

OPERATION & MAINTENANCE MANUAL

CK2000

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IMPORTANT INFORMATION

Thank you for your purchasing KOBELCO crawler crane. Our CK series full-hydraulically operated crawler crane, is manufactured based on our many years of experience and expertise. This manual describes important information about Model CK2000.

Before operating the machine, be sure to thoroughly read this manual in order to use the machine safely and efficiently.



Do not operate or maintain this machine until you read this manual and understand the instructions. Improper operation or maintenance of this machine may cause accidents and could result in serious injury or death.

Always keep this manual in the operator's cab.

If it is missing or damaged, place an order to a KOBELCO authorize distributor for a replacement.

If you have any questions, please consult your KOBELCO authorize distributor.


SAFETY INFORMATION

Most accidents, that occur during operation are due to neglect of precautionary measures and safety rules. Sufficient care should be taken to avoid these accidents.

Erroneous operation, lubrication or maintenance services are very dangerous and may cause injury to, or death of, personnel.

Precautionary measures or notes provided in this manual should be read and understood by personnel before starting each task.

Operation, inspection, and maintenance should be carefully carried out, and safety must be given first priority.

Safety labels are indicated with  marks. The safety information contained in this manual is intended only general safety information.

Safety labels appear both in this manual and on the machine.

All safety labels are identified by the words "DANGER", "WARNING" and "CAUTION".

These words mean the following:



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



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



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against possible damage to the machine and its components.

Note

Supplementary explanation.

It is very difficult for us to forecast every danger that may occur during operation. However, safety can be ensured by operating this machine according to methods recommended by KOBELCO.

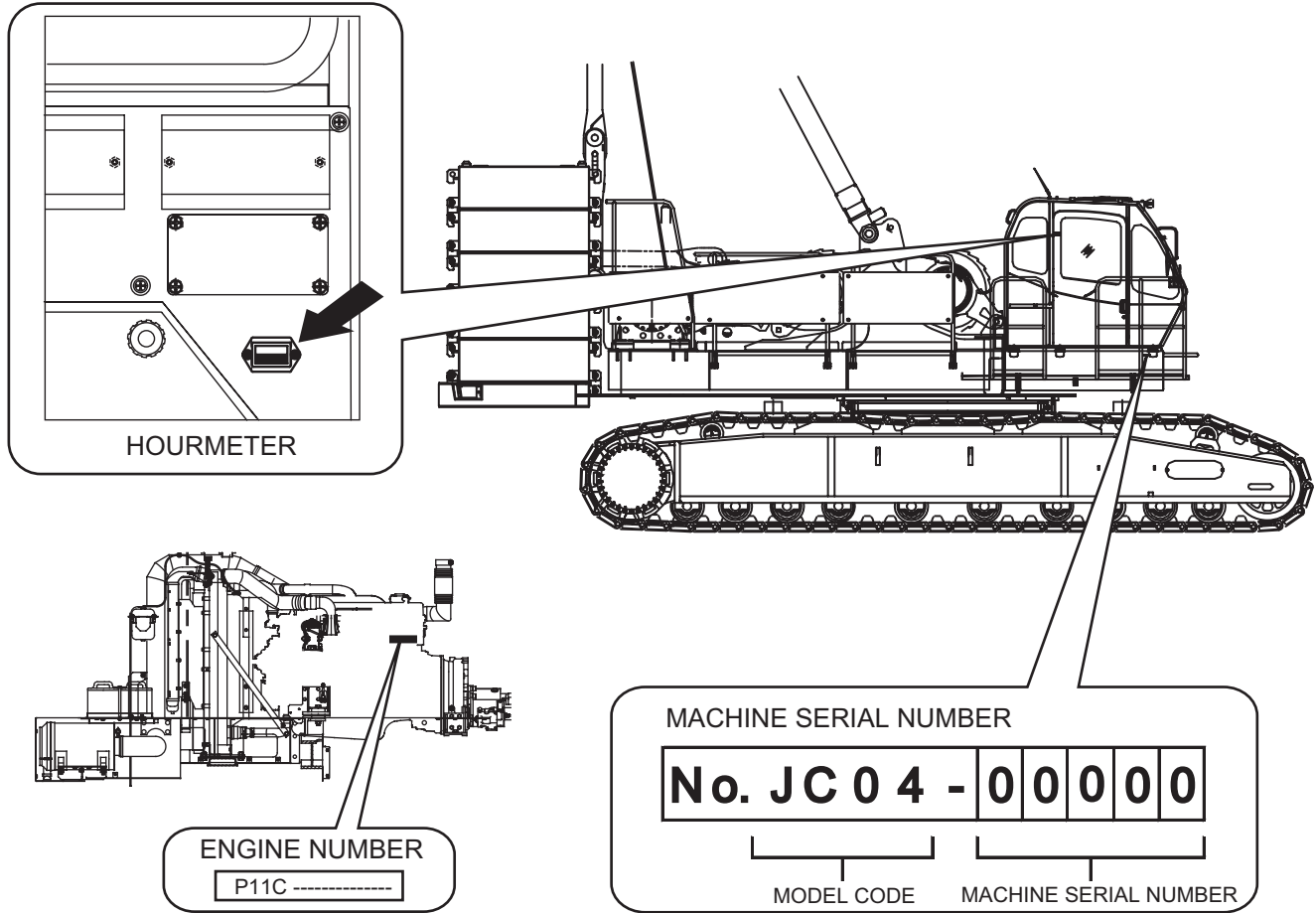
While operating the machine, be sure to perform work with great care, so as not to damage the machine or allow accidents to occur.

Please continue studying this manual until proper operation is completely understood.

IMPORTANT INFORMATION

MACHINE SERIAL NUMBER

When you order repair parts or need machine repair or service, always inform us of the machine serial number (stamped on the name plate) and the total number of hours indicated on the hourmeter (located on the gauge).



ENTER MACHINE SERIAL NUMBER OF THIS MACHINE

MACHINE MODEL	CK2000	MACHINE SERIAL No.	JC04-	ENGINE No.	P11C-
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WARRANTY

The terms under which this machine is guaranteed are clearly defined in the accompanying WARRANTY. Trouble and damage occurring during the terms of the guarantee shall be repaired at no cost to the purchaser, according to the warranty description, if the trouble or damage is determined to be our responsibility. However, if you use the machine contrary to the instructions of this manual, the WARRANTY does not cover any damage to the machine.

REPAIR PARTS

When servicing and repairing the machine, be sure to use genuine parts in order to make the machine performance display sufficiently.

Since the important security parts are prepared to ensure safety and to protect the machine from an serious accident, be sure to replace them every specified period of time.

EXPLANATION OF WARNING LABELS

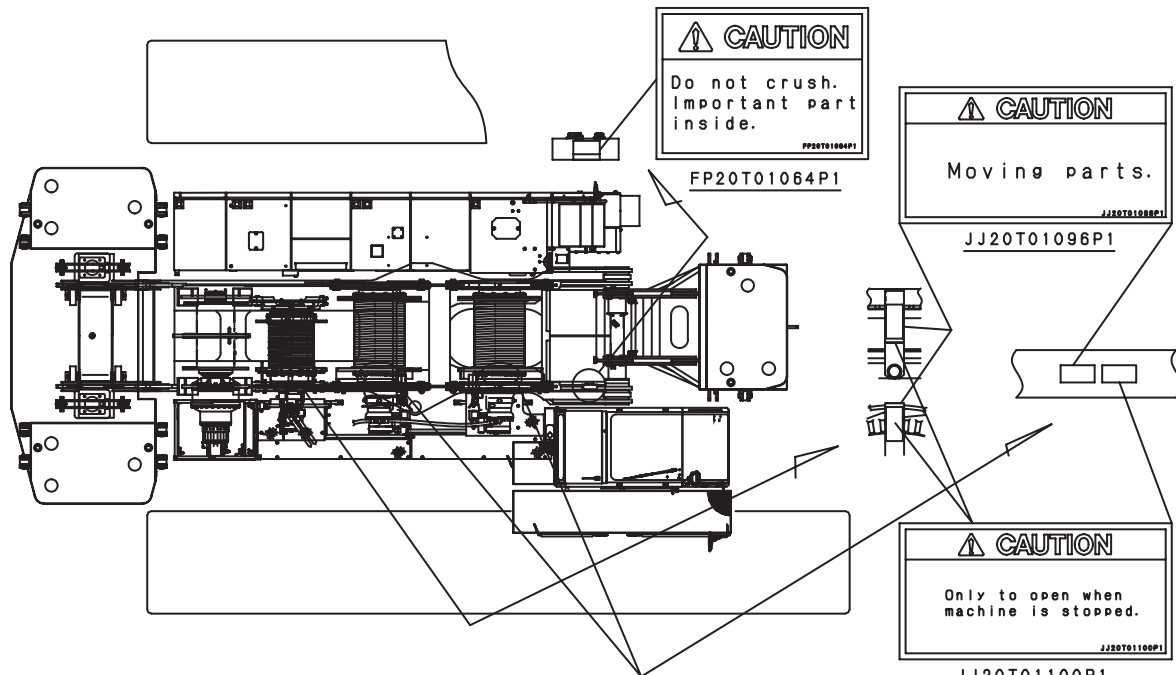
Since the warning labels are installed in the machine and indicated with the three stages in the same way as the warning description, confirm the positions and contents of all warning labels first.

Put them to the practical use to secure safety when operating, checking and performing maintenance.

HANDLING OF WARNING LABELS

- (1) When the warning label is damaged or stained, order it to the designated service shop.
- (2) Do not remove the warning labels.
- (3) When the surface of the warning label is soiled and difficult to be seen, wipe it cleanly.

IMPORTANT INFORMATION



CAUTION
Do not crush. Important part inside.
FP20T01064P1

CAUTION
Moving parts.
JJ20T01096P1

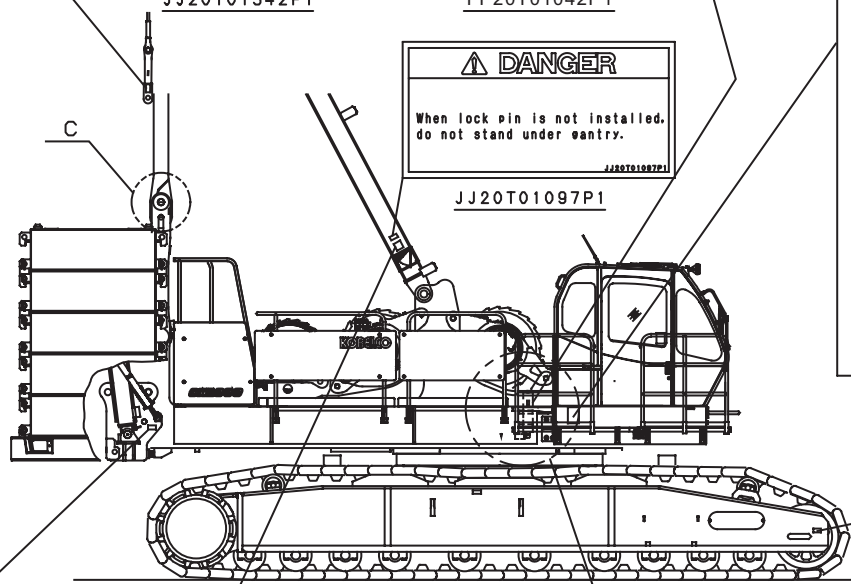
CAUTION
Only to open when machine is stopped.
JJ20T01100P1

DANGER
Do not forget to connect the low-gantry fixing links, when self installing and remove the machine. Failure to observe this caution result in a serious injury.
JJ20T01342P1

WARNING
AVOID EXPLOSION WHEN HANDLING ACCUMULATOR
THIS CASE IS CHARGED WITH HIGH PRESSURE NITROGEN GAS. NEVER ATTEMPT TO WELD, GAS-CUT, PUT ON FIRE, NOR DISASSEMBLE THE CASE TO AVOID EXPLOSION.
FP20T01042P1

DANGER
When lock pin is not installed, do not stand under gantry.
JJ20T01097P1

DANGER
DEATH OR INJURY MAY RESULT IF MACHINE, LOAD, OR LOAD LINE TOUCHES OR COMES CLOSE TO ELECTRICAL LINES. ALWAYS MAINTAIN A CLEARANCE OF AT LEAST 10 FEET (3 METERS) BETWEEN THE CRANE OR THE LOAD BEING HANDLED AND POWERLINES.
UNLAWFUL TO PLACE ANY PART OF THIS MACHINE OR LOAD WITHIN 10 FEET (3 METERS) OF HIGH VOLTAGE LINES OF 50,000 VOLTS OR LESS. GREATER CLEARANCES ARE REQUIRED FOR HIGHER VOLTAGES. SEE YOUR LOCAL, STATE, AND FEDERAL REGULATIONS.
ALWAYS NOTIFY ELECTRIC COMPANY IF THERE ARE ELECTRIC LINES IN THE AREA WHERE MACHINE WILL BE WORKING.
GG20T01127P1



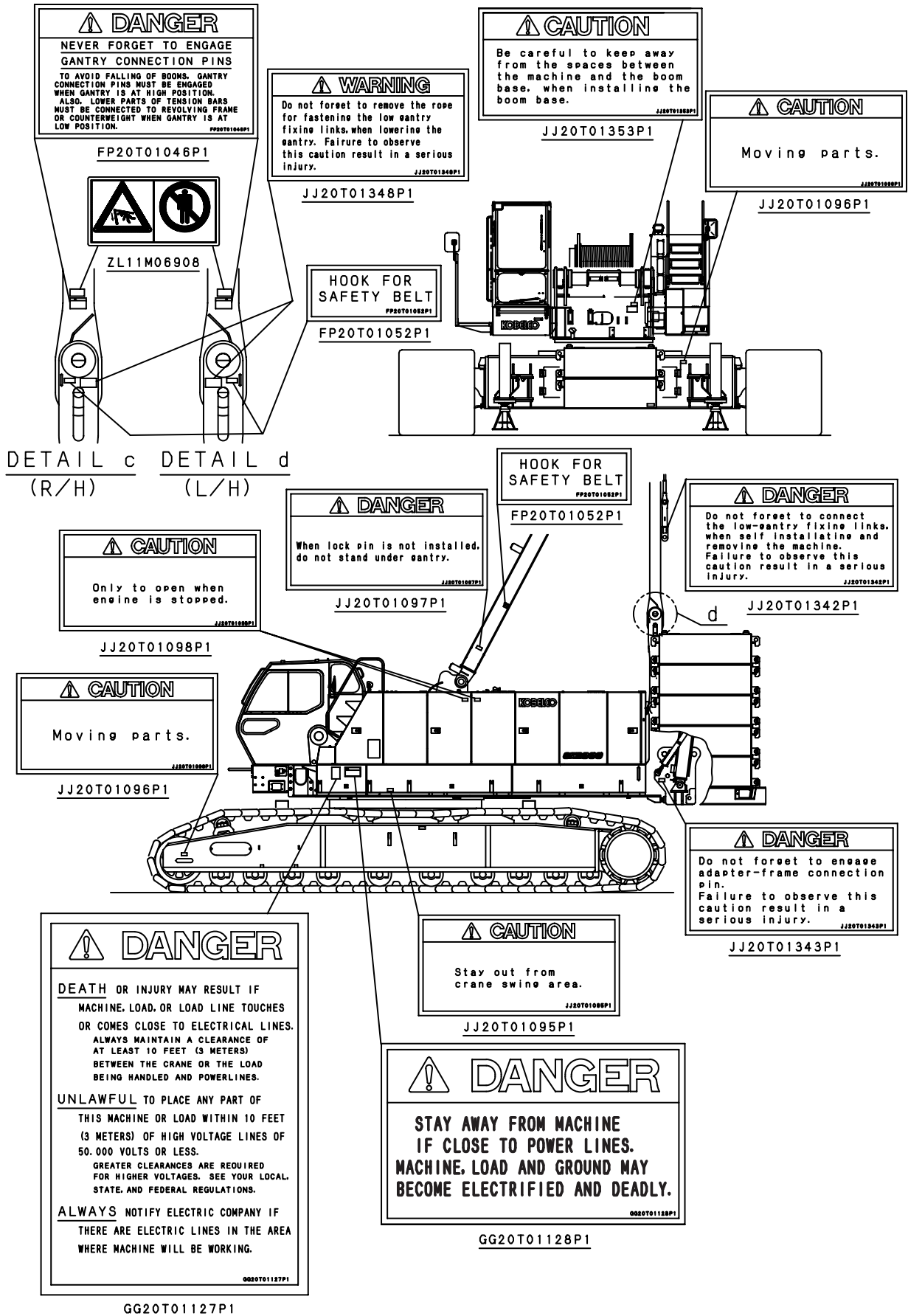
CAUTION
Moving parts.
JJ20T01096P1

DANGER
Do not forget to engage adapter-frame connection pin. Failure to observe this caution result in a serious injury.
JJ20T01343P1

WARNING
Description of the colored area of the angle indicator on the gantry during rising and lowering the gantry.
Red Area
Do not lower the gantry without the gantry cylinders.
Yellow Area
When the boom-base is grounded and connected the more than 10ft insert boom, it is possible to rise and lower the gantry using the boom hoist rope.
JJ20T01349P1

ACCUMULATOR
CHARGING GAS PRESSURE.
3.4 to 3.7MPa
(493 to 537psi)
GG20T01540P1

WARNING
COMPRESSED NITROGEN
DO NOT WELD, FLAMECUT DISPOSE IN FIRE OR DISASSEMBLE.
GG20T01554P1



IMPORTANT INFORMATION

WARNING

WALKING ON GUARDS MAY CAUSE STUMBLING AT PROJECTED ITEMS AND SLIPPING BY OIL, WATER, OR GREASE.
 PROTECTOR SHOULD BE EMPLOYED WHEN WALKING FOR MAINTENANCE JOB, TO AVOID TIPPING OVER AND FALLING DOWN FROM THE MACHINE.

FP20T01051P1

WARNING

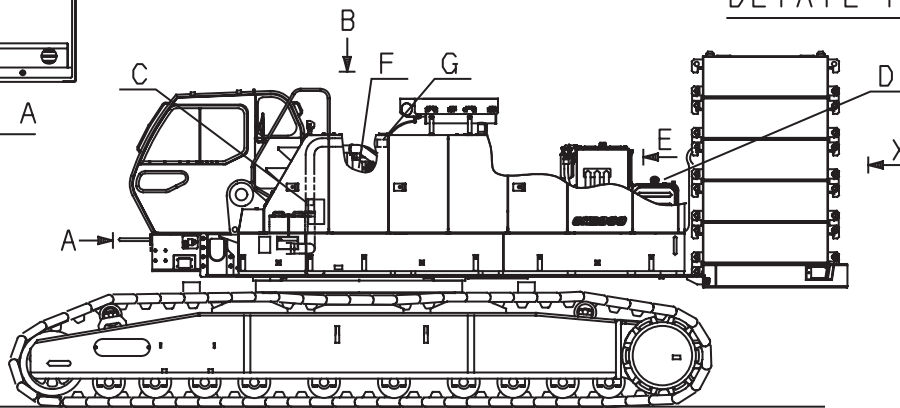
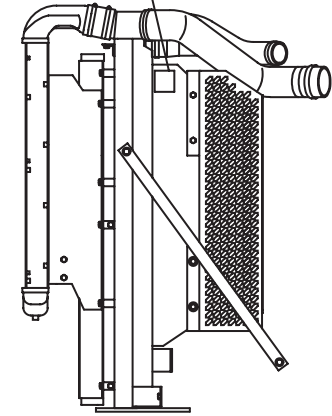
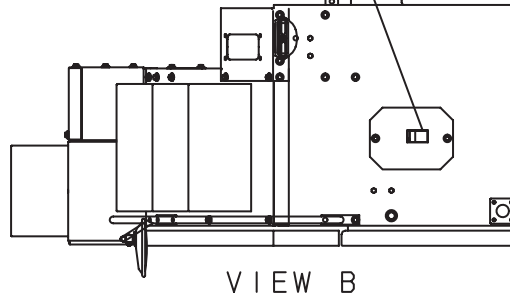
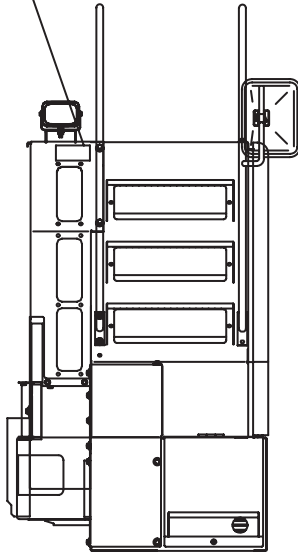
Steam of hot coolant can cause injury or blindness.
 Never loosen or open radiator cap when coolant is hot and under pressure.
 Before opening radiator cap:
 -Cool down engine completely.
 -Cover radiator with cloth rag.
 -Loosen cap slowly to relieve pressure.

YN20T01010P1

WARNING

Rotating parts can cause personal injury.
 Keep away from fan and belt when engine is running.
 Stop engine before servicing.

YN20T01009P1



DANGER

WHEN INSTALLATION AND REMOVAL OF THE CRAWLERS (1)

Do not stand under or near the crawlers being lifted.
 The lifter should be operated on the firm and level ground with the machine maintained horizontally.
 Steel plates may be needed under the floats unless the ground is concreted.

DANGER

ALL COUNTERWEIGHTS MUST BE REMOVED BEFORE OPERATING THE LIFTER.

GN20T01041P1

CAUTION

CAUTION FOR HIGH TEMPERATURE

AS ENGINES AND MUFFLERS MAY BE HEATED TO HIGH TEMPERATURES, DO NOT DIRECTLY TOUCH THEM BY HAND.

FP20T01043P1

WARNING

WHEN INSTALLATION AND REMOVAL OF THE CRAWLERS (2)

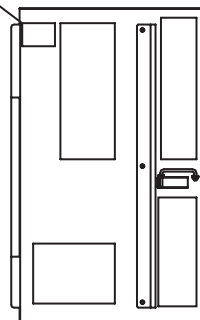
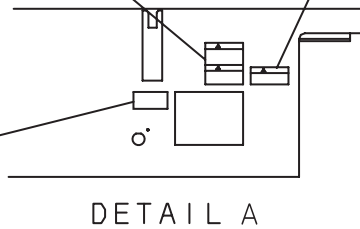
Do not insert fingers into pin holes for alignment.
 The quick couplers must be connected completely.

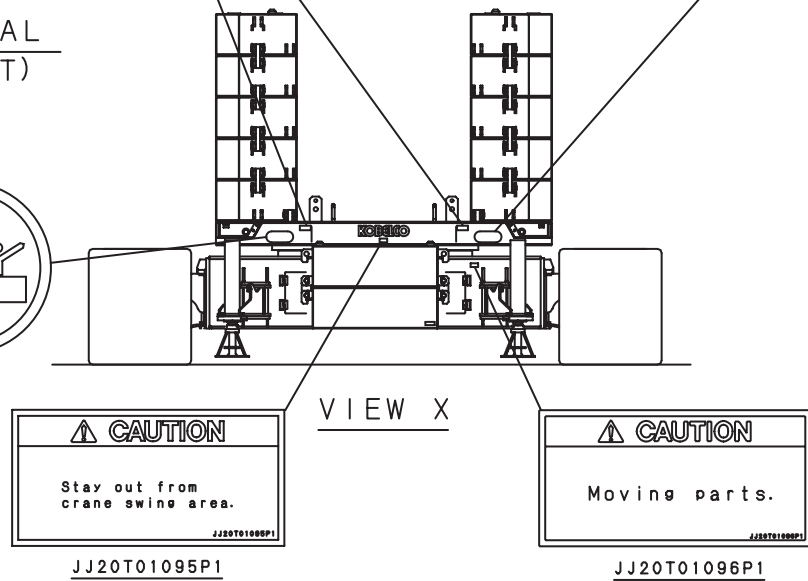
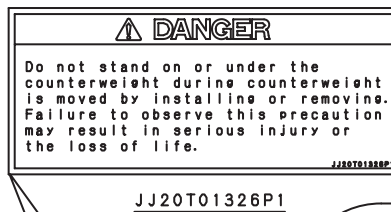
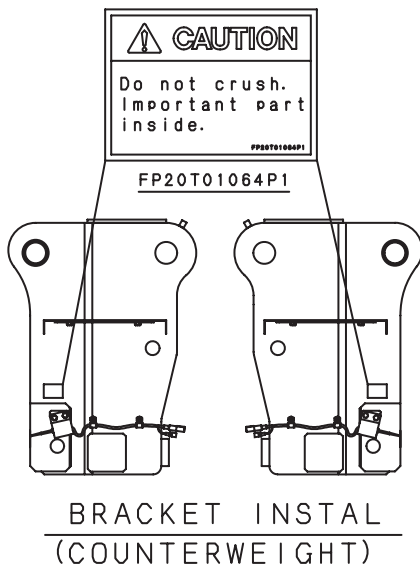
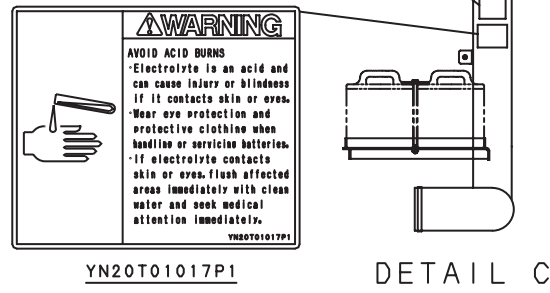
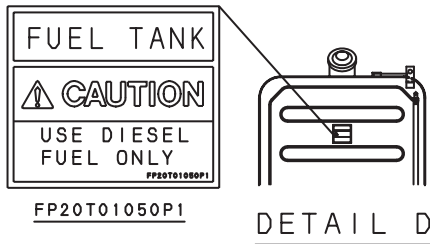
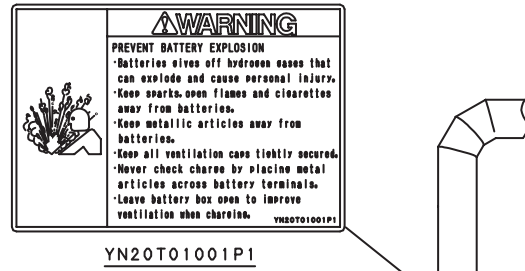
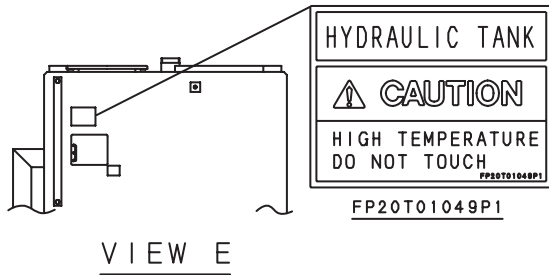
JJ20T01102P1

CAUTION

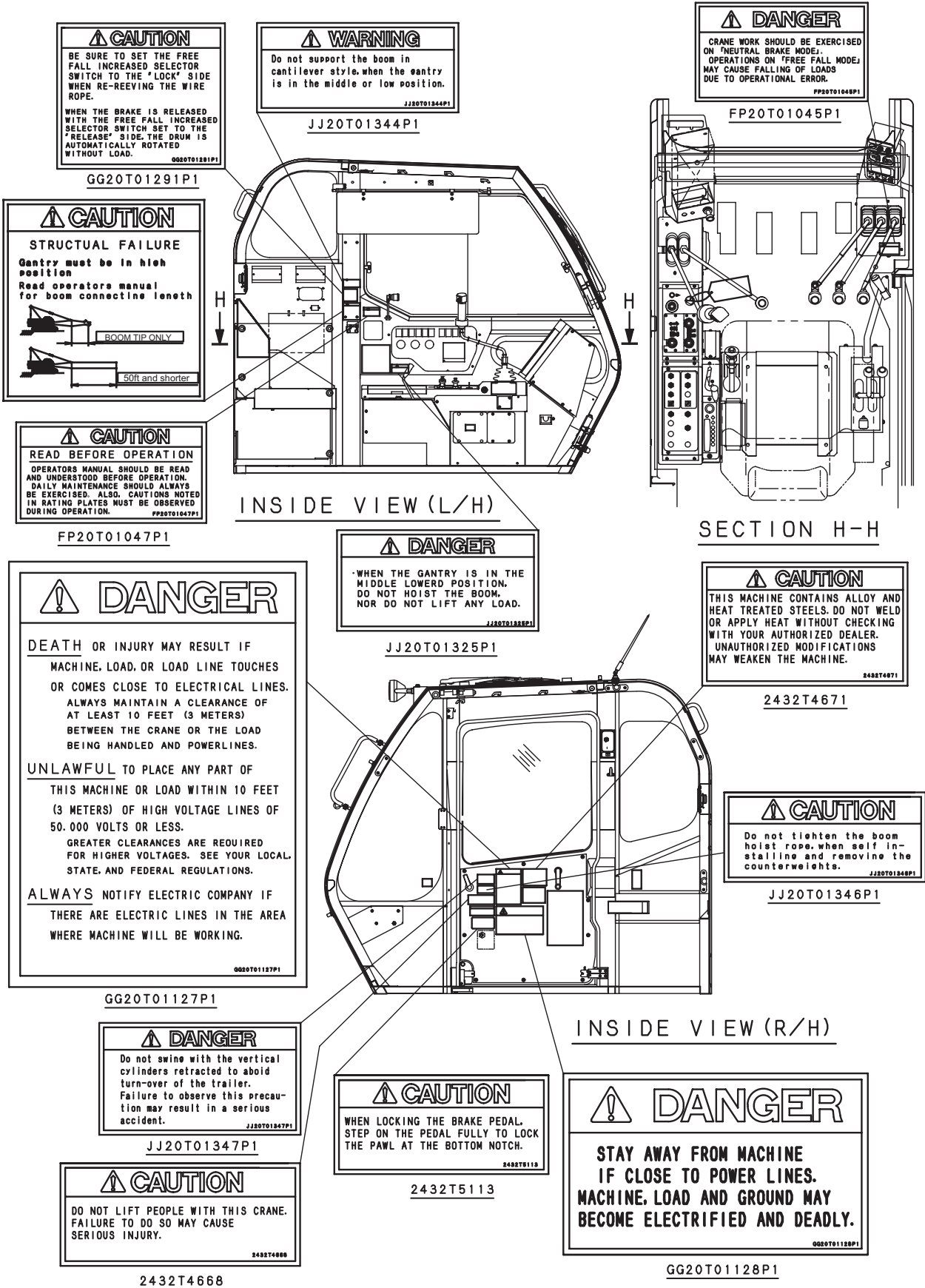
Stay out from crane swing area.

JJ20T01095P1





IMPORTANT INFORMATION




⚠ CAUTION

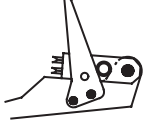
CAUTION FOR USING SPREADER GUIDES

TO AVOID DAMAGE TO SPREADER GUIDES, PLACE THE GUIDES TO STORING POSITION, AFTER SPREADER IS CONNECTED TO LOWER BOOM.

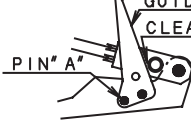
TO AVOID NIPPING OF HANDS OR FINGERS, AT FIRST THE GUIDES SHOULD BE HELD BY HANDS AND PINS DISENGAGED, AND THEN SHOULD BE PLACED IN STORING POSITION.



STORING POSITION



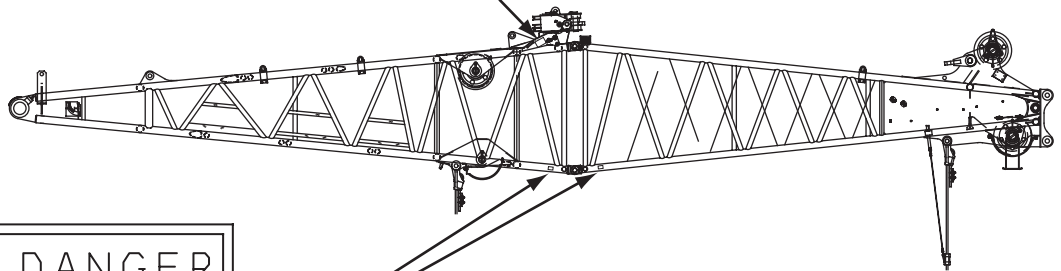
WORKING POSITION
(BOOM DISASSEMBLING / ASSEMBLING)



DISASSEMBLING OF PIN "A"

FP20T01012P1


FP20T01012P1



⚠ DANGER

DO NOT ENTER UNDER BOOM

TO AVOID SERIOUS INJURY CAUSED BY FALLING OF BOOM, DO NOT ENTER UNDER BOOM WHILE DISASSEMBLING/ASSEMBLING OF BOOM.




FP20T01013P1

FP20T01013P1

⚠ CAUTION

Be sure to place two (2) wooden blocks under the assembly, when transporting and laying on the ground. Failure to observe this caution may lead to damage of the boom tip assembly.

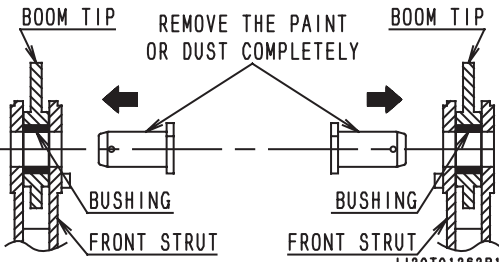


JJ20T01352P1

JJ20T01352P1

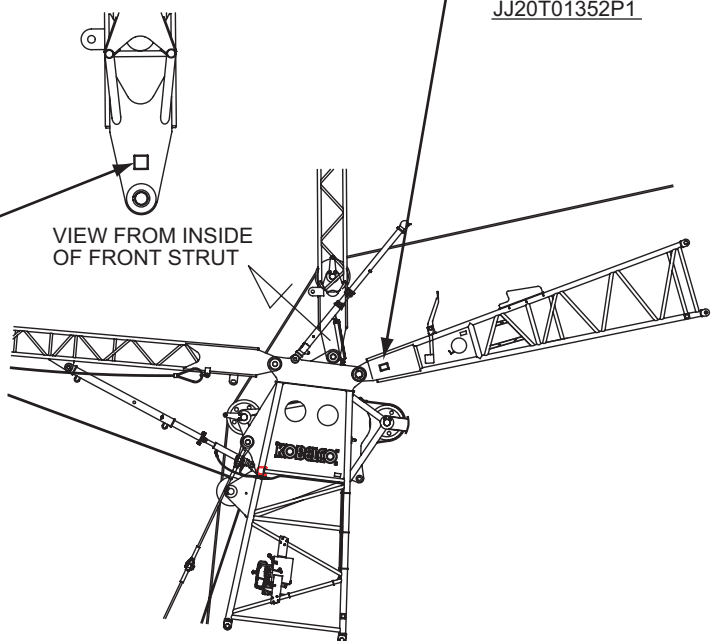
⚠ CAUTION

The bushing in the pin hole to install front strut is coated with plastic material. Insert a pin after the pin hole is aligned completely, and do not hit the pin hard. Failure to observe this caution may lead to damage of the coating of the bushing.

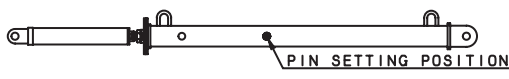

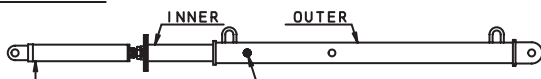


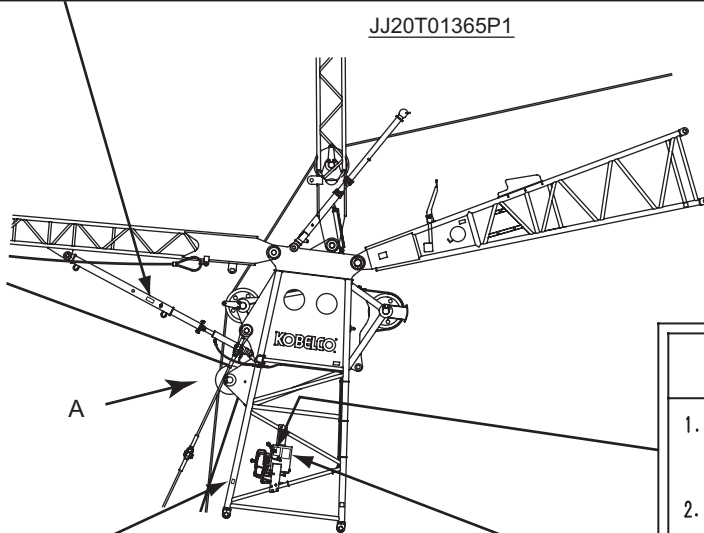
JJ20T01262P1

JJ20T01262P1



IMPORTANT INFORMATION

<p>⚠ DANGER</p> <p>SET THE STRUT BACKSTOP PIN IN THE CORRECT POSITION AS INDICATED. FAILURE TO OBSERVE WILL RESULT IN DAMAGE TO THE STRUT BACKSTOP, BOOM, JIB AND/OR THE STRUTS AND IN SERIOUS INJURY OR LOSS OF LIFE.</p>	<p>STRUT BACKSTOP PIN SETTING POSITION</p> <p>FOR TRANSPORTATION (FULL RETRACT)</p>  <p>PIN SETTING POSITION</p>	<p>INNER CONDITION</p>  <p>FOR TRANSPORTATION AND LIFTING</p>
	<p>FOR LIFTING</p>  <p>INNER OUTER</p> <p>HYDRAULIC CYLINDER BOOM LENGTH 70FT~180FT/21.34m~54.86m</p>	<p>JJ20T01365P1</p>



⚠ CAUTION

1. CHECK THE OIL FOR PROPER LEVEL BEFORE BOOM ERECTION TO PREVENT OVER FLOWING AND/OR MALFUNCTION.
2. PROPER OIL LEVEL IS CENTER OF GAUGE AFTER THE CYLINDER FULLY RETRACTED.

JH20T01106P1

JH20T01106P1

⚠ DANGER

CLOSE THE COCK ABOVE TANK SURELY. IF THE COCK IS OPEN, IT IS IN DANGER OF JIB OVERHOISTING BECAUSE OF CYLINDER SHRINKING

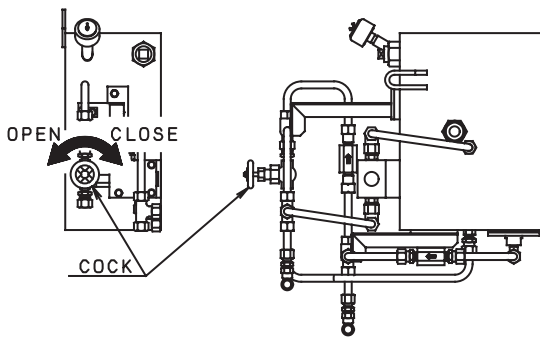
JH20T01087P1

JH20T01087P1

⚠ WARNING

- Open the Cock on the hydraulic tank to make allow the strut backstop cylinders to freely extend or retract when installing the cylinders to the main boom side or dismantling the cylinders from the main boom side.
- Securely Close the Cock on the hydraulic tank after installing the strut backstop cylinders to the main boom side and keep the cock closed during crane operation, otherwise the Jib may pulled over.

Failure to observe this warning may result in serious injury or loss of life.



COCK

JJ20T01351P1

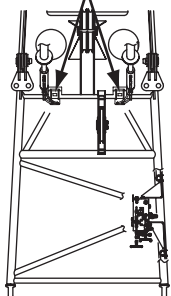
JJ20T01351P1

⚠ CAUTION

CONFIRM TO JOIN COUPLER SURELY

JH20T01088P1

JH20T01088P1

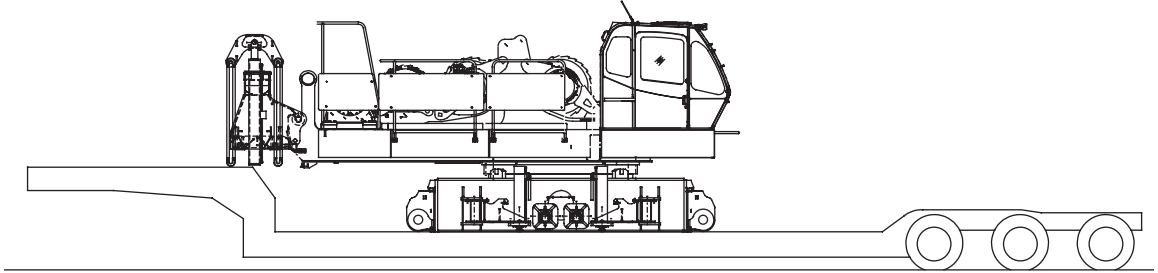


VIEW A

QUICK REFERENCE FOR ASSEMBLING OF THE MACHINE

A. INITIAL ASSEMBLING PROCEDURE

1. MACHINE IN THE TRANSPORTATION POSITION

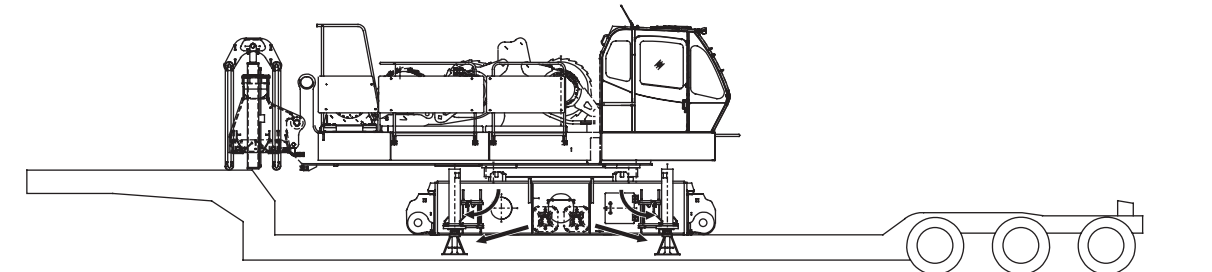


Description

Warning : Do not swing the machine on the trailer.

Refer page : 9-4

2. ARRANGEMENT OF THE TRANSLIFTER



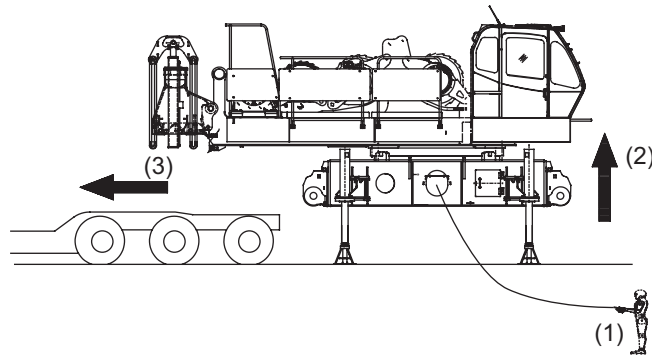
Description Unfold the translifter arms and install the floats to the cylinders.

Warning : Do not swing the machine on the trailer.

Refer page : 9-4, 9-5

IMPORTANT INFORMATION

3. EXTEND THE TRANSLIFTER.

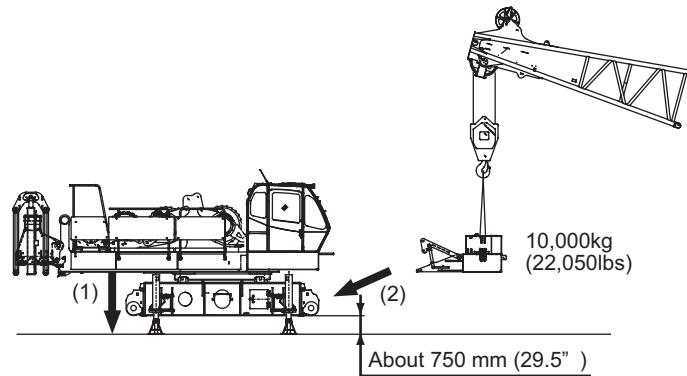


- Description
- (1) Connect a remote control box.
 - (2) Extend 4 cylinders fully with the machine kept horizontal.
 - (3) Drive trailer away.

Warning : Keep the machine horizontal during extending the translifter cylinders.

Refer page: 9-6

4. INSTALL THE CARBODY WEIGHT ON FRONT AND REAR OF THE MACHINE.



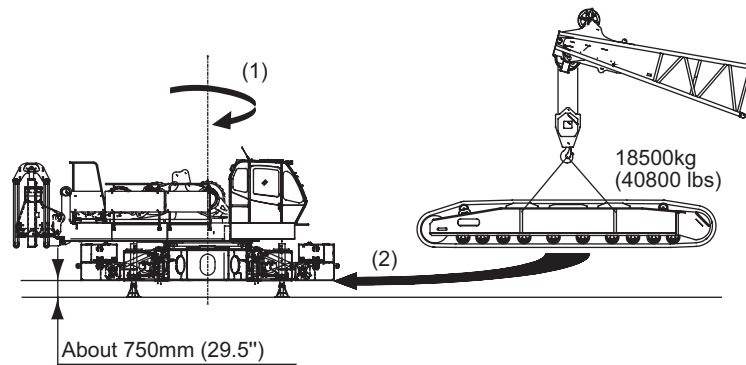
- Description
- (1) Adjust the height between the ground and the bottom of the lower frame so that the height becomes about 30".

- (2) Install the carbody weight on front and rear of the machine.

Warning Absolutely, do not install the crawler unit before installation of the carbody weight to avoid turn-over of the machine caused by machine unbalance.

Refer page: 9-8

5. INSTALL THE CRAWLER UNIT ON RIGHT HAND AND LEFT HAND OF THE MACHINE.

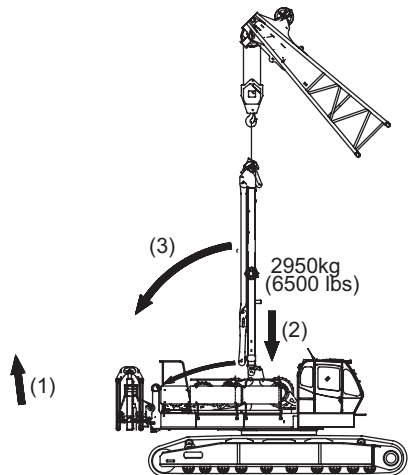


- Description
- (1) Swing upper machine to the side.
 - (2) Install the crawler unit on the R.H. and L.H. of the machine.
 - (3) Fully retract the translifter cylinders.
 - (4) Hung on the floats to the hook on the side of the carbody weight.

Warning Inspect if all connection and disconnection parts are correct.

Refer page: 9-9 to 9-15

6. INSTALL THE GANTRY ASSEMBLY.LEFT HAND OF THE MACHINE.



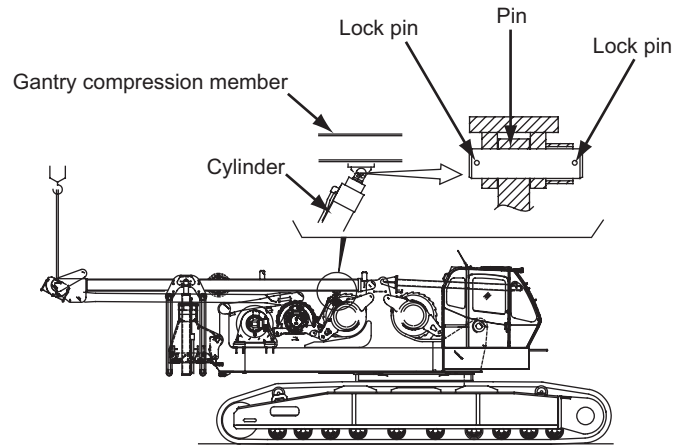
- Description
- (1) Lift the gantry and connect the pins.
(R.H. and L.H.) on the upper frame securely.

Warning Connect the lifting sling to the tip of the gantry securely.

Refer page: 9-15 to 9-16

IMPORTANT INFORMATION

7. SET THE GANTRY SHAFT TO THE CYLINDER YOKE.

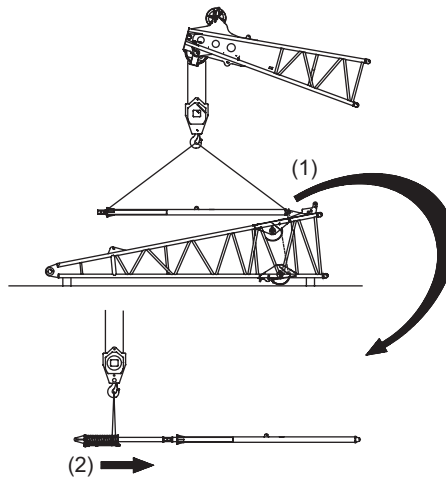


Description Lower the gantry and set the gantry shaft to the cylinder yoke securely.

Warning Confirm if the set point between the gantry shaft and the cylinder yoke are correct.

Refer page: 9-18

8. REMOVE THE BACKSTOP FROM THE LOWER BOOM.



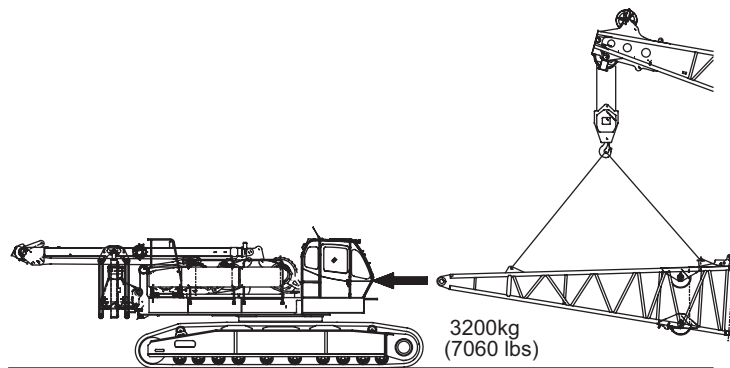
Description (1) Remove the outer tube of the backstop on the boom base.

(2) Insert the inner tube to the outer tube.

Warning Confirm if the set point between the gantry shaft and the cylinder yoke are correct.

Refer page: 9-19

9. INSTALL THE BOOM BASE TO THE MACHINE.

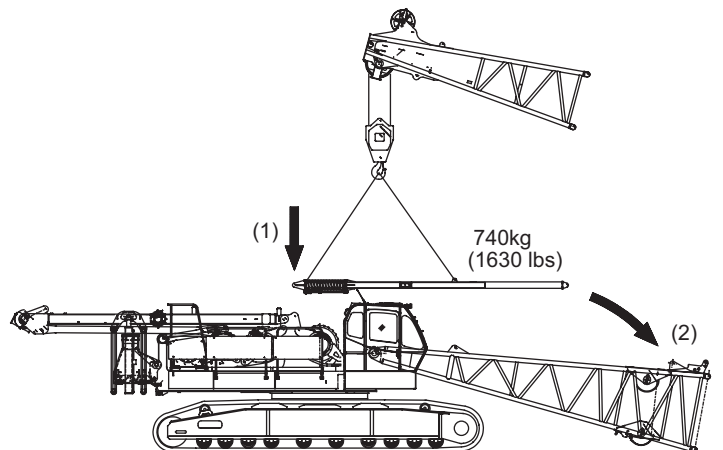


Description Lift the boom horizontally and connect the boom foot to the upper frame.

Warning

Refer page: 9-19

10. INSTALL THE BACKSTOP ASSEMBLY.



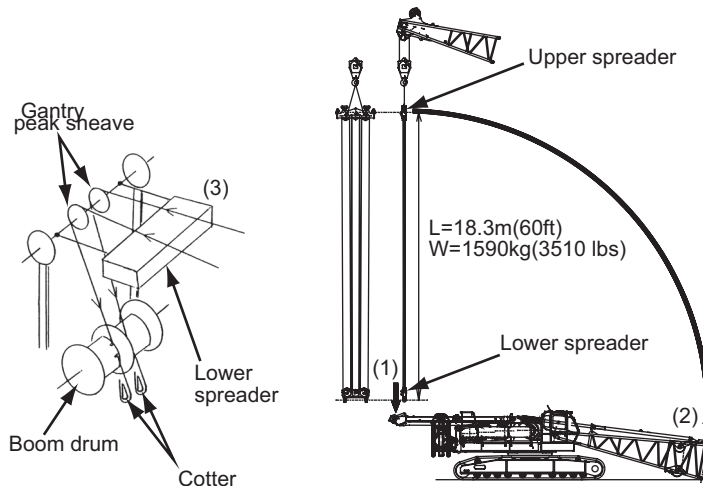
Description Install the rear end of the backstop to the machine first and then connect the front end of the backstop on the boom base.

Warning

Refer page: 9-21

IMPORTANT INFORMATION

11. INSTALL THE SPREADER INCLUDING BOOM WIRE.



Description (1) Suspend the upper spreader vertically and connect the lower spreader to the link on the gantry tip with connecting pin.

Note: Full length of the spreaders and boom wire = 60 ft/Total weight = 3510 lbs.

(2) Move down the upper spreader toward the boom base and connect the upper spreader to the bracket on the tip of the boom base.

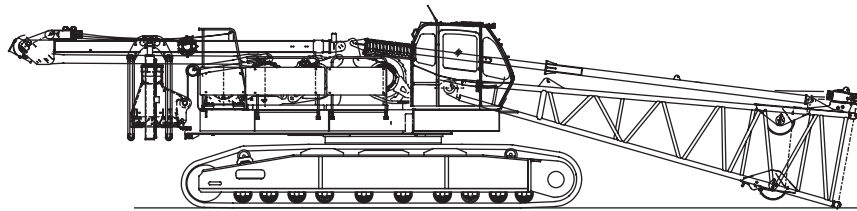
(3) Wind both end of the boom wire rope to the boom drum securely.

(4) Recheck all parts which you have been assembled at this first initial assembly.

Warning Connect the lifting sling to the upper spreader securely.

Refer page: 9-22 to 9-24

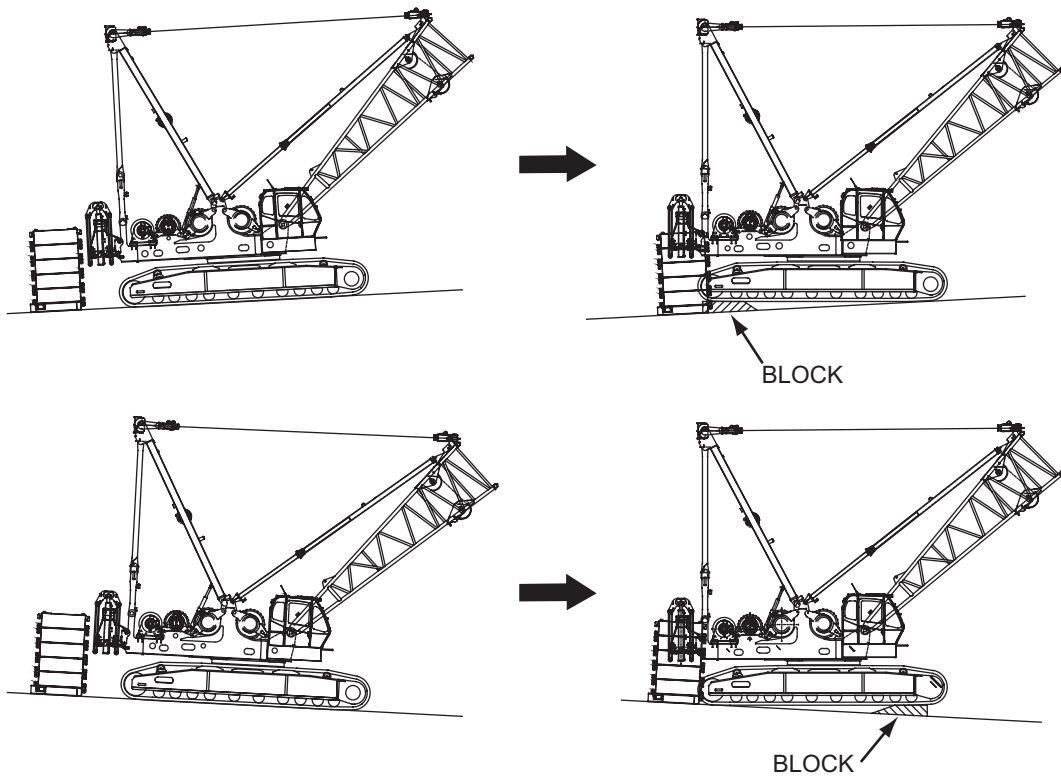
12. NORMAL ASSEMBLING PROCEDURE.



B. SELF ASSEMBLY AND DISASSEMBLY PROCEDURE

CAUTION

Before installing the counterweight, make sure that the machine is placed in a horizontal position. If not, make it horizontal by inserting a wooden block etc. between the machine and the ground. Do not support the machine by transliifter when the counterweight is lifted by the c/w lift cylinder. Failure to observe this warning may result in serious injury or death.



CAUTION

- Absolutely, do not swing the machine on the trailer.
- Extend the transliifter cylinders onto the ground and support the machine horizontally and securely.

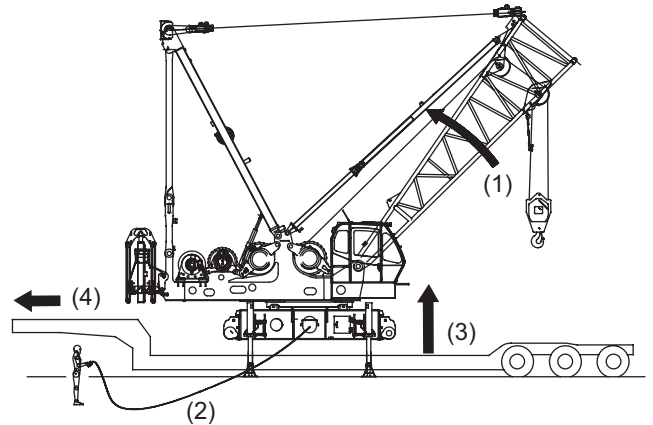
3. EXTEND THE TRANSLIFTER CYLINDER

- (1) Raise the boom.
- (2) Connect the remote-control box.
- (3) Extend the four cylinders equally until fully extended.
- (4) Drive trailer away.

CAUTION

Keep the machine horizontally during extending the translifter cylinder.

Refer page : 4-13

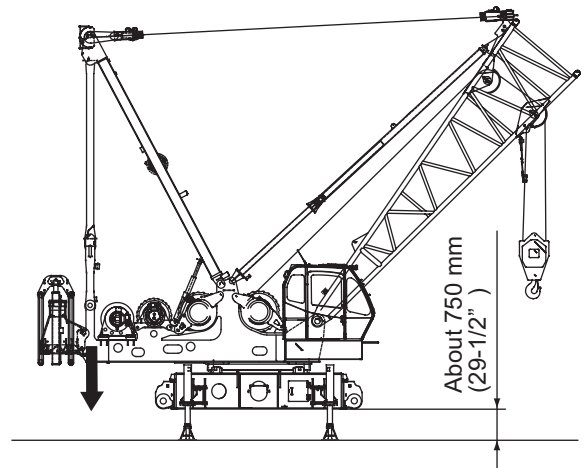
**4. ADJUST THE MACHINE HEIGHT**

Adjust the height between the ground and the bottom of the lower frame so that the height becomes about 750 mm (29.5").

CAUTION

Keep the machine horizontal during adjusting the translifter cylinder.

Refer page : 4-14

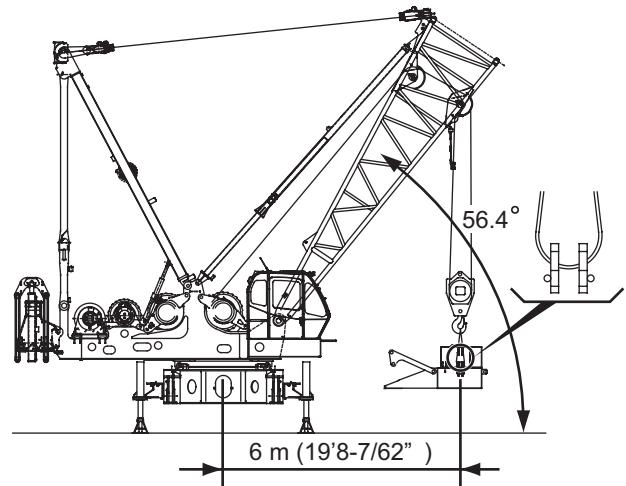


IMPORTANT INFORMATION

5. LIFT THE CARBODY WEIGHT (FRONT & REAR)

Raise the boom angle up to 56.4 deg. and lift the carbody weight.

Refer page : 4-16



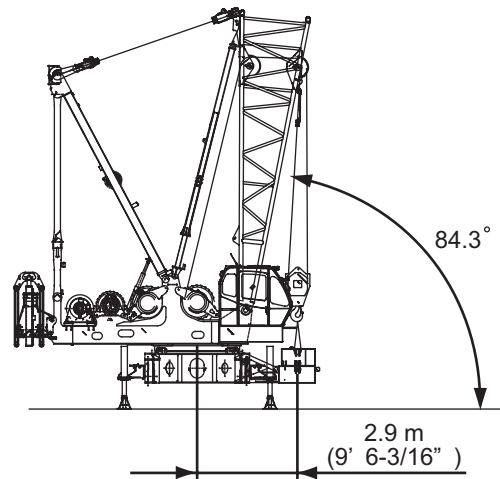
6. INSTALL THE CARBODY WEIGHT (FRONT & REAR)

Raise the boom angle up to 84.3 deg. and install the carbody weight carefully.

CAUTION

Absolutely, do not install the crawler unit before installing the carbody weight to avoid turn-over of the machine due to unbalance.

Refer page : 4-18



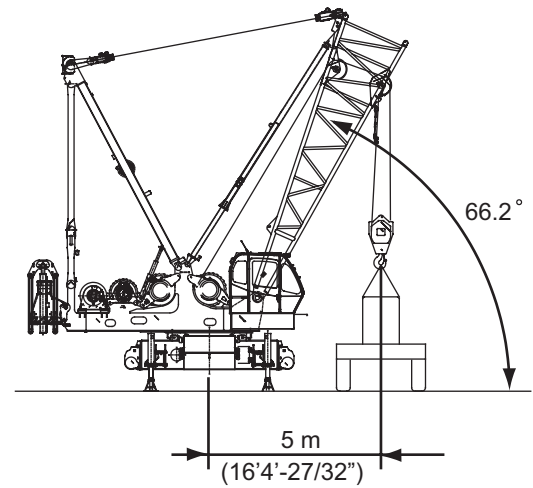
7. LIFT THE CRAWLER UNIT (R.H. & L.H.)

Raise the boom angle up to 66.2 deg. and lift the carbody weight.

CAUTION

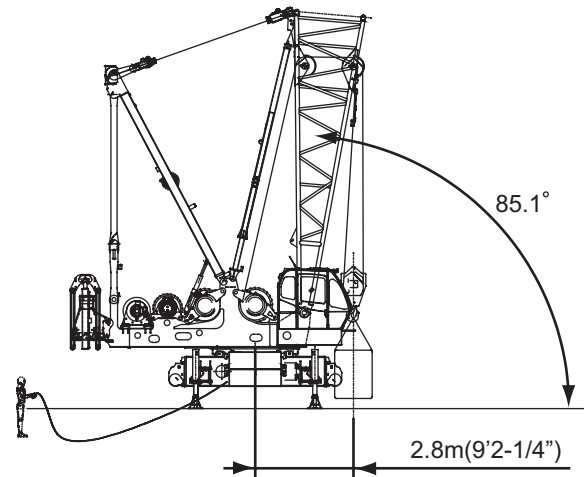
Keep the working radius within 5.0 m (16' 5-0") during lifting the crawler unit. The machine will stop automatically when the working radius is over 5.0 m (16' 5-0") by LMI system.

Refer page : 4-20

**8. INSTALL THE CRAWLER UNIT (R.H. & L.H.)**

Raise the boom angle up to 85.1 deg. and install the crawler unit carefully.

Refer page : 4-21

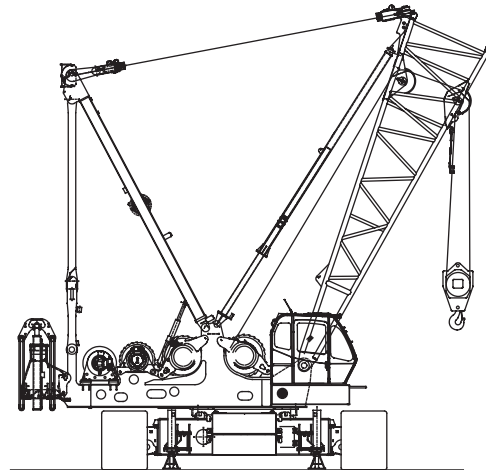


IMPORTANT INFORMATION

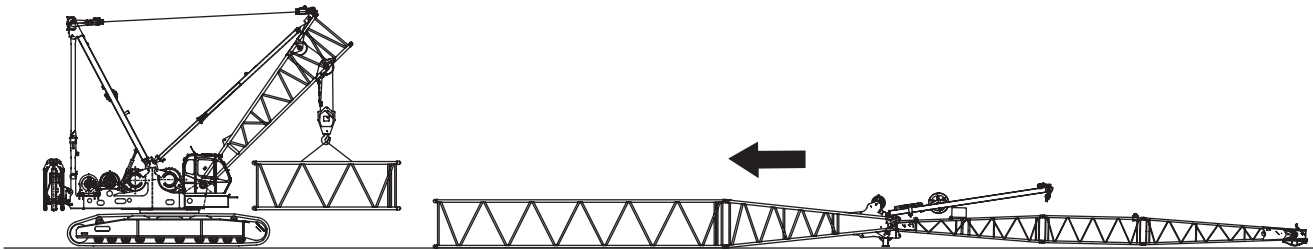
9. RETRACT THE TRANSLIFTER CYLINDERS

- (1) Lower the boom angle about 65 deg.
- (2) Retract a translifter cylinders fully.
- (3) Hang the floats on the hook on the both side of the carbody weights.

Refer page : 4-23



10. ARRANGE THE ATTACHMENT



Arrange the attachment from the tip side of the boom/jib according to the boom and jib arrangement.

Refer page : 4-25 to 4-56

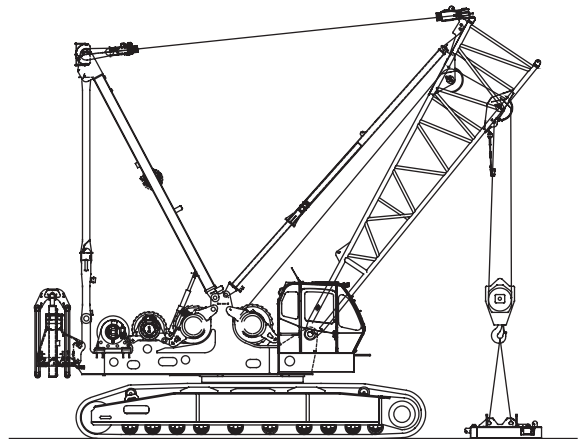
11. ARRANGE THE COUNTERWEIGHT

Make a flat place and put a base counterweight.



Keep the working radius within 6.0 m (19' 8-1/4") during lifting the crawler unit. The machine will stop automatically when the working radius is over 6.0 m (19' 8-1/4") and lifted load is over 7,435 kg (16,400 lbs) by LMI system.

Refer page : 4-58



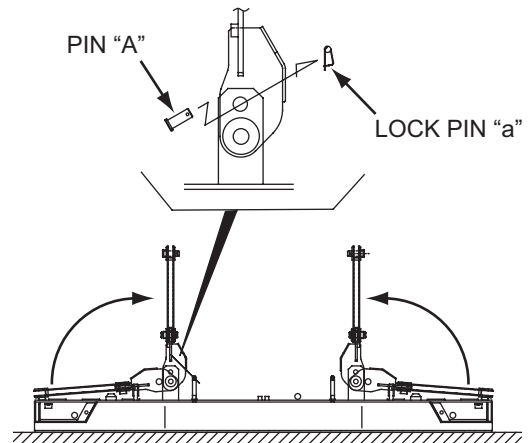
12. ARRANGE THE COUNTERWEIGHT

- (1) Raise the links.
- (2) Fix the links with pin "A" and lock pin "a".



Keep the working radius within 6.0 m (19' 8-1/4") during lifting the crawler unit. The machine will stop automatically when the working radius is over 6.0 m (19' 8-1/4") and lifted load is over 7,435 kg (16,400 lbs) by LMI system.

Refer page : 4-58



IMPORTANT INFORMATION

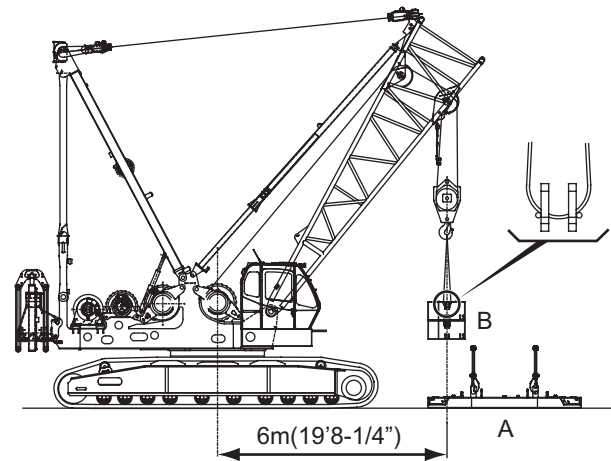
13. ARRANGE THE COUNTERWEIGHT

- (1) Put the counterweight (B) on the counterweight (A).
- (2) Pile up all counterweights equally on the R.H. and L.H. and insert the fix pin to stabilize the counterweights.

CAUTION

- (1) Keep the working radius within 6.0 m (19' 8-1/4") during lifting the crawler unit. The machine will stop automatically when the working radius is over 6.0 m (19' 8-1/4") and lifted load is over 7,435 kg (16,400 lbs) by LMI system.
- (2) The machine can lift up to 3 pieces of counterweights (B).
The weights must be lifted by wire or sling as shown in the figure above.

Refer page : 4-59



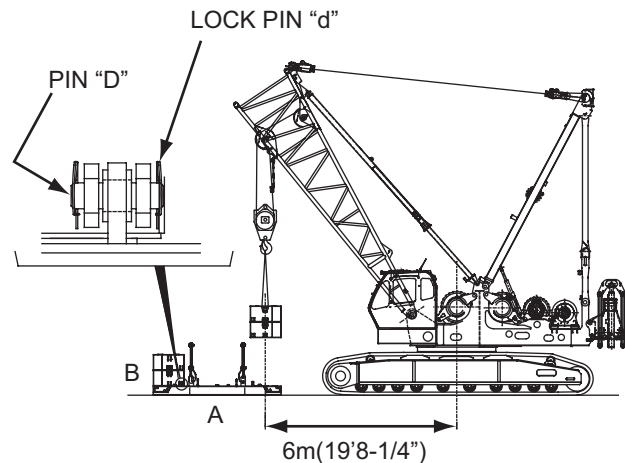
14. ARRANGE THE COUNTERWEIGHT

- (1) Fix the counterweight (B) with pin "D" and lock pin "d".
- (2) Pile up all counterweights equally on the R.H. and L.H. and insert the fix pin to stabilize the counterweights.

CAUTION

- (1) Keep the working radius within 6.0 m (19' 8-1/4") during lifting the crawler unit. The machine will stop automatically when the working radius is over 6.0 m (19' 8-1/4") and lifted load is over 7,435 kg (16,400 lbs) by LMI system.
- (2) The machine can lift up to 3 pieces of counterweights (B). The weights must be lifted by wire or sling as shown in the figure above.

Refer page : 4-59



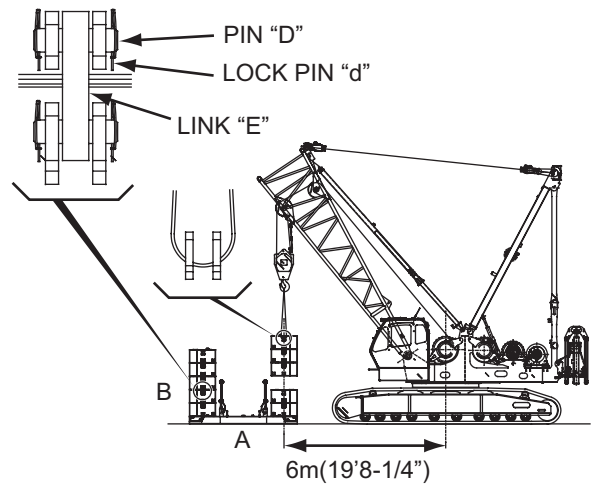
15. ARRANGE THE COUNTERWEIGHT

- (1) Fix the counterweight (B) with pin "D", pin "d" and link "E".
- (2) Pile up all counterweights equally on the R.H. and L.H. and insert the fix pin to stabilize the counterweights.

CAUTION

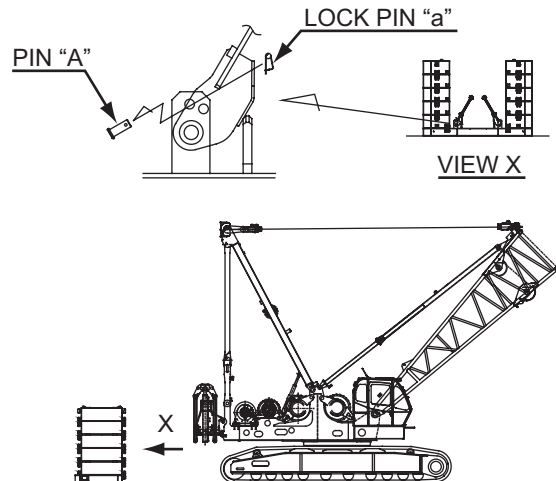
- (1) Keep the working radius within 6.0 m (19' 8-1/4") during lifting the crawler unit. The machine will stop automatically when the working radius is over 6.0 m (19' 8-1/4") and lifted load is over 7,435 kg (16,400 lbs) by LMI system.
- (2) The machine can lift up to 3 pieces of counterweights (B). The weights must be lifted by wire or sling as shown in the figure above.

Refer page : 4-60



16. MOVE THE MACHINE

Refer page : 4-61

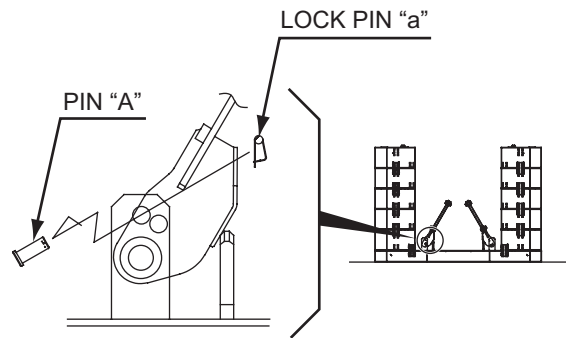


IMPORTANT INFORMATION

17. SET THE LINKS

Lean the links on counterweight (A) against the plate at the counterweight (A) by removing pin "A" and lock pin (a).

Refer page : 4-61



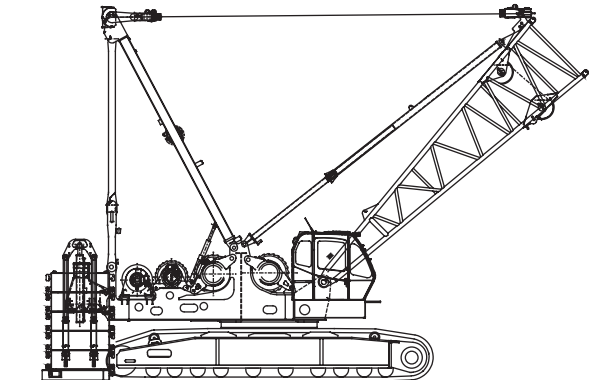
18. ADJUSTMENT OF POSITION

- (1) Move the machine as close as possible to the counterweight and the machine center and weight center become aligned.
- (2) Lower the boom on the ground.
- (3) Connect the counterweight lifting links to the counterweight link on the base counterweight.

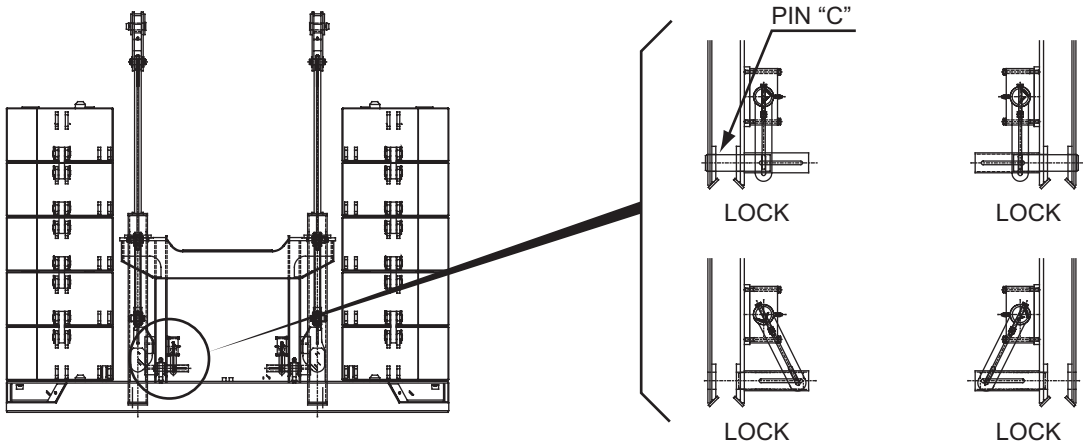
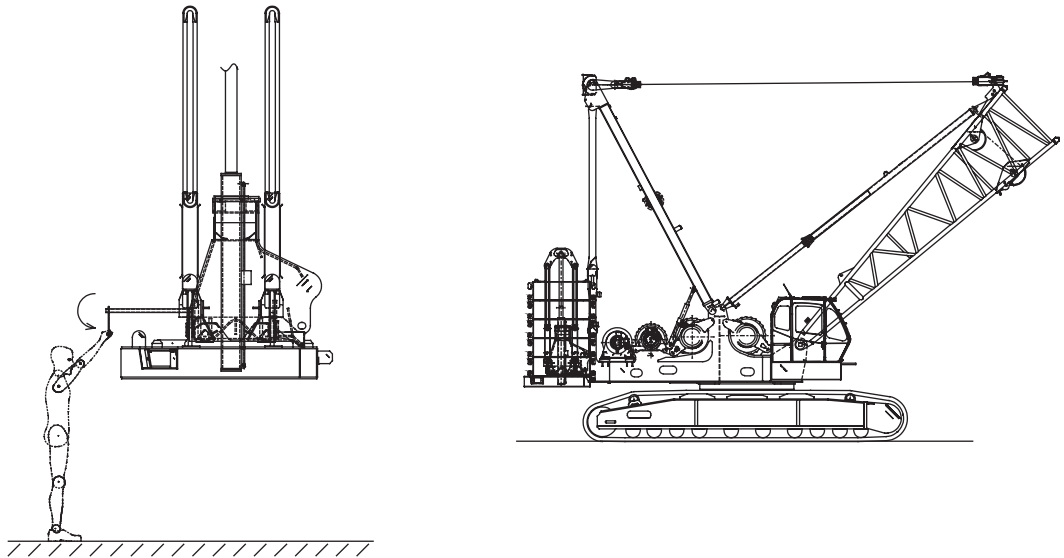
CAUTION

If not, make it horizontal by inserting wooden blocks etc. between the machine and the ground. (Refer to page B-1.)

Refer page : 4-62



19. LIFT AND INSTALL THE COUNTERWEIGHTS



- (1) Connect the remote control cable to the connector on the R.H. deck.
- (2) Turn on the switch on the L.H. side panel in the cab to the "GANTRY" position.
- (3) Extend the counterweight cylinders by the remote control box.
- (4) Extend the counterweight cylinders until the cylinder reaches the stroke end.

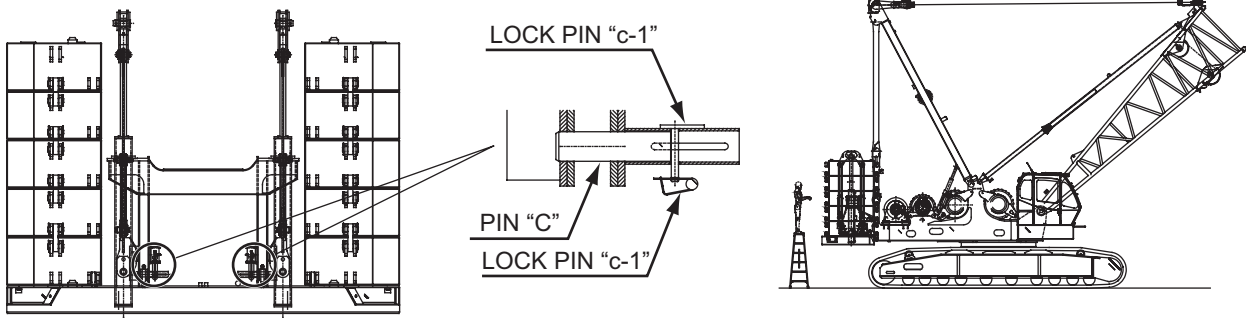
CAUTION

- (1) Do not touch the remote control box during inserting the support pins.
- (2) Extend both of the counterweight cylinders equally gradually, paying attention to interference between the counterweights and upper structures.

Refer page : 4-63 to 4-64

IMPORTANT INFORMATION

20. INSTALL THE COUNTERWEIGHT

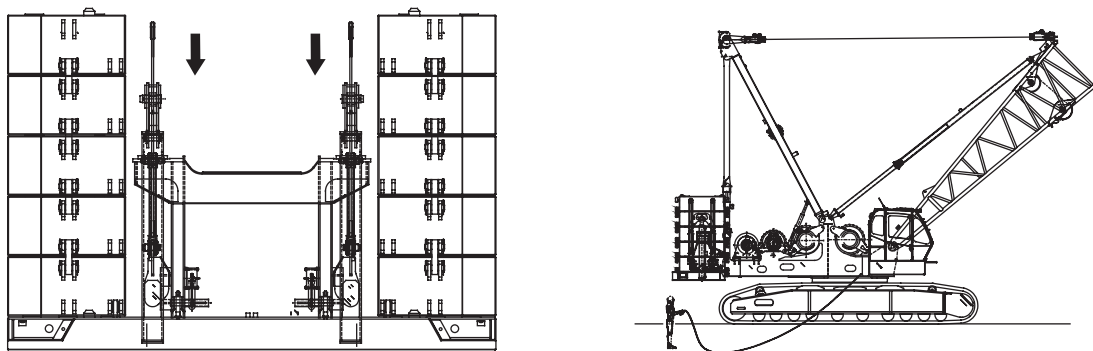


(1) Go up onto counterweight (A) using the ladder.

(2) Set the lock pins "c-1" and "c-2".

Refer page : 4-65

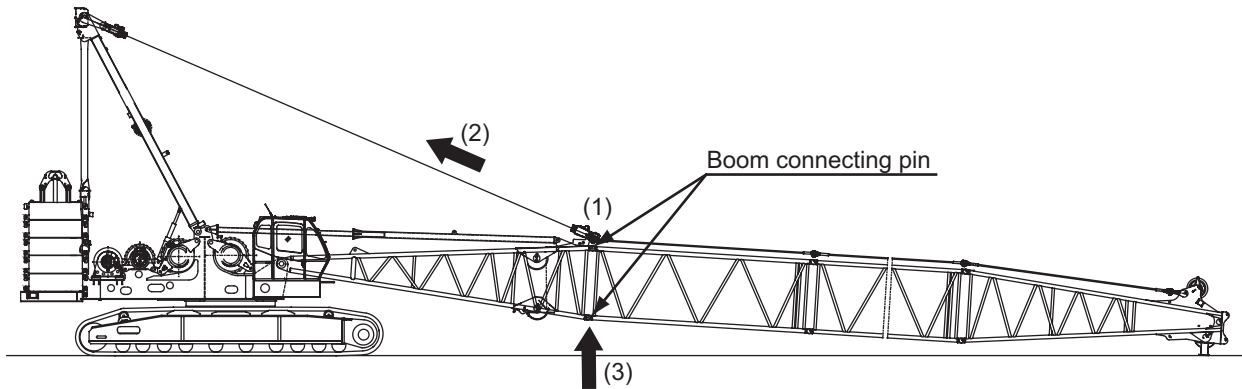
21. INSTALL THE COUNTERWEIGHT



Fully retract the cylinders.

Refer page : 4-65 to 4-66

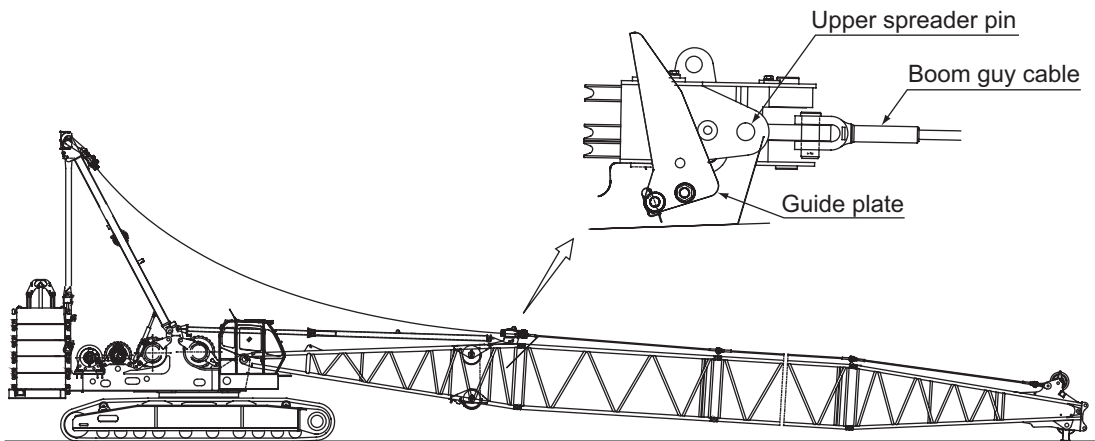
22. CONNECT THE BOOM BASE TO THE NEXT BOOM SECTION



- (1) Connect the boom base to the next boom with upper side boom connecting pins.
- (2) Hoist the boom wire rope and insert the lower side boom connecting pins.
- (3) Set the spreader guide before disconnect the spreader from tip of the lower boom.

Refer page : 4-67

23. CONNECT THE UPPER SPREADER AND BOOM GUY CABLE



- (1) Lower the boom wire rope to connect the upper spreader and the guy cable.
- (2) Connect the upper spreader and the guy cable.
- (3) Disconnect the upper spreader fixing pin on the tip of the lower boom.
- (4) Raise the boom wire rope while watching the boom drum wire rope condition.
- (5) Set the guide plate on the upper spreader to the lower position.

Refer page : 4-68 to 4-71

1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

INTRODUCTION

Because cranes have the ability to lift heavy loads to great heights, they also have a potential for accidents if safe operating practices are not followed. This book will help you prevent accidents that could result in injury, death, or property damage.

General safe practices for working on machinery must be followed as well as the safe operating practices recommended here.

OPERATOR'S RESPONSIBILITY

The operator is the best safety feature in any crane. Safety must always be the operator's most important concern. He must refuse to operate when he knows it is unsafe and consult his supervisor when safety is in doubt.

He must read and understand the Operator's Manual and see that the machine is in proper order before operating.

He must understand how to read the rating plate and know that his machine can safely lift each load before attempting to lift it.

He must never lift a load without knowing the length of the boom, the weight of the load, and the load radius or boom angle.

Never attempt to operate the crane at conditions exceeding those shown on the rating chart. Such operation can cause tipping or structural failure of the crane that can result in damage, injury, or death.

He must be alert, physically fit, and free from the influences of alcohol, drugs, or medications that might affect his eyesight, hearing, reactions, judgment.

He must see that unnecessary people, equipment, and material are kept out of the work area. The area around the machine should be properly barricaded.

When an operator's vision is restricted or when operating in hazardous places such as near electrical power lines or around people, a signalman must be used. Because the operator is not always in the best position to judge distances and can not see all parts of the jobsite, a signalman may also be necessary at other times. Operators must understand standard crane signals and take signals only from designated signalmen.

1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

SIGNALMAN'S RESPONSIBILITY

The primary duty of a signalman is to assist the operator in safe and efficient operation. Operators depend on designated signalmen to assist them in making movements without endangering people or property.

Signalmen must have a clear understanding of the work to be done so that they can safely coordinate each job with operators and other crew members. Signalmen must place themselves where they can be clearly seen and where they can safely observe the entire operation. Standard crane signals must be used unless other methods of signaling, such as two way radios or flags have been agreed upon.

CREW MEMBER'S RESPONSIBILITY

Any unsafe condition or practice must be corrected or reported to the job supervisor.

Everyone who works around the crane, including riggers and oilers, must obey all warning signs and watch out for his own safety and the safety of others. Crew members setting up machines or handling loads are expected to know proper machine erection and rigging procedures.

Watch for hazards during operations and alert the operator and signalmen of dangers such as power lines, the unexpected presence of people, other equipment or unstable ground conditions.

MANAGEMENT'S RESPONSIBILITY

See that operators are trained, competent, physically fit and, if required, licensed. Good vision is required, as are good judgment, coordination and mental ability. Any person who lacks any of these qualities must not be allowed to operate a crane.

Signalmen must have good vision and sound judgment, know standard crane signals and be able to give signals clearly. They must have enough experience to be able to recognize hazards and signal the operator to avoid them.

Riggers must be trained to determine weights and distances and to select proper lifting tackle. Rigging is a complex subject far beyond the scope of this manual. It is management's responsibility to employ qualified riggers.

Crew members must be given specific safety responsibilities and instructed to report any unsafe conditions to their supervisors.

PLANNING THE JOB

Most accidents can be avoided by careful job planning. The person in charge must have a clear understanding of the work to be done and equipment capabilities. He must consider all dangers at the jobsite, develop a plan to do the job safely, and then explain the plan to all concerned. Factors such as these should be considered:

- What crew members are needed and what responsibilities will they be given?
- What is the weight of the load to be lifted, the lift radius, boom angle, and the rated capacity of the crane?
- How will the signalmen communicate with the operator?
- What equipment is required to do the job safely? Is a crane the best equipment for the job?
- How can the equipment be safely transported to the jobsite?
- Are there gas lines, electrical power lines or structures that must be moved or avoided?
- Is the surface strong enough to support the machine and load?
- How will loads be rigged?
- What special safety precautions must be taken if a crane must travel with a suspended load or if more than one crane is needed to lift a load?
- Are unusual weather conditions such as winds or extreme cold expected?
- What steps will be taken to keep unnecessary people and equipment safely away from the work area?
- How can the crane be positioned to use the shortest boom and radius possible?

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OPERATOR'S CHECK LIST

The operator must make a safety check before starting to work each day to see that the machine is in proper order. Some things to check are:

- Check the machine log book to see that periodic maintenance and inspections have been performed and all necessary repairs made.
- Check the operation of the boom hoist kickout, boom angle indicator, back up alarms, and other safety devices.
- Carefully inspect load bearing parts such as wire rope, (load lines, boom hoist cable, suspension lines), boom, outriggers, hooks, and rigging.
- Inspect the crane for any missing bolts, nuts or pins and any cracked or broken components.
- Be sure no unauthorized field modifications have been made, such as counterweights increased or decreased and booms that have been improperly repaired.
- Check for fuel and hydraulic oil leaks.
- After starting the engine, check all gauges for proper readings.
- Test all controls for proper operation.
- Check brakes and clutches. Test load brakes by lifting a load a few inches off the ground and holding it.

OPERATING PRECAUTIONS

The following recommendations represent our experience in regard to the most likely causes of personal injury and damage to equipment. Careful observance of the following recommendations will prevent the majority of common accidents.

