counterbalance valves to provide positive load lowering and prevent accidental load drop if the hydraulic pressure is suddenly lost.

Load Hoist Drums

Main and Optional Auxiliary Winches

- Axial piston, full and half displacement (2-speed) motor driven through planetary reduction unit for positive control under all load conditions.
- Grooved lagging
- Power up/down mode of operation
- Hoist drum cable follower – standard
- Drum rotation indicator
- Drum diameter: 15 in (38.1cm)
- Rope length:
 - Main: 850 ft (259.1m)
 - Auxiliary: 500 ft (152.4m)
- Maximum rope storage: 951 ft (290m)
- Terminator style socket and wedge

Third wrap indicator – optional – Visually and audibly warns the operator when the wire rope is on the first/bottom layer and when the wire rope is down to the last three wraps

Swing System

Dual Swing Drives

Motor/Planetary – Bi-directional hydraulic swing motor mounted to a planetary reducer for 360° continuous smooth swing at 2.0 rpm

Swing Park Brake – 360°, electric over hydraulic, (spring applied/hydraulic released) multi-disc brake mounted on the planetary reducer. Operated by a switch in the operator's cab.

Swing Brake – 360°, foot operated, hydraulic applied disc brake mounted to the planetary reducer

House Lock – Four position house lock (boom over front, rear or sides) operated from the operator's cab

Counterweight

Consists of a five piece design.

- One "A" counterweight, 19,000 lb (8 618kg)
- One "B" counterweight, 16,000 lb (7 257kg)
- One "C" counterweight, 16,000 lb (7 257kg)
- Two "A" lower counterweights, 12,500 lb (5 670kg) each

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Operator's Cab

Fully enclosed modular steel compartment is independently mounted and padded to protect against vibration and noise.

Tilting cab 0–20°

- All tinted/tempered safety glass
- Sliding entry door and front and rear window
- Swing up roof window with windshield wiper
- Door and window locks
- Hot water heater
- Air conditioner
- Sun visor
- Cloth seat
- Circulating fan
- Front windshield and top hatch wipers and washers
- Dry chemical fire extinguisher
- Engine instrumentation panel (tachometer, voltmeter, engine oil pressure, engine water temperature, fuel level, hydraulic oil temperature, hour meter, and service monitor system)
- Mechanical drum rotation indicators for main (rear) and auxiliary (front) hoist drums
- Six way adjustable seat
- Foot throttle
- Optional Joystick controls
- Fully adjustable single axis controls
- Bubble type level
- Ergonomic gauge layout
- Controls shut off lever
- AM/FM Radio
- Travel levers & pedals
- Monitor for rear view and winch cameras

Optional

- Upper mounted remote control flood light
- One rotating amber beacon on top of cab
- One amber strobe beacon on top of cab

Rated Capacity Limiter System

HED graphic audio-visual warning system with anti-two block and function limiter. Operating data available includes:

- Crane configuration
- Boom length
- Boom head height
- Allowed load and % of allowed load
- Data logging
- Boom angle
- Radius of load
- Actual load
- Drum Rotation Direction Indicators (DRDI)
- Operator settable alarms (include):
 - Maximum and minimum boom angles
 - Maximum tip height
 - Maximum boom length
 - Swing left/right positions
 - Operator defined area (imaginary plane)
- Optional internal bar graph indicator
- Optional external bar graph indicator

Machinery House

Hinged doors (four on right side, one on left side) for machinery access. Upper left side guard rails

Catwalks

Standard on right and left sides. Catwalks fold up and pin for reduced travel width.

Lower Structure

Lower Frame

All welded box construction frame with precision machined surfaces for turntable bearing, rotating joint, and axles beams

Extendable and Retractable axle beams controlled by a hydraulic cylinder mounted inside the beams

Side Frames

Side Frames [With 36" (0.91m) Track Shoes]

All welded, precision machined, steel frames can be hydraulically extended and retracted with a hydraulic cylinder mounted in the lower frame.

- 15 ft 2.2 in (4.63m) extended gauge
- 12 ft 8.7 in (3.88m) intermediate gauge
- 8 ft 11.6 in (2.73m) retracted gauge
- 23 ft 4.2 in (7.11m) overall length
- 36 in (0.91m) wide track shoes
- Sealed (oil filled) idler and drive planetaries
- Compact travel drives
- Hydraulic self adjusting tracks

Track Rollers

- Twelve sealed (oil filled) bottom track rollers per side frame
- Three sealed (oil filled) top track rollers per side frame
- Heat treated, mounted on anti-friction bearings

Tracks

Heat treated, self-cleaning grouser shoes and heat treated track pins with dirt seals. 65 track shoes per side.

- Optional flat or "street" pad

Take Up Idlers

Cast steel, heat treated, self-cleaning, mounted on sealed tapered roller bearings

Travel and Steering

Each side frame contains a pilot controlled, bi-directional, axial piston motor and a planetary gear reduction unit to provide positive control under all load conditions.

- 2-speed travel
- Individual control provides smooth, precise maneuverability including full counter-rotation.
- Spring applied, hydraulically released multiple wet-disc type brake controlled automatically
- Maximum travel speed is 2 mph (3.2km/h).
- Designed to 40% gradeability

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Jack System

System contains four hydraulic cylinders individually mounted on swing-out beams.

- Individual jack cylinders are operated by remote control, or can be operated by controls mounted on lower.
- Minimum height of lower frame when resting on pontoons is 14.7 in (37.4cm).
- Maximum height of lower frame with jacks fully extended is 45.2 in (114.8cm).