1. Mistakes in calculating lifting capacity can cause accidents.

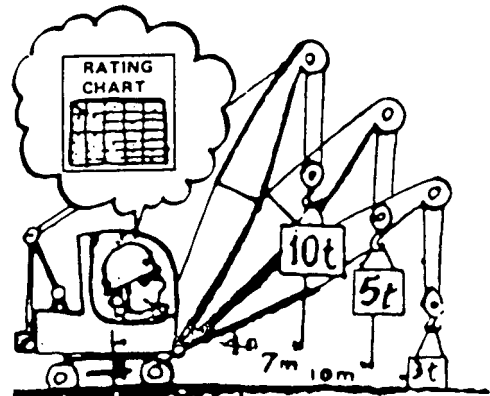
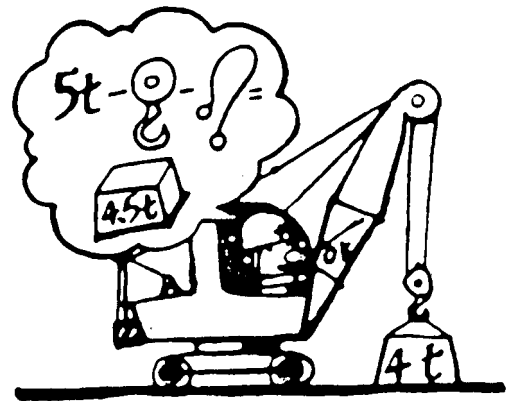
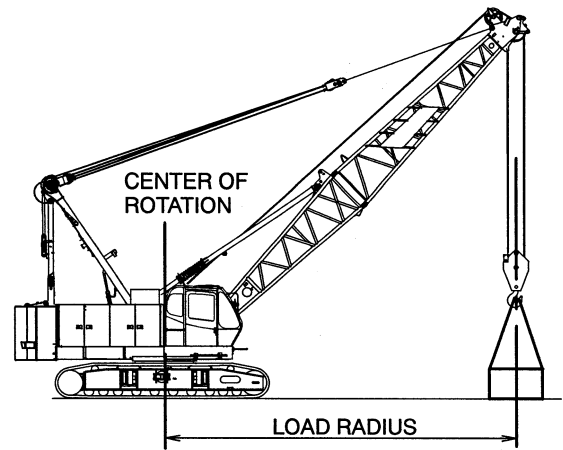
Several factors must be considered including:

- (1) Load radius (the distance between the center of the crane rotation to the center of the load). Note that the radius will increase when the load is lifted.
- (2) Weight of the load, hook, and rigging.
- (3) Boom length, jib, parts of line, and operating area (side, rear).

Use the next lower rated capacity when working at boom length or radii between the figures on the rating chart. It is dangerous to guess the capacity for boom length or radii between those listed on the rating plate.

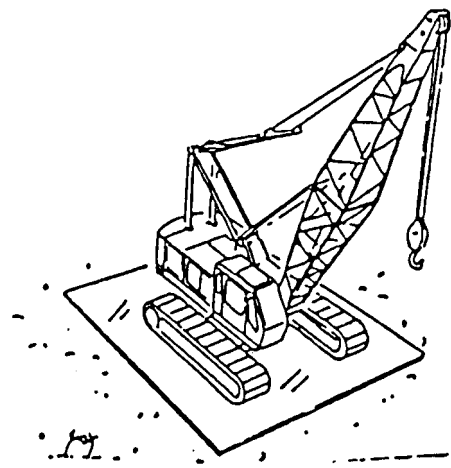
Trying to lift a load without knowing whether it is within the rated capacity while expecting the crane to start to tip to warn of an overload is very dangerous and should never be done. Cranes may suddenly tip over or collapse if too heavy.

Always operate within the rated capacity. The operator must reduce the load under adverse field conditions until, in his judgment, the machine can safely handle the lift. (See Operating Precautions #3, 10, 16, 19, 27, and 28.)



2. Cranes may tip over or collapse if the operating surface cannot support their weight. Timber mats, steel plates or concrete rafts may be needed under crawlers to distribute the load under the crane so that the bearing strength of the ground is not exceeded.

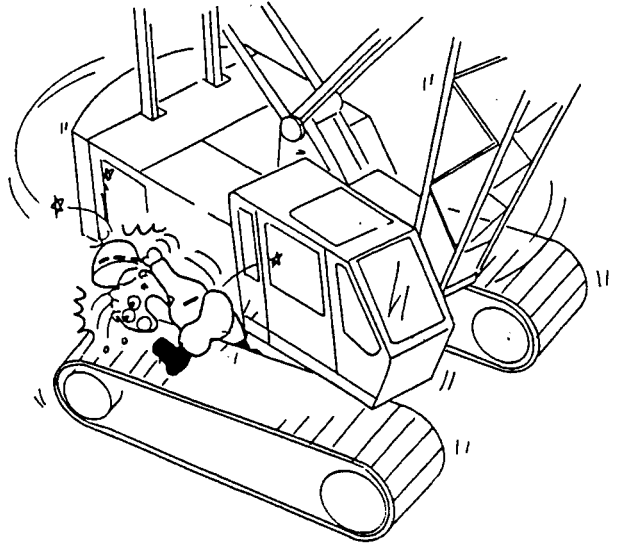
Determine the load bearing capacity of the ground or other surface on which machines will be operating. Be sure cranes are adequately supported. Avoid soft or unstable ground, sand, areas with high water tables, and partially frozen ground. When machines are working near trenches, the trenches should be shored or sloped to prevent cave-ins or slides.



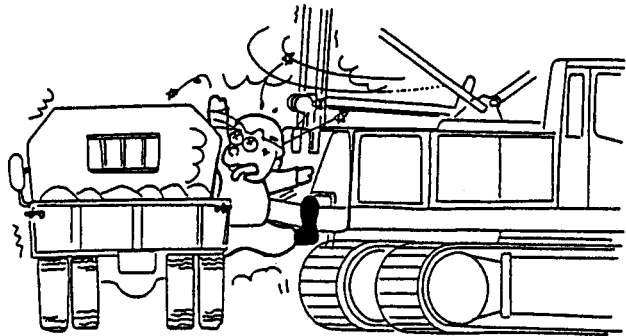
1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

3. The rated capacity of a crane is determined with the crane leveled within ± 0.5 deg. of grade (1 foot drop or rise in 100 foot distance). Out of level more than ± 0.5 deg. will drastically reduce the lifting capacity. Be sure cranes are level.

4. People can be crushed by the scissors-like action of the upper rotating on the lower. Stay away from rotating cranes. Erect barricades to keep people away. Take the time to determine that these areas are clear before swinging.

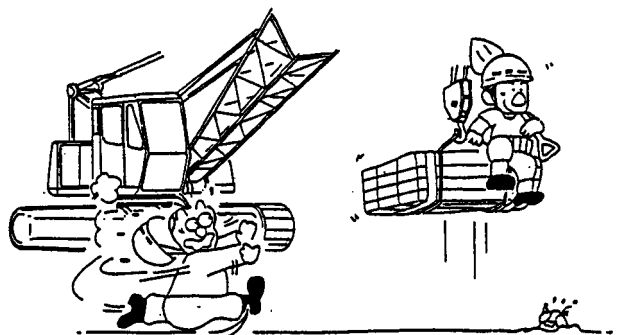


5. People can be crushed by the rear (counterweight) of the machine if there is not enough room for it to swing. Position machines so that people cannot be trapped between the counterweight and other obstructions.



6. Many people have been injured when riding crane hooks or loads or while being lifted in manbaskets. They have no control over how they are handled and no protection from impacts or falls. Small mistakes can be fatal.

Never permit anyone to ride loads, slings, hooks, etc., for any reason.



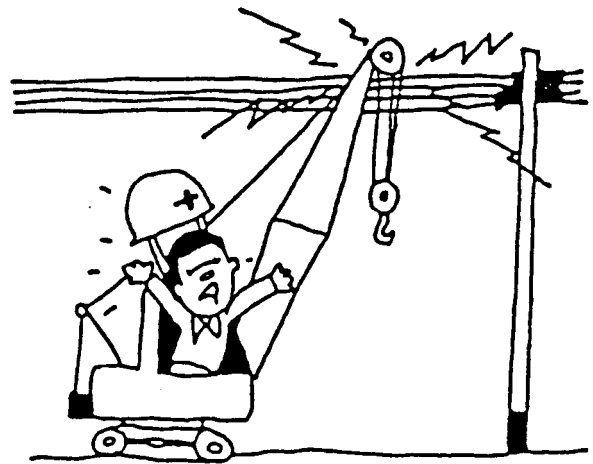
1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

7. Power electrical lines have killed or serious injured people working around cranes and excavators. These accidents can be avoided by following a few simple rules.

Always determine whether there are power lines in the area before starting any job. OSHA regulations require at least 3.05 meter (10 feet) of clearance from lines carrying 50,000 volts or less. Greater clearances are required for lines with higher voltages. Some states require greater clearances than OSHA. Safety requires that you stay as far as possible from power lines and never violate minimum clearances.

Always take these precautions if power lines are present.

- (1) Notify the electrical power Company before beginning work.
- (2) You and the Power Company must take specific precautions. These may include locating cranes and materials away from electrical power lines, de-energizing and grounding lines, rerouting lines, removing barricading lines, and insulating lines with rubber sleeves.
- (3) Use a signalman to maintain a safe distance between any part of the machine or load and electrical power lines. The operator is not in the best position to judge distances.
- (4) Warn people to stay away from the machine and load at all times.
If the load must be guided into place, ask the Power Company about special precautions such as insulated poles or hot sticks.
- (5) Slow down. Give yourself time to react to problems and to double check the distance between electrical power lines and any part of the machine or load.



Operation Near High Voltage Power Lines	
Normal Voltage, kV (Phase to Phase)	Minimum Required Clearance, m(ft)
to 50	3.05 (10)
Over 50 to 200	4.60 (15)
Over 200 to 350	6.10 (20)
Over 350 to 500	7.62 (25)
Over 500 to 750	10.67 (35)
Over 750 to 1000	13.72 (45)
Operation in Transit With No Load and Boom or Mast Lowered.	
Normal Voltage, kV (Phase to Phase)	Minimum Required Clearance, m(ft)
to 0.75	1.22 (4)
Over 0.75 to 50	1.83 (6)
Over 50 to 345	3.05 (10)
Over 345 to 750	4.87 (16)
Over 750 to 1000	6.10 (20)

(extracted from ASME/ANSI Standard B30.5-2004)
SAFE MAINTENANCE PRACTICES

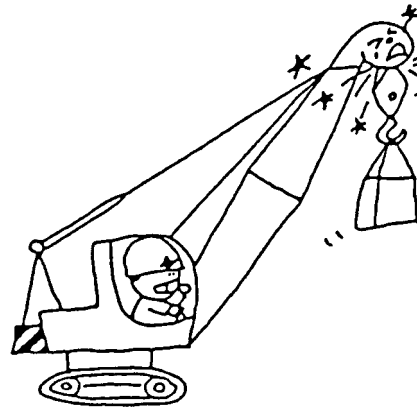
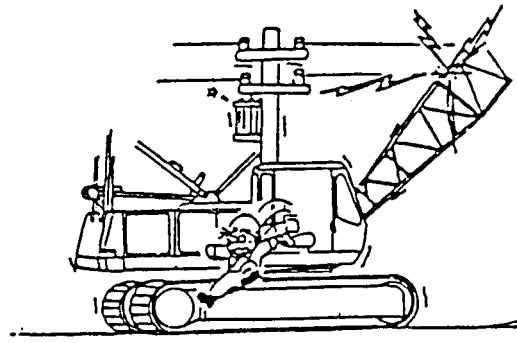
Required Clearances for Operation Near High Voltage Power Lines

1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

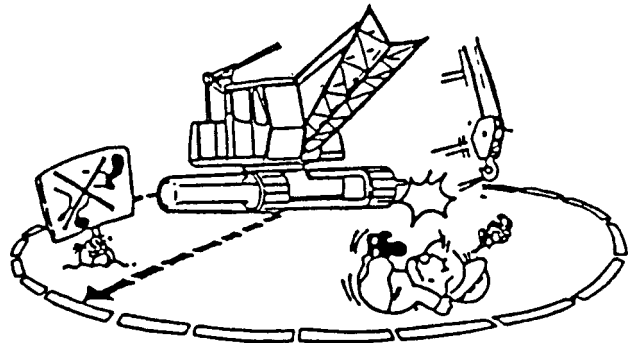
Careful planning and supervision offer better protection than any known hardware. Insulated boom cages, proximity warning devices, and insulating links have limitations and can fail without warning. Insulated boom cages and links only protect part of the crane and can break down electrically if contaminated with dust and water.

Operation of proximity warning devices can be affected by different arrangements of power lines, the movement of trucks, materials, and the crane itself, and other influences. Relying on any of these devices could be dangerous because users may think they are providing protection when in fact they are not.

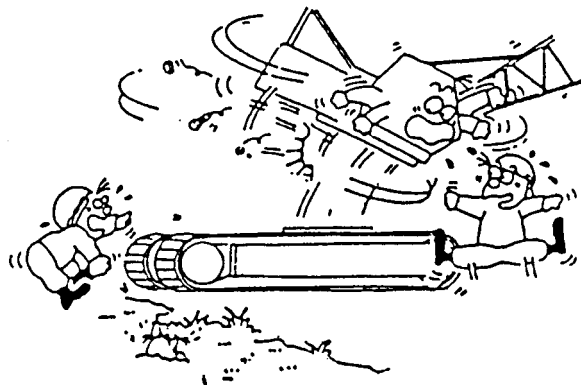
If any part of the crane or rigging contacts a high voltage line, the safest procedure for the operator is to stay at his post until the contact is cleared, or the power has been shut off. Do not allow anyone on the ground to touch the machine. If the operator must leave the machine, he should jump off, rather than climb off.



8. The load line can break if the hook block contacts the end of the boom. This is called "two blocking". Two blocking, for example, can be caused by hoisting the hook into the end of the boom or lowering the boom without paying out load line. Two blocking can pull jibs and lattice booms over backwards or cause structural damage at boom or jib points. Always keep space between the hook block and boom point. Lower the hook when lowering the boom.



9. People can be injured if the hook, boom, load or outriggers are moved when personnel are nearby. Make sure everyone is clear before moving the hook, boom, load or outriggers. Do not move loads over people. Do not allow the load to bump or catch on anything.



10. Rapid swings or sudden starts and stops can cause the hook and attached load to swing out of control. Always start and stop movements smoothly and swing at speeds that will keep the load under control.

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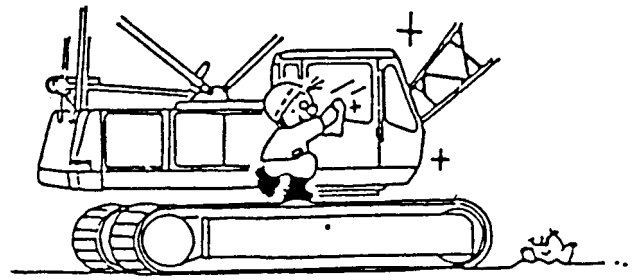
11. Dirty windows, darkness, bright sunlight, fog, rain and other conditions can make it difficult for the operator to see.

Keep windows clean. Do not operate if you cannot see clearly enough to operate safely. Replace cracked or broken glass as soon as possible.

There are several specific safety signs on your machine. Their exact location and description of the hazard are reviewed in this section. Please take the time to familiarize yourself with these safety signs.

Make sure that you can read all safety signs. Clean or replace these if you cannot read the words or see the pictures. When cleaning the labels use a cloth, water and soap. Do not use solvent, gasoline, etc.

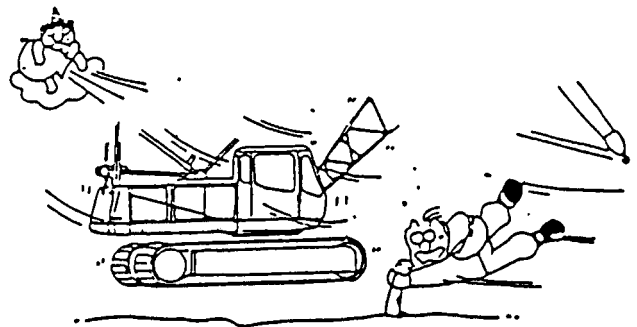
You must replace a label if it is damaged, missing or cannot be read. If a label is on a part that is replaced, make sure a new label is installed on the replaced part.



12. Even light winds can blow loads out of control, collapse booms, or tip cranes. Winds aloft can be much stronger than at ground level.

Do not lift loads if winds create a hazard. Lower the boom if necessary.

Moderate winds may create a hazard for long booms or loads with large surface areas.



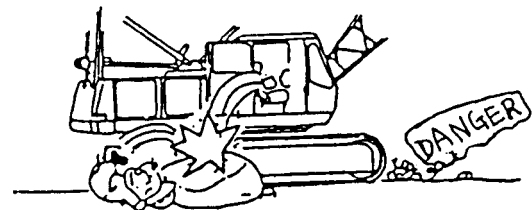
13. Carelessness in getting on and off equipment can result in serious injuries.

Always wait until the machine has stopped.

Do not jump on or off. Always use both hands and make sure you have good footing.

14. Slippery floors and steps, tools, trash, or other loose items can cause falls.

Keep the machine clean and dry.

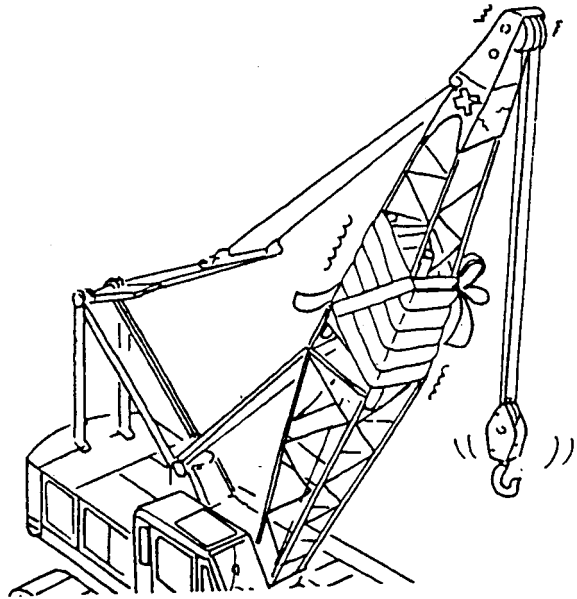


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15. Damaged crane booms may collapse. Lattice type booms will be weakened by damaged chords, bent or missing lacings, or cracked welds. Inspect the crane boom daily for damage. Do not use damaged booms.

CAUTION

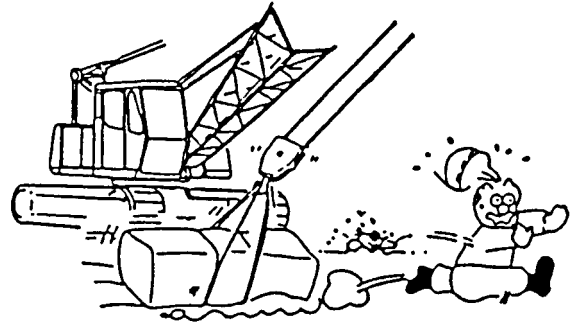
Due to the high strength steels used in booms and jibs, special repair procedures are required. Consult your local authorized KOBELCO authorized distributor for instructions.



16. Crane booms can collapse if side loaded (pulled sideways). Typical causes of side loading are rapid starts and stops while swinging, dragging a load sideways, winds, or lifting when the crane is not level.

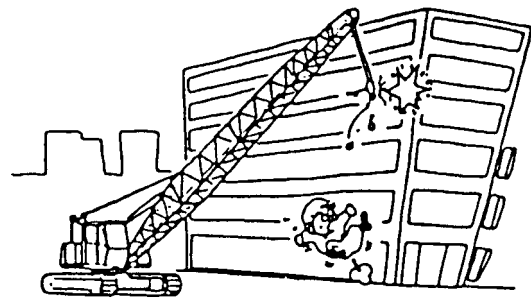
Take care to avoid side loading.

17. If the load strikes the boom or the boom hits a building or other object, the boom may collapse. Never let the load or any other object contact the boom.



18. Boom suspension lines will stretch when the load is lifted and contract when the load is released. At high boom angles this may be enough to pull the boom backwards over the crane or collapse the boom stops.

When releasing loads be sure the boom never tightens against the backstops. Release loads slowly booming out if necessary while releasing.



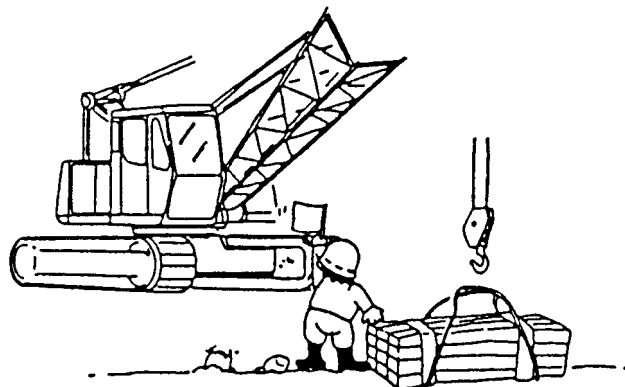
19. The load will swing out of control if it is not directly beneath the boom point when lifted. This can side load the boom and may cause the crane to tip or collapse.

Always place the boom point directly above the load when lifting. Make certain all personnel stand clear of the load as it is lifted.



1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

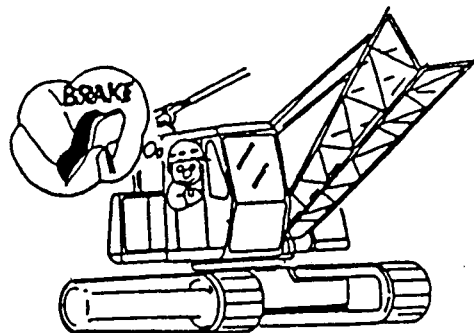
20. Trying to lift a load which is stuck, frozen or attached to something else may result in tipping, boom collapse or other damage.
Be sure that loads are free before lifting.



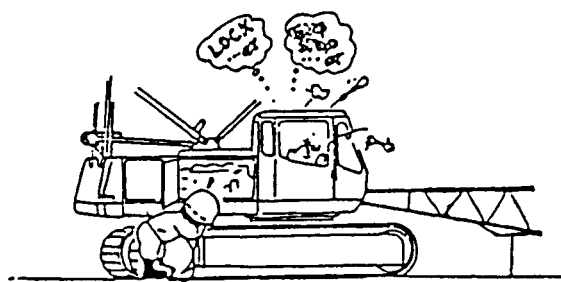
21. If there is not enough wire rope on the drum the rope can snap loose.

Keep at least two full wraps of wire rope on drums when operating.

22. If foot brake pedals and locks are equipped on the crane, always keep your feet on the pedals while foot pedal brake locks are in use.

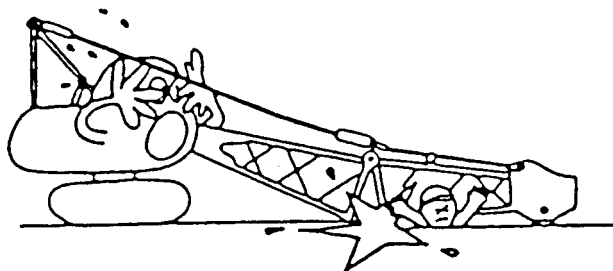


23. Trying to repair or adjust equipment with a suspended hook or load or with the boom raised could release machinery and let it move unexpectedly.
Always lower the load to the ground and the boom onto proper cribbing before doing maintenance or repair work.



24. Pressure in hydraulic systems can be retained for long periods of time. If not properly released before maintenance people attempt to work on the hydraulic systems, this pressure can let machinery move or cause hot oil and hose ends to shoot out at high speed.

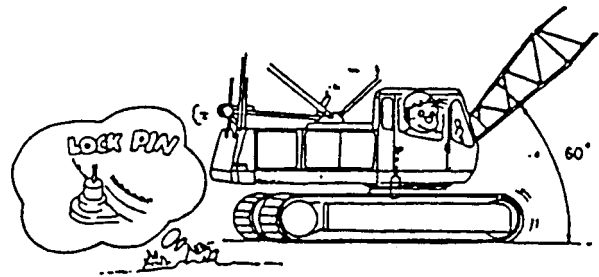
Release system pressure before attempting to make adjustment or repairs.



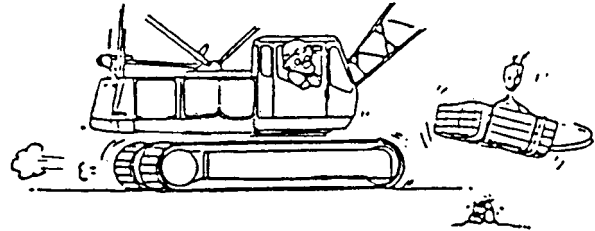
25. Pin-connected booms and jibs may fall if not properly supported when removing pins.
Make sure both ends of each boom and jib section are supported and the boom suspension lines completely slacked off before removing pins.
Never stand on, inside, or under booms or jibs during assembly or disassembly.

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26. As with all heavy equipment, care must be taken when cranes are driven (traveled), whether on or off the jobsite. Watch for people, electrical power lines, low or narrow clearances, bridge or road load limits, and steep hills or uneven terrain. Use a signalman in close quarters. Know the height, width and weight of your machine. Set swing brake or lock before traveling.



27. Load ratings for cranes are based on the machine being level and operated properly so that dynamic effects of operation do not increase the loadings on the crane. Traveling a crane with a long boom or with a load suspended involves special hazards including the increased possibility of side loading or tipping.



Because of the many variables involved in pick and carry operations, the user must evaluate conditions and take appropriate precautions such as these:

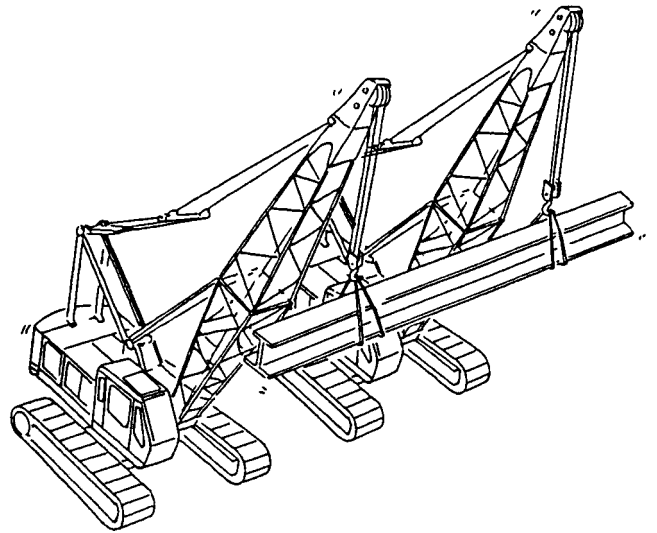
- Follow the travel precautions listed in rule 26.
- Check the rating plate for limitations.
- Position the boom in line with the direction of travel.
- Reduce the maximum load while traveling to reflect operating conditions. The safe load will vary depending on speed, crane, and other conditions.
- Travel slowly and avoid sudden stops and starts.
- Avoid backing away from the load. This could increase the radius and cause the machine to tip over.
- Use tag lines to keep loads under control.
- Keep the load close to the ground.
- Use the shortest boom possible.

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28. Using two or more cranes to lift a load involves many hazards not normally encountered in single crane lifts.

Multi-crane lifts must be carefully engineered, keeping the following points in mind.

- Since the load is not freely suspended, careful engineering studies must be made to ensure that the load carried by each machine is less than its rated capacity.
- Make sure slings are arranged to divide the load as planned.
- Review the lifting plan with operators, signalmen and other crew members before beginning the lift.
- Carefully coordinate crane movements through every stage of the lift.
- Avoid boom side loading (see #16).



29. Leaving a machine unattended can be very dangerous. Before leaving his seat, the operator must take the following steps to prevent his machine from moving:

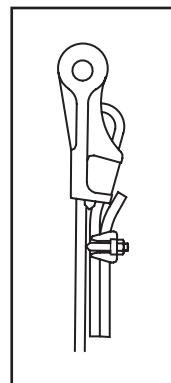
- Lower the load or bucket to the ground. Lower the boom when necessary.
- Set the swing brake or lock.
- Set all drum locks.
- Set parking brakes.
- Set propel brakes or locks on crawler machines.
- Disengage the engine clutch or shut off the engine.
- Place the function lock lever in the shut down position.

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30. All wire rope must be inspected daily to determine whether it should be replaced. Wire rope should be replaced when any of the following conditions exist:
- In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay [for special conditions relating to rotation resistant rope]
 - Wear of one-third the original diameter of outside individual wires;
 - Kinking, crushing, bird caging, or other damage resulting in distortion of the rope structure;
 - Evidence of damage from rust or corrosion.
 - Evidence of any heat damage from any cause;
 - Reductions from nominal diameter of more than;
 - (1) 0.4 mm (1/64 in.) for diameters up to and including 8.0 mm (5/16 in.);
 - (2) 0.8 mm (1/32 in.) for diameters 9.5 mm (3/8 in.), to and including 13.0 mm (1/2 in.);
 - (3) 1.2 mm (3/64 in.) for diameters 14.5 mm (9/16 in.), to and including 19.0 mm (3/4 in.);
 - (4) 1.6 mm (1/16 in.) for diameters 22.0 mm (7/8 in.), to and including 29.0 mm (1-1.8 in.);
 - (5) 2.4 mm (3/32 in.) for diameter 32.0 mm (1-1/4 in.), to and including 38.0 mm (1-1/2 in.)
 - In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

Never handle wire rope with bare hands.

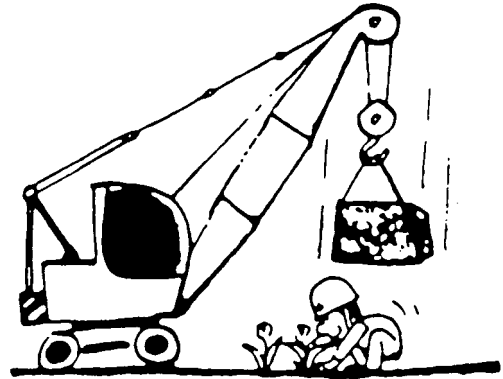
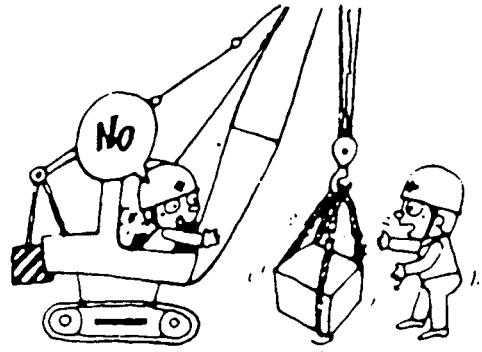
31. Improper wire rope connections may fail under load. Wire rope and connections must be installed properly and inspected daily.
- Wedge sockets should be installed so that the loaded side of the rope is in a straight line with the edge of the socket and not bent by the wedge.
 - U-bolt clamps (clips) must not be installed on the loaded side of the load line.



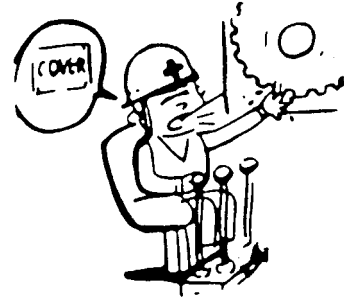
1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

32. The operator or person in charge should see that:

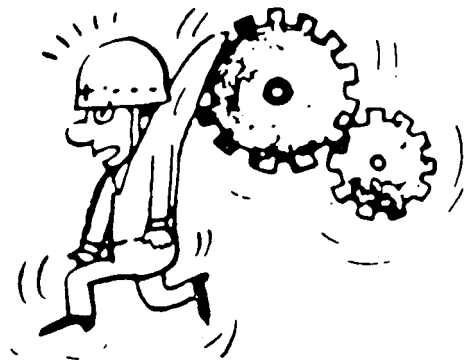
- Loads are well secured before being lifted.
- Slings are not kinked or damaged. The load is well balanced, and the hook block is adequate for the load to be lifted. Slings are properly arranged on the hook.
- Sudden stops and starts are avoided.
- The hoist line is vertical before starting the lift.
- The crane hook is equipped with a properly functioning retainer latch.
- Crane loads, grapples, or buckets do not pass over the heads of workmen nor in any way endanger their safety. All loose objects must be removed from the load. Non-operating personnel should be warned, or told to leave the immediate area, when making crane lifts.



33. Always replace protective guards and panels before operating the machine.



34. Never wear loose clothing rings or other objects which may become entangled in the moving machinery.



35. The operator should test the winch brakes when a load is first lifted, and when the load is only a few inches above its starting position, to assure the ability of the brakes to hold the load while it is aloft.

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36. When refueling, be careful not to smoke. Stop the engine, and keep metal funnels in contact with the fuel tank filler pipe to prevent static electrical sparks from igniting the fuel. Turn off cab heater (if equipped) while refueling, and avoid refueling near an open flame.

WARNING

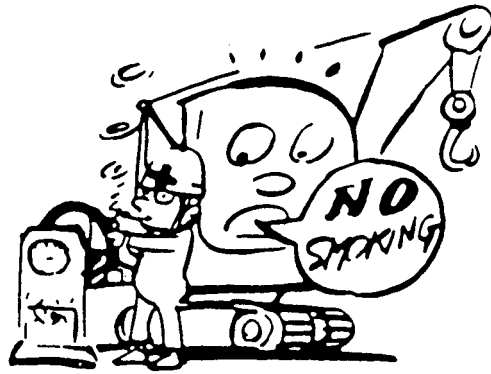
Make sure to use light oil. (However, replenish the fuel which matches the regional conditions in cold climates.)

If the fuel other than the specified type is used or gasoline, kerosene and alcohol group fuels are supplied or used after mixing them, it may cause malfunction due to the sliding defect on the fuel sliding section in the injection pump and/or in the injector, or it may adversely affect the engine and result in damages.

Check that the fuel is the specified product when fueling to your vehicle. If a wrong product was supplied, thoroughly drain it.

If the engine is started with the wrong fuel filled, it is very dangerous because it may cause fire disaster or damage to the engine.

37. If an overheated condition necessitates an engine shutdown, use extreme care when checking the radiator, if possible, wait for radiator to cool. Use a heavy cloth and gloves to protect yourself while slowly loosening the cap. Wait until the sound and fluid flow stops. Then remove the cap.
38. Be careful where you park your machine. Do not leave it where there is a chance of a bank caving in on it, or in a low spot where heavy rains may wash out the footing.
39. When leaving the crane unattended, always remove keys and lock all cab doors to prevent unauthorized person from tampering with the machine and possibly injuring themselves or others.



MEASURES FOR RADIO TRANSMITTERS

When working in the vicinity of a transmitting antenna for a broadcasting station, the boom could act as a large antenna, and could become electrified. High voltage of electricity may be generated at the hook end, and the hook could become heated. If this happens, do not touch the hook. Electrical shock, or burning could result. Ground personnel should be warned to stay away from the machine.

MEASURES FOR LIGHTNING

1. When lightning storms are generated and lightning bolts are anticipated, immediately take the following steps:
 - (1) Stop the work, and lower the load onto the ground. When the boom (or tower) can be lowered, lower it onto the ground.
 - (2) Engage the brakes and locks (winch and swing) and stop the engine. Turn off the power source of the load safety device and main switch.
 - (3) Advise all personnel to stay away from the surrounding area of the machine.
2. If a lightning strike occurs check the machine before operating it.
 - (1) Check for burns and damage.
 - (2) Check the electrical devices and load safety device for performance.
 - (3) Check each function for abnormality.

MEASURES FOR EARTHQUAKE

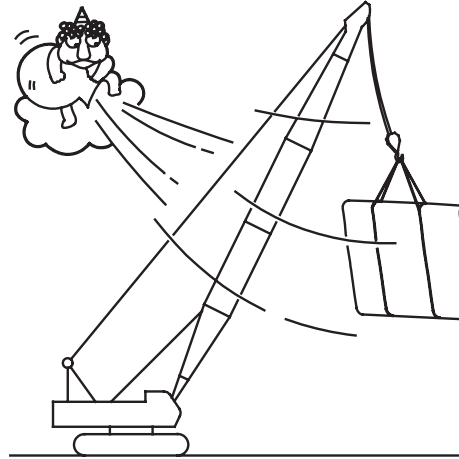
1. When earthquakes occur, immediately take the following step:
 - (1) Stop the work, and lower the load and hook onto the ground. When the boom (or tower) can be lowered, lower it onto the ground.
 - (2) Engage the brakes and locks (winch and swing), stop the engine, and turn off the electrical power of the main switch and load safety device.
 - (3) Advise all personnel to stay away from the surrounding area of the machine.
2. After the earthquake is over, check the machine before operating.
 - (1) Check each function for performance.
 - (2) Check the electrical devices and load safety device for performance.

1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

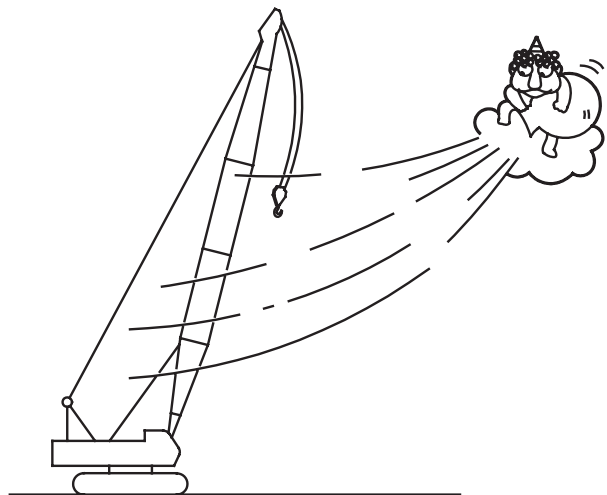
INFLUENCE OF WIND

Influence of the wind on the machine becomes larger in proportion to the size of a lifted load, lifting height, and boom length. The following conditions are very dangerous, so utmost care is necessary for operation.

1. When lifting a load of wide area, against which the wind blows hard, the wind could cause the overturn of the machine and damage to the boom. The wind could also blow the load against the boom, and could cause damage.



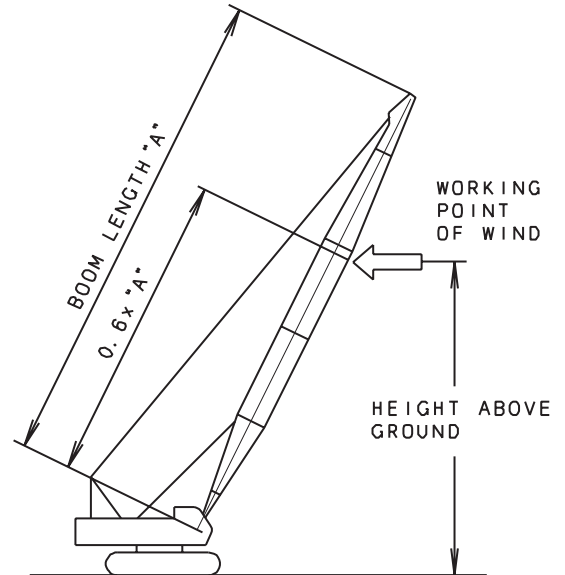
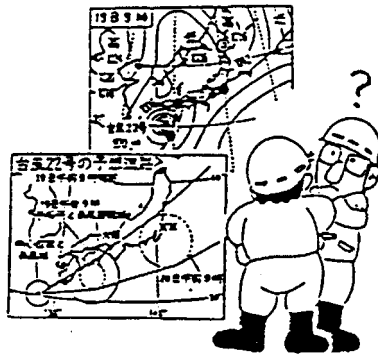
2. When the boom is fully raised without a load, the wind could blow the boom backward resulting in an overturn of the machine.



1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

CAUTIONS FOR WIND

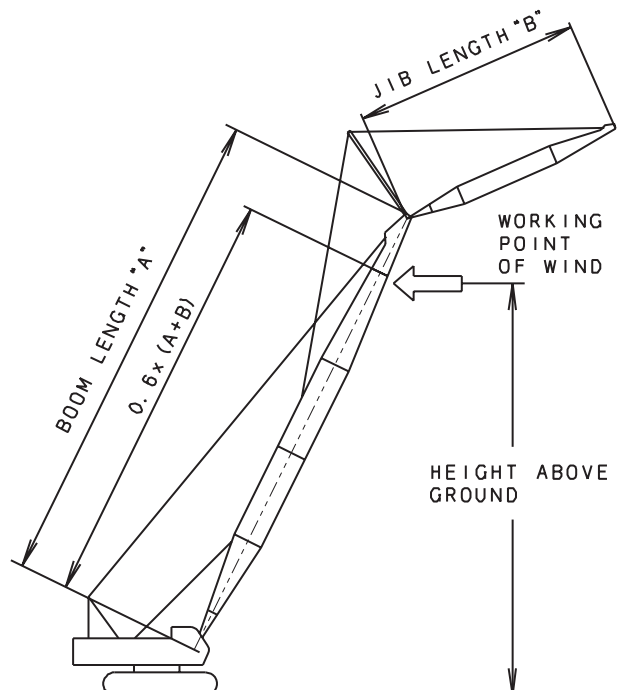
When performing crane or tower operation in strong wind, utmost cautions are required according to the wind velocity, machine condition and working environment. The wind velocity is different on the ground than in the high air. It is also different on flat ground and in city air. Always consider these conditions and take proper measures to meet the situation. The wind velocity mentioned here means the instantaneous wind speed. When the wind velocity exceeds 10 m/sec. (33 ft/sec.) stop the work.



METHOD OF WIND VELOCITY MEASUREMENT

1. If an instantaneous anemometer is provided in the machine, measure the wind velocity with the anemometer provided on the boom tip section or the tower cap.
2. If an instantaneous anemometer is not provided in the machine, the wind velocity given by a weather report can be converted to the instantaneous wind speed.
3. The instantaneous wind speed can be approximated by the Beaufort chart (see next page).

The position where the wind works against the machine is the height above the ground which corresponds to 60% of the boom length at that time.



1. SAFE OPERATING PRACTICES FOR MOBILE CRANES

Beaufort Wind Scale Chart

Approximate wind velocity at 10 m height from the open and flat ground	Details
m/sec.	On land
Less than 0.3	Calm, smoke rises vertically.
0.3 to less than 1.6	Smoke drift indicates wind direction, still wind vanes.
1.6 to less than 3.4	Wind felt on face, leaves rustle, vanes begin to move.
3.4 to less than 5.5	Leaves and small twigs constantly moving, light flags extended.
5.5 to less than 8.0	Dust, leaves, and loose paper lifted, twigs move.
8.0 to less than 10.8	Many whitecaps, leaf in small trees begin to sway.
10.8 to less than 13.9	Larger tree branches moving, whistling in wires, hard to walk under an umbrella.
13.9 to less than 17.2	Whole trees moving, resistance felt walking against wind.
17.2 to less than 20.8	Twigs broken, cannot walk against wind.
20.8 to less than 24.5	Slight structural damage occurs, chimney broken, slate blows off roofs.
24.5 to less than 28.5	Seldom experienced on land, trees broken or uprooted, and considerable structural damage.
28.5 to less than 32.7	Scarcely experienced, damages occur in wide areas.
32.7 or more	

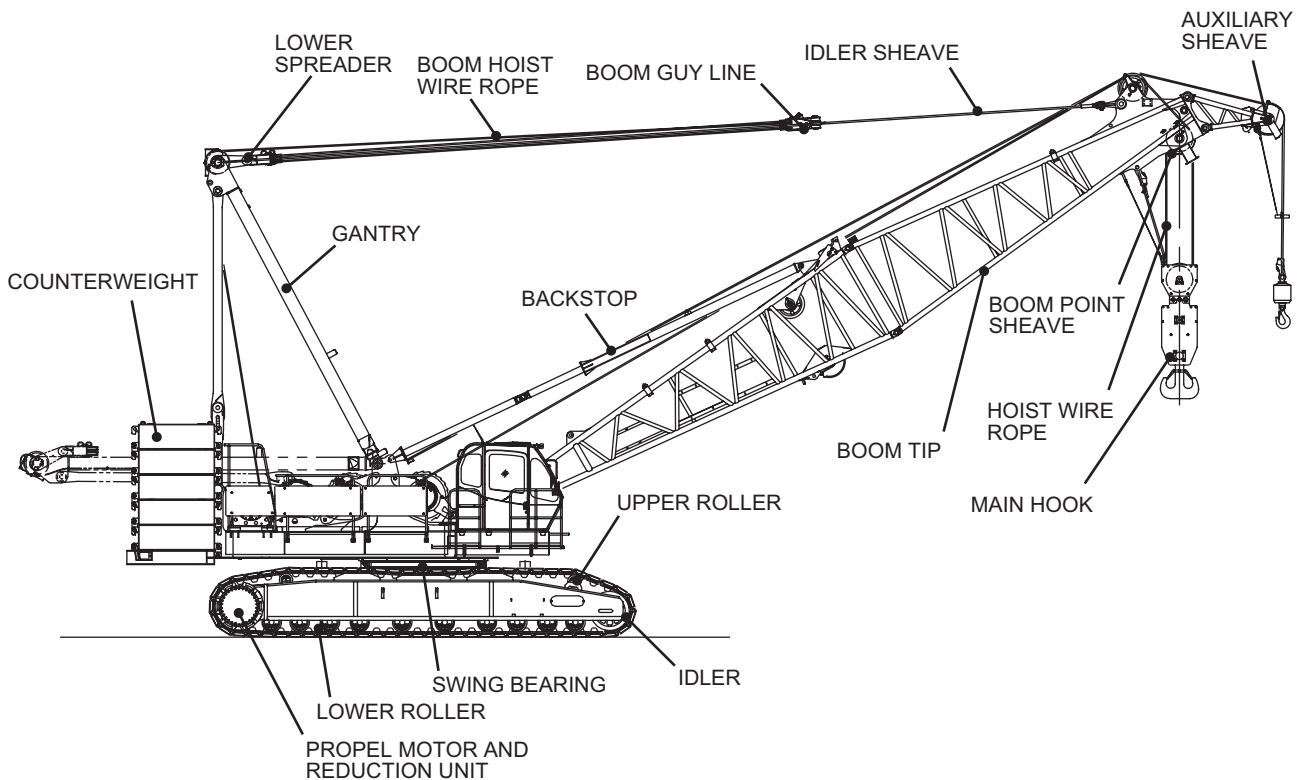
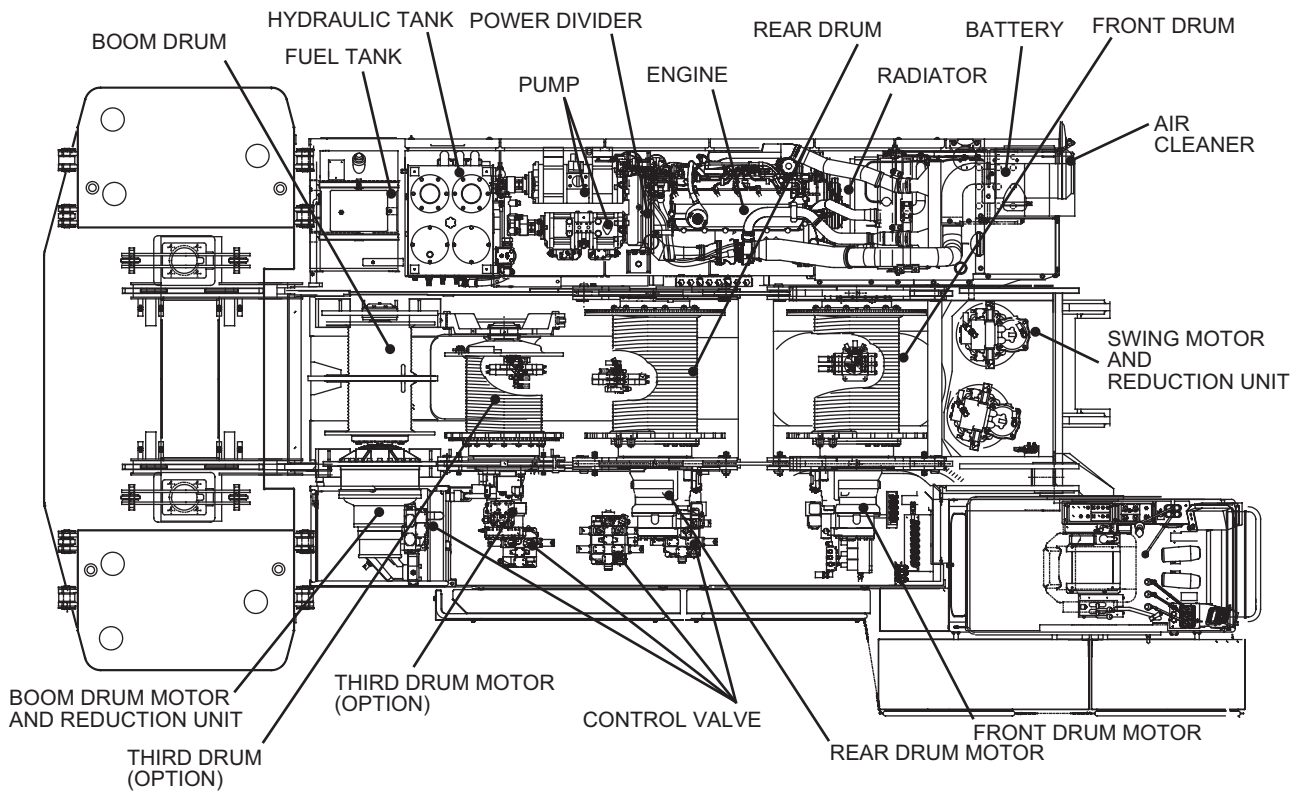
Conversion Table of Wind Velocity [m (ft)]

Wind velocity of weather report Height above ground m (ft)	3				5				8				10			
	Flat area		City area		Flat area		City area		Flat area		City area		Flat area		City area	
	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.	Av.	Inst.
5 (17)	2.7 (8.9)	9.8 (32.2)	2.5 (8.2)	10.0 (32.8)	4.5 (14.8)	11.7 (38.4)	4.2 (13.8)	11.4 (37.4)	7.1 (23.3)	14.5 (47.6)	6.7 (22.0)	14.0 (45.9)	8.9 (29.2)	16.3 (53.5)	8.4 (27.6)	15.8 (51.8)
10 (33)	3.0 (9.8)	10.2 (33.5)	3.0 (9.8)	10.2 (33.5)	5.0 (16.4)	12.3 (40.4)	5.0 (16.4)	12.3 (40.4)	8.0 (26.2)	15.4 (50.5)	8.0 (26.2)	15.4 (50.5)	10.0 (32.8)	17.5 (57.4)	10.0 (32.8)	17.5 (57.4)
15 (50)	3.2 (10.5)	10.4 (34.1)	3.3 (10.8)	10.5 (34.5)	5.4 (17.7)	12.7 (41.7)	5.6 (18.4)	12.9 (42.3)	8.6 (28.2)	16.0 (52.5)	8.9 (29.2)	16.3 (53.5)	10.7 (35.1)	18.2 (59.7)	11.1 (36.4)	18.7 (61.4)
20 (66)	3.4 (11.2)	10.5 (34.5)	3.6 (11.8)	10.8 (35.4)	5.6 (18.4)	12.9 (42.3)	6.0 (19.7)	13.3 (43.6)	9.0 (29.5)	16.5 (54.1)	9.5 (31.2)	17.0 (55.8)	11.2 (36.7)	18.8 (61.7)	11.9 (39.0)	19.5 (64.0)
25 (82)	3.5 (11.5)	10.7 (35.1)	3.8 (12.5)	11.0 (36.1)	5.9 (19.4)	13.2 (43.3)	6.3 (20.7)	13.6 (44.6)	9.4 (30.8)	16.9 (55.4)	10.1 (33.1)	17.6 (57.7)	11.7 (38.4)	19.3 (63.3)	12.6 (41.3)	20.2 (66.3)
30 (99)	3.6 (11.8)	10.8 (35.4)	4.0 (13.1)	11.2 (36.7)	6.0 (19.7)	13.3 (43.6)	6.6 (21.7)	13.9 (45.6)	9.6 (31.5)	17.1 (56.1)	10.6 (34.8)	18.1 (59.4)	12.0 (39.4)	19.6 (64.3)	13.2 (43.3)	20.9 (68.6)
40 (132)	3.8 (12.5)	11.0 (36.1)	4.2 (13.8)	11.5 (37.7)	6.3 (20.7)	13.6 (44.6)	7.1 (23.3)	14.5 (47.6)	10.1 (33.1)	17.6 (57.7)	11.3 (37.1)	18.9 (62.0)	12.6 (41.3)	20.2 (66.3)	14.1 (46.3)	21.8 (71.5)
50 (164)	3.9 (12.8)	11.1 (36.4)	4.5 (14.8)	11.7 (38.4)	6.6 (21.7)	13.9 (45.6)	7.5 (24.6)	14.9 (48.9)	10.5 (34.5)	18.0 (59.1)	12.0 (39.4)	19.6 (64.3)	13.1 (43.0)	20.8 (68.2)	15.0 (49.2)	22.8 (74.8)
75 (260)	4.2 (13.8)	11.4 (37.4)	5.0 (16.4)	12.2 (40.0)	7.0 (23.0)	14.4 (47.2)	8.3 (27.2)	15.7 (51.5)	11.2 (36.7)	18.8 (61.7)	13.2 (43.3)	20.9 (68.6)	14.0 (45.9)	21.7 (71.2)	16.5 (54.1)	24.8 (81.4)
100 (328)	4.4 (14.4)	11.6 (38.1)	5.3 (17.4)	12.6 (41.3)	7.4 (24.3)	14.8 (48.6)	8.9 (29.2)	16.3 (53.5)	11.8 (38.7)	19.4 (63.7)	14.2 (46.6)	21.9 (71.9)	14.7 (48.2)	22.4 (73.5)	17.8 (58.4)	26.7 (87.6)

2. OPERATION

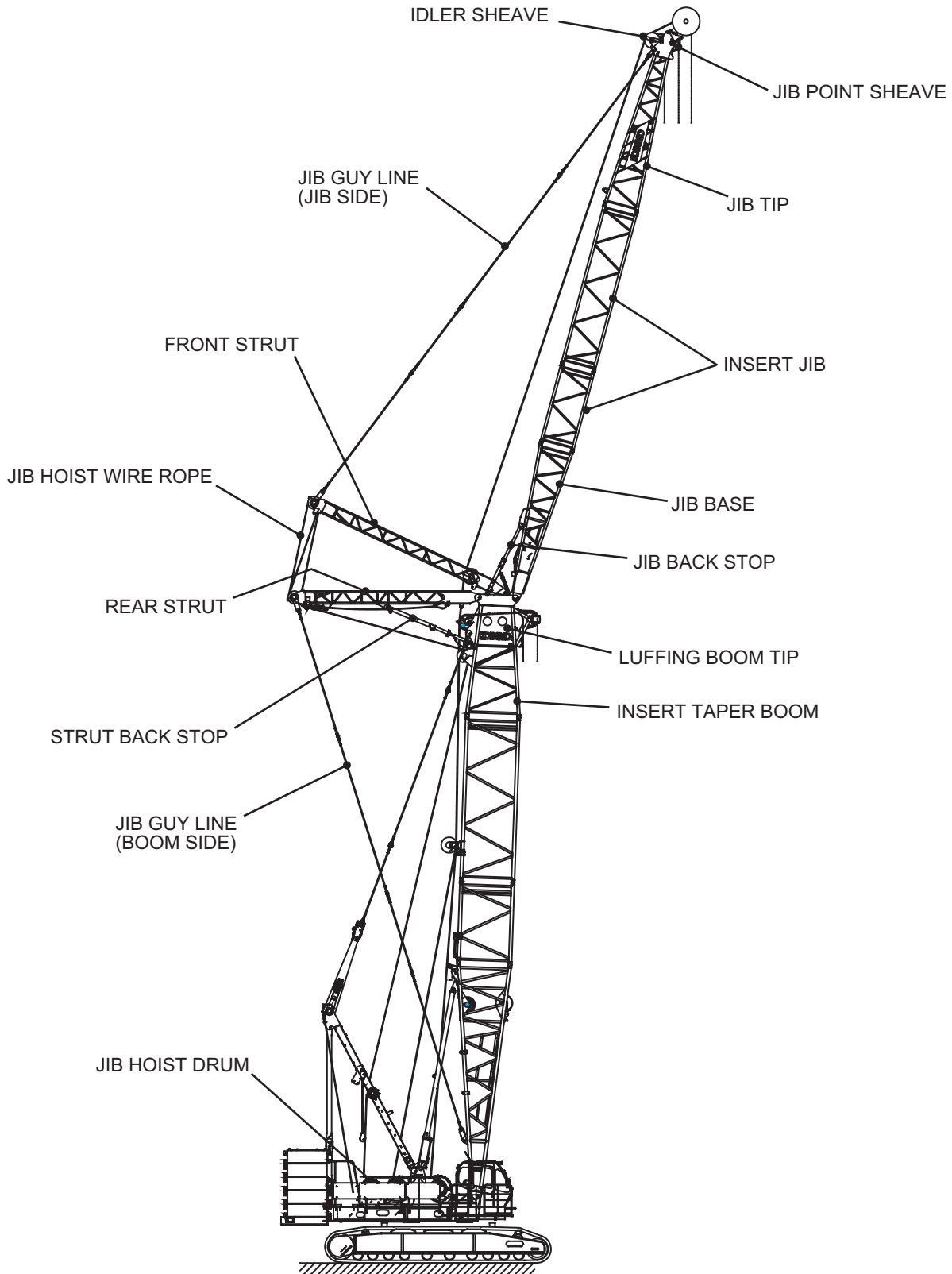
2.1 TERMINOLOGY OF MACHINE EACH PART

2.1.1 CRANE ATTACHMENT



2. OPERATION

2.1.2 LUFFING JIB ATTACHMENT



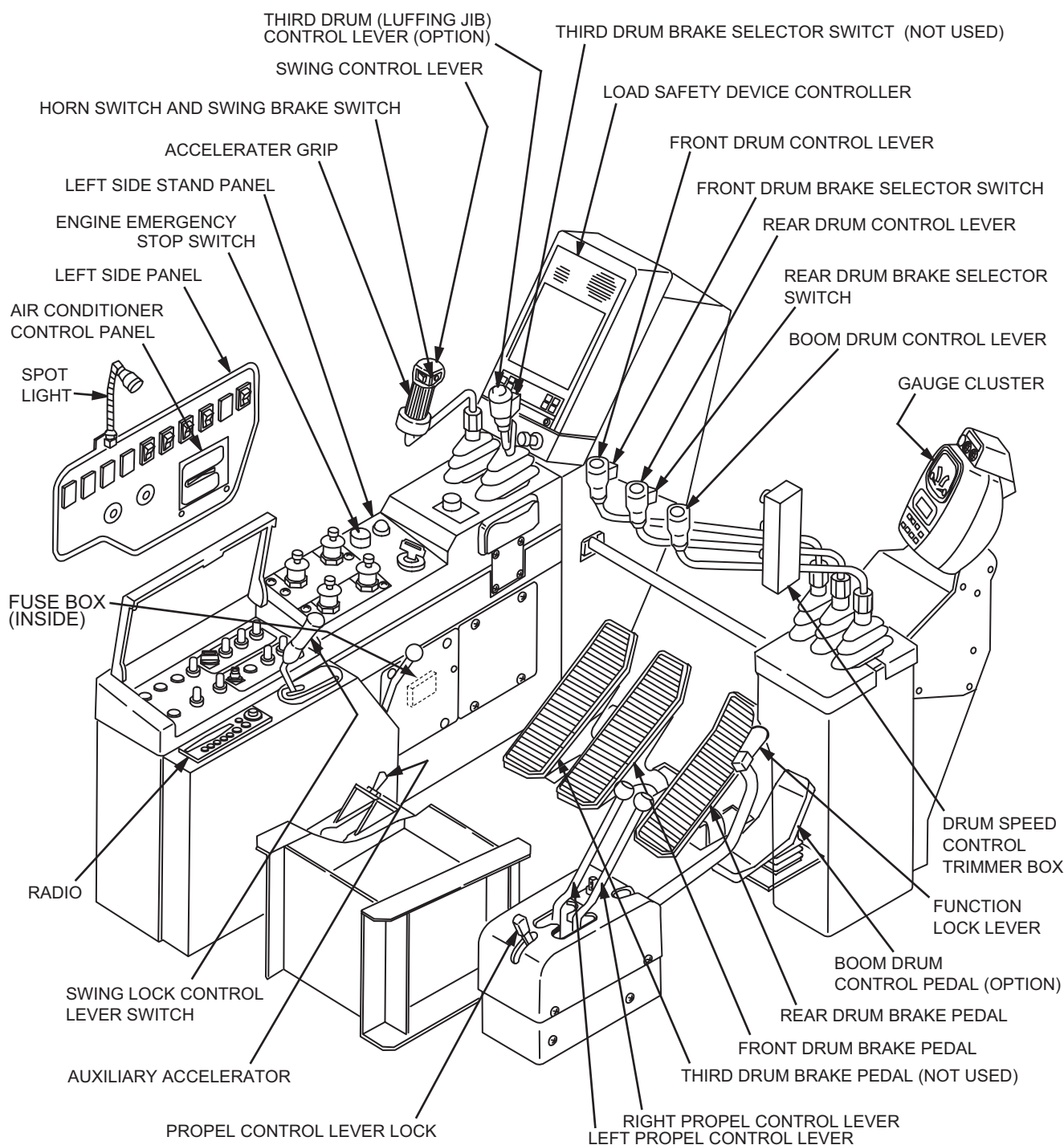
2.2 LOCATIONS AND TERMS OF OPERATING CONTROLS



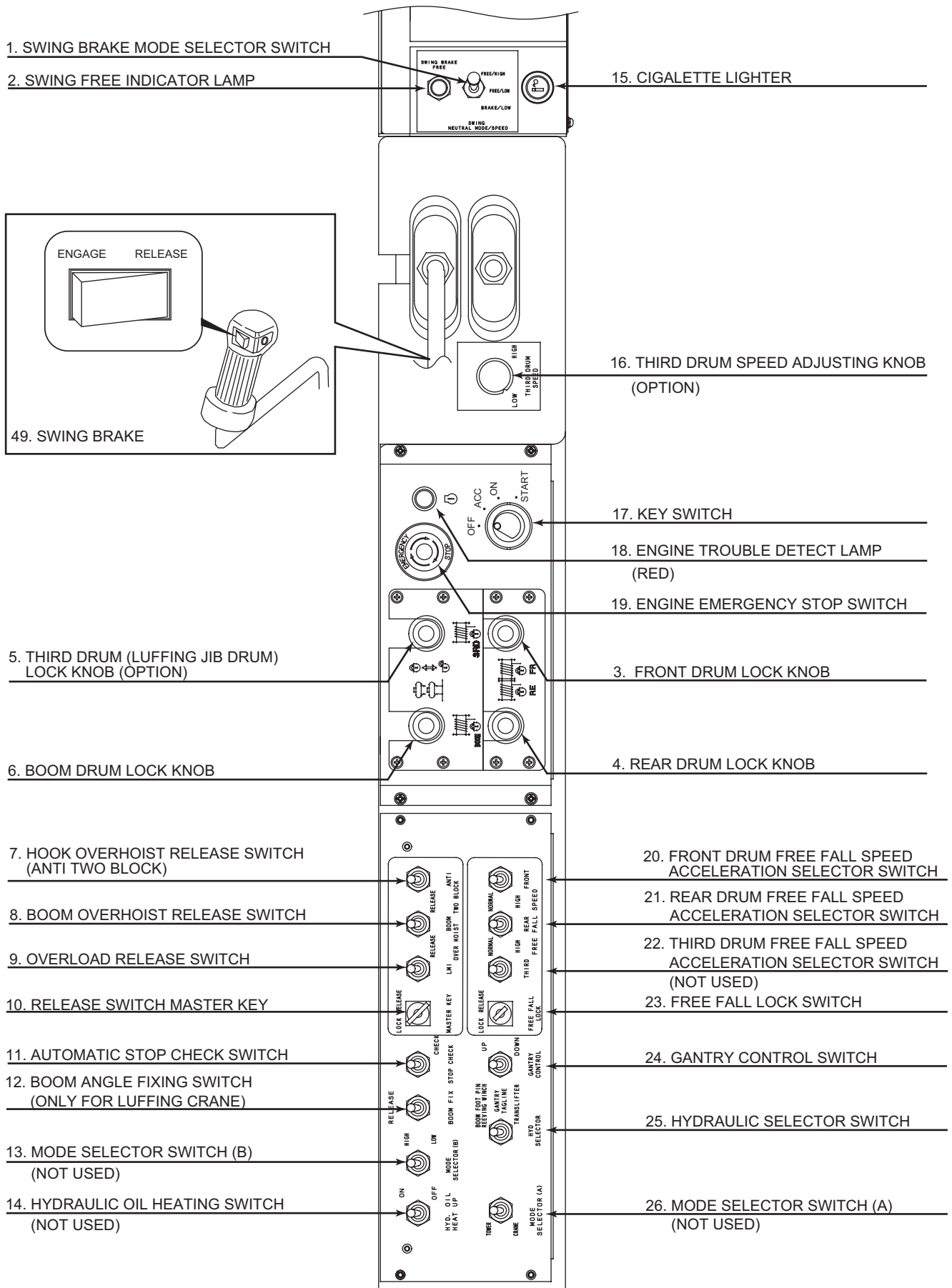
Do not use the devices and equipment provided in this machine for any purpose other than the purposes specified in this manual.
Failure to observe this precaution may result in serious injury or death.

Note

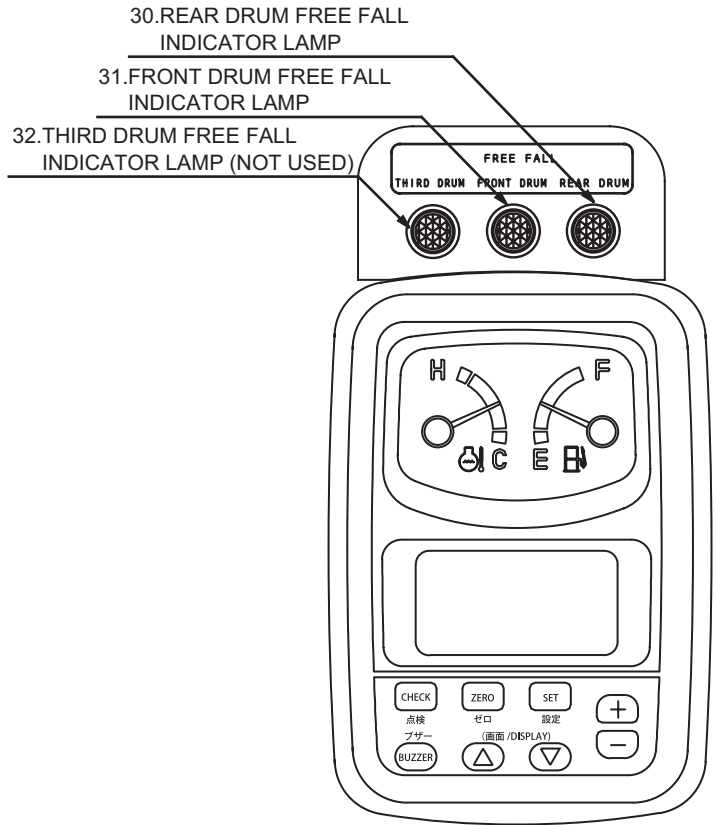
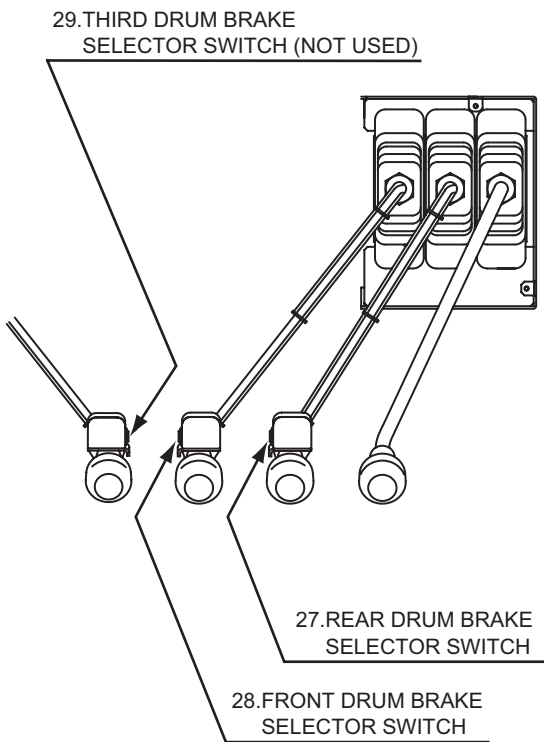
Optional items are also included in this figure.



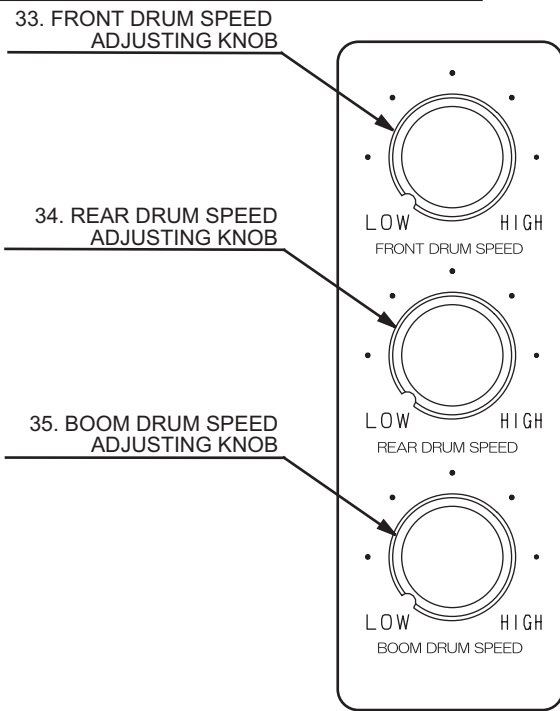
2. OPERATION



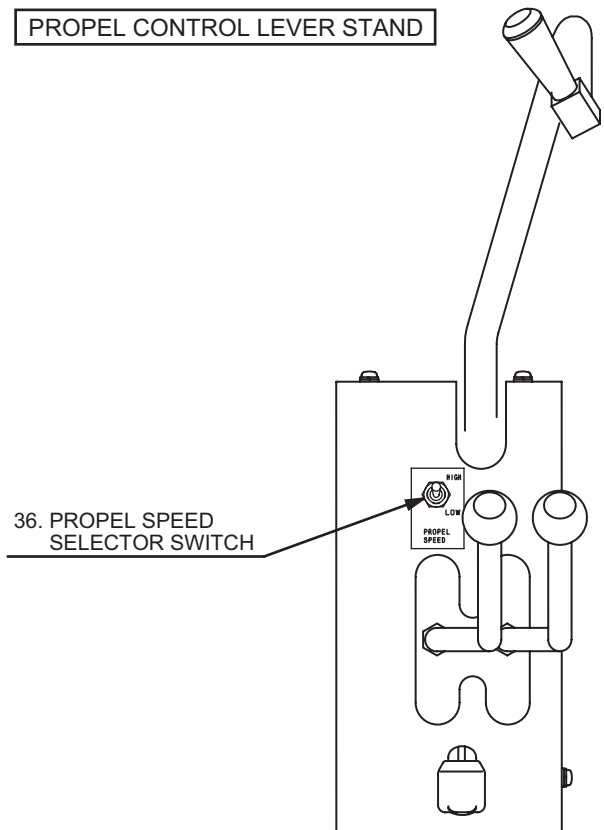
RIGHT SIDE STAND



DRUM SPEED ADJUSTING TRIMMER BOX

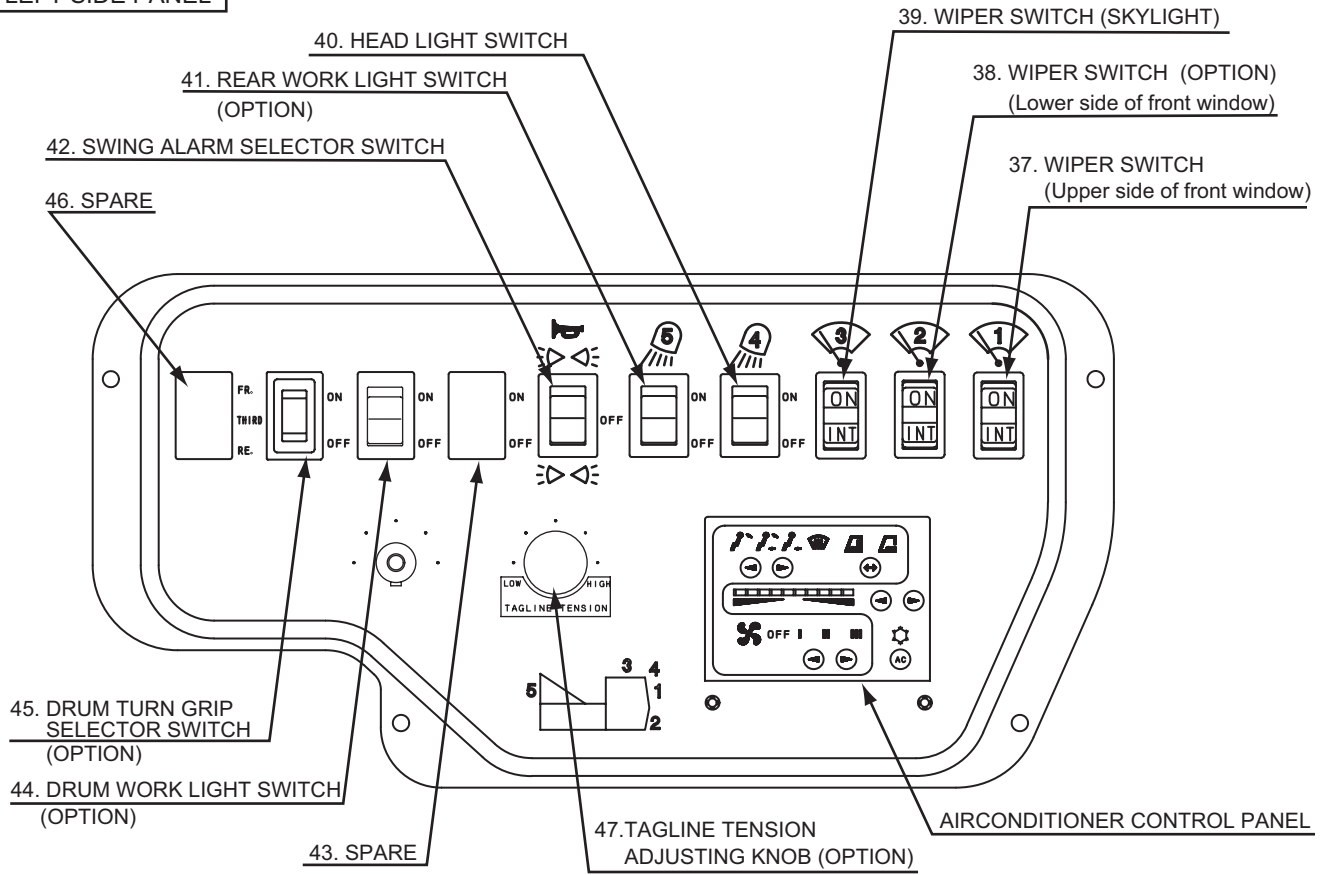


PROPEL CONTROL LEVER STAND

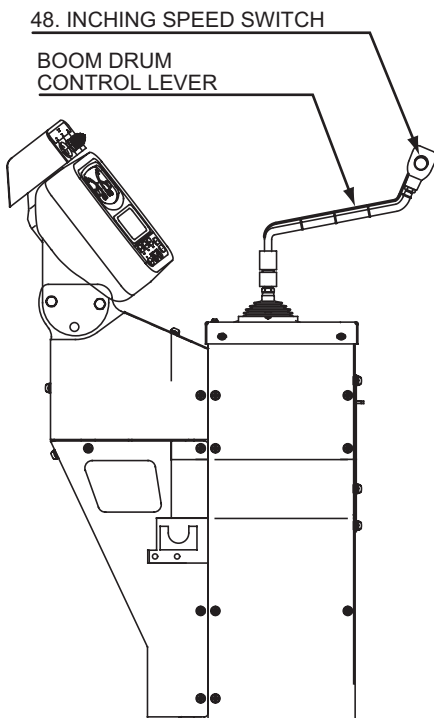


2. OPERATION

LEFT SIDE PANEL



BOOM CONTROL LEVER



2.2.1 OPERATING SWITCHES

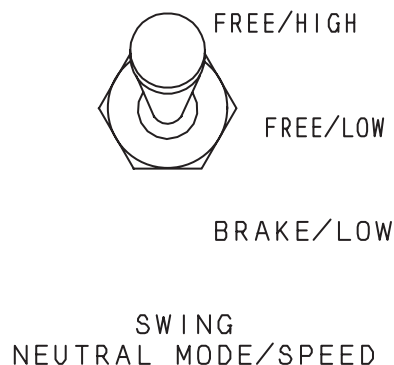
Note

Standard and optional controls for this machine are identified and described in the following list. Therefore the following list contains controls which are not furnished on every machine.

The functions of each switch are explained on the following pages. For operating instructions for each lever, see 2.3 CRANE OPERATION .

1. SWING BRAKE MODE SELECTOR SWITCH

FREE HIGH	High swing speed is selected, but the swing brake will not function automatically when the swing control lever is returned to the neutral position.
FREE LOW	Low swing speed is selected, but the swing brake will not function automatically when the swing control lever is returned to the neutral position.
BRAKE	Swing brake functions automatically when the swing control lever is returned to the neutral position and low swing speed is selected.



Note

Swing speed should be selected according to the job application.



2. SWING FREE INDICATOR LAMP

This lamp lights up when the swing brake mode selector switch (item 1) is set to the FREE position.

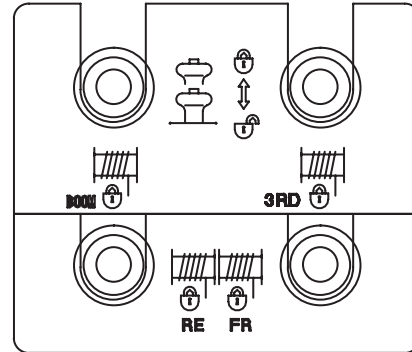
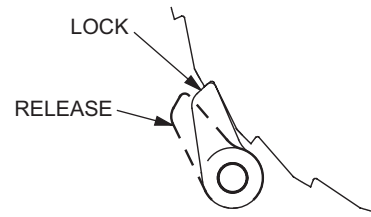


2. OPERATION

3. FRONT DRUM LOCK KNOB
4. REAR DRUM LOCK KNOB
5. THIRD DRUM LOCK KNOB (OPTION)
6. BOOM DRUM LOCK KNOB

 (LOCK)	The drum lock is engaged.
 (RELEASE)	The drum lock is released.

When the engine is stopped while the boom drum lock is released, the warning buzzer will sound for approximately four seconds.

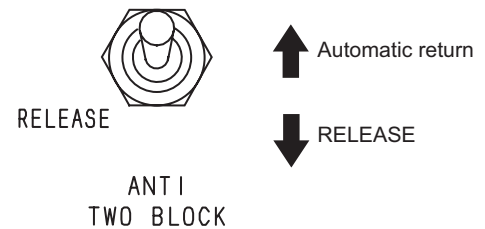


7. HOOK OVERHOIST RELEASE SWITCH (ANTI TWO BLOCK)

RELEASE	An automatic stop due to hook overhoist can only be released when this switch is controlled to the RELEASE position.
---------	--

The switch is automatically returned when released.

This switch is effective only when the "10. RELEASE SWITCH MASTER KEY" is set to the RELEASE position.

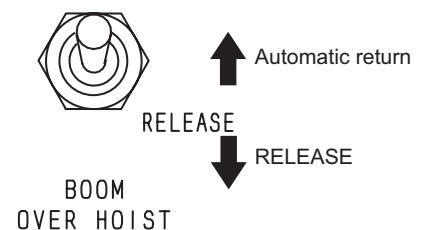


8. BOOM OVERHOIST RELEASE SWITCH

RELEASE	An automatic stop due to boom overhoist can only be released when this switch is controlled to the RELEASE position.
---------	--

The switch is automatically returned when released.

This switch is effective only when the "10. RELEASE SWITCH MASTER KEY" is set to the RELEASE position.

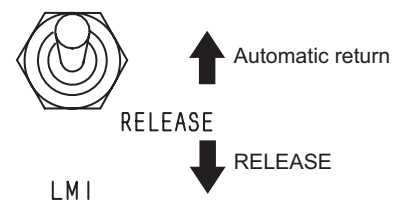


9. OVERLOAD RELEASE SWITCH

RELEASE	An automatic stop due to overload can only be released when this switch is controlled to the RELEASE position.
---------	--

The switch is automatically returned when released.

This switch is effective only when the "10. RELEASE SWITCH MASTER KEY" is set to the RELEASE position.



10. RELEASE SWITCH MASTER KEY

LOCK	Functions of the overload release, boom overhoist release, and the anti-two block release switches are disabled.
RELEASE	Functions of the overload release, boom overhoist release, and the anti-two block release switches can be actuated and released.

The key can be taken off in the LOCK position.

LOCK RELEASE



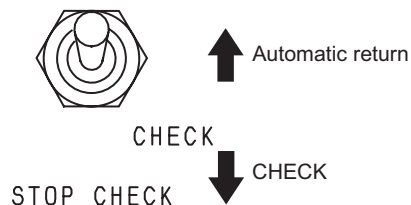
MASTER KEY

11. AUTOMATIC STOP CHECK SWITCH

Automatic stop function can be checked by this switch.

CHECK	Automatic stop function is actuated, and boom raising and lowering and hook raising become unavailable.
-------	---

The switch automatically returns when released.



12. BOOM ANGLE FIXING SWITCH (LUFFING CRANE)

FIX	Boom angle is fixed.
RELEASE	Boom raising and lowering is possible.

Note

Use for luffing operation only.

RELEASE



BOOM FIX

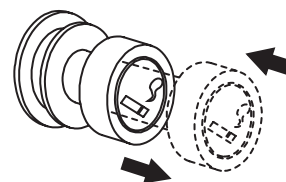
15. CIGARETTE LIGHTER

To operate lighter, push in. The lighter will pop out when ready to use.

CAUTION

If the lighter knob does not pop up within 30 seconds after it is depressed, the lighter is not operating properly.

Pull out the cigarette lighter and take it to the service shop. Do not install 12 V accessory into the lighter receptacle.

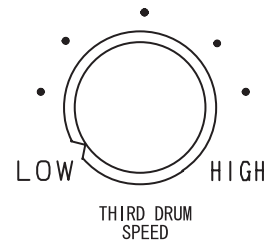


2. OPERATION

16. THIRD DRUM SPEED ADJUSTING KNOB

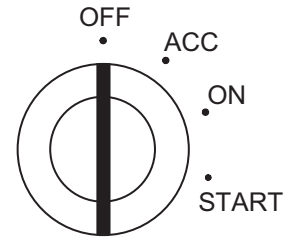
(OPTION)

RIGHT TURN	The rotating speeds of the third drum are accelerated.
LEFT TURN	The rotating speeds of the third drum are decelerated.



17. KEY SWITCH

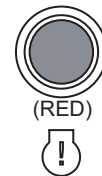
OFF	Position to stop the engine. (Position to insert the key and to take it out.)
ACC	Position to connect the accessory electrical circuit.
ON	Position to connect the electrical circuit for the engine.
START	Position to start the engine.



18. ENGINE TROUBLE DETECT LAMP

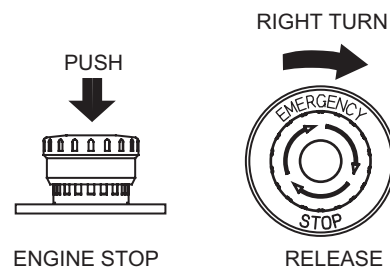
The lamp lights up when the engine control unit (ECU) detects any fault related to the engine. Details of the fault can be checked by turning on the diagnosis switch. (It changes to blinking.)

At normal condition (without any error), the lamp lights up when key switch is on position and lights off when the engine started.



19. ENGINE EMERGENCY STOP SWITCH

Press the switch to stop the engine emergency. When the switch is pressed once, it will be held being pushed in. To reset the switch, turn it to the right.



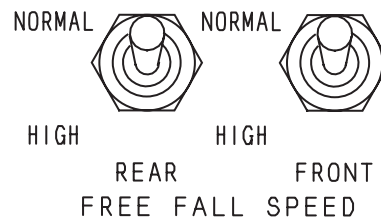
- 20. FRONT DRUM FREE FALL SPEED ACCELERATION SELECTOR SWITCH
- 21. REAR DRUM FREE FALL SPEED ACCELERATION SELECTOR SWITCH

HIGH	Free fall speed is increased. When the brake is released with this switch set to the "HIGH" side, the drum is automatically rotated without load. This side is for crane operation, and for acceleration of the free fall of light-weight loads such as a ball hook block without a load.
NORMAL	Free fall speed is adjusted to normal. This side is for bucket operation.

These switches are effective only in the free fall mode condition.

CAUTION

DO NOT set this switch to the "HIGH" side for the free fall of heavy loads, or works other than crane operation, such as wire reeving.

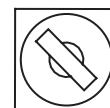


- 23. FREE FALL LOCK SWITCH (OPTION)

LOCK	Free falling of the front drum and rear drum become impossible.
RELEASE	Only while this switch is turned to the right, free falling of the front drum and rear drum can be operated.

When this switch is set in the LOCK side, even if the brake selector switches are set in the FREE FALL side, free falling cannot be operated. The key can be taken off in the LOCK side.

LOCK RELEASE



FREE FALL LOCK

- 24. GANTRY CONTROL SWITCH

UP	The gantry is raised up.
DOWN	The gantry is lowered down.
NEUTRAL	The gantry is held.



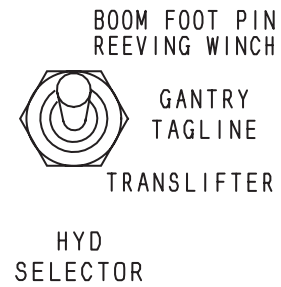
2. OPERATION

25. HYDRAULIC SELECTOR SWITCH

Set to neutral position.

The gantry, counterweight lifting cylinders and the tagline can be operated when this switch is set to the neutral position.

BOOM FOOT PIN REEVING WINCH	For boom foot pin or reeving winch operation.
GANTRY / TAGLINE	For gantry and tagline or counterweight lifting cylinders operation.
TRANSLIFITER	For translifter operation.



27. REAR DRUM BRAKE SELECTOR SWITCH

28. FRONT DRUM BRAKE SELECTOR SWITCH

For details of free fall operation, refer to the "2.4 FREE FALL OPERATION".

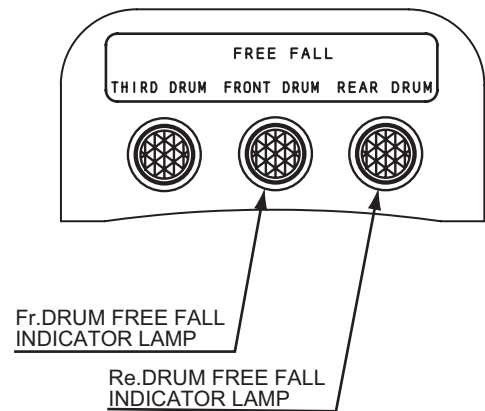
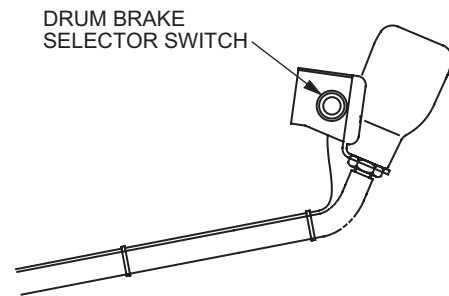
(1) FREE FALL MODE

To select the free fall mode, set the free fall lock switch to the "RELEASE" position, fully depress the drum brake pedal, and push the switch. Then, the free fall indicator lamp lights up to show that the free fall mode is selected (braking can be actuated with the brake pedal).

(2) NEUTRAL BRAKE MODE

To select the neutral brake mode, fully depress the drum brake pedal, and push the switch again.

Then, the free fall indicator lamp goes out (braking is automatically actuated).

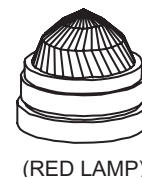


30. REAR DRUM FREE FALL INDICATOR LAMP

This lamp lights up when the rear drum is in free fall mode.

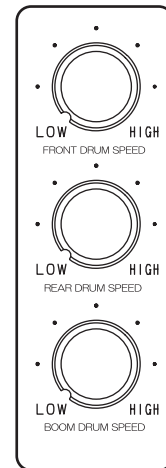
31. FRONT DRUM FREE FALL INDICATOR LAMP

This lamp lights up when the front drum is in free fall mode.



- 33. FRONT DRUM SPEED ADJUSTING KNOB
- 34. REAR DRUM SPEED ADJUSTING KNOB
- 35. BOOM DRUM SPEED ADJUSTING KNOB

RIGHT TURN	The rotating speeds of the front drum, rear drum and boom hoist drum are accelerated.
LEFT TURN	The rotating speeds of the front drum, rear drum and boom hoist drum are decelerated.



- 36. PROPEL SPEED SELECTOR SWITCH

HIGH SPEED	High speed is selected
LOW SPEED	Low speed is selected



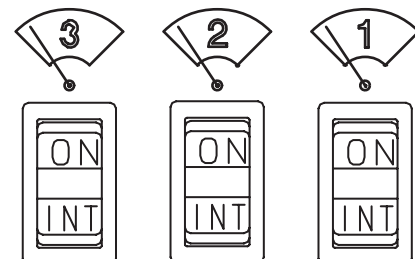
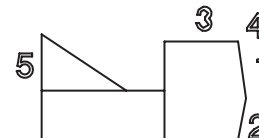
PROPEL SPEED

- 37. WIPER SWITCH (UPPER SIDE OF FRONT WINDOW) 1
- 38. WIPER SWITCH 2 (LOWER SIDE OF FRONT WINDOW) (OPTION)
- 39. WIPER SWITCH (SKYLIGHT) 3

ON	The wiper operates continuously.
INT	The wiper operates intermittently.

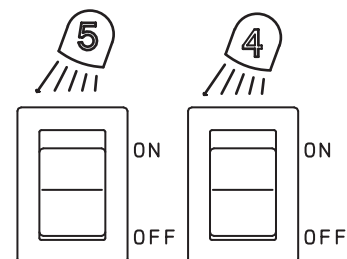
By pushing this switch while in the ON or INT position, washer liquid is squirted out.

Press the center of the switch in to operate the washer system.



- 40. HEADLIGHT SWITCH 4
- 41. REAR WORKLIGHT SWITCH (OPTION) 5



ON	The lights are illuminated.
OFF	The lights are turned off.

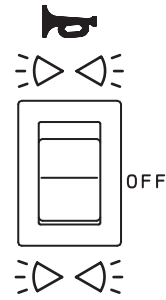


2. OPERATION

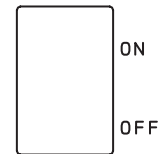
42. SWING ALARM SELECTOR SWITCH

This is used to select the alarm when swinging.

 (WARNING LAMP BUZZER)	The buzzer sounds and the swing flasher goes on and off.
 (WARNING LAMP)	The swing flasher goes on and off.
OFF	Nothing operates.

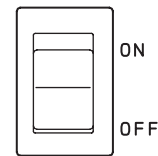


43. SPARE



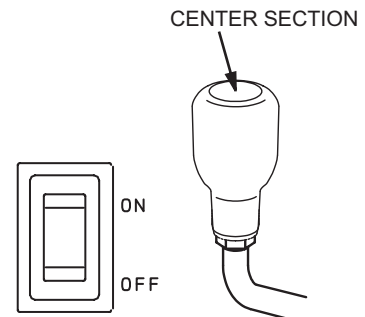
44. DRUM WORK LIGHT SWITCH (OPTION)

ON	The light is illuminated.
OFF	The light is turned off.