Optional Tool Boxes

Two heavy duty steel design tool boxes that bolt onto the lower frame counterweights.

Boom

Design

Five section, formed construction of extra high tensile steel consisting of one base section and four telescoping sections. Two plate design of each section has multiple longitudinal bends for superior strength. The first telescoping section extends independently by means of one double-acting, single stage hydraulic cylinder with integrated holding valves. The second telescoping section extends independently by means of one double-acting, single stage hydraulic cylinder with integrated holding valves. The Third and Fourth telescoping sections extend proportionally by means of one double-acting, single stage cylinder with integrated holding valves and cables.

Boom

- 40–150 ft (12.2–45.7m) five section full power boom
- Three boom extend modes, controlled from the operator's cab, provide superior capacities by varying the extension of the telescoping sections:
 - **Standard mode** is the full power, synchronized mode of telescoping all sections proportionally
 - **A-max¹** mode (or mode 'A1') extends only the inner and center sections to 95 ft (29m) offering increased capacities for in-close, maximum capacity picks
 - **A-max²** mode (or mode 'A2') tip, outer and center sections extend to 122.5 ft (37.34m) offering maximum stability
- Mechanical boom angle indicator
- Maximum tip height for each extend mode is:
 - Standard is 159 ft 6 in (48.6m).
 - A-max² is 132 ft 6 in (40.3m)
 - A-max¹ is 105 ft 6 in (32.1m)

Optional

- Remote control boom floodlight

Boom Wear Pads

- Wear pads with Teflon inserts that self-lubricate the boom sections
- **Top and bottom wear pads are universal for all boom sections**

Boom Head

- Six 16.5 in (41.9cm) root diameter nylon sheaves to handle up to 12 parts of line
- Easily removable wire rope guards
- Rope dead end lugs on each side of the boom head
- Boom head is designed for quick-reeve of the hook block

Boom Elevation

- One double acting hydraulic cylinder with integral holding valve
- Boom elevation: –2.5° to 80°

Optional Equipment

Auxiliary Lifting Sheave

- Single 16.5 in (41.9m) root diameter nylon sheave
- Easily removable wire rope guard
- Does not affect erection of the fly or use of the main head sheaves

Hook Blocks And Balls

- 35 ton (31.8mt) 1 sheave quick-reeve hook block with safety latch
- 50 ton (45.4mt) 4 sheave quick-reeve hook block with safety latch
- 80 ton (72.6mt) 5 sheave quick-reeve hook block with safety latch
- 100 ton (90.7mt) 6 sheave quick-reeve hook block with safety latch
- 140 ton (127.0mt) 7 sheave quick-reeve hook block with safety latch
- 12 ton (10.9mt) swivel and non-swivel hook balls with safety latch

Fly & Attachments

- 31 ft (9.4m) lattice fly, stowable, offsettable to 2°, 15°, 30°, and 45°. Maximum tip height is 187 ft (57m).
- 31–55 ft (9.4–16.7m) two piece bi-fold lattice fly, stowable, offsettable to 2°, 15°, 30°, and 45°. Maximum tip height is 211 ft (64.3m).
- 10 ft (3.0m) lattice fly, stowable, offsettable to 2°, 15°, and 30° and 45°. Maximum tip height is 166 ft (50.6m).
- 10–31 ft (3.0–9.4m) two piece lattice fly, stowable, offsettable to 2°, 15°, and 30° and 45°. Maximum tip height is 187 ft (57m).
- 10–31–55 ft (3.0–9.4–16.7m) three piece bi-fold lattice fly, stowable, offsettable to 2°, 15°, and 30° and 45°. Maximum tip height is 211 ft (64.3m).

Work Platform

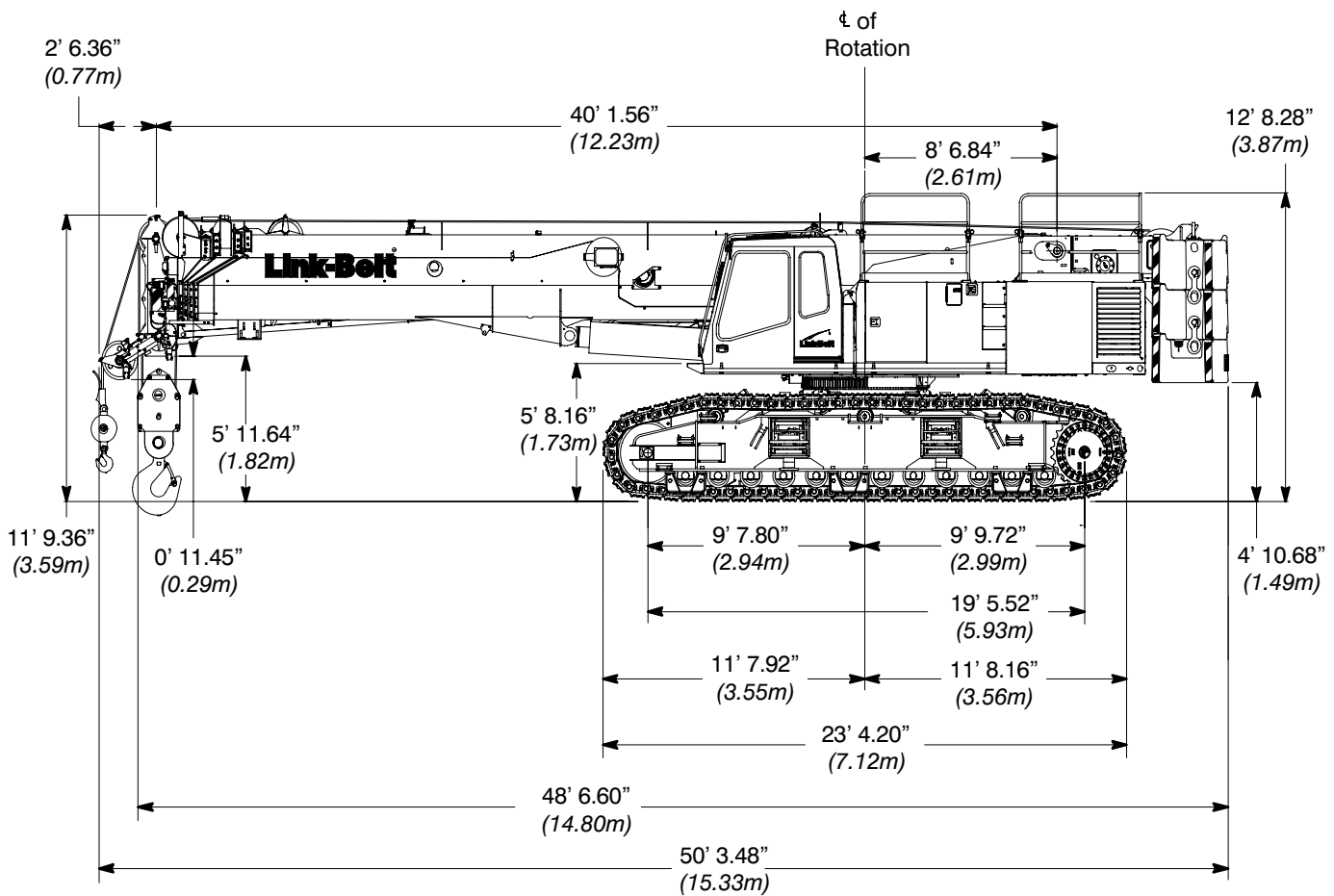
- Boom mounted work platform under design.

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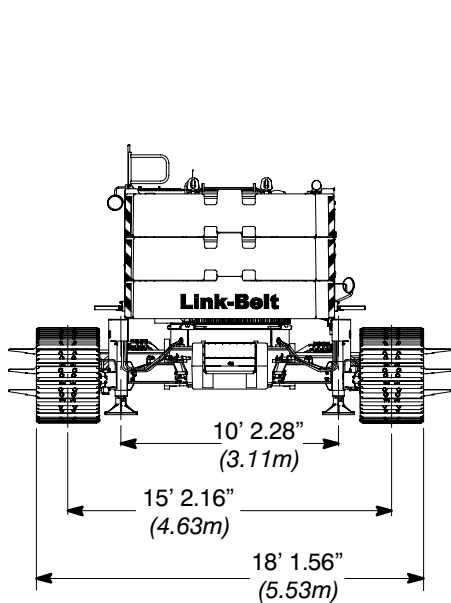
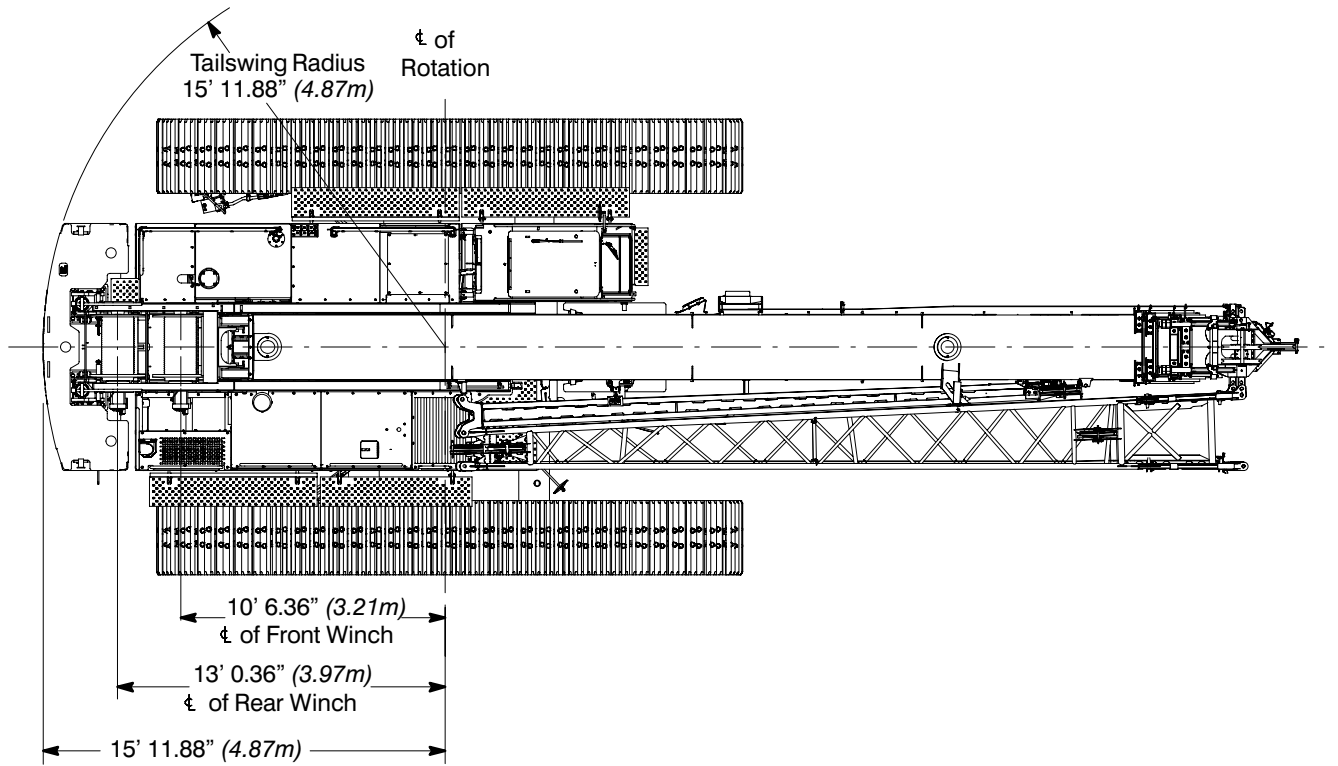
Dimensions