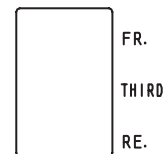


45. DRUM TURN GRIP SELECTOR SWITCH (OPTION)

ON	The center section of the grip moves according to the drum rotation speed.
OFF	Nothing operates.



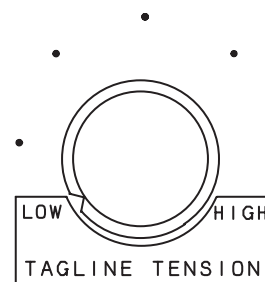
46. SPARE



47. TAGLINE TENSION ADJUSTING KNOB (OPTION)

RIGHT TURN	Tension of the tag line rope becomes stronger.
LEFT TURN	Tension of the tag line rope becomes weaker.

Turn left fully when not in use.

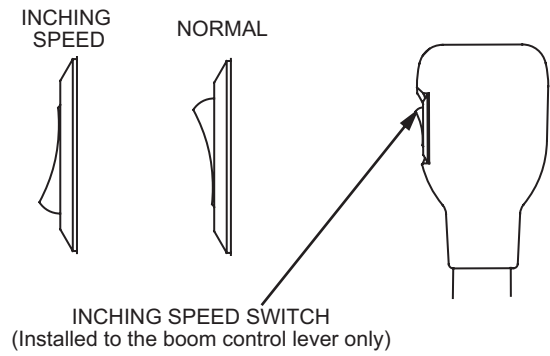


48. INCHING SPEED SWITCH

INCHING SPEED	The front drum, rear drum, propel speeds are reduced to about 1/4 of the normal speeds. The boom drum speed is reduced to about 1/4 of the normal speed.
NORMAL	Normal speed.

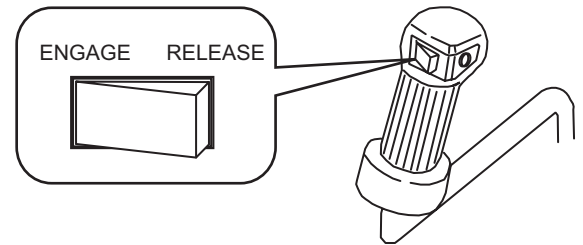
The front drum, rear drum, propel speeds are not reduced when in the free fall mode condition (the front drum or rear drum).

The boom drum, third drum speeds are not reduced when in the free fall mode condition (the third drum).



49. SWING BRAKE SWITCH

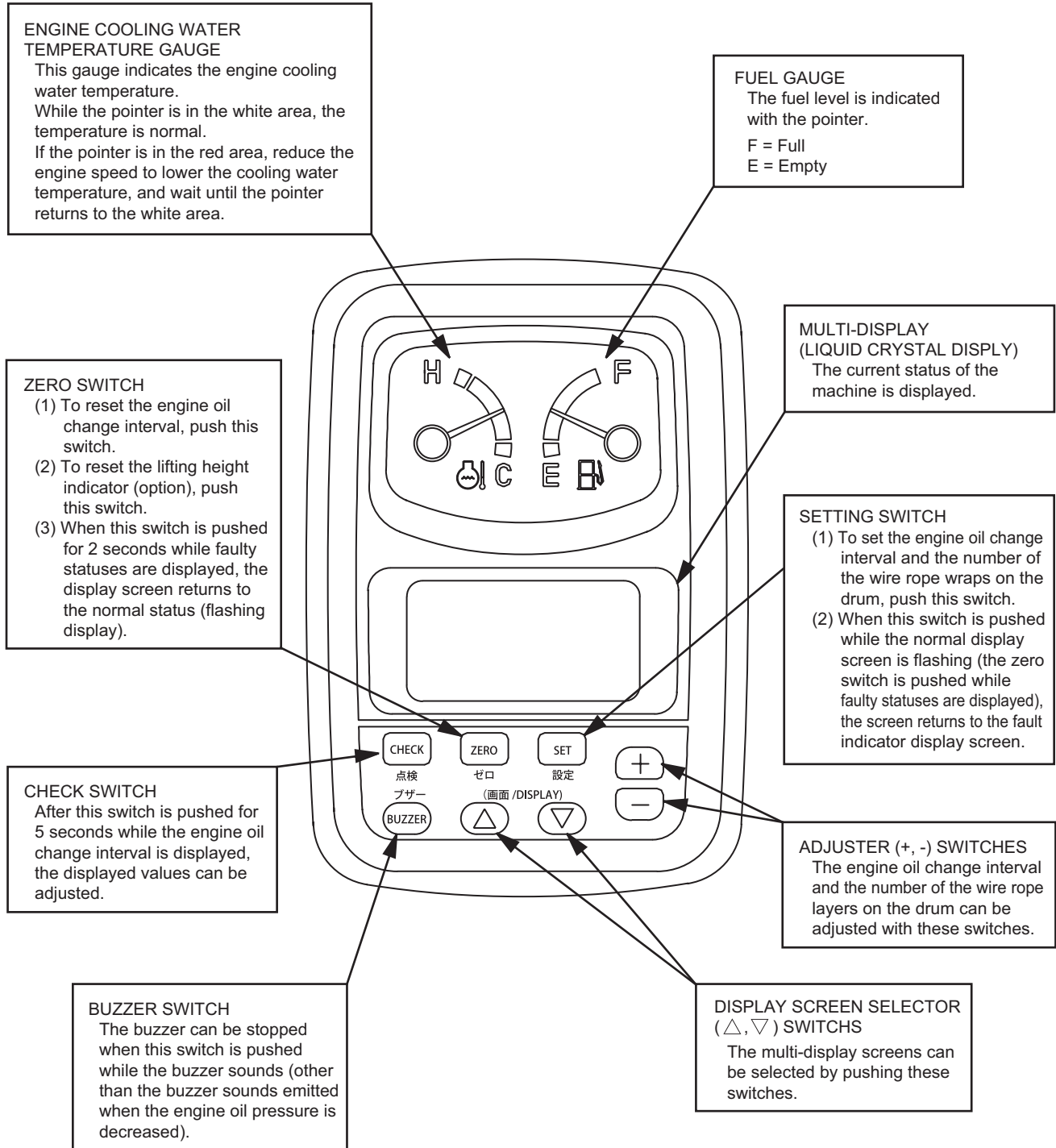
ENGAGE	Swing brake is engaged.
RELEASE	Swing brake is released.



2. OPERATION

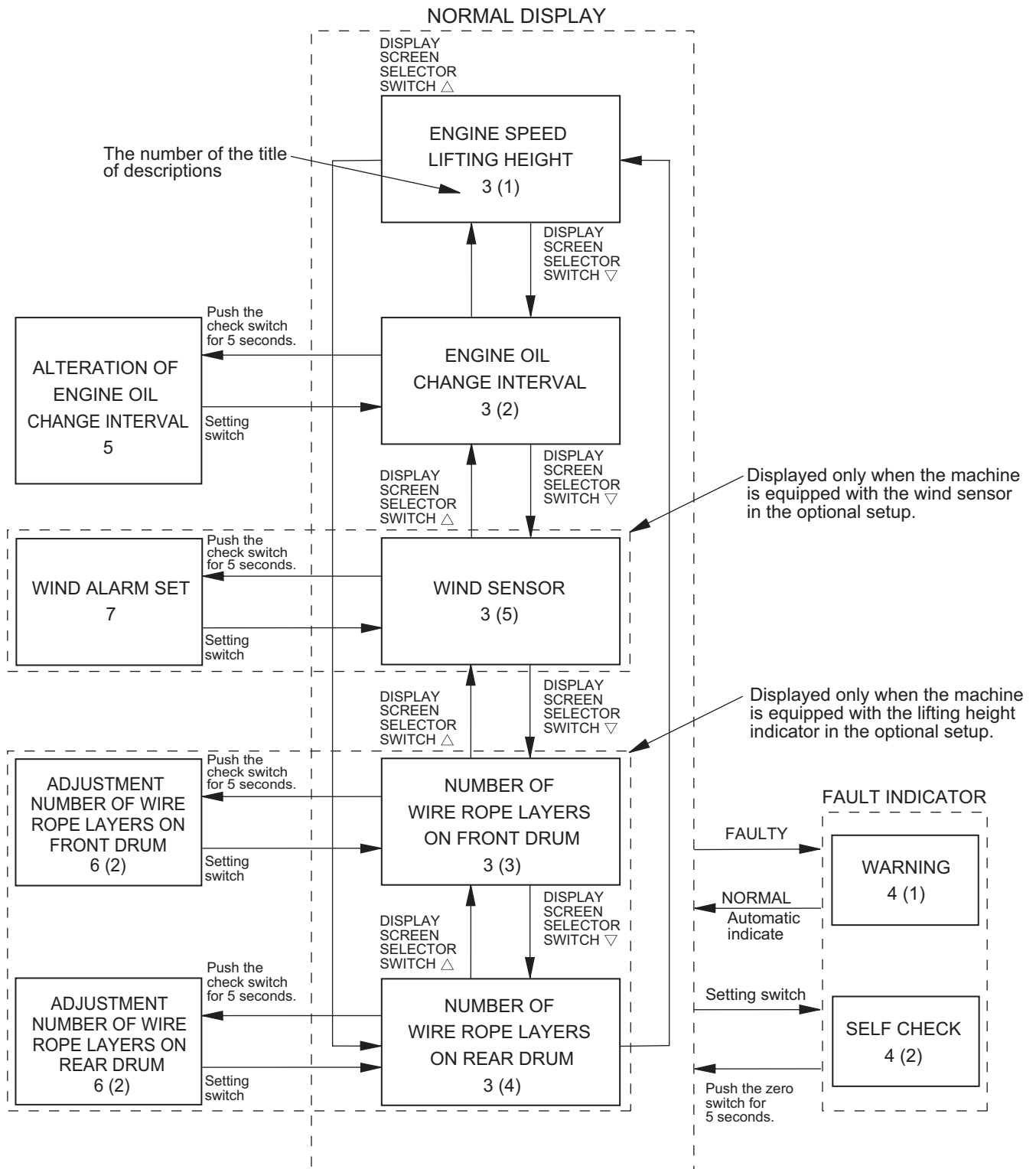
2.2.2 GAUGE CLUSTER CONFIGURATION

1. TERMINOLOGIES AND FUNCTIONS



2. CONFIGURATION OF MULTI-DISPLAY (LIQUID CRYSTAL DISPLAY)

The display screen can be switched by pushing the display screen selector switches, check switch, setting switch, and the zero switch.

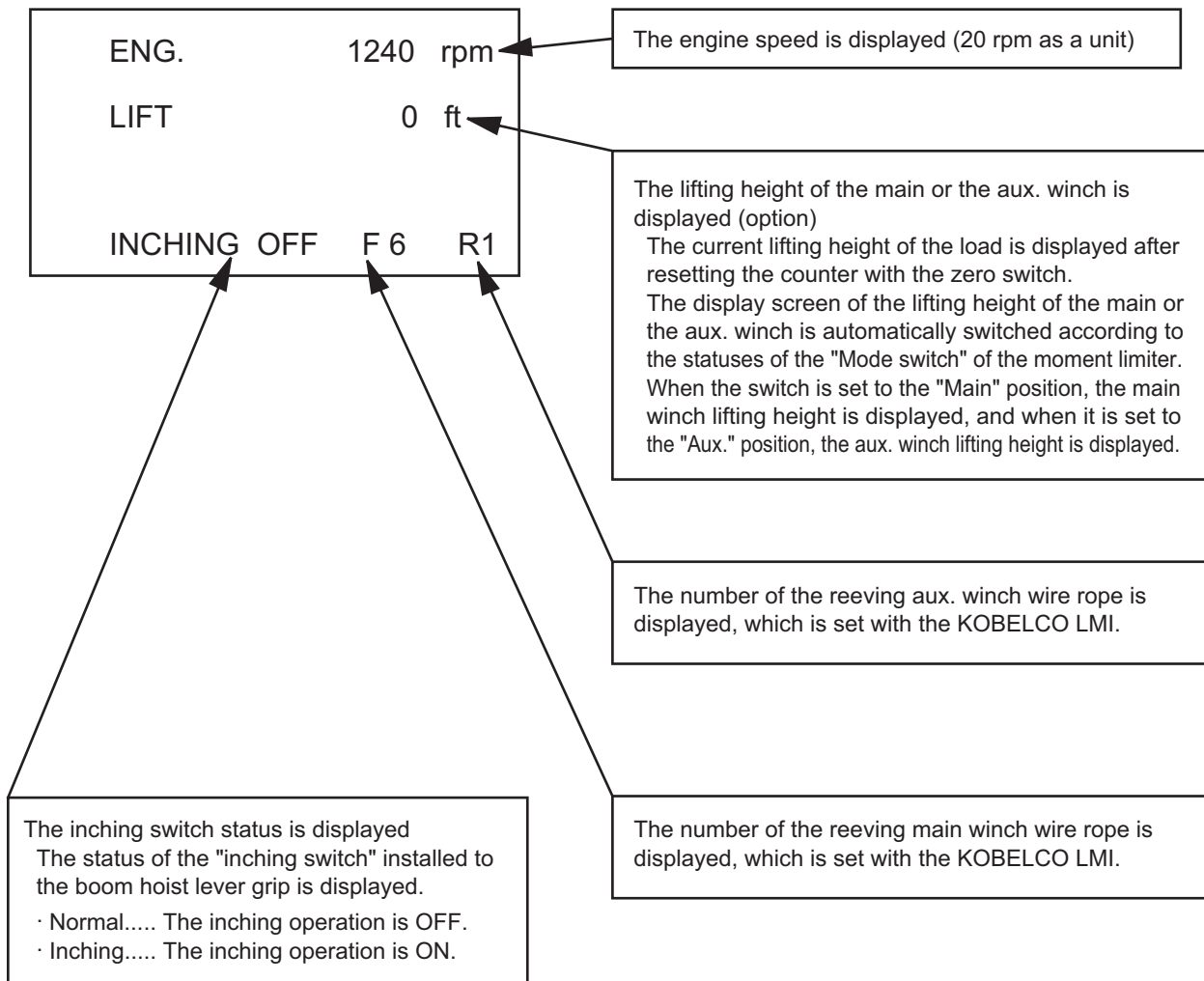


2. OPERATION

3. NORMAL DISPLAY

(1) ENGINE SPEED AND LIFTING HEIGHT DISPLAY SCREEN

When the engine key is set to the "ON" position while there is no fault, this screen appears. If any faulty status is displayed, refer to the page 2-21.

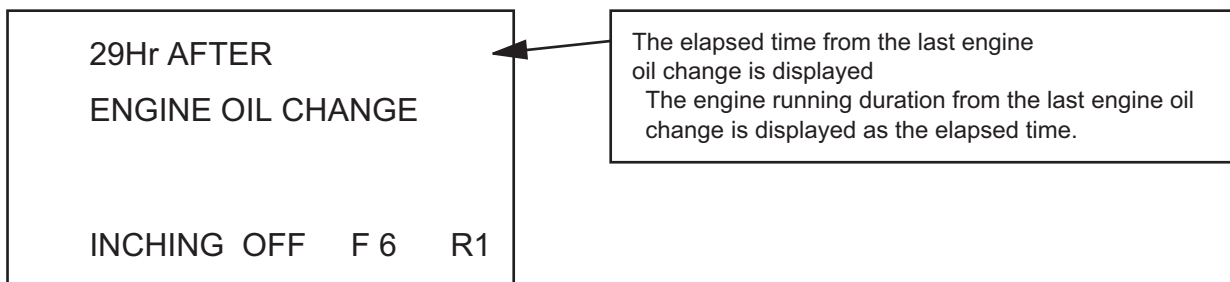


Note

The lifting height gauge is not provided, the lifting height is not displayed.

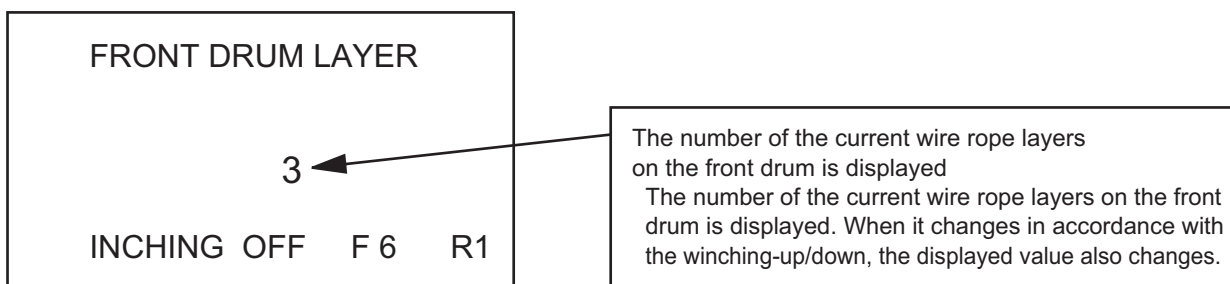
(2) ENGINE OIL CHANGE INTERVAL DISPLAY SCREEN

When the "▽" display screen selector switch is pushed, the display screen below appears.



(3) NUMBER OF WIRE ROPE LAYERS ON FRONT DRUM DISPLAY SCREEN

When the "▽" display screen selector switch is pushed, the display screen below appears.

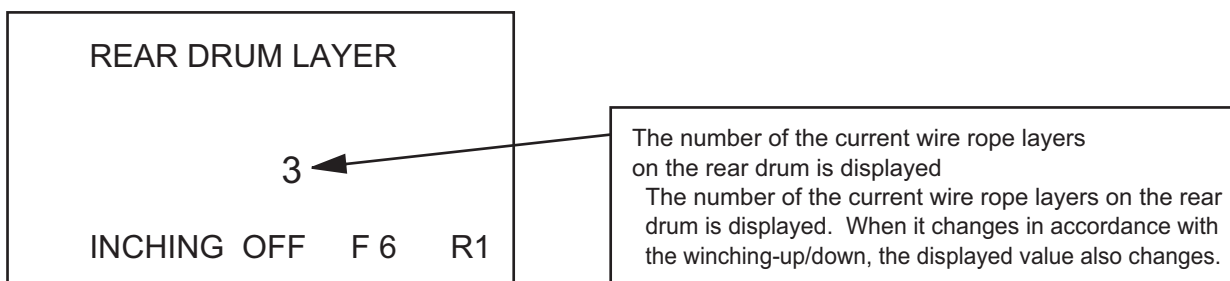


Note

The lifting height gauge is optional, and if the lifting height gauge is not provided, the display above does not appear.

(4) NUMBER OF WIRE ROPE LAYERS ON REAR DRUM DISPLAY SCREEN

When the "▽" display screen selector switch is pushed, the display screen below appears.

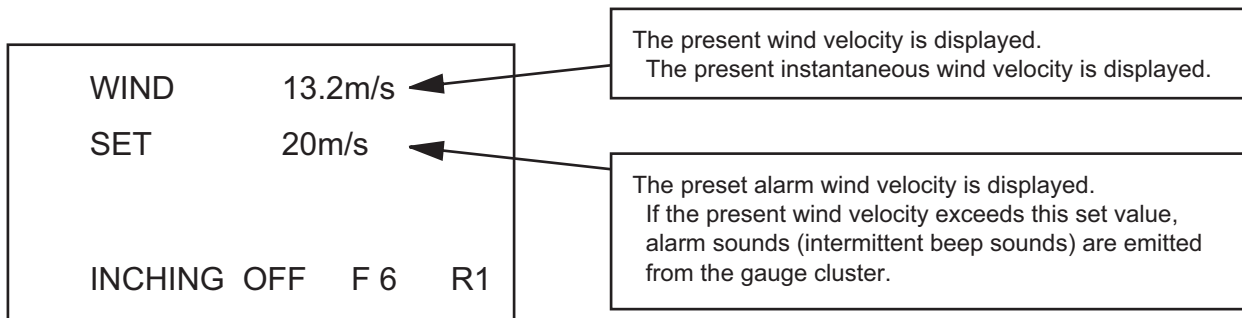


2. OPERATION

(5) WIND VELOCITY DISPLAY SCREEN (OPTION)

The screen appears after the "Engine oil change time display screen" described in 3 (2), if the machine is equipped with the anemometer.

(It will not appear if the anemometer is not provided for the machine.)












4. FAULT INDICATOR DISPLAY

When a fault occurs, the corresponding fault indicator display appears.











(1) WARNING DISPLAY

*Buzzer alarms

- ◎ : the buzzer repeatedly sounds for 0.2 seconds, with 0.3 seconds of intermittence (the buzzer sounds cannot be stopped with the buzzer switch).
Blank: the buzzer does not sound.
- : the buzzer repeatedly sounds for 0.5 seconds, with 0.5 seconds of intermittence (the buzzer can be stopped with the buzzer switch).
Blank: the buzzer does not sound.
- △ : the buzzer repeatedly sounds for 0.2 seconds, with 0.3 seconds of intermittence, and stop after 5 seconds.
Blank: the buzzer does not sound.

Displayed items	Descriptions and remedies	Buzzer
	The message is displayed when the engine cooling water temperature is 0°C or less with the key switch turned ON.	
	The message is displayed for 5 seconds after the operation is complete.	
	The charging circuit is malfunctioned. Consult with your nearest KOBELCO authorize distributor. * Note : That it is not fault even this item is momentarily displayed immediately after the engine is started.	
	The control primary pressure is abnormal. Stop the operation at once, and consult with your nearest KOBELCO authorize distributor. * Note : That it is not fault even this item is momentarily displayed immediately after the engine is started.	
	The engine oil pressure is abnormal. Stop the engine at once, and consult with your nearest KOBELCO authorize distributor.	◎
	The cooling water level in the radiator is insufficient. Refill the radiator with cooling water.	
	The cooling water temperature is excessively high. Idle the engine to lower temperature, and consult with your nearest KOBELCO authorize distributor.	○
	The engine oil filter is clogged. Replace the filter.	
	The engine air cleaner is clogged. Clean or replace the element.	

2. OPERATION

Displayed items	Descriptions and remedies	Buzzer
	<p>The fuel level is insufficient. Refuel.</p>	
	<p>The hydraulic oil temperature is excessively high. Adjust the engine speed to the medium level to lower the oil temperature, and consult with your nearest KOBELCO authorize distributor.</p>	
	<p>The temperature of clutch cooling oil of the front drum is excessively high. Idle the engine at a high speed to lower the oil temperature. If this item frequently appears during normal operations, consult with your nearest KOBELCO authorize distributor. At the same time, inform the KOBELCO authorize distributor of the details of the operation (lifting load, free fall distance, speed, and duration).</p>	○
	<p>The temperature of clutch cooling oil of the rear drum is excessively high. Idle the engine at a high speed to lower the oil temperature. If this item frequently appears during normal operations, consult with your nearest KOBELCO authorize distributor. At the same time, inform the KOBELCO authorize distributor of the details of the operation (lifting load, free fall distance, speed, and duration).</p>	○
	<p>The winch cooling line filter is clogged. Replace the filter cartridge. This item may appear during cold weather even when the filter is not clogged. If the item disappear during warm-up, the cartridge does not need to be replaced</p>	○
	<p>The front drum emergency solenoid is actuated. The free fall operation of the front drum is impossible. The status may be returned by setting the key switch to the ""OFF"" position, and setting it to the ""ON"" position again a short while later. If the status cannot be returned by performing the steps above, consult with your nearest KOBELCO authorize distributor.</p>	○
	<p>The rear drum emergency solenoid is actuated. The free fall operation of the rear drum is impossible. The status may be returned by setting the key switch to the ""OFF"" position, and setting it to the ""ON"" position again a short while later. If the status cannot be returned by performing the steps above, consult with your nearest KOBELCO authorize distributor.</p>	○
	<p>The third emergency solenoid is actuated. The free fall operation of the third drum is impossible. The status may be returned by setting the key switch to the ""OFF"" position, and setting it to the ""ON"" position again a short while later. If the status cannot be returned by performing the steps above, consult with your nearest KOBELCO authorize distributor.</p>	○
	<p>The hook block Anti-two-block (overhoist) stop status is released. Stop the release, and operate in the normal status.</p>	△
	<p>The boom overhoist stop status is released. Stop the release, and operate in the normal status.</p>	△

Displayed items	Descriptions and remedies	Buzzer
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> W-21 <div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; padding: 2px 5px;">M/L</div> BYPASS </div> </div>	<p>The moment limiter redundancy switch is actuated.</p> <p>The moment limiter is malfunctioned, and automatic stop operation due to overload and the overhoisted hook block is impossible.</p> <p>Immediately stop the operation, or return extremely carefully, and consult with your nearest KOBELCO authorize distributor.</p>	△
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> W-31 ENGAGE THE DRUM LOCK </div>	<p>This item is displayed whenever the engine is stopped. It does not mean occurrence of a malfunction, but is intended for prevention of failure in engagement of the drum lock.</p> <p>* Note : This item is displayed even when the drum lock is engaged.</p>	○
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> H-1 <div style="display: flex; align-items: center; gap: 10px;"> <div style="font-size: 2em; font-weight: bold;">CPU</div> <div style="font-size: 0.8em; line-height: 1;">MECHATRO FAILURE</div> </div> </div>	<p>The CPU is malfunctioned.</p> <p>Consult with your nearest KOBELCO authorize distributor.</p>	○
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> H-2 <div style="display: flex; align-items: center; gap: 10px;"> <div style="font-size: 2em; font-weight: bold;">M/L</div> <div style="font-size: 0.8em; line-height: 1;">STOP RELEASE</div> </div> </div>	<p>The overload automatic stop status is released.</p> <p>Stop the release, and operate in the normal status.</p>	△
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> G-25 OPT FUEL FILTER <div style="text-align: center; margin-top: 5px;">×</div> </div>	<p>Drain water from the fuel filter when water pooled in the fuel filter.</p> <p>The display can be erased by "ZERO" switch of the gauge cluster depress more than 2 seconds.</p>	

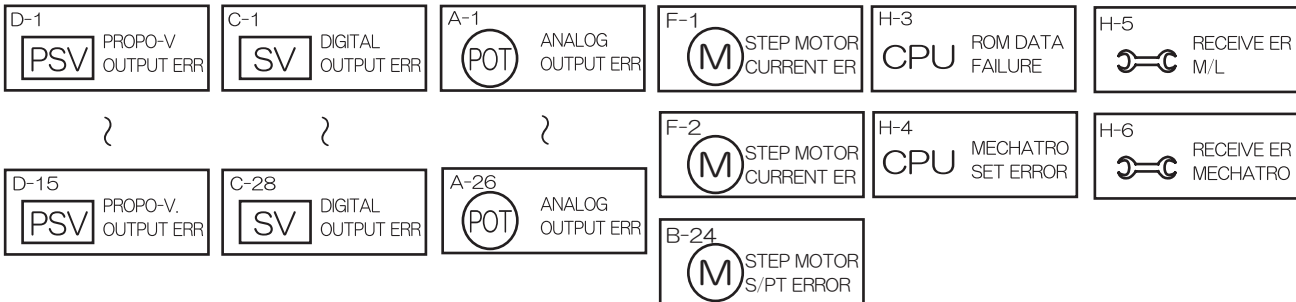
2. OPERATION

(2) WARNING DISPLAY (SELF CHECK)

If the solenoid valve or the center has malfunctioned, the display screens below appear.

When there are multiple malfunctions, they will be displayed consecutively.

When these display screens appear, inform your nearest KOBELCO authorize distributor of the display screen number (the number on the upper left corner of the display screen).



Number	Error	Number	Error
D-1	BOOM RAISE PROPO-V	C-21	Re.-C/V SOL-V
D-2	BOOM LOWER PROPO-V	C-22	3RD-C/V SOL-V
D-3	Fr.-RAISE PROPO-V	C-23	D/O SPARE
D-4	Fr.-LOWER PROPO-V	C-24	FREE FALL VOICE ALARM
D-5	Re.-RAISE PROPO-V	C-25	D/O SPARE
D-6	Re.-LOWER PROPO-V	C-26	Fr.-WINCH FREE FALL LAMP
D-7	3RD(JIB)-RAISE PROPO-V	C-27	Re.-WINCH FREE FALL LAMP
D-8	3RD(JIB)-LOWER PROPO-V	C-28	3RD-WINCH FREE FALL LAMP
D-9	Fr.-MOTOR PROPO-V		
D-10	Re.-MOTOR PROPO-V	A-1	Fr.-MOTOR POTENTIO
D-11	SWING SPEED PROPO-V	A-2	Re.-MOTOR POTENTIO
D-12	MAIN PUMP PROPO-V	A-3	BOOM MOTOR POTENTIO
D-13	3RD MOTOR PROPO-V	A-4	A/D SPARE
D-14	SWING REACTION PROPO-V	A-5	A/D SPARE
D-15	BOOM PUMP PROPO-V	A-6	A/D SPARE
		A-7	GRIP ACCELERATOR POTENTIO
C-1	BATTERY RELAY	A-8	FOOT ACCELERATOR POTENTIO
C-2	D/O SPARE	A-9	A/D SPARE
C-3	D/O SPARE	A-10	A/D SPARE
C-4	BOOM PUMP SPEED SOL-V	A-11	SWING PUMP PRESS. SENSOR
C-5	MAIN PUMP SPEED SOL-V	A-12	3RD MOTOR SPEED ADJUST KNOB
C-6	SPARE	A-13	Fr.-RAISE PRESS. SENSOR
C-7	Fr.-WINCH CLM SOL-V	A-14	Fr.-LOWER PRESS. SENSOR
C-8	Fr.-WINCH ESM SOL-V	A-15	Re.-RAISE PRESS. SENSOR
C-9	SPARE	A-16	Re.-LOWER PRESS. SENSOR
C-10	Re.-WINCH CLA SOL-V	A-17	3RD-RAISE PRESS. SENSOR
C-11	Re.-WINCH ESA SOL-V	A-18	3RD-LOWER PRESS. SENSOR
C-12	SPARE	A-19	Fr.-CLUTCH PRESS. SENSOR
C-13	3RD-WINCH CLT SOL-V	A-20	Re.-CLUTCH PRESS. SENSOR
C-14	3RD-WINCH EST SOL-V	A-21	3RD-CLUTCH PRESS. SENSOR
C-15	Fr.-MOTOR BOOST SOL-V	A-22	WIND VELOCITY SENSOR
C-16	Re.-MOTOR BOOST SOL-V	A-23	BLANK
C-17	3RD-MOTOR BOOST SOL-V	A-24	BOOM RAISE PRESS. SENSOR
C-18	Fr.-WINCH REV. GRIP SOL-V	A-25	BOOM LOWER PRESS. SENSOR
C-19	Re.-WINCH REV. GRIP SOL-V	A-26	JIB TENSION
C-20	Fr.-C/V SOL-V		

(3) RETURN TO NORMAL DISPLAY SCREEN WHILE FAULT INDICATOR DISPLAY SCREEN APPEARS

When a fault occurs, first, a fault indicator display screen appears.

To return to the normal display when in this status, perform the steps described to the right.

Note

If the fault occurred is corrected while the normal display screen is flashing, the screen enters the lit status automatically.

While the fault indicator display screen appears, push the zero switch for more than 2 seconds.



The normal display screen flashes.



When the setting switch is pushed while the normal display screen is flashing, the fault indicator display screen returns.

5. ALTERATION OF ENGINE OIL CHANGE INTERVAL

Reset to "0" the engine oil change interval when the oil change is complete.

- (1) Display the "Engine oil change interval display screen".
- (2) Press the check switch for more than 5 seconds. The displayed oil change interval flashes.
- (3) When the zero switch is pressed for more than a second, the oil change interval is reset to "0".
To set to an interval other than "0", press the adjuster "+" switch. The displayed oil change interval increases by 1. The interval can be continuously increased by pressing this switch.
By pressing the adjuster "-" switch, the displayed oil change interval decreases by 1. The interval can be continuously decreased by pressing this switch.
- (4) Press the setting switch after adjusting the value. The alteration is complete, and the screen returns to the normal status.
- (5) If no alteration is required, select another display screen with the display screen selector switches without pressing the setting switch. The alteration will be canceled.

29Hr AFTER
ENGINE OIL CHANGE

INCHING OFF F 6 R1

2. OPERATION

6. LIFTING HEIGHT GAUGE

To obtain the correct lifting height, the setting of the number of the reeving wire rope of the load safety device controller (refer to the page 3-35) and the initial adjustment of the lifting height gauge (refer to the 2-27) are absolutely necessary.

(1) USE OF LIFTING HEIGHT GAUGE

- (A) Display the "Engine speed and lifting height screen".
- (B) Select the main lifting mode or the auxiliary lifting mode with the "Mode selector switch" of the load safety device controller.
The display screen will be switched according to the statuses of the switch.
Main.....main lifting
Aux.....auxiliary lifting
- (C) Make sure that the displayed number of the reeving wire rope is correct by checking the actual number of the reeving wire rope.
- (D) Move the load to any position and press the zero switch. The displayed lifting height is reset to "0 ft". The zero switch can be used only in the "Engine Speed and Lifting Height Gauge" screen. Resetting is impossible in other screens.
- (E) The lifting height changes according to the winching-up/down and the raising/lowering of the boom and jib.
When the lifting height exceeds the reset value, it is indicated with the "+" mark, and when it is lower than the reset value, it is indicated with the "-" mark.

ENG.	1240	rpm
LIFT	10	ft
INCHING OFF	F 6	R1

(2) INITIAL ADJUSTMENT OF LIFTING HEIGHT GAUGE

If the drum is rotated without a wire rope wrap during the wire rope replacement, or the drum is rotated with the wire rope caught in during the disassembly and the assembly of the boom, the wire rope layers on the drum must be adjusted. If the adjustment is not performed correctly, the lifting height may not be changed, or the displayed value may be incorrect. Be sure to adjust it correctly.

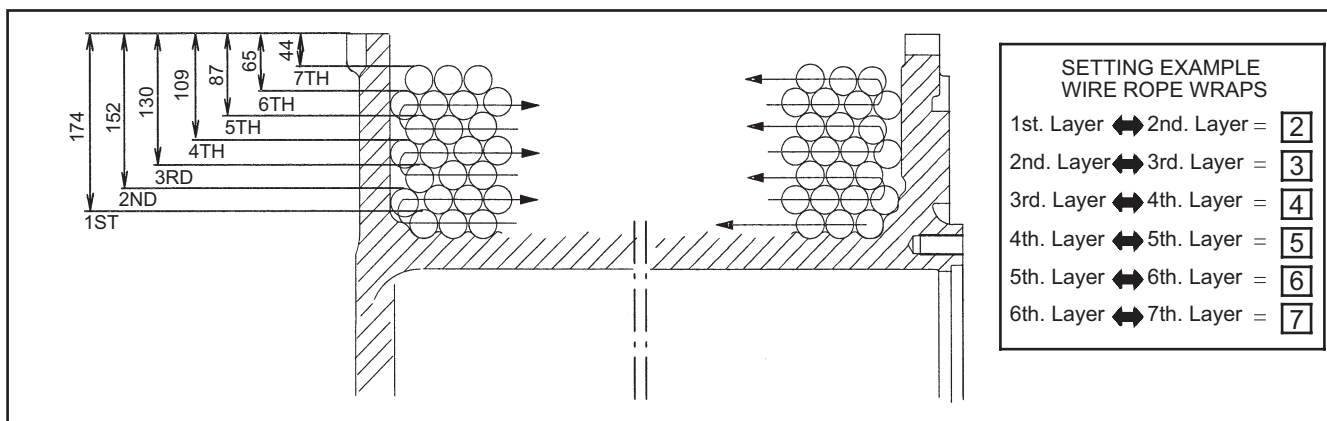
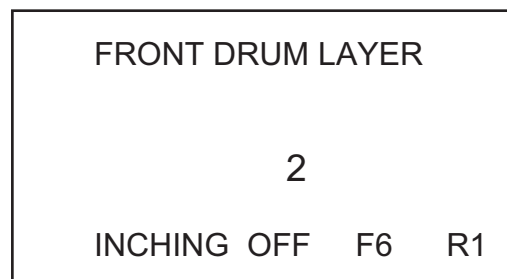
The initial adjustment of the lifting height gauge must be performed for both of the main winch and the auxiliary winch.

The adjustment steps are identical to the front drum and the rear drum .

The adjustment steps for the front drum are described below.

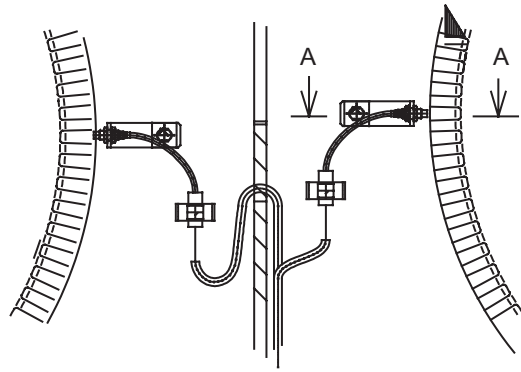
- (A) Winch the main hook block (up or down), and stop it at the position where the wire rope layers on the drum changes.
- (B) Display the "Front Drum Layers" display screen.
- (C) Press the check switch for more than 5 seconds. Then, the displayed value of the wire rope wraps on the drum flashes.
- (D) Press the adjuster "+" switch and the wire rope wraps on the drum increases by 1. It can be continuously increased by pressing the switch. Press the adjuster "-" switch and the value decreases by 1.

Adjust the displayed value of the wire rope wraps on the drum to the current correct value. It can be judged by the distance between the drum flange end and the wire rope. Refer to the diagram below.

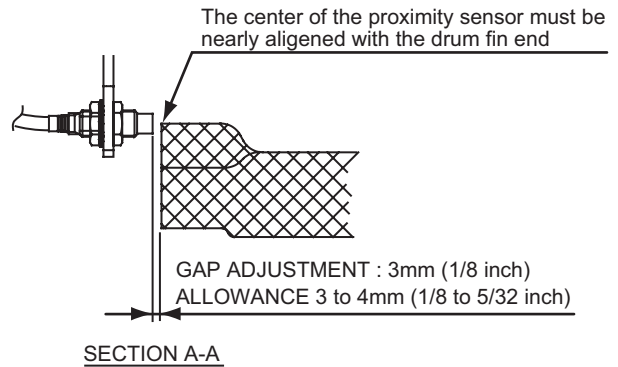


2. OPERATION

- (E) Press the setting switch after adjusting the value.
The adjustment is complete and the screen returns to the normal status.
- (F) If no alteration is required, select another display screen with the display screen selector switch without pressing the setting switch.
The alteration is canceled and the value returns to the original one.

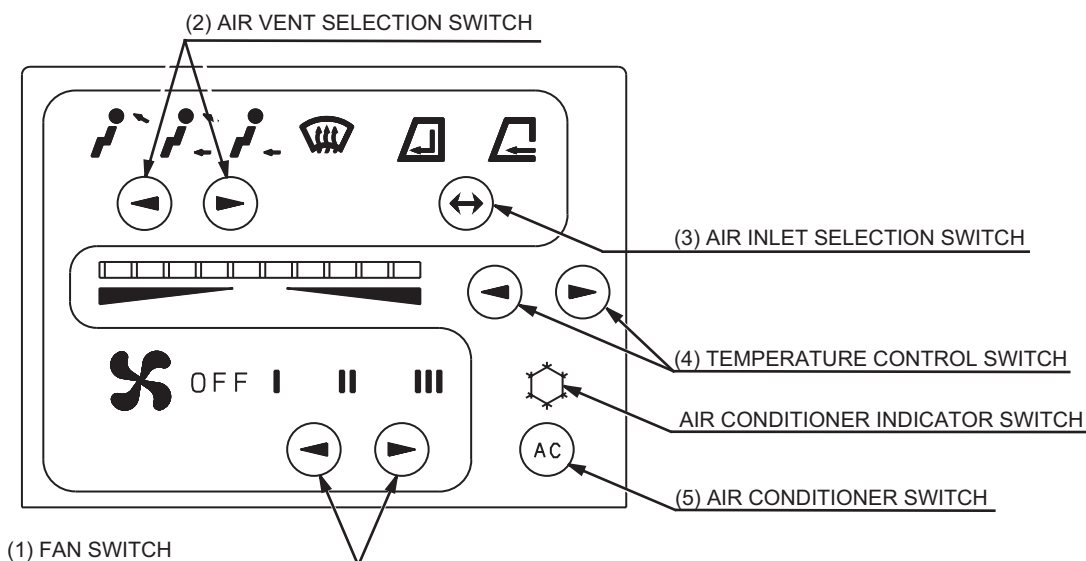


- (G) Follow the steps described in the "(1) USE OF LIFTING HEIGHT GAUGE" of the section 7, and ensure that the lifting height value changes in accordance with the setting.
- (H) When the indicated lifting height is incorrect, the sensor gap adjustment may be improper. Adjust the gap of the proximity sensor.
If the indicated lifting height is still incorrect, consult with your nearest KOBELCO authorize distributor.



2.2.3 OPERATING THE AIR CONDITIONER

1. CONTROL PANEL

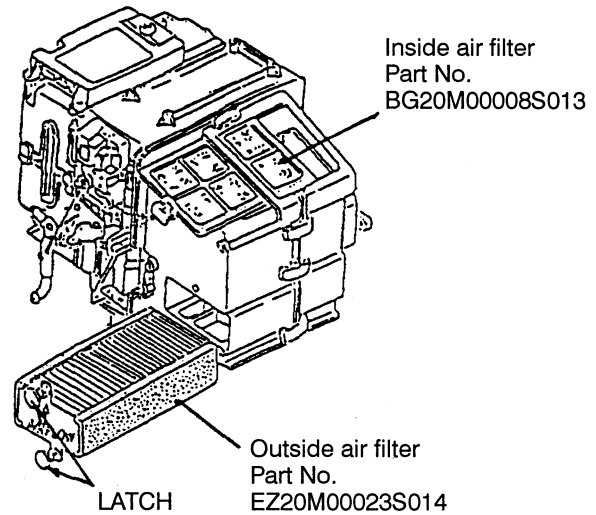


<p>(1) FAN SWITCH The switches control the air conditioner ON/OFF function and the blower speed.</p> <p> ----- position Low ----- position Medium ----- position High </p>							
<p>(2) AIR VENT SELECTION SWITCH These switches control the open/close position of each air vent. Select the desired air flow mode from the three mode position. The selected position is always shown by a lamp. Select if the front glass is misted.</p>							
<p>(3) AIR INLET SELECTION SWITCH This switch selects the open or close position of air inlet.</p>	<table border="1"> <tr> <td></td> <td>Selector switch for selection between internal air circulation and open intake.</td> </tr> <tr> <td></td> <td>When this position is selected, the air inlet is closed which causes the air to recirculate inside the cab.</td> </tr> <tr> <td></td> <td>When this position is selected, the air inlet is opened which allows fresh air to be introduced into the cab.</td> </tr> </table>		Selector switch for selection between internal air circulation and open intake.		When this position is selected, the air inlet is closed which causes the air to recirculate inside the cab.		When this position is selected, the air inlet is opened which allows fresh air to be introduced into the cab.
	Selector switch for selection between internal air circulation and open intake.						
	When this position is selected, the air inlet is closed which causes the air to recirculate inside the cab.						
	When this position is selected, the air inlet is opened which allows fresh air to be introduced into the cab.						
<p>(4) TEMPERATURE CONTROL SWITCH These switches control the temperature of air coming out of the air vents to any of five levels during heating (red label) and cooling (green label).</p> <p>1. Push the left switch (◀), and the range of the GREEN lights decrease and the air temperature goes down.</p> <p>2. Push the right switch (▶), and the range of the LED lights increase and the air temperature goes up.</p>							
<p>(5) AIR CONDITIONER SWITCH This is used to turn ON and OFF the cooling function during cooling or dehumidification heating. Push once to change over from ON/OFF to OFF/ON. When the switch is turned ON, the lamp on the upper part of the switch lights up.</p>	<p> AIR CONDITIONER INDICATOR LAMP AIR CONDITIONER SWITCH </p>						

2. OPERATION

2. CAUTIONS

- (1) Fresh air should be introduced into the cab, when the air conditioner is used for long time.
- (2) Do not lower the temperature more than necessary.



3. CHECK AND SERVICE

When the filter is clogged, wind volume is decreased, and capacity of the air conditioner is lowered.

Check the filter; clean or replace if it is dirty (Every 3 months).

(1) INSIDE AIR FILTER

Removal ...Lightly raise up the filter hook, then remove the filter for cleaning or replacing.

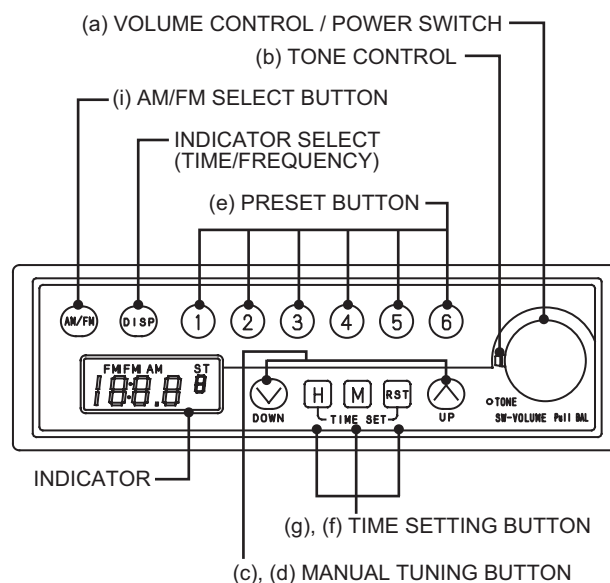
(2) OUTSIDE AIR FILTER

Removal ...Unhook the latches located at the top and bottom, then remove the outside air filter for cleaning or replacing.

2.2.4 AM/FM RADIO (OPTION)

1. To Hear the Radio Broadcasting

- (1) Place the key switch in the ON or ACC position.
- (2) Push power switch (a) to power on.
Push the switch again to turn power off.
- (3) Turn volume control (a) to the right to turn volume high.
- (4) Choose your desired radio station by operating the manual tuning button (c), (d) or the preset button (e).
(Refer to the method of tuning.)
When pushing preset button (e), push the button within 1 seconds.
- (5) After adjusting the volume properly, adjust tone control (b) as desired.
Turn to the right to make the tone high, and turn to the left to make the tone low.



2. Method of Each Tuning

(1) Method of Auto Tuning

By pushing the manual tuning button (c) or (d) for 0.5 seconds or longer, the radio station of higher frequency is selected, and the tuning is automatically stopped when receiving the radio wave. At this time, the received frequency is indicated on the indicator.

(2) Method of Manual Tuning

When selecting a high frequency broadcasting, push the "UP" button (d) of manual tuning button, and when selecting a low frequency broadcasting, push the "DOWN" button (c). At this time, indicator indicates the received frequency.

Method of Manual Tuning

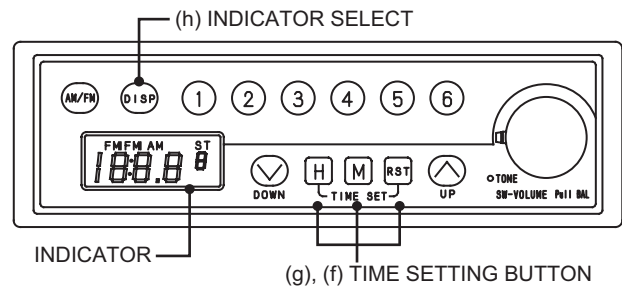
(3) Method of Preset (Setting the Selecting Button)

- (a) Choose AM or FM by pushing the AM/FM selector button (i).
- (b) Adjust the frequency to that of the radio station, which you desire to memorize, by pushing the "UP" button (d) and "DOWN" button (c).
(The received frequency is indicated on the indicator.)
- (c) By pushing the preset button (e) for 1 second or longer, the selected frequency is memorized.
(In the AM/FM radio, six broadcasting frequencies can be set respectively in AM and FM.)

2. OPERATION

3. Setting Method of Time

- (1) Place the key switch in the ON or ACC Position.
- (2) By pushing button (RST) (f) for 1 second or longer, the o'clock indicator blinks and the time setting will become possible.
- (3) Adjust o'clock with button (h) of time setting button (g), and adjust minute with button (m) of (g). By continuing pushing makes movement quick.
- (4) By pushing button (RST) (f) once more for 1 second or longer after setting is finished, the time setting will be completed.
- (5) Indicator shows the time regardless of ON and OFF of the radio. When the broadcasting frequency is desired to be checked, push "DISP" button (h).



2.3 CRANE OPERATION

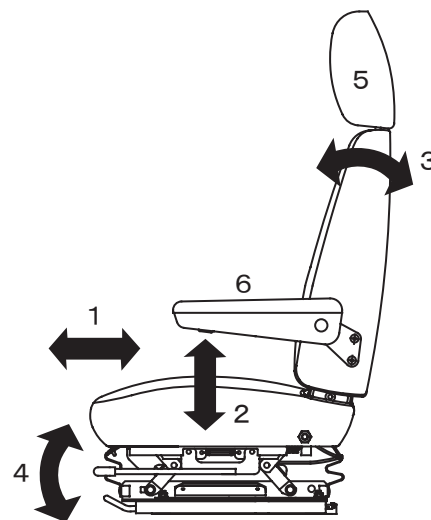
2.3.1 ADJUSTING THE OPERATOR'S SEAT

1. ADJUSTING BACK AND FORWARD

Pull the lever (item No.1) to adjust the seat backward and forward within 160 mm (6.3 inch) range. After adjusting, release lever to set the position.

2. ADJUSTING HEIGHT

Pull up the lever (item No. 3) to lift the back of the seat, push the lever down to lift the front of the seat. To lower the seat, reverse the lifting procedure.



3. ADJUSTING RECLINING CONDITION

Pull the lever (item No. 2) to set the back of the seat to the most suitable angle. After adjusting, release the lever to set the seat.

4. ADJUSTING TILTING ANGLE

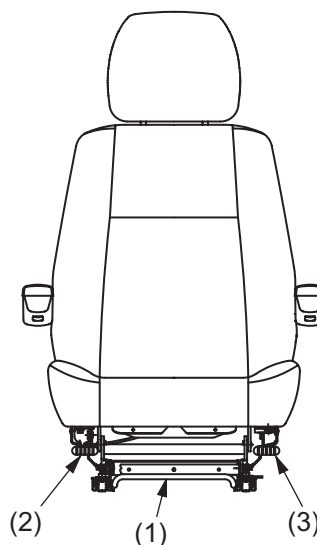
Pull the lever (item No. 3) to set the seat tilting angle to the most suitable angle. After adjusting, release the lever to set the seat.

5. HEADREST

The headrest can be adjusted up or down.

6. ARMREST

The armrest can be turned 180 deg. backward.

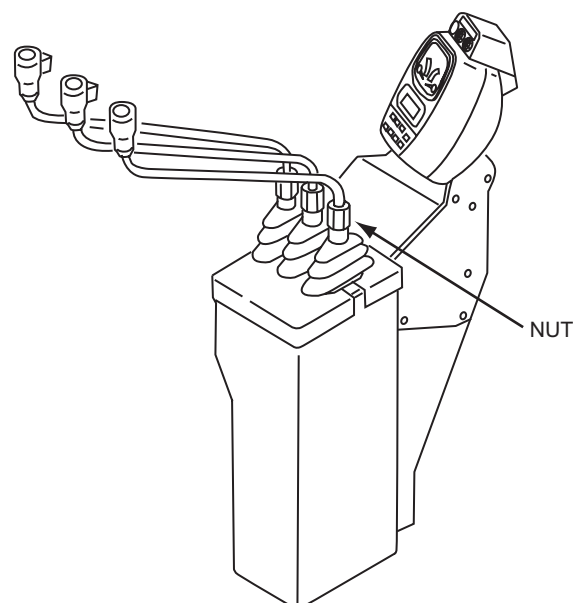


2.3.2 ADJUSTING THE CONTROL LEVER DIRECTION

By loosening the nut, the control lever can be adjusted for direction. Adjust it to the most suitable position. After adjusting, secure the lever with the nut.



Nut must be retightened before using crane.



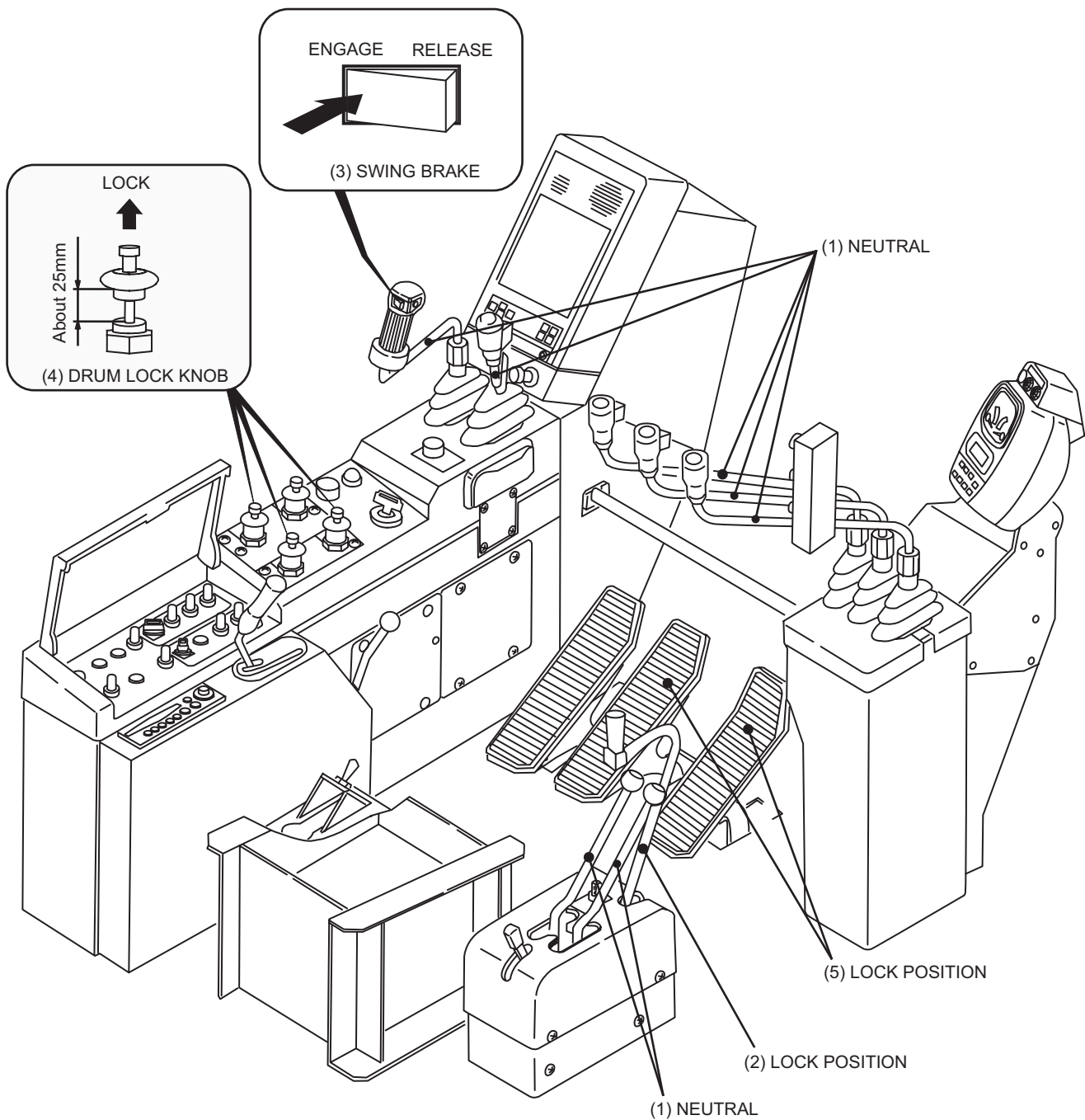
2. OPERATION

2.3.3 STARTING AND STOPPING THE ENGINE

1. STARTING THE ENGINE

Before starting the engine, set the control levers and switches as follows:

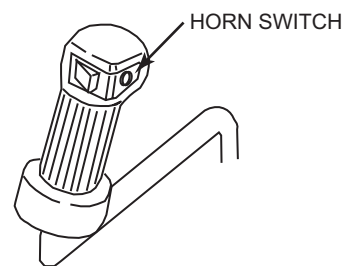
- (1) Boom hoist, front drum, rear drum, third drum (option), swing and propel control lever..... Neutral
- (2) Function lock lever..... Lock position
- (3) Swing brake switch..... Engaging side
- (4) Front drum, rear drum, boom drum and third drum (option) lock knob..... Lock side
- (5) Front drum, rear drum and third drum (not used) brake pedals..... Lock position



WARNING

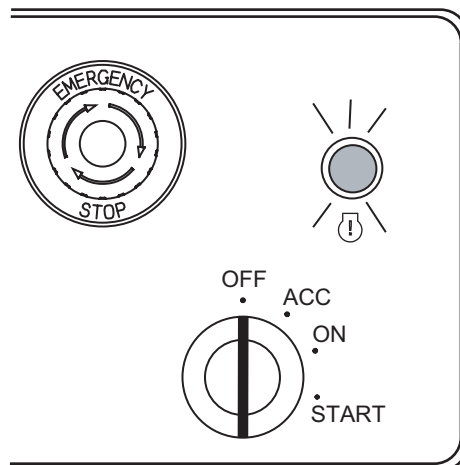
Sound the signal horn to warn the surrounding personnel before starting the engine.

Failure to observe this precaution may result in serious injury or death.



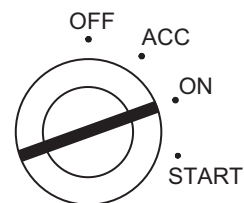
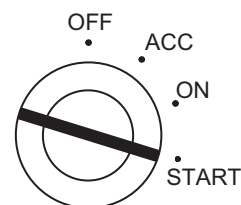
- (1) Turn the key switch 2 steps to the right (ON position).

Though the engine control warning lamp is lit up, it is not fault (they are lit up to check burn-out of the bulbs).



- (2) By turning the key switch one step more to the right (START position), the engine starts. After the engine starts, immediately release the key. The key returns to the ON position automatically.

Do not allow the starter to run more than 15 seconds continuously. If the engine does not start within 15 seconds, release the key and wait for more than 20 seconds, then start the engine again.



- (3) After the engine starts, immediately check the monitor for abnormality. If the readings are improper, stop the engine immediately and determine the cause.

2. OPERATION

(4) To adjust the engine speed, use the accelerator grip.

If it is impossible to adjust the engine speed with the use of the accelerator grip, adjust by using the auxiliary accelerator (located under the operator's seat). If the accelerator fails, turn on the by-pass switch (a) then operate the by-pass switch then operate the auxiliary accelerator switch (b).

CAUTION

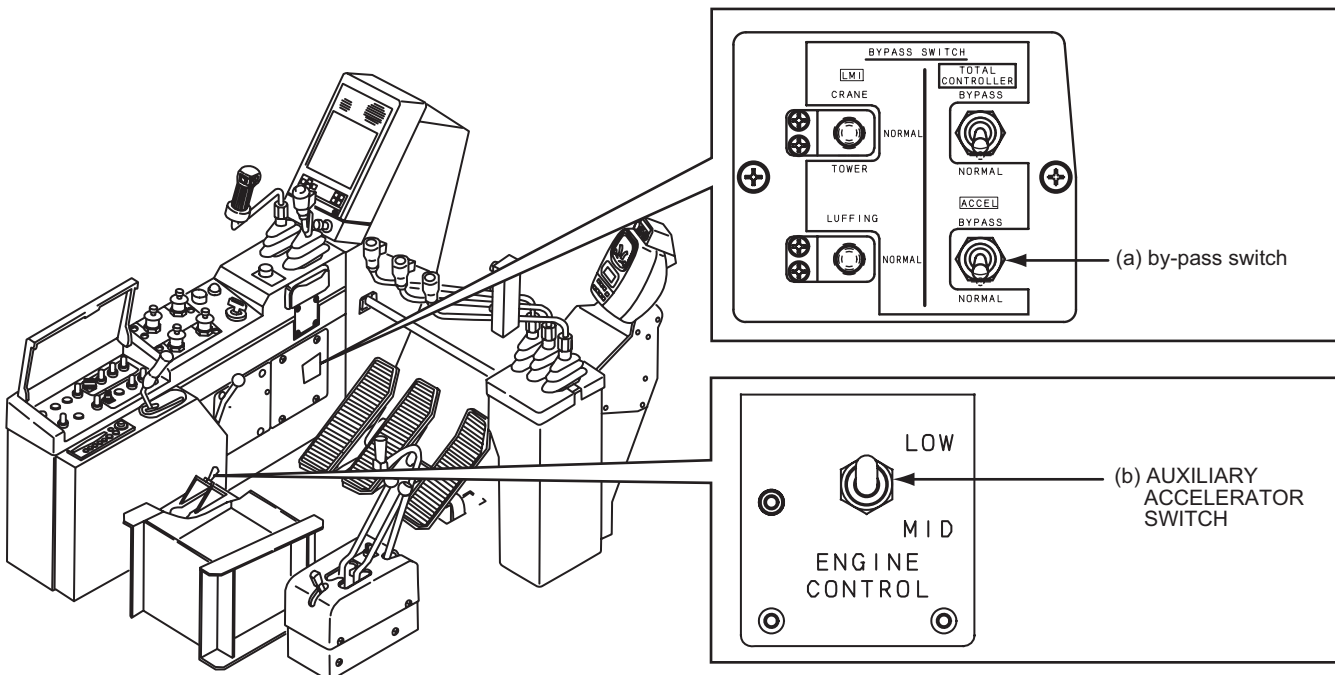
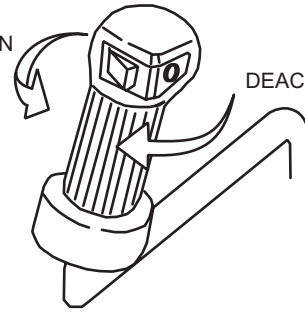
Do not operate auxiliary accelerator when the system works properly.

Failure to observe this precaution may result in damage to the system.

Desired control is available
In the range of 120 deg.

ACCELERATION

DEACCELERATION

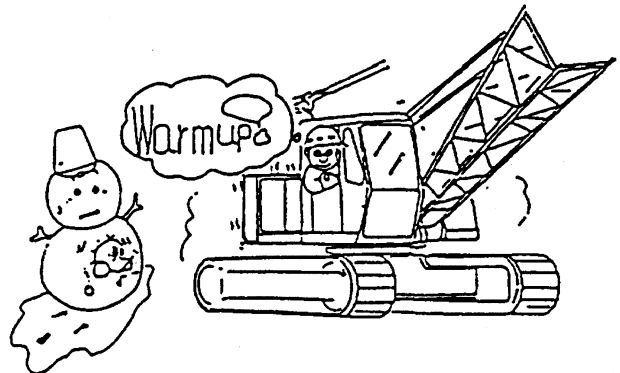


2. ENGINE WARMING OPERATION

Allow the engine to run at less than middle engine speed for 5 to 10 minutes with no load. Extend the warm-up time twice in a cold area.

CAUTION

If the crane is operated immediately without warming up the engine, the engine and the hydraulic components will be worn out earlier than usual or will become damaged.



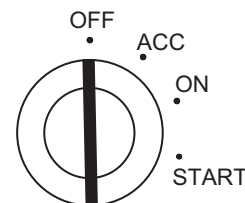
3. STOPPING THE ENGINE

Before stopping the engine, set the control levers and switches as follows:

- (1) Boom hoist, front drum, rear drum, third drum (option), swing and propel control lever..... Neutral
- (2) Function lock lever..... Lock position
- (3) Swing brake switch..... Engaging side
- (4) Front drum, rear drum, boom drum and third drum (option) lock knob..... Lock side
- (5) Front drum, rear drum and third drum (not used) brake pedals..... Lock position

(A) Allow the engine to run at a low speed for approximately 5 minutes with no load before stopping the engine.

(B) Turn the key switch to the OFF position (2 steps to the left).



2.3.4 FUNCTION LOCK LEVER

When leaving the operator's seat, be sure to place this lever in the LOCK position.

When this lever is placed in the LOCK position, the machine does not operate even if any control lever is operated accidentally.

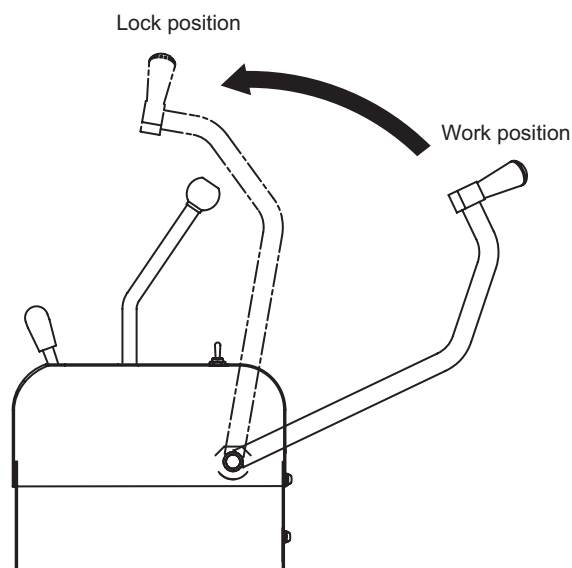


Do not set the function lock lever to the "LOCK" position during operation.

Otherwise, all the operation functions are suddenly stopped, causing extreme danger.

Failure to observe this precaution may result in serious injury or death.

When operating the machine, place the function lock lever in the WORK position.



2. OPERATION

2.3.5 PROPELLING OPERATION

⚠ DANGER

Before propelling the machine, strictly observe the following procedures.

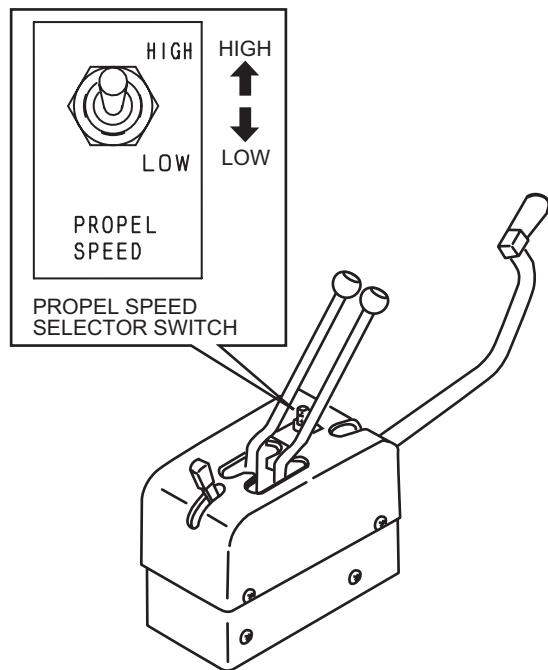
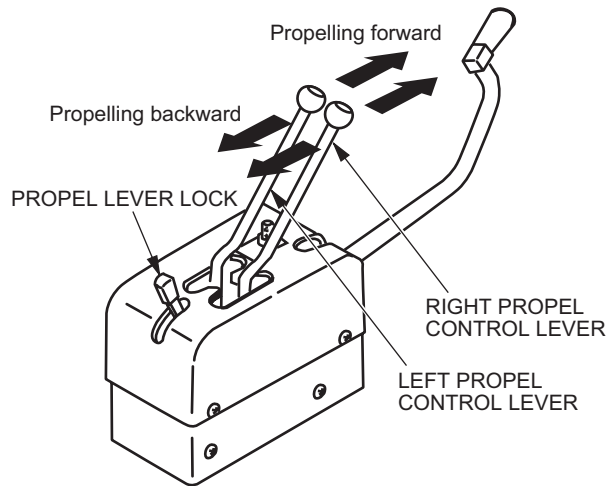
- Confirm that people and obstacles are kept out of the propelling area.
- Sound the horn to warn the surrounding people.
- Be especially careful, when the boom is long, boom angle is large, ground is uneven, or when a load is lifted.
- For stability of swinging and traveling, see page 4-1.
- Use a signal person to direct operation.

Failure to observe this precaution may result in serious injury or death.

Propel speed is regulated by turning the accelerator grip, and by proportionally pushing and pulling the propel control levers. High and low propel speed is regulated by operating the propel speed selector switch.

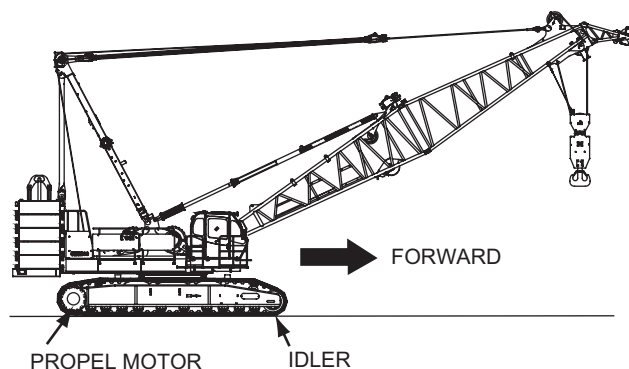
High speed ... Use this speed on good ground conditions.

Low speed..... Use this speed when a tractive force is required on bad ground conditions.



1. When the propel speed selector switch is placed in the HIGH SPEED position, pivot turn and counter-rotation cannot be operated depending on the ground conditions and the engine speed.
2. Since the machine may propel partially on a rough terrain, adjust propelling by the stroke of the propel control levers.

Propelling forward is propelling toward the idler side, and propelling backward is propelling toward the propel motor side. When the cab positions to the propel motor side, use caution with propelling operation in reverse only.



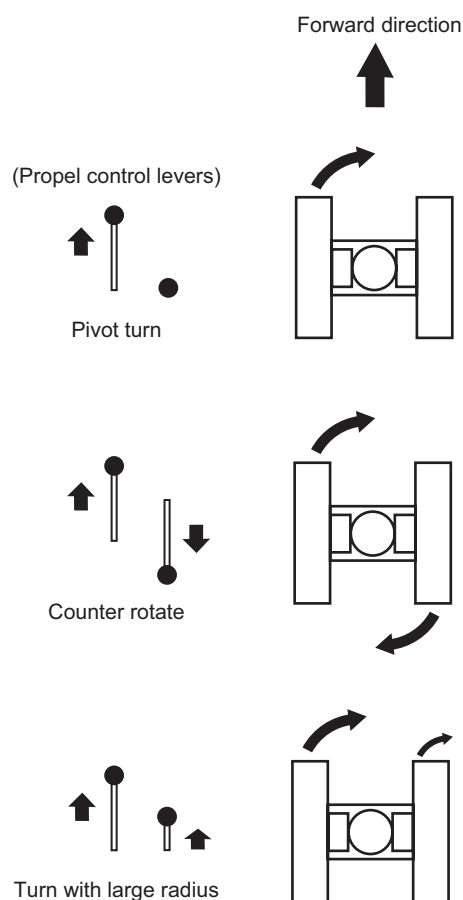
CAUTION

Provide the gentle slope so that the machine does not suddenly tilt and fall down at the beginning and end positions of slope.

- (1) Release the propel control lever lock.
- (2) It is possible for the machine to perform propelling start/backward and pivot turn/spin turn/wide curve turn by operating the right and left propel control levers.
- (3) Engage the control lever lock when you do not want to propel the machine.

WARNING

- **Do not perform sudden starts/stops/operation of the machine. Failure to observe this warning may result in serious accidents due to collision or boom windage.**
- **If the main or auxiliary drum is operated while propelling the machine, it may cause danger because the propel speed changes or the direction slants. To operate these actions simultaneously, lower the machine speed and slowly operate the drum.**



2. OPERATION

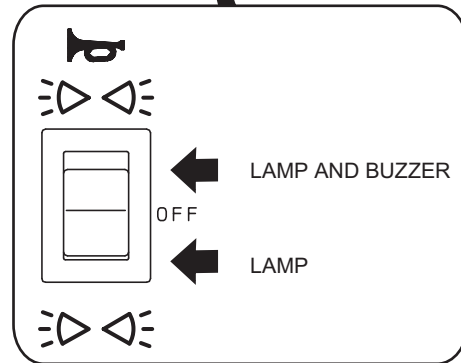
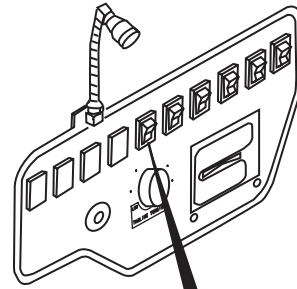
2.3.6 SWINGING OPERATION

WARNING

- Before initiating any swing operations, ensure the area in the swing path of the hook and/or load, and the tail swing area, is clear of all obstructions and personnel.
- Sound signal horn to warn personnel.
- For stability of swinging, see page 4-1.

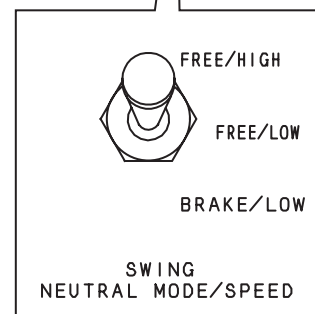
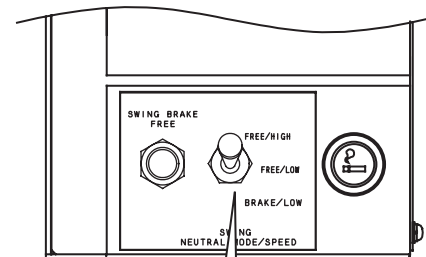
As for details of the swing brake modes, see the section 1. on page 2-7.

Failure to observe this precaution may result in serious injury or death.



Swing speed is regulated by turning the accelerator grip, and by proportionally pushing and pulling the swing control lever.

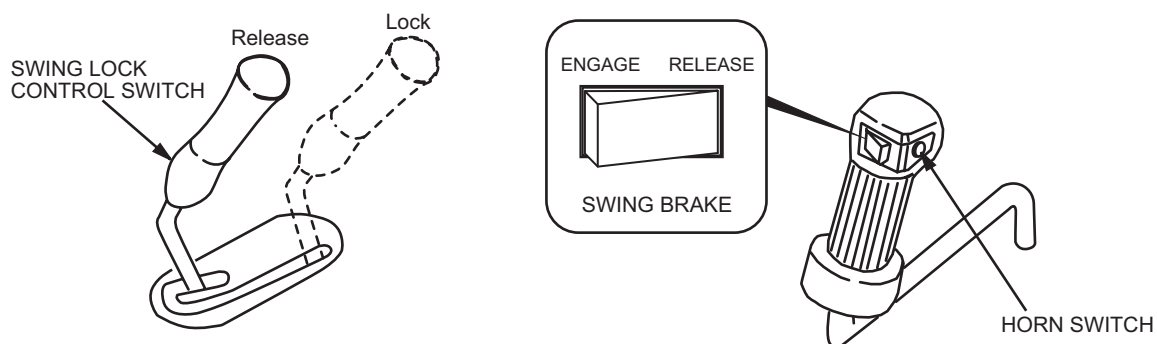
1. According to working conditions, select the alarm with the swing alarm selector switch.
2. The swing brake modes which consist of FREE HIGH, FREE LOW and BRAKE should be selected according to the job application. When FREE LOW or BRAKE is selected, the swing speed becomes slower.



CAUTION

When the BRAKE mode is selected, do not return the swing control lever to the neutral position too quickly in order to avoid shocks to the machine and booms.

3. Release the swing lock pin and swing brake.



CAUTION

Since the machine may swing naturally due to the wind or ground inclination, pay attention to release the swing brake. When the operator shut off lever is moved from the lock position to the work position, care should be taken because the machine also may swing naturally. (Regardless of positions of the swing brake switch, if the operator shut off lever is set at the lock position, it means that the swing brake has been engaged.)

CAUTION

DO NOT set the swing brake switch to the "Engaging" side during swinging (while the lever is operated).

2. OPERATION

4. Push the swing control lever forward to swing to the left. Pull the lever back to swing to the right. To stop the swing motion.

(1) FREE MODE

Slowly move the lever in the opposite direction.

(2) BRAKE MODE

Slowly return the lever to the neutral position.

CAUTION

- Avoid rapid swings or sudden starts and stops.
 - After the swing motion has been completely stopped, engage the swing parking brake.
-

WARNING

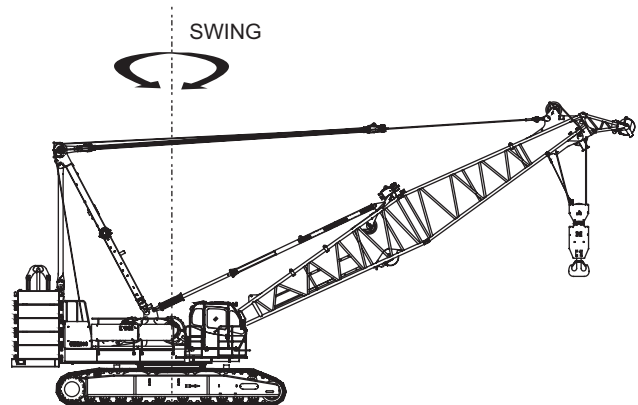
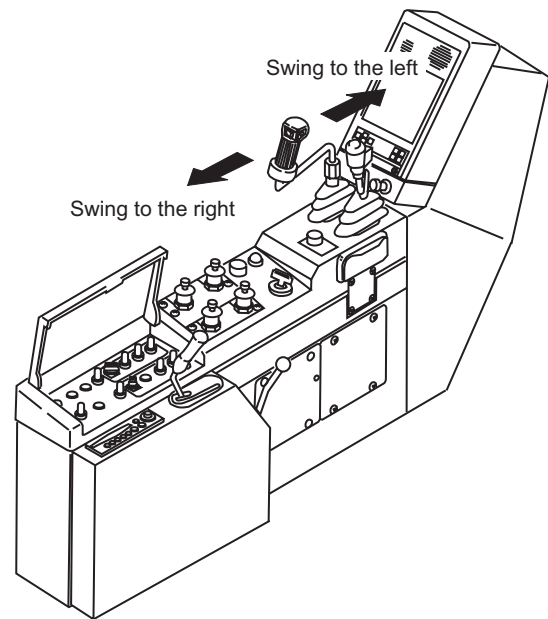
- Do not use the swing parking brake for the purpose of stopping the swing motion.
- Always check to ensure that the load is hanging free and directly under the boom tip before swinging.

Failure to observe this precaution may result in serious injury or death.

5. When pausing operations, orient the machine straight ahead, and then, actuate the swing lock.

CAUTION

Activating the swing lock and swinging operation with the machine in any position other than the swing lock position (Machine oriented straight ahead) may lead to the damage of the machine.



2.3.7 BOOM RAISING/LOWERING OPERATION

WARNING

Before operating the boom, ensure that the area above and beneath the boom is clear of all obstructions and personnel. Failure to observe this precaution may result in serious injury or death.

Speed of boom hoist can be adjusted by turning the accelerator grip and pressing or pulling up the boom operating lever and the maximum speed of boom up and down motion can be also adjusted by operating the drum speed adjusting knob.

1. Release the drum lock.
2. Push the boom drum control lever forward to lower the boom, and pull the lever backward to raise the boom.

WARNING

The load line can break if the hook block contacts the end of the boom. This is called "two blocking". Two blocking can be caused by lowering the boom without paying out load line. Two blocking can pull jibs and lattice crane booms over backwards or cause damage to the tip.

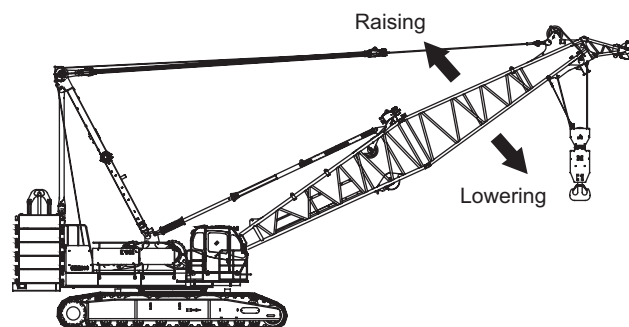
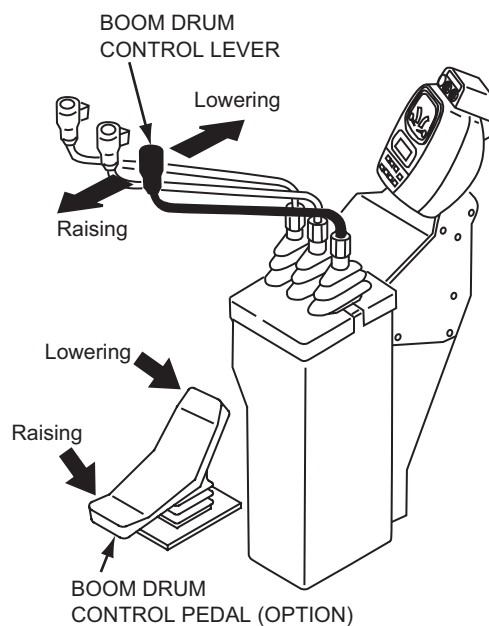
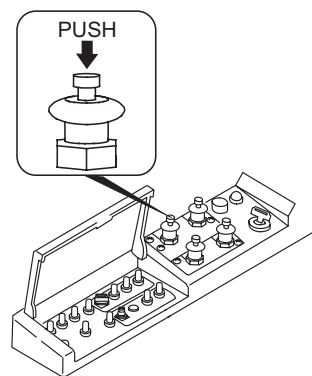
Always keep adequate space between the hook block and boom point. Lower the hook when lowering the boom.

Failure to observe this precaution may result in serious injury or death.

When the boom is not lowered by operating the boom drum control lever to the boom lowering side, it is possible that the drum lock is engaged in the ratchet of the drum. In this case, move the boom drum control lever to the boom raising side slightly, then move the lever to the lowering side again.

DANGER

Do not activate the drum lock while the boom is lowered. Otherwise, the drum or drum lock may be damaged.

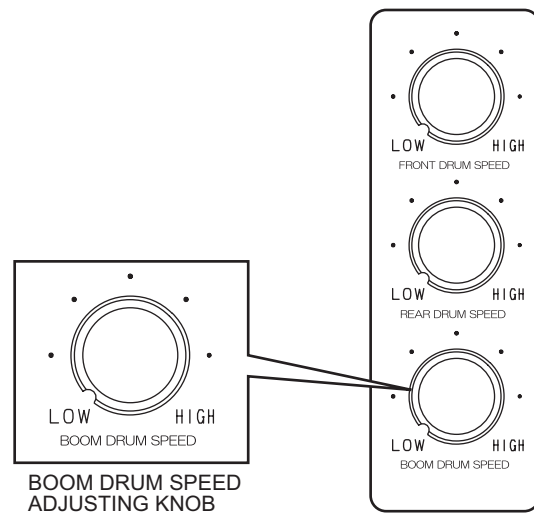


2. OPERATION

Advice

Boom operation can be done by the boom foot pedal. When the far (fore) side of the boom foot pedal is pressed down, the boom is lowered. When the near (hind) side of the boom foot pedal is pressed down, the boom is raised. Do not operate the boom drum control lever and the boom foot pedal at the same time. If the boom drum control lever and the boom foot pedal are operated at the same time, precedence is taken by the bigger side of the signal (valve stroke).

3. According to the working conditions, adjust the speed of the drum with the drum speed adjusting knob.
4. When the boom approaches the upper limit angle, the hoisting speed is reduced. The angle to start the speed reduction differs depending on the engine revolution; accordingly make sure to reduce the speed approximately 10 degrees before the upper limit angle in the case of HIGH IDLE and approximately 3 degrees before the upper limit angle in the case of LOW IDLE.
5. Be sure to stop the engine, and engage the drum lock before leaving the operator's seat. To engage the drum lock, push and hold the button, and then fully pull the knob up.



2.3.8 HOOK RAISING/LOWERING OPERATION

 WARNING

When making lifts, strictly follow the capacity charts for determining the loads that can be handled as supplied by the manufacturer.

Follow good operating practice and procedures as outlined in this manual.

Failure to observe this precaution may result in serious injury or death.

 WARNING

The load line can break if the hook block contacts the end of the boom. This is called "two blocking". Two blocking can be caused by lowering the boom without paying out load line. Two blocking can pull jibs and lattice crane booms over backwards or cause damage to the tip.

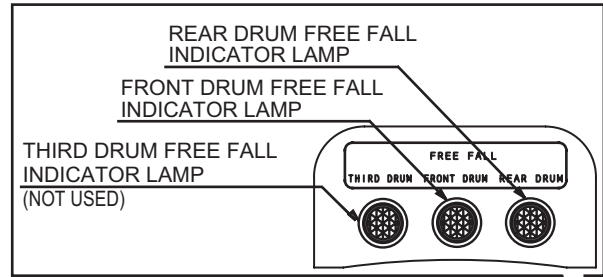
Always keep adequate space between the hook block and boom point. Lower the hook when lowering the boom.

Failure to observe this precaution may result in serious injury or death.

Raising and lowering speed is regulated by turning the accelerator grip and by proportionally pushing and pulling the drum control lever. The maximum raising and lowering speed of the drum is regulated by operating the drum speed adjusting knob.

2. OPERATION

1. Ensure that the "FREE FALL INDICATOR LAMP" stays out.
2. Release the drum lock.
When the hook is not lowered by operating the drum control lever to the lowering side, it is possible that the lock is engaged in the ratchet of the drum. In this case, slightly move the control lever to the raising side, then move to the lowering side again.



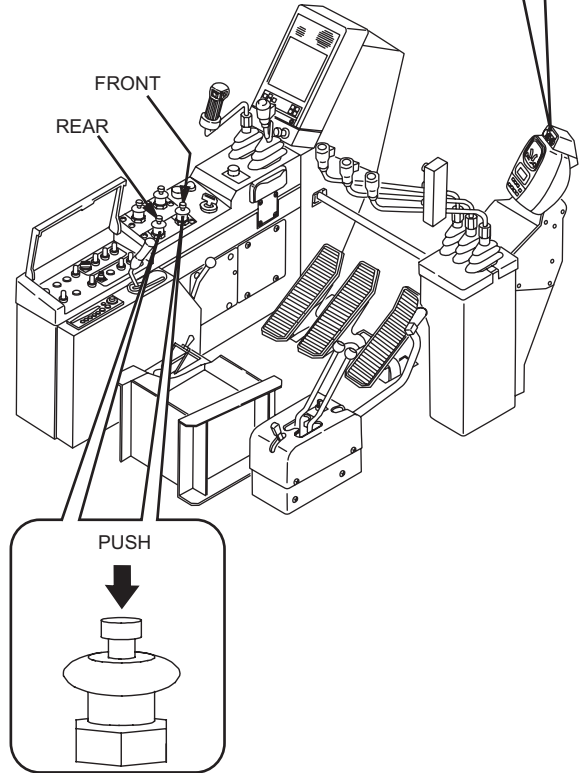
⚠ DANGER

Before releasing the drum lock confirm that the drum brake mode is in the **NEUTRAL BRAKE MODE**. If not, move the switch to the **NEUTRAL BRAKE MODE**.

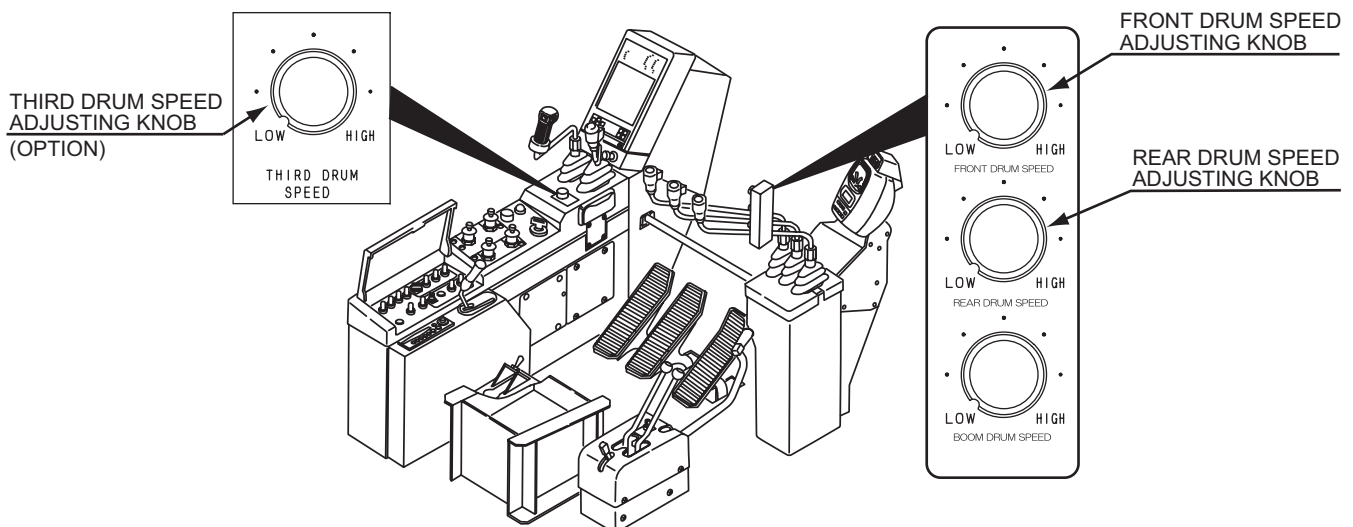
Failure to observe this precaution may result in serious injury or death.

⚠ DANGER

Do not actuate the drum lock while the hook is lowered. Otherwise, the drum or drum lock may be damaged.



3. According to working condition, adjust the maximum speed of the drum with the drum speed adjusting knob.



Raising / Lowering Operation

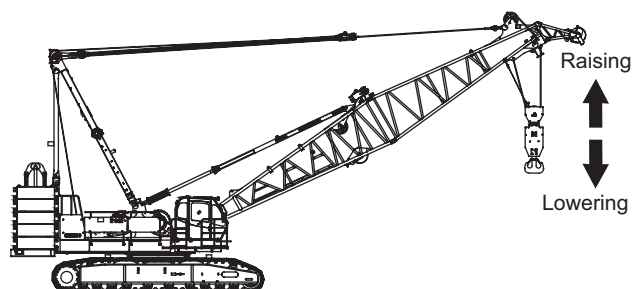
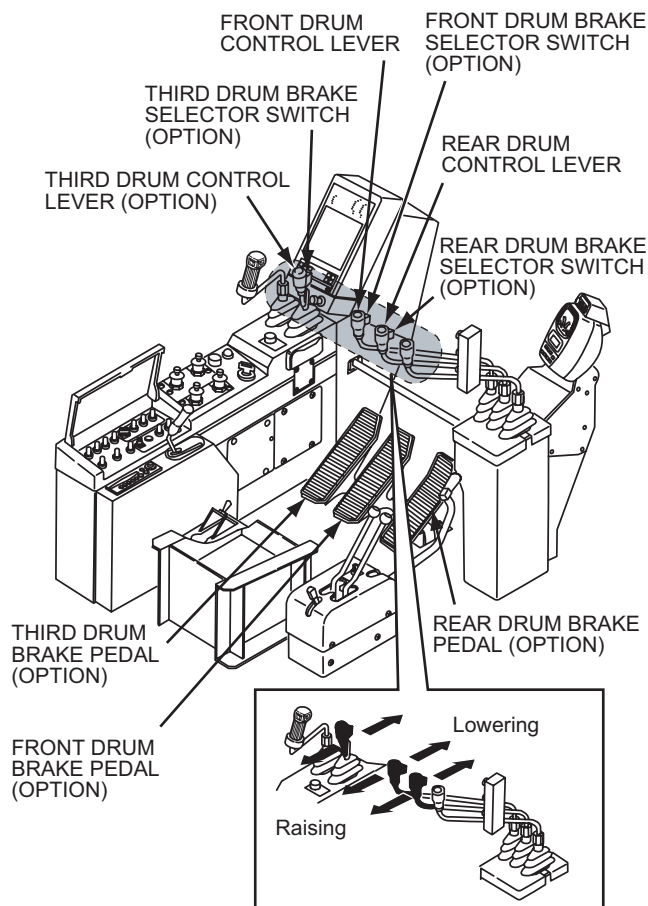
1. RAISING
Pull the drum control lever toward the raising side to hoist a load.
2. LOWERING
Push the drum control lever forward to lower the load.
When the hook is not lowered by operating the drum control lever to the lowering side, it is possible that the lock is engaged in the ratchet of the drum. In this case, slightly move the control lever to the raising side, then move to the lowering side again.
3. STOPPING
When the drum control lever is returned to the neutral position, the automatic brake operates to stop the load.
When the load is held in the air for a long time, engage the drum lock. To engage the drum lock, push and hold the button, and then fully pull the knob up.

WARNING

Always keep your foot on the brake pedal or set the brake pedal to the lock position, even when the neutral brake is used so that the foot pedal can be operated at any time. Failure to observe this precaution may result in serious injury or death.

Note

The inching of the raising/lowering using the brake pedal together with the drum control lever is impossible because of the brake system.



2. OPERATION

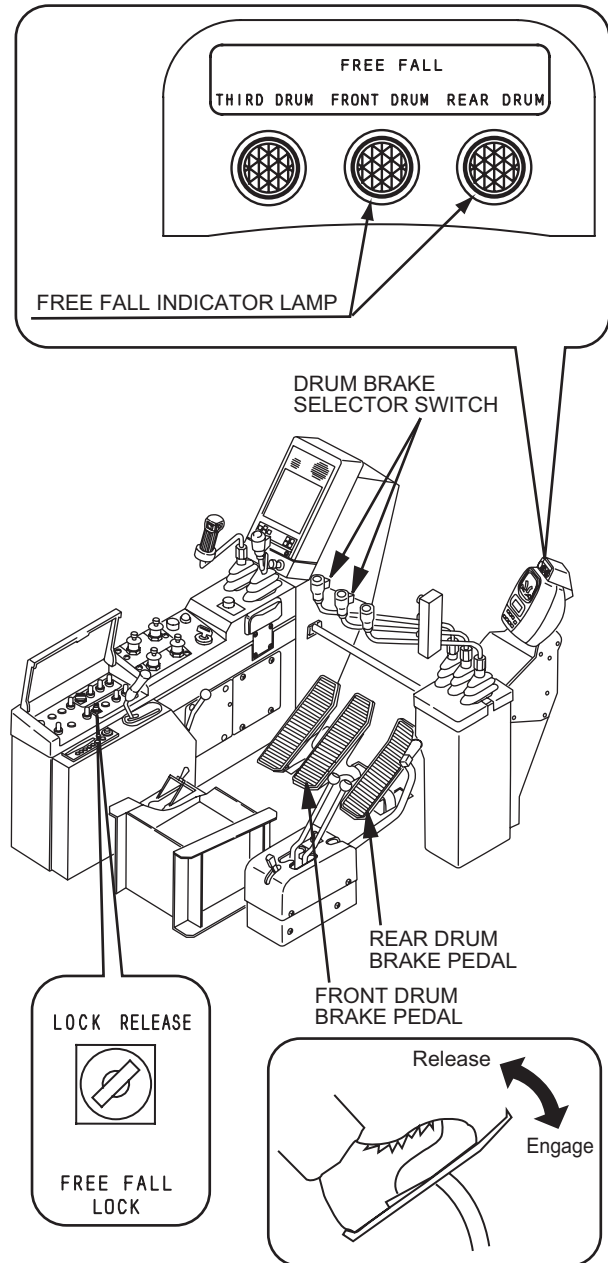
2.4 FREE FALL OPERATION

⚠ DANGER

- Do not perform operations in the **FREE FALL** mode until you have confirmed that the brake is functioning properly and will hold the load that will be lifted.
- Do not release your foot from the brake pedal when operating in the **FREE FALL** mode.
- Do not apply the foot brake suddenly, and avoid abrupt stops when lowering the hoist line while operating in the **FREE FALL** mode.
- Do not use the drum lock to stop the lowering of the hoist line while operating in the **FREE FALL** mode.
- Do not operate the lever while the load is being lowered during the free fall mode.
- Do not overheat the brake by operating in the **FREE FALL** mode repeatedly at high heights.

Failure to observe these precautions may result in serious injury or death.

The use of the free fall must be limited to excavating operations with the bucket. When lifting or lowering the bucket during the **FREE FALL** mode, be sure to follow the procedures below.



1. Set the "Free Fall Lock Switch" (with key in the left side stand) to the "Release" position.
2. Set the control lever to the neutral position, and with the brake pedal depressed fully, push the brake selector switch at once. The free fall indicator lamp lights up to indicate that the brake is in the free fall condition.

3. Raising
Pulling the drum control lever back, raising is possible even while the brake pedal remains depressed.
4. Lowering (Power Lowering)
After pushing the drum control lever forward, lowering is possible even while the brake pedal remains depressed.
5. Stopping
Depress the brake pedal, and return the drum control lever to the NEUTRAL position. The bucket is stopped.
When the load is held in the air for a long time, shift the switch from the "FREE FALL MODE" to the "NEUTRAL BRAKE MODE" position and engage the drum lock.
6. Free fall
 - (A) Depress the brake pedal fully.
 - (B) Return the drum control lever to the neutral position.
 - (C) Slowly release the brake pedal to free fall the bucket.
 - (D) Lowering speed is adjusted by adjusting pressure to the brake pedal.
 - When the depressed brake reaches to the specified position, the brake pedal slightly vibrates. If the brake pedal is depressed further from this position, the brake is activated.

 DANGER

Before operating the foot brake in the free fall position, be sure to confirm that the brake is functioning by depressing the brake pedal fully. Failure to observe this precaution may result in serious injury or death.

 CAUTION

DO NOT release the brake pedal while the hook placed on the ground FREE FALL ACCELERATION SELECTOR SWITCH set to the "HIGH" side.
Otherwise, the drum is automatically rotated in the lowering direction, leading to rope upsetting.

2. OPERATION

FREE BRAKE MODE SWITCHING		
	BRAKE→FREE	FREE→BRAKE
FUNCTION LOCK LEVER	WORK POSITION	WORK POSITION
FREE FALL LOCK SWITCH	RELEASE	RELEASE
DRUM CONTROL LEVER	NEUTRAL	NEUTRAL
BRAKE PEDAL	DEPRESS	DEPRESS
BRAKE SELECTOR SWITCH	PUSH (ONCE)	PUSH (ONCE)
FREE LAMP	LIGHT UP	GOES OUT
MODE	FREE	BRAKE

(7) Switching from "FREE FALL MODE" to "BRAKE MODE"

While the "FREE FALL MODE" is selected, set the drum control lever to the NEUTRAL position, and fully depress the brake pedal. Push the brake selector switch on the control lever again.

The free fall indicator lamp goes out to indicate that the "BRAKE MODE" is selected.

Note

- When a light bucket is lowered during the free fall mode in cold weather, the lowering speed may be slow. While engaging the drum lock, winch down to warm-up the hydraulic oil (perform this step for approximately five minutes).
- If the feel of brake operation changes after the hydraulic oil is changed, contact your nearest KOBELCO authorize distributor.

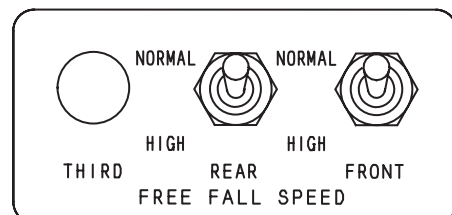
CAUTION

Do not use the FREE FALL ACCELERATION SELECTOR SWITCH during the free fall of heavy-weight loads. Otherwise, a great shock may occur when the free fall speed is changed.

Note

When the brake is released with the FREE FALL ACCELERATION SELECTOR SWITCH in "HIGH" position, the drum pays out without load.

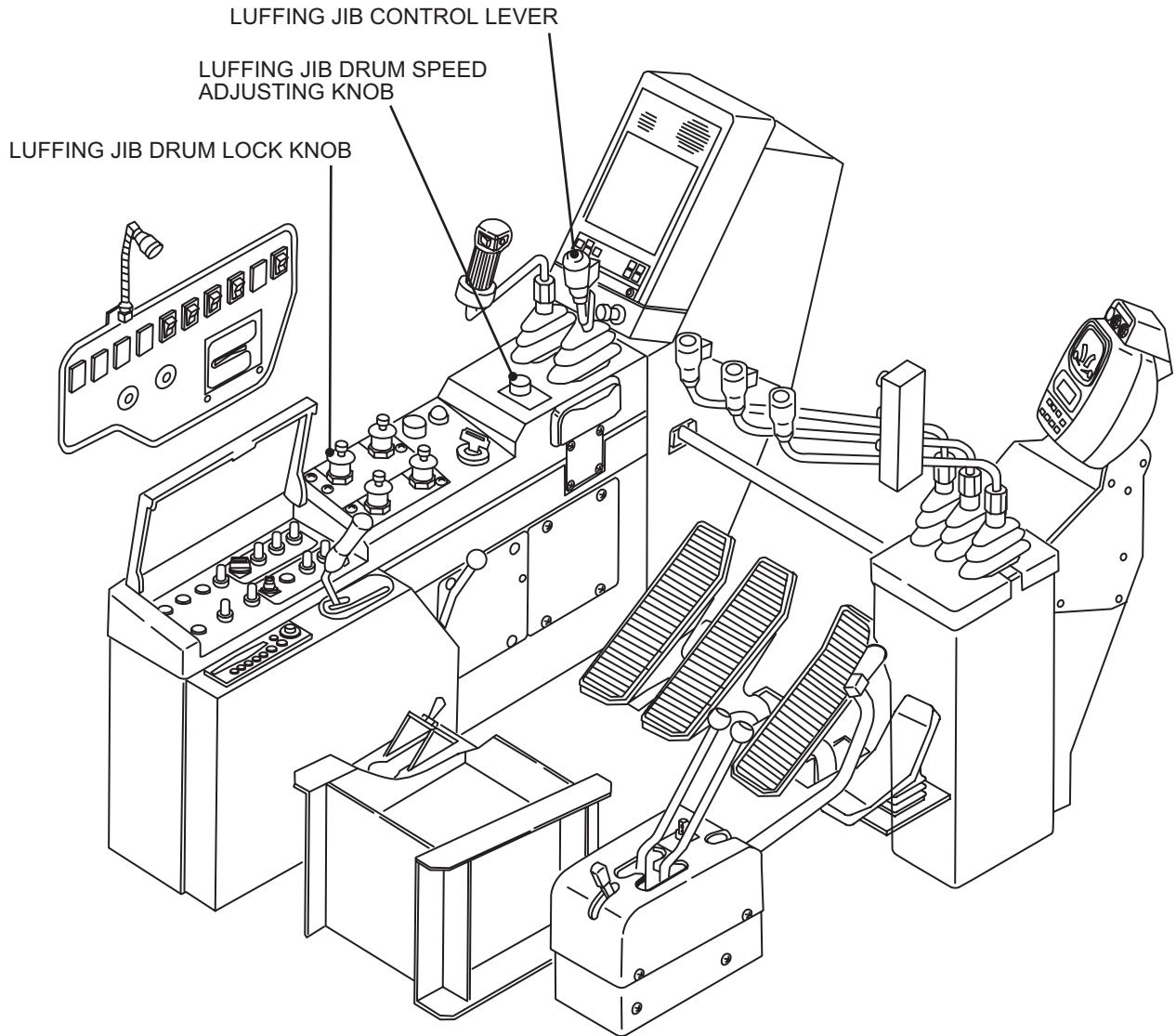
Be sure to set the FREE FALL ACCELERATION SELECTOR SWITCH to the "NORMAL" position when spooling out the wire rope.



2.5 LUFFING JIB OPERATION

Controls peculiar to luffing jib operation are described here.

Use the third drum for hoisting the luffing jib.



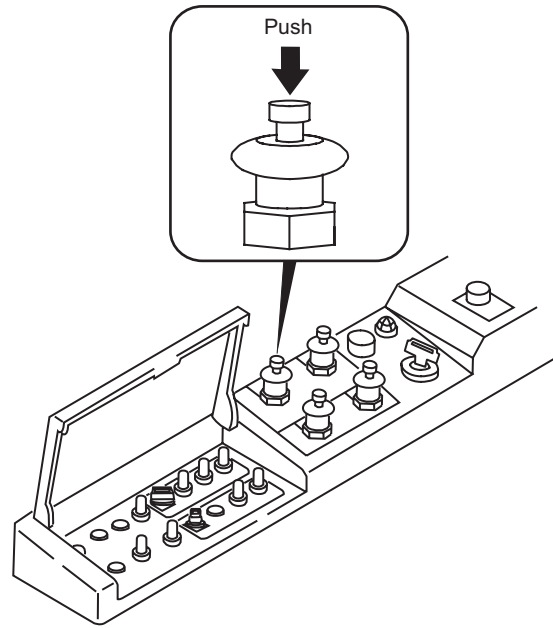
2. OPERATION

2.5.1 JIB RAISING/LOWERING OPERATION

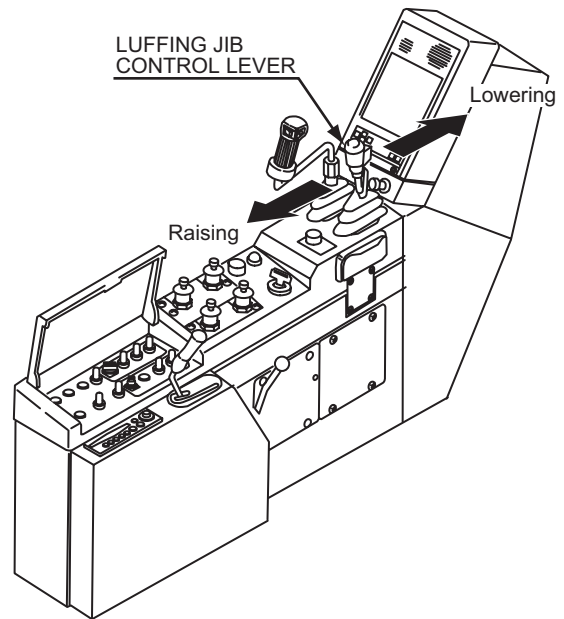
WARNING

Before operating the jib ensure the area above and beneath the jib clear of all obstructions and personnel.

Failure to observe this precaution may result in serious injury or death.



1. Release the drum lock.



2. Push the jib hoist control lever forward to lower the jib, and pull the lever backward to raise the jib.

WARNING

The load line can break if the hook block contacts the end of the jib. This is called "two blocking". Two blocking can be caused by lowering the jib without paying out load line. Two blocking can pull jibs and jib over backwards or cause damage to the tip.

Always keep adequate space between the hook block and jib point. Lower the hook when lowering the jib.

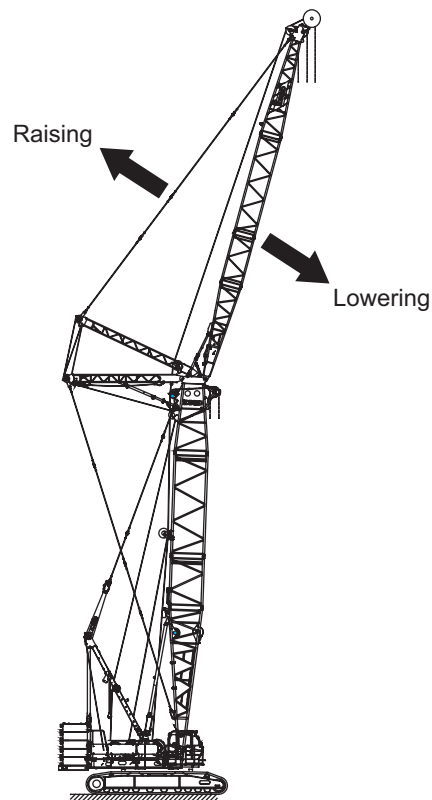
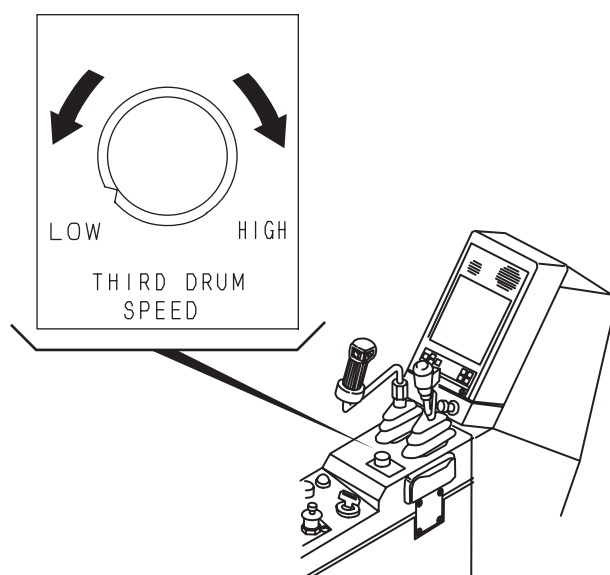
Failure to observe this precaution may result in serious injury or death.

When the jib is not lowered even by operating the jib hoist control lever to the jib lowering side, it is considered that the drum lock is engaged in the ratchet of the drum. In this case, move the jib hoist control lever to the jib raising side slightly, then move the lever to the lowering side again.

DANGER

Do not actuate the drum lock while the jib is lowered. Otherwise, the drum or drum lock may be damaged.

3. According to the working condition, adjust the speed of the drum with the drum speed adjusting knob.
4. When the luffing jib approaches the upper limit angle, the hoisting speed is reduced. The angle to start the speed reduction differs depending on the engine revolution; accordingly make sure to reduce the speed approximately 10 degrees before the upper limit angle in the case of HIGH IDLE and approximately 3 degrees before the upper limit angle in the case of LOW IDLE.



5. Be sure to stop the engine, and engage the drum lock before leaving the operator seat. To engage the drum lock, shift the drum lock switch to the lock side.

2. OPERATION

2.5.2 HOOK HOIST DRUM CONTROL

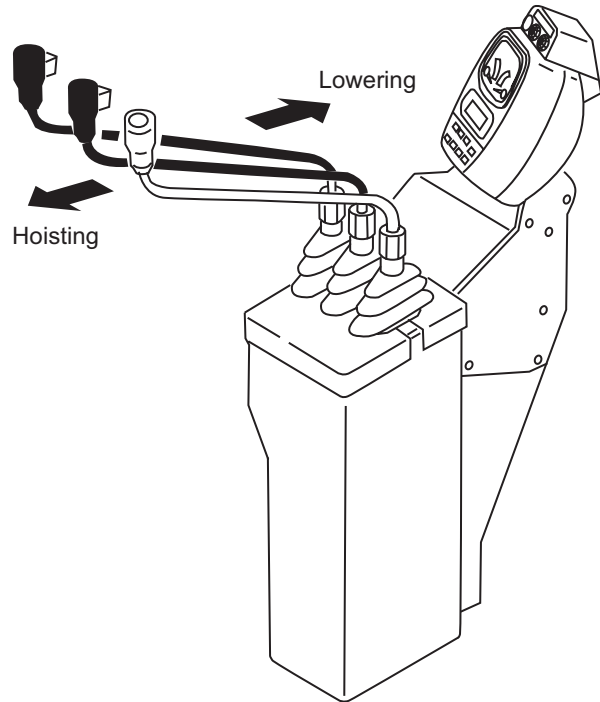
CAUTION

When hoisting load, always observe the provided rated load chart.

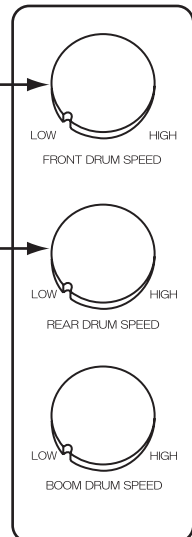
Hoisting and lowering speed can be adjusted by the accelerator grip and/or the drum control lever.

Maximum hoisting and lowering speed can be set with the hoist drum speed select switch.

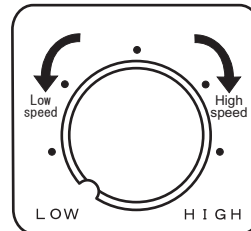
Release the drum lock.



FRONT DRUM SPEED
ADJUSTING KNOB



REAR DRUM SPEED
ADJUSTING KNOB



HOOK RAISING/LOWERING
SPEED ADJUSTING KNOB

HOOK HOIST DRUM CONTROL**1. RAISE**

Pull the hook hoist drum lever backward to raise the load.

2. LOWER

Push the hook hoist drum lever forward to lower the load.

Even when the hook hoist drum lever is pushed forward and load is not lowered, the drum lock pawl may be engaged with the ratchet of the drum. In this case move the lever slightly for the raising side and then for the lowering side.

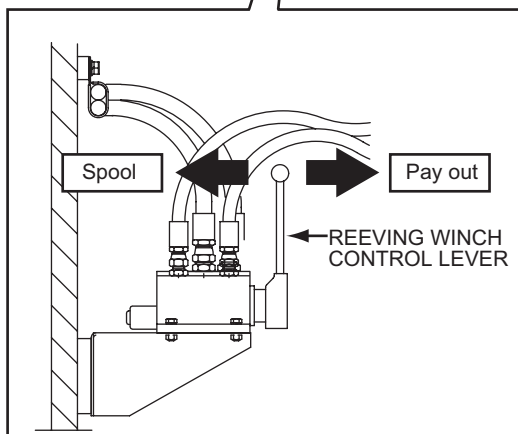
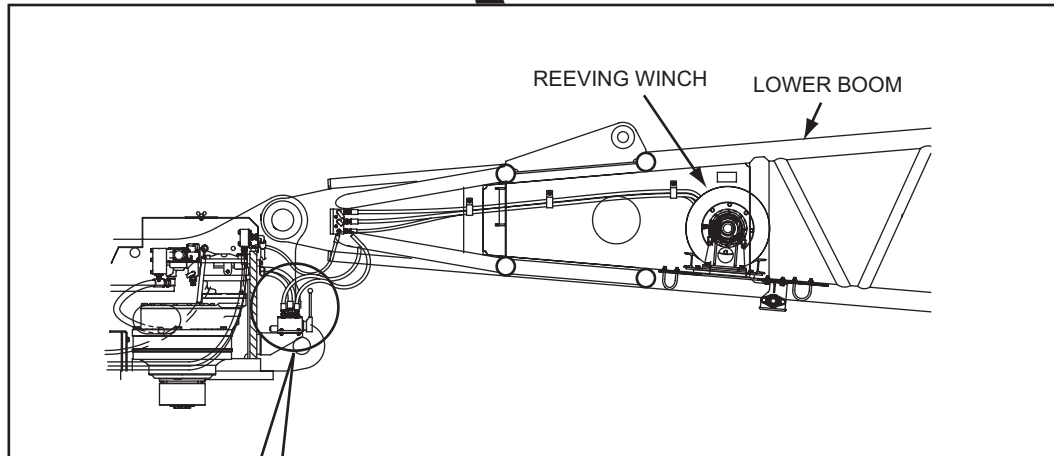
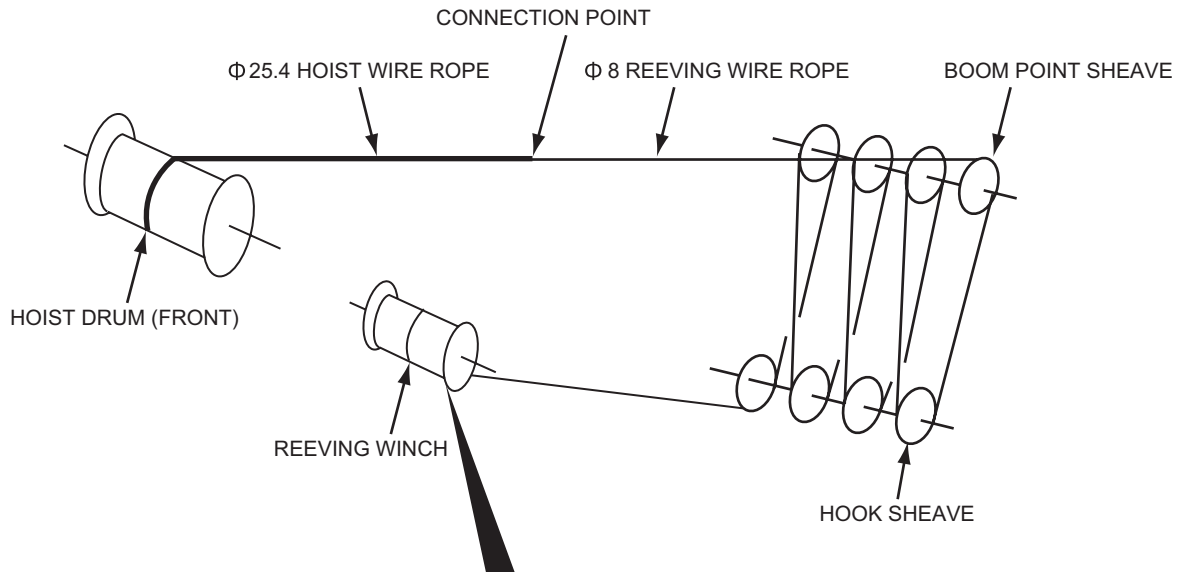
3. STOP

Return the hook hoist drum control lever to the neutral position to set the brake automatically and to hold the load. Set the drum pawl lock when the load will be suspended in the air for the long time.

2. OPERATION

2.6 HANDLING OF REEVING WINCH (OPTION)

Use the reeving winch when reeving the hoist wire rope through the boom point sheaves and the hook sheaves.



1. Set the hydraulic selector switch, located on the left stand panel in the operator's cab to the "REEVING WINCH" position.

2. Start the engine and swing the reeving winch control lever backward of the machine. The wire rope is wound.
To pay out the wire rope, swing the control lever forward of the machine.

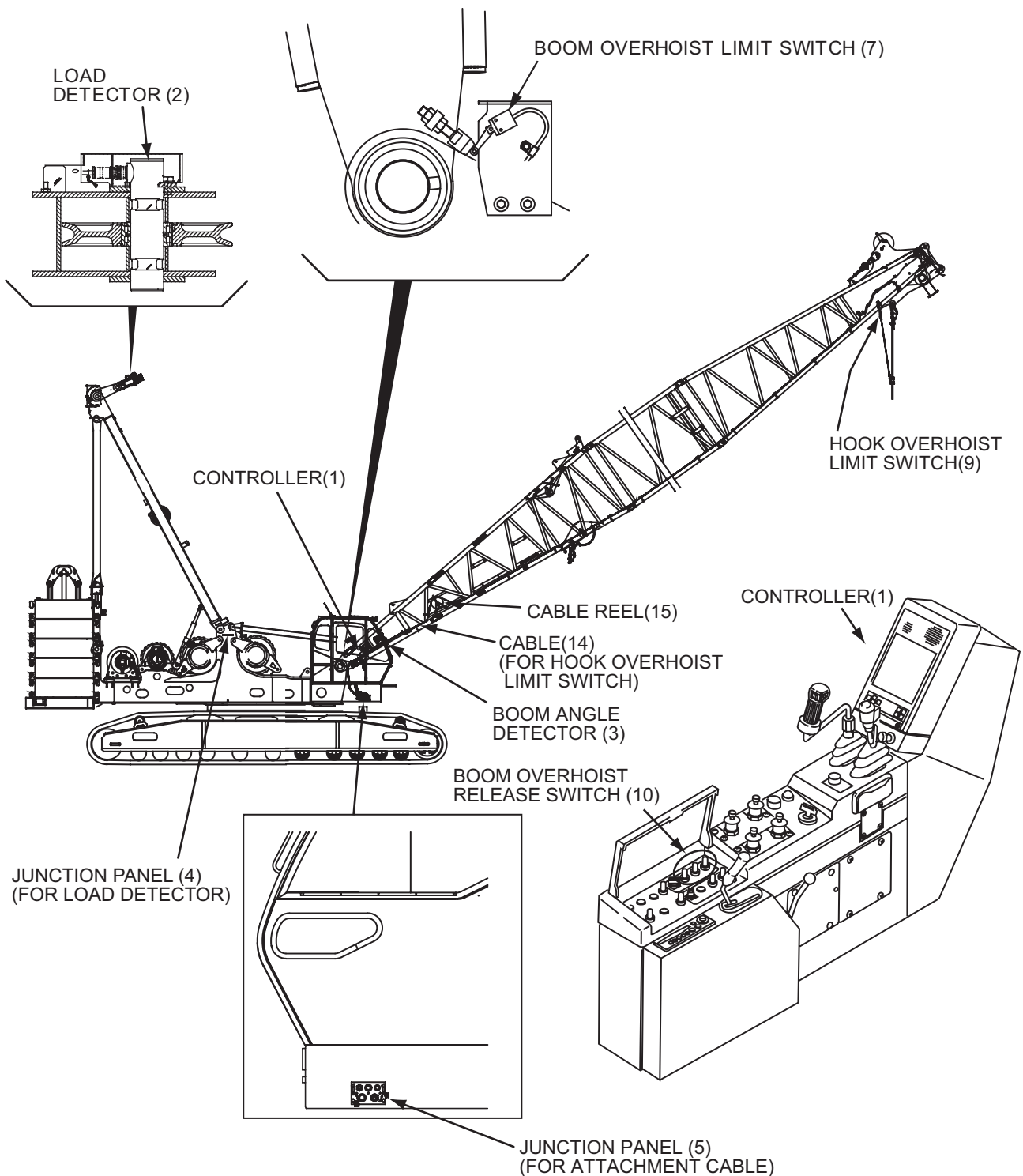
3. LOAD SAFETY DEVICE

The Load Safety Device (Prevention device from Overload and Overhoist condition) is a safety device which is provided in order to prevent damage to the machine and/or overturn accident due to an overload. Therefore, be sure to use this device in order to perform crane operation more safely. Descriptions in this chapter are applicable to the typical model, and illustrations and displayed values may differ from those of the model actually used. In such a case, take them as references.

3.1 ARRANGEMENT OF EQUIPMENTS

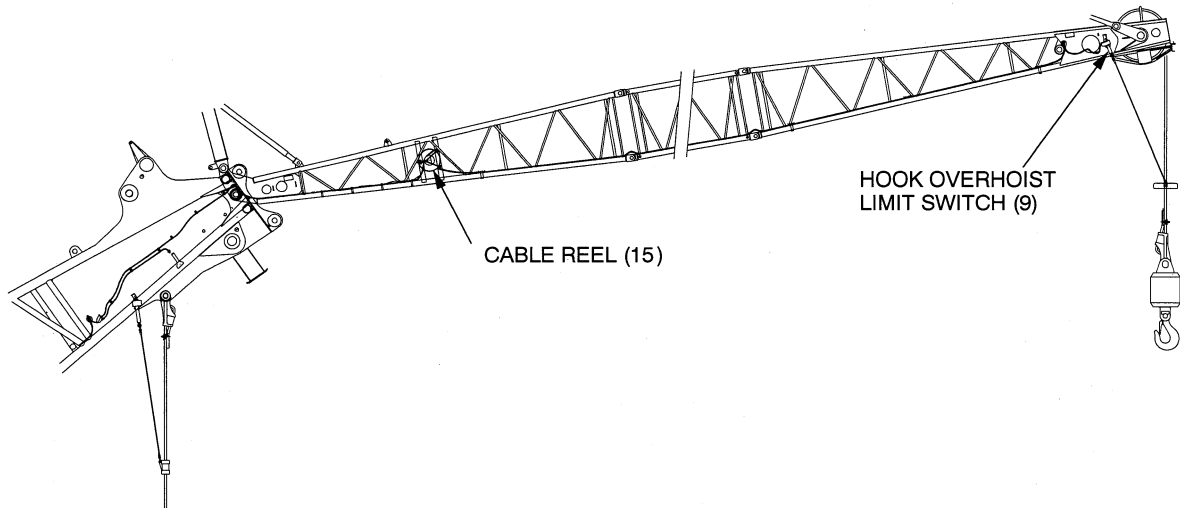
The item numbers of part names in the figure of arrangement of equipments correspond to the numbers in the description up to topic 3.4.

BOOM

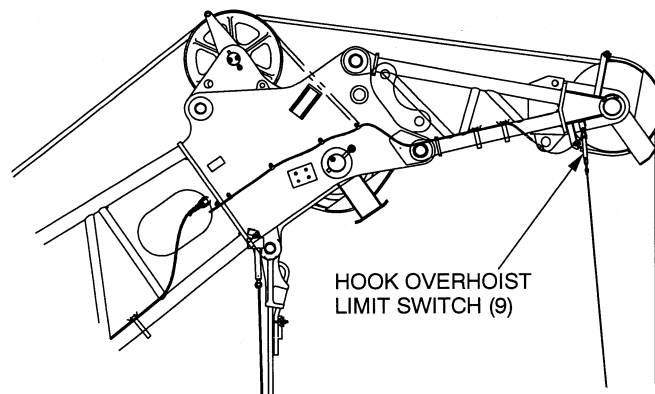


3. LOAD SAFETY DEVICE

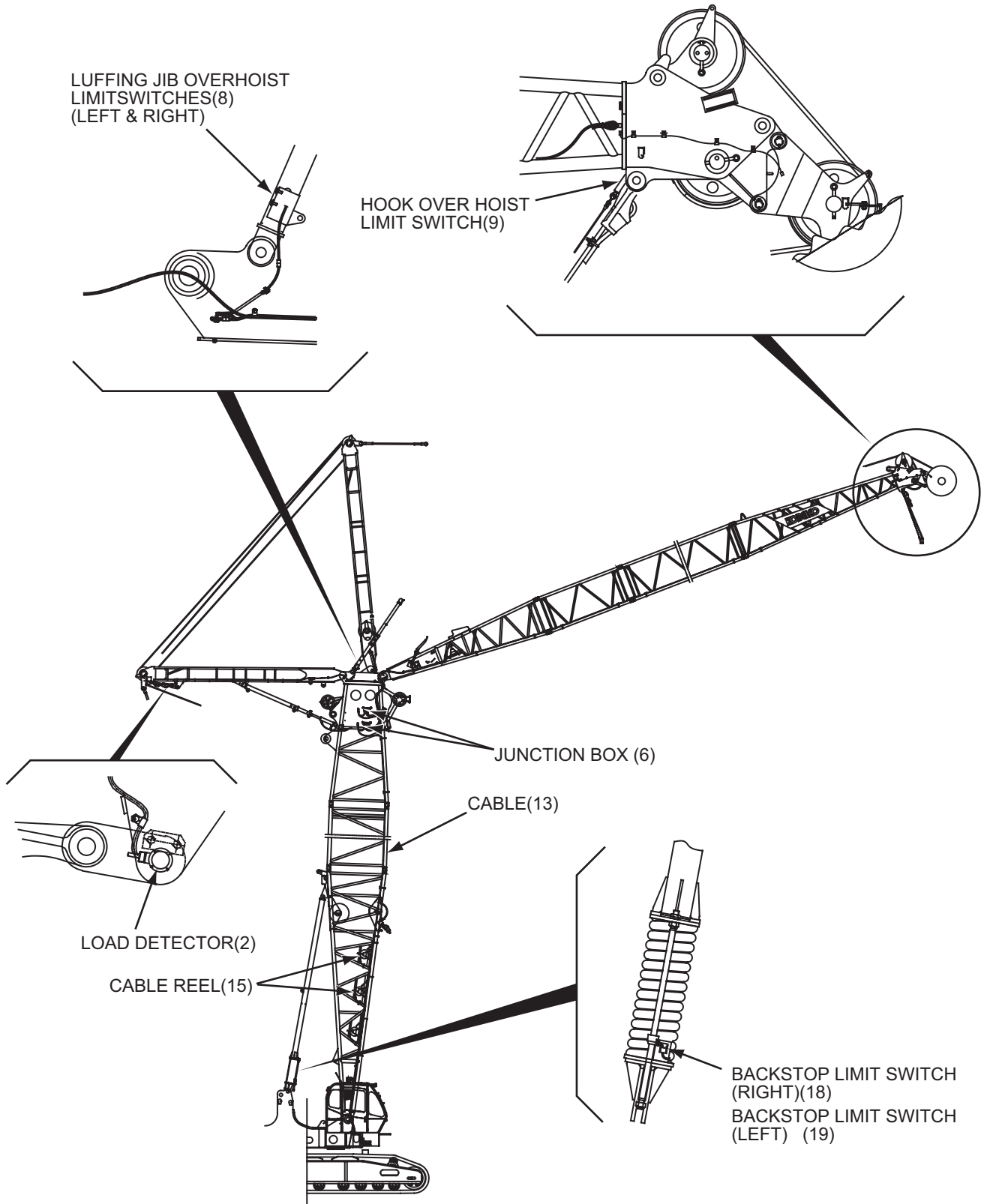
JIB



AUXILIARY SHEAVE

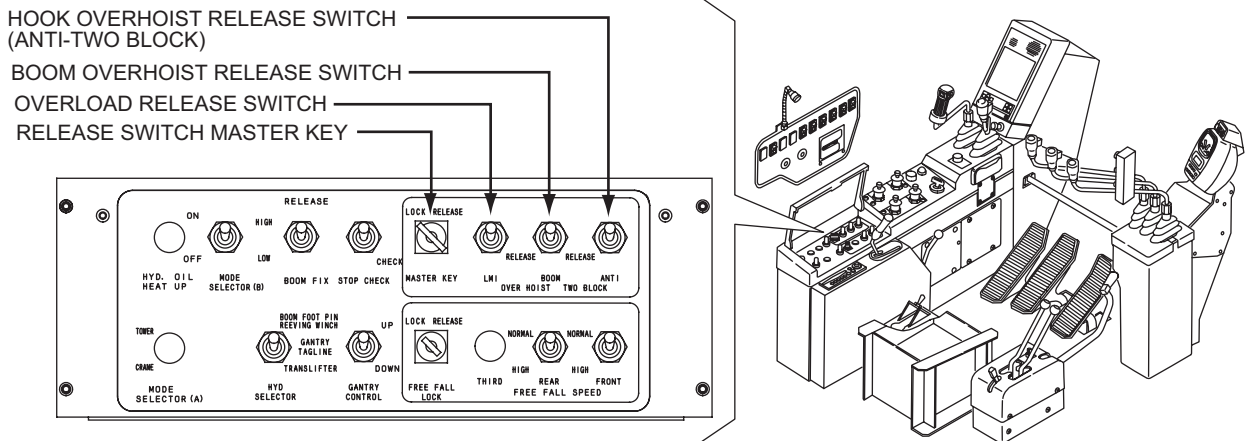


LUFFING

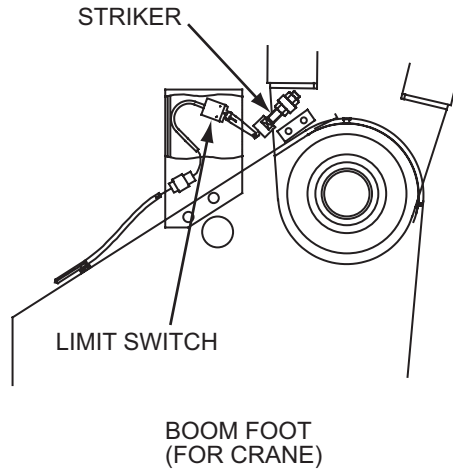


3. LOAD SAFETY DEVICE

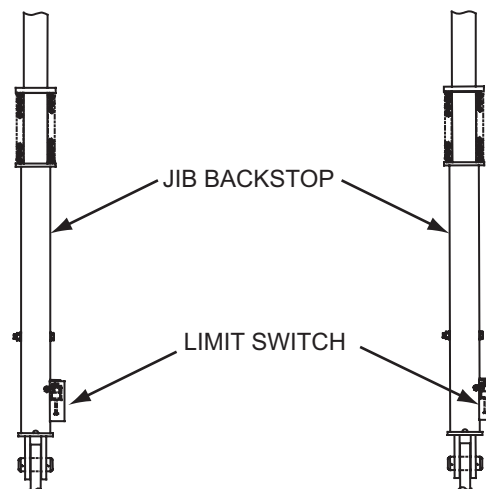
DETAIL OF OPERATOR'S ROOM INSIDE



DETAIL OF BOOM AND LUFFING BOOM OVERHOIST LIMIT SWITCH



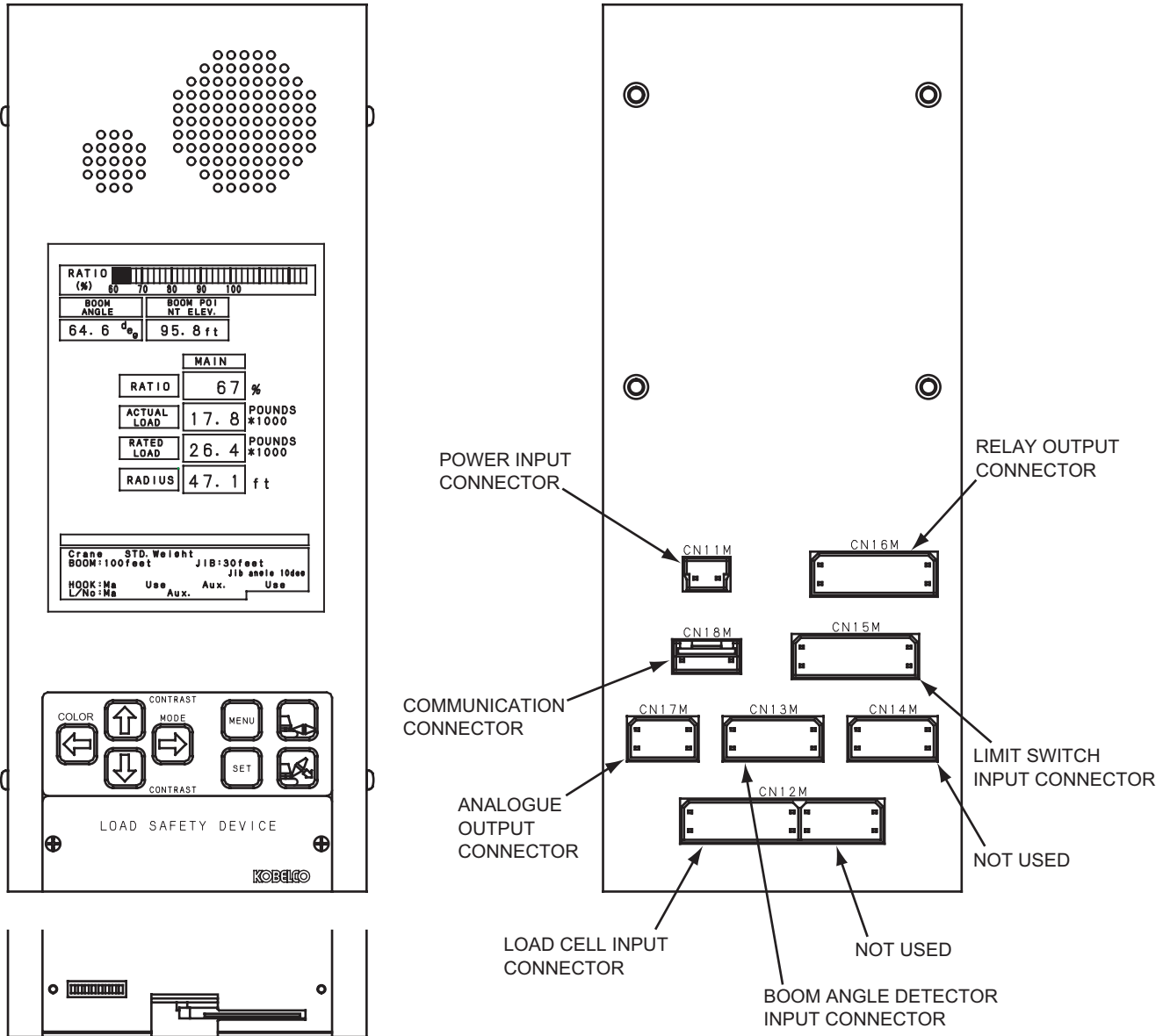
DETAIL OF LUFFING JIB OVERHOIST LIMIT SWITCH



3.2 TYPE AND FUNCTIONS OF EQUIPMENTS

CONTROLLER/MONITOR (1)

This figure indicates the machine condition, and issues the signals for the alarms and stop.



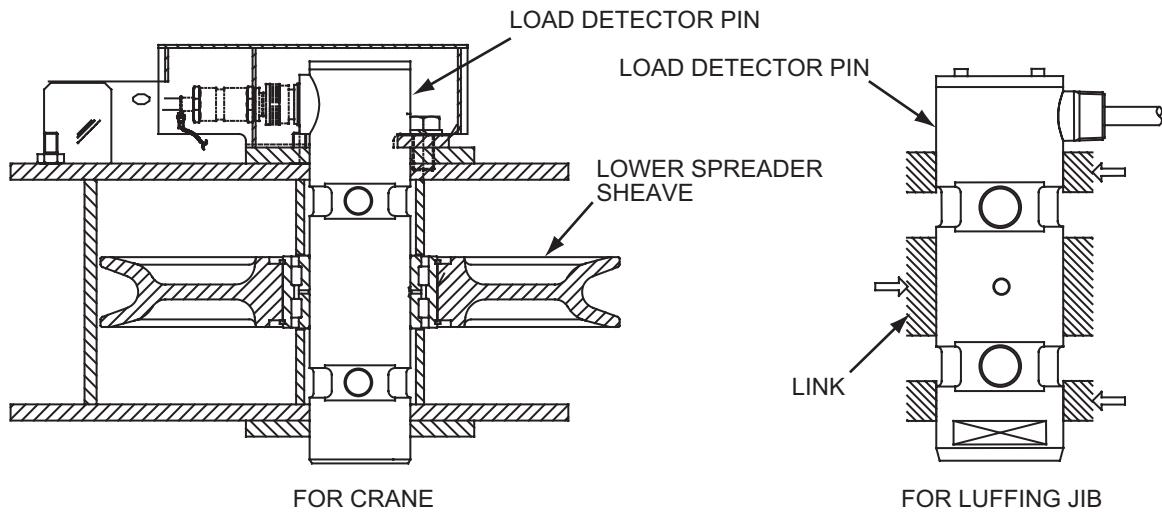
Note

All numeral value in the (1) DISPLAY in the chapter 3.LOAD SAFETY DEVICE give an example only.

3. LOAD SAFETY DEVICE

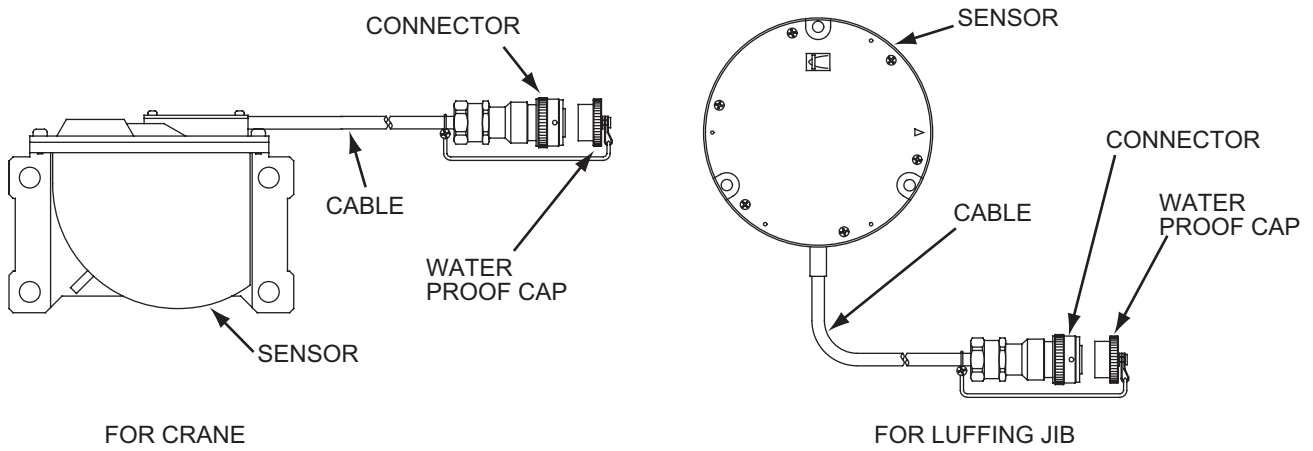
LOAD DETECTOR (2)

This pin detects load.



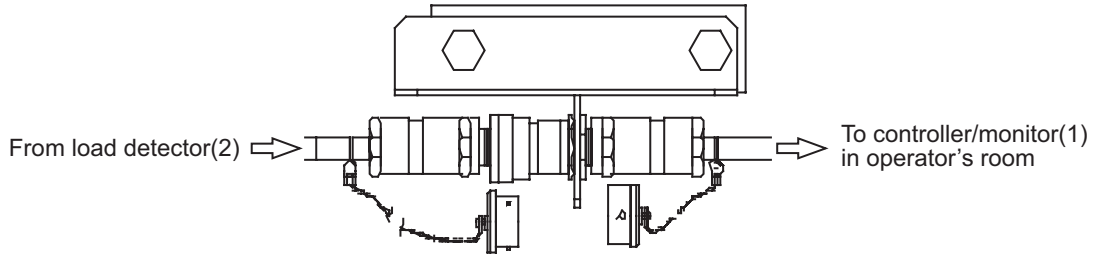
ANGLE DETECTOR (3)

This device detects the angle of boom.



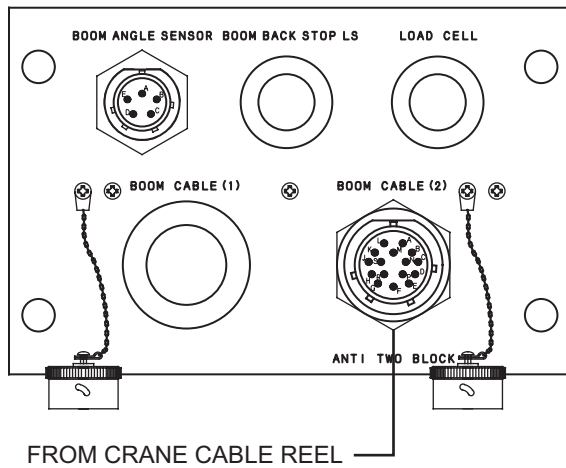
JUNCTION PANEL FOR LOAD DETECTOR (4)

This is junction panel for the cable from the load detector and the cable from the operator's room.

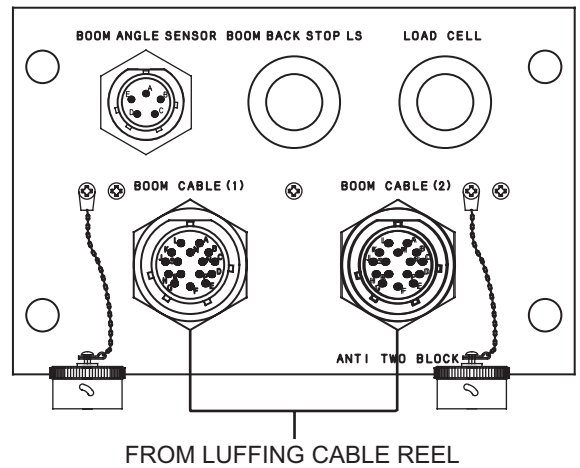


ATTACHMENT JUNCTION PANEL (5)

This is the junction of the cable from the attachment detector and the cable in the operator's room.

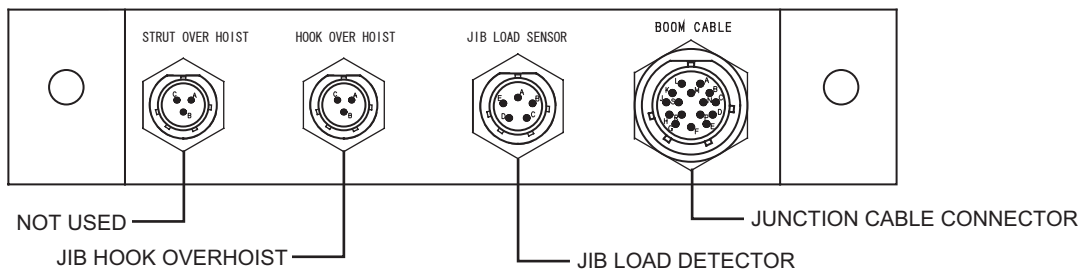
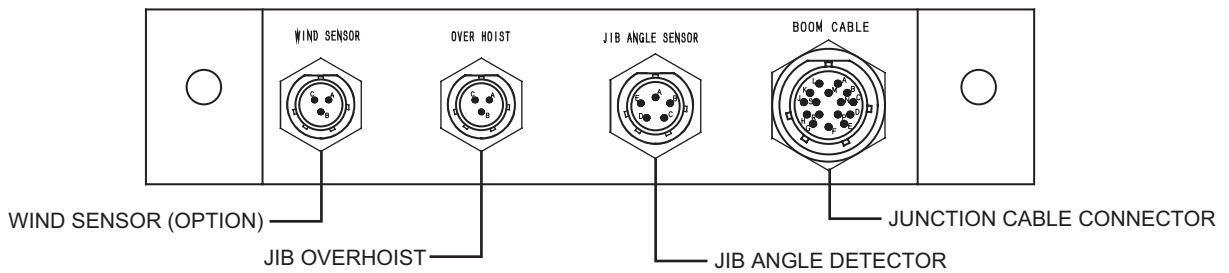


CRANE



LUFFING

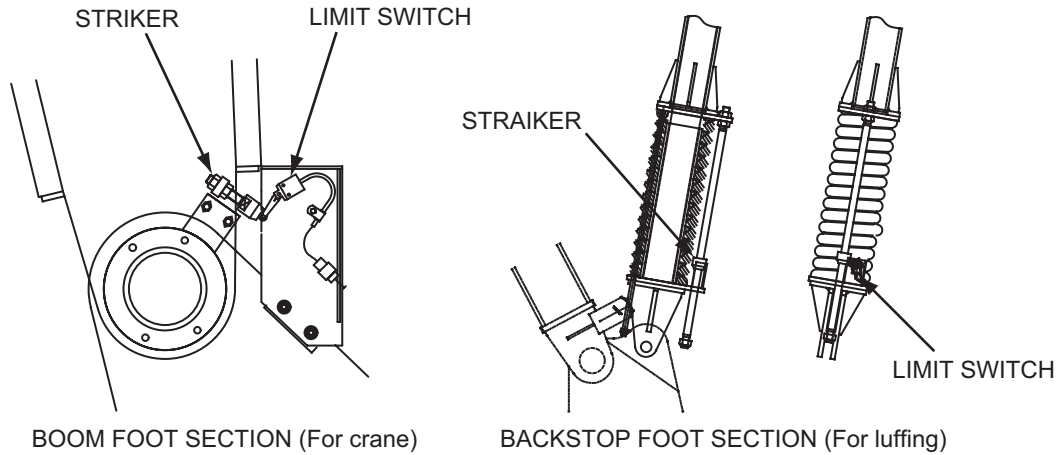
LUFFING CABLE JUNCTION BOX (6)



3. LOAD SAFETY DEVICE

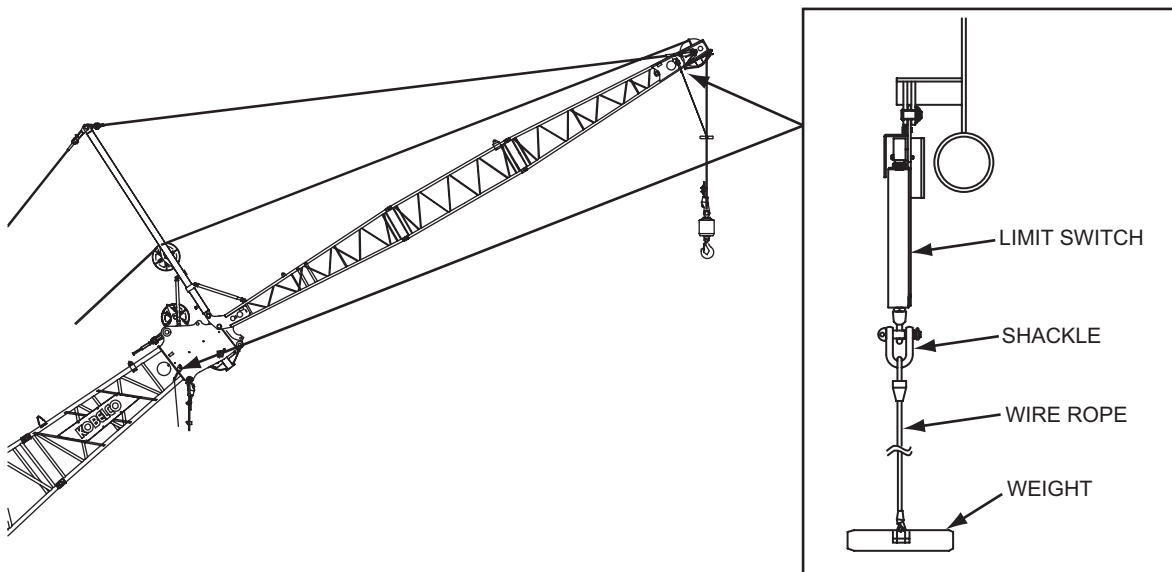
BOOM (LUFFING BOOM) OVERHOIST LIMIT SWITCH (7)(18)(19)

This switch prevents the boom from overhoisting. When the boom hoist operation is stopped by the boom overhoist limit switch at approximately 84.0 degree boom angle (In the luffing mode, the boom is automatically stopped by the right limit switch of the backstop foot section at approximately 88.2 degree boom angle, while it is stopped by the left limit switch at approximately from 89.0 degree to 89.2 degree boom angle.), the stop function cannot be released by the boom overhoist release switch.



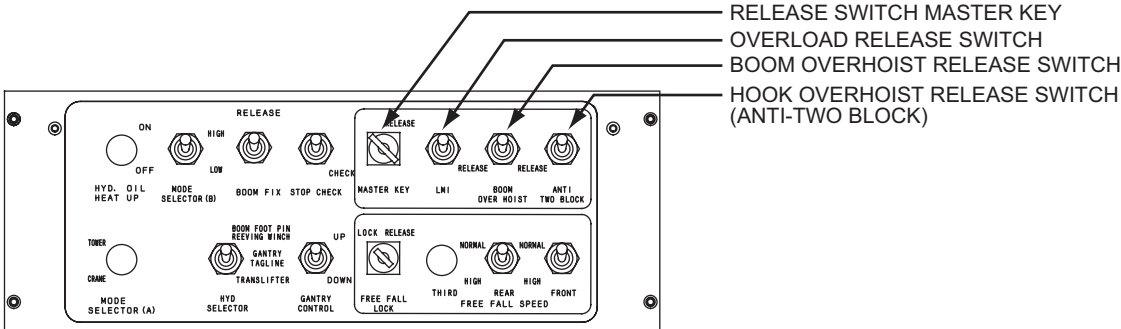
HOOK OVERHOIST LIMIT SWITCH (9)

This switch prevents the hook overhoisting.



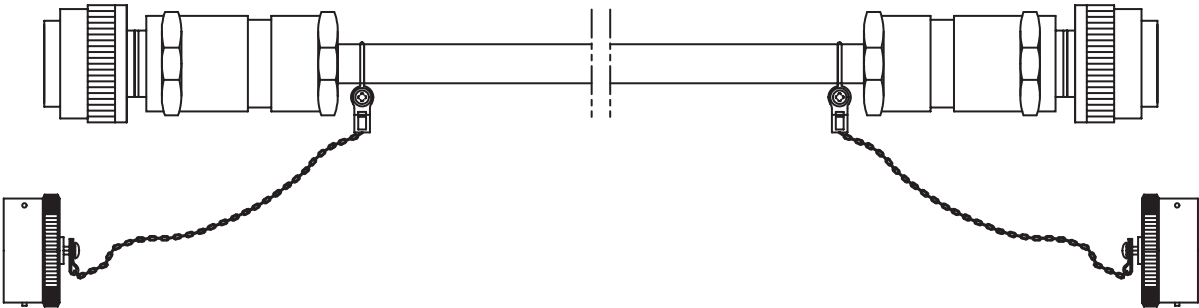
RELEASE SWITCH (10)

This switch is used to release automatic stop by safety device.



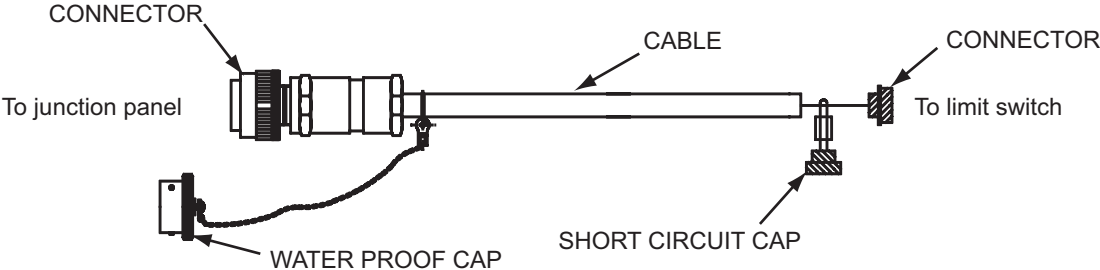
LUFFING JUNCTION CABLE (13)

This cable connects the luffing junction box (6) and the attachment junction box (5).



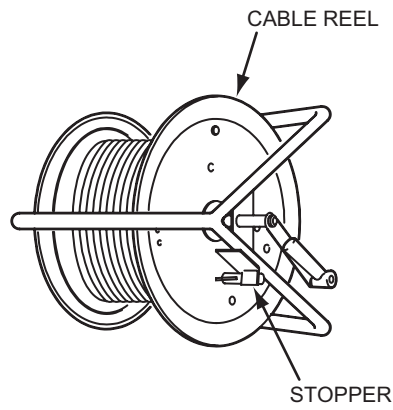
CABLE FOR HOOK OVERHOIST LIMIT SWITCH (14)

This cable connects the limit switch and the junction panel.



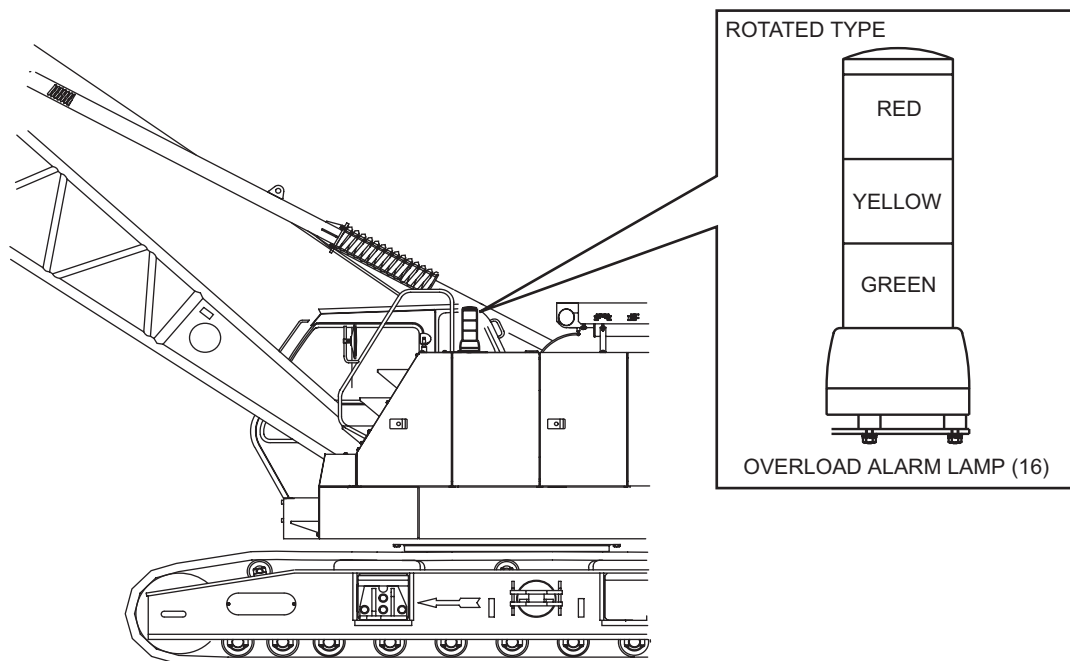
3. LOAD SAFETY DEVICE

CABLE REEL (15)



OVER LOAD ALARM LAMP (16) (OPTION)

Indicated status	Red	Yellow	Green
Loading ratio is less than 90 %			○
Loading ratio ranges from 90 % to 100 %		○	
Loading ratio is 100 % or more	○		
Hook overhoist			○
Boom overlowering	○		
Boom overhoist			○
Tower jib overhoist			○
Tower jib overlowering	○		
Assembly posture (at assembly and disassembly)	○		
While the overload release switch is actuated	○		

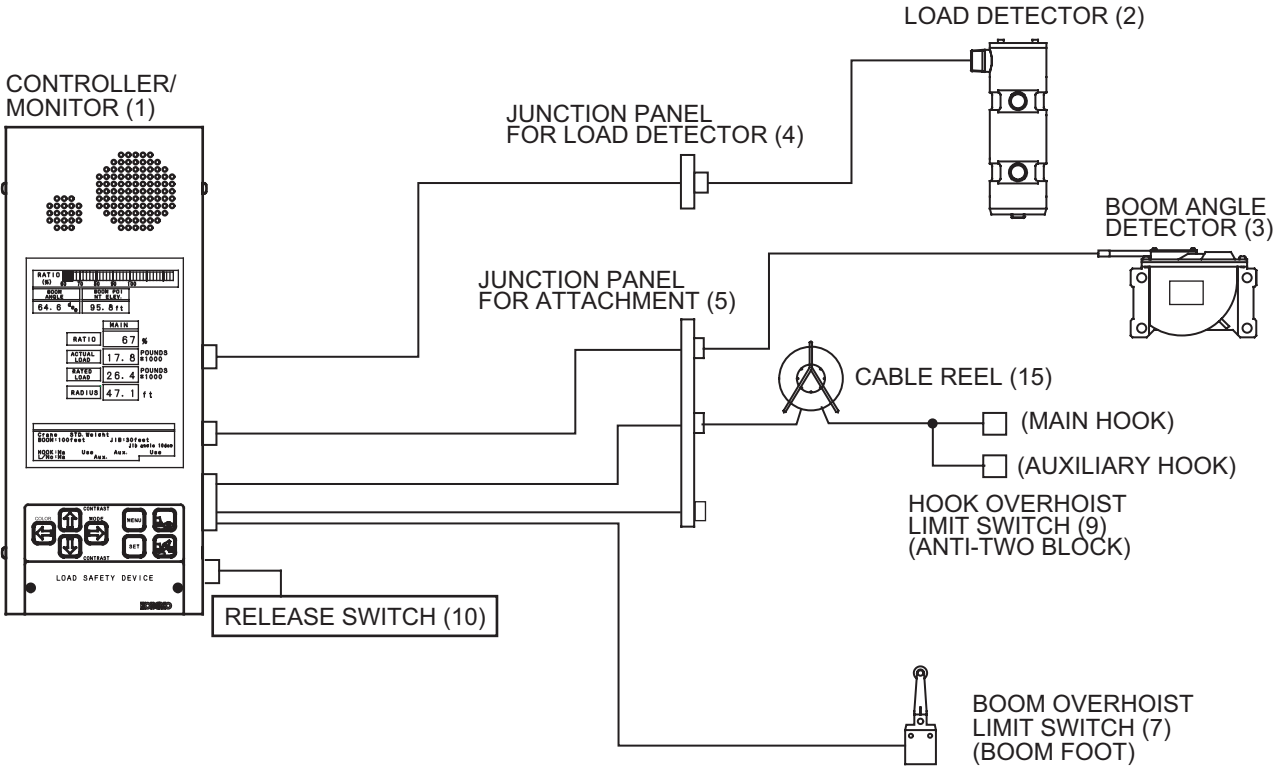


3.3 CONNECTING PROCEDURE OF WIRING

3.3.1 CRANE ATTACHMENT

DIAGRAM OF SYSTEM

1. CRANE ONLY



3. LOAD SAFETY DEVICE

2. CONNECTING PROCEDURE

CAUTION

The cable should be handled with care in order to avoid damage.

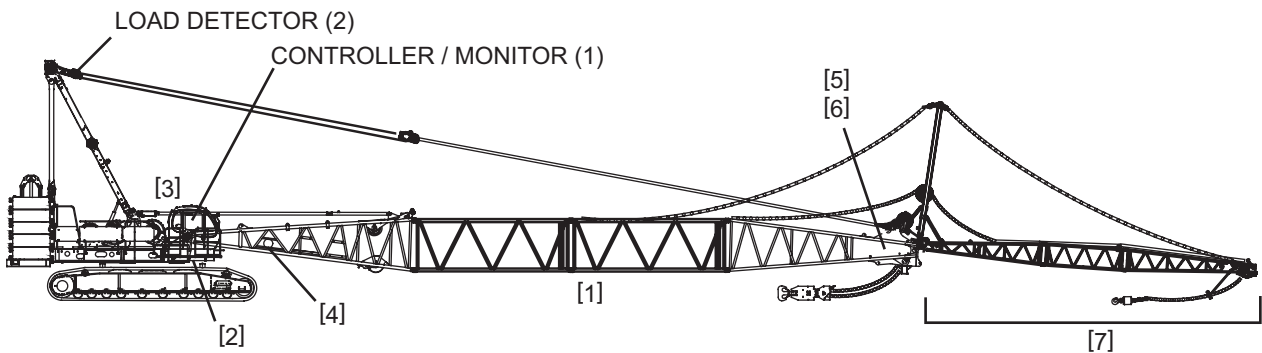
When assembling the basic machine and attachment, make the connections as follows. And, when disassembling, disconnect the connectors in the reverse order.

CAUTION

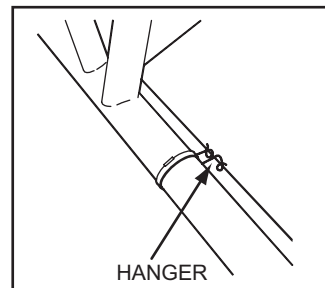
Overload preventive device may not work correctly if water enters into connectors.

When making the connections, in order to prevent water from entering,

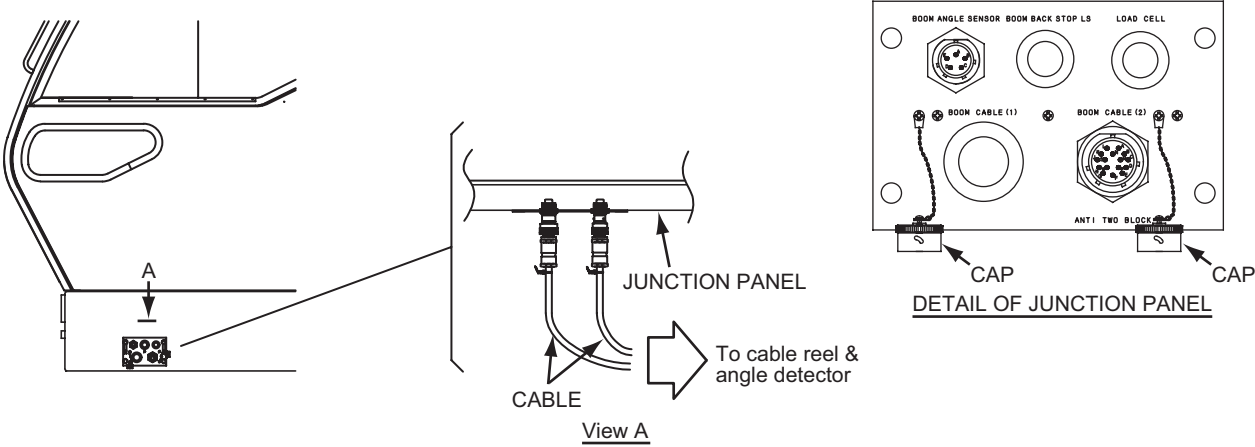
1. Tighten with hands fully.
2. Connect the removed caps together.
3. After disconnecting, install the cap securely.



[1] Fix the junction cables and cables for the limit switches to the boom and jib with the hangers.



[2] CONNECTING ATTACHMENT HARNESS TO BODY HARNESS

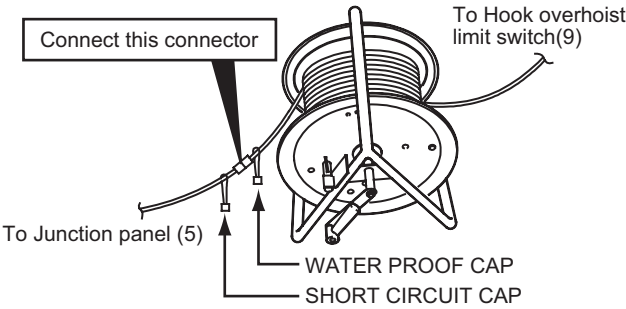


[3] CONNECTING JUNCTION PANEL (4) FOR LOAD DETECTOR



[4] CONNECTING CABLE REEL (15)

- FOR OPERATING CRANE

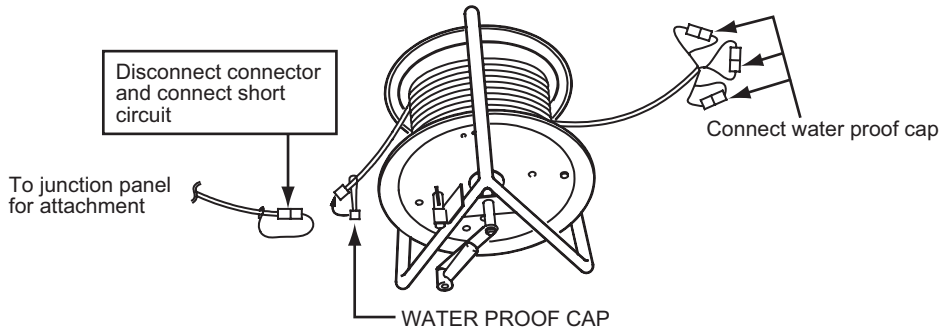


WARNING

Do not operate crane with short circuit cap, connect. Failure to observe this precaution may lead to automatic stop and alarm unable to work in event of hook overhoist and may lead to serious injury or death.

3. LOAD SAFETY DEVICE

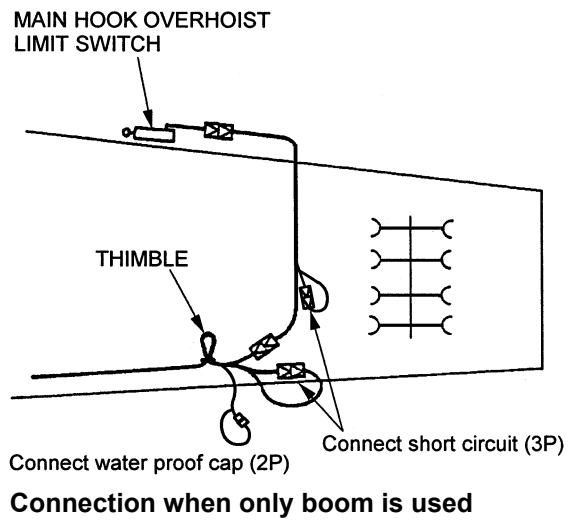
- FOR TRANSPORTATION



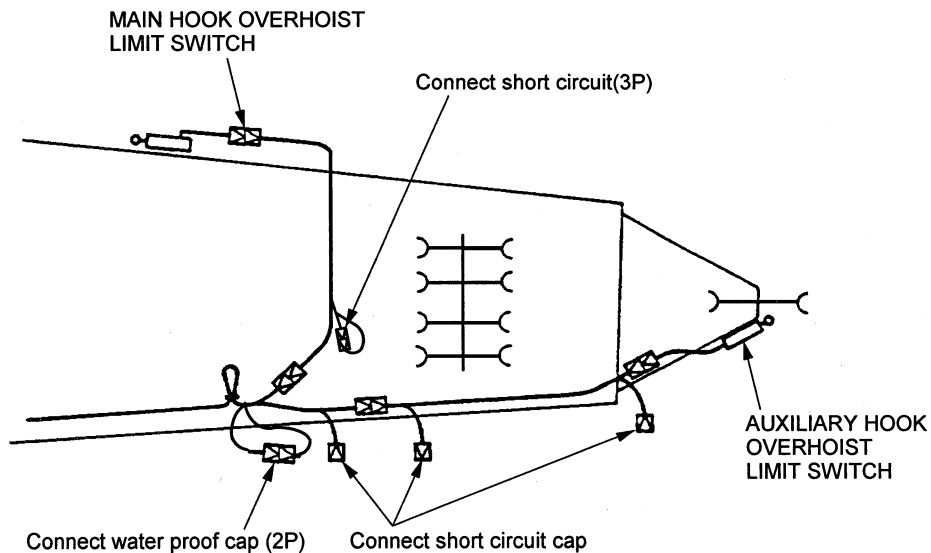
[5] CONNECTION OF CABLES AT BOOM TIP SECTION

Note

A thimble hook for supporting the cable is provided on the boom tip section. If the cable is not hung to this hook, unreasonable force is loaded to the connector for connecting the hook limit switch. Be sure to hang the thimble to this hook.

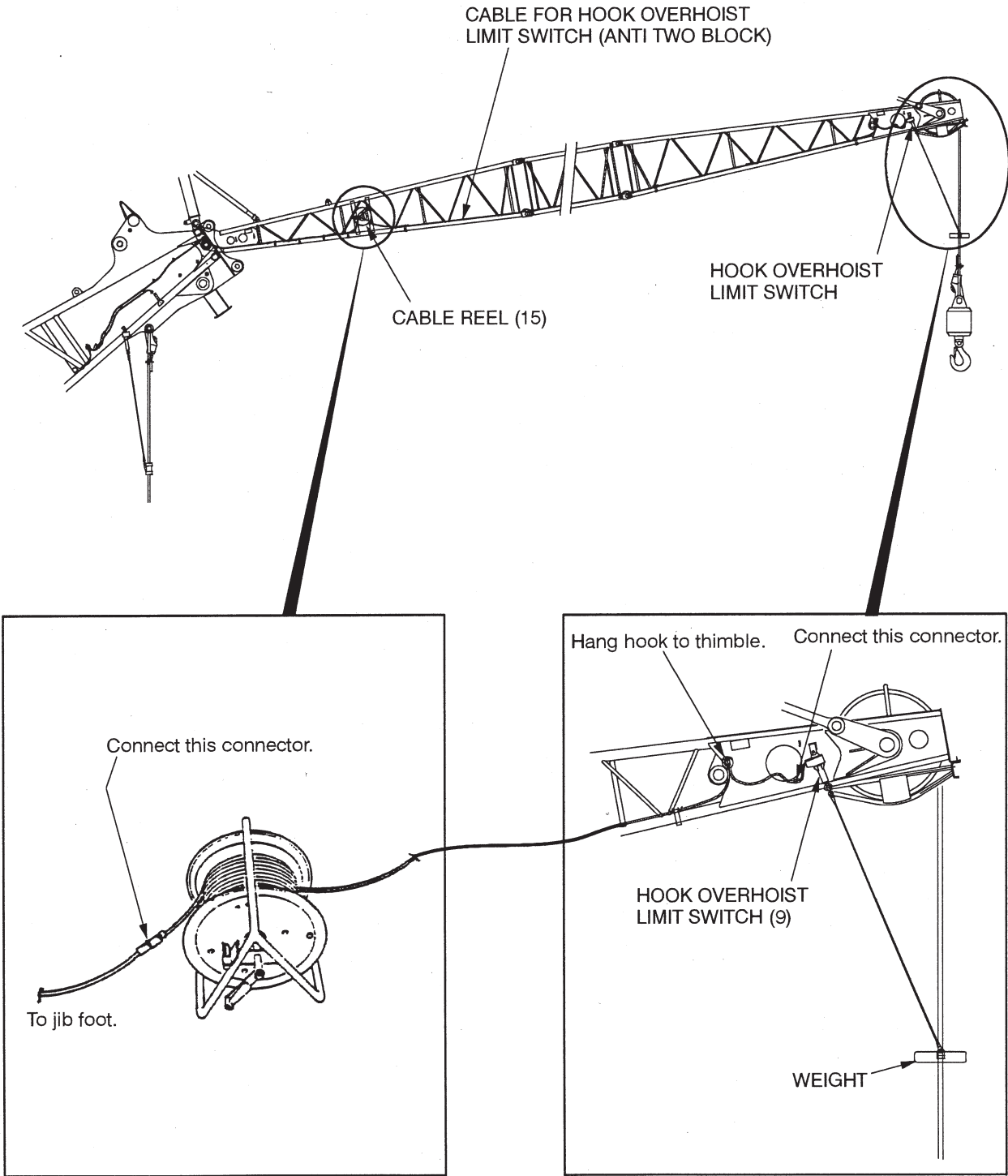


[6] CONNECTION OF THE HOOK OVERHOIST LIMIT SWITCH SECTION



Connection when auxiliary sheave is attached to boom.

[6] CONNECTION AT THE JIB SECTION (WITH FIXED JIB)



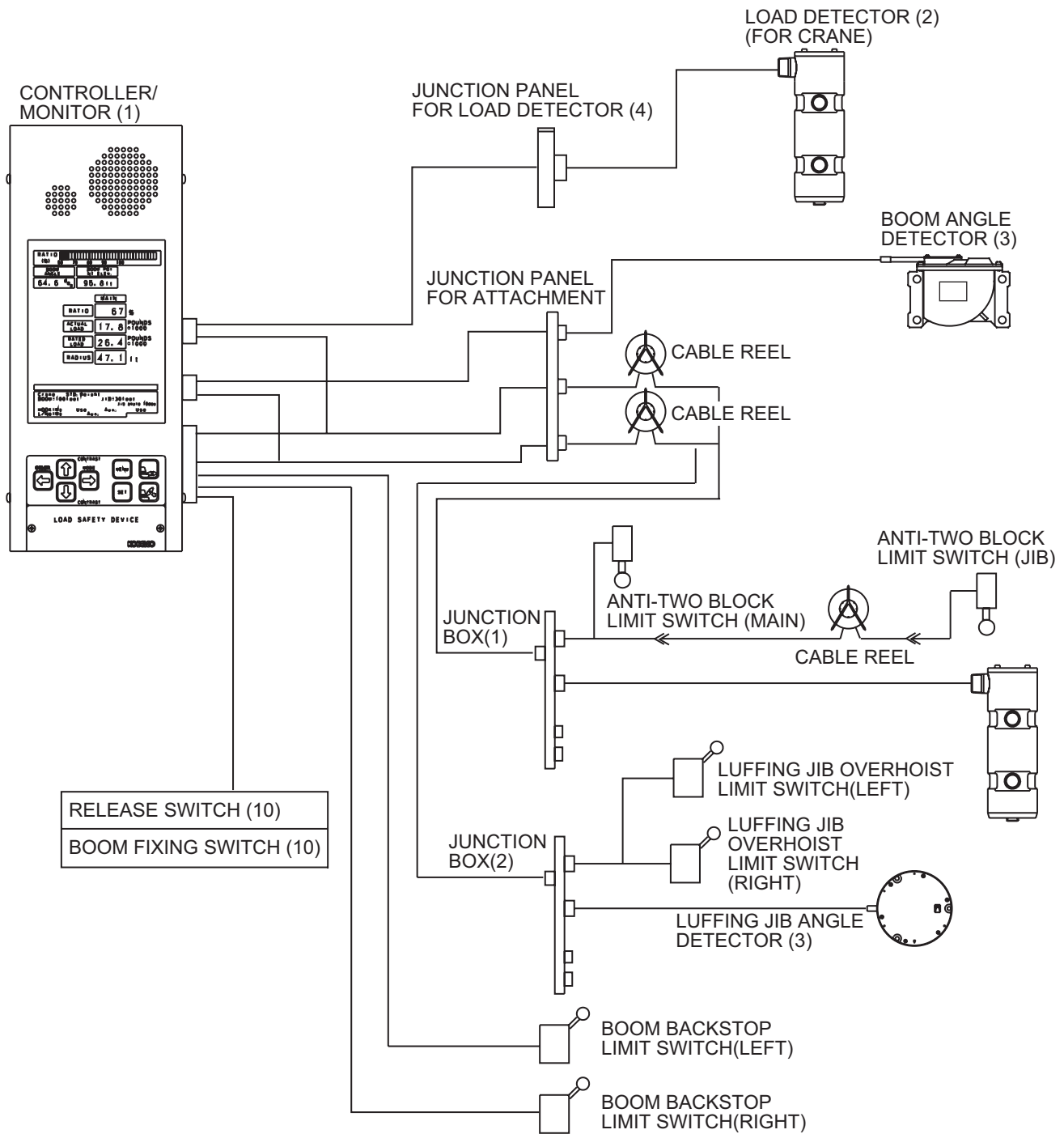
Note

A thimble hook for supporting the cable is provided on the boom tip section. If the cable is not hung to this hook, unreasonable force is loaded to the connector for connecting the hook limit switch. Be sure to hang the thimble to this hook.

3. LOAD SAFETY DEVICE

3.3.2 LUFFING ATTACHMENT

1. DIAGRAM OF SYSTEM



2. CONNECTING PROCEDURE

CAUTION

The cable should be handled with care in order to avoid damage.

When assembling the basic machine and attachment, connect the connectors as follows.

And, when disassembling, disconnect the connectors in the reverse order.

Prior to the connection of the connector, first, make sure that no water remains in the connecting section of the connector to avoid any water intrusion.

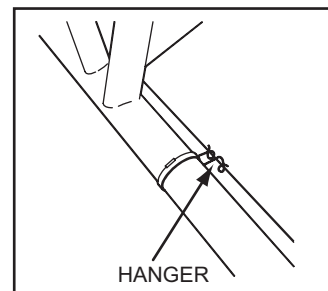
Be sure to remove water completely before the connection.

- (1) Tighten with hands fully securely.
- (2) Connect the removed caps each other too.
- (3) After disconnecting, install the cap securely.

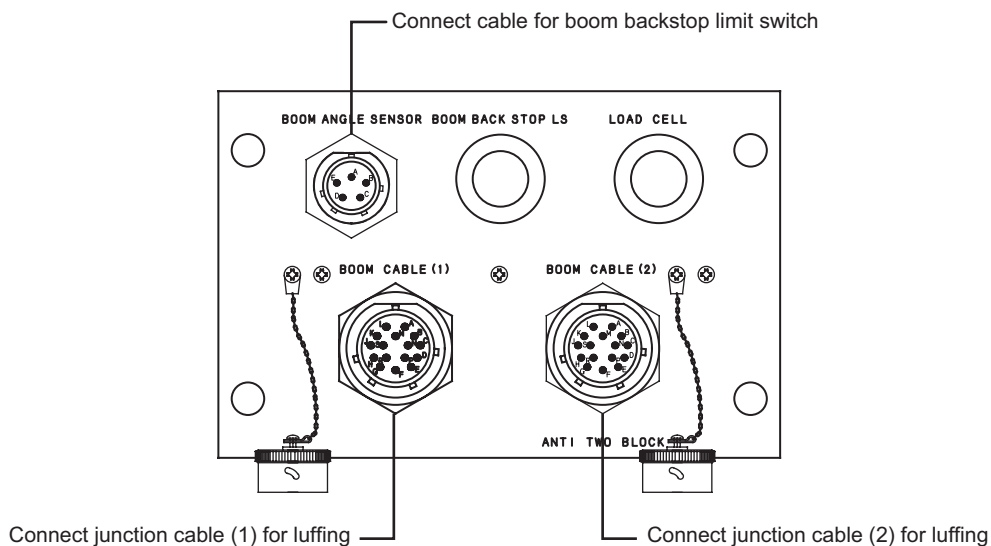
CAUTION

Overhoist preventive device may not work correctly if water enters into connectors.

Fix the junction cables and cables for the limit switches to the boom with the hangers.