Base Crane

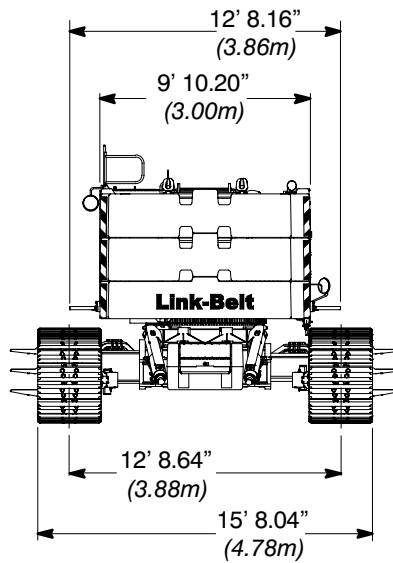
General Dimensions	English	Metric
Basic Boom	40–150 ft	12.2–45.7m
Minimum Load Radius	10 ft	3.05m
Maximum Boom Angle	80°	80°
Track Shoe Width	36 in	0.91m
Track Shoe Width (Optional)	44 in	1.12m



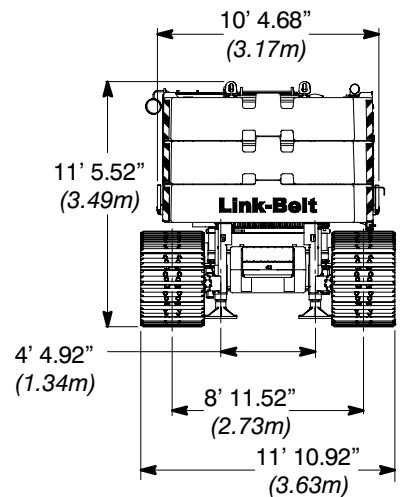
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Extended Gauge



Intermediate Gauge



Retracted Gauge

[Not applicable with 44" (1.12m) track shoes]

Note: All dimensions with 36" (0.91m) standard track shoes.

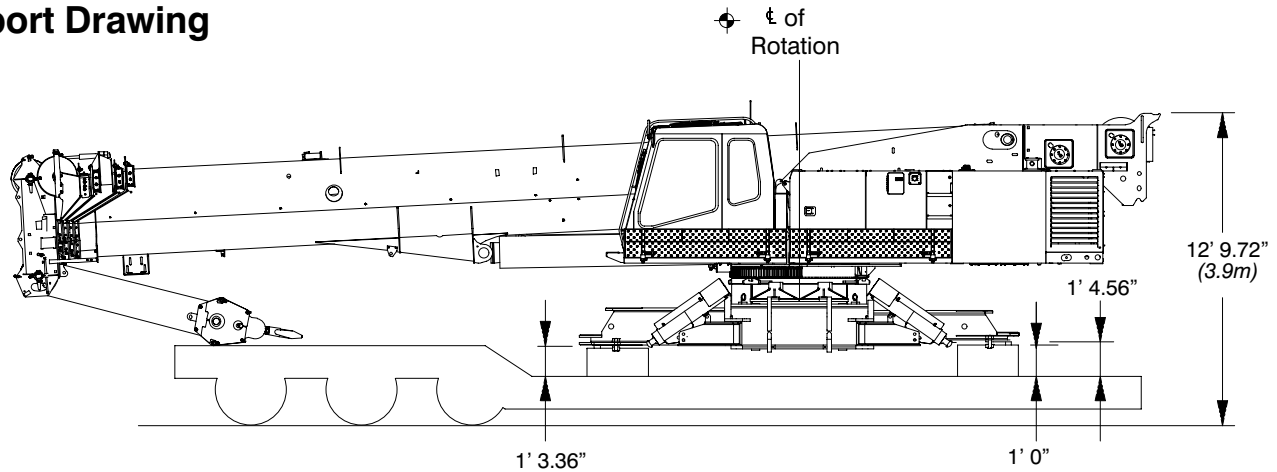
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Working Weights

Option	Description	Gross Weight lb (kg)	Ground Bearing Pressure (on soft ground) psi (kg/cm ²)
1	Base crane, "ABC" counterweight, 2 piece lower counterweight, 36" (0.91m) track shoes, 850 ft (259.0m) type "ZB" main wire rope, 500 ft (152.4m) type "ZB" auxiliary wire rope, 2 piece fly, 80 ton (72.6mt) 5 sheave hook block, 12 ton (10.89mt) hook ball, and a 200 lb (90.7kg) operator.	223,470 (101 151kg)	13.26 (0.93)

Notes: Ground bearing pressure is based on the total weight distributed evenly over the track contact area.