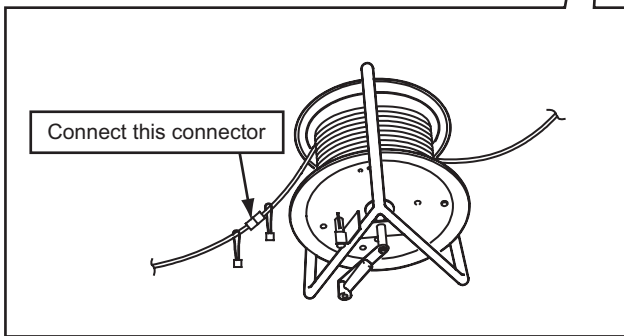
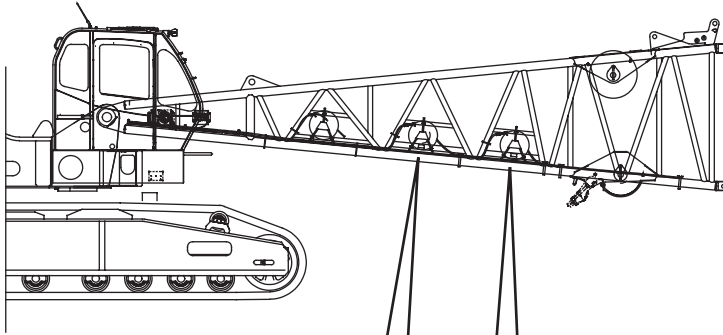


[1] CONNECTION OF JUNCTION BOX (5) FOR ATTACHMENT

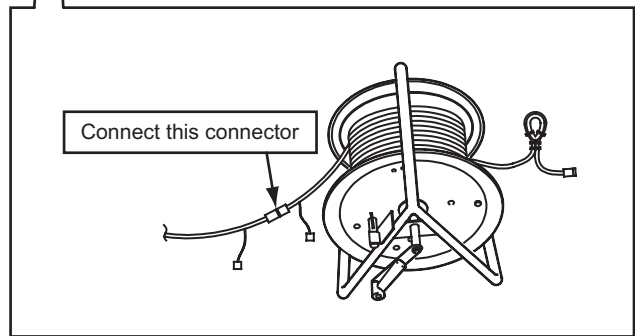


3. LOAD SAFETY DEVICE

[2] CONNECTION OF CABLE AT CABLE REEL

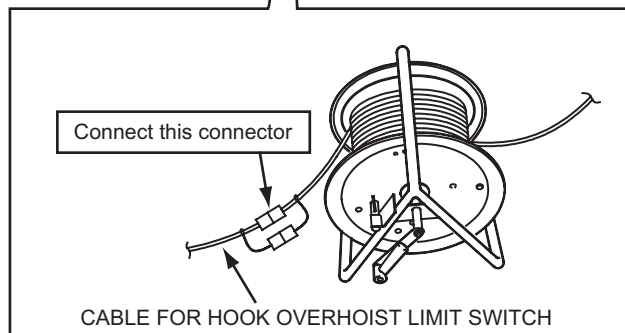
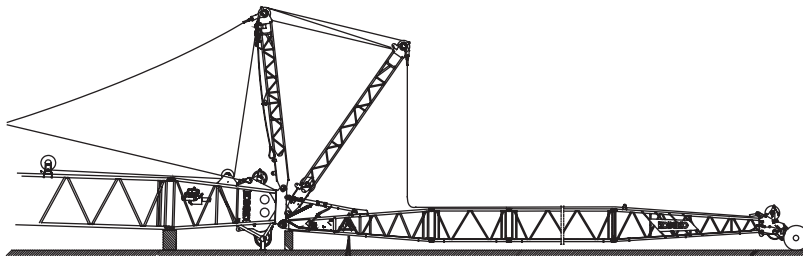


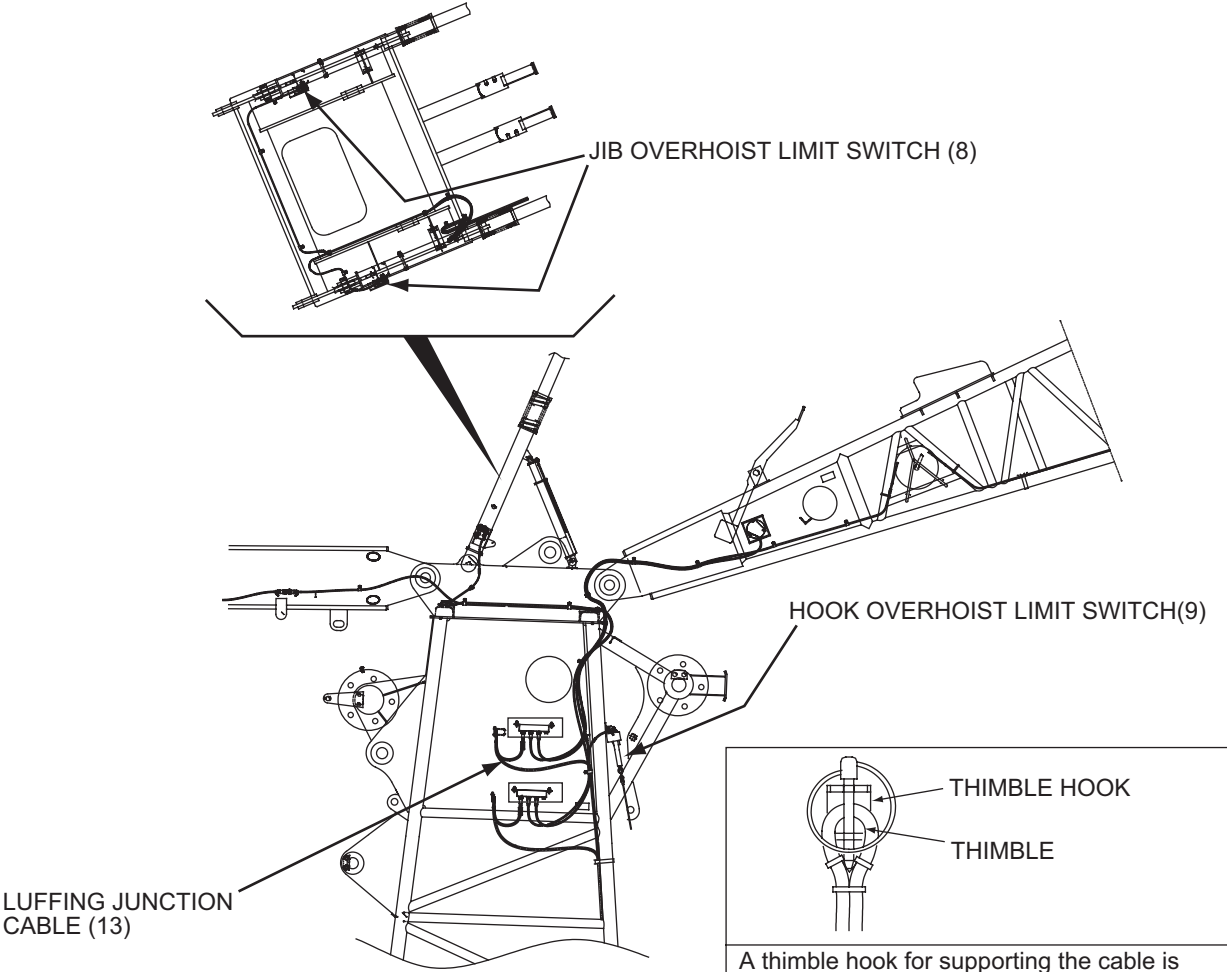
For luffing jib junction cable (2)



For luffing jib junction cable (1)

[3] CONNECTION OF CABLE AT LUFFING BOOM TIP

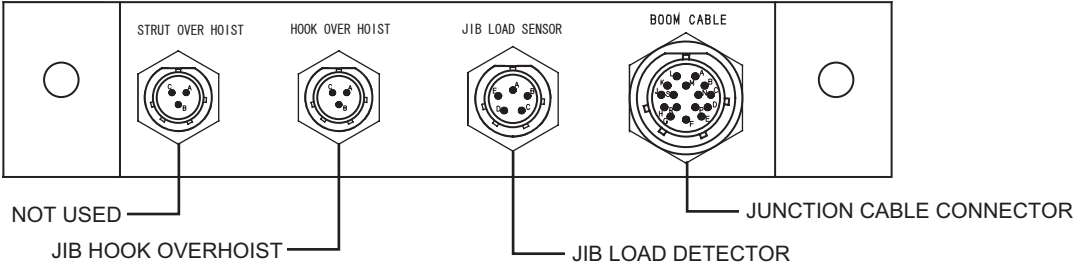
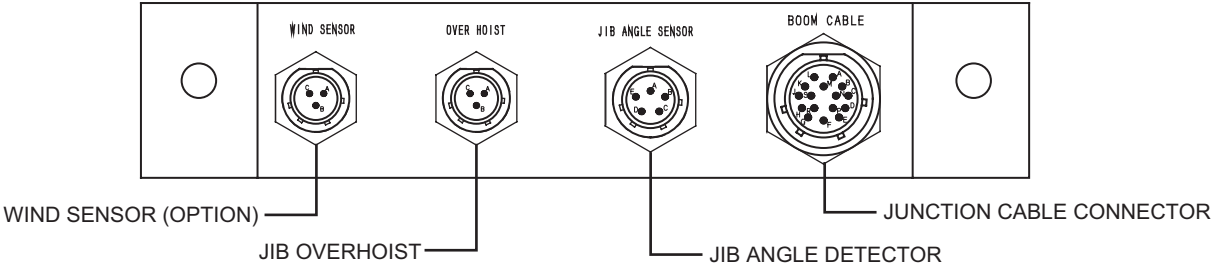




THIMBLE HOOK

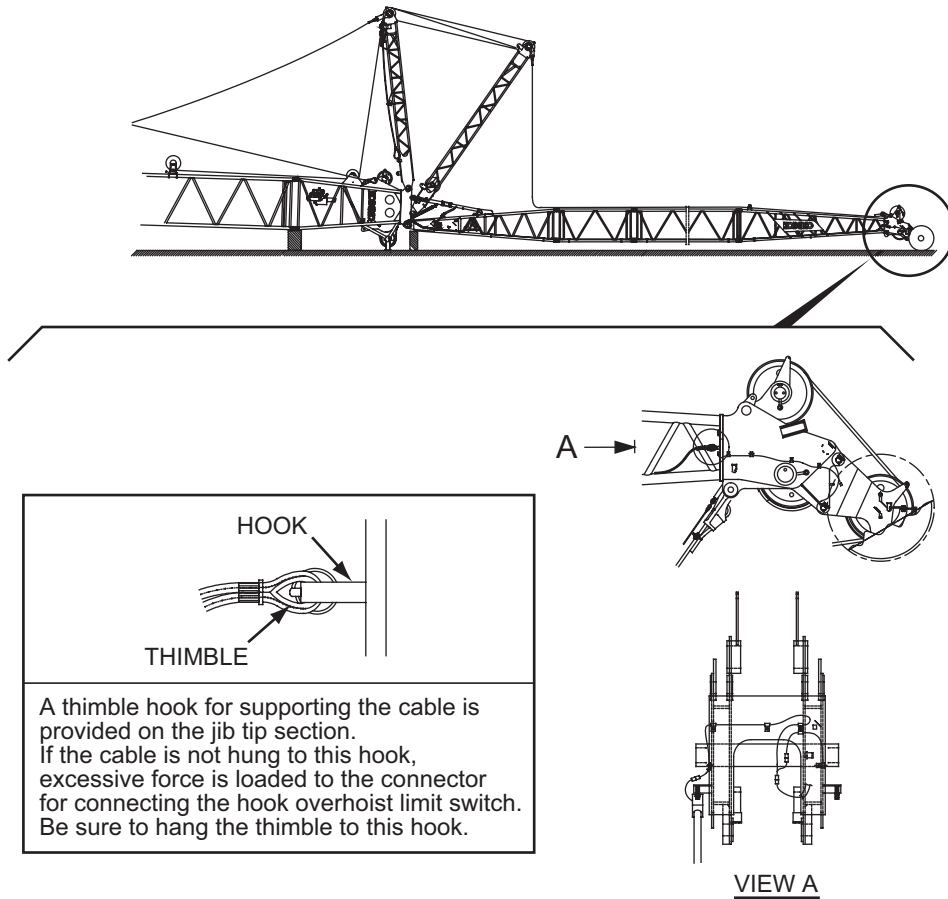
THIMBLE

A thimble hook for supporting the cable is provided on the luffing boom tip. If the cable is not hung to this hook, excessive force is loaded to the connector for connecting the hook overhoist limit switch. Be sure to hang the thimble to this hook.

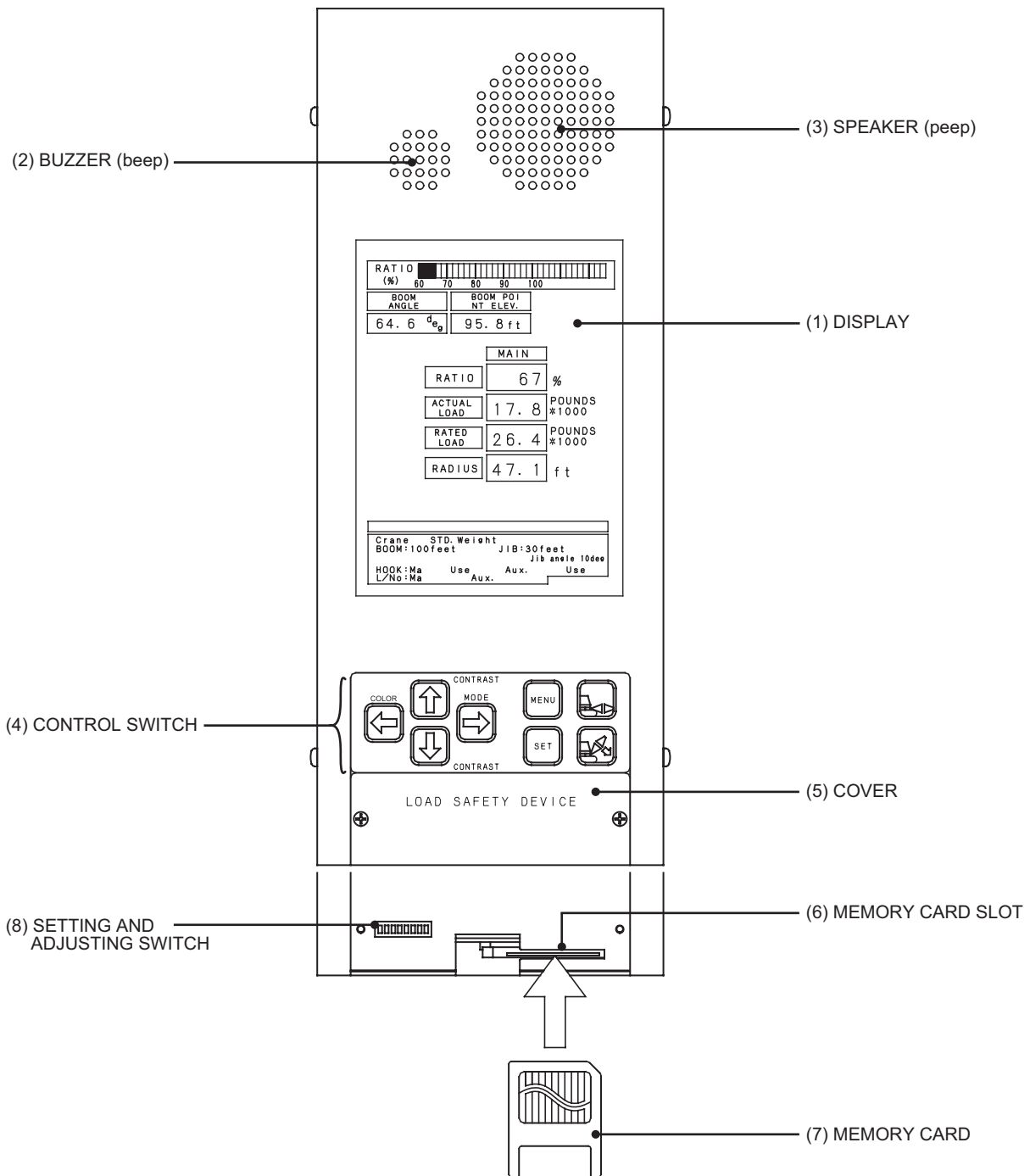


3. LOAD SAFETY DEVICE

[4] CONNECTION OF CABLE AT LUFFING JIB POINT



3.4 FUNCTION OF CONTROLLER/MONITOR



Note

All numeral value in the (1) DISPLAY in the chapter 3.LOAD SAFETY DEVICE give an example only.

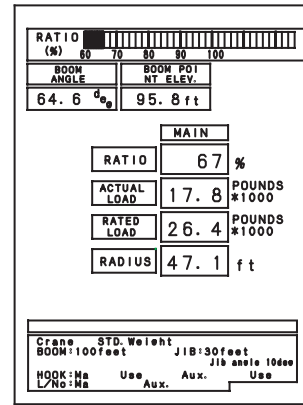
Note

Do not touch these switches (8) and memory card (7) unless approved by KOBELCO authorize distributor.

3. LOAD SAFETY DEVICE

1. DISPLAY

Current status of the crane is displayed.
(For details, refer to 3.5.)



2. BUZZER (beep)

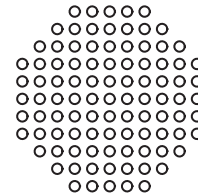
Warning buzzers mainly related to overload (including load limit warning) are issued. When the moment ratio is 90% or more, intermittent buzzers (beep) are issued, and continuous buzzers are issued when it is 100%. Intervals of intermittent buzzers become shorter according to increasing of the moment ratio.



Buzzer types	Buzzers
Intermittent	beep, beep, beep,
Continuous	beep

3. SPEAKER (peep)

Boom or hook blocks overhoist and/or boom working area limit warning buzzers (peep) are issued. When the boom exceeds the working area limit prenotice point, intermittent buzzers are issued. When the boom reaches the working area limit stop point or the hook blocks or boom is overhoisted, continuous buzzers are issued. Intervals of intermittent buzzers become shorter according to accessing to the boom stop point.



Buzzer types	Buzzers
Intermittent	peep, peep, peep,
Continuous	peep

Note

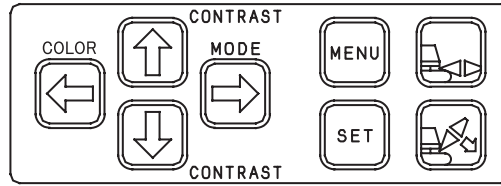
1. Buzzers warning overhoist









Buzzers warning boom overhoist are issued when the limit switch is actuated. Buzzers warning hook overhoist are issued when the limit switch is actuated to stop the hook blocks, and the winch lever is set to the "WINCH" position or the boom lever is set to the "LOWER" position.
(No warning buzzer is issued while the levers are set to the "NEUTRAL" positions.)

2. Buzzers warning working area limit

Unless the prenotice point is set, warning buzzers are issued when the boom reaches the position 5 degree before or 1 m before the stop point.


4. CONTROL SWITCH



	<p>Use this switch to change the display colors or decrease figures.</p> <p>* To change the colors, depress and hold this switch for three seconds or longer.</p>
	<p>Use this switch to switch the mode between the MAIN and AUX. modes or increase figures.</p> <p>* To change the current mode, depress and hold this switch for three seconds or longer.</p>
	<p>Use this switch to adjust the brightness of the display screen (to darken) or select any intended item.</p> <p>* To adjust the contrast, depress and hold this switch for three seconds or longer. Then, the brightness of the screen is changed a little every three seconds. To change the brightness extremely, depress and hold it for several tens of seconds.</p>
	<p>Use this switch to adjust the brightness of the display screen (to brighten) or select any intended item.</p> <p>* To adjust the contrast, depress and hold this switch for three seconds or longer. Then, the brightness of the screen is changed a little every three seconds. To change the brightness extremely, depress and hold it for several tens of seconds.</p>
	<p>Use this switch to display or cancel the list of selection items.</p>
	<p>Use this switch to decide or execute the selected item.</p>
	<p>Use this switch to switch the mode between the assembly/disassembly and operation modes.</p> <p>* To change the current mode, depress and hold this switch for three seconds or longer.</p>
	<p>Use this switch when it is necessary to lower the boom onto the ground at out of angle (lower limit angle/no rated load) without any load only. Refer to page 3-53 "3.BOOM /JIB LOWERING METHOD AT OUT OF ANGLE".</p> <p>* Depress and hold this switch for three seconds or longer for cancellation.</p>

3. LOAD SAFETY DEVICE



Do not lift any load when lowering the boom with this switch .

Failure to observe this precaution may result in overturning and/or damage of the machine and may lead to serious injury or death.

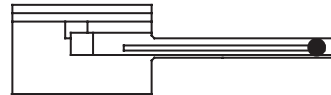
5. COVER

DO NOT open unless you need to load the memory card or operate the setting and adjusting switches.



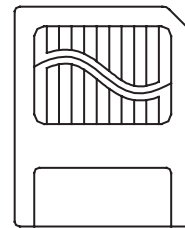
6 .MEMORY CARD SLOT

Insert the data memory card here.



7. MEMORY CARD

This card contains the data related to the crane capacity.

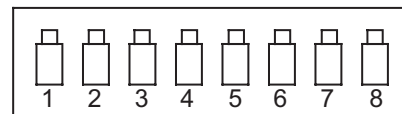


Note

Always keep this card in the memory card slot and do not remove or touch it.

8. SETTING AND ADJUSTING SWITCHES

This switches are used for upgrading of programs or adjustment only.



Do not touch these switches unless approved by KOBELCO authorize distributor.

3.5 OPERATING PROCEDURE OF CONTROLLER

Referring to the setting items (following table), perform necessary setting.

Setting Item	Classification of Operation		
	Daily Operation	Operation after Changing Attachment	Operation at Initial Erection
(1) Setting of crane configuration	X	O	O
(2) Section of main/aux. lifting	O	O	O
(3) Setting of working area limit value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

NOTE : O = Necessary X = Unnecessary = If Necessary

Since the set value is memorized in the controller even by stopping the engine and turning the power off, resetting is not required.

TURNING POWER ON

When the key switch is set to the ON position, power is automatically supplied to the controller. If power is not supplied to the controller, check the fuse in the fuse box located in the left side stand.

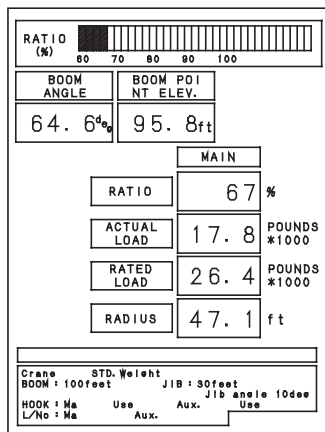
Just after power is supplied, the alarm sounds, but the alarm goes off soon. Then, start operation.

When power is supplied to the controller, the following screen is displayed on the controller as follows.

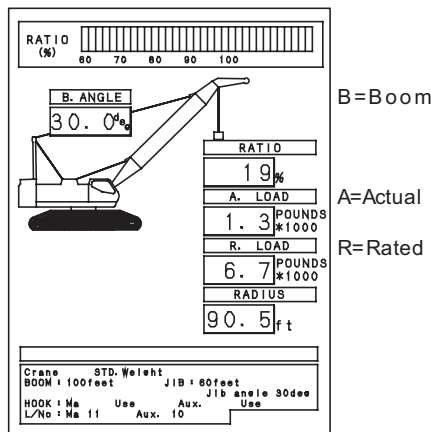
The main screen is displayed and the crane is ready to operate.

● CRANE

Main screen without silhouette



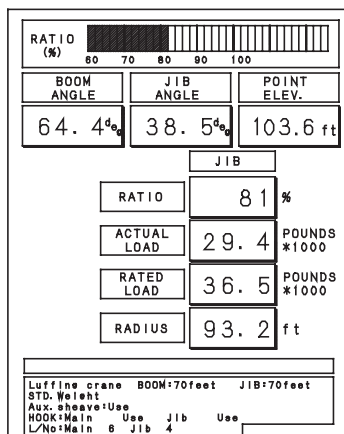
Main screen with silhouette



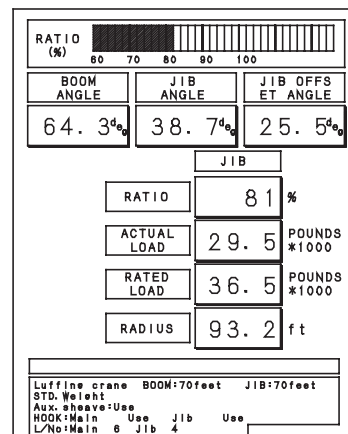
B=Boom
A=Actual
R=Rated

● LUFFING

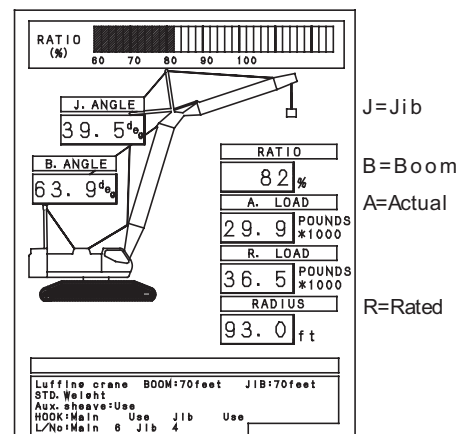
Main screen without silhouette (Jib point elevation indicate)



Main screen without silhouette (Jib offset angle indicate)



Main screen with silhouette




J=Jib
B=Boom
A=Actual
R=Rated

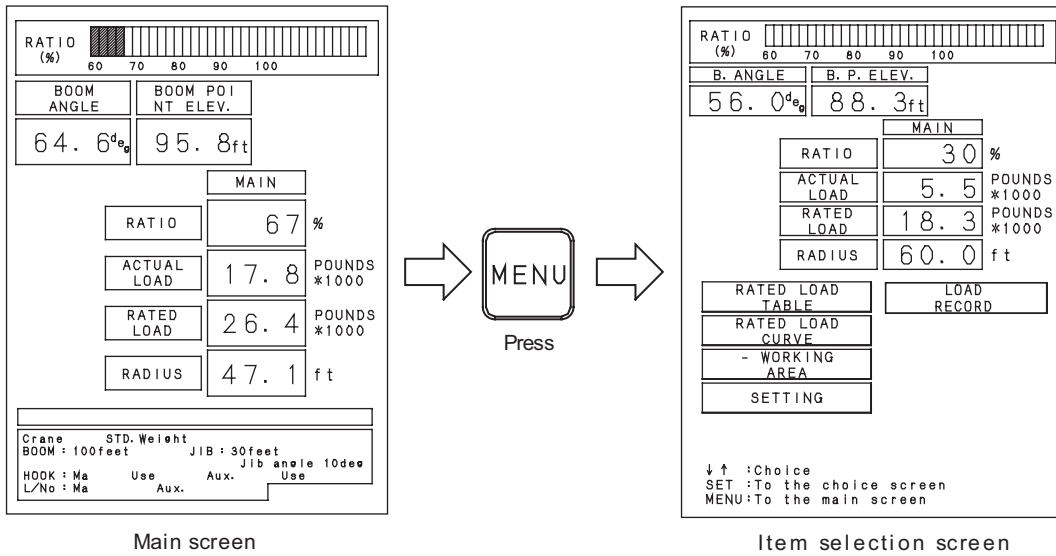
Either of two main screens, main screen with crane silhouette (figure) or without crane silhouette, can be selected with SETTING SCREEN procedure.




3. LOAD SAFETY DEVICE

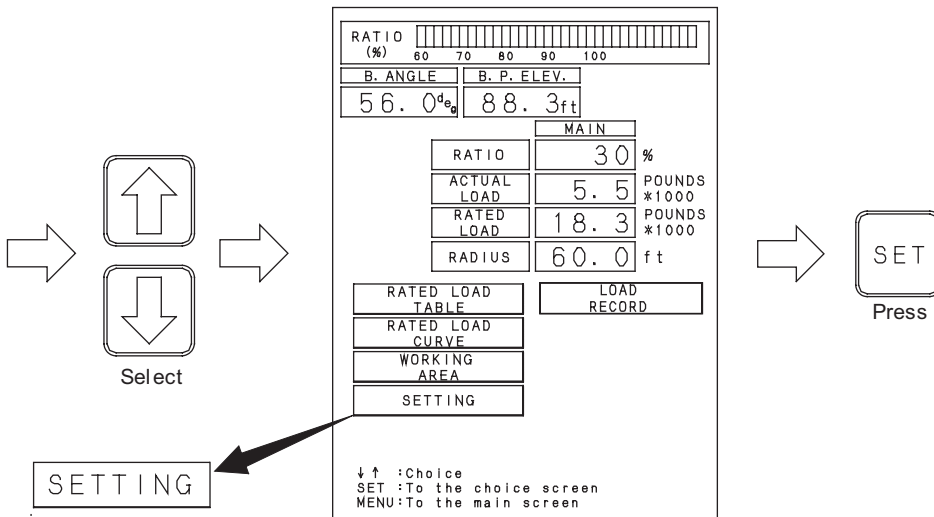
3.5.1 SETTING SCREEN



The controller display patterns can be altered.

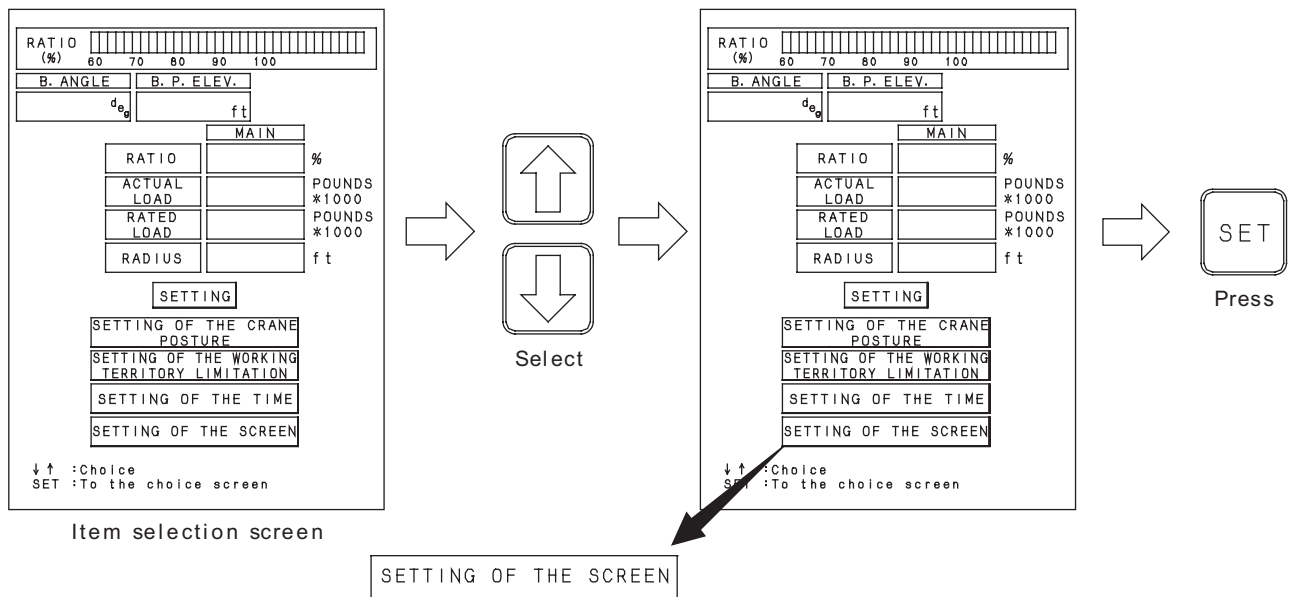
1. Press the  switch while the main screen is displayed. Then, the item selection screen appears.







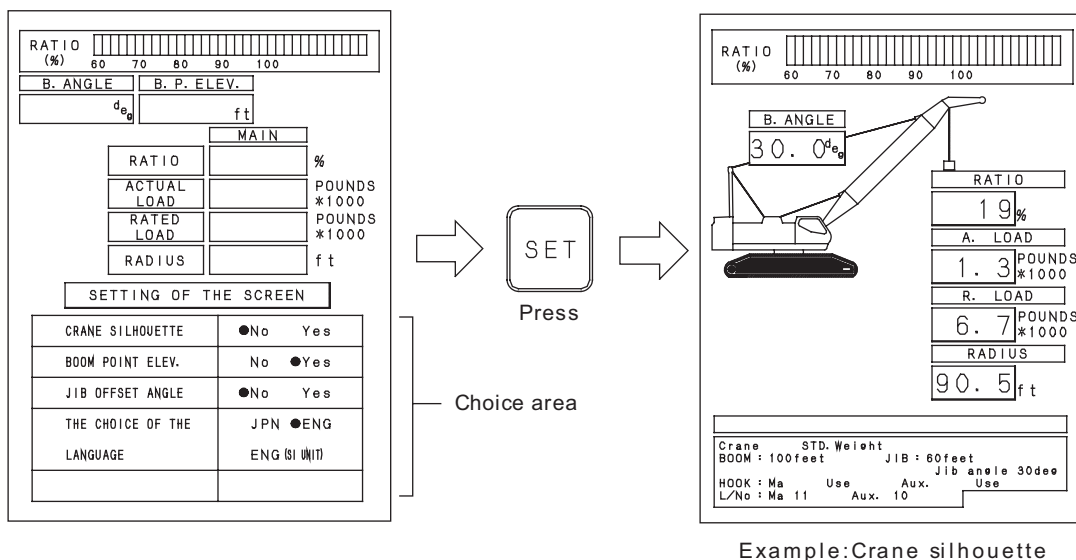
2. On the item selection screen, select the "SETTING" with the  and  switches, and press the  switch.



3. Next, select the [SETTING OF THE SCREEN] among the items displayed on the screen with the  and switches, and press the  switch.



4. Then, the screen to alter display patterns appears. Select any intended item with the  or  switch, and choose any intended choice between "NO" and "YES", with the  or  switch.




Example:Crane silhouette

CRANE SILHOUETTE	Whether the crane silhouette (figure) is displayed or not can be chosen (refer to the next page).
BOOM POINT ELEV.	Whether the boom point elevation is displayed or not can be chosen.
JIB OFFSET ANGLE	Luffing jib only.
THE CHOICE OF THE LANGUAGE	The language used can be switched. Choose "ENG" for CK2000.

* For both of the "BOOM POINT ELEV." and the "JIB OFFSET ANGLE", "YES" cannot be chosen at the same time.

3. LOAD SAFETY DEVICE

Press the  switch on the main screen. Then, the item selection screen appears.

● CANE

When this item is selected, a rated load table is displayed on the lower part of the screen.

When this item is selected, rated load curves and current position are displayed on the lower part of the screen.

When this item is selected, a graph indicating working area is displayed on the lower part of the screen with the working area limit settings reflected.

When this item is selected, the setting screen appears.

When this item is selected, any of load statuses recorded in the controller is displayed here.

RATIO (%)		60 70 80 90 100	
B. ANGLE	B. P. ELEV.		
56.0 ^d _e	88.3ft		
MAIN			
RATIO	30	%	
ACTUAL LOAD	5.5	POUNDS *1000	
RATED LOAD	18.3	POUNDS *1000	
RADIUS	60.0	ft	
RATED LOAD TABLE	LOAD RECORD		
RATED LOAD CURVE			
WORKING AREA			
SETTING			
↓↑ :Choice SET :To the choice screen MENU:To the main screen			

B : Boom
B.P : Boom Point

● LUFFING

When this item is selected, the setting screen appears.

When this item is selected, any of load statuses recorded in the controller is displayed here.

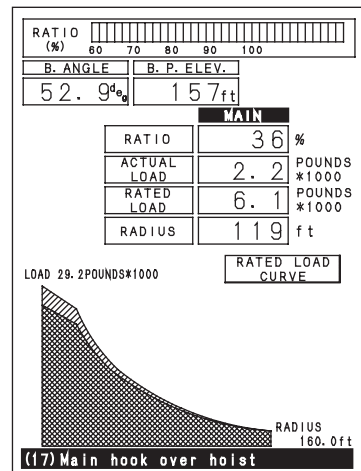
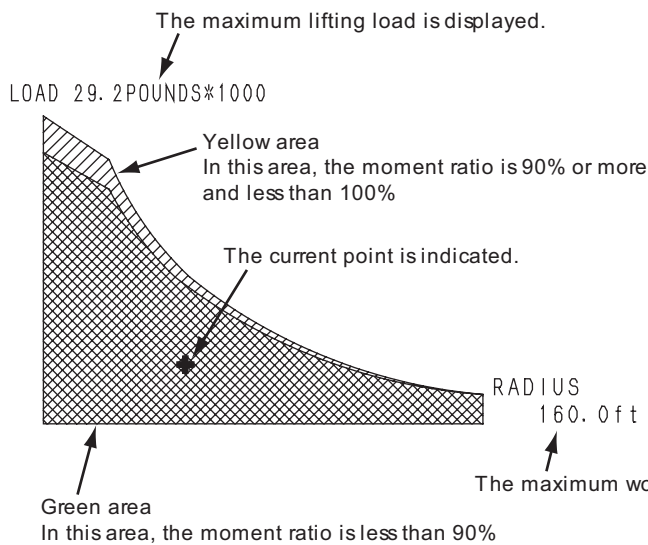
RATIO (%)		60 70 80 90 100	
B. ANGLE	B. P. ELEV.	JIB OFFSET ANGLE	
56.0 ^d _e	88.3ft	25.2 ^d _e	
MAIN			
RATIO	82	%	
ACTUAL LOAD	29.5	POUNDS *1000	
RATED LOAD	36.1	POUNDS *1000	
RADIUS	93.7	ft	
SETTING	LOAD RECORD		
↓↑ :Choice SET :To the choice screen MENU:To the main screen			

B : Boom
J : Jib

- Screen when the [RATED LOAD TABLE] is selected.

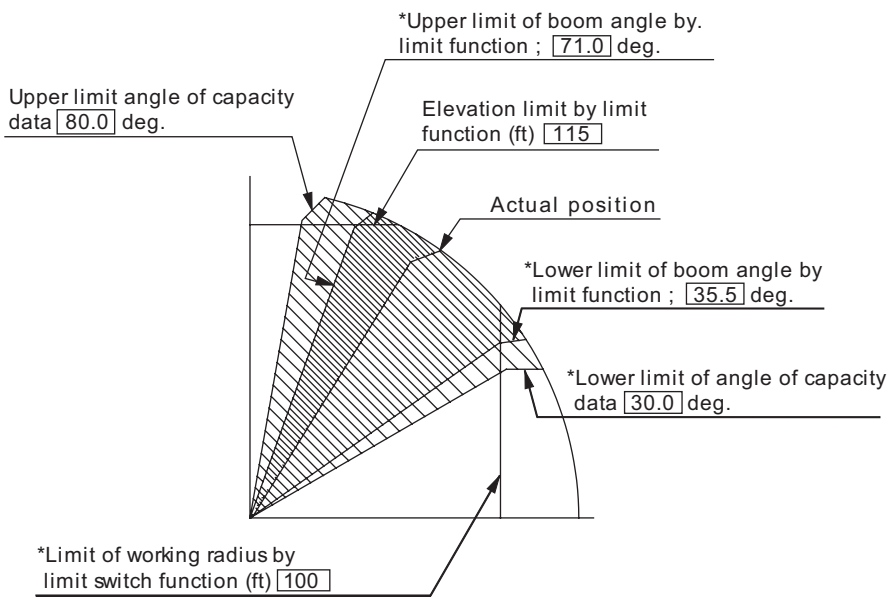
RATIO (%)	60 70 80 90 100		
B. ANGLE	B. P. ELEV.		
52.9°	157ft		
MAIN			
RATIO	36	%	
ACTUAL LOAD	2.2	POUNDS *1000	
RATED LOAD	6.1	POUNDS *1000	
RADIUS	119	ft	
RATED LOAD TABLE (MAIN)		BOOM LENGTH 190.0ft	
RADIUS (ft)	RATED LOAD (POUNDS *1000)	RADIUS (ft)	RATED LOAD (POUNDS *1000)
32.0	29.2	120.0	6.0
36.0	28.1	130.0	4.9
40.0	27.2	140.0	4.1
50.0	25.0	150.0	3.4
60.0	19.2		
70.0	15.2		
80.0	12.3		
90.0	10.2		
100.0	8.5		
110.0	7.1		
(17) Main hook over hoist			

- Screen when the [RATED LOAD CURVE] is selected.



3. LOAD SAFETY DEVICE

- Screen when the [WORKING AREA] is selected.



RATIO (%)		60 70 80 90 100	
B. ANGLE	B. P. ELEV.		
d _e		ft	
MAIN			
RATIO		%	
ACTUAL LOAD		POUNDS *1000	
RATED LOAD		POUNDS *1000	
RADIUS		ft	
BOOM [deg]		WORKING AREA	
UPP ANG. LIMIT		P. ELEV. LIMIT [ft] 88.0	
80.071.0			
BOOM [deg]		BOOM [deg]	
LOW ANG. LIMIT		LOW ANG. LIMIT	
30.035.5		30.035.5	
RADIUS LIMIT [ft] 34.0			
(24) Over load forecast			


- Screen when the [LOAD RECORD] is selected.

Past load statuses are displayed. In respect of items such as moment ratio, working radius, boom length, jib length, operation mode (Main/Aux.), and date,

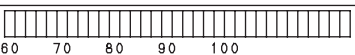
- (1) Ten records in order of the height of moment ratio.
- (2) Ten records in order of the recentness of date are recorded and displayed.

When the [LOAD RECORD] is selected with the cursor → and the [SET] switch is pressed, ten records are displayed in order of the height of moment ratio.

RATIO (%)		60 70 80 90 100			
B. ANGLE	B. P. ELEV.				
d _e	ft				
MAIN					
RATIO		%			
ACTUAL LOAD		POUNDS *1000			
RATED LOAD		POUNDS *1000			
RADIUS		ft			
LOAD RECORD (MAX. VALUE)		↑ ↓: Next page			
RATIO	RADIUS	BOOM	JIB	MODE	DATE
148	95	100	2	M	2000. 711. 1429
97	43	100	2	M	2000. 711. 1623
58	43	100	2	M	2000. 711. 1623
34	43	100	2	M	2000. 711. 1623
24	43	100	2	M	2000. 711. 1631
0	0	0	0		2000. 0 0. 0 0
0	0	0	0		2000. 0 0. 0 0
0	0	0	0		2000. 0 0. 0 0
0	0	0	0		2000. 0 0. 0 0
0	0	0	0		2000. 0 0. 0 0

When the  or  switch is pressed, ten records are displayed in order of the recentness of date.

RATIO (%)



B. ANGLE

B. P. ELEV.

d_e

f t

MAIN

RATIO

%

ACTUAL LOAD

POUNDS *1000

RATED LOAD

POUNDS *1000

RADIUS

f t

LOAD RECORD (RECENT VALUE) ↑ ↓:Next page

RATIO	RADIUS	BOOM	JIB	MODE	DATE
24	43	100	2	M	2000. 711. 1631
34	43	100	2	M	2000. 711. 1623
97	43	100	2	M	2000. 711. 1623
58	43	100	2	M	2000. 711. 1623
148	95	100	2	M	2000. 711. 1429
0	0	0	0		2000. 0 0. 0 0
0	0	0	0		2000. 0 0. 0 0
0	0	0	0		2000. 0 0. 0 0
0	0	0	0		2000. 0 0. 0 0
0	0	0	0		2000. 0 0. 0 0

The main screen is displayed and the crane is ready to operate. (Example of main screen)

3. LOAD SAFETY DEVICE

3.5.2 SETTING OF THE CRANE CONFIGURATION

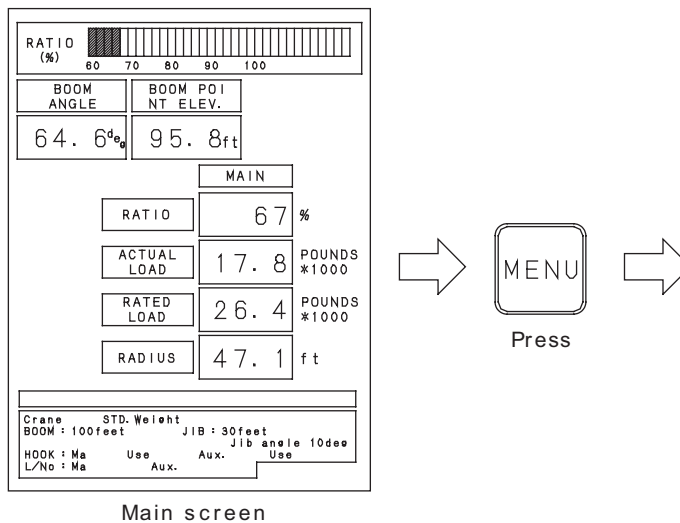


Always check if the selected crane configuration is correct. Failure to observe this precaution may result in overturning of crane or damage of crane and may lead to serious injury or death.

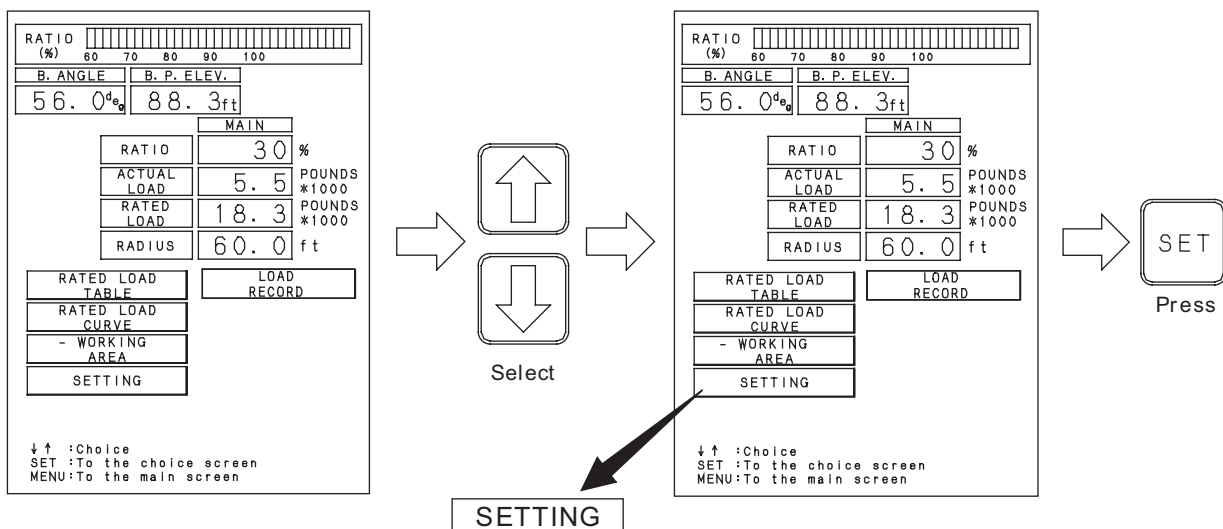
Setting of the crane configuration is necessary in order to use the load safety device correctly according to the type of the attachment, boom length, jib length, installation of the auxiliary sheave and type of the hook to be used.




1. Setting

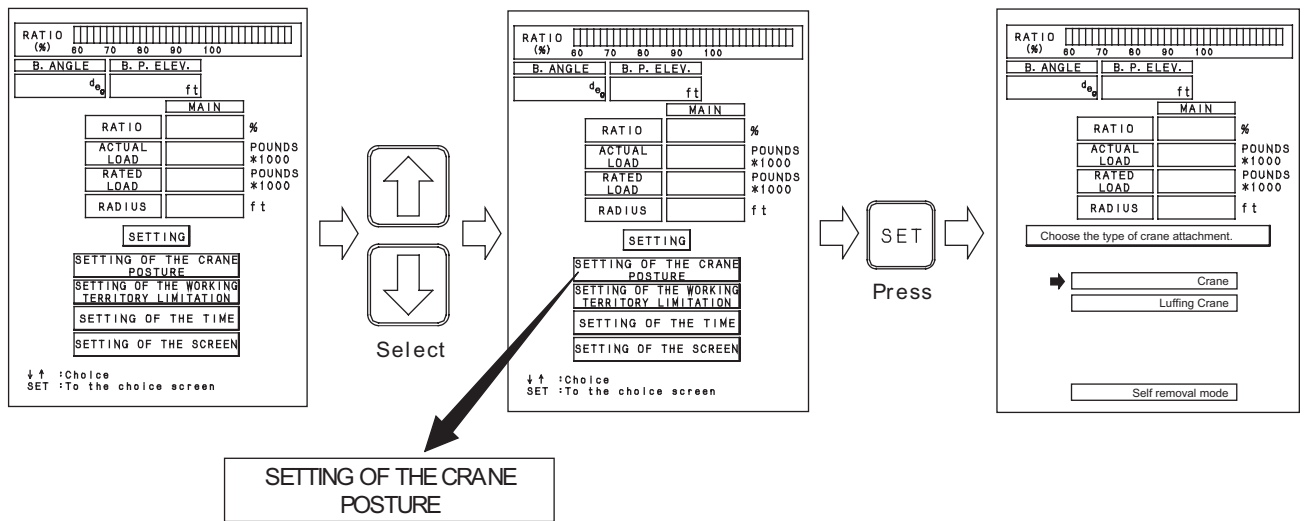
(1) Press the switch while the main screen is displayed. Then, the item selection screen appears.



(2) On the item selection screen, select the "SETTING" with the and switches, and press the switch.



(3) Next, select the [SETTING OF THE CRANE POSTURE] among the items displayed on the screen with the  and  switches, and press the  switch.



(4) For setting hereafter, follow the instructions displayed on the item selection screen. The items to be selected comprise the boom length, type of attachment, jib type, jib offset angle, main hook, auxiliary hook, and number of the parts of line of wire rope on hook blocks.

Example of setting

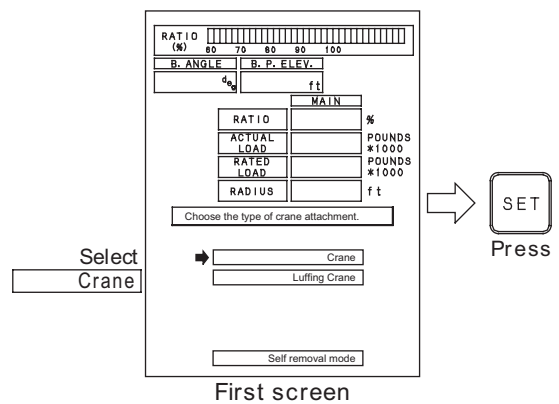
- Select of attachment : Crane
- Weight : Counterweight (133,600 lbs) + Carbody weight
- Boom length : 100 feet
- Jib type : With auxiliary sheave
- Main hook, Auxiliary hook : Main hook = Use, Auxiliary hook = Use
- Number of the parts of line of wire rope : Main hook = 4, Auxiliary hook = 1

Select in order of number (A) to (I)

(A) Attachment type selection screen is displayed.
Select "Crane".

Note

Small numbers displayed on the lower left part of the screen indicate the LMI code. Ignore this code, since it has no relation to the operation of controller.



3. LOAD SAFETY DEVICE

(B) Counterweight and carbody weight type selection screen is displayed.

Select "CWT (133600 lbs) + CBWT".

Select
CWT (133600 lbs) + CBWT

SET
Press

(C) Boom length selection screen is displayed.

Select "100" feet.

Select
100 feet

SET
Press

(D) Jib type selection screen is displayed.

Select "Aux. sheave".

Select
Aux. sheave

SET
Press

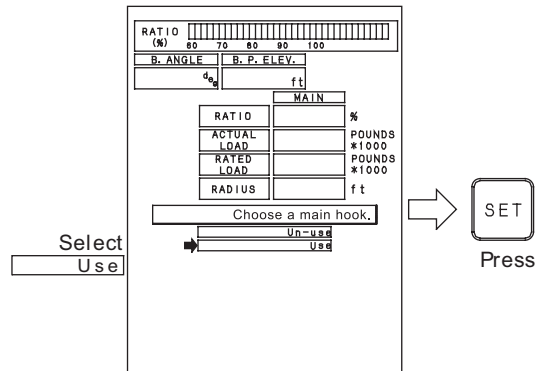
(E) Jib offset angle selection screen is displayed.

Select "Un-use", since the machine is not equipped with the jib.

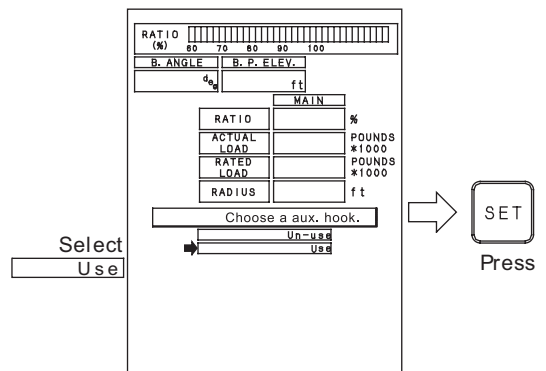
Select
Un-use

SET
Press

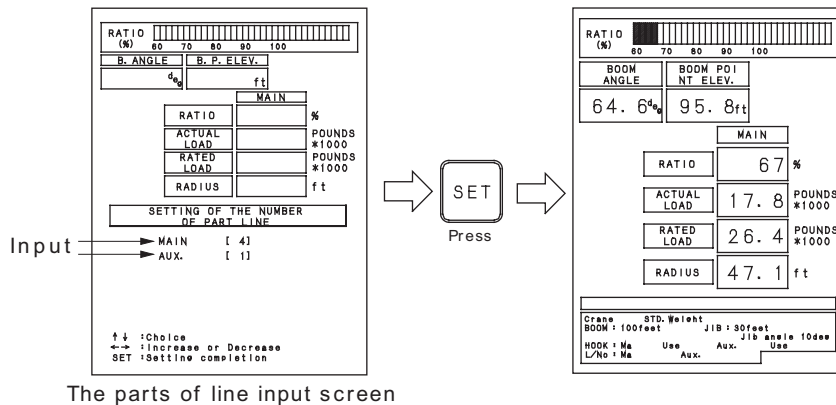
(F) Main hook selection screen is displayed.
Select "Use".



(G) Auxiliary hook selection.
Select "Use".



(H) Lastly, the number of part line input selection. Enter "4" for the main hook, and "1" for the auxiliary hook. Only the parts of line of wire rope on the hook for which "Use" is selected is displayed.



Check the settings
After all the settings and input are complete, the screen automatically returns to the main screen.

3. LOAD SAFETY DEVICE

Note

In case of error occurred After all settings are complete, the corresponding data is searched. If no corresponding data is found, an error message is displayed and a buzzer sounds.

Note

All controller/monitor display messages may be subject to grammatically incorrect phrasing due to computerized language translations. If the message being displayed is unclear, contact your nearest KOBELCO representative for clarification.

Note

If an error occurs, press the or switch to reset the screen status. Then recheck the installed attachment and re-enter the settings.

RATIO [] (%) 60 70 80 90 100

B. ANGLE [] B. P. ELEV. []

d_a [] ft

MAIN

RATIO	[]	%
ACTUAL LOAD	[]	POUNDS *1000
RATED LOAD	[]	POUNDS *1000
RADIUS	[]	ft

SETTLEMENT OF NUMBER OF PART LINE []

MAIN [2]

There are no applicable crane data.
Push SET if you set it up again. Push MENU if it is stopped.

↓↑ :Choice
SET :To the choice screen
MENU:To the main screen

When data is normally read in :

There are no applicable crane data.
Push SET if you set it up again. Push MENU if it is stopped.

The screen automatically returns to the main screen, and the settings are displayed on the lower part of the screen.

3.5.3 SELECTION OF MAIN/JIB/AUX. LIFTING



Always check if the selected crane configuration is correct.

Failure to observe this precaution may result in overturning of crane or damage of crane and may lead to serious injury or death.

For crane

If the machine is equipped with the main hook (front drum) and aux hook (rear drum) together, be sure to select either of the main (front drum) or the aux (rear drum) according to the hook to be used, and to select the capacity.

Selecting procedure is as follows:

For luffing

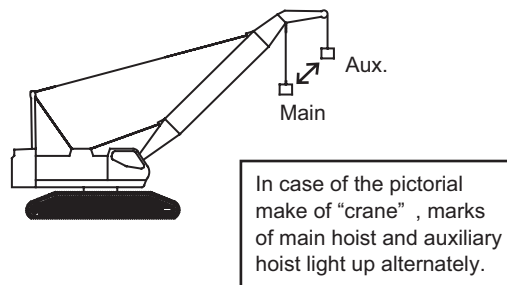
If the machine is equipped with the main hook (front drum), jib hook (front or rear drum) and auxiliary hook (rear drum), be sure to select either the main (front drum) or the jib (front or rear drum) or the aux. (rear drum) according to the hook to be used. You must also select the appropriate capacity.

By pushing switch on the controller, select the lifting. Press and hold the switch for three seconds or longer.

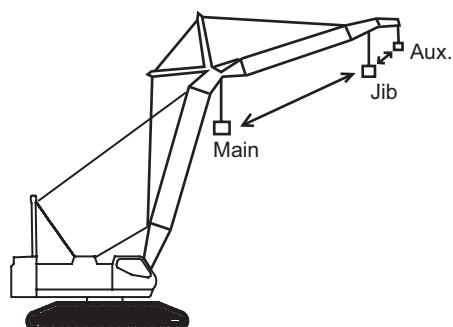
Every pushing toggles the mode of the main lifting and aux lifting alternately.

	MAIN	← MAIN/JIB/AUX. indicator
RATIO	30	%
ACTUAL LOAD	5.5	POUNDS *1000
RATED LOAD	18.3	POUNDS *1000
RADIUS	60.0	ft

Without silhouette



With silhouette (Crane)



With silhouette (Luffing)

3. LOAD SAFETY DEVICE

3.5.4 SETTING OF WORKING AREA LIMIT VALUE

When working inside a building or in a narrow place, the sphere in which the machine can be operated can be set as desired in addition to the rated range specified by the Load Safety Device. (Function to limit the working area)

Working area limit value can be set for the boom upper and lower limit angles, maximum load, maximum working radius, and maximum point height. For the items other than the maximum load, warning point and stopping point can be set individually. If only the stopping point is set, a warning is provided at the specified position (refer to the table shown below).

When the boom reaches the warning point, intermittent buzzer sounds are issued. When the boom reaches the stopping point, continuous buzzer sounds are issued, and the boom is automatically stopped if it is operated in the dangerous direction. Both of intermittent buzzer sounds and continuous buzzer sounds are issued only when the control lever is operated toward the dangerous direction. They are not issued when the lever is set to the neutral position (or the boom is operated in the safe direction), even if the boom reaches the warning or stopping point.

By this setting, contacting accidents of the boom and etc. due to careless mistake during operation can be prevented.


Working Area Limit Value possible to be set.

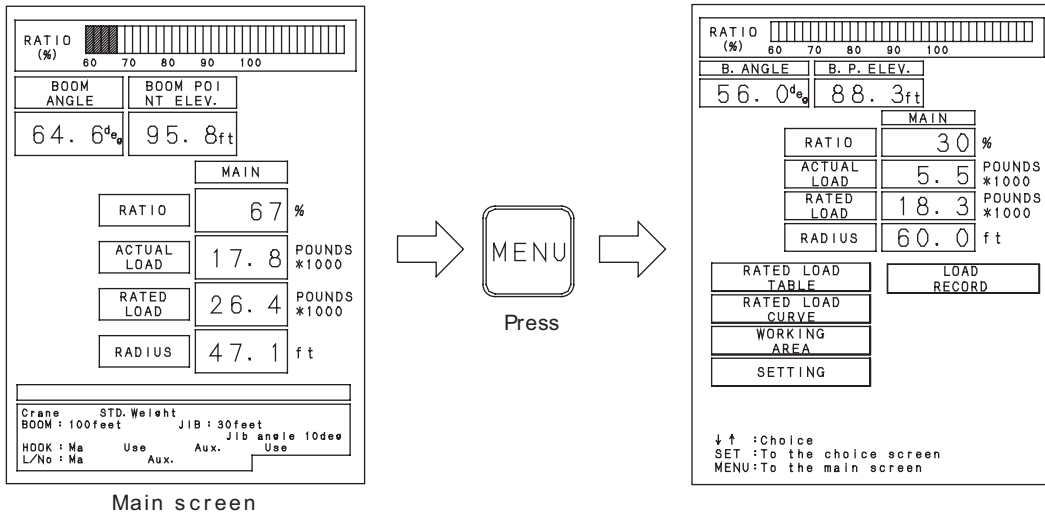
Symbol	Working Area Limit	Setting Unit	Warning Point
A	Limit value of upper and lower limit boom or tower boom angle	Setting on 0.1 degrees of unit	5 degrees before limit value (When warning point is not set)
B	Limit value of lifting load (Main / Aux.)	Setting on 100 pound of unit	90%
C	Limit value of operating radius (Main / Aux.)	Setting on 0.1 feet of unit	1 foot before limit value (When warning point is not set)
D	Limit value of point height	Setting on 0.1 feet of unit	1 foot before limit value (When warning point is not set)
E	Limit value of upper and lower limit jib angle	Setting on 0.1 degrees of unit	5 degrees before limit value (When offset point is not set)




Plural settings of above A through D are possible simultaneously. The value set once is memorized until it is changed even by turning power off.

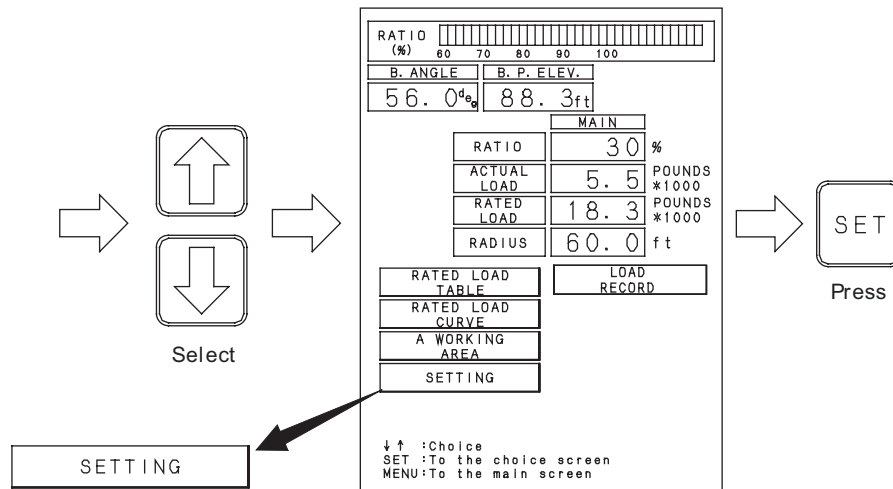
The intermittent alarm is issued before reaching the limit value, and when operation exceeds the limit value, continuous alarm sounds, and operation is automatically stopped.

1. Setting




(A) Press the  switch while the main screen is displayed. Then, the item selection screen appears.

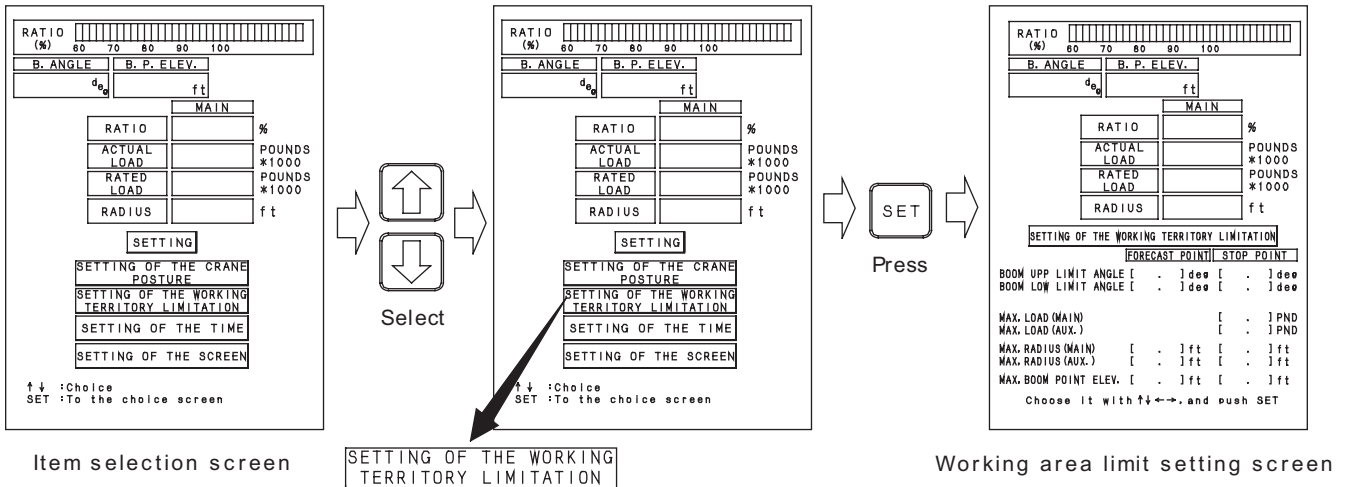







(B) On the item selection screen, select the "SETTING" with the  and  switches, and press the  switch.



3. LOAD SAFETY DEVICE

(C) Next, select the [SETTING OF THE WORKING TERRITORY LIMITATION] among the items displayed on the screen with the  and  switches, and press the  switch. The working area limit setting screen is displayed.



Two types of input methods are available for entering numerical characters; teaching method and increase/decrease method. To enter numerical characters, move the boom to the point to be limited in advance. In this status, move the cursor (light blue) onto the intended limit item, and press the  switch. The numerical characters on the cursor indicate the current boom position. If the displayed numerical characters are acceptable, press the  switch (teaching method). If you need to change the displayed value further, increase or decrease it with the  or  switch until the desired value is obtained, and press the  switch (increase/decrease method).

The functions of the limit items set as shown above will be effective.

- The maximum point height cannot be set for the main and auxiliary hoist modes individually. In the main hoist mode, the limit function is activated when the boom tip reaches the set point. In the auxiliary hoist mode, it is activated when the jib (or auxiliary sheave) tip reaches the set point.
- When inputting limit load values, only the increase/decrease method is available.

Warning point and stopping point

For the items that both of warning point and stopping point can be set, the warning point must be set to the side safer than the stopping point. Failure to observe this rule during setting will lead to the display of warning messages and rejection of set values. In such a case, retry setting.

When canceling input halfway

Canceling is possible just after the cursor is moved onto the item intended and the switch is pressed. Press the switch. Then, the screen returns to the previous one, and you can retry input from the beginning.

When limit function is not used

If [0.0] is input for a limit item, the limit function for the item will not work. Thus, input "0.0" for each limit item when you do not need the limit function for it.


3. LOAD SAFETY DEVICE

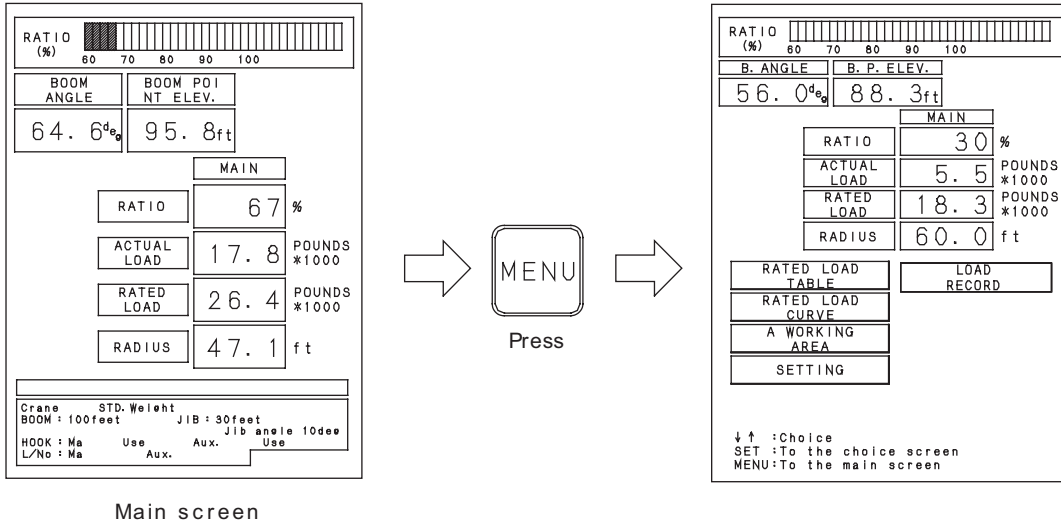
3.5.5 SETTING OF THE TIME




The current time is displayed on the lower right part of the main screen.

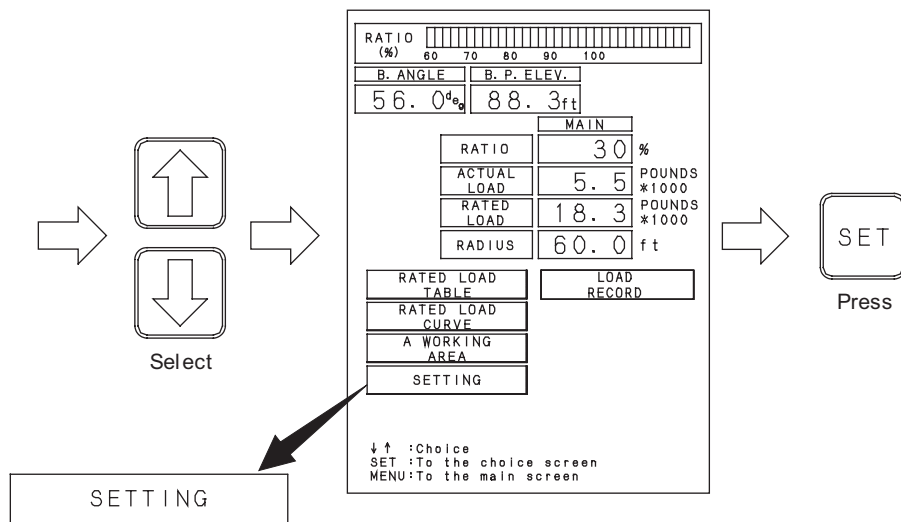
If the displayed time is not correct, adjust it by using the following procedures.

1. Setting Time

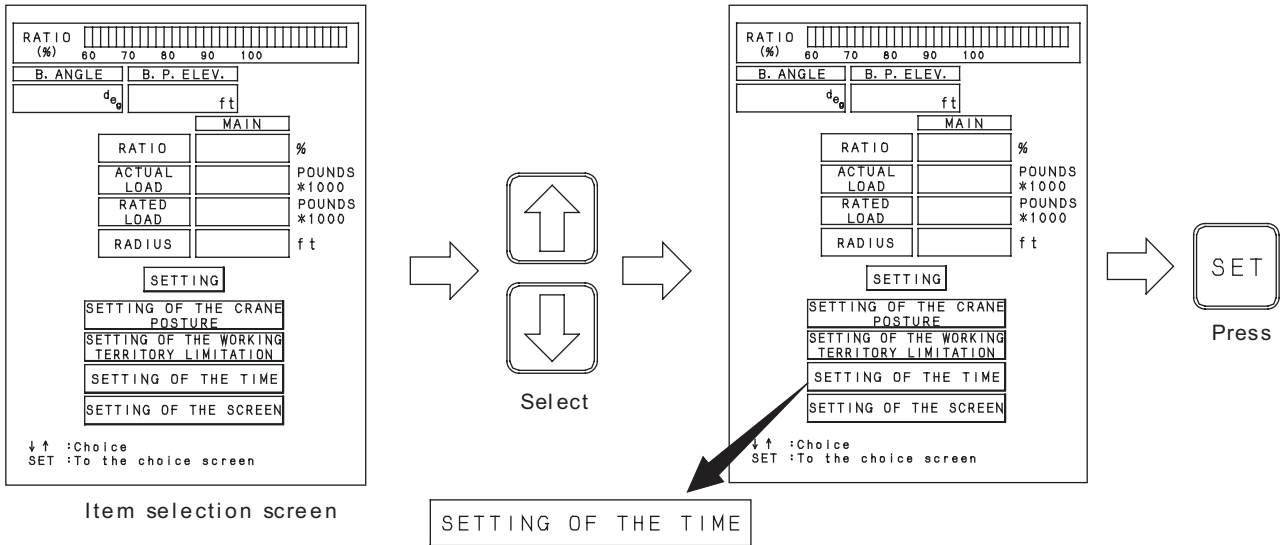
(A) Press the  switch while the main screen is displayed. Then, the item selection screen appears.



(B) On the item selection screen, select the "SETTING" with the  and  switches, and press the  switch.

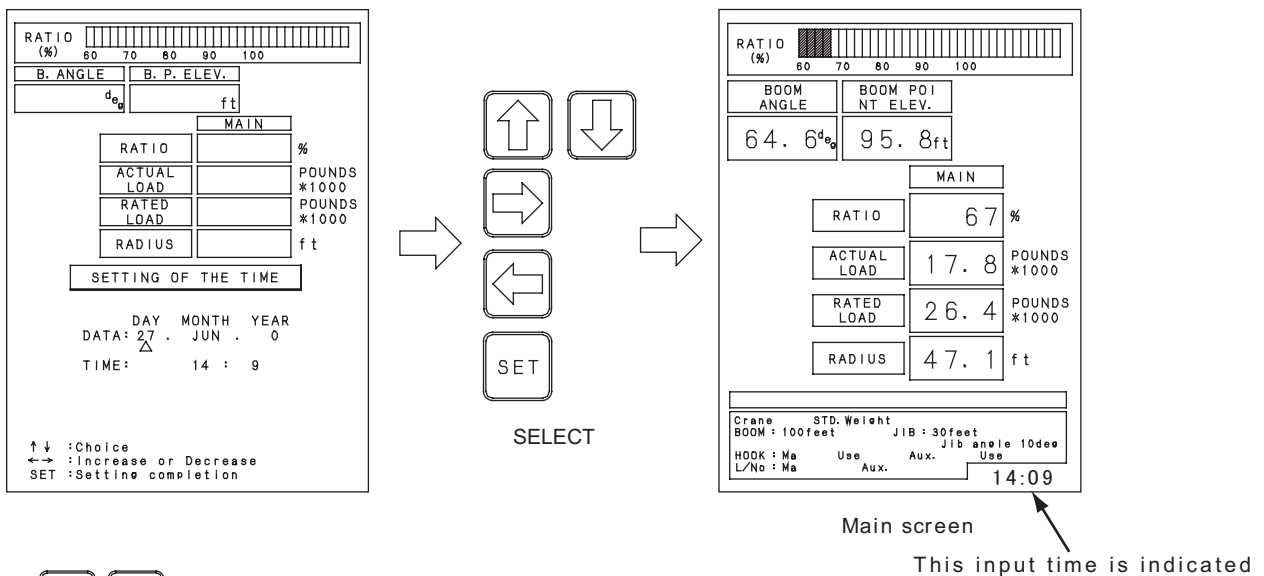


(C) Next, press the **SET** switch.



(D) The time setting screen appears. Select any intended item with the or switch, and adjust it with the or switch.

After adjusting all the settings, press the **SET** switch to complete the setting.



- switch: movement of cursor (Δ MARK)
- switch: increase
- switch: decrease
- SET** switch: set completion

3. LOAD SAFETY DEVICE

3.6 WARNING ALARM AND AUTOMATIC STOP

3.6.1 ITEMS OF WARNING ALARM AND AUTOMATIC STOP

When the machine enters respective hazardous condition, the controller issues warning alarm and/ or stops the machine automatically as shown in the following table. When the machine stops automatically, immediately operate the machine to the safer side.

CRANE

Hazardous Conditions	Indication and Stop									
	Color change in indicator						Code display **	Buzzer		Automatic stop
	Boom angle	Loading ratio	Actual load	Rated load	Operating radius	Mode		Overload warning buzzer	Overhoist warning buzzer	
Loading ratio more than 90 %	-	Yellow	-	-	-	-	(24)	Intermittent	-	-
Loading ratio more than 100%	-	Red	-	-	-	-	(05)	Continuous	-	Stop
Main hook block overhoist	-	-	-	-	-	Red	(17)	-	Continuous*	Stop
Auxiliary hook block overhoist	-	-	-	-	-	Red	(18)	-	Continuous*	Stop
Boom overhoist	Red	-	-	-	-	-	(08)	-	Continuous*	Stop
Boom overhoist (limit)	Red	-	-	-	Red	-	(21)	-	Continuous*	Stop
Boom overhoist (Backstop limit)	Red	-	-	-	Red	-	(60)	-	Continuous*	Stop
Boom over lowering	Red	---	---	0.0	Red	-	(07)	Continuous	-	Stop

* Only when the lever is operated in the more dangerous direction.

** Refer to error code table in page3-67.

LUFFING

Hazardous Conditions	Indication and Stop										
	Color change in indicator							Code display **	Buzzer		Automatic stop
	Boom angle	Load-ing ratio	Actual load	Rated load	Operat-ing rarious	Jib an-gle	Mode		Overload warning buzzer	Overhoist warning buzzer	
Loading ratio more than 90%	-	Yellow	-	-	-	-	-	(24)	Intermit-tent	-	-
Loading ratio more than 100%	-	Red	-	-	-	-	-	(05)	Continu-ous	-	Stop
Main hook block overhoist	-	-	-	-	-	-	Red	(17)	-	Continu-ous*	Stop
Jib and Aux. hook block overhoist	-	-	-	-	-	-	Red	(18)	-	Continu-ous*	Stop
Luffing boom overhoist	Red	-	-	-	-	-	-	(08)	-	Continu-ous*	Stop
Luffing boom overhoist (Right side limit)	Red	-	-	-	-	-	-	(21)	-	Continu-ous	Stop
Luffing boom overhoist (Left side limit)	Red	-	-	-	-	-	-	(60)	-	Continu-ous	Stop
Luffing boom overhoist	Red	-	-	0.0	-	-	-	(07)	Continu-ous	-	Stop
Luffing jib overhoist	-	-	-	-	-	Red	-	(14)	-	Continu-ous*	Stop
Luffing jib overhoist (limit)	-	-	-	-	Red	Red	-	(22)	-	Continu-ous	Stop
Luffing jib over-lowering	-	---	---	0.0	Red	Red	-	(13)	Continu-ous	-	Stop

* Only when the lever is operated in the more dangerous direction.

** Refer to error code table in page3-67.

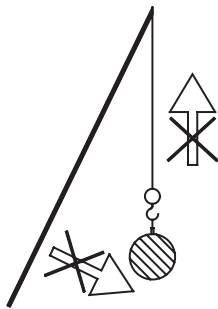
3. LOAD SAFETY DEVICE

3.6.2 CONTENTS OF AUTOMATIC STOP

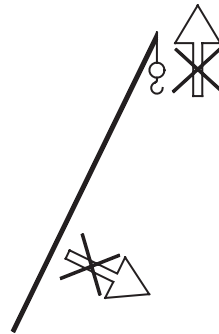
When the machine stops automatically due to respective hazardous condition, the machine cannot be operated in the X mark direction in the following figures. Since the direction without the X mark is safer side, the machine can be operated in this direction even without operating the release switch. When the machine stops automatically, immediately operate the machine to the safer side.

CRANE OPERATION

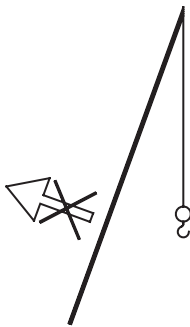
(1) OVERLOAD



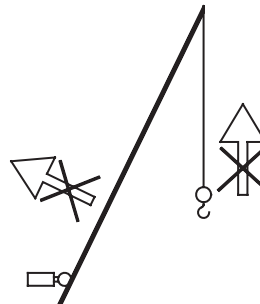
(2) HOOK OVERHOIST (Anti-two Block)



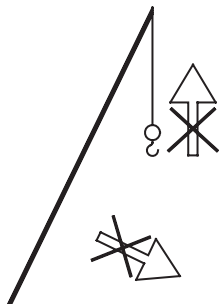
(3) BOOM OVERHOIST
(Controlled by LMI)



(4) BOOM OVERHOIST
(Controlled by boom overhoist limit switch)



(5) BOOM OVER LOWERING



Generally, when the boom is overhoisted, the LMI controller stops boom hoist automatically, according to the rating conditions.

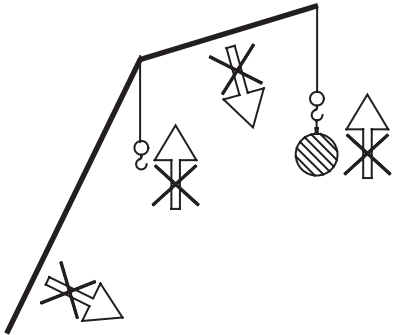
Even if the operator tries to raise the boom higher with the boom overhoist release switch, the boom overhoist limit switch (located near the boom foot) automatically stops the boom hoist at approximately 84.0 degree. The automatic stop cannot be released at this time.

3. LOAD SAFETY DEVICE

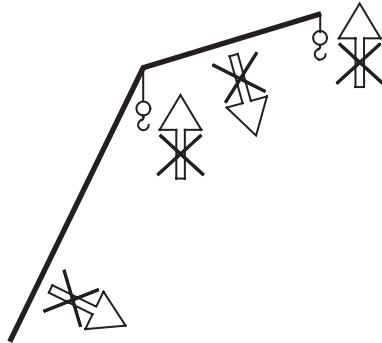
LUFFING CRANE OPERATION

1. MAIN MODE

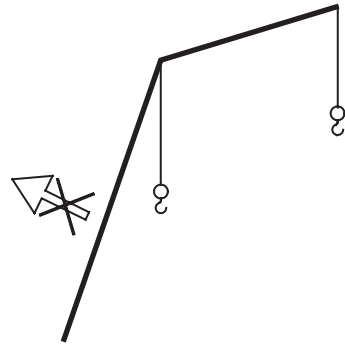
(1) OVERLOAD



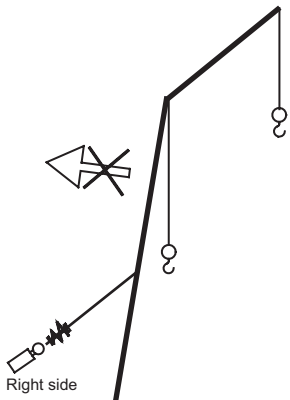
(2) HOOK OVERHOIST



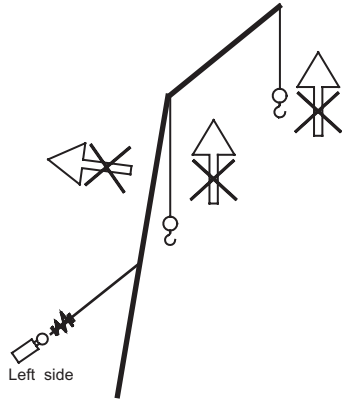
(3) BOOM OVERHOIST
(Controlled by LMI)



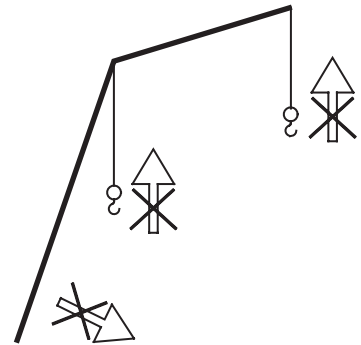
(4) BOOM OVERHOIST
(Controlled by boom
backstop limit switch 1)



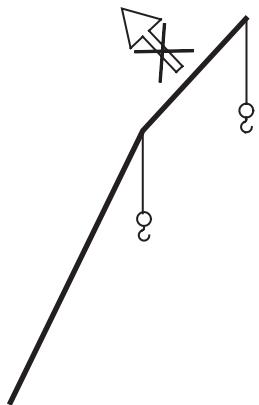
(5) BOOM OVERHOIST
(Controlled by boom
backstop limit switch 2)



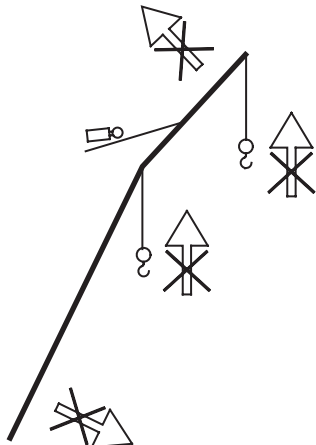
(6) BOOM OVER LOWERING



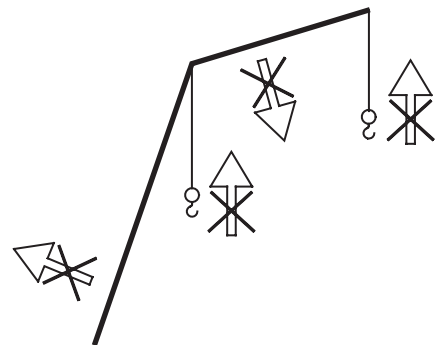
(7) JIB OVERHOIST
(Controlled by LMI)



(8) JIB OVERHOIST
(Controlled by jib overhoist
limit switch)



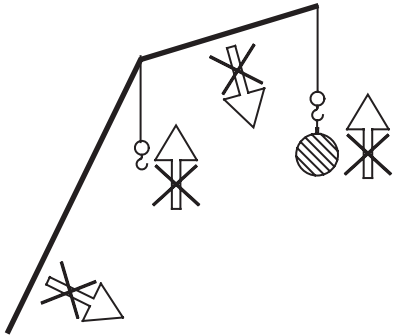
(9) BOOM OVER LOWERING



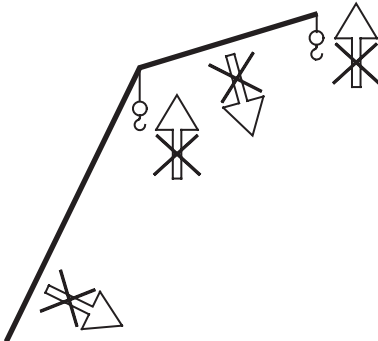
LUFFING CRANE OPERATION

2. AUX. MODE

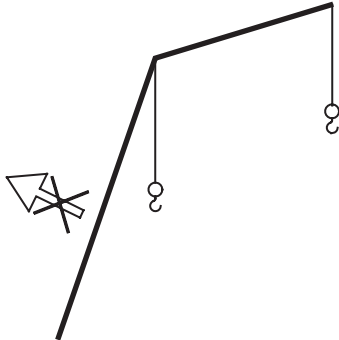
(1) OVERLOAD



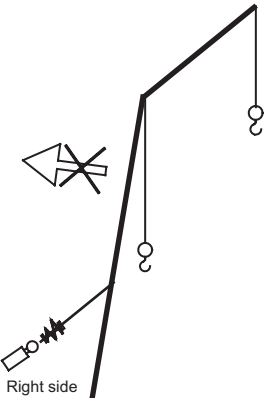
(2) HOOK OVERHOIST



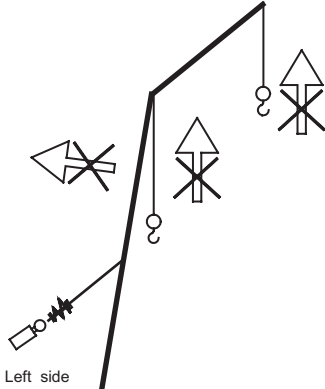
(3) BOOM OVERHOIST
(Controlled by LMI)



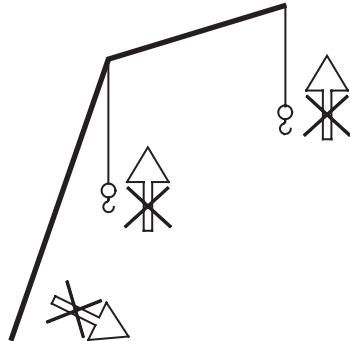
(4) BOOM OVERHOIST
(Controlled by boom
backstop limit switch 1)



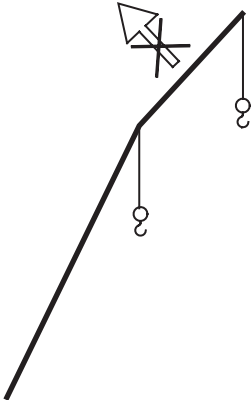
(5) BOOM OVERHOIST
(Controlled by boom
backstop limit switch 2)



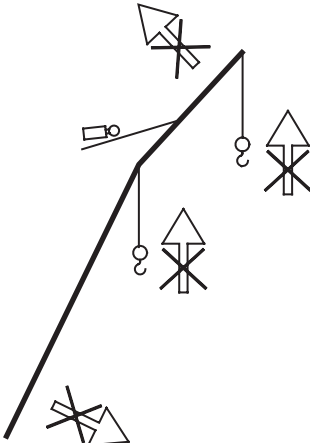
(6) BOOM OVER LOWERING



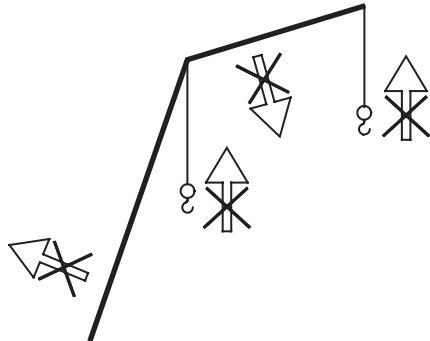
(7) JIB OVERHOIST
(Controlled by LMI)



(8) JIB OVERHOIST
(Controlled by jib overhoist
limit switch)



(9) BOOM OVER LOWERING



3. LOAD SAFETY DEVICE

Generally, when the boom is overhoisted, the controller of LMI functions to stop boom hoist automatically according to the rating conditions.

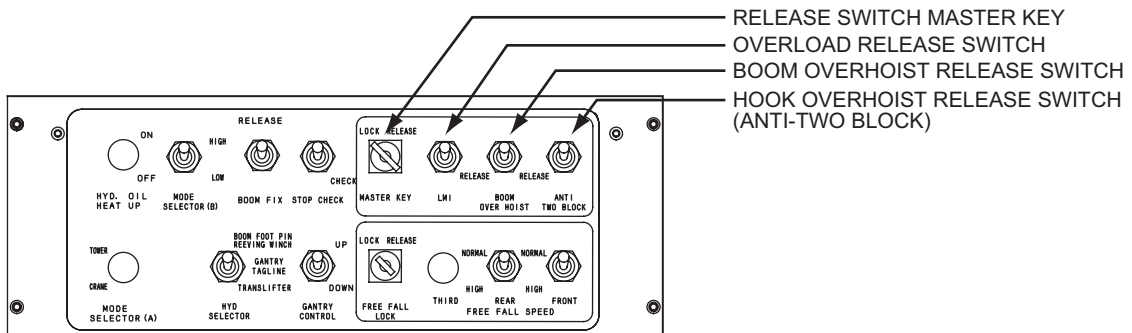
Even if the operator tries to raise the boom higher with the boom overhoist release switch, the boom overhoist limit switch located near the boom foot functions and stops the boom hoist at approximately 84.0 degree automatically in this time. The automatic stop in this time cannot be released.

3.6.3 RELEASE OF AUTOMATIC STOP

1. AUTOMATIC STOP RELEASE SWITCH



Do not operate crane with keeping the release switches fixed in the RELEASE position. Failure to observe this precaution may result in overturning and/or serious damage of the crane and leads to serious injury or death.



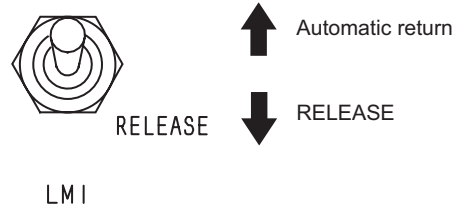
2. OPERATION OF AUTOMATIC STOP RELEASE SWITCH

Use this switch only when releasing the automatic stop to operate the machine for emergency or maintenance work is required.

• OVERLOAD RELEASE SWITCH (LMI)

This switch releases the automatic stop function due to overload and when the operating radius exceeds the limit.

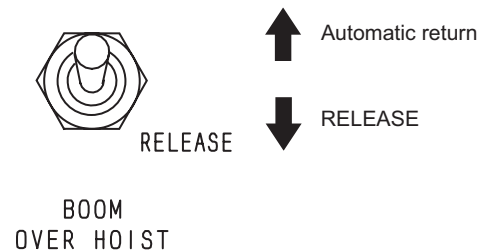
By placing the switch in the RELEASE position, the automatic stop is released.



• BOOM OVERHOIST RELEASE SWITCH

This releases the automatic stop function due to boom overhoist.

By placing the switch in the RELEASE position, the automatic stop is released.



3. LOAD SAFETY DEVICE

- HOOK OVERHOIST RELEASE SWITCH

(Anti-two Block)

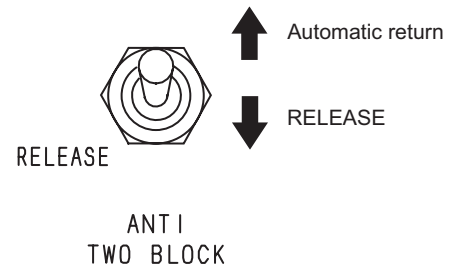
This switch releases the automatic stop when the hook is overhoisted.

By placing the switch in the RELEASE position, the automatic stop is released.

When releasing the automatic stop function due to overhoist, push and hold the release switch as it is. If released, the switch returns to the neutral position to allow the automatic stop function to operate.

When releasing the automatic stop function, be sure to operate the corresponding release switch.

Even by operating a release switch without relation, the automatic stop function cannot be released.



WARNING

Use the release switch only under necessary circumstances such as disassembling and assembling the machine.

Failure to observe this precaution may result in serious injury or death.

DANGER

Do not operate crane with keeping the release switches fixed in the RELEASE position.

Failure to observe this precaution may result in overturning and/or serious damage of the crane and leads to serious injury or death.

- RELEASE SWITCH MASTER KEY

Release function of automatic stop with "OVERLOAD RELEASE SWITCH", "BOOM OVERHOIST RELEASE SWITCH", and "HOOK OVERHOIST RELEASE SWITCH" can be controlled with this key.

This key can be removed when it is at the "LOCK" position.

Release of automatic stop with the release switches is cancelled by turning this key to the "LOCK" position. It becomes possible when the key is turned to the "RELEASE" position.

LOCK RELEASE



MASTER KEY

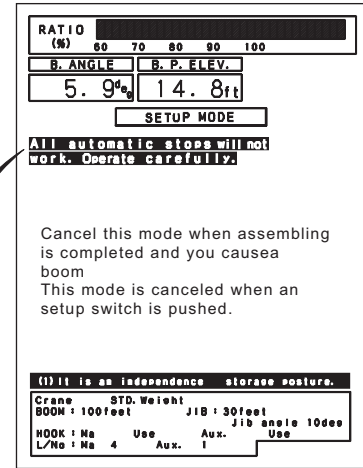
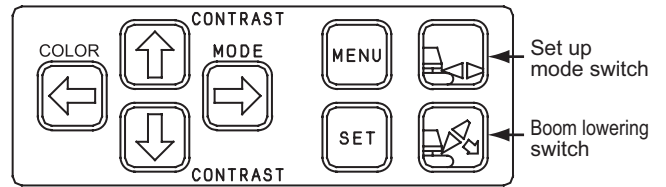
3. BOOM /JIB LOWERING METHOD AT OUT OF ANGLE

- (1) When lowering only main boom (boom length is 190 feet or shorter) with aux. sheave (boom length is 190 feet or shorter)

If the boom is equipped with the hook block only, the boom can be lowered onto the ground without stopping. However, the automatic stop works because of the overhoisted hook when the limit switch weight touches the ground and opens the point of contact in the limit switch.

To lower the boom further, return the control lever to the neutral position, and press the set up mode switch

once for more than 3 (three) seconds. Then, the SETUP mode is actuated, and boom lowering becomes possible.




All automatic stops will not work. Operate carefully.

Screen displayed when the switch is pressed.


3. LOAD SAFETY DEVICE

- (2) When lowering only main boom (boom length is 200 feet or longer) with aux. sheave (boom length is 200 feet or longer) and fixed jib.

Lower the boom until it is automatically stopped. When it is stopped, press the boom lowering switch  once for more than 3 (three) seconds.

Then, the boom lowering mode is actuated, automatic stop function is released, and boom lowering becomes possible.

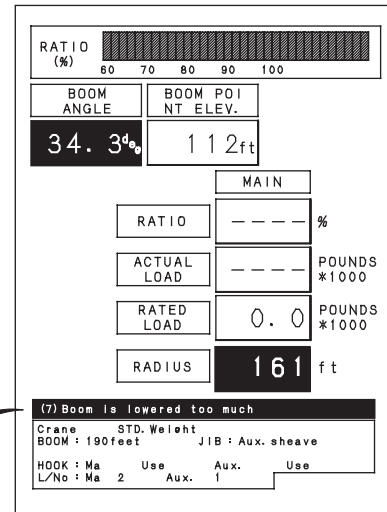
However, when the hook overhoist weight touches the ground, the hook overhoist automatic stop function is actuated.

To lower the boom further, return the control lever to the neutral position, and press the set up switch  once.

Then, the SETUP mode is actuated, and boom lowering becomes possible.

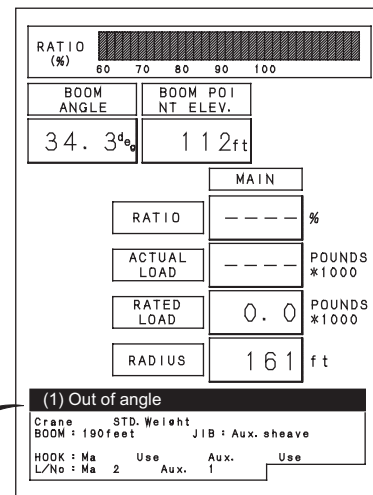
Note

When pressing  or  switch, hold it for three seconds or longer.



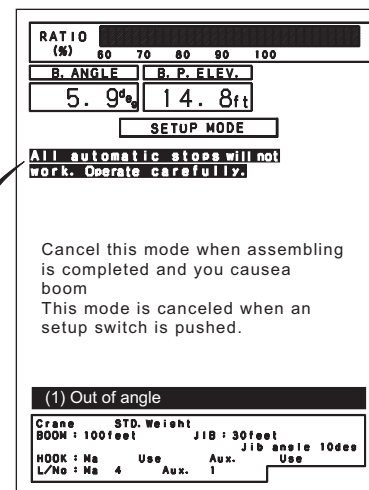
(7) Boom is lowered too much

Screen displayed when the boom is lowered and stopped at the lower limit angle.



(1) Out of angle

Screen displayed when the  switch is pressed.



All automatic stops will not work. Operate carefully.

Screen displayed when the  switch is pressed.

(3) When lowering luffing jib

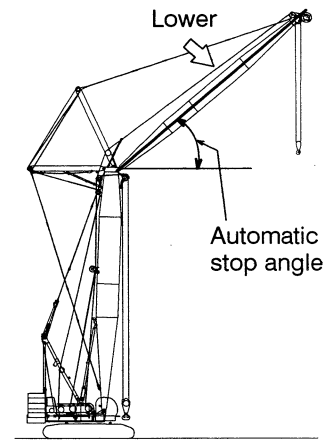
Lower the jib until it is automatically stopped.

When it is stopped, press the boom lowering switch

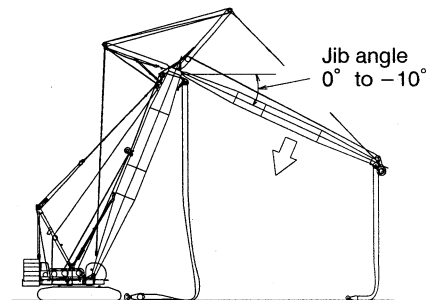


once for more than 3 (three) seconds.

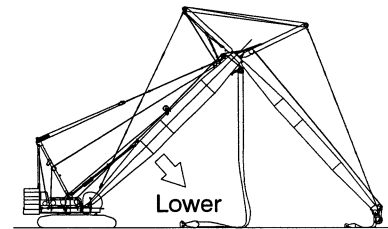
Then, the jib lowering mode is actuated, automatic stop function is released, and jib lowering becomes possible.



Lower the jib until the jib angle is within the range from 0° to -10°.




Then, lower the boom until the jib tip comes into contact with the ground.

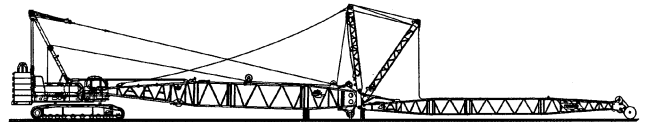


However, when the hook overhoist weight touches the ground, the hook overhoist automatic stop function is actuated.

To lower the jib further, return the control lever to

the neutral position, and press the set up switch 

once for more than 3 (three) seconds. Then, the SETUP mode is actuated, and jib lowering becomes possible.



Note

When pressing  or  switch, hold it for three seconds or longer.

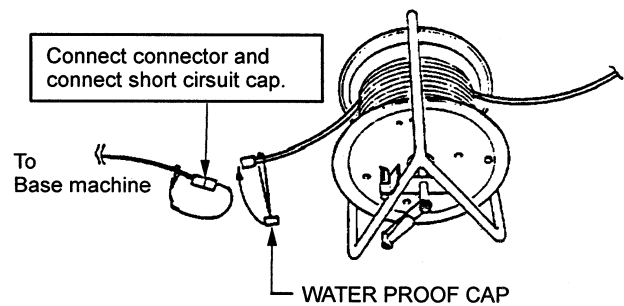
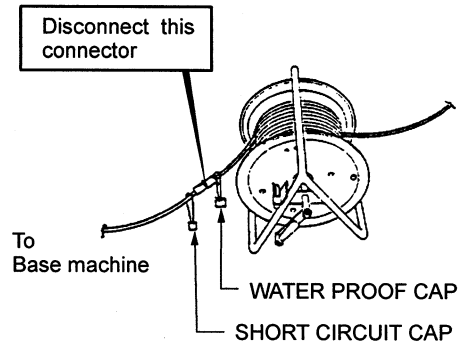
3. LOAD SAFETY DEVICE

4. RELEASE OF AUTOMATIC STOP WHEN ASSEMBLING AND DISASSEMBLING THE BOOM

- (1) Release by Short-circuiting the Cable for the Hook Overhoist Limit Switch

When the cable for the hook overhoist limit switch is not completely connected, the automatic stop function operates. When raising or lowering the boom or when winding the winch wire rope onto the drum in assembling and disassembling work, make the following measures.

Using the short circuit cap, short-circuit the cable for the hook overhoist limit switch in the place of the cable reel for the boom base section.



WARNING


Absolutely do not use the short circuit cap except when disassembling and assembling the basic machine.

Failure to observe this precaution may result in serious accident and leads to mode serious injury or death.

(2) Release by Set up Mode


When the attachment is not installed and when the boom angle detector and hook overhoist limit switch cable are not completely connected, the automatic stop function operates.

The load safety device can be entered the SETUP/

mode by pressing the mode set up switch  once.


At this time, the automatic stop and alarm sounds are canceled. However, remember that the automatic stop by the boom overhoist limit switch works. When the load safety device enters the SETUP mode, the boom angle and messages to inform of the SETUP MODE are displayed on the screen.

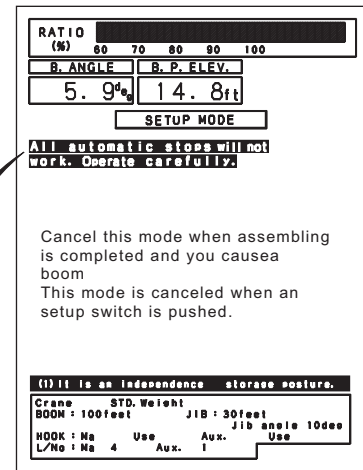
When the boom is raised after the assembly/disassembly is completed, the mode can be switched to the operation mode by pressing the SETUP switch

 once again. If the boom is raised during the SETUP mode, the SETUP mode is automatically switched to the operation mode when the boom angle is 15 degrees.

Therefore, the SETUP mode cannot be actuated while the boom is raised even when the SETUP switch is pushed.

The SETUP mode is cancelled when the power to the controller is shut down. Therefore, press the

 switch again to enter the SETUP mode when the power is supplied to the controller.



All automatic stops will not work. Operate carefully.

Screen displayed when the  switch is pressed.

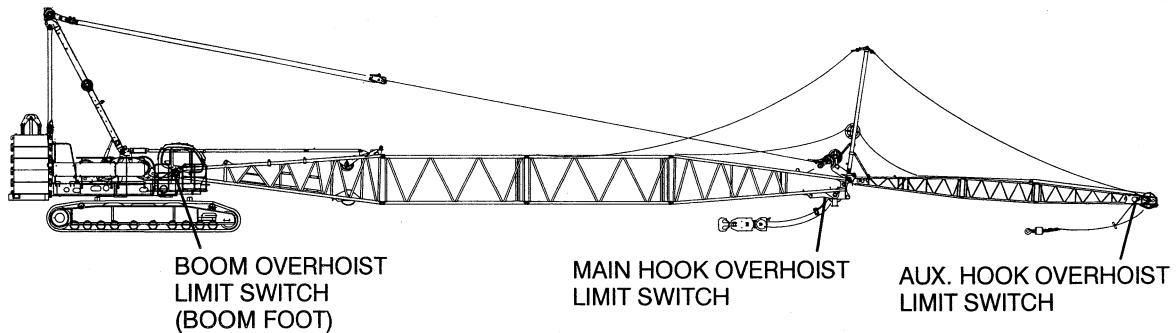
3. LOAD SAFETY DEVICE

3.7 INSPECTION

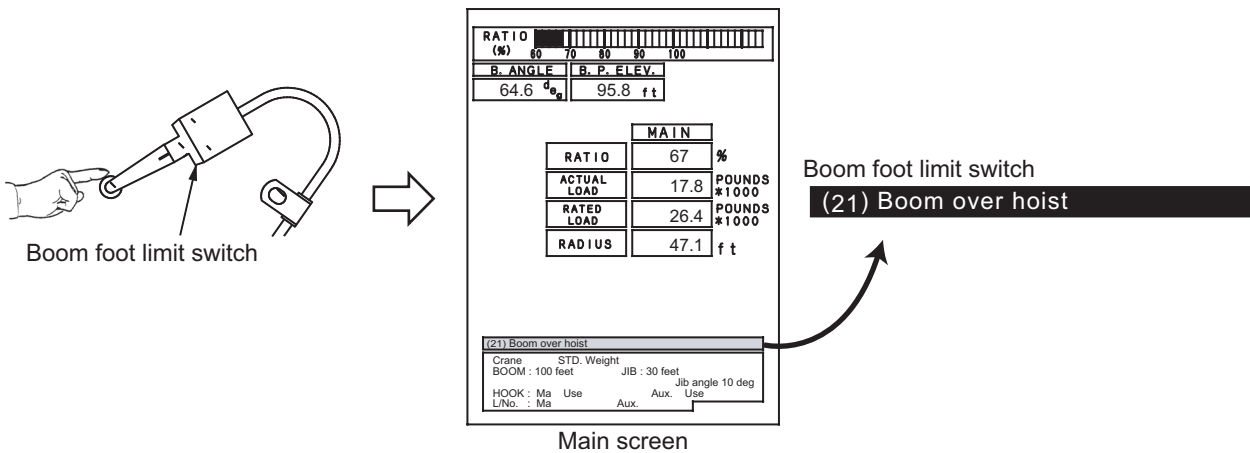
3.7.1 INSPECTION BEFORE RAISING THE BOOM AFTER ASSEMBLY OF ATTACHMENT IS COMPLETED

After the assembly of attachment is completed, inspect the safety device relation for performance, and confirm that there is no abnormality, then raise the boom. Besides, since sometimes the limit switch may already operate, pull the limit switch once to set to the safe condition, then inspect respectively as follows:

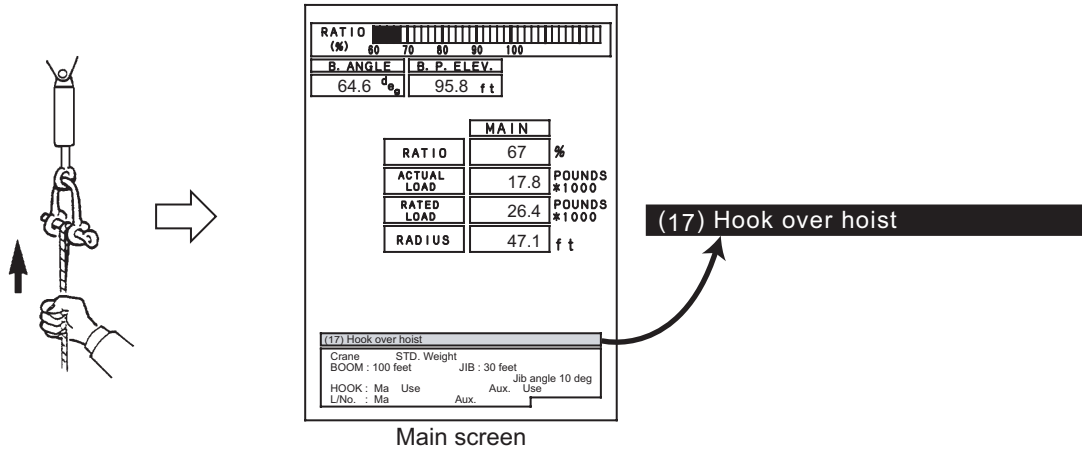
CRANE ATTACHMENT



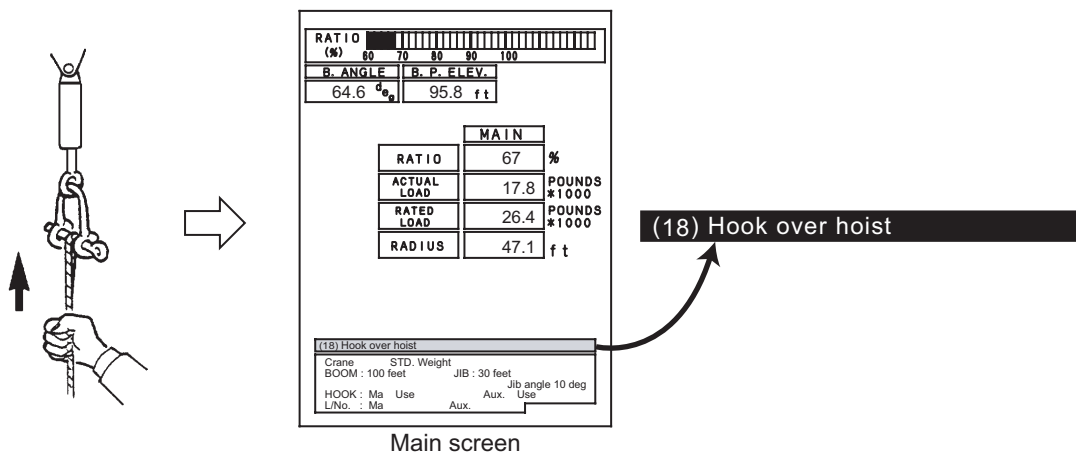
- Push the roller of the limit switch by hand, and confirm that the boom angle indicator on the controller turns red and either of the following messages appears in the message display window. If the right side of the backstop is pressed, a message "(21) Boom over hoist" will appear.



- Inspection of Main Hook Overhoist Limit Switch
Push up the weight lifting rope of the limit switch to confirm that the message of "(17) Hook over hoist" is displayed in the message display window, and pull the rope with hand to confirm that this message disappears.

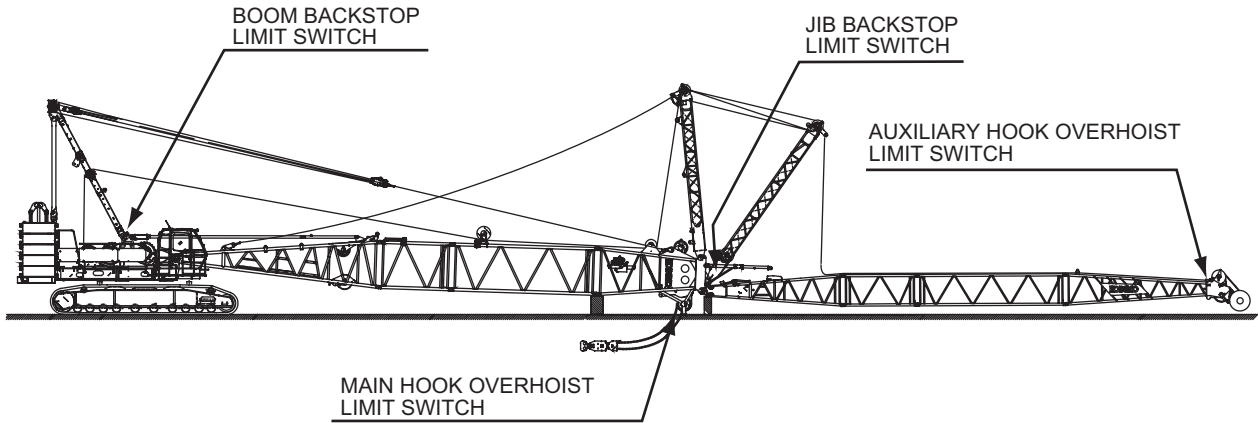


- Inspection of Auxiliary Hook Overhoist Limit Switch
Push up the weight lifting rope of the limit switch to confirm that the message of "(18) Hook over hoist" is displayed in the message display window, and pull the rope with hand to confirm that this message disappears.

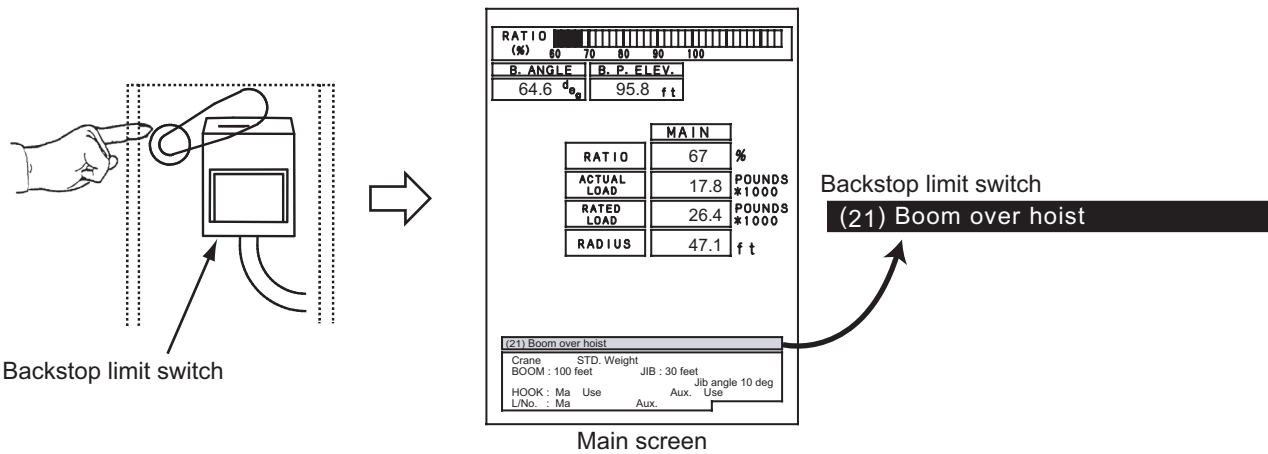


3. LOAD SAFETY DEVICE

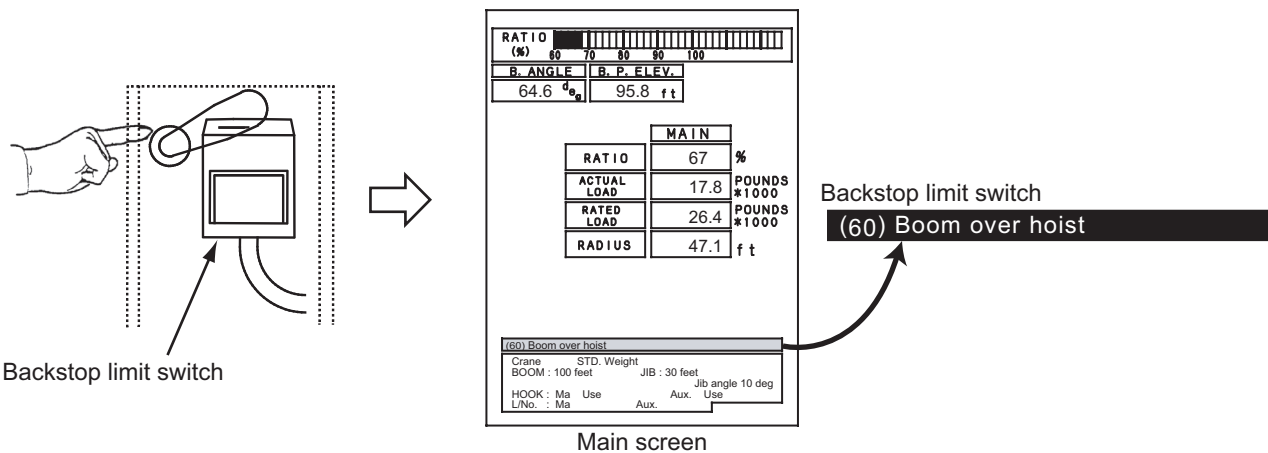
LUFFING CRANE ATTACHMENT



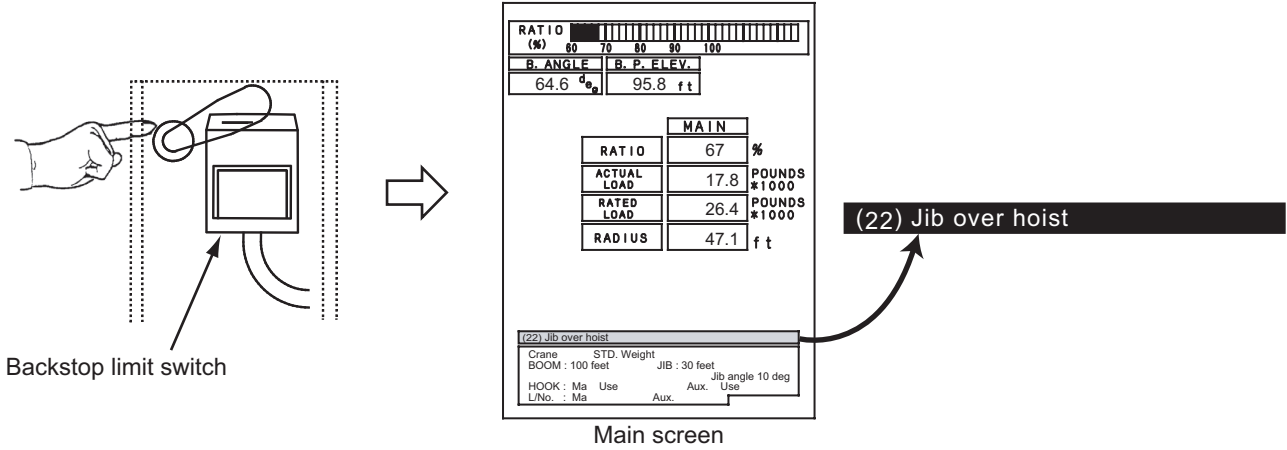
- Inspection of Boom Overhoist Limit Switch
Push the roller of the limit switch with hand, and confirm that the boom angle indicator turns into red, and the message of "(21) Boom over hoist" is displayed in the message display window.



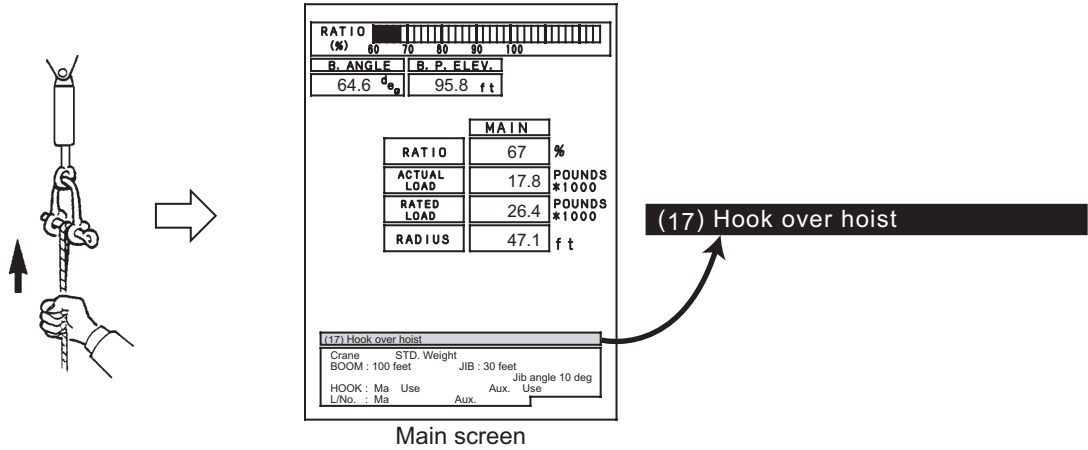
- Inspection of Boom Backstop Limit Switch
Push the roller of the limit switch hand, and confirm that the boom angle indicator turns into red, and the message of "(60) Boom over hoist" is displayed in the message display window.



- Inspection of Jib Overhoist Limit Switch (Right and Left)
Push the roller of the limit switch with hand, and confirm that the boom angle indicator turns into red, and the message of "(22) Jib over hoist" is displayed in the message display window.

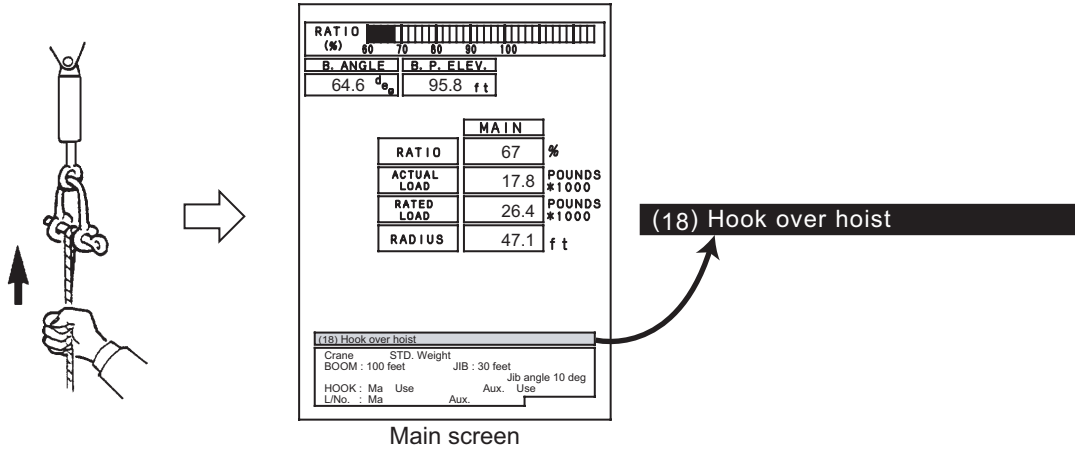


- Inspection of Main Hook Overhoist Limit Switch
Push up the weight lifting rope of the limit switch to confirm that the message of "(17) Hook over hoist" is displayed in the message display window, and pull the rope with hand to confirm that this message disappears.



3. LOAD SAFETY DEVICE

- Inspection of Auxiliary Hook Overhoist Limit Switch
 Push up the weight lifting rope of the limit switch to confirm that the message of "(18) Hook over hoist" is displayed in the message display window, and pull the rope with hand to confirm that this message disappears.

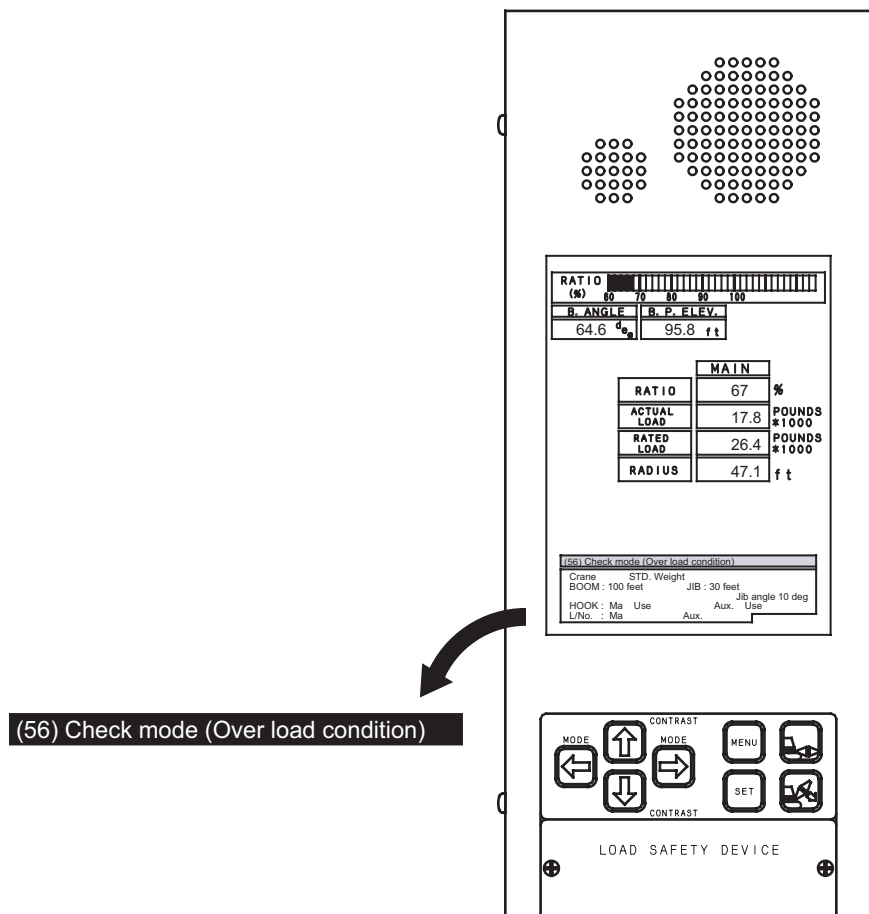


- Check of the load safety device with controller
If it is difficult to check the automatic stop function in case of overload by lifting a load actually, the function can be checked with the LMI controller.

Access the main screen, and press and hold the **SET** switch. Then, the device simulates the overload status and the automatic stop function is actuated (LMI check mode).

In this status, ensure that the hoisting of the hook blocks and the lowering of the boom are impossible.

The LMI check mode is started when approx. three seconds have passed after the **SET** switch is pressed, and the mode continues until the switch is released. The message of "(56) Check mode (Over load condition)" is displayed on the screen during the LMI check mode.



3. LOAD SAFETY DEVICE

3.7.2 INSPECTION AFTER ERECTING THE ATTACHMENT

Operate the machine up to the respective hazardous condition, and confirm the boom overhoist automatic stop/warning alarm functions and indications of the controller have no abnormality. The automatic stop angle of the boom in the overhoist side is shown in the following table. Besides, the automatic stop angle in the over-lowering side varies according to the boom length.

Classification	Kind of Overhoist	Classification of Stop	Automatic Stop Angle
Crane	Boom overhoist	LMI Controller	80.0 to 83.5 degrees
		Limit switch	84 degrees
Luffing Crane	Boom overhoist	LMI Controller	Max. 88 degrees
		Limit switch (Right)	88.2 degrees
		Limit switch (Left)	89.2 degrees
	Jib overhoist	LMI Controller	Jib offset 13.0 to 18.0 degrees
		Limit switch	Jib offset 11.9 to 11.0 degrees

* Angle of automatic stop by LMI depends on the conditions such as boom length and jib length.

3.8 CAUTION FOR HANDLING THE LOAD SAFETY DEVICE

1. WELDING WORK

Avoid damage of the controller and other electrical parts from a high electric current by welding work to the machine. When welding work to the machine, stop the engine, and turn the key switch to the OFF position and also disconnect the battery cable to be more complete.

2. OBSTRUCTION OF ELECTRIC WAVE (JAMMING)

When a broadcasting station is near and when the machine is subjected to jamming, consult your local KOBELCO authorize distributor.

3. OBSTRUCTION OF STATIC ELECTRICITY

If the surface of the controller is rubbed with a dry nylon cloth, etc. strongly, static electricity is generated.

Static electricity has a bad effect on the controller. Do not rub strongly.

Note

Refer to page 1-7 "Required Clearances for Operation Near High Voltage Power Lines".

3. LOAD SAFETY DEVICE

3.9 INDICATION OF ERRORS AND REMEDY

When an error is detected, the message is indicated on the message display window.

When an error code is indicated, the machine stops automatically, and the buzzer sounds. However, releasing by operating the overload release switch is possible.

Error Message Table

Malfunction	Error Code and the Message	Buzzer	Remedy
Crane configuration	(34) Code setup error	beep	Reset crane configuration.
Load detector (Crane)	(36) The trouble of the load cell for the boom (1).	beep	Replace load detector or cable.
Boom angle detector	(44) The trouble of the boom base angle sensor.	beep	Replace boom angle detector or cable.
Abnormality in communication with total controller	(57) Communication unusual.	-	Check communication line. Replace total controller or LMI.
Load detector (Luffing)	(39) The trouble of the load cell for the jib (2)	beep	Replace load detector or cable or junction box.
Jib angle detector	(47) The trouble of the lower jib angle sensor	beep	Replace jib angle detector or cable or junction box.

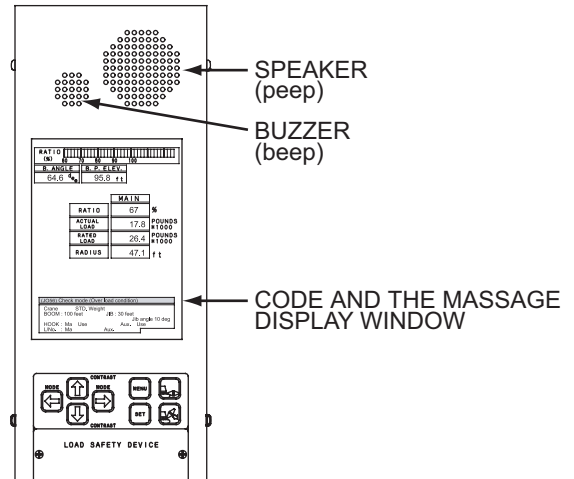
Note

When boom angle detector is replaced, the controller should be adjusted.

Ask your nearest KOBELCO authorize distributor for the controller adjustment.

3.10 INDICATION OF MESSAGE AND ALARM

Note that the machine is not malfunctioned when messages shown below are displayed depending on the conditions of the crane. These messages disappear when the control lever is operated to the safer side.



Message Table

Code and the Message	Buzzer	Display conditions (machine status)
(1) Out of angle.	-	Out of capacity set range
(2) Stop by the hook overhoist is canceled.	-	The hook overhoist automatic stop release switch is actuated.
(3) Stop by the boom/jib overhoist is canceled.	-	The boom overhoist automatic stop release switch is actuated.
(4) Stop by the overload is canceled.	-	Overload status is canceled.
(5) Overload condition.	beep	The loading ratio exceeds the specified level.
(6) Head wind is strong.	beep	The head wind alarm is issued.
(7) Boom is lowered too much.	beep	The boom is out of the maximum working radius area.
(8) Boom is raised too much.	peep *	The boom is out of the minimum working radius area.
(9)Jib is lowered too much.	peep	The jib is out of the maximum working radius areas.
(10)Jib is raised too much.	peep	The jib is out of the minimum working radius area.
(13)Jib is lowered too much.	beep	The jib offset angle is larger than the set value.
(14)Jib is raised too much.	peep	The jib offset angle is smaller than the set value.
(17) Hook overhoist.	peep *	The main hook overhoist limit switch is actuated.
(18) Hook overhoist.	peep *	The aux. hook overhoist limit switch is actuated.
(21) Boom overhoist.	peep	The boom overhoist limit switch is actuated.
(22)Jib overhoist.	peep	The jib overhoist limit switch is actuated.
(24) Overload forecast.	beep, beep ...	Loading ratio is 90% or more, and lower than the specified level.
(25) Reached the setup value of the load limitation.	beep	Lifting load exceeds the lifting load limit value set by operator.
(26) Reached 90% of the load limitation value.	beep, beep ...	Lifting load exceeds 90% of the lifting load limit value set by operator.
(27) Boom angle reached upper limitation value.	peep *	The boom reaches the boom angle upper limit point (stop point) set by operator.

3. LOAD SAFETY DEVICE

Message Table

(28) Boom angle reached lower limitation value.	peep	*	The boom reaches the boom angle lower limit point (stop point) set by operator.
(29) Jib angle reached upper limitation value.	peep		The jib reaches the jib angle upper limit point (stop point) set by operator.
(30) Jib angle reached lower limitation value.	peep		The jib reaches the jib angle lower limit point (stop point) set by operator.
(31) Working radius reached limitation value.	peep	*	The boom reaches the working radius limit point (stop point) set by operator.
(32) Boom point elevation reached limitation value.	peep	*	The boom reaches the boom height limit point (stop point) set by operator.
(33) Jib point elevation reached limitation value.	peep		The jib reaches the jib height limit point (stop point) set by operator.
(60) Boom overhoist	peep		The luffing boom overhoist limit switch (left) is actuated. CONFIRMING PROPER FUNCTIONING OF LOAD SAFETY DEVICE
(63) CWT detect error.	beep		The input signal from the counterweight detector does not match the data.

In conditions with *, the buzzer sounds only when the control lever is operated in the direction / function of dangerous side.

3.11 CONFIRMATION OF FUNCTION FOR LOAD SAFETY DEVICE

The load safety device should be checked with following items at least once a year.

1. Indication of operating radius

- (A) Lower the boom and stop it within allowable working range.
- (B) Measure the actual operating radius, and be sure to check correct indication of operating radius on the controller.

2. Indication of actual load

- (A) Lift a known weight (load).
- (B) Be sure to check the reading of actual load on the controller with total load for correct indication.
The total load should be weight of load being lifted, weight of hook block and weight of lifting device.

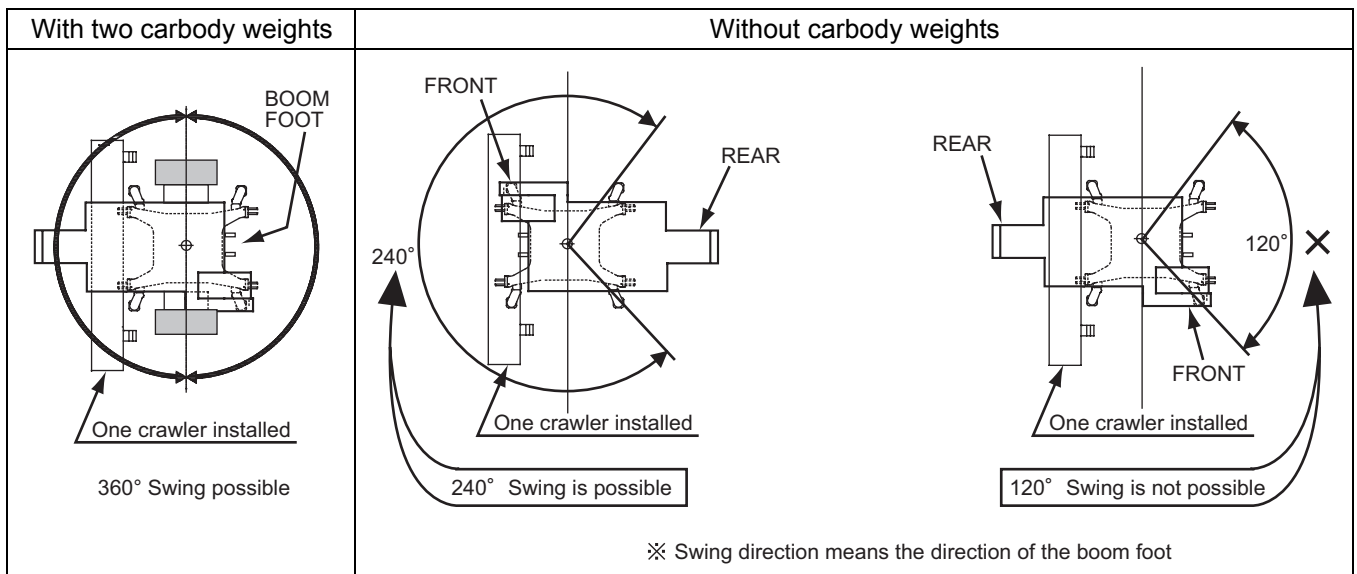
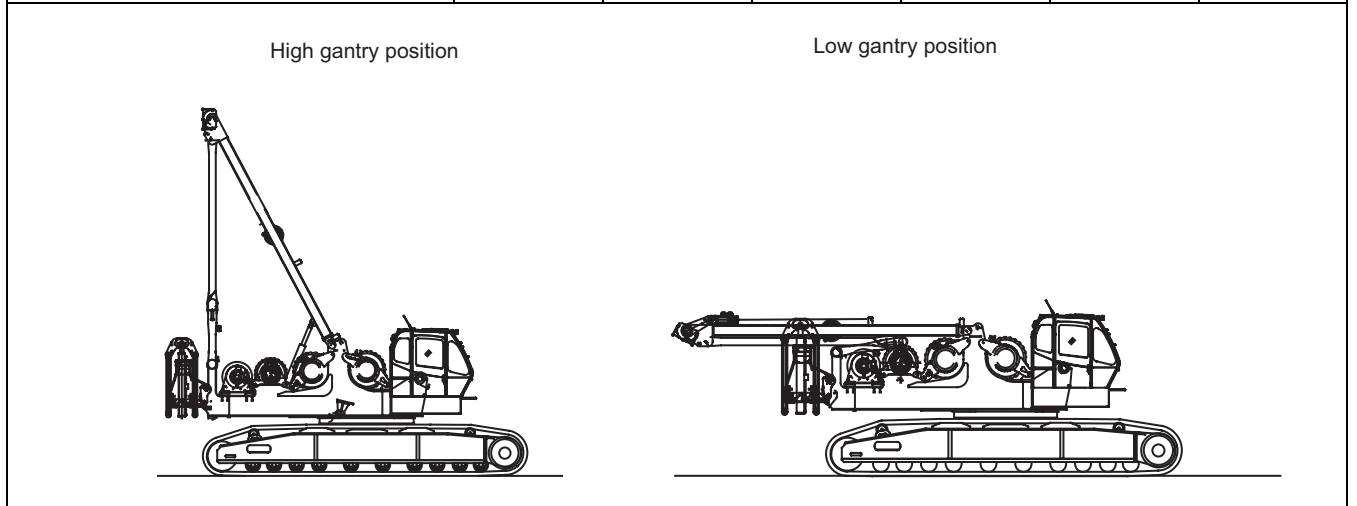
The total safety device should be adjusted when the discrepancy of indication exceeds the allowable range. Ask your nearest KOBELCO authorize distributor for the controller adjustment.

4. ASSEMBLY OF THE MACHINE

4.1 STABILITY IN SWINGING AND TRAVELING

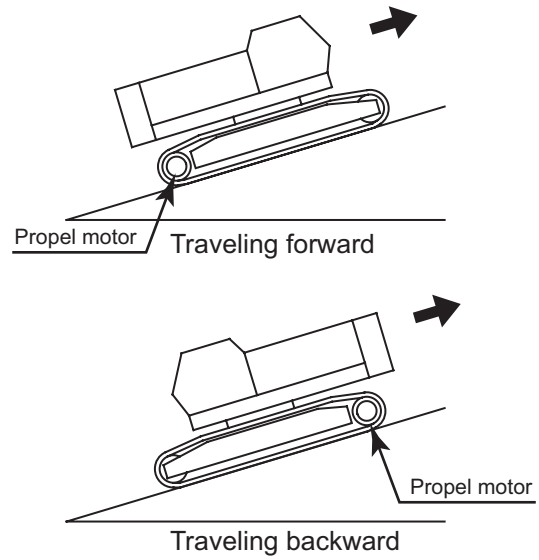
4.1.1 WITHOUT BOOM BASE

Gantry position	Counter-weight (lbs)	Carbody-weight (lbs)	All-round swing		Propelling	
			With crawler	When jacked up without crawler	Forwarding	Backwarding
Low gantry position	None	None	O	X	O	O
High gantry position	None	None	O	O	O	O
Low gantry position	None	44,100	O	O	O	O
High gantry position	None	44,100	O	O	O	O
Low gantry position	132,280	None	X	X	X	O
High gantry position	132,280	None	X	X	X	O
Low gantry position	132,280	44,100	X	X	X	O
High gantry position	132,280	44,100	X	X	X	O



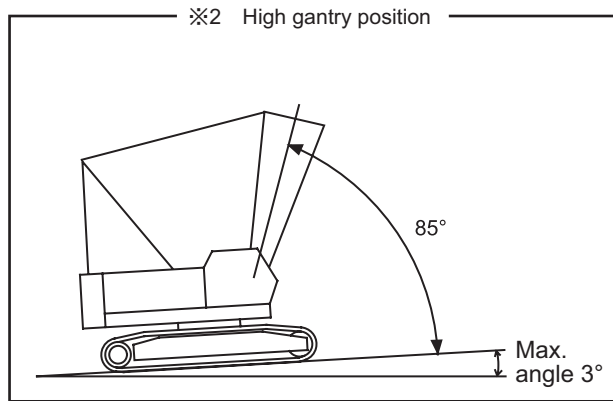
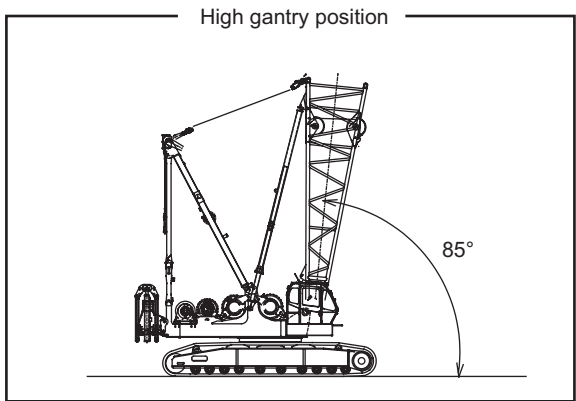
4. ASSEMBLY OF THE MACHINE

- (1) The table on the previous page above shows the values for operation on a firm ground. On a weak ground, operate with care after curing the ground.
- (2) As a principle, swinging on a trailer is prohibited.
- (3) Maximum slope angle is 16.7° (30%).
- (4) Traveling forward means the case, where the counterweight is at the lower slope and the traveling backward, where it is at the upper slope.



4.1.2 WITH BOOM BASE

Gantry position	Boom angle	Counter-weight (lbs)	Carbody-weight (lbs)	All-round swing		Propelling	
				With crawler	When jacked up without crawler	Forwarding	Backwarding
High gantry position	0° to 85°	None	None	O	O	O	O
		None	44,100	O	O	O	O
		132,280	None	X	X	X	O
		132,280	44,100	X	X	*2 △ Max. angle 3°	O



4. ASSEMBLY OF THE MACHINE

4.2 TRANSLIFTER

Translifter is assisting device for transportation used when the basic machine is loaded to or unloaded from a trailer or when crawlers are removed. Please refer to previous table for stability. Translifter must be operated on the flat and firm ground, paying attention to trailer access direction, location of crawler lifting auxiliary crane [70,000 kg class] into account. Vertical cylinder load of the translifter may reach to maximum (37,000 kg) per each cylinder and ground must stand for it. As safety practice, place steel plate under each float. Float dimension : □ 400 mm (□ 15-3/4") Float to ground clearance with crawler fitted: 90 mm (3-17/32")

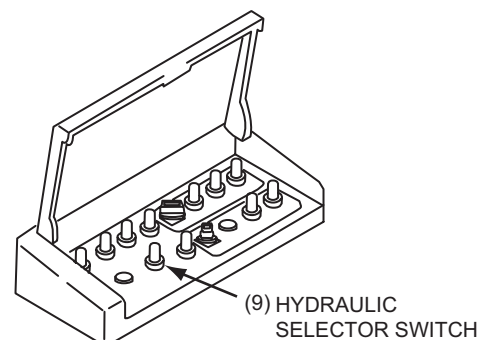
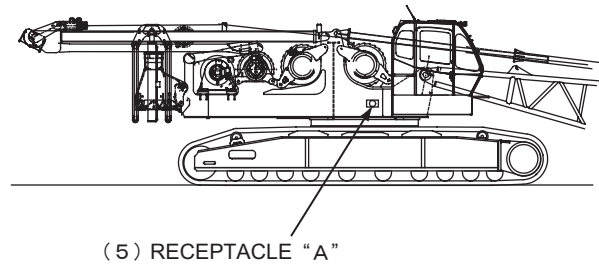
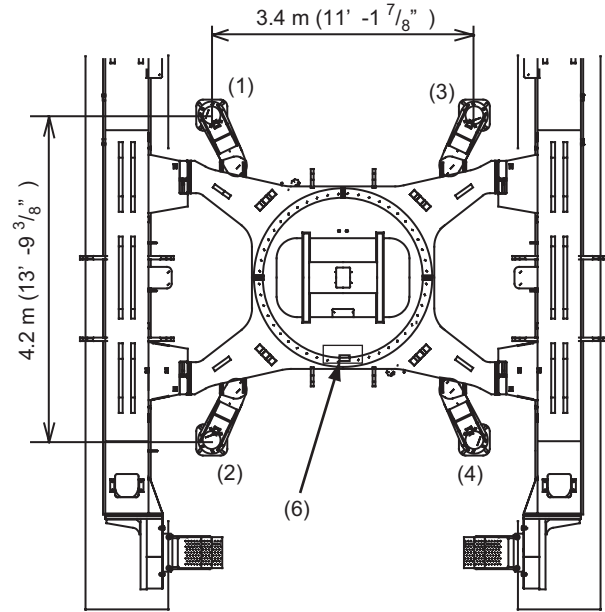


Engage swing brake and swing lock when operating translifter to avoid turn-over of machine. Failure to observe this precaution will result in serious accident.

4.2.1 COMPOSITION OF THE TRANSLIFTER

Translifter is composed of following equipment and parts.

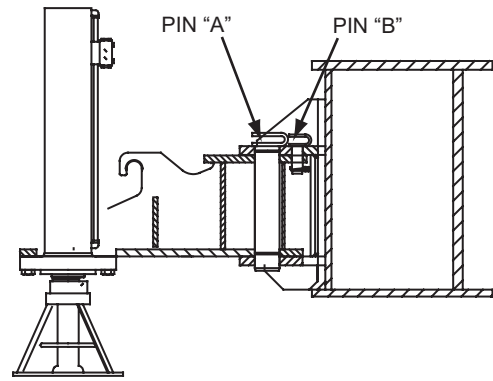
1. Four cylinders to lift up the basic machine (1), (2),(3), (4)
2. Receptacle "A" located under the operator cabin. (5)
3. Terminal box on the carbody side (6)
4. Remote control switch (7)
(Stored in the operator cabin)
5. Translifter connecting cable (8)
(Stored in tool box)
6. Hydraulic selector switch (9)
(Side stand panel in the operator cabin)



4.2.2 HANDLING TRANSLIFTERS (1) - (4)

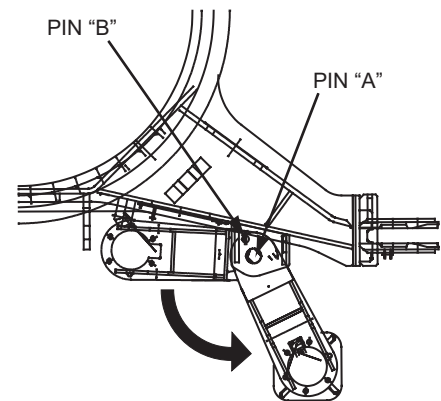
1. Vertical cylinder

Fix the vertical cylinder to the machine with the pin "A" and pin "B".



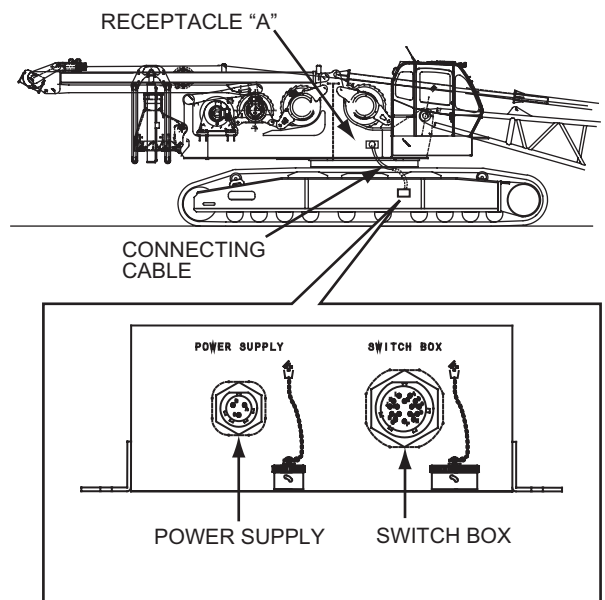
2. Receptacle "A" under the operator cabin. (5)

Connect to the Receptacle (power supply) on the carbody side with the connecting cable.



3. Terminal box (the power supply and switch box) in the carbody side. (6)

Connect the power supply to receptacle "A" under the operator cabin with the connecting cable. Connect the switch box to the remote control cable.



4. ASSEMBLY OF THE MACHINE

4. Remote control switch (7)

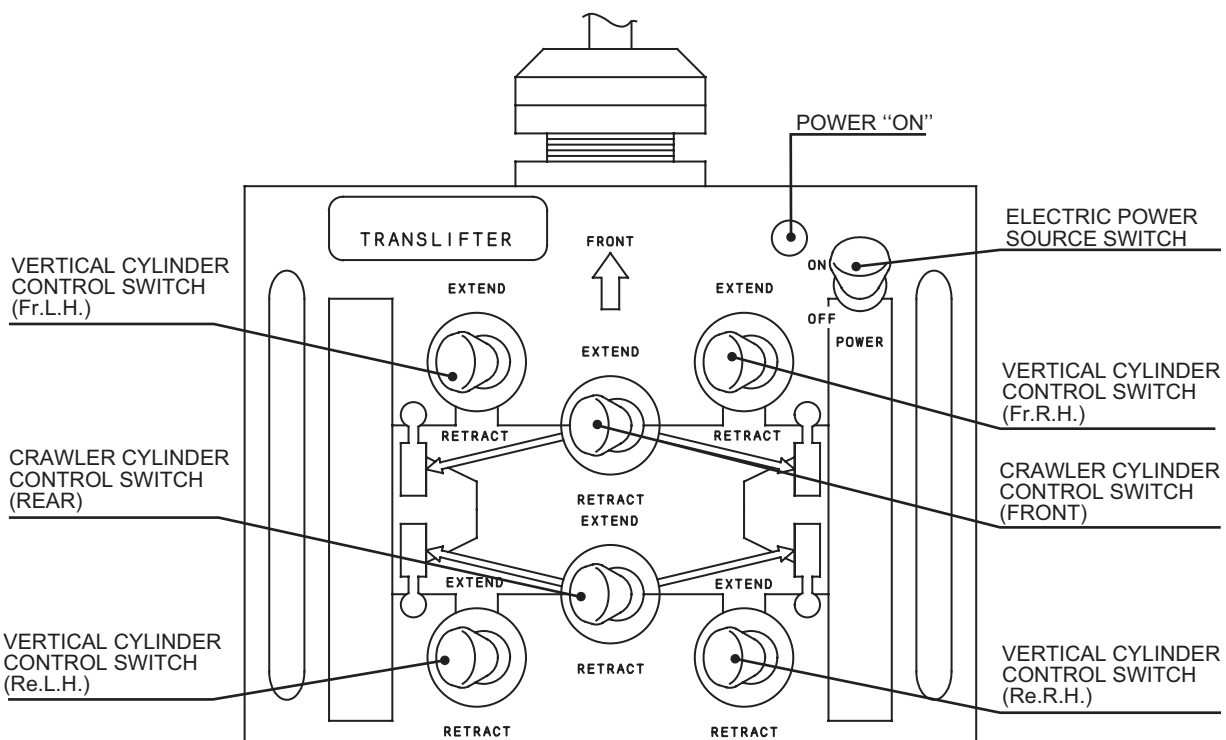
This is the control switch for operating the vertical translifter cylinder and crawler fixing pin cylinders. After power is "ON" and depress EXTEND or RETRACT selector switch of each cylinder switch, then cylinder starts to move and stop when released.

During cylinder movement, buzzer will ring.

Cut the power when control switch is not used.

When operating four vertical cylinders simultaneously, some cylinders may extend at different times because of load discrepancies put on each cylinder.

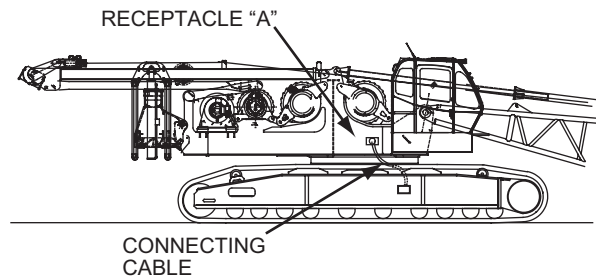
Ensure machine is kept level at all times.



5. Connecting cable (8)

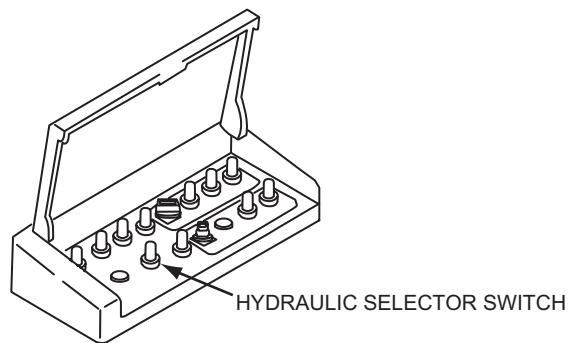
This is the connecting cable between the upper machinery and lower machinery.

(Connection between receptacle "A" and the receptacle power supply in the terminal box.)



6. Hydraulic selector switch (9)

This is the switch to select translifter operation, reeving winch operation, boom foot pin cylinder operation, and gantry cylinder operation.



4. ASSEMBLY OF THE MACHINE

4.3 UNLOADING THE BASE MACHINE

This chapter describes unloading the basic machine from the trailer. Here, attachment, counterweight and crawlers are removed and gantry and base boom are already in the transporting position.

This chapter describes unloading the basic machine from 50 ton class trailer.



Do not put your finger into pin hole.

Failure to observe this precaution will result in serious injury.

Check the following points before starting actual work.

1. Yard
 - (1) Ground must be flat and firm, with adequate steel plates placed if necessary.
 - (2) There is enough space for auxiliary crane and access for trailer and truck.
2. Confirmation of work procedure and safety practice.

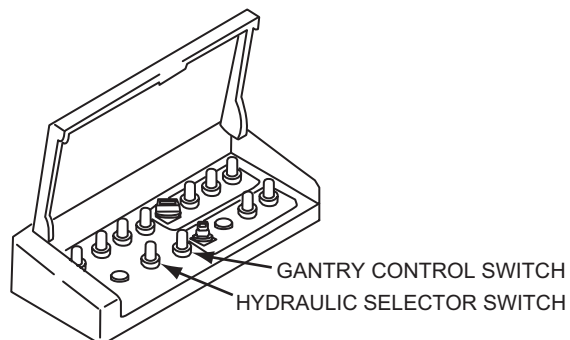
Prior to assembly work, all personnel concerned must confirm work procedure and safety practice and set for individual's role and responsibility.
3. Machine inspection before work.

Basic machine must be inspected before work.

4.3.1 ERECTING THE GANTRY

Erecting the gantry and change the machine from transport style to operating style.

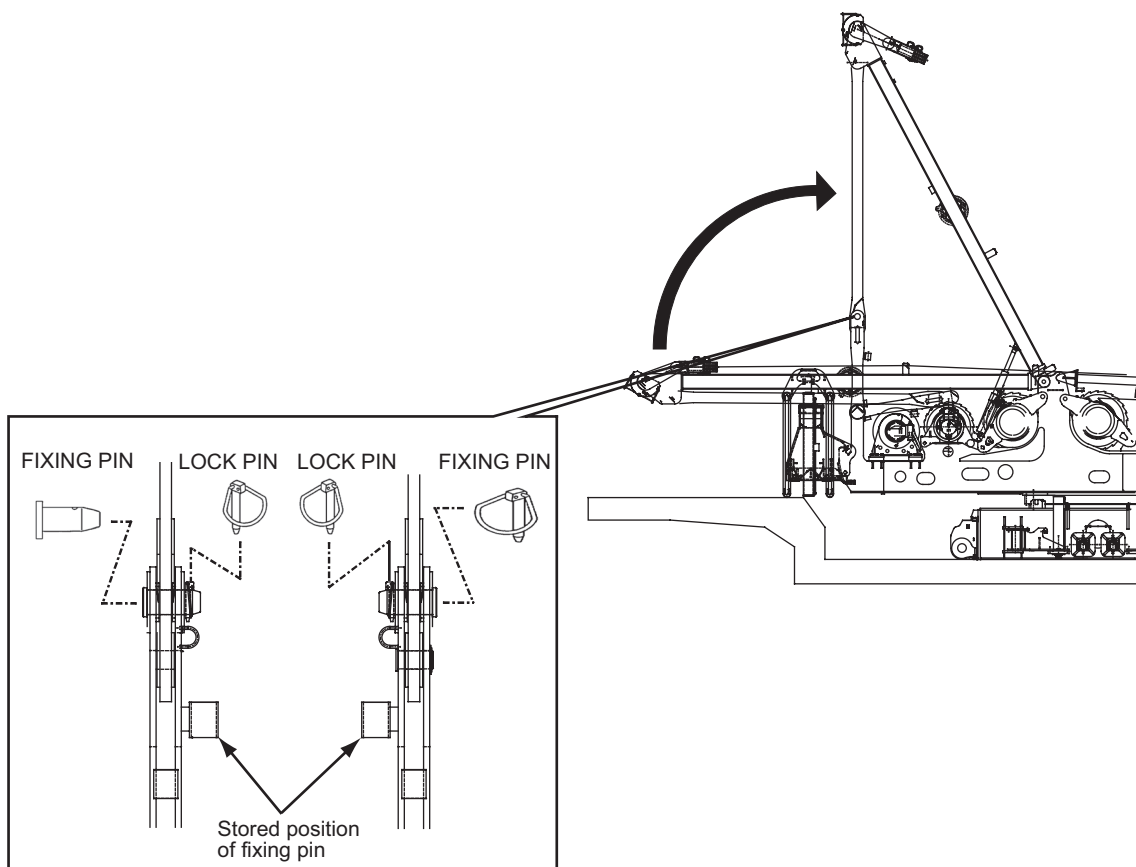
1. Confirm that the gantry cylinder is installed on the gantry.
2. Start the engine and set the speed to about 1000 rpm.
3. Set the hydraulic selector switch in the operator cabin side stand panel to "Neutral" position and turn the Gantry Control Switch to move the gantry.



CAUTION

Do not touch the gantry operating switch when boom raising wire rope is tensioned during crane operation or boom raising.

4. Install the fixing pin from the inside toward the outside of the gantry, and set the lock pin to avoid slip out when the gantry comes to the operating position.

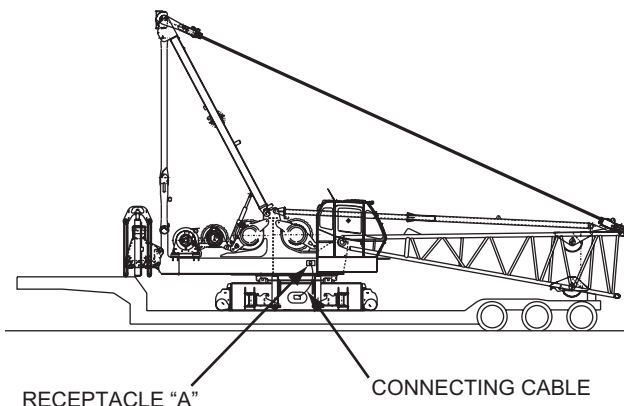


4. ASSEMBLY OF THE MACHINE

4.3.2 SETTING THE TRANSLIFTERS

1. Check the ground condition before parking the trailer.
2. Connect the receptacle "A" under the operator's cabin to the receptacle power supply in the carbody side terminal box with the connecting cables.

Connect the receptacle switch box in the carbody terminal box with cables from remote control.

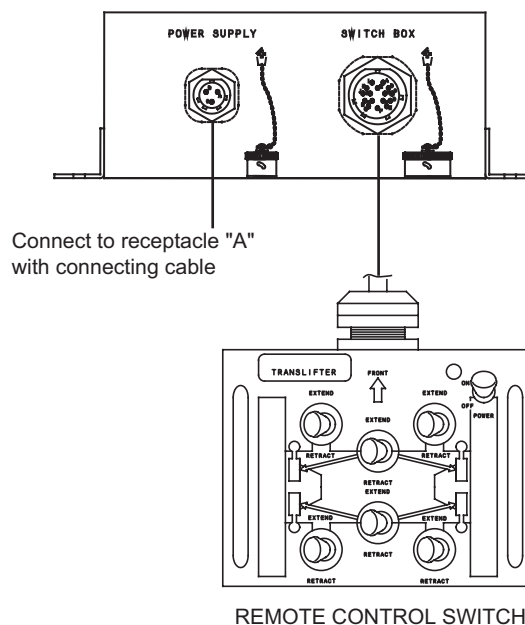


WARNING

Do not swing with the vertical cylinders retracted to avoid turnover of the trailer. Failure to observe this precaution may result in serious accident.

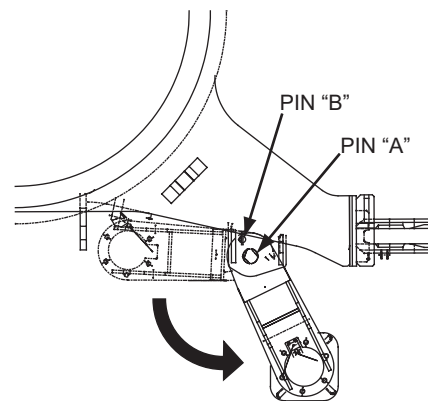
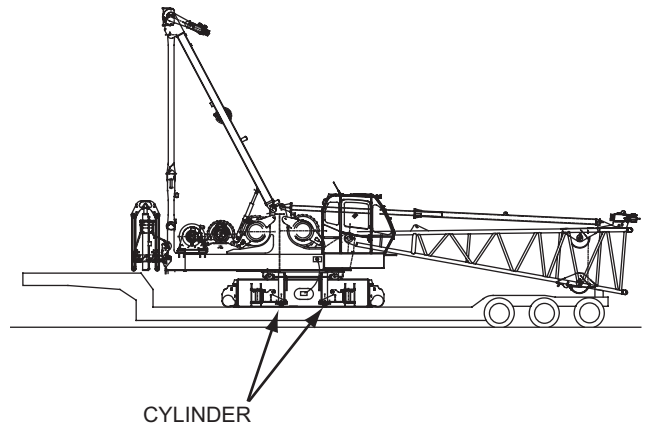
WARNING

Do not swing with connecting cable CN2 connected.

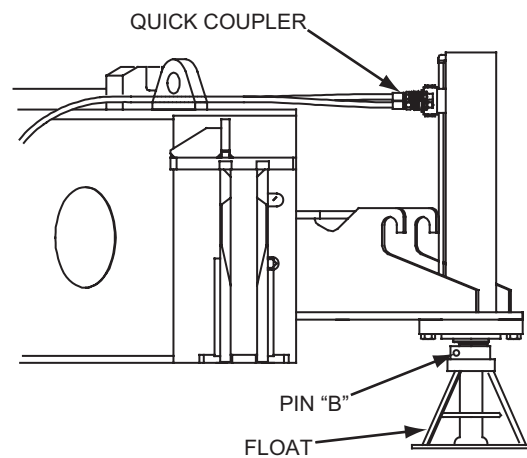


4. ASSEMBLY OF THE MACHINE

4. Install the translifter cylinder assemblies with auxiliary crane to the machine with the pins "A" (4 pos). Fix the cylinder to the operating position with the pin "B".



5. Connect the hydraulic hose with quick coupler to the vertical cylinder.
6. Install the float to the vertical cylinder and lock it with pin "B".

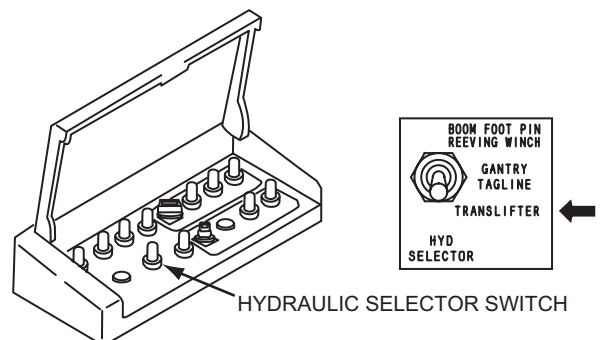


CAUTION

Float weight about 33kg. It is recommended to install or remove it by two persons to avoid injury to your body.

7. Check if vertical cylinder hose is securely connected by pulling quick coupler.

8. Start the engine and set the speed to about 1000 rpm. Move the hydraulic selector switch located on the side stand panel in the operator's cab toward the translifter position.



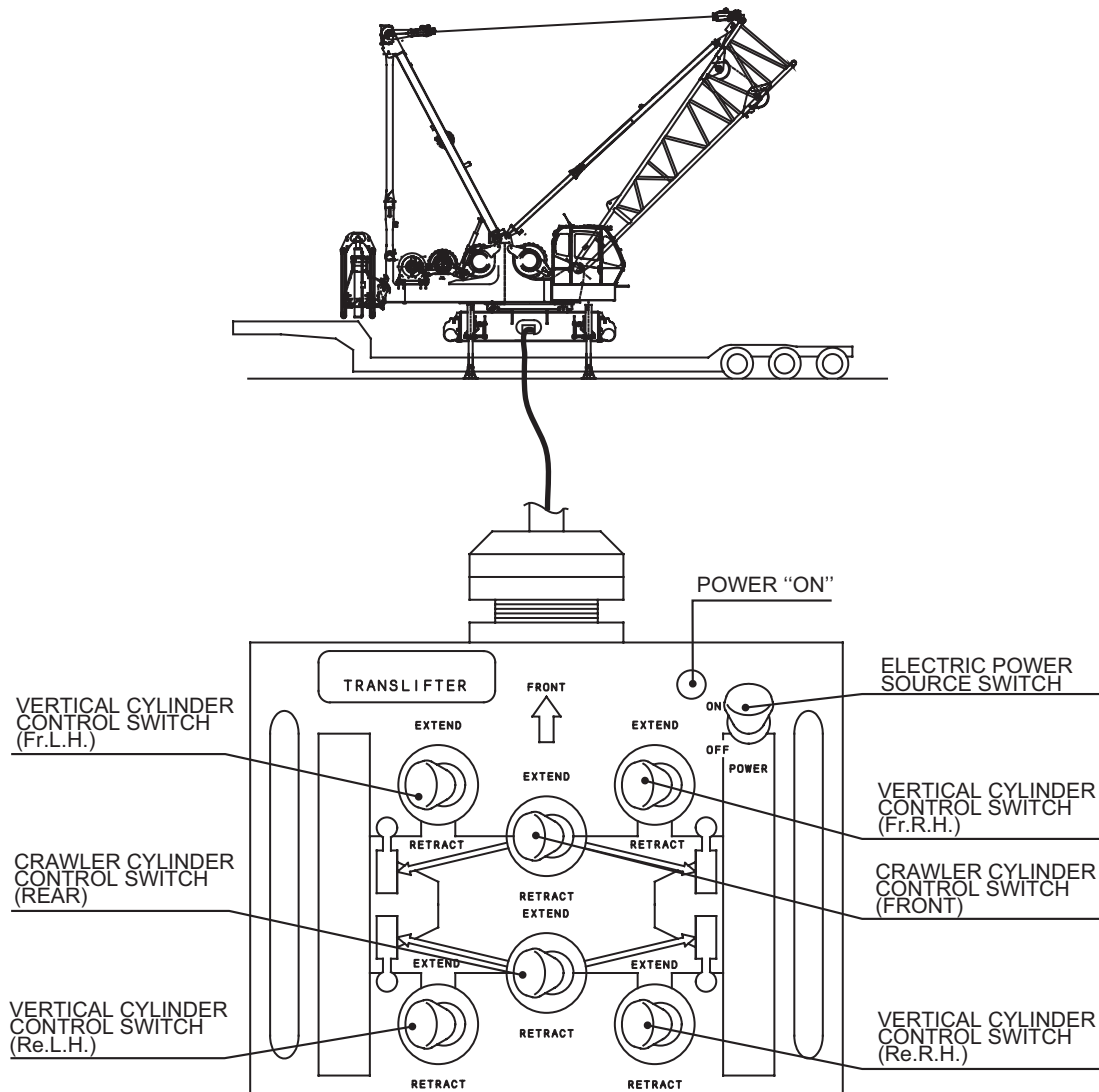
9. Hoist the base boom to approximately 50°, and, engage the drum lock.

4. ASSEMBLY OF THE MACHINE

- Extend the vertical cylinder by remote control switch until the lower surface of the translifter float just touches the floor.

WARNING

Make sure that the ground for vertical cylinder is flat and firm to avoid turnover of machine. Failure to observe this precaution may result in serious accident.



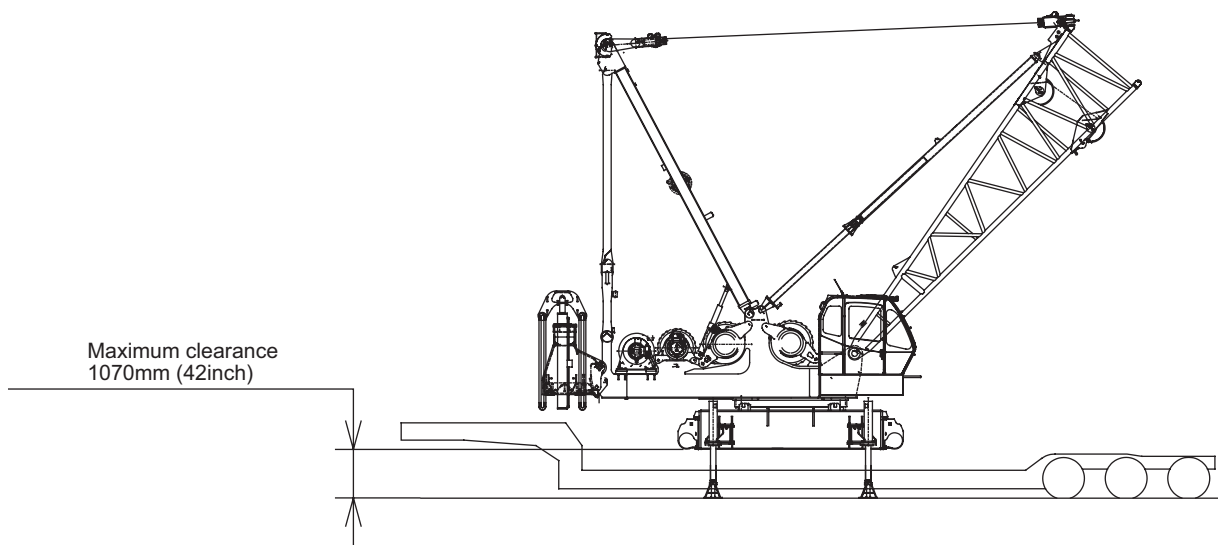
During work, watch the level and keep the basic machine always in leveled position. Make sure that the four floats sit on the ground firmly.

WARNING

Engage the swing brake and swing lock when operating translifter to avoid turn-over of machine. Failure to observe this precaution will result in serious accident.

4.3.3 UNLOAD THE BASE MACHINE FROM THE TRAILER

1. Remove the chain or sling from the trailer.
2. Fully extend the vertical cylinder by remote control switch.

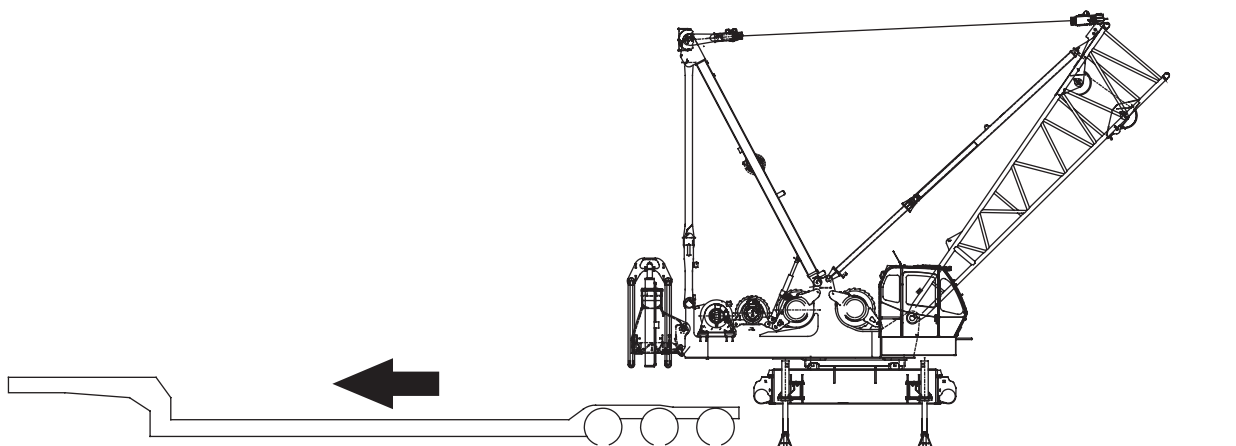


During work, watch the level and keep the basic machine always in leveled position. Make sure that the four floats sit on the ground firmly.

WARNING

Engage the swing brake and swing lock when operating translifter to avoid turn-over of machine. Failure to observe this precaution will result in serious accident.

3. Drive out the trailer from under the machine.



4. ASSEMBLY OF THE MACHINE

4.3.4 INSTALLATION OF THE HOOK BLOCK TO THE BASE BOOM

1. Operate the translifter to lower the machine until the clearance between the ground and the bottom of the lower frame becomes 750 mm (29.5").



Make sure that the ground for the floats is flat and firm to avoid turn-over of machine. Failure to observe this precaution may result in serious accident.

2. Lower the base boom to the height appropriate for reeving of the hoist wire rope.

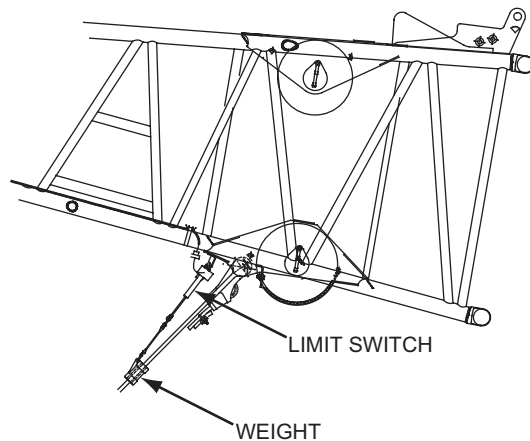
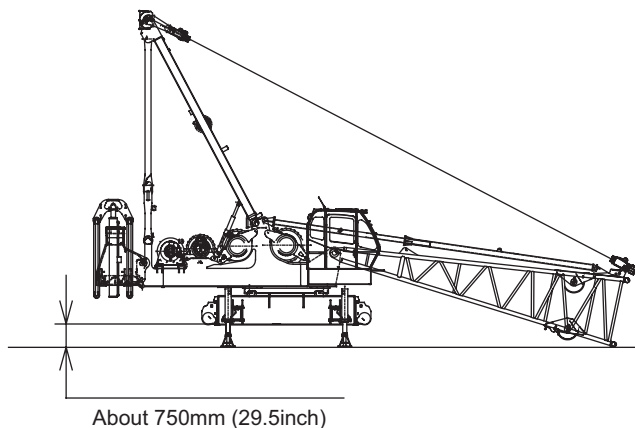


Do not stand on the base boom. The base boom may fall suddenly. Failure to observe this precaution may result in serious injury or the death.



Watch out the boom hoist drum to keep from overwinding.

3. Install the limit switch and weight to the base boom.



- Unwind the wire rope on the front drum, and reeve it through the boom base sheave, weight for the limit switch and hook block (2-wire rope reeving).

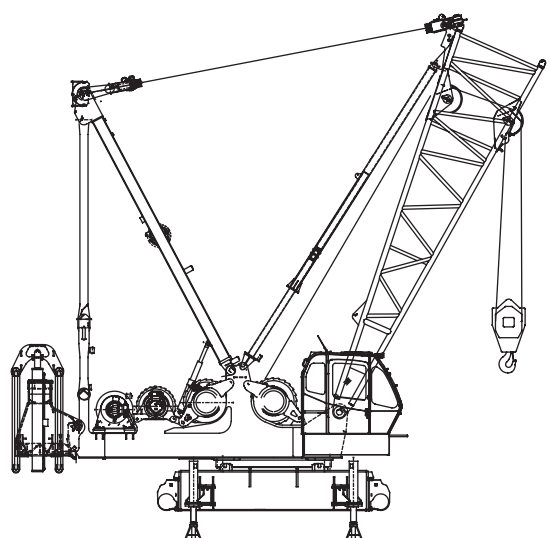
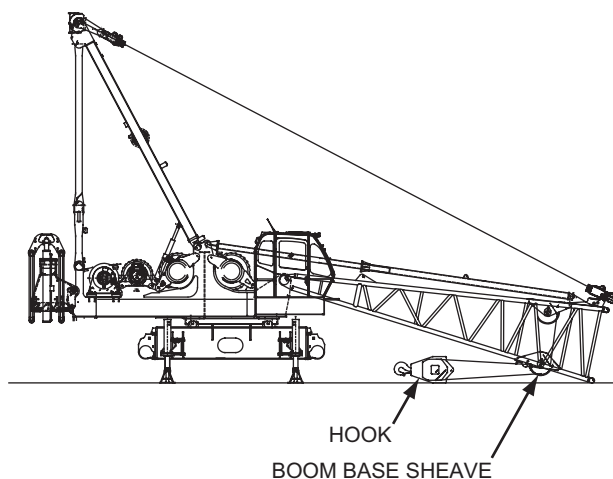
WARNING

Do not touch a wire rope directly with bare hands. If wire protrude, you could be injured. Working gloves are recommended.

Keep hands and clothing clear of the rotating drum and running wire rope.

Failure to observe this precaution may result in serious injury or death.

- Connect the wiring of the hook overhoist limit switch, referring to Chapter 3, "LOAD SAFETY DEVICE".
- Raise the base boom and lift up the hook block.



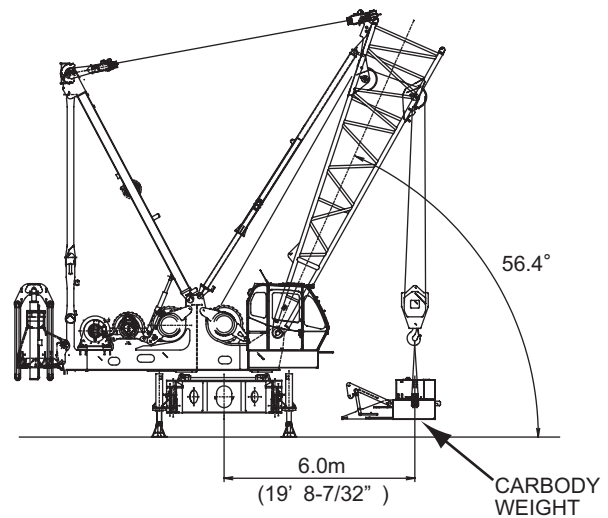
4. ASSEMBLY OF THE MACHINE

4.4 INSTALLATION OF THE CARBODY WEIGHT

WARNING

Ensure that the working mode selector switch of the load safety device is set to the "ELF REMOVAL MODE" position. Failure to observe this precaution may result in serious injury or death.

1. Swing the upper structure to orient toward the carbody weight.
2. Lift the carbody weight (Weight: 5,000 x 2 kg (11,025 x 2 lbs))



⚠ WARNING

When making lifts, strictly follow the capacity charts supplied by the manufacturer for determining the loads that can be handled.

Follow good operating practice and all procedures as outlined in this manual when attempting to lift any load.

Failure to observe this precaution may result in serious injury or death.

⚠ WARNING

The load line can break if the hook block contacts the end of the boom. This is called "two blocking". Two blocking can be caused by lowering the boom without paying out load line.

Two blocking can pull jibs and lattice crane booms over backwards or cause damage to the tip.

Always keep adequate space between the hook block and boom point. Lower the hook when lowering the boom.

Failure to observe this precaution may result in serious injury or death.

⚠ DANGER

Do not operate the machine abruptly when the machine is standing with translifters.

Failure to observe this precaution may result in serious injury or death.

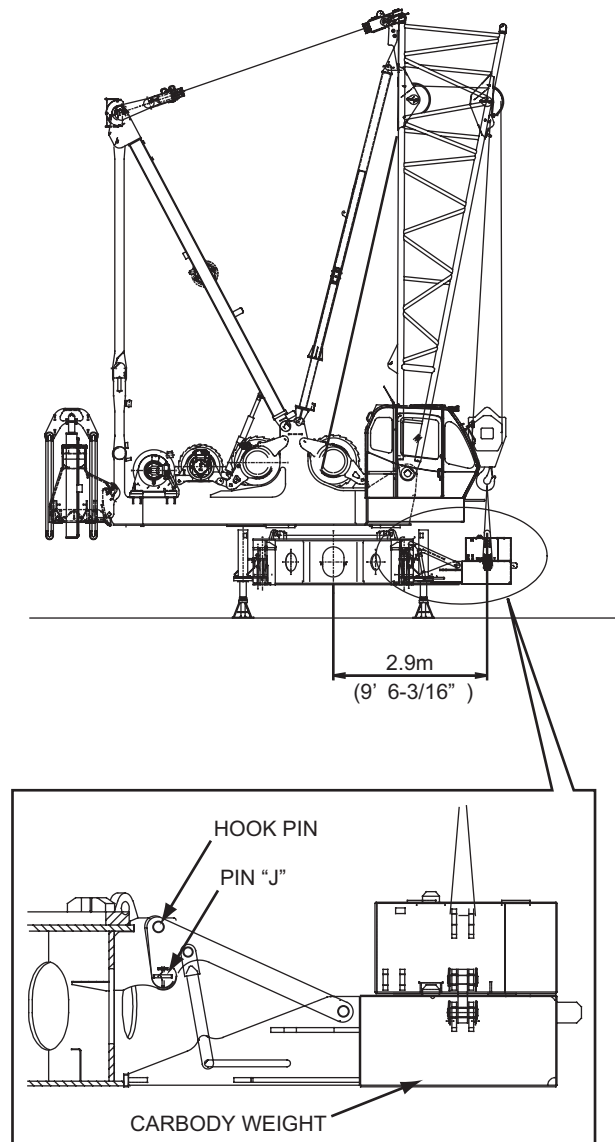
⚠ DANGER

Do not stand under lifted or between carbody weight and the basic machine to avoid accident or drop or being caught.

Failure to observe this precaution may result in serious injury or death.

4. ASSEMBLY OF THE MACHINE

3. Install carbody weight by hooking to the bracket.
4. Insert the pin "J" and fix it with the lock pin.
5. Similarly install the other carbody weight to the machine.



4.5 INSTALLATION OF THE CRAWLER

4.5.1 INSTALLATION OF THE FIRST CRAWLER

1. Bring the trailer with first crawler as close as to the machine.

Watch out the clearance of carbody weight and trailer. Make sure the crawler is turned in the proper direction. The machine can swing 360° with lifting the first crawler.

CAUTION

Remove cable CN2 connection upper with lower terminal box before swinging.

DANGER

Fit the carbody weights, before install the crawlers. Do not exceed 5 m (16' 4-7/8") load radius. Otherwise the machine may tip over.

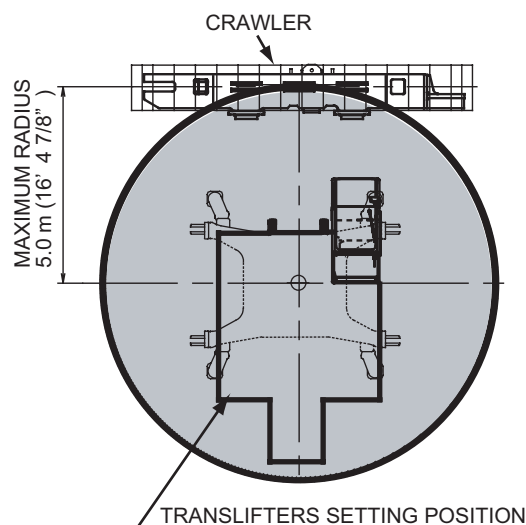
Failure to observe this precaution may result in serious injury or death.

2. Swing the upper structure to orient it toward the crawler.

DANGER

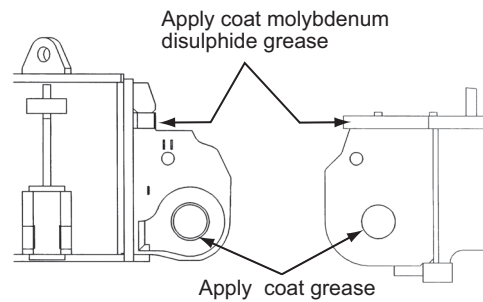
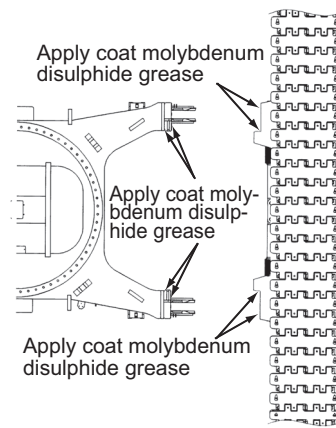
so not operate the machine abruptly when the machine is standing with translifter.

Failure to observe this precaution may result in serious injury or death.

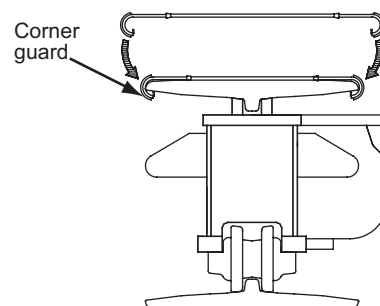
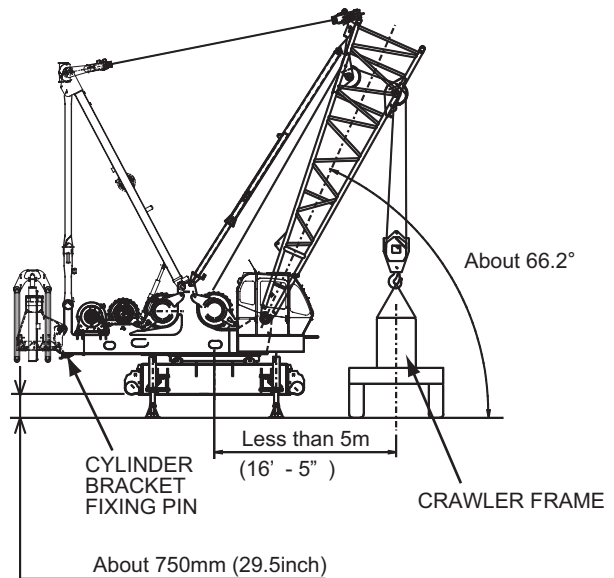


4. ASSEMBLY OF THE MACHINE

3. Apply grease to the engaging sections on the upper surfaces of the connecting sections of the lower structure with the crawler frames, and the connecting pin holes.



4. Rig the crawler to the hook block with 4 leg sling.
Lift the crawler (about 18,500 kg (40,800 lbs)) slowly.
When lifting the crawler, use the shoe corner guard so that wire is not caught into shoes.



5. Slowly move the crawler toward the mounting side of the lower structure.

⚠ DANGER

Keep away from the spaces under the lifted crawler frame or between the machine and the crawler frame to avoid being caught in. Failure to observe this precaution may result in serious injury or death.