Transport Drawing



Transport Weight – 89,000 lb (40 370kg)

Base crane, 850 ft (259.0m) type "ZB" main wire rope, 500 ft (152.4m) type "ZB" auxiliary wire rope, 2 piece fly, 80 ton (72.6mt) 5 sheave hook block, and 12 ton (10.89mt) hook ball.

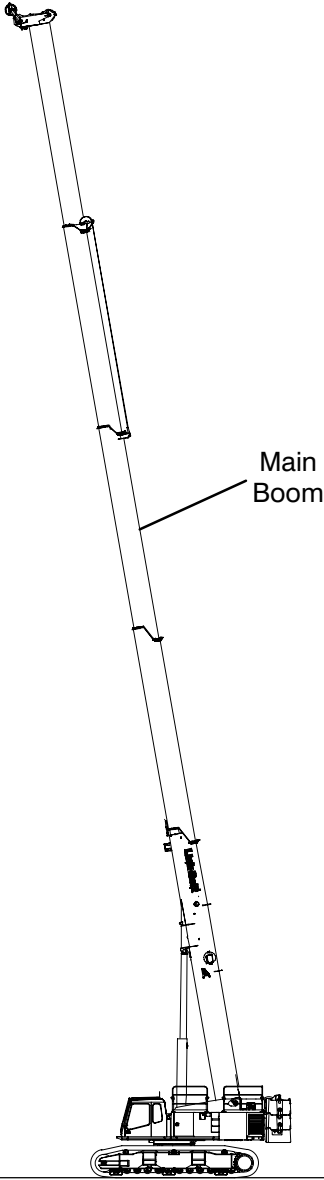
Load Hoist Performance

Main (Rear) and Auxiliary (Front) Winches – 7/8 in (22mm) Rope										
Layer	Maximum Line Pull		Normal Line Speed		High Line Speed		Layer		Total	
	lb	kg	ft/min	m/min	ft/min	m/min	ft	m	ft	m
1	21,120	9 579.9	174	53.0	348	106.1	114	34.7	158	48.2
2	19,056	8 643.7	193	58.8	386	117.7	124	37.8	333	101.5
3	17,359	7 873.9	211	64.3	423	128.9	134	40.8	525	160.0
4	15,940	7 230.3	230	70.1	461	140.5	144	43.9	734	222.8
5	14,735	6 683.7	249	75.9	499	152.1	154	46.9	960	292.6
6	13,700	6 214.2	268	81.7	537	163.7	164	50.0	1204	367.0

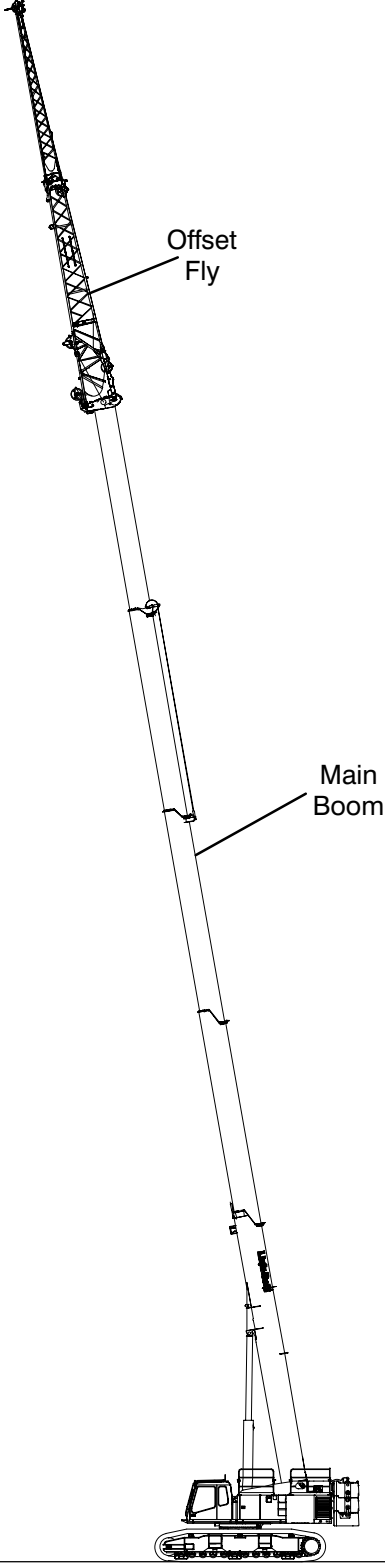
Wire Rope Application		Diameter		Type	Maximum Permissible Load	
		in	mm		lb	kg
Main (Rear) Winch	Standard	7/8	22	Type ZB	20,920	9 489.2
	Optional	7/8	22	Type RB	17,520	7 946.9
Auxiliary (Front) Winch	Standard	7/8	22	Type ZB	20,920	9 989.2
	Optional	7/8	22	Type RB	17,520	7 946.9

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Attachments



40–150 ft (12.2–45.7m)
Main Boom



40–150 ft (12.2–45.7m) Main Boom With
10–31–55 ft (3.0–9.4–16.8m) Offset Fly

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Operator's Manual

Fundamental Terms

Many terms are used which refer to crane function, assembly, operation, and maintenance. The following list gives a brief definition as to how the terms are used in this Operator's Manual and how they fit this particular crane.

Accumulator: A container in which fluid is stored under pressure as a source of hydraulic energy.

Aeration: The condition when air is present in the hydraulic fluid. This causes the fluid to appear milky and components to operate erratically because of the compressibility of air trapped in the fluid.

Anemometer: An instrument for measuring the direction and force, or velocity, of the wind; a wind gauge.

Annually: Once a year

Anti-Two Block System (ATB): A system of electromechanical devices used to alert or prevent the crane operator from two blocking the crane. See "Two Block".

Attachment: The boom assembly, offset fly section, auxiliary lifting sheave, or the combination of them.

Auger: A boom attachment used to drill vertical holes into the ground.

Automatic Brake: Drum brake system that is applied automatically any time the drum control lever is in neutral.

Auxiliary Lifting Sheave: A unit which connects to the boom head machinery and is used for reeving winch wire rope for a second winch drum.

Backward Stability: Resistance to overturning of the crane in rearward direction.

Base Section: The segment of the boom which attaches to the upper frame by the boom foot pin.

Boom: The assembly of the base, inner (T1), center (T2), outer (T3), and tip (T4) sections used as the telescoping extension.

Boom Angle: The angle above or below horizontal of the longitudinal axis of the boom base section.

Boom Angle Indicator: An accessory which measures the angle of the boom above horizontal.

Boom Foot: Base of boom where it attaches to the upper revolving frame.

Boom Hoist: The hydraulic method of raising and lowering the boom to different boom angles.

Boom Length: The straight line through the centerline of the boom foot pin to the centerline of the boom head sheave shaft, measured along the longitudinal axis of the boom.

Boom Section: The base, inner (T1), center (T2), outer (T3), and tip (T4) segments which are used as the telescoping extension.

Bypass: A secondary passage of fluid flow, in addition to the main flow path.

Capacity Chart: The chart(s) in the Crane Rating Manual in the crane which gives rated lifting capacities for the crane under different load conditions.

Carbody: See "Lower Frame".

Carrier Roller: Rollers of track mechanism which are not power driven but are used to guide the track along the top of the side frame.

Cab Walk: Platforms attached to the crane that provide a walkway along the sides of the upper.

Cavitation: A condition where air is induced into a cavity, line or chamber normally filled with oil. This condition can cause damage to pumps, cylinder walls, etc.

Center (T2) Section: The segment of the boom which is attached to the inner (T1) and outer (T3) sections.

Check Valve: A valve which permits flow in one direction only.

Circuit: A complete or partial path over which current or fluid may flow.

Closed Center Circuit: The condition where the fluid only flows through the main control valves when a control valve spool is actuated. This can be done two different ways: (1) using a pressure compensated pump, or (2) using a fixed displacement pump, unloading valve and an accumulator.

Collector Ring (Slip Ring): A device used to transmit the electrical power from the lower to the upper utilizing a rotating disk to allow rotation of the upper.

Compressibility: The change in volume of fluid when it is subjected to a unit change in pressure.

Counterbalance Valve (Holding Valve): A valve which regulated fluid flow by maintaining resistance in one direction, but allows free flow in the other direction.

Counterweight: Weight used to supplement the weight of the crane in providing stability for lifting loads.

Cracking Pressure: The pressure at which a pressure actuated valve begins to open to allow flow.

Crane Configuration: The relative position and arrangement of the parts or elements of the crane e.g. amount of counterweight, attachment position, side frame position, etc.

Crane Rated Capacity: The maximum weight allowed to be lifted with the crane setup in a particular crane configuration.

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Crane Rating Manual: A compilation of the necessary information needed to plan lifts with the crane. It includes instructions such as the allowable lifting capacity charts, Working Range diagrams, Working Areas diagram, etc.

Crane Set Up: The act or instance of preparing the crane for operation which entails the positioning of the crane and its elements. It concerns such details or items such as finding a suitable location to perform the lift, setting the side frame position, leveling, cribbing, or blocking of the crane, etc.

Crawler Lower: The portion of a crawler crane located below the turntable bearing.

Cylinder: A device which converts fluid power into mechanical force and motion. It usually consists of a moveable element such as a piston and piston rod, which operates within a cylindrical bore.

Delivery: The volume of fluid discharge by a pump in a given time, usually expressed in gallons per minute (gpm) or liters per minute (*L/min*).

Displacement: The quantity of fluid which can pass through a pump, motor or cylinder in a single revolution or stroke.

Double Acting Cylinder: A cylinder in which fluid force can be applied in either direction.

Drum Lagging: See "Winch Drum".

Drum Rotation Indicator: A system that is used to monitor winch drum speeds.

Filter: A device which functions to remove insoluble contaminants from a fluid by a porous media.

Flow Divider: A valve which divides a flow of oil into two streams.

Fly Base (Fly Base Section): The lower most section of the fly.

Fly Section: Boom tip extension supported only at its base.

Force: Any cause which tends to produce or modify motion. In hydraulics, total force is expressed by the product of pressure (P) and the area of the surface (A) on which the pressure acts. (Formula: $F = P \times A$)

Frame: Structure on which either upper or lower machinery is attached.

Freely Suspended Load: Load hanging free with no direct external force applied except by the hoist line.

Friction: The property which tends to resist the relative motion of one surface in contact with another surface. It always exerts a "Drag" in the direction opposite of the motion, thus consumes power.

Full Flow: In a filter, the condition where all the fluid must pass through the filter element.

Full Load Speed: The speed at which an engine runs when it is delivering its full rated horsepower.

Full Power Boom: Hydraulic telescopic boom with cylinders, or cylinders and cables, to extend/retract each extendable section of the boom.