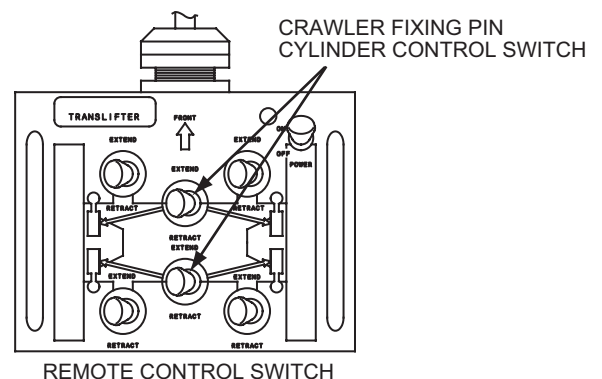
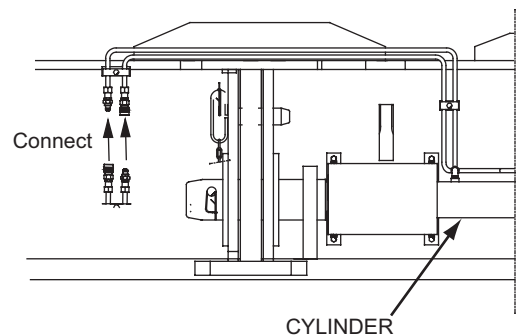
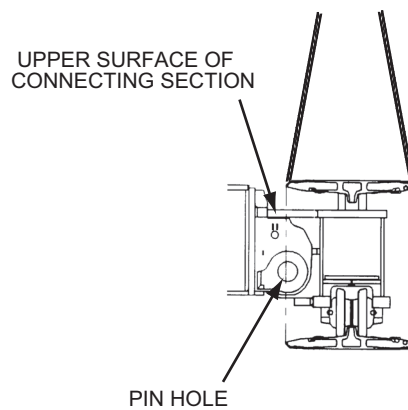
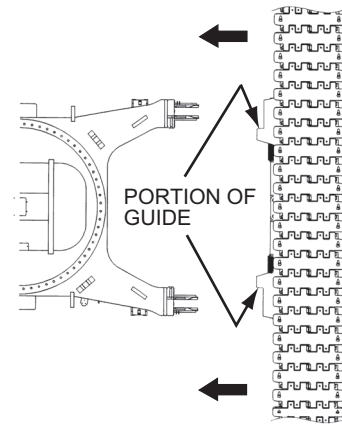
6. Fit the crawler frame along with the guide section of the lower structure to engage the upper surface of the connecting section.
7. While lowering the crawler frame slowly, align the pin holes on the carbody and the crawler frame. If the shoe comes in contact with the ground, and the pin holes cannot be aligned correctly, lift the machine with the translifter cylinder until the shoe does not come in contact with the ground. Crawler should be adjusted correctly to prevent from lifting too much to avoid dragging.

⚠ WARNING

To avoid the turnover of the machine, lift the machine horizontally with the translifter. Failure to observe this precaution may result in serious injury or death.

8. Connect the hydraulic hose for the connecting pin cylinder with the quick coupler.

9. Operate the remote control switch, and fully insert the crawler connecting pin. If the pin is hardly inserted, adjust the pin hole position.



4. ASSEMBLY OF THE MACHINE

10. After fully inserting the two crawler connecting pins, stop the engine. Then, insert the fixing pin while supporting the crawler. Attach the lock pin to the inserted fixing pin, and lock it with the spring pin.

WARNING

Be sure to attach the lock pin and the spring pin to avoid any accident due to the coming-off the fixing pin.

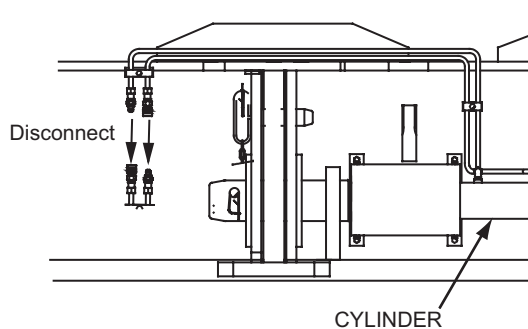
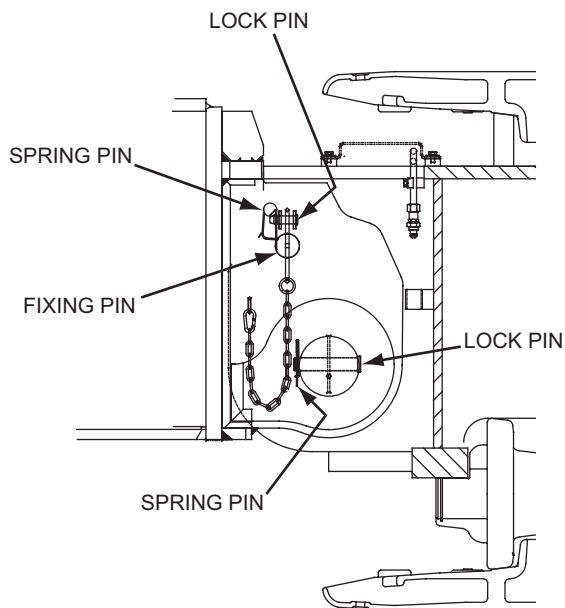
11. Attach the lock pin to the crawler connecting pin, and lock with the spring pin.

WARNING

Be sure to attach the lock pin and the spring pin to avoid any accident due to the coming-off the fixing pin.

12. Remove the hydraulic hose for the connecting pin cylinder with the quick coupler.

13. Completely install the crawler to the lower structure, and remove the sling wire rope from the crawler.



4.5.2 INSTALLATION OF THE SECOND CRAWLER

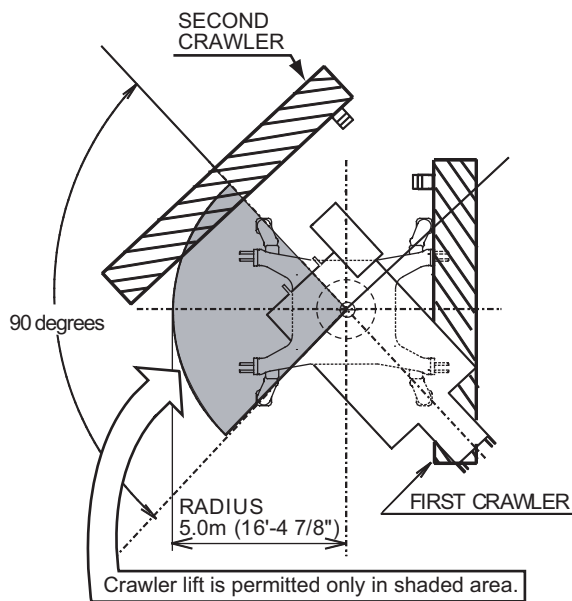
1. Bring the trailer with second crawler as close as to the machine. Watch out the clearance of carbody weight and trailer. Make sure the crawler is turned in the proper direction.

DANGER

Do not swing over center of translifter cylinder (51°) while lifting the second crawler.

Do not exceed 5 m (16' 4-7/8") load radius. Otherwise the machine may tip over.

Failure to observe this precaution may result in serious injury or death.



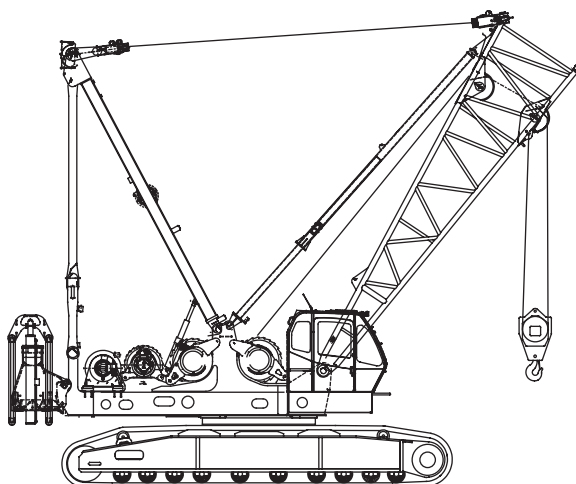
2. Swing the upper structure to orient it toward the crawler.

DANGER

Do not operate the machine abruptly when the machine is standing with translifter.

Failure to observe this precaution may result in serious injury or death.

3. Install the second crawler in the same way as the first.
The connecting pin removal/installation cylinder hydraulic hose is common to the right and left sides. After installing a crawler, use the hose for the other crawler.



4. ASSEMBLY OF THE MACHINE

4. After installing the both crawlers, retract the translifter cylinder until the crawlers come in contact with the ground completely.
5. Remove the floats and store them in the storing position.

CAUTION

Float weight about 35 kg (77 lbs). It is recommended to install or remove it by two persons to avoid injury to your body.

6. Connect all of hydraulic hoses (left and right) for propel with quick couplers. (Four hoses on each side) After connecting, check for tightness by pulling them.

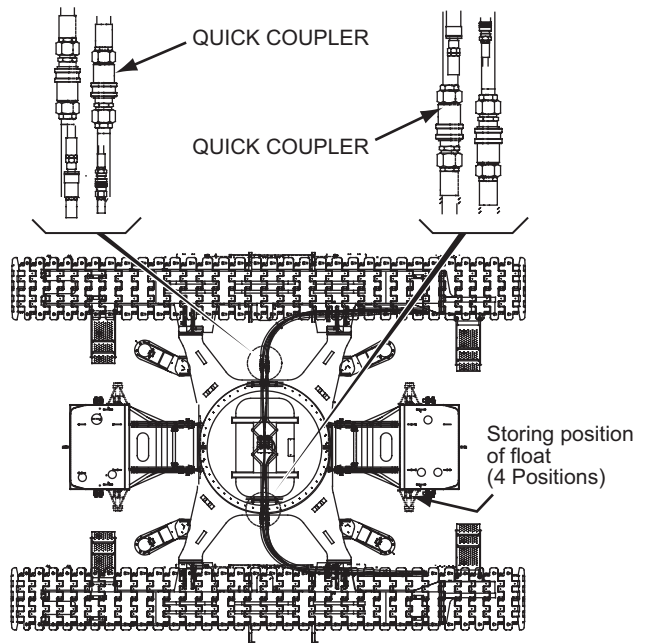
DANGER

Do not swing when connecting or disconnecting hydraulic hose of crawler to avoid accident of being caught.

Failure to observe this precaution may result in serious injury or death.

CAUTION

Incomplete connection of hose may cause damage to propel motor or reduction unit.



4.6 ASSEMBLING THE ATTACHMENT

This procedure is the same as using an assist crane or self erection by means of base boom on base machine.



For most efficient use of this machine, boom and guy line arrangement must be correctly observed as shown in these figures.

[TOOLS]

- One set of attached tools
- Wooden blocking
- Assisting crane (50,000 kg class)
- Sling cloths
- Lifting wire rope (fiber belt)
- Steel bar [$\Phi 20 \times 300\text{mm}$ ($\Phi 13/16$ inch \times 12 inch)]

4.6.1 ASSEMBLY OF THE BOOM

1. Arrangement of Boom/Jib/Guyline

Preparation of boom/jib/guy line and steel blocking plate (Pillow wedge)

Prepare necessary parts.

(1) Boom and Jib Prepare the boom and jib following to the arrangement chart.

Do not assemble the boom with boom arrangement not specified in the arrangement chart.

And also, check the each boom and jib for damage.

If damage is confirmed, repair the damage in the designated service shop.

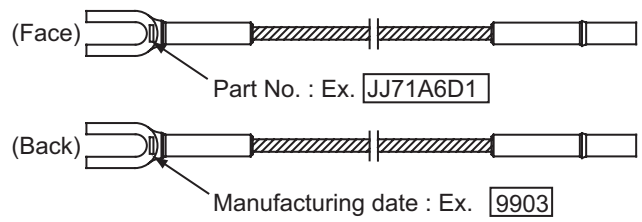
Item	Boom length
Length of boom to which jib can be attached.	24.4 m to 73.2 m (80 ft to 240ft)
Length of boom to which auxiliary sheave can be attached.	15.2 m to 82.3 m (50 ft to 270 ft)



Do not use damaged boom section. The damaged booms may collapse and cause serious injury or death.

4. ASSEMBLY OF THE MACHINE

- (2) Prepare the guy lines following the arrangement chart as the same as the boom. The diameter of the boom guy line is 30 mm (1-3/16 inch) , and that of the jib guy line is 26 mm (1-1/32 inch). To discriminate each guy line, see the part number stamped on the connector part.

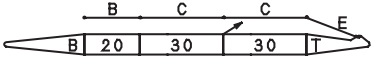
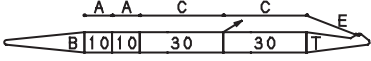
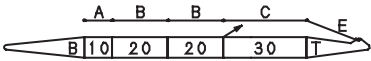
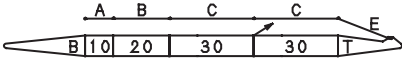
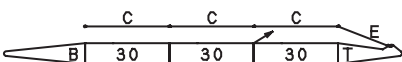
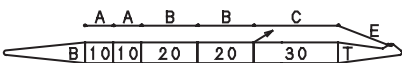
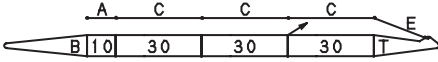
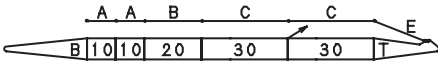
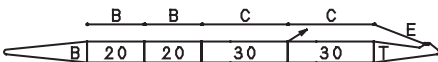
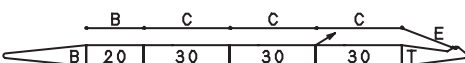
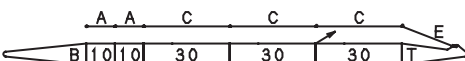
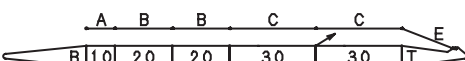
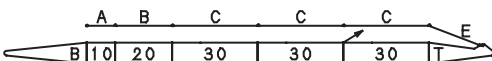
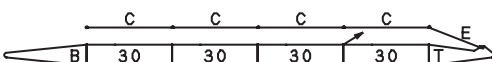
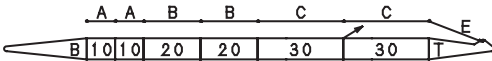


4. ASSEMBLY OF THE MACHINE

Boom Length ft (m)	Boom and Guy line arrangement chart (1/4)	With Aux. Sheave	With Jib	Main Hoist	Aux. Hoist
				Reeving (No. of Line)	Reeving (No. of Line)
50 (15.2)		O	X	12	2
60 (18.3)	*	O	X	12	2
70 (21.3)	 *	O	X	10	2
80 (24.4)	* 	O	O	10	2
90 (27.4)	 *	O	O	9	2
100 (30.5)	 *	O	O	8	2
110 (33.5)	* 	O	O	8	2
120 (36.6)	 *	O	O	7	2

O : Attachable, X : Not Attachable

4. ASSEMBLY OF THE MACHINE

Boom Length ft (m)	Boom and Guy line arrangement chart (2/4)	With Aux. Sheave	With Jib	Main Hoist	Aux. Hoist
				Reeving (No.of Line)	Reeving (No.of Line)
130 (39.6)	  	O	O	6	2
140 (42.7)	  	O	O	6	2
150 (45.7)	  	O	O	6	2
160 (48.8)	  	O	O	5	2
170 (51.8)	  	O	O	5	2

O : Attachable, X : Not Attachable

4. ASSEMBLY OF THE MACHINE

Boom Length ft (m)	Boom and Guy line arrangement chart (3/4)	With Aux. Sheave	With Jib	Main Hoist	Aux. Hoist
				Reeving (No. of Line)	Reeving (No. of Line)
180 (54.9)		O	O	5	2
190 (57.9)		O	O	4	2
200 (61.0)		O	O	4	2
210 (64.0)		O	O	4	2
220 (67.1)		O	O	4	2
230 (70.1)		O	O	4	2

O : Attachable, X : Not Attachable

4. ASSEMBLY OF THE MACHINE

Boom Length ft (m)	Boom and Guy line arrangement chart (4/4)	With Aux. Sheave	With Jib	Main Hoist	Aux. Hoist
				Reeving (No.of Line)	Reeving (No.of Line)
240 (73.2)		O	X	4	2
250 (76.2)		O	X	4	2
260 (79.3)		O	X	4	2
270 (82.3)		O	X	4	2
280 (85.3)		X	X	2	X

O : Attachable, X : Not Attachable

OPTION

(When use of heavy boom)

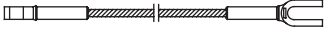

Boom Length ft (m)	Heavy boom and Guy line arrangement chart	With Aux. Sheave	With Jib	Main Hoist	Aux. Hoist
				Reeving (No.of Line)	Reeving (No.of Line)
40 (12.2)		X	X	14	X

↗ mark shows the guy line installing position when the jib is used.

* mark shows the standard boom arrangement which enables each boom length of less than that boom length to be configured.

Kind of insert boom	
Symbol	Boom length
10	3.0 m (10ft)
20	6.1 m (20 ft)
30	9.1 m (30 ft)
40	12.2 m (40 ft)

Boom Guy Line Chart

Symbol	Guy Line Dimension		Part Number	Remarks [m (ft)]	Connector Type
	Diameter (mm)	Length m (ft)			
A	30	3.0 (10)	GN71A00005D1	3.0 (10) Insert Boom	
B		6.1 (20)	GN71A00005D2	6.1 (20) Insert Boom	
C		9.1 (30)	GN71A00005D3	6.1 (20) Insert Boom	
D		12.2 (40)	GN71A00005D4	12.2 (40) Insert Boom	
E		5.74 (18.8)	GN71A00006D5	Boom Tip	

Boom guy lines A, B, and C are also used as the luffing and the strut guy line.

2. Connecting the insert boom

(1) Referring to the boom and guy line arrangement chart, lift the required insert boom(s), being careful not to mistake the top for the bottom, and bring it near the boom base section.

⚠ DANGER

- Do not stand under the boom or inside the boom structure when removing the connector pins.
- Do not climb, stand, or walk on boom.
- Use a ladder or similar device to reach only necessary areas.

Failure to observe this precaution may result in serious injury or death.

4. ASSEMBLY OF THE MACHINE

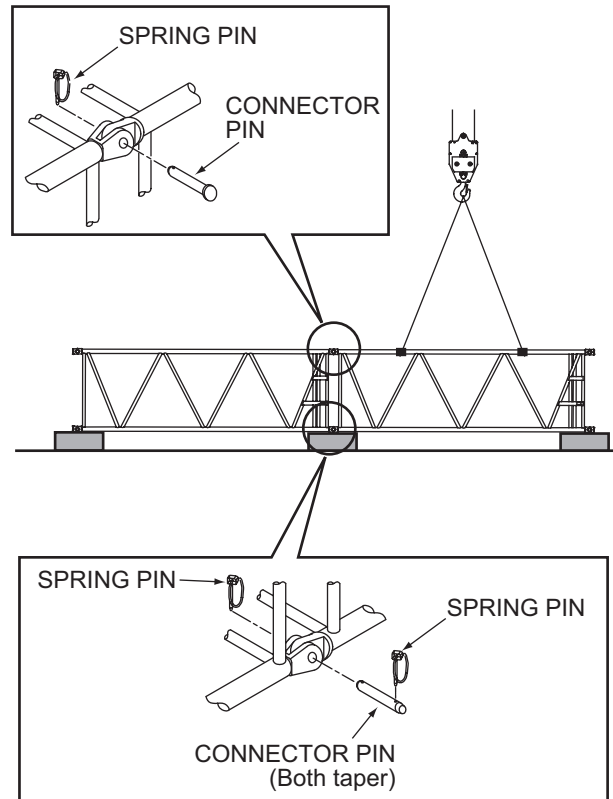
(2) Align the top connector pin holes, insert the connector pin into the lock pinholes facing up and down. Insert the spring pins to fix the connector pins.

Note

Be sure to tap the connector pins from the outside to the inside.



Do not insert your hand or finger into pin hole. Failure to observe this precaution may result in serious injury or death.



(3) Referring to the boom and guy line arrangement chart, connect the insert booms in order in the same way.

3. Installation of the boom tip

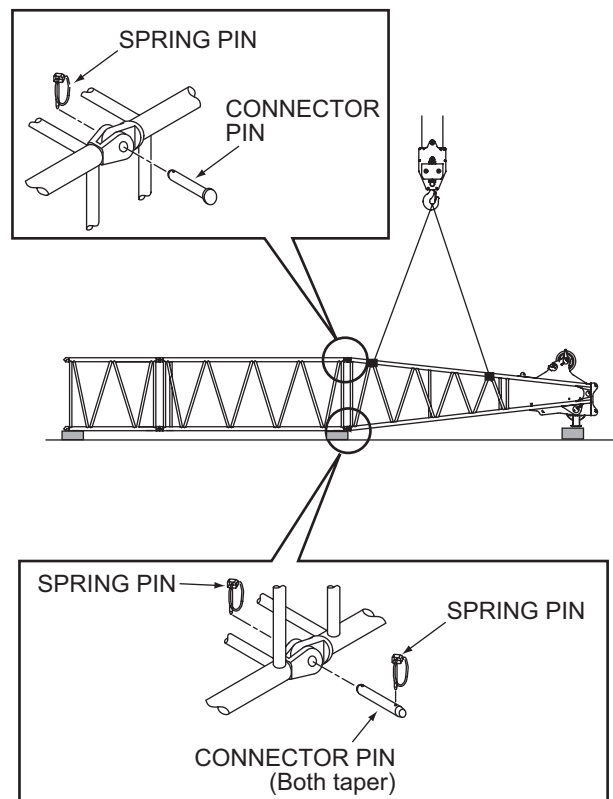
Align connectors of the boom tip with that of the insert boom, tap the connector pins (pin with brim) in, and insert the spring pin into the side of the connector pins to fix them.

Note

Be sure to tap the connector pins (pin with brim) from the outside to the inside.



Do not insert your hand or finger into pin hole. Failure to observe this precaution may result in serious injury or death.



4. Installation of the guy line

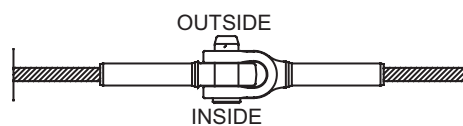
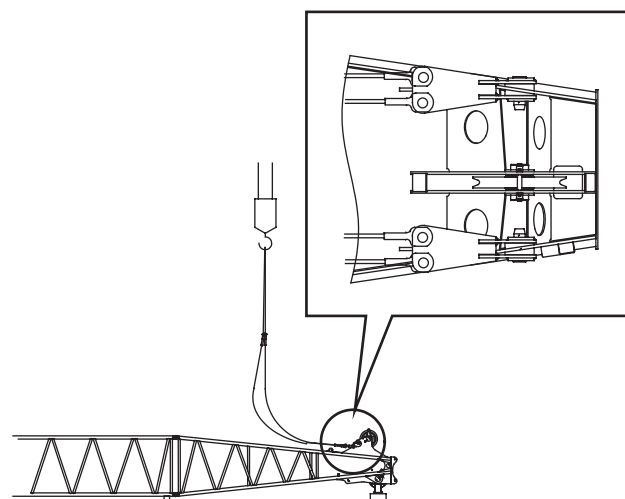
- (1) Prepare guy lines according to the guy line arrangement chart.
- (2) Connect the prepared guy lines from the boom top to the machine side one after another. When connecting the guy lines, be sure to remove the slack on them. Excessively slacked guy lines make it impossible to connect with the upper spreader.

WARNING

When working at a high place, be sure to use a safety belt to prevent any falling accident. Use a scaffolding board for working on the boom.

CAUTION

To prevent the wire rope from being caught on, insert the guy line connecting pin from inside to the outside.

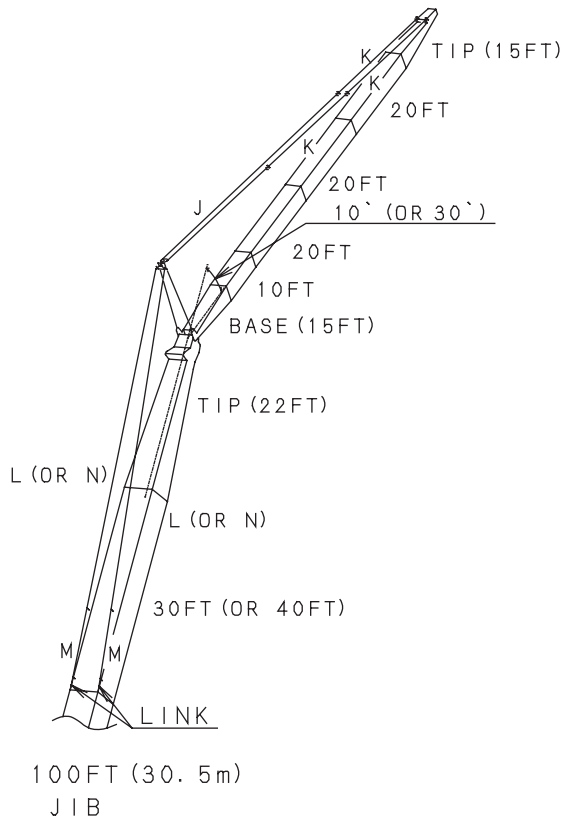
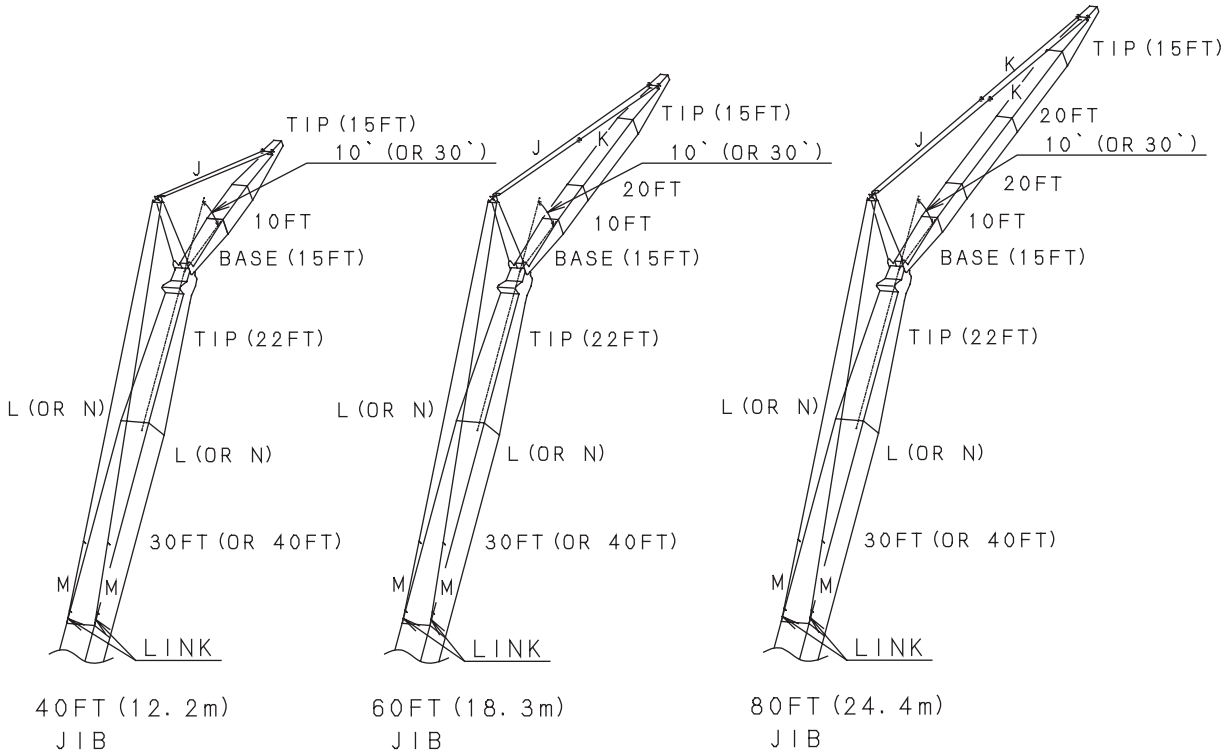


4. ASSEMBLY OF THE MACHINE

4.6.2 ASSEMBLY OF THE JIB

1. Arrangement of jib and guy line

The length of the boom to which the jib is attached is 24.4 m (80 feet) to 73.2 m (240 feet).



Arrangement of guy line in boom side

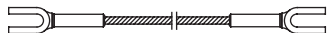

	Boom arrangement
--	------------------

Offset Angle	Boom tip + 30 ft Arrangement	Boom tip + 30 ft Arrangement
10°	L	N
30°	L + M	N + M

M : Additional guy line when the offset angle is 30°.

Arrangement of guy line in jib side

12.2m (40) Jib	18.3m (60) Jib	24.4m (80) Jib	30.5m (100) Jib
J	J + K	J + K + K	J + K + K + K

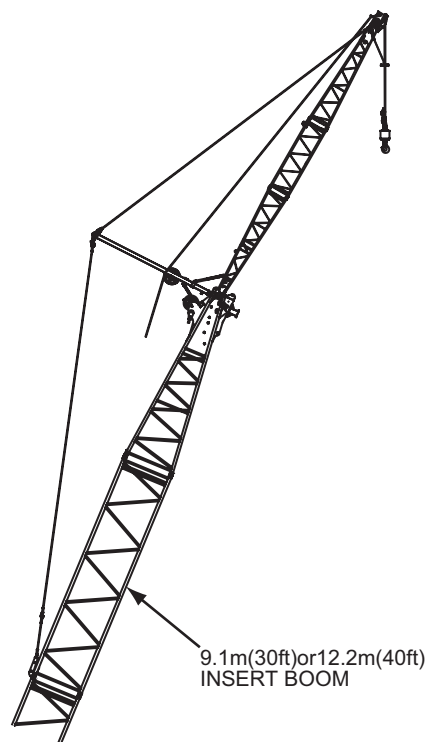
Kind of Guy line				Connector Type
Symbol	Diameter (mm)	Length (m(ft))	Part Number	
J	Φ 2626	26.58 (87.2)	2430R307D2	 
K	Φ 26	11.73 (38.5)	2430R302D28	
L	Φ 26	16.00 (52.5)	2430R302D37	
M	Φ 26	1.63 (5.3)	2430R302D21	
N	Φ 26	18.97 (62.2)	2430R302D38	

2. Assembly of the jib

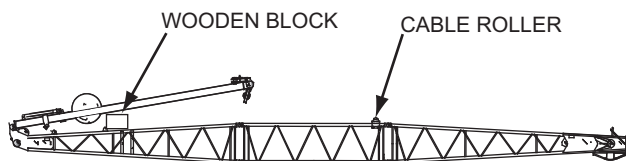
For arrangement of the jib and guy line, see page 4-31 and 4-32. The boom length to which the jib can be attached is 24.4 m (80 ft) to 73.2 m (240 ft).

⚠ DANGER

Do not stand or work under, inside or on the jib structure when assembling jib.
Failure to observe this precaution may result in serious injury or death.

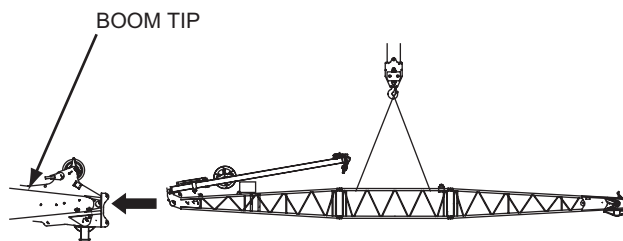


- (1) Assemble the jib on the extended boom top, and install the cable roller to the insert boom just under the upper jib.
 The jib connecting pins are all pins with brim.



4. ASSEMBLY OF THE MACHINE

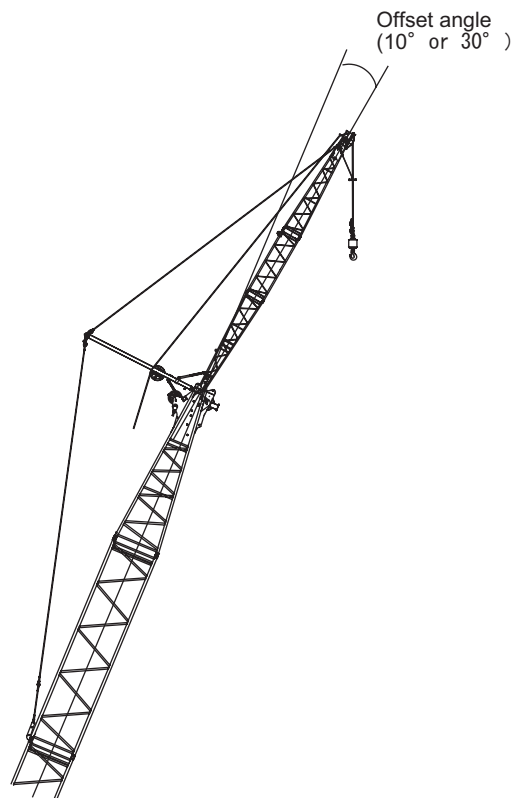
(2) Lifting up the preassembled jib, connect it to the boom tip section.



(3) Prepare the jib guy lines (the jib side and boom side).

- The length of the jib guy line of the jib side varies according to the jib length.
- The length of the jib guy line of the boom side varies according to the jib offset angle (10° or 30°).

Refer to page 4-31, 4-32.



(4) Remove the equalizer sheave on the jib side of the strut by pulling the pin out.

Note

Do this work by two persons.

(5) Insert the jib guy line to the sheave frame as shown.

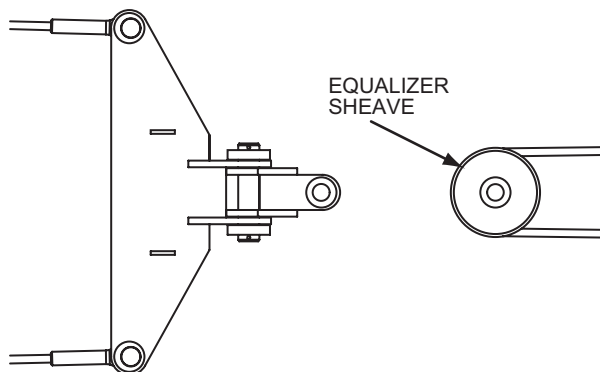
Note

Do this work by two persons.

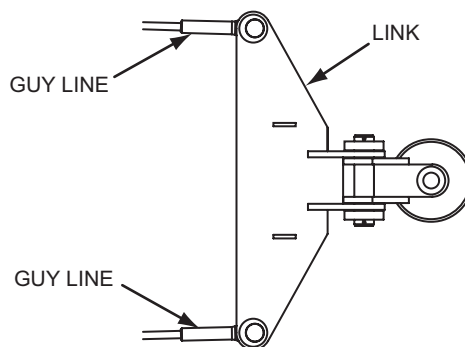
(6) Set the jib guy line back to the original location through the sheave groove.

Note

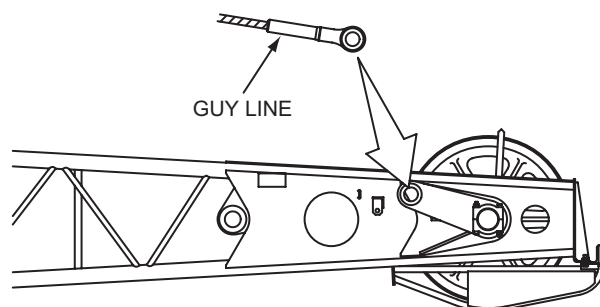
Do this work by two persons.



(7) Connect both ends of the jib guy line to the link.



(8) Connect both ends of the jib guy line to the top end of the jib.

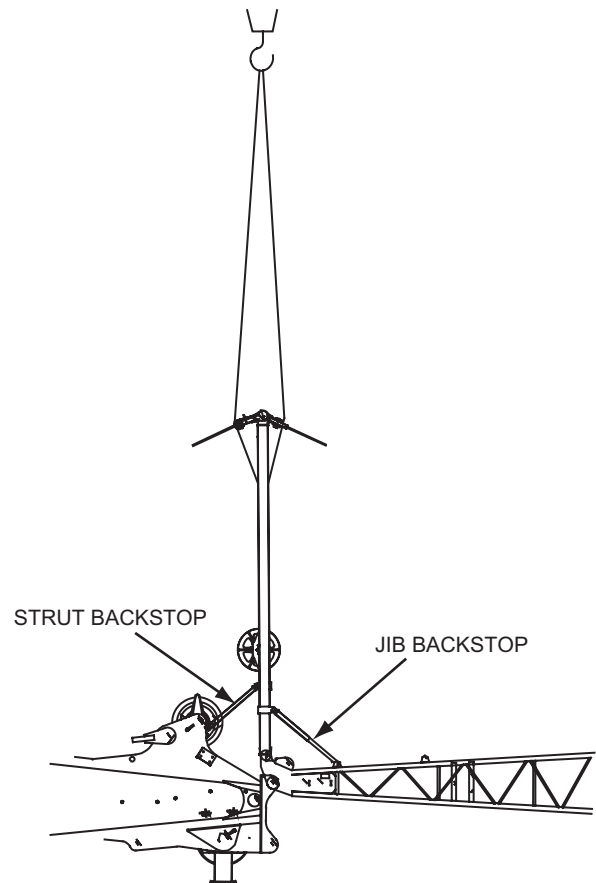


4. ASSEMBLY OF THE MACHINE

(9) Raise the strut with the assisting crane and install the strut back stop and jib back stop.

Note

Use the long pin (both ends tapered pin) for link as the connector pin for the insert boom to the link.

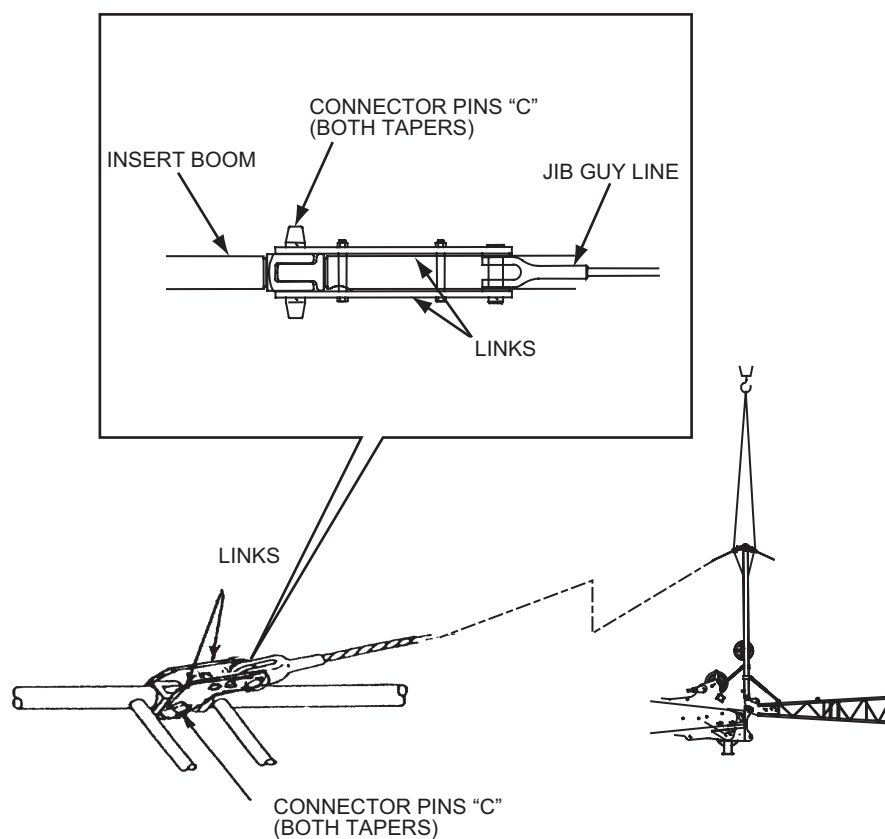


- (10) Install the link to the connecting pin on the insert boom.
- (11) Connect the jib guy line on the boom side to the link.
- (12) Remove the sling rope from the jib strut.

WARNING

After the assembly has been completed, be sure to confirm that all connecting pins and lock pins are correctly installed.

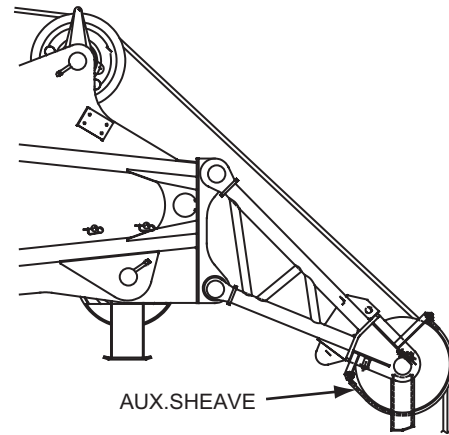
Failure to observe this precaution may result in serious injury or death.



4. ASSEMBLY OF THE MACHINE

4.6.3 INSTALLATION OF THE AUXILIARY SHEAVE

The boom lengths with which the auxiliary sheave can be installed is 15.2 m (50 ft) to 82.3 m (270 ft).



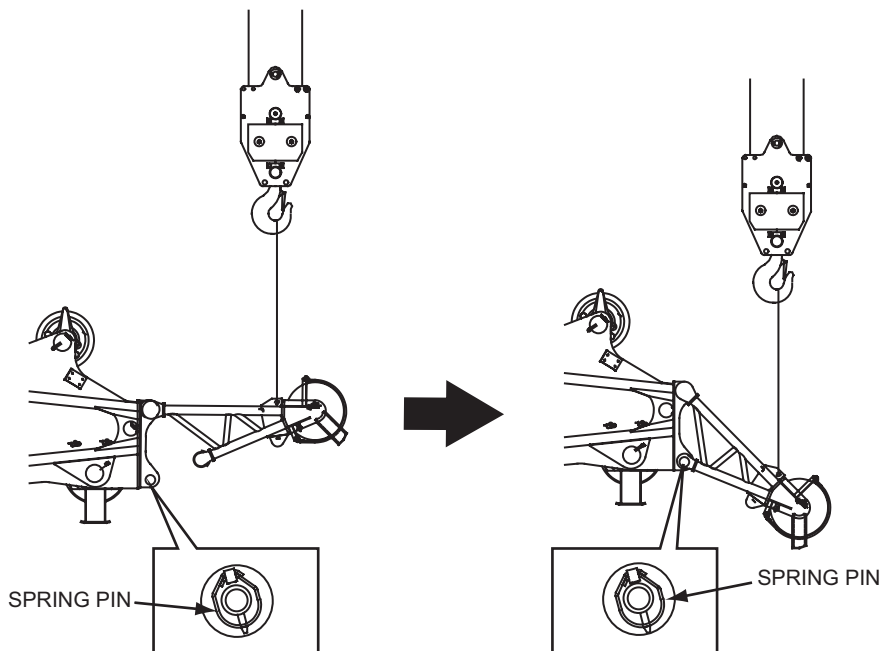
Weight:648lbs(294kg)

- (1) Lift the auxiliary sheave with the assisting crane.
Then, fix it to the boom top with the pins, and lock them with spring pins (2 pos., both upper and lower sides).

WARNING

Do not insert your hand or finger to pin hole to align or check holes.

Failure to observe this precaution may result in serious injury or death.



4.7 ASSEMBLING THE LUFFING ATTACHMENT

This section explains about assembly, self-standing of luffing jib.

Assembly procedure is explained on the assumption that the machine meets the following conditions.

- All counterweights are installed to the machine.
- Gantry is raised to high position.

Before starting the work, check the following items.

1. Location

(1) Care should be taken so that the attachment is erected or lowered in front or rear side of the crawlers. Ensure that the working area is wide enough to assemble the attachment and the ground is level and firm. The ground must be cured or steel plates must be laid between the machine and the ground if necessary.

(2) Remove all obstacles in the working area, and keep off the area from anyone unconcerned using ropes.

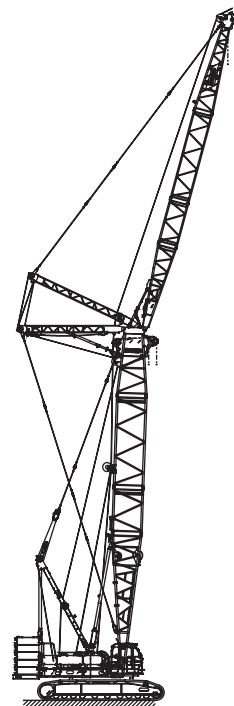
(3) Secure the area required for installation of the auxiliary crane and the entering route for carriers transporting materials necessary for assembly.

2. Arrangement for working procedures and safety precautions

Prior to assembly, all the staffs concerned must hold the meeting to arrange for working procedures and safety precautions and specify their roles and responsibilities.

3. Check before operation

Thoroughly check the machine before starting operation.



4. ASSEMBLY OF THE MACHINE

DANGER

Do not stand or work under, inside, or on the luffing boom or jib when installing or removing the connector pins at anytime.

Failure to observe this precaution may result in serious injury or death.

DANGER

Do not apply slings directly to a sharp edge part to prevent the slings from cutting.

Apply the sling to the guy cable pin hole or bracket for lifting through a shackle.

DANGER

Do not perform unauthorized production or modification of booms, jibs, or backstops.

WARNING

Before climbing on machine make certain that the guard and walkways are clean and dry, and use life belt in order to prevent falls due to slippery surface. Failure to observe this precaution may result in serious injury or death.

WARNING

Do not put your hand or finger into a pin hole.

WARNING

To avoid serious injury, fix guy line to both ends of each boom when placing guy lines on the booms during boom connection.

CAUTION

Do not handle boom or jib sections with chains, hooks or wire rope attached directly to main chords or lacings. Either use soft material sling points or use fabric type slings.

(Equipment needed)

- Complete assembly tools
- Auxiliary Crane
- Sling Wire Rope, Textile belt
- Wooden Blocks
- Cushion

4.7.1 ARRANGEMENT OF BOOM / LUFFING JIB / GUY LINE

1. Boom and Jib

In accordance with arrangement, prepare boom and jib.

Do not assemble boom and jib in an arrangement that is not covered in the table.

Also check for damages on each boom and jib insert.

If any damage is found, ask your nearest KOBELCO authorize distributor to repair the damaged insert(s).



Do not use damaged boom or jib inserts for performing work. Failure to do so may result in the collapsing of the attachment and may cause serious injury or death.

Type of Boom		
Symbol	Boom Length	Specification
B	8.5 m (28ft)	Boom base
10	3.0 m (10ft)	Insert boom
20	6.1 m (20ft)	Insert boom
30	9.1 m (30ft)	Insert boom
BT	3.6 m (12ft)	Boom tip

Type of Jib		
Symbol	Boom Length	Specification
JB	5.8 m (19 ft)	Jib base
10J	3.0 m (10ft)	Insert jib
20J	6.1 m (20ft)	Insert jib
40J	12.2 m (40ft)	Insert jib
JT	6.4 m (21ft)	Jib tip

4. ASSEMBLY OF THE MACHINE

BOOM AND JIB COMBINATIONS

		Jib length (m(ft))										
		21.3 (70)	24.4 (80)	27.4 (90)	30.5 (100)	33.5 (110)	36.6 (120)	39.6 (130)	42.7 (140)	45.7 (150)	48.8 (160)	51.8 (170)
Boom length (m(ft))	21.3 (70)	○	○	○	○	○	○	○	○	○	○	○
	24.4 (80)	○	○	○	○	○	○	○	○	○	○	○
	27.4 (90)	○	○	○	○	○	○	○	○	○	○	○
	30.5 (100)	○	○	○	○	○	○	○	○	○	○	○
	33.5 (110)	○	○	○	○	○	○	○	○	○	○	○
	36.6 (120)	○	○	○	○	○	○	○	○	○	○	○
	39.6 (130)	○	○	○	○	○	○	○	○	○	○	○
	42.7 (140)	○	○	○	○	○	○	○	○	○	○	○
	45.7 (150)	○	○	○	○	○	○	○	○	○	○	○
	48.8 (160)	○	○	○	○	○	○	○	○	○	○	○
	51.8 (170)	○	○	○	○	○	○	○	○	○	○	○
	54.9 (180)	○	○	○	○	○	○	○	○	○	○	○

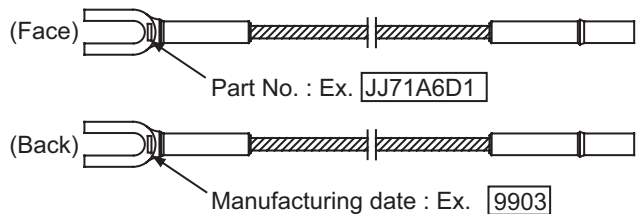
○ : Combinations which is allowed.

2. Guy Line

Similarly to the case of boom/jib, prepare guy lines in accordance with the arrangement table.

The diameters of the boom and strut guy line are 30 mm (1-3/16 inch) and jib guy line are 34 mm (1-11/32 inch).

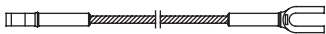

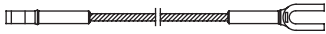

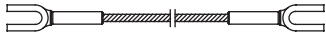
For identification of respective guy lines, check the part No. stamped on the connector.



CAUTION

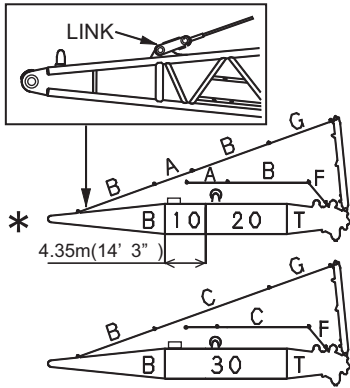
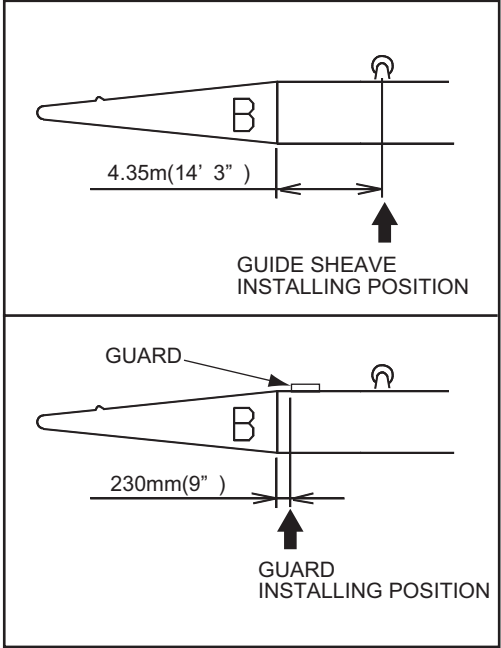
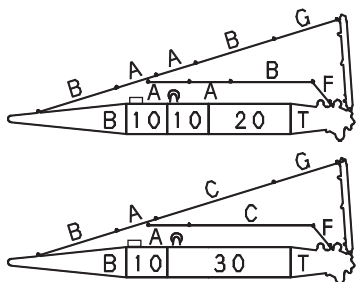
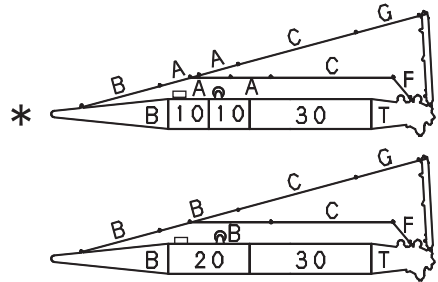
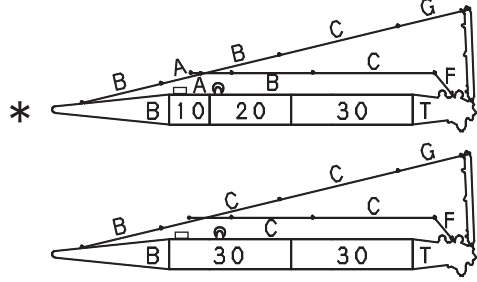
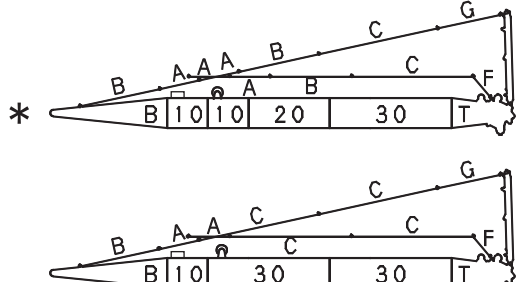
To prevent injuries to hands and legs, care should be taken while uncoiling twisted guy lines.

4. ASSEMBLY OF THE MACHINE

Symbol	Type of Guy line			Connector Type	
	Diameter (mm)	Lenfth (m(ft))	Part Number		
A	Φ 30	3.05 (10)	GN71A00005D1		
B		6.1 (20)	GN71A00005D2		
C		9.1 (30)	GN71A00005D3		
F		1.9 (6.4)	GN71A00006D6		
G		4.9 (16)	GN71A00005D7		
P		Φ 34	3.05 (10)	JJ71A00006D1	
Q			6.1 (20)	JJ71A00006D2	
R	12.2 (40)		JJ71A00006D4		
S	5.5 (18)		JJ71A00006D5		
T	5.5 (18)		JJ71A00007D4		

Luffing boom and the strut guy lines A, B and C are also used as the boom guy lines.

4. ASSEMBLY OF THE MACHINE

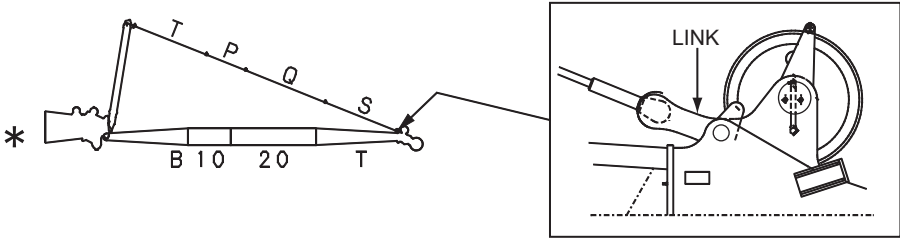
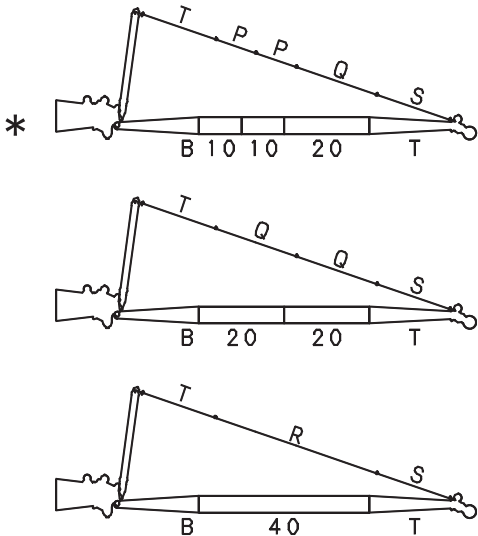
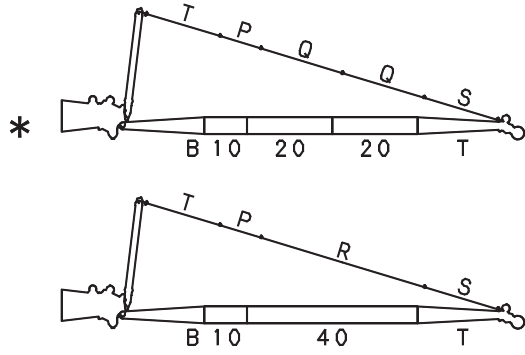
Boom Length m (ft)	Boom, Boom guy line and Strut guy line arrangement chart (1/3)	
21.3 (70)		
24.4 (80)		
27.4 (90)		
30.5 (100)		
33.5 (110)		

Boom Length m (ft)	Boom, Boom guy line and Strut guy line arrangement chart (2/3)
36.6 (120)	
39.6 (130)	
42.7 (140)	
45.7 (150)	
48.8 (260)	

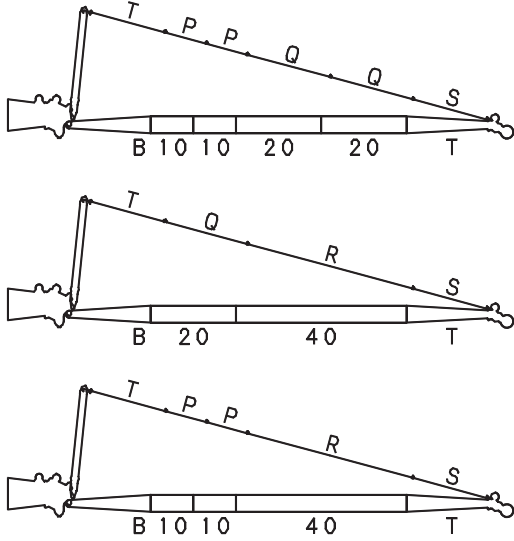
4. ASSEMBLY OF THE MACHINE

Boom Length m (ft)	Boom, Boom guy line and Strut guy line arrangement chart (3/3)
51.8 (170)	
54.9 (180)	

- mark shows the guide sheave installing position.
(Install the guide sheave to the position apart from the connection of the bottom boom the insert boom by 4.35 m(14 ft. 3in..))
- A boom marked with * can be used not only as a standard length of boom but also as a shorter boom.

Jib Length m (ft)	Jib, Jib guy line arrangement chart (1/4)
21.3 (70)	
24.4 (80)	
27.4 (90)	

4. ASSEMBLY OF THE MACHINE

Jib Length m (ft)	Jib, Jib guy line arrangement chart (2/4)
30.5 (100)	<p style="text-align: center;">*</p>  <p>The diagrams illustrate three different jib and guy line arrangements for a 30.5m (100ft) jib. Each diagram shows a jib with a top guy line and a bottom guy line. The top guy line has points labeled T, P, P, Q, Q, S. The bottom guy line has points labeled B, T. The diagrams show different spacing configurations for the guys:</p> <ul style="list-style-type: none"> Diagram 1: Top guy line points T, P, P, Q, Q, S. Bottom guy line points B, T. Spacing between B and T is divided into segments of 10, 10, 20, and 20. Diagram 2: Top guy line points T, Q, R, S. Bottom guy line points B, T. Spacing between B and T is divided into segments of 20 and 40. Diagram 3: Top guy line points T, P, P, R, S. Bottom guy line points B, T. Spacing between B and T is divided into segments of 10, 10, and 40.

Jib Length m (ft)	Jib, Jib guy line arrangement chart (3/4)
33.5 (110)	<p>* </p>
36.6 (120)	<p>* </p>
39.6 (130)	<p>* </p>
42.7 (140)	<p>* </p>

4. ASSEMBLY OF THE MACHINE

Jib Length m (ft)	Jib, Jib guy line arrangement chart (4/4)
45.7 (150)	<p>The diagram shows a jib of length 45.7m (150ft) supported by a machine on the left. The jib is divided into segments of 10m, 20m, 40m, and 40m. Guy lines are attached at points T, P, Q, R, R, and S along the jib. The boom is supported by a cable labeled B. A star symbol (*) is at the machine attachment point.</p>
48.8 (160)	<p>The diagram shows two configurations for a 48.8m (160ft) jib. The top configuration has boom segments of 10m, 10m, 20m, 40m, and 40m, with guy lines at points T, P, P, Q, R, R, and S. The bottom configuration has boom segments of 20m, 20m, 40m, and 40m, with guy lines at points T, Q, Q, R, R, and S. A star symbol (*) is at the machine attachment point.</p>
51.8 (170)	<p>The diagram shows a 51.8m (170ft) jib supported by a machine on the left. The jib is divided into segments of 10m, 20m, 20m, 40m, and 40m. Guy lines are attached at points T, P, Q, Q, R, R, and S. The boom is supported by a cable labeled B. A star symbol (*) is at the machine attachment point.</p>

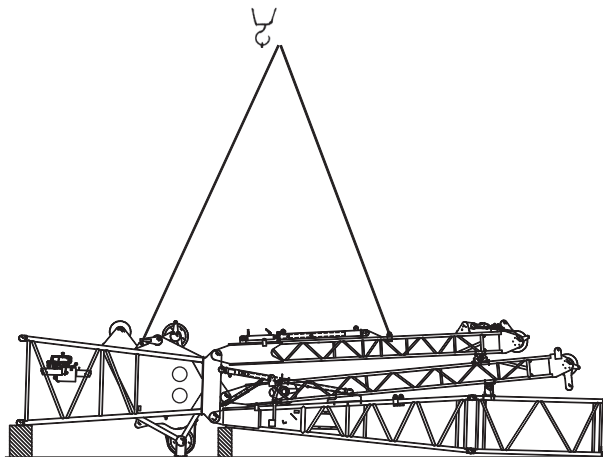
Before starting work, check the following points again.

- Machine is placed on firm and level ground.
- For the combination of all the boom length, place steel blocking plates between the ends of the crawlers at the idler and the ground.
- Counterweights are properly set.

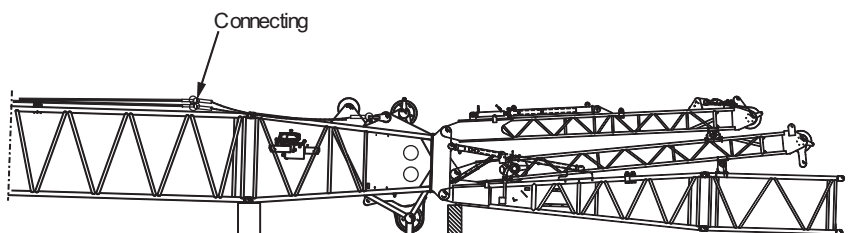
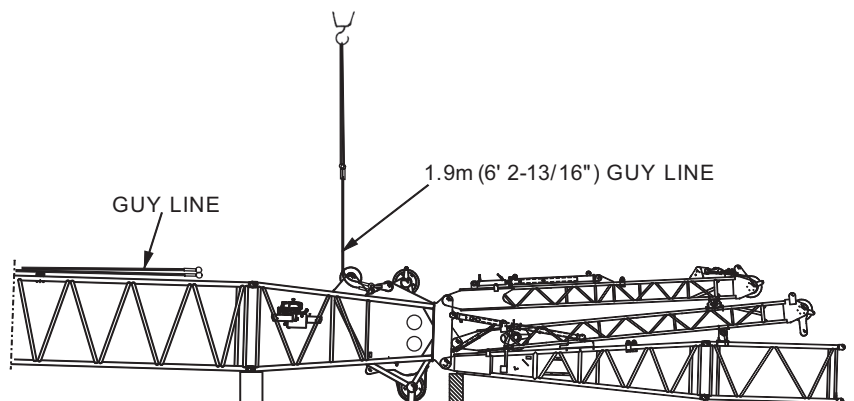
4.7.2 CONNECTING LUFFING BOOM TIP ASSEMBLY

The luffing boom tip assembly comprises the strut, jib base, and the insert jib. (travelling kit)

1. Lift the boom tip assembly with the auxiliary crane, and connect it to the insert taper boom.

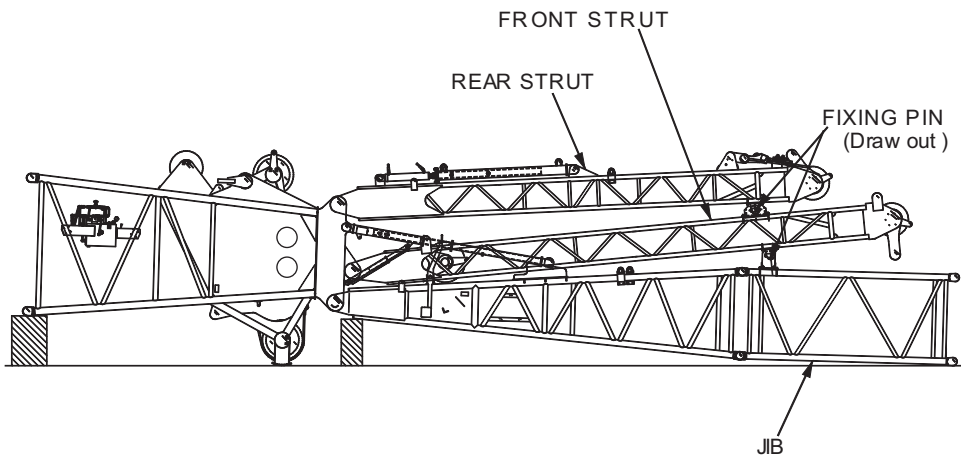


2. Connect the 2.7 m (8.8') basic guy line to the luffing boom tip and the guy line from the boom side together.



4. ASSEMBLY OF THE MACHINE

3. Remove the rear strut, front strut, and the fixing pin. Remove the fixing pin that connect the front and rear struts.

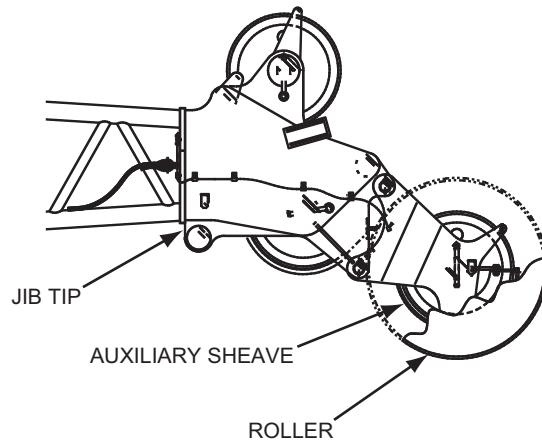


4.7.3 INSTALLING THE AUXILIARY SHEAVE FOR LUFFING

Install the auxiliary sheave for luffing jib to the jib tip.

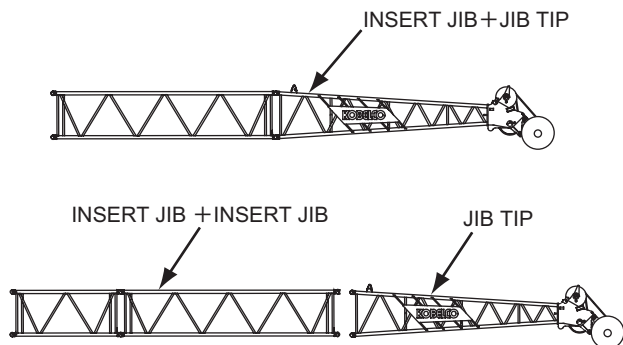
⚠ DANGER

Do not stand or work under, inside or on the jib structure when assembling jib. Failure to observe this precaution may result in serious injury or death.



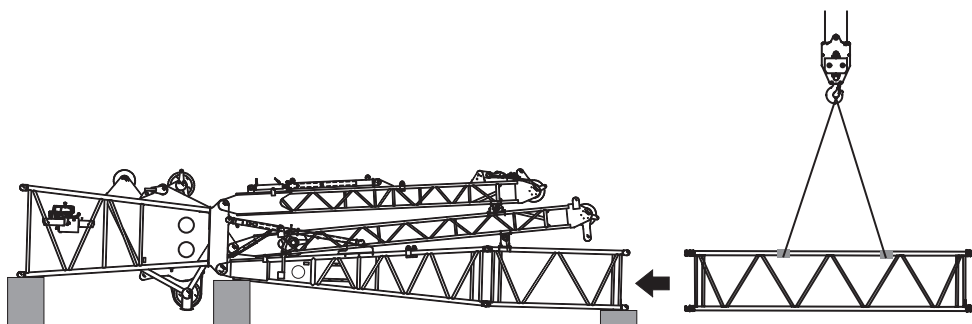
4.7.4 ASSEMBLING THE LUFFING JIB

Referring to arrangement table of jib and jib guy lines, assemble required jib. In case of the long jib, divide the jib into some blocks for the convenience of working, and connect them in order after assembly. Support the middle portion of the jib with wooden blocks, not only the both ends of the jib.



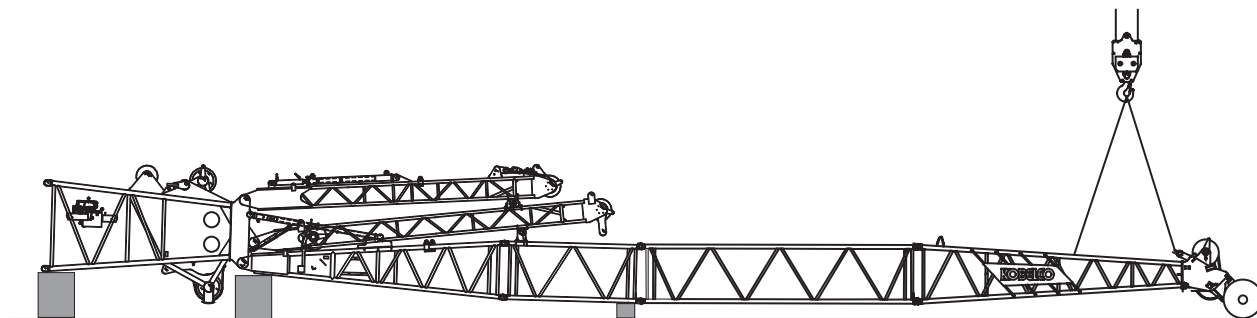
1. Connecting insert jib

Lift the insert jib with auxiliary crane, and connect it to the jib base.



2. Connecting jib tip

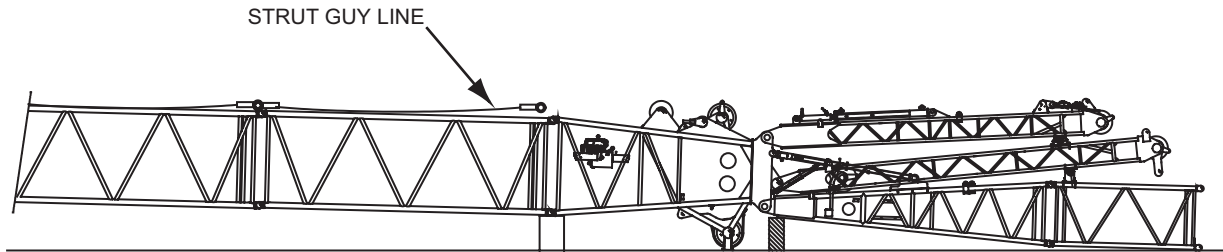
Lift the jib tip with the auxiliary crane, and connect it to the insert jib.



4. ASSEMBLY OF THE MACHINE

4.7.5 INSTALLING STRUT GUY LINE

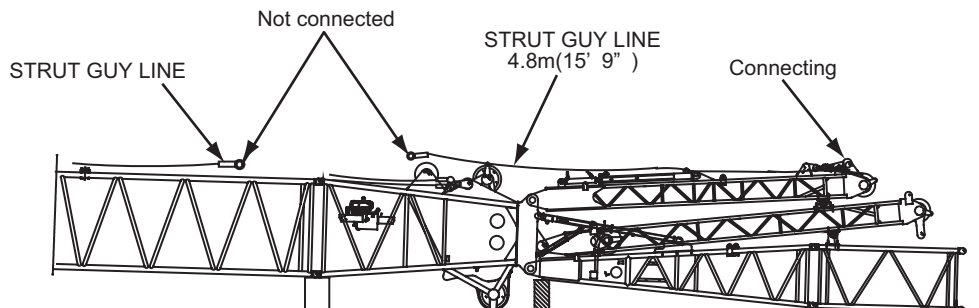
1. In accordance with arrangement table of guy line, prepare a strut guy line.
2. Set the strut guy line on the connected boom.



3. Connect the strut guy line from the jib base to the jip tip.
4. Connect the 4.9 m (16.1') guy line to the rear strut, and tilt it toward the boom.

Note

DO NOT connect the strut guy line from the boom and the strut guy line from the rear strut at this time.



CAUTION

When installing guy lines, take care not to damage the lattice pipe of the boom or jib.

CAUTION

Be sure to install the strut guy line to the inside of the boom guy line.

4.8 INSTALLATION OF THE COUNTERWEIGHT

4.8.1 ASSEMBLING THE COUNTERWEIGHTS

WEIGHT OF EACH SECTION

Section	Weight
No.1 Weight (A)	10,000 kg (22,050 lbs)
No.2 Weight (B)	5,000 kg (11,020 lbs)

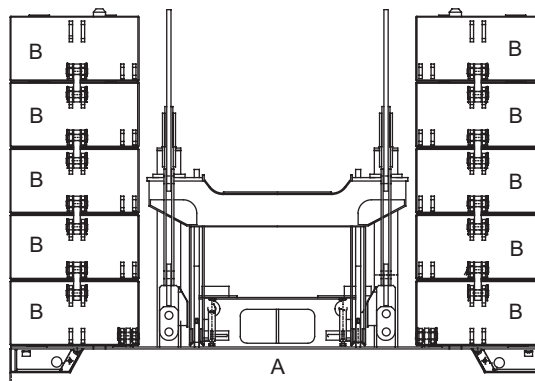
CAUTION

To avoid the turnover of the machine, be sure to install the carbody weights before installing the weights.

CAUTION

Make sure that the working mode of the load safety device is set to the "SELF REMOVAL MODE".

- The following conditions must be satisfied for counterweight mounting
 - firm horizontal ground,
 - provides at least 12 cm distance (by using wooden chocks, etc.) from the No. 1 Weight to the ground.
- Select the site of assembly for assembling and hoisting up the No. 1 Weight. Lay on underlay for the No. 1 Weight.
The base plate's underlay eases connecting the counterweight links.



4. ASSEMBLY OF THE MACHINE

WARNING

When making lifts, strictly follow the capacity charts supplied by the manufacturer for determining the loads that can be handled.

Follow good operating practice and all procedures as outlined in this manual when attempting to lift any load.

Failure to observe this precaution may result in serious injury or death.

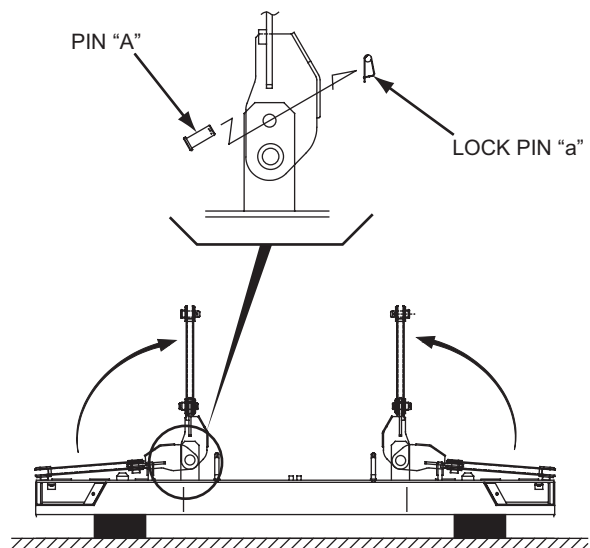
WARNING

The load line can break if the hook block contacts the end of the boom. This is called "two blocking". Two blocking can be caused by lowering the boom without paying out load line. Two blocking can pull jibs and lattice crane booms over backwards or cause damage to the tip.

Always keep adequate space between the hook block and boom point. Lower the hook when lowering the boom.

Failure to observe this precaution may result in serious injury or death.

- (1) Raise the links then fix the links with pin "A" and lock pin "a".



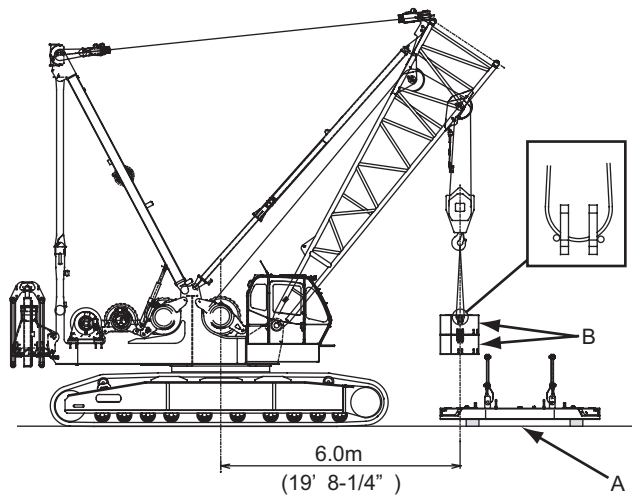
4. ASSEMBLY OF THE MACHINE

(2) Put the counterweight (B) on the counterweight (A).

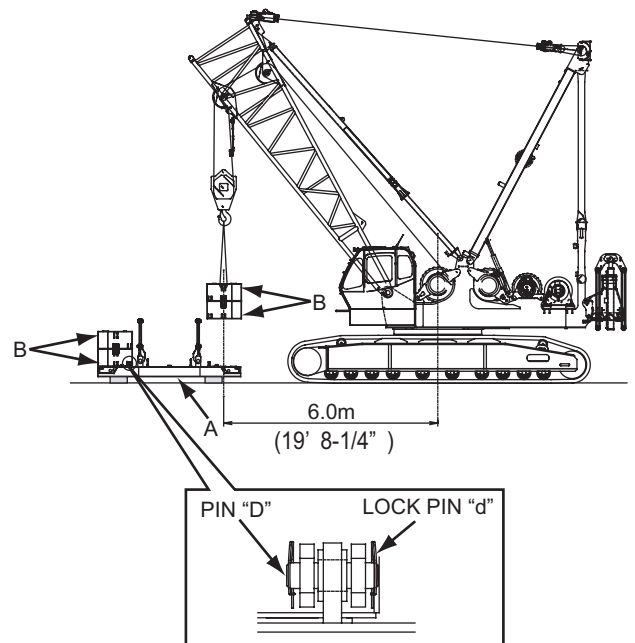
WARNING

Up to three counterweights can be piled up and lifted.

When lifting them, reeve the wire rope or sling as shown in the right figure. Failure to observe this warning may result in serious injury or death.



(3) Fix the counterweight (B) with pin "D" and lock pin "d".

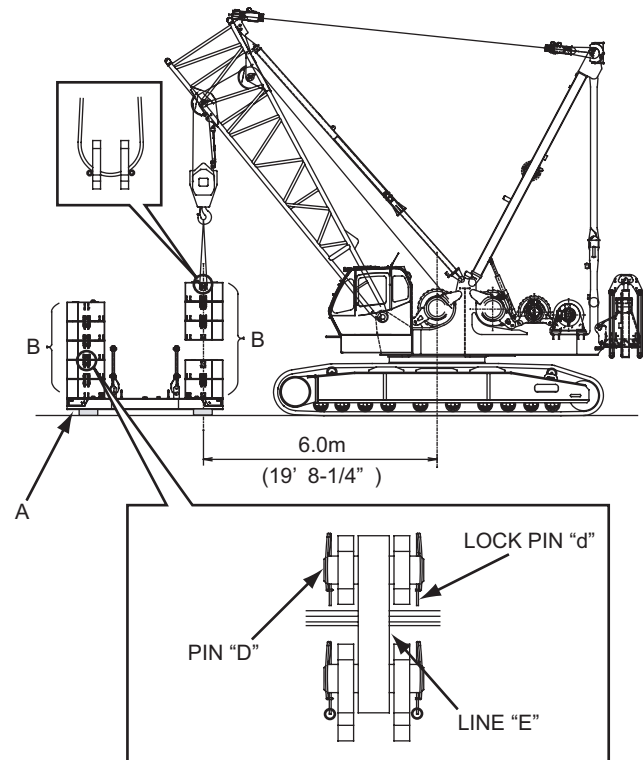


4. ASSEMBLY OF THE MACHINE

- (4) Fix the counterweight (B) with pin "D" , lock pin "d"
and link "E"

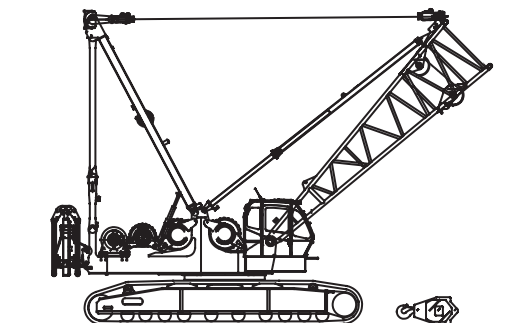
WARNING

Do not lift more than three weights at a time. Lifting brackets may break.
Failure to observe this precaution may result in serious injury or death.



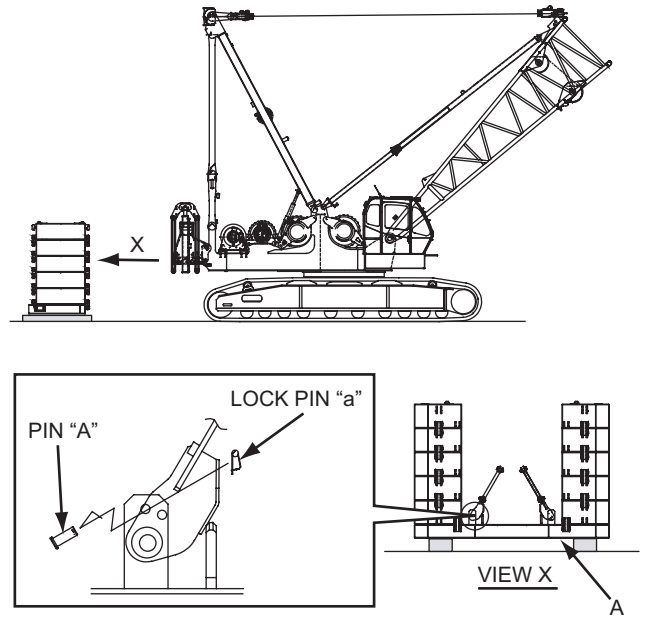
4.8.2 REMOVING THE HOOK BLOCK FROM THE BASE BOOM

1. Lower the base boom and hook block.
2. Spool the wire rope to the front drum.



4.8.3 SETTING THE COUNTER-WEIGHT LINK

Lean the links on counterweight (A) against the plate on counterweight (A) as shown on "VIEW-X" by removing pin "A" and lock pin "a".



4. ASSEMBLY OF THE MACHINE

4.8.4 INSTALLATION OF COUNTERWEIGHTS TO MACHINE

1. Installation of counterweight lifting guy cables
 - (1) Propel the machine to the position that the counterweight lifting links can be connected to the counterweight lifting section.

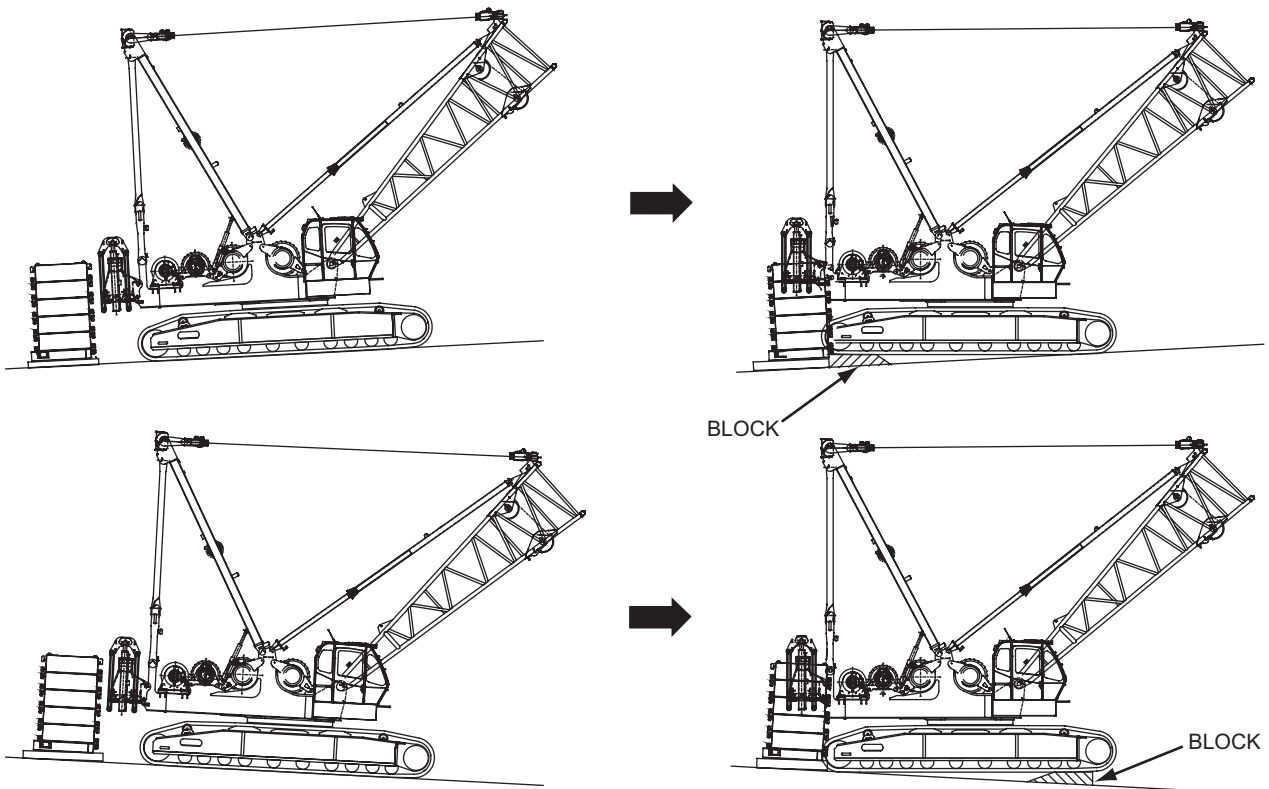
WARNING

Slowly propel the machine while paying attention to prevent any interference of the basic machine with the counterweights.

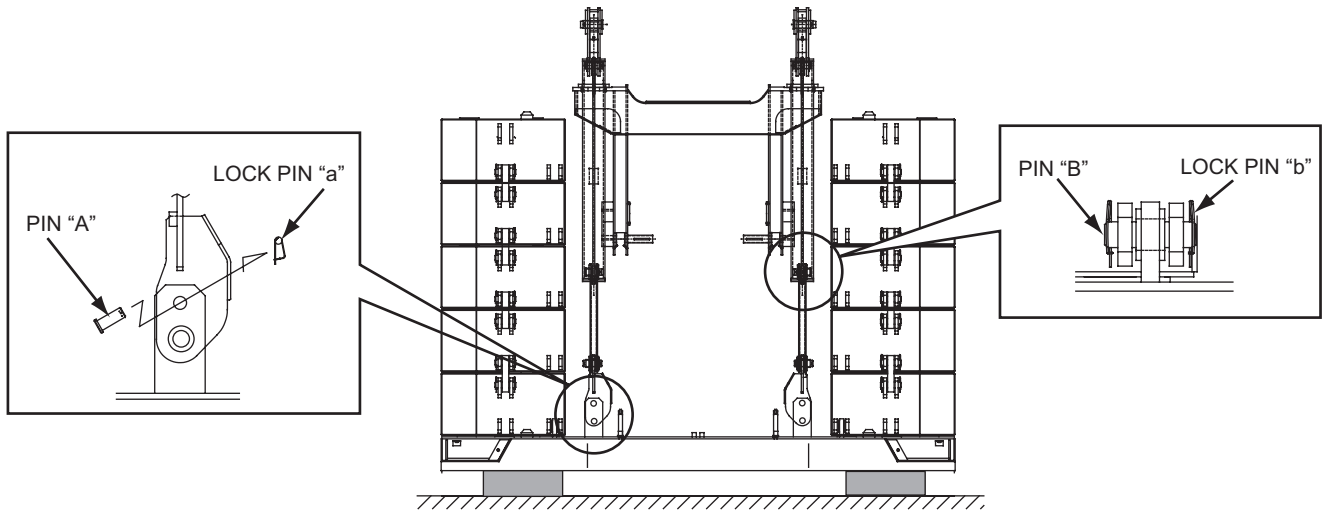
- (2) Set the machine horizontally.

WARNING

Before installing the counterweight, make sure that the machine is flat. If the machine is inclined, then make the machine flat by wood block etc. Do not support the machine by translifter, when the counterweight is lifted by the c/w lift cylinder. Failure to observe this warning may result in serious injury or death.

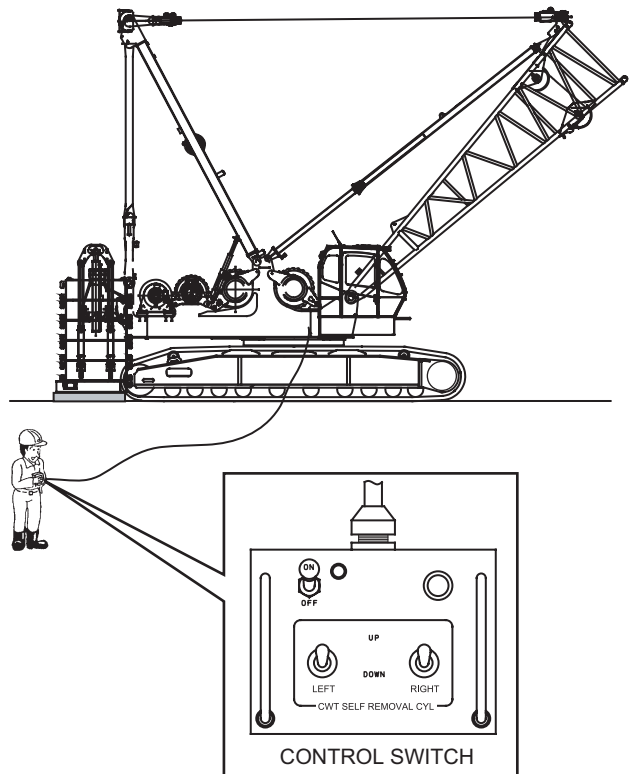


- (3) Install the counterweight lifting links to the counterweight.
- (A) Stand counterweight links by setting pin "A" and lock pin "a" again.
- (B) Connect the links by setting pin "B" and "b" as shown in this drawing.



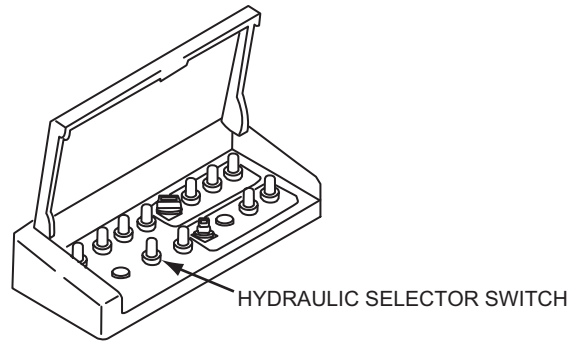
2. Installation of counterweights to swing frame

- (1) Connect the remote control cable to the receptacle located under the operator cabin.



4. ASSEMBLY OF THE MACHINE

- (2) Move the hydraulic selector switch located on the side stand panel in the operator cabin toward the gantry/tag line position. Set the engine speed to about 1000 rpm.



- (3) Operate the remote control to lift the counterweight.

⚠ DANGER

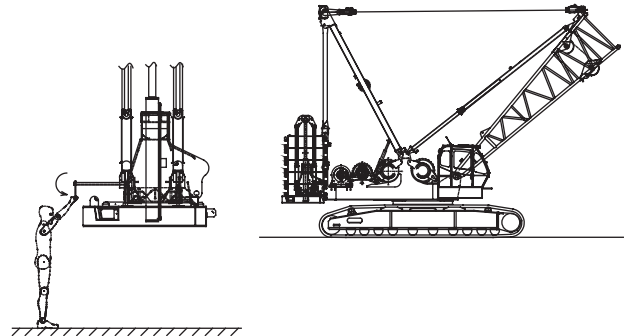
Slowly lift the counterweight.

Failure to observe this precaution may result in serious injury or death.

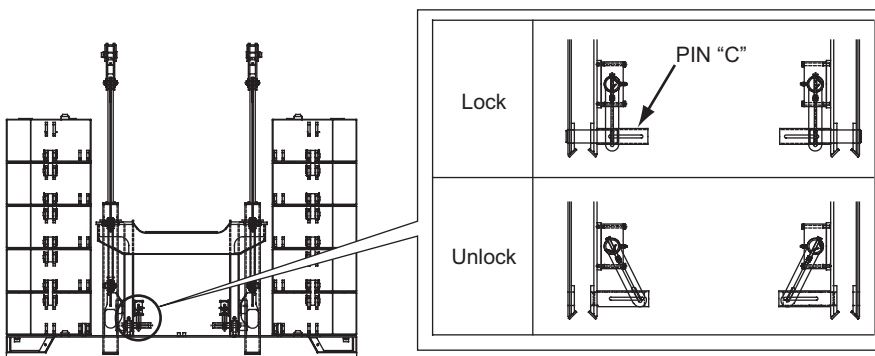
⚠ DANGER

When lifting the counterweights, equalize the motions of the right and the left cylinders to keep horizontality.