Function Limiters (Function Lockout, Hydraulic Cut-outs, Hydraulic Kickouts): Devices incorporated into the anti-two block system which will disable the crane function of winch up, telescope out, and/or boom down (as applicable) as a two block situation approaches.

Gradeability: The slope which a crane can climb expressed as a percentage.

Ground Pressure: Weight of crane divided by the area of the surface directly supporting the crane.

Head Machinery: An arrangement of sheaves on the end of an attachment used to reeve wire rope.

High Idle: Governed engine speed at full throttle and no load.

Hoist: Function of lifting and lowering loads.

Hoist Drum: See "Winch Drum".

Hoist Wire Rope: The wire rope used to reeve the winch and the attachments for lifting loads.

Holding Valve: See "Counterbalance Valve".

Hook Ball: Ball with hook attached and used for lifting service. It is used with one part of line only.

Hook Block: Block with hook attached used in lifting service. It may have a single sheave for double or triple line, or multiple sheaves for four or more parts of line.

Hydraulic Reservoir: The storage tank for hydraulic fluid.

Inner (T1) Section: The segment of the boom which is attached to the base and center (T2) sections.

Instability: A "tipping condition" in which the moments acting to overturn a crane exceed the moments acting to resist overturning.

LBCE: Link-Belt Construction Equipment.

Lifting Capacity: The rated load for any given load radius and boom angle under specified operating conditions.

Line Pull: The wire rope pull generated off a wire rope drum or lagging at a specified pitch diameter.

Line Speed: The wire rope velocity at a wire rope drum or lagging at a specified pitch diameter.

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Load Factor: Load applied at the boom tip which gives the same moment effect as the boom mass.

Load Indicator: A device for measuring and displaying the net load being lifted.

Load Line: Another term for "Hoist Wire Rope". In lifting crane service it refers to the main hoist. The secondary hoist is referred to as a "Whip Line".

Load Radius: The horizontal distance from the centerline of rotation of the upper to the center of gravity of a suspended load.

Loaded Boom Angle: The angle between the boom base section and horizontal with a freely suspended load at the rated radius.

Load Stepping: The procedure of moving a load without traveling the crane when conditions do not allow traveling with a load (pick and carry). Park the crane on a level area, lift the load, swing around, and set it down ahead of the crane. Travel the unloaded crane beyond the load, level the crane, lift the load, swing, and set it down farther along the route. Continue this procedure until the load is at its destination.

Lower Frame: The lower upon which the revolving upper frame is mounted.

Lower Roller: See "Track Roller".

Mat: Support, usually of timber or wire construction, for supporting the pontoons on soft surfaces where the pontoon areas are not large enough to support the load without settling.

Motor (Hydraulic): A rotary motion device which changes hydraulic energy into mechanical energy, a rotary actuator.

No Load Stability Limit: The radius or boom angle beyond which it is not permitted to position the boom because the crane can overturn without any load on the hook.

Offset Fly: A fly section that is capable of being pinned at different angles.

Oil Cooler: A heat exchanger used to remove heat from the hydraulic or transmission fluid.

Open Center Circuit: A circuit where the pump continuously circulates fluid through the control valves when they are in a neutral position.

Operational Aid: An accessory that provides information to facilitate operation of a crane or that takes control of particular crane functions without action of the operator when a limiting condition is sensed.

Operator's Cab: A housing which covers the operator's station.

Outer (T3) Section: The segment of a the boom which is attached to the center (T2) and tip (T4) sections.

Pick And Carry: The crane operation of lifting a load and traveling with it suspended.

Pilot Pressure: Auxiliary pressure used to actuate or control hydraulic components.

Pinion: Usually the small gear in a gear train which drives the other gears.

Pitch Diameter: Root diameter of drum, lagging or sheave, plus the diameter of the wire rope.

Planetary: A set of gears used to either speed up or slow down the input vs the output to gain speed or power whichever is applicable.

Platform: A device (basket, work platform, bucket, cage, etc.) designed and fabricated with its intended use being to position personnel.

Poppet: A disc, ball or cone shaped part of certain valves, which when closed against a seat prevents flow.

Port: The open end of a passage. May be within or at the surface of a hydraulic component housing or body.

Pressure: Force per unit of area usually expressed in pounds per square inch (psi) or Kilopascals (*kPa*).

Pressure Drop: The reduction in pressure between two points in a line or passage due to the energy lost in maintaining flow.

Pressure Reducing Valve: A valve which limits the maximum pressure at its outlet regardless of the inlet pressure.

Pump (Hydraulic): A device which converts mechanical force and motion into hydraulic fluid power.

Radius Of Load: The horizontal distance from the centerline of rotation of the crane to the center of gravity of the suspended load.

Rated Capacity Indicator (RCI): A device that automatically monitors radius, load weight, and load rating and warns the crane operator of an overload condition.

Rated Capacity Limiter (RCL): A device that automatically monitors radius, load weight, and load rating and prevents movements of the crane that would result in an overload condition.

Reeving: Passing of wire ropes over pulleys or sheaves.

Relief Valve: A pressure operated valve which bypasses pump delivery to the reservoir, limiting system pressure to a predetermined maximum valve.

Operator's Manual

Reservoir: A container for storage of fluid in a fluid power system.

Restriction: A reduced cross-sectional area in a line which produces a pressure drop.

Rigging Switch (System Override Switch): A switch which can be used to override any or all of the function limiters (cutouts) which have been activated on the crane during crane rigging/set up.

Rope: Refers to wire rope unless otherwise specified. See "Wire Rope".

Rotating Joint: Component which transfers fluid between a stationary and a rotating member.

Schematic: A diagram or representation of a system showing everything in a simple way. No attempt is made to show the various devices in their actual relative positions. A schematic points out the operation of a circuit for troubleshooting purposes.

Seasonally: Four times per year.

Semiannually: Twice per year.

Shall: The word shall is to be understood as mandatory.

Should: The word should is to be understood as advisory.

Side Frame: Supporting structure of the track mechanism. Side frames are attached to the lower frame and may be extendable and/or removable.

Side Loading: 1. A load applied at an angle to the vertical plane of the boom. 2. Horizontal side force applied to the lifted load either on the ground or in the air.

Single Acting Cylinder: A cylinder in which fluid power can only be used in one direction. Another force must be used to return the cylinder.

Slew: See "Swing".

Spool: Term loosely applied to almost any moving cylindrically shaped part of a hydraulic component which moves to direct flow through the component.

Sprocket: The driving element of the track mechanism. Receiving power through the drive motor, the sprocket meshes with the track to travel the lower.

Strainer: A filtering device for the removal of coarse solids from a fluid.

Stroke: The length of travel of a piston or spool.

Suction Line: The hydraulic line connecting the pump inlet port to the hydraulic reservoir.

Sump Tank: See "Hydraulic Reservoir".

Surge: A very sudden rise in hydraulic pressure in a circuit.

Swing: The rotation of the upper with the lower remaining stationary.

Swing Brake: A brake which is used to resist the rotation of the upper during normal, stationary crane operations.

Swing Motor: Hydraulic device which uses a planetary to rotate the upper on the lower.

Swing Park Brake: A self contained brake used for holding the upper, in any position, during normal crane operations.

System Override Switch: See "Rigging Switch".

Tailswing: The swing radius from the centerline of rotation of the upper frame to the extreme rear of the counterweight or most rearward component.

TCC: Telescopic Crawler Crane.

Tip (T4) Section: The outer most segment of the boom, which is attached to the outer (T3) section.

Torque: Turning or twisting force usually measured in foot-pounds (ft-lb) or Newton meters (*Nm*).

Track: Assembled track shoes and connecting pins around idler rollers and drive sprockets; that part of lower which contacts the ground.

Track Roller: Rollers of track mechanism which are not power driven, but are used to support the side frame and guide the track along the ground.

Travel Swing Lock: A mechanical lock that engages with the upper directly over either the front, rear, or either side of the lower only. Use of the travel swing lock is mandatory when transporting or lifting the crane.

Turntable Bearing: A large bearing which attaches the upper to the crawler allowing the upper to rotate on the lower.

Two Block: The situation when the crane's hook block, hook ball, and/or load contacts the attachment's head machinery.

Two Block Warning System: A system of electromechanical devices used to warn the crane operator of an impending two block condition.

Unloading Valve: A valve which bypasses flow to tank when a set pressure is maintained on its pilot port.

Upper: The portion of the crane located above the turntable bearing.

Upper Cab: See "Operator's Cab".

Upper Revolving Frame: The main structure of the upper section of the crane which serves as mounts for other components in the upper section.

Operator's Manual

Valve: A device for controlling flow rate, flow direction or pressure of a fluid.

Viscosity: The resistance to flow. High viscosity indicates a high resistance, low viscosity, a low resistance.

Whip Line: Secondary hoist line. Also see "Load Line".

Winch: Function of lifting and lowering loads.

Winch Drum: A rotating cylindrical spool with side flanges used to wrap the winch wire rope during the raising and lowering with the winch.

Winch Wire Rope: The wire rope used to reeve the winch and the attachments for lifting loads.

Wire Rope: A flexible, multiwired member usually consisting of a core member around which a number of multiwired strands are helically wrapped.

Wiring Diagram: A diagram which included all the devices in an electrical system and shows their functional relationships to each other. Such a diagram gives the necessary information for actual wiring or physically tracing circuits when troubleshooting is necessary.

Work Platform: See "Platform".

Working Area: Area measured in a circular arc about the centerline of rotation as shown on the Working Areas diagram.

Working Weight: Weight of crane with full radiator, half full fuel tank, and attachments installed.

360° Swing Lock: A positive mechanical lock against rotation of the upper over the lower during normal, stationary crane operations.

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ELECTRONIC DATA RECORDER REQUEST FORM

We, _____, hereby request
(Company Name)
Link-Belt Construction Equipment Company (LBCE) retrieve, interpret, and
provide a summary of the electronic data recovered from the computer system
installed by LBCE on model _____, with assigned serial
number _____.

We request the following data be retrieved:
(Place check mark in box for information requested)

- Engine Performance Data (engine temperature, engine speeds, fluid temperature, etc.)
- Operational Mode (computer set-up)
- Boom Length
- Boom Angle
- Load Radius
- Counterweight Configuration
- Lifted Load(s)
- Number of Lifts
- Anti -Two Block (ATB) Status
- Status
- Other

Date(s) and Time Range(s) of data requested: _____

The time to reply to this inquiry will be three (3) weeks from the time the data is received by the LBCE Technical Product Support Department in Lexington Kentucky. The reply time may increase due to the amount of Data, and/or the Date and Time Range requested.

LBCE may assess a charge to provide the service of retrieve and interpretation of the data requested, plus travel time that may be involved by an LBCE representative to retrieve the data.

Requesting Company Representative

Date