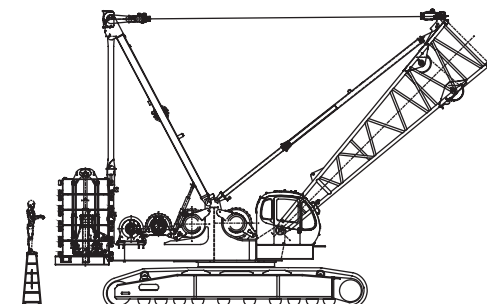
Failure to observe this precaution may result in serious injury or death.



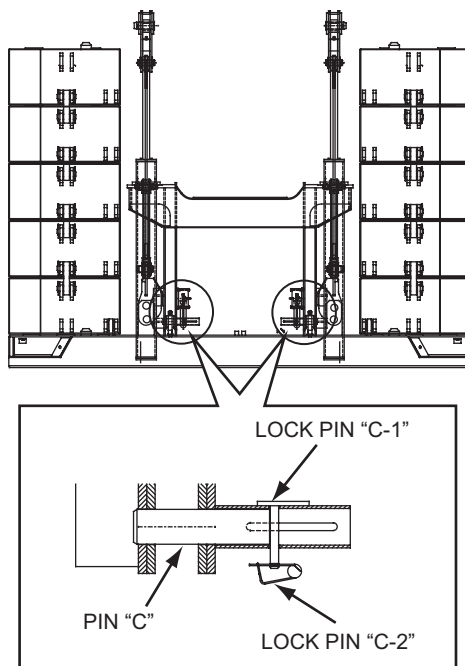
- (A) Set the weight support pin "C" using extension bar.
(B) Retract the cylinder by about 50 mm. Then counterweight unit is supported by pin "C".



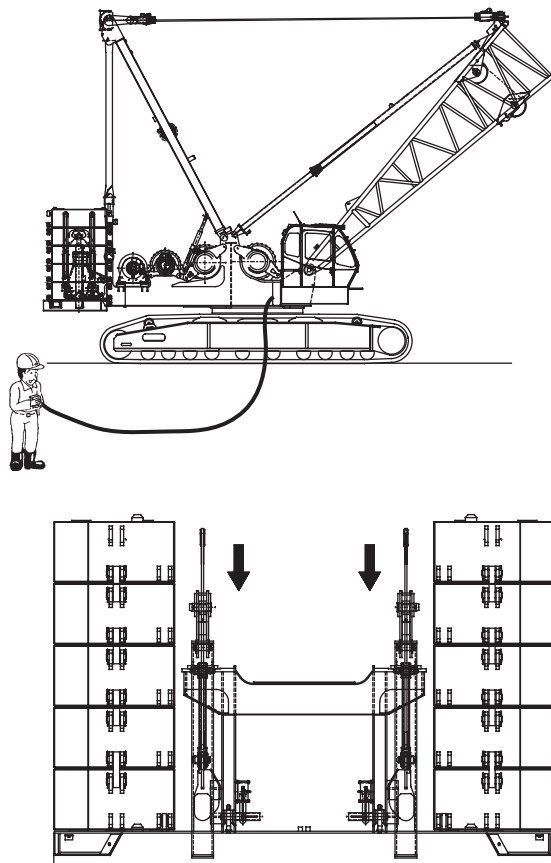
- (4) Go up onto counterweight (A) using the ladder.



(5) Set the lock pins "c-1" and "c-2".

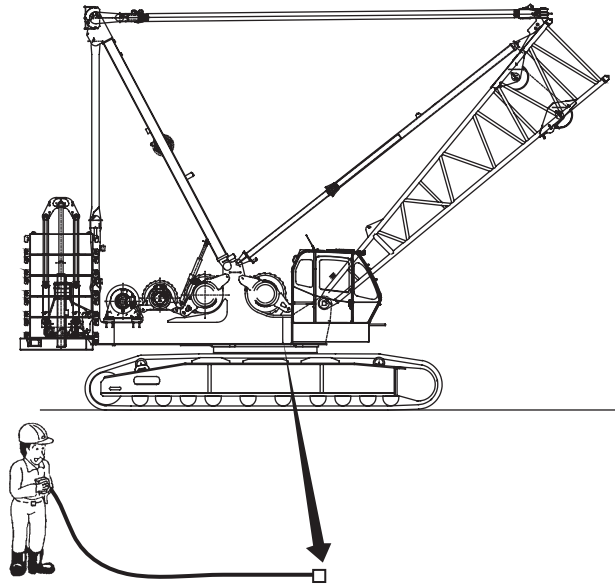


(6) Fully retract the cylinder.



4. ASSEMBLY OF THE MACHINE

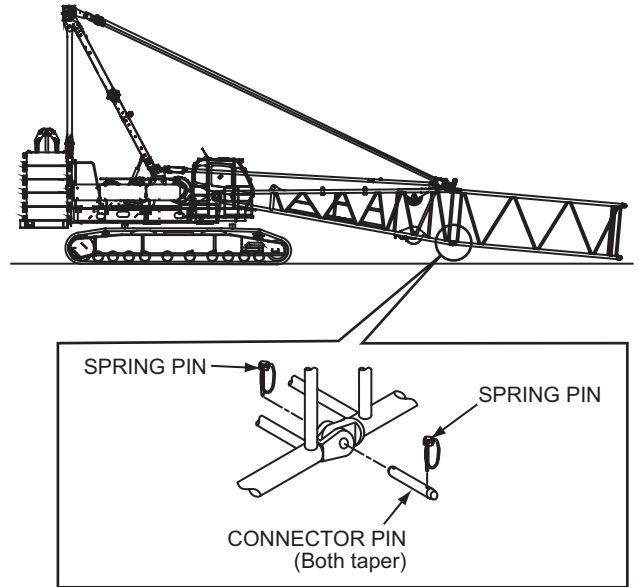
(7) Disconnect and store the remote control cable.



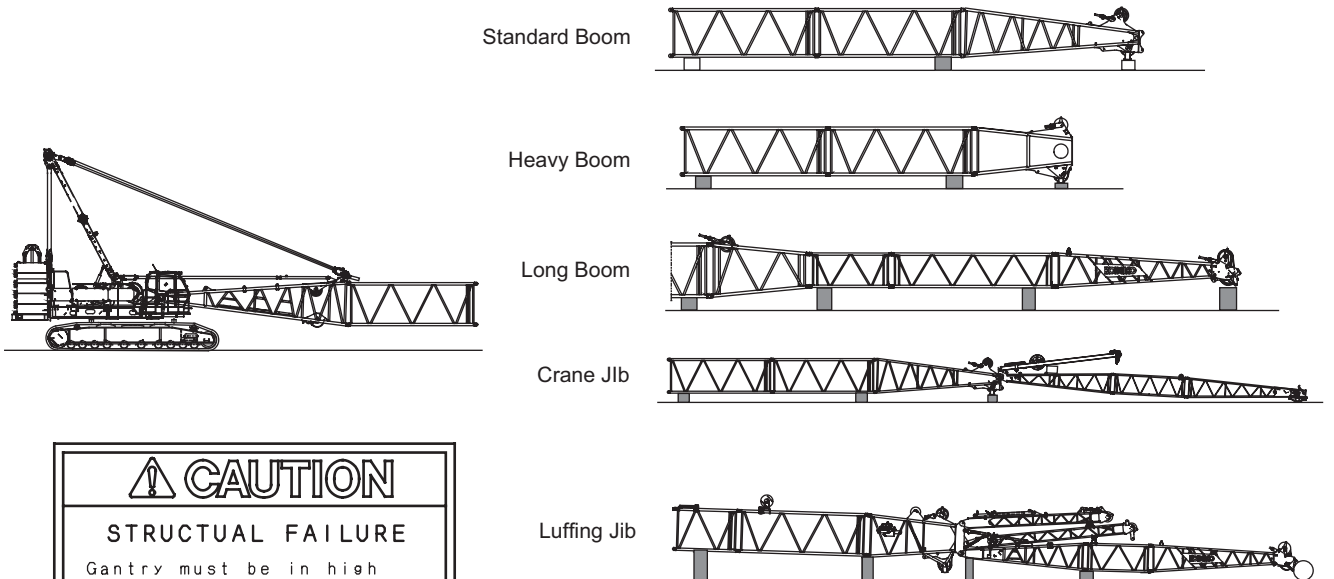
4.9 CONNECTING THE BOOM

4.9.1 CONNECTING THE BASE BOOM TO THE INSERT BOOM

1. Connect the base boom to the lower pin on the insert boom.



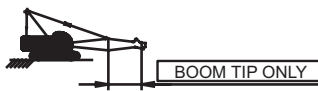
2. Connect the base boom to the assembled insert boom.




⚠ CAUTION

STRUCTURAL FAILURE

Gantry must be in high position
Read operators manual for boom connecting length

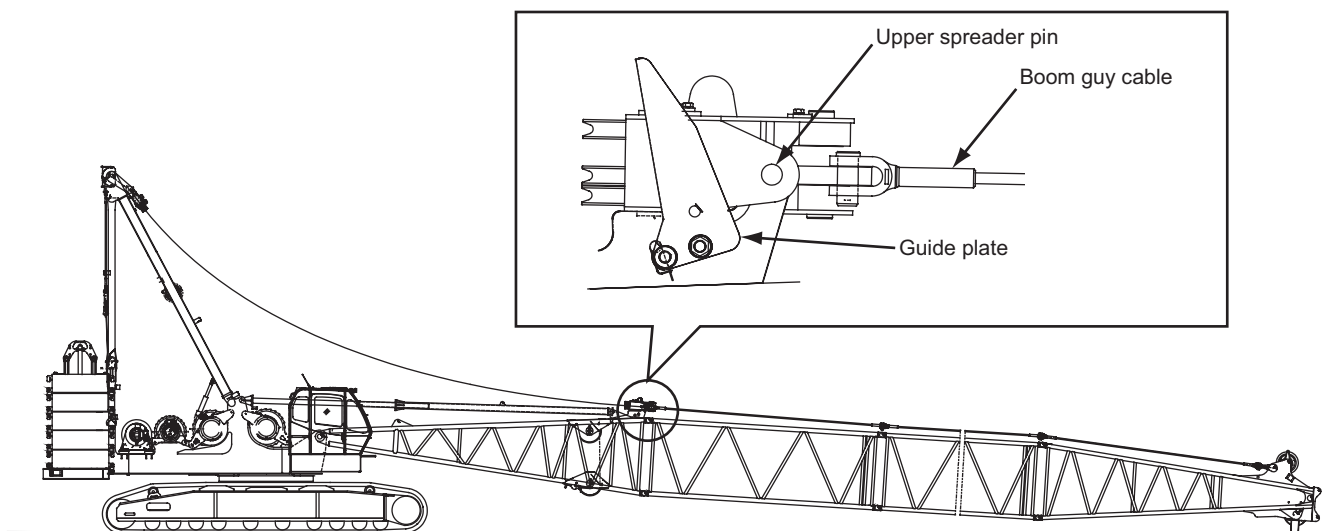
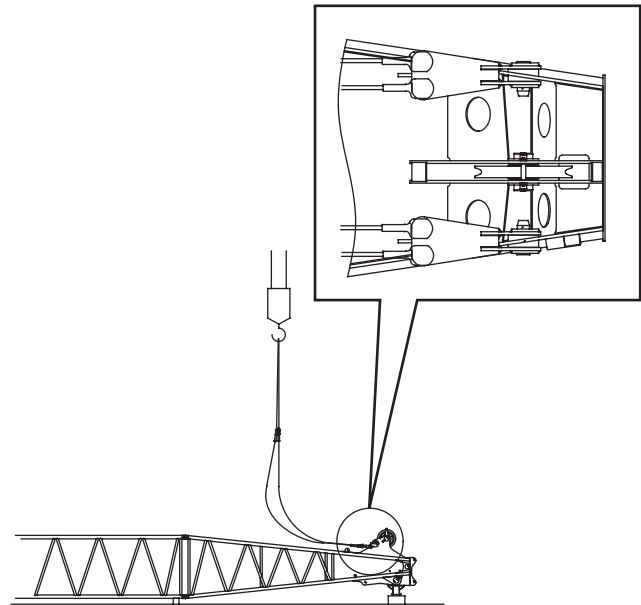




4. ASSEMBLY OF THE MACHINE

4.9.2 INSTALLATION OF THE GUY LINE

1. Prepare guy lines according to the guy line arrangement chart.
2. Connect the prepared guy lines from the boom end side to the machine side one after another. When connecting the guy lines, be sure to remove the slack on them. Excessively slacked guy lines make it impossible to connect with the spreader.

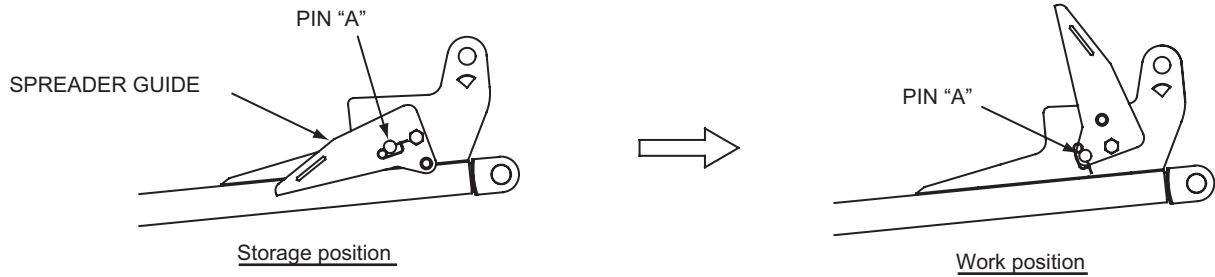


CAUTION

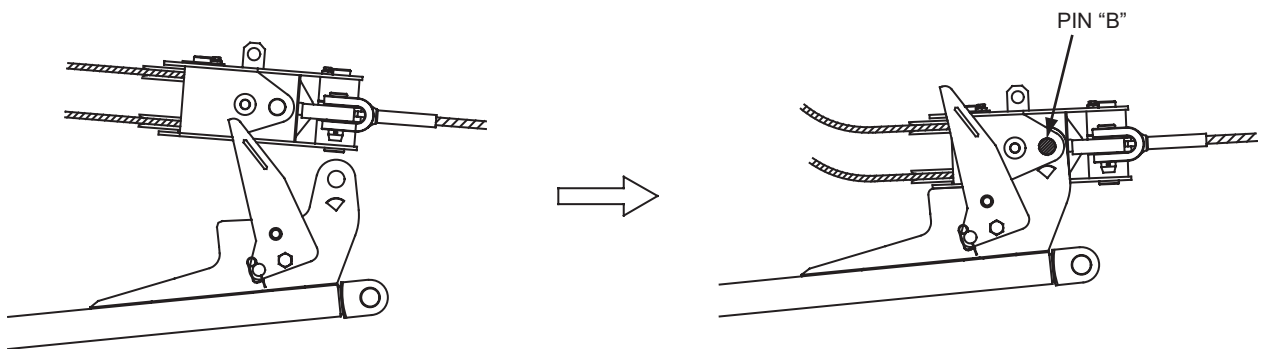
To prevent the wire rope from being caught on, insert the guy line connecting pin from inside to the outside.

HOW TO USE SPREADER GUIDE

1. Draw out pin "A", change the spreader guide from the storage position to the work position. Place the pin "A" in the work position.



2. Lower the boom. After the tip end of the boom has been grounded, slowly loosen the boom hoist wire rope more. The spreader is lowered along the spreader guide. When the hole of the spreader is aligned with the pin hole of the bracket on the boom base section, insert pin "B" to connect the spreader to the bracket.

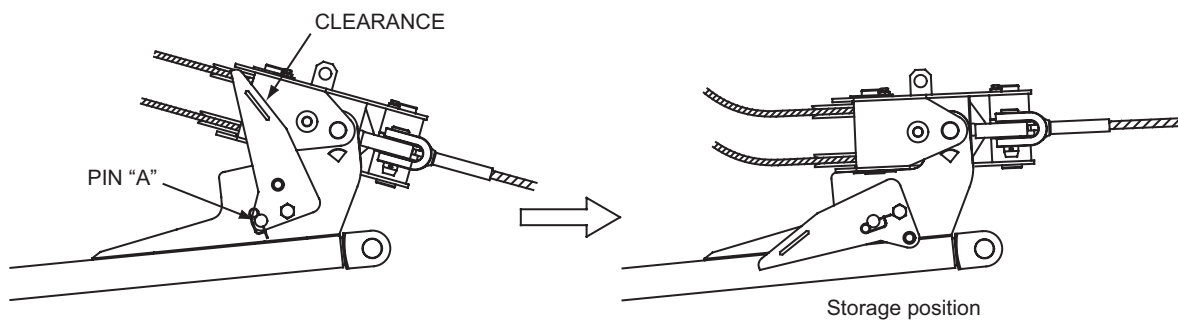


4. ASSEMBLY OF THE MACHINE

- When storing the spreader guide, slowly stretch the boom hoist wire rope. When clearance is generated between the spreader and the spreader guide, draw out pin "A", and return the spreader guide to the storage position. Since the clearance is not generated with boom base section only, perform before disassembling the boom.

CAUTION

- When the gantry is in the lowered condition, be sure to set the guide in the storage position. If the guide is left in the work position, the guide could be damaged by boom hoisting.
 - When the gantry is lowered and the upper spreader is connected to the boom base section, set the guide in the storage position. At this time, do not raise the boom to more than 20 degrees. If the boom is raised to more than 20 degrees, the winch wire rope has possibility to be damaged.
-



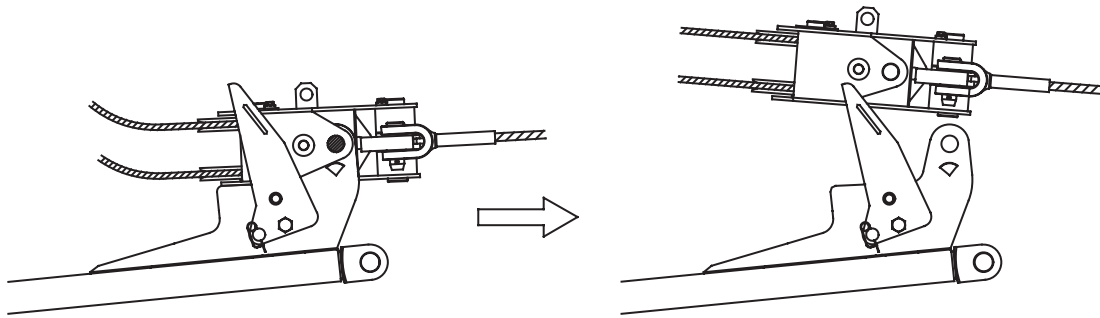
WARNING

Be sure to hold the guide end with hands. Only then, remove the pin, and stow the spreader guide. Failure to observe this precaution may result in serious injury or death.

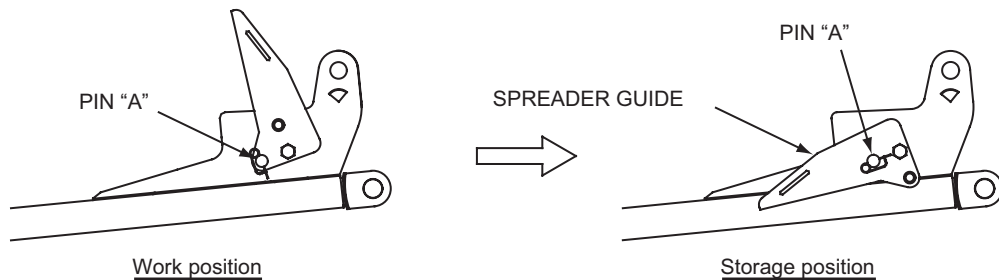
4. After change of the boom connection or assembly has been finished, draw out pin "B", and wind up the boom hoist wire rope so that the spreader slides up on the guide.

Relating to the reeving way of the boom hoist wire rope, the spreader slides up while rocking from side to side.

If the spreader is raised up at a stretch, the spreader has possibility to be caught on the guide and to bend the guide. If it is caught, loosen the wire rope once, then move the boom drum control lever to the RAISE side intermittently to remove hooking.



5. Return the spreader guide to the storage position.



6. When setting the spreader guide to the work position, after the boom connection is finished, stretch the boom hoist wire rope, and set the spreader guide to the work position.

4. ASSEMBLY OF THE MACHINE

4.10 ASSEMBLING THE LUFFING JIB ATTACHMENT

4.10.1 INSTALLING LUFFING JIB HOIST WIRE ROPE

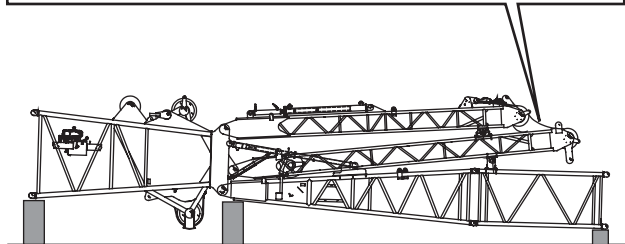
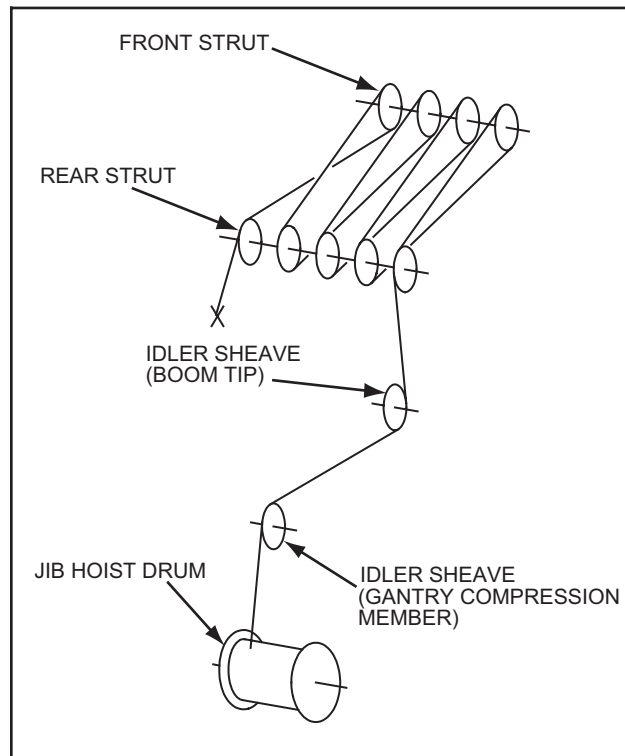
1. Draw the jib hoist wire rope out of the jib drum, and reeve it through the front and rear strut point sheaves, referring to the right figure at the right.
2. Fix the end of wire rope (dead end) to the rear strut with the rope socket.

WARNING

Do not touch the wire rope directly with bare hands. If wires protrude, you could be injured. Work gloves are recommended.

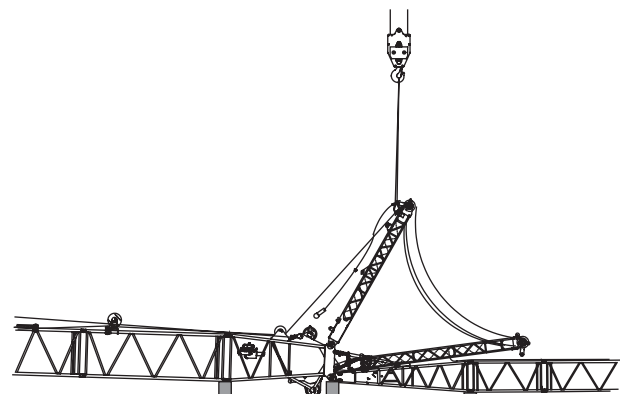
Keep hands and clothing clear of the rotating drum and moving wire rope.

Failure to observe this precaution may result in serious injury or death.

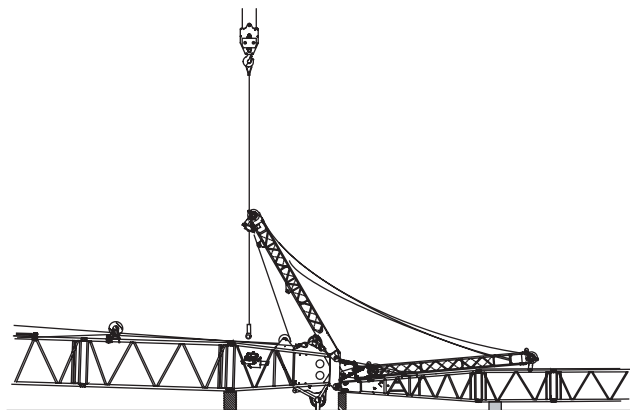


4.10.2 CONNECTING STRUT GUY LINE

1. Lift the rear strut with the auxiliary crane, letting out the jib hoist wire rope.

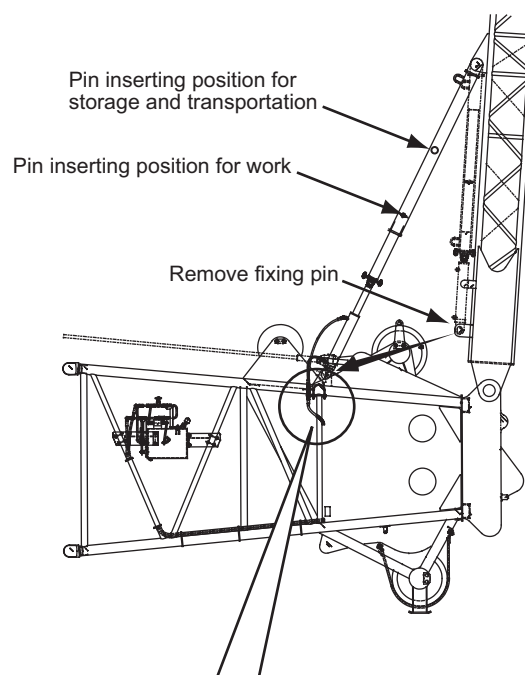


2. Raise rear strut toward the machine until the strut guy line can be connected.
3. With the pin holes of strut guy line aligned, insert the connecting pin into the hole, and securely fix it to prevent it from being removed.



4.10.3 INSTALLING STRUT BACKSTOP

1. Raise the rear strut until the strut backstop can be connected.
2. Remove the fixing pin that connects the rear strut and strut backstop. At this time, support the strut backstop so that it may not move.
3. Slowly move both of the strut backstops until the pin hole of the hydraulic cylinder can be aligned with that on the insert taper boom. Insert the pin and securely fix it with the spring pin to prevent it from being removed. Connect the strut backstop cylinder hoses to the tube from the hydraulic oil reservoir. Open the cock to allow hydraulic oil to enter cylinders.
4. Set the length of the strut backstop appropriately for the length of the boom.



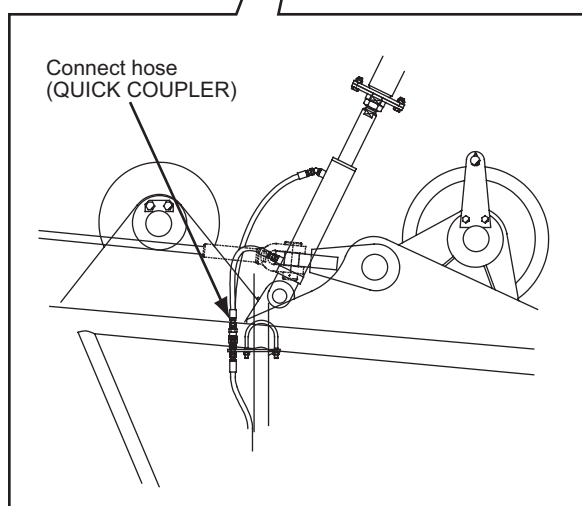
⚠ DANGER

Set the strut backstop pin in the correct position as indicated.

Failure to observe this precaution will result in damage to the strut backstop, boom, jib and/or the struts and in serious injury or death.

Note

Suitable boom length is stamped on the pin hole.



4. ASSEMBLY OF THE MACHINE

5. Connect both of the right and left hoses from the cylinders to the couplers on top of the boom tip.

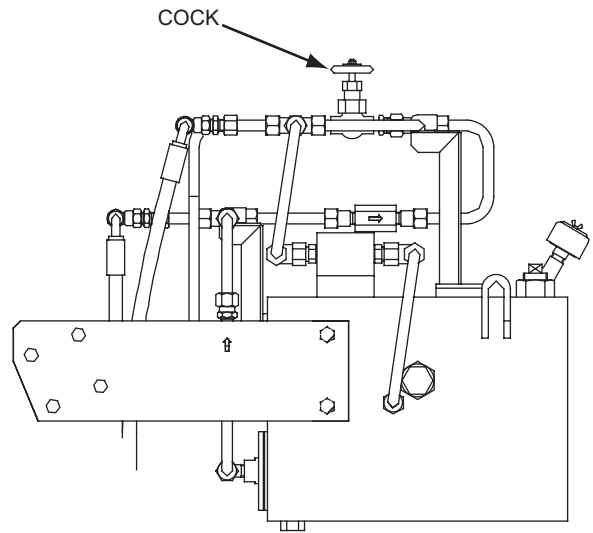
CAUTION

Be sure to check that the couplers are fully connected with the hoses.

6. Securely tighten the cock on top of the hydraulic tank (Turn the cock clockwise to tighten it).

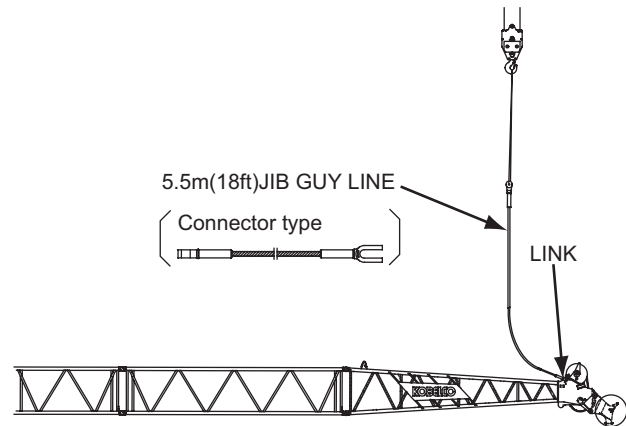
WARNING

If the cock is left opened, the cylinder can extend and retract freely, which causes the jib to be pulled up by dead load of rear strut. Failure to close cock can lead to a dangerous situation.

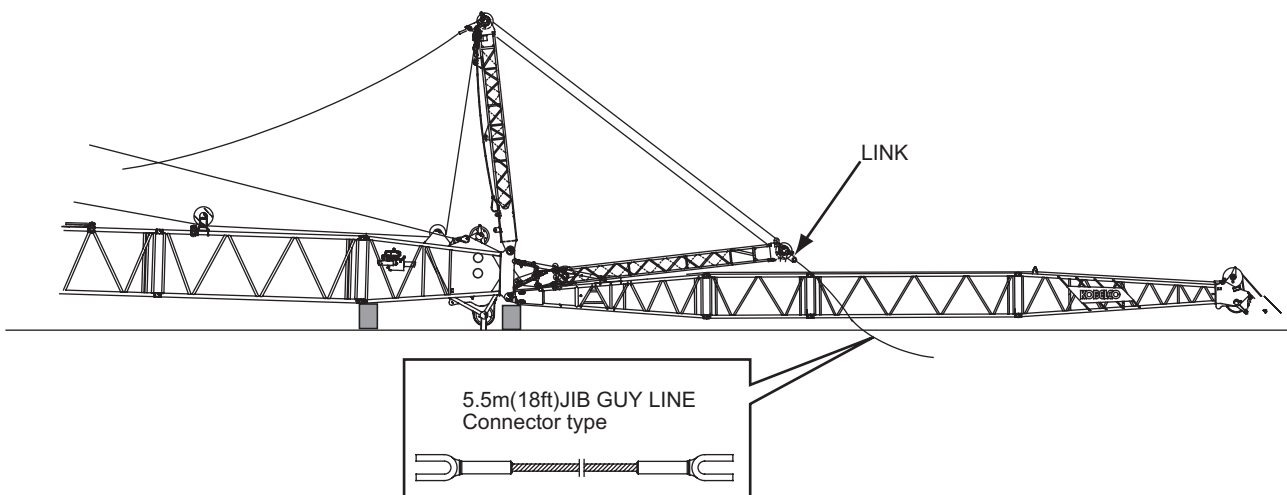


4.10.4 INSTALLING JIB GUY LINE

1. Connect the 5.5 m (18 ft) guy line to the guy line link on the jib tip.



2. Bring the jib guy line toward the strut.
3. Connect the 5.5 m (18 ft) guy line to the guy line link on the front strut.



4.11 REEVING THE WIRE ROPE FOR CRANE, JIB AND AUXILIARY SHEAVE

4.11.1 REEVING THE FRONT DRUM WIRE ROPE FOR CRANE WITHOUT LUFFING JIB



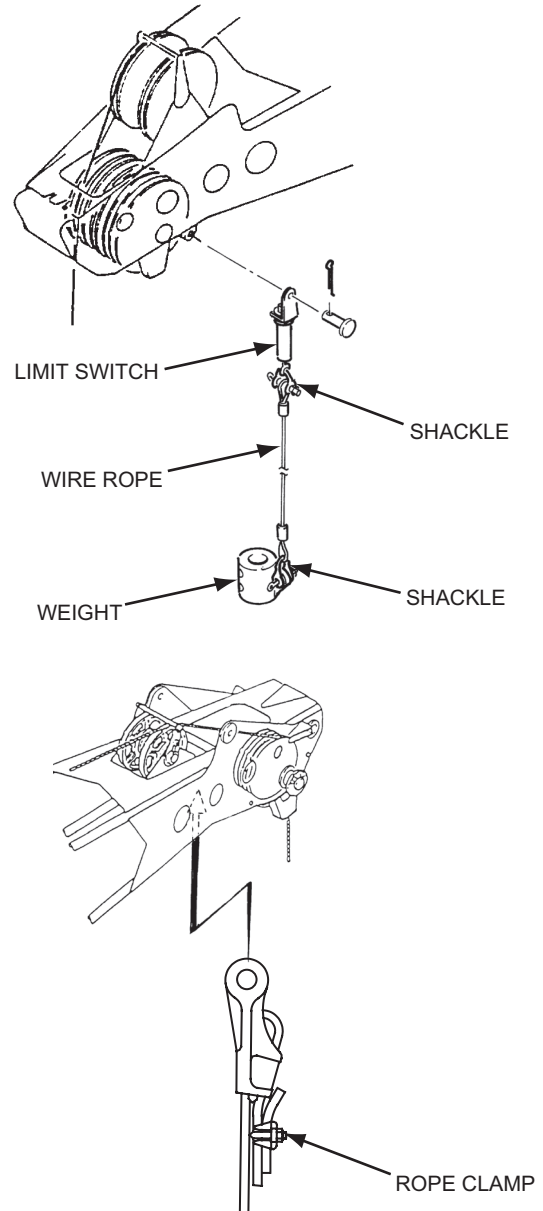
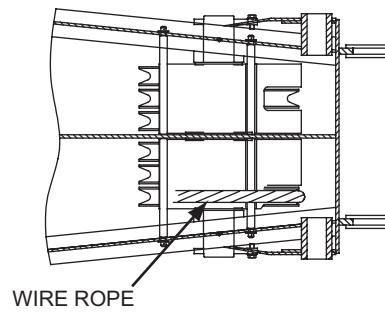
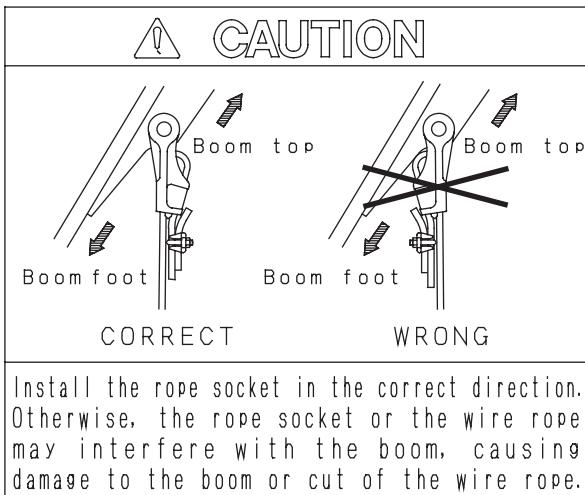
To prevent personnel from being caught by the rope, be sure to post a signal person. Failure to observe this precaution may result in serious injury or death.



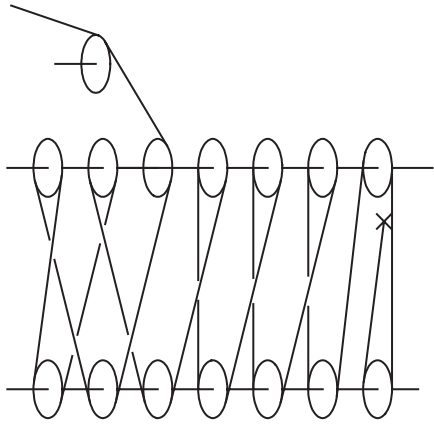
Do not touch a wire rope directly with bare hands. If wires protrude, you could be injured. Working gloves are recommended. Failure to observe this precaution may result in serious injury or death.

4. ASSEMBLY OF THE MACHINE

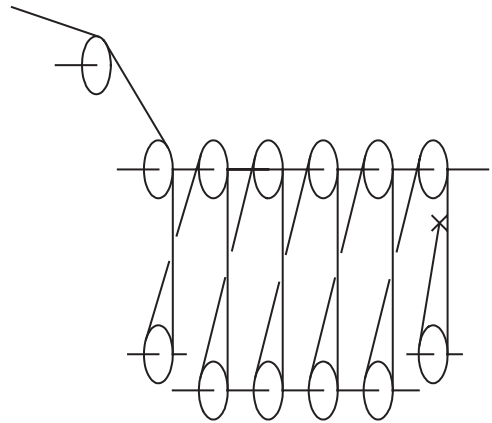
1. Prepare the hook, overhoist limit switch, weight and socket, etc. to used near the tip end of the boom
2. Operating the front drum control lever to the lowering side to pay out the wire rope to the tip end of the boom, pass it through the first sheave from the right of the boom point.
3. Install the overhoist limit switch and weight to the left side bracket on the tip end of the boom. Insert the cotter pin into the shackle pin to fix it.
4. Pass the front drum wire rope through the hook sheave(s) and boom point sheave(s) in order. Do not forget to pass the wire rope through the weight for the overhoist limit switch. Fix the wire rope end to the boom point for even number part reeving and to the hook for odd number part reeving with the rope socket.



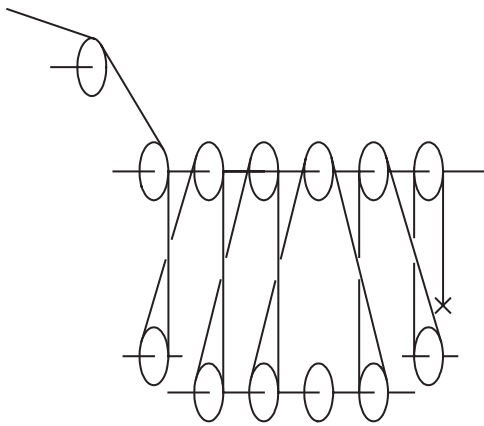
CK2000 WIRE ROPE REEVING



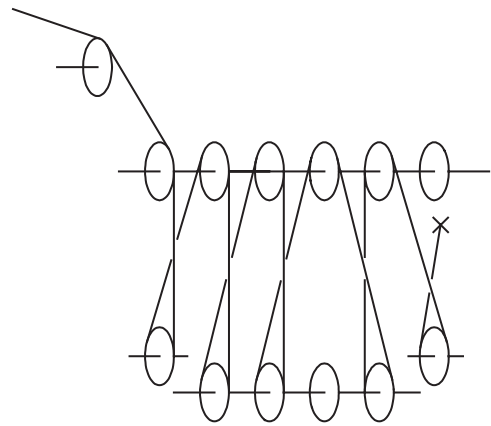
14 PARTS (FOR HEAVY BOOM)



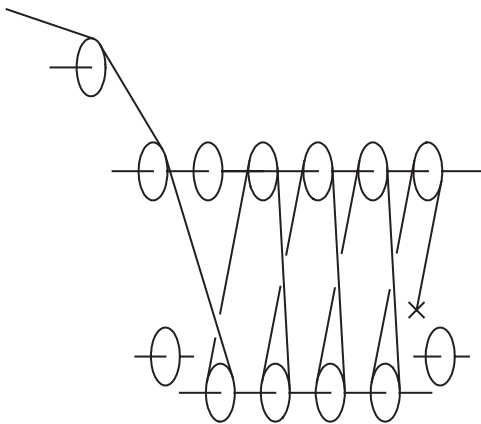
12 PARTS



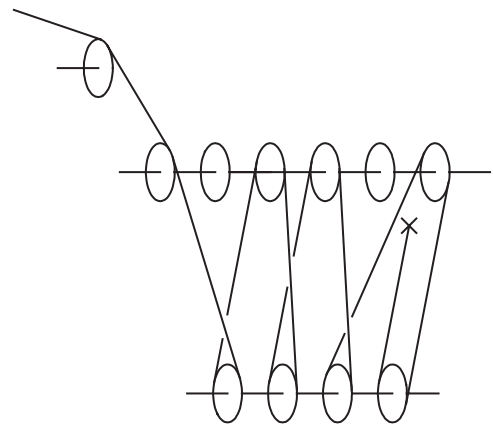
11 PARTS



10 PARTS



9 PARTS



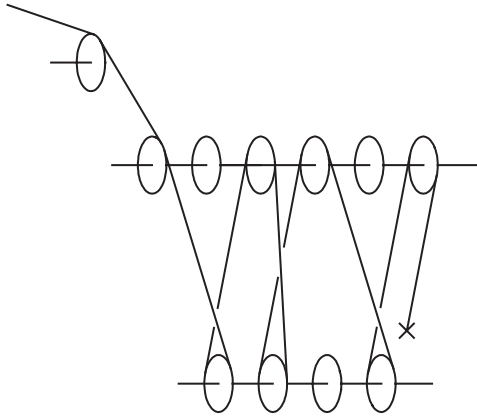
8 PARTS

(Above figures are viewed from tip side)

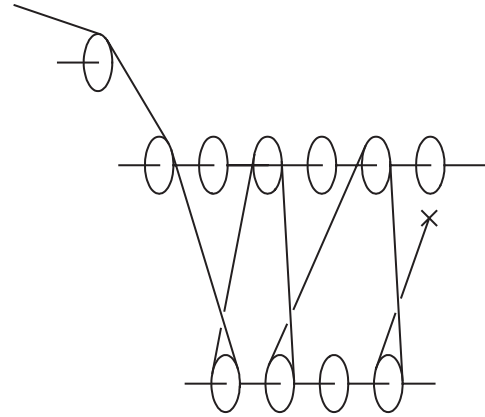
(Above figure are viewed from tip side.)

4. ASSEMBLY OF THE MACHINE

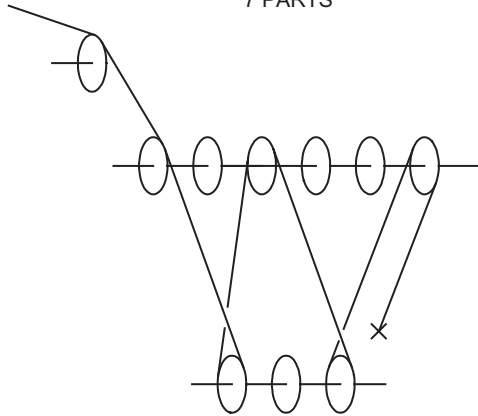
CK2000 WIRE ROPE REEVING



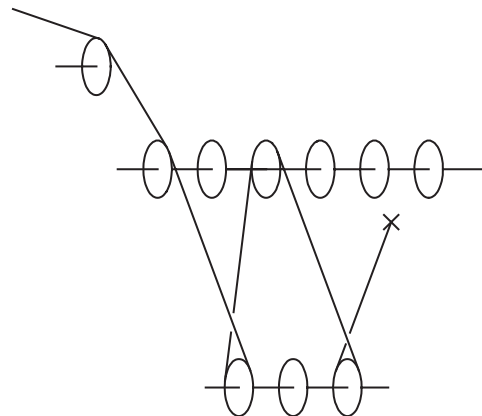
7 PARTS



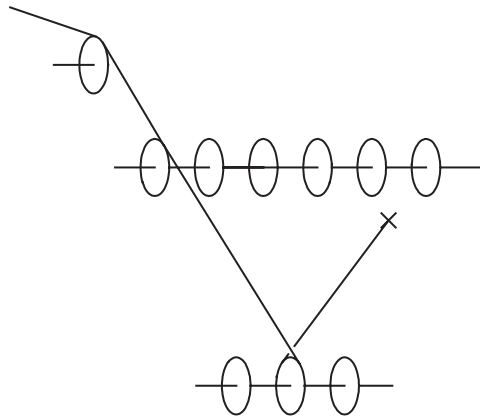
6 PARTS



5 PARTS



4 PARTS



2 PARTS

(Above figures are viewed from tip side)

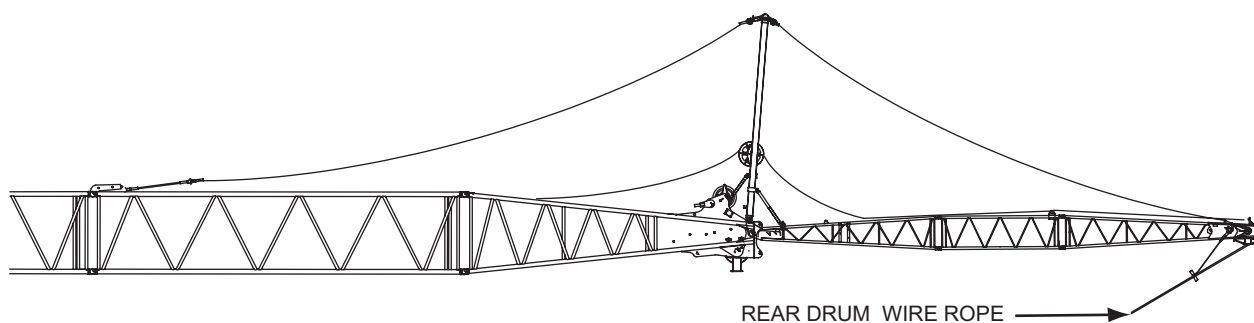
(Above figure are viewed from tip side.)

4.11.2 REEVING REAR DRUM WIRE ROPE TO THE JIB

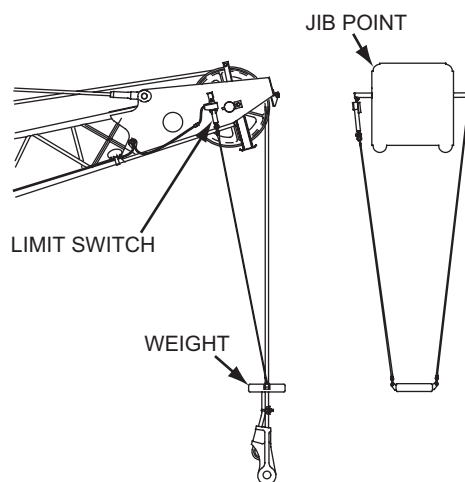
WARNING

Do not touch a wire rope directly with bare hands. If wire protrude, you could be injured. Working gloves are recommended. Keep hands and clothing clear of the rotating drum and running wire rope. Failure to observe this precaution may result in serious injury or death.

1. Place the hook near the tip end of the jib.
2. Push the rear drum control lever to the lowering side to pay out the rear drum wire rope to the tip end of the jib, and pass it through the jib point sheave.

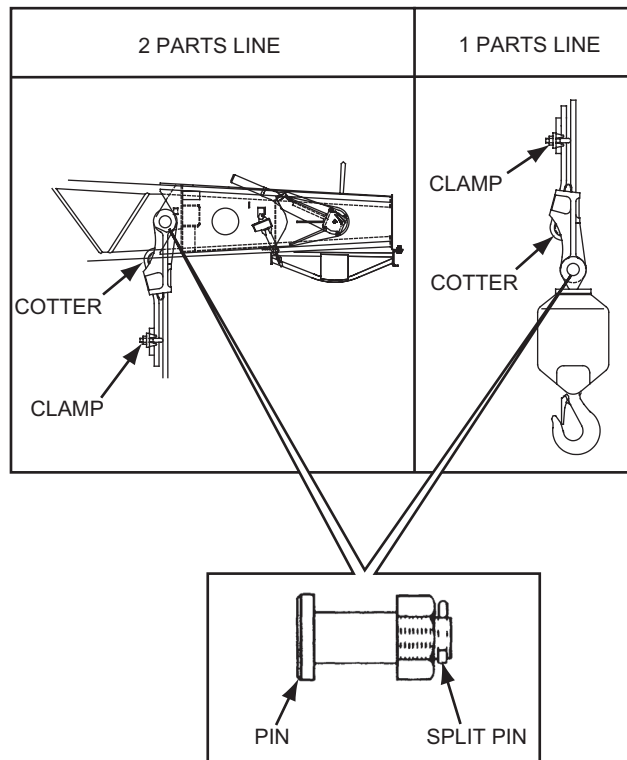


3. Install the limit switch and weight to the jib point section.
Lock the shackle pins with cotter pins.



4. ASSEMBLY OF THE MACHINE

4. Pass the wire rope end through the weight for the limit switch. When using 1 part of line, fix the wire rope end to the hook block, and fix it to the upper jib when using 2 parts of lines. Use the rope socket when fixing the wire rope end.



5. Referring to Chapter 3 Load Safety Device, connect the wiring for the auxiliary hoist hook overhoist limit switch.

WARNING

After the assembly has been completed, be sure to confirm that all connecting pins and lock pins are correctly installed.

Failure to observe this precaution may result in serious injury or death.

CAUTION

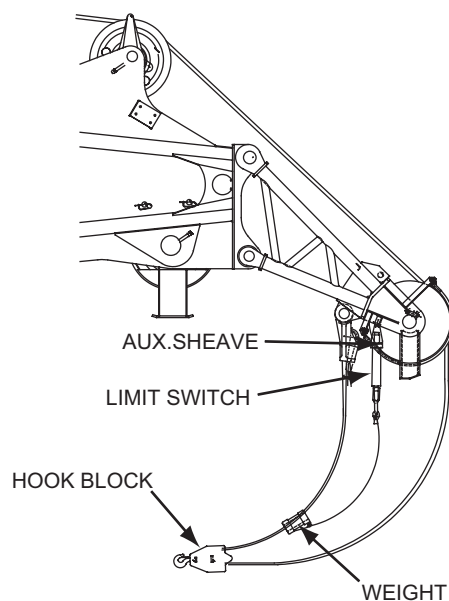
Check the performance of the anti-two-block alarm system.

4.11.3 REEVING THE REAR DRUM WIRE ROPE TO THE AUXILIARY SHEAVE

1. Place the ball hook near the tip of the auxiliary sheave.
2. Control the rear drum control lever to the lowering position to pay out the wire rope up to the tip end of the boom, and pass the wire rope through the idler sheave and auxiliary sheave in this order.



3. Install the limit switch and weight to the auxiliary sheave.
4. Pass the wire rope end through the weight for the limit switch, and fix the end to the ball hook with the use of the rope socket.
5. Connect the wiring of the auxiliary hook anti-two-block (overhoist) limit switch, referring to Chapter 3 Load Safety Device.



4. ASSEMBLY OF THE MACHINE

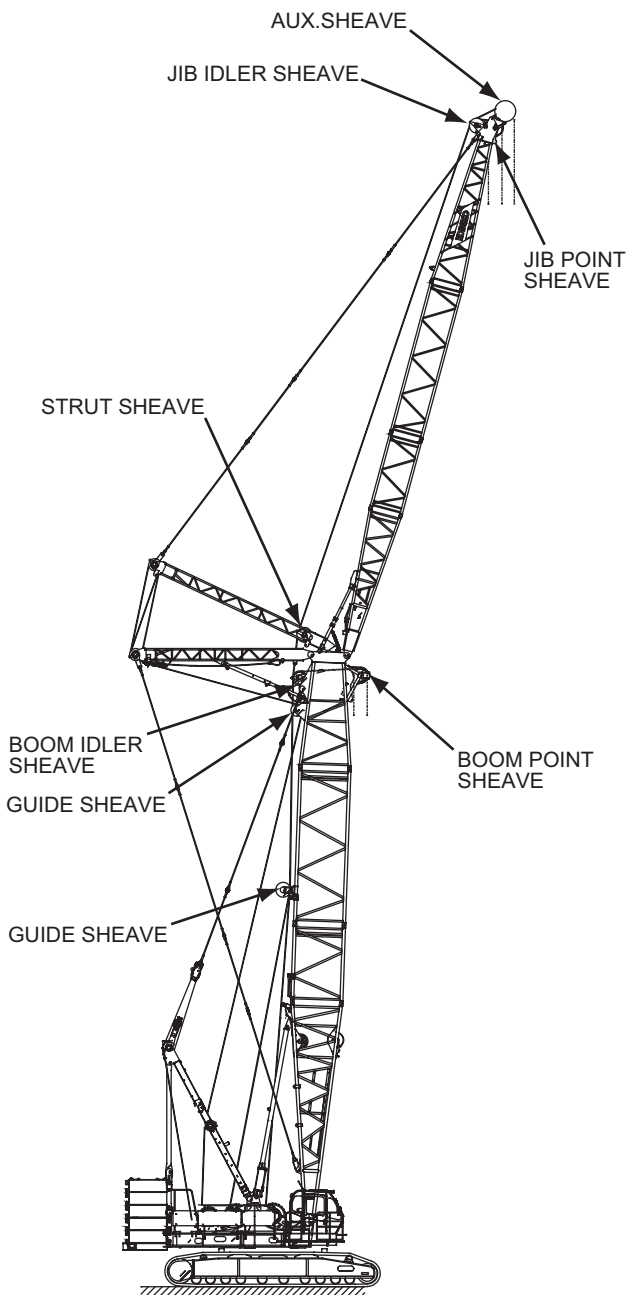
4.12 REEVING THE WIRE ROPE FOR CRANE WITH LUFFING ATTACHMENT

WARNING

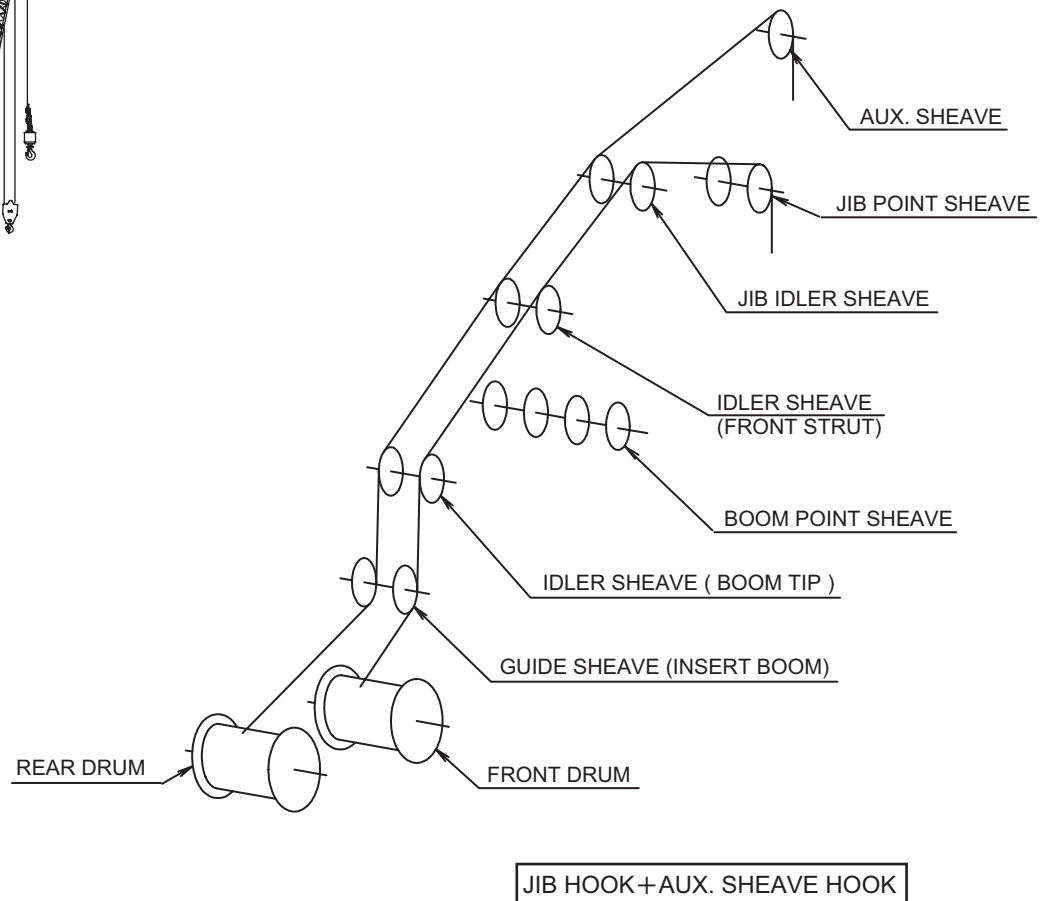
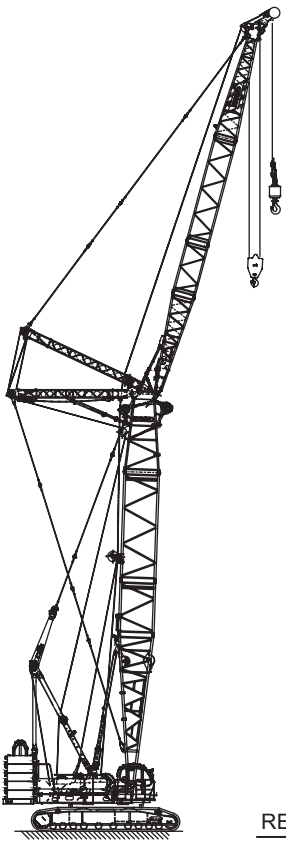
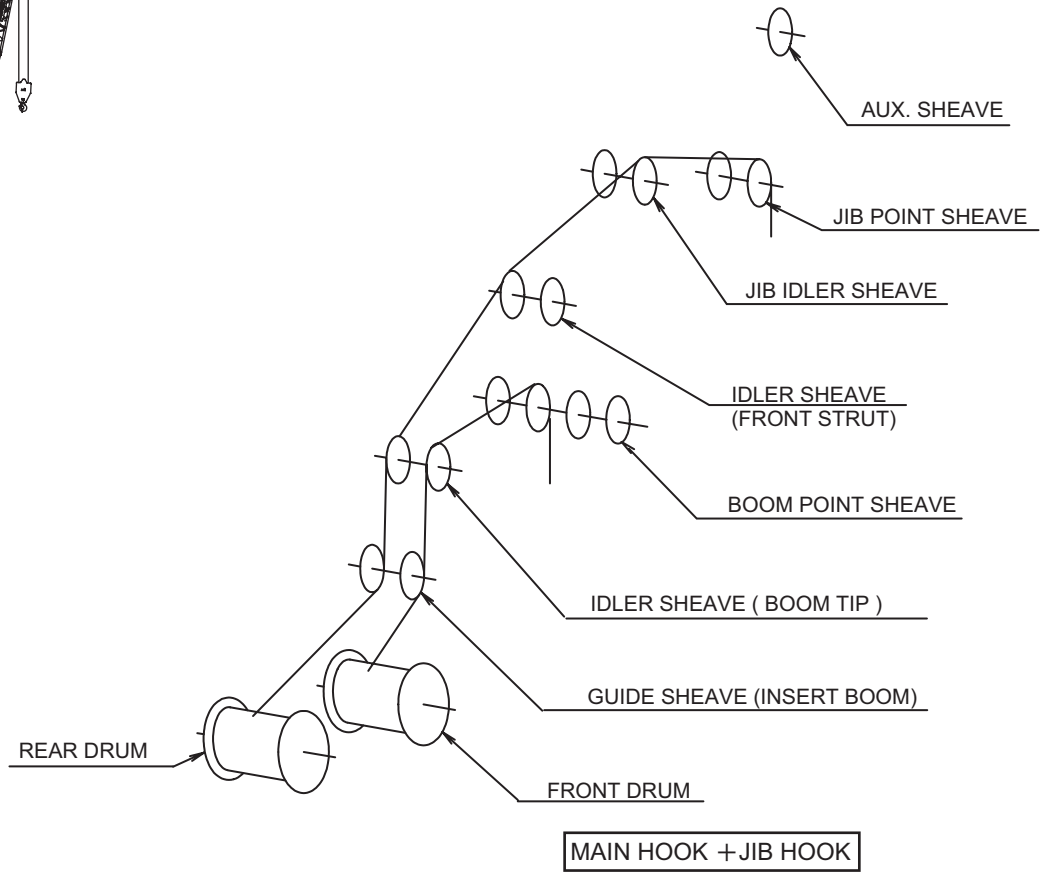
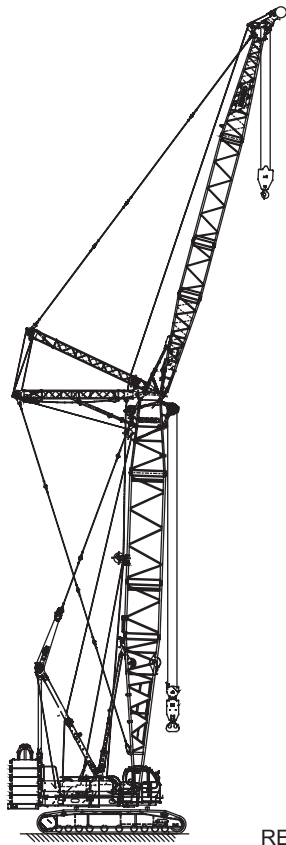
Do not touch the wire rope directly with bare hands. If wires protrude, you could be injured. Work gloves are recommended. Keep hands and clothing clear of the rotating drum and moving wire rope. Failure to observe this precaution may result in serious injury or death.

1. Unspool the wire rope on the front or rear drum; reeve the wire rope by referring to the diagrams on the next page.

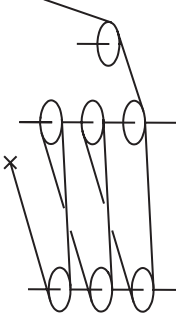
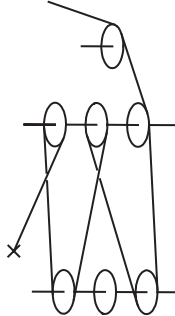
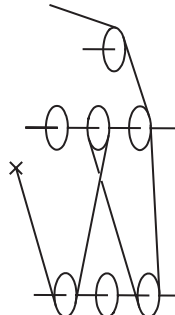
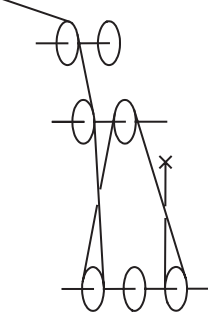
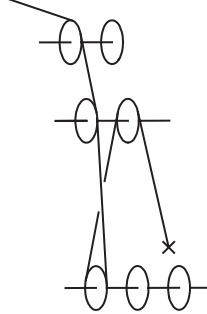
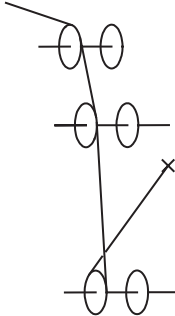
The wire rope on the front drum can be used for the jib hook block, and the wire rope on the rear drum is used for the main hook block or auxiliary sheave hook block.



4. ASSEMBLY OF THE MACHINE



4. ASSEMBLY OF THE MACHINE

<p>Boom Point</p>	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>6 PARTS</p> </div> <div style="text-align: center;">  <p>5 PARTS</p> </div> <div style="text-align: center;">  <p>4 PARTS</p> </div> </div>
<p>Jib Point</p>	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>4 PARTS</p> </div> <div style="text-align: center;">  <p>3 PARTS</p> </div> <div style="text-align: center;">  <p>2 PARTS</p> </div> </div>

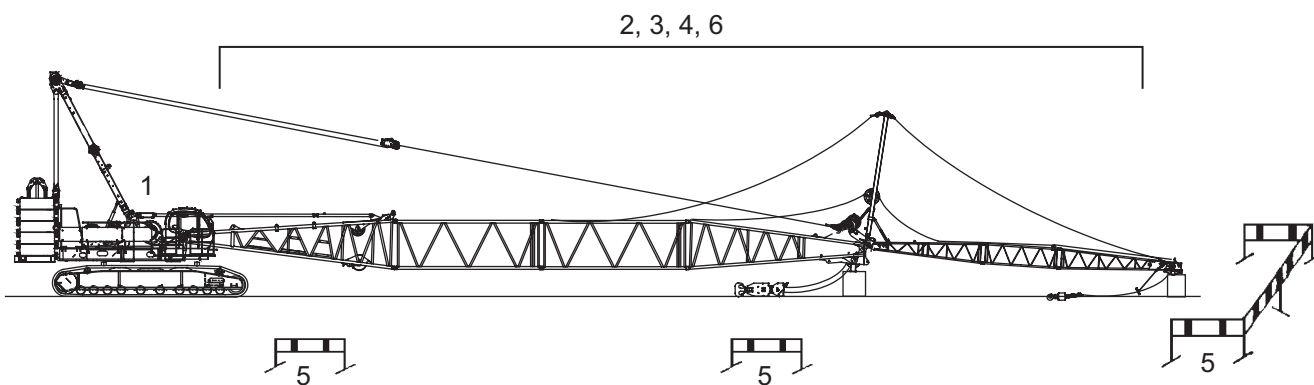
4.13 ERECTING THE ATTACHMENT

4.13.1 CONNECTING THE SAFETY DEVICE (Refer to Chapter 3.)

4.13.2 CONFIRMATION BEFORE ERECTING THE ATTACHMENT

Check the following items, and confirm that there is no abnormality, then erect the attachment.

1. Preoperation check,
2. Lubrication to the each part of the attachment,
3. The wire ropes correctly reeved,
4. Tools, etc. not left on the attachment.
5. The off limiting step to the surrounding area of the attachment was taken,
6. The wirings for the boom, main and auxiliary hook overhoist limit switches correctly connected.



4. ASSEMBLY OF THE MACHINE

4.13.3 ERECTING THE ATTACHMENT



Before operating the boom, ensure the area above and beneath the boom is clear of all obstructions and personnel.

Failure to observe this precaution may result in serious injury or death.

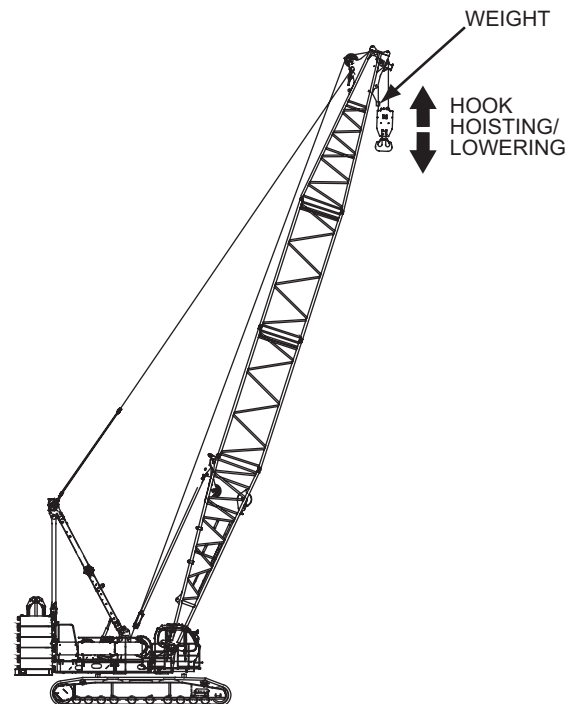
1. CAUTIONS WHEN ERECTING

- (1) Erecting of the attachment must be performed in the front and rear direction of the crawlers.
 - (2) Place the hook block until boom angle reaches approximately 30 degrees.
 - (3) Operation must be performed at a low speed. Sudden start and stop must be avoided.
 - (4) Prevent catching and kink, etc. of the wire rope in the tip of the boom and jib.
2. Release the drum lock in the side where the hook is attached.
 3. Operate the boom hoist control lever toward the HOISTING side to raise the boom slowly.
 4. Paying close attention to catching and kink of the hoist wire rope, raise the hook.

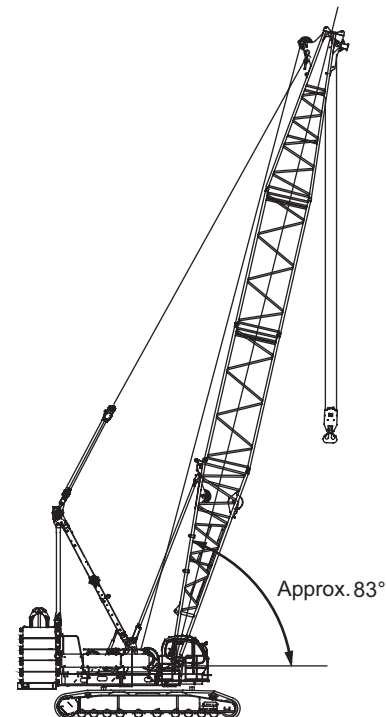
4.13.4 CHECK BEFORE STARTING THE WORK

1. Before starting actual work, confirm the following items.

(1) When the hook is raised to strike against the weight for preventing overhoist, raising motion must be stopped.



(2) When the boom is raised to approximately 80.4 degrees of boom angle, boom raising must be stopped.



4. ASSEMBLY OF THE MACHINE

4.14 ERECTING THE LUFFING ATTACHMENT

4.14.1 CONNECTING SAFETY DEVICE

When wiring the safety device, keep all connectors free from water or moisture.

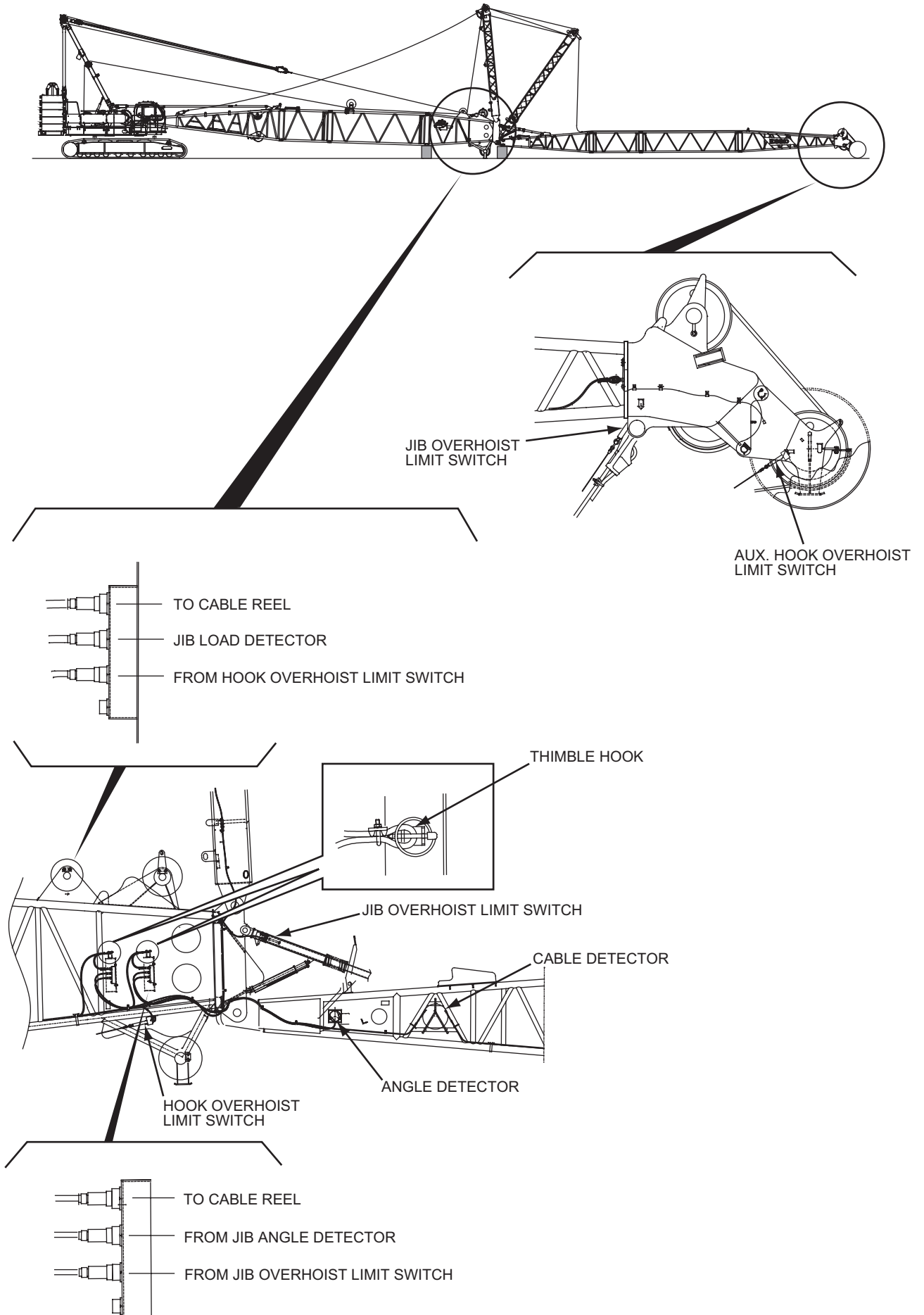
1. Ensure that the wiring for safety device is properly completed.
2. Reeve the extension cable from the cable reel located on the base boom through the thimble on the boom tip. Only then, securely connect it to the junction box.
3. Provide wiring from the junction box to the respective limit switches, and the cable reel on the jib base, ensuring that the wires are securely connected.



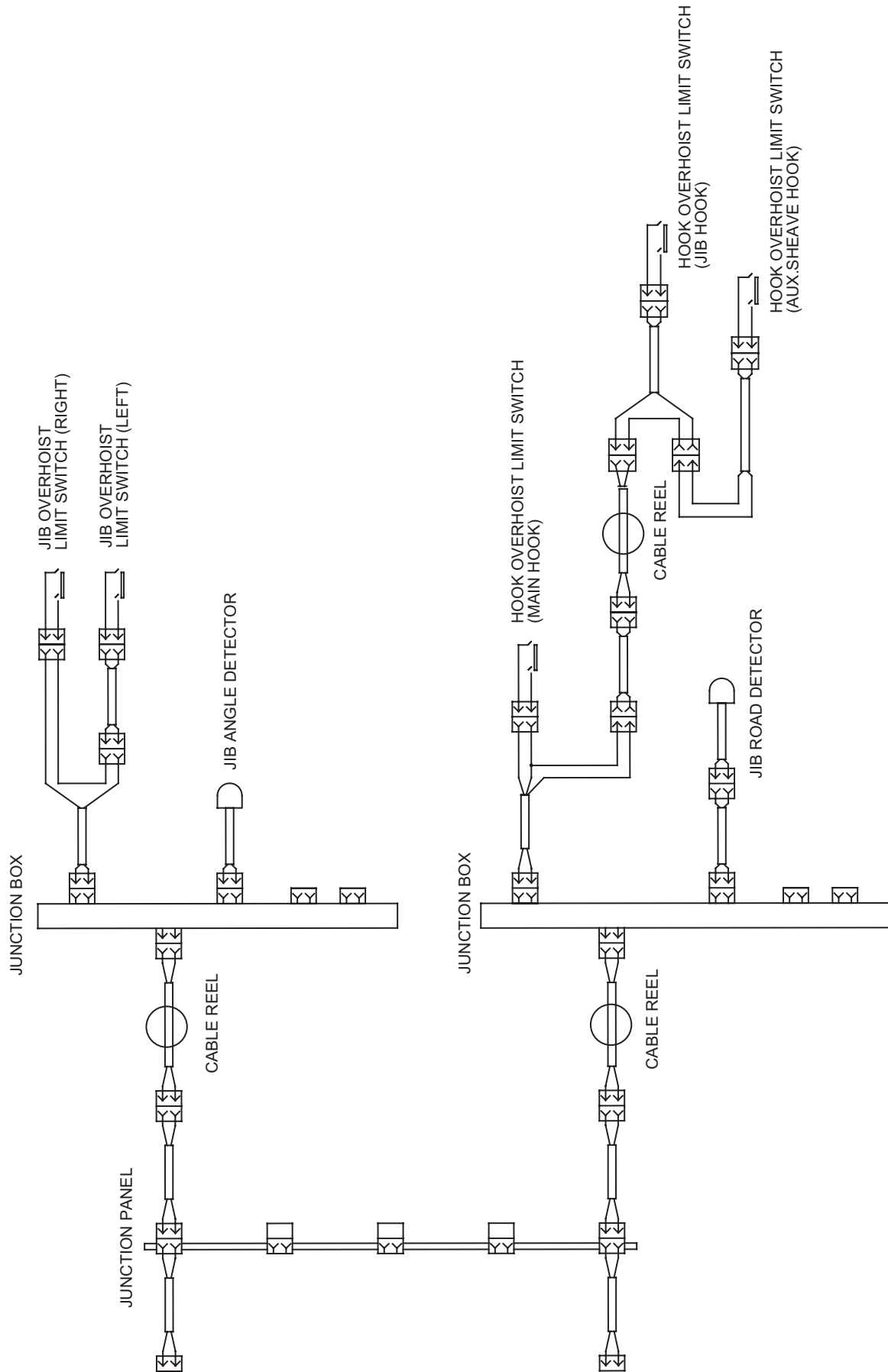
Make sure that all connections are fully connected and locked.

Failure to observe this precaution may result in serious injury or death.

-
4. Reeve the extension cable from the cable reel located on the jib base through the thimble on the jib tip. Only then, securely connect it to the limit switches.
 5. Check Function of Respective Limit Switch Ensure that respective limit switches work correctly. Refer to subsection 3.6 for more information.



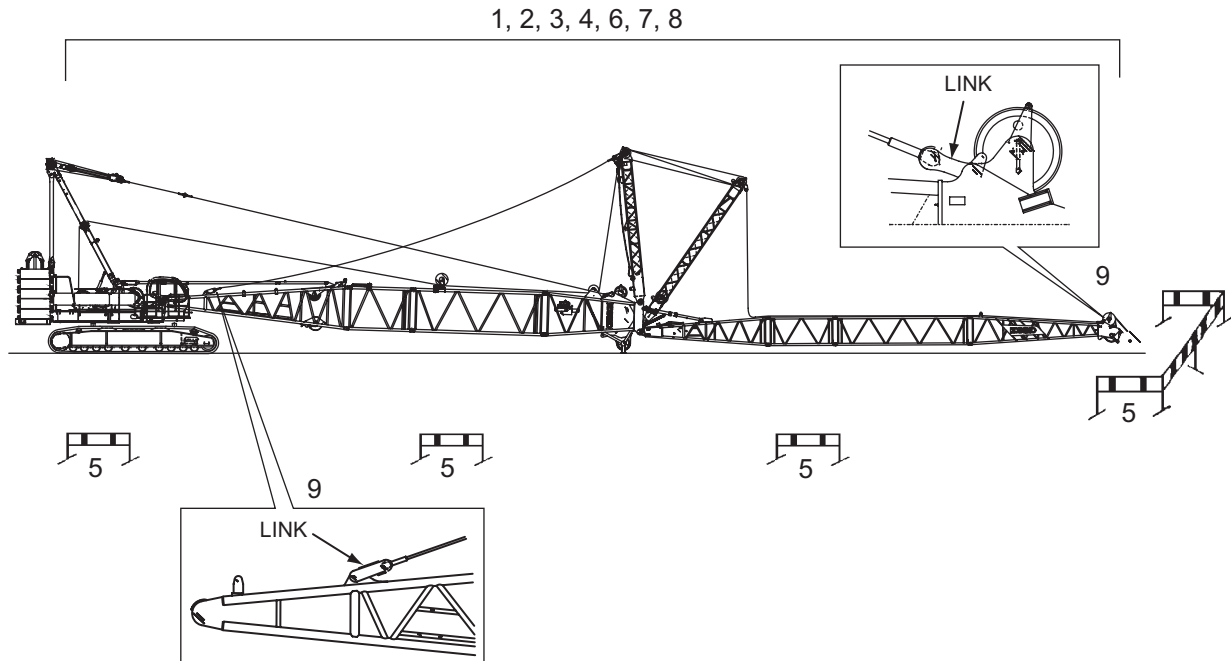
4. ASSEMBLY OF THE MACHINE



4.14.2 CONFIRMATION BEFORE ERECTING THE LUFFING ATTACHMENT

Check the following items, and confirm that there is no abnormality before erecting the attachment.

1. Preoperation check.
2. Lubrication to the each part of the attachment.
3. The wire ropes are correctly reeved.
4. Tools, etc. not left on the attachment.
5. The "off limit area" surrounding the attachment is secure from all unnecessary personnel.
6. The wiring for the boom, main and auxiliary hook overhoist limit switches are correctly installed.
7. The wiring for the limit switches of the boom, jib, and backstop must be fully completed.
8. All the hydraulic hoses are securely connected.
9. Links must be connected to the guy line connecting portions of the boom base and the jib tip.



4. ASSEMBLY OF THE MACHINE

4.14.3 ERECTING LUFFING ATTACHMENT

WARNING

To prevent possible serious injury or death from being caught in a suddenly lowered attachment, do not enter the area under attachment.

Post a watchman, if necessary.

WARNING

To prevent possible serious injury or death from being dragged or struck by a suddenly moving hook, keep clear from the area near the hook when the attachment is erected.

CAUTION

Precautions for erecting the luffing attachment.

1. Erect the attachment to the front or rear side of the crawlers; Not over the sides.
 2. Operate the attachment slowly and avoid abrupt starting or stopping.
 3. Prevent the wire rope at the top of the boom or jib from being caught in or kinked.
 4. Ensure that the ground is flat and level in the area where the jib point rollers move. Place steel plates between the machine and the ground if the ground is not flat or level.
 5. Keep all personnel from in front of or behind the jib point rollers.
 6. DO NOT erect the attachment in windy weather.
 7. Keep the hook block placed on the ground until the attachment angle reaches the workable range.
-

- (1) Set the boom hoist lever to the hoist position to raise the boom at a low speed.
- (2) Simultaneously, move the jib hoist drum control lever to the lowering position, and unspool the jib hoist wire rope paying attention to the jib guy lines, so that they do not become excessively slack.

⚠ WARNING

Take care not to erect the front strut excessively. Otherwise, it interferes with the rear strut, leading to damages on the struts.

⚠ CAUTION

If the jib guy line slackens excessively, the connector of the jib guy line slips on the top surface of the jib, leading to damages on the lattice pipe.

- (3) With front drum and rear drum control levers operated, unspool the wire rope from the third (jib hoist) drum so that the hook does not leave the ground until the attachment is in the working range.
- (4) Erect the boom until the boom angle comes into the range shown in the table below.

To give a margin for machine stability and to reduce the load on machine, erect the boom with jib offset angle set from 90 to 110 degrees.

⚠ WARNING

Strictly observe the ranges of the boom angle to keep the jib point from lifting off the ground prematurely. Failure to observe this warning may lead to the crane operating.

4. ASSEMBLY OF THE MACHINE

Table 1 Jib offset angle to enable jib point to lift off the ground

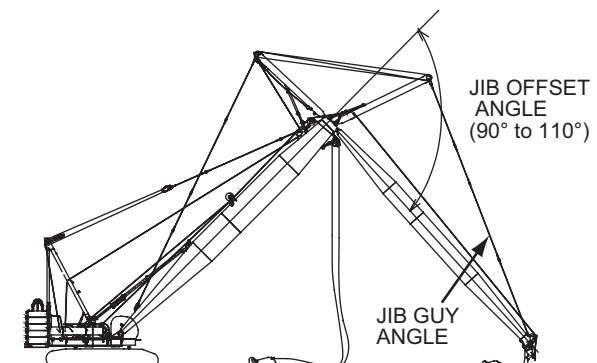
Boom Length m(ft)	steel blocking plate	Jib length m(ft)										
		21.3 (70)	24.4 (80)	27.4 (90)	30.5 (100)	33.5 (110)	36.6 (120)	39.6 (130)	42.7 (140)	45.7 (150)	48.8 (160)	51.8 (170)
21.3 (70)	NEED	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110
24.4 (80)	NEED	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110
27.4 (90)	NEED	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110
30.5 (100)	NEED	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110
33.5 (110)	NEED	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110
36.6 (120)	NEED	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	40-110	45-110
39.6 (130)	NEED	40-110	40-110	40-110	40-110	40-110	40-110	40-110	45-110	45-110	50-110	55-110
42.7 (140)	NEED	40-110	40-110	40-110	40-110	40-110	45-110	50-110	55-110	55-110	60-110	60-110
45.7 (150)	NEED	40-110	40-110	40-110	50-110	50-110	55-110	55-110	60-110	60-110	65-110	70-110
48.8 (160)	NEED	45-110	50-110	55-110	55-110	55-110	60-110	65-110	65-110	70-110	70-110	70-110
51.8 (170)	NEED	55-110	60-110	60-110	65-110	65-110	65-110	70-110	70-110	70-110	80-110	80-110
54.9 (180)	NEED	65-110	65-110	65-110	70-110	70-110	80-110	80-110	90-110	90-110	90-110	90-110

* For your reference, angles shown in the table above are not those at time of attachment being lowered.

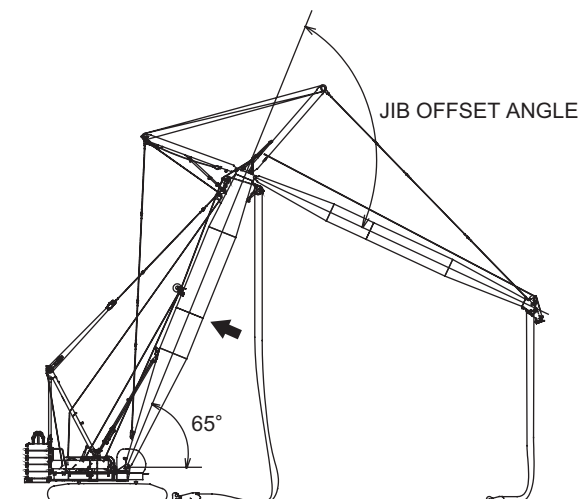
- (5) After the attachment reaches the appropriate offset angle, set the luffing jib control lever to the raising position, to remove any slack in the jib guy lines.
- (6) With the jib guy lines tensioned, the jib point lifts off the ground.
- (7) Increase the boom angle to the minimum working angle, while keeping the jib offset angle.



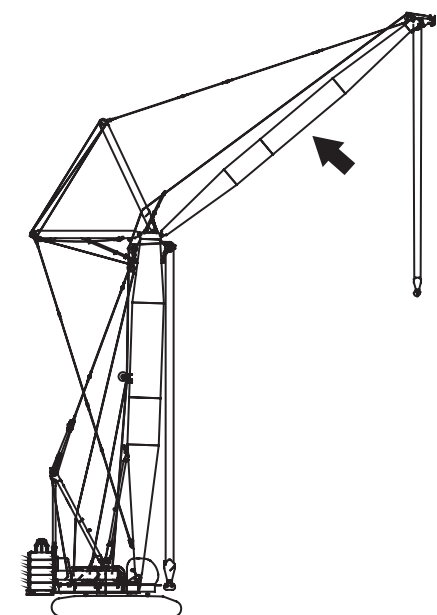
Erecting the jib before the boom angle reaches the minimum working angle may cause overturning or damages to the crane.



- (8) After the jib point lifts off the ground, pay out the load hoist lines to prevent the hook blocks from being lifted off the ground.
- (9) Erect the boom and jib until they reach the workable range, hook blocks remain on the ground.



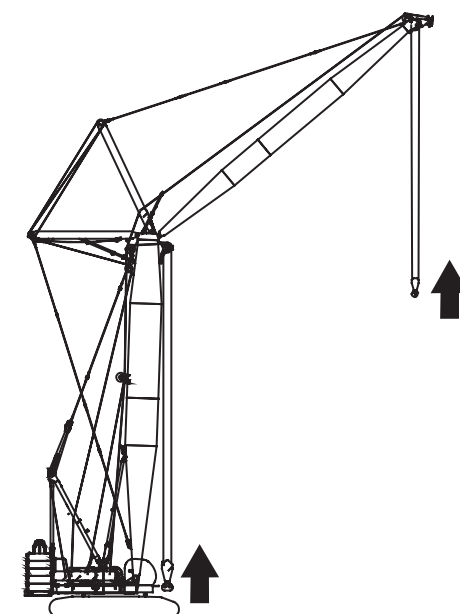
- (10) Hoist the hook off the ground.



4.14.4 CHECK BEFORE STARTING THE WORK

Check the following items for being all right before starting the work.

1. Check the function of the anti-two block system.
 - (1) Ensure that the hook block hoisting operation stops when the hook block comes into contact with the weight of the overhoist limit switch.
 - (2) After checking the anti-two block function, lower the hook to the working range area.



5. DISASSEMBLY OF THE ATTACHMENT

This section covers assembling, erecting, lowering and disassembling of the crane attachment and transport of the boom. Before starting the actual work, confirm the following items.

1. PLACE

(1) Paying attention to that erecting and lowering of the attachment must be operated in front or rear of the crawlers, there must be adequate room for assembling and the ground must be firm and level.

Improve the ground as required and lay sheet plates of iron.

(2) There must be also adequate room to set an assisting crane and to allow free passage of vehicles delivering necessary parts and for unloading and storing the parts until they are required.

2. WORKING PROCEDURE AND PREARRANGEMENT FOR SAFETY

Before assembling work, gather the all concerned to make previous arrangement for the working procedure and safety, and make precise role and responsibility of each person.

3. PREOPERATION CHECKS

Perform the preoperation checks of the basic machine.

Note

When the engine starts, the warning alarm of the safety device always sounds for two to three seconds.

4. MACHINE POSTURE BEFORE ASSEMBLY

(1) Counterweight (carbody weight) shall be attached.

(2) Gantry shall be raised.

5. DISASSEMBLY OF THE ATTACHMENT

DANGER

Do not stand or work under, inside, or on the boom when installing or removing the connector pins at anytime.

Failure to observe this precaution may result in serious injury or death.

DANGER

Do not apply slings directly to a sharp edge part to prevent the slings from cutting.

Apply the sling to the guy cable pin hole or bracket for lifting through a shackle.

WARNING

Before climbing on machine, make certain that the guard and walk ways are clean and dry, and use life belt in order to prevent falls due to slippery surface. Failure to observe this precaution may result in serious injury or death.

WARNING

Do not put your hand or finger into a pin hole.

WARNING

To avoid serious injury, fix guy line to both ends of each boom when placing guy lines on the booms during boom connection.

CAUTION

Do not handle boom or jib sections with chains, hooks or wire rope attached directly to main chords or lacings. Either use soft material sling points or use fabric type slings.

5.1 LOWERING THE ATTACHMENT

When lowering the attachment, observe the following items.

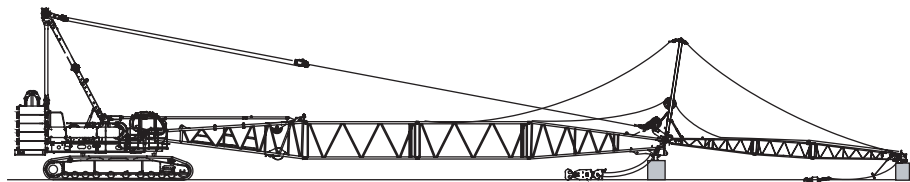
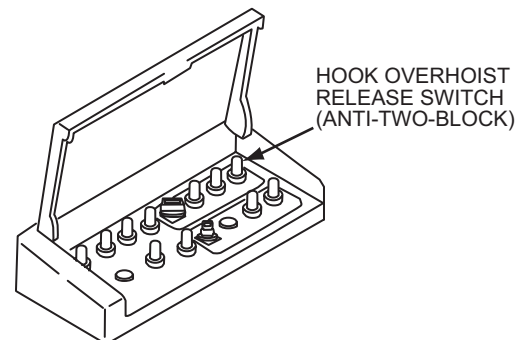
1. Lowering of the attachment must be performed in the front and rear direction of the crawlers.
2. When the boom angle is less than approximately 30 degrees, place the hook on the ground.
3. Operation must be operated at a low speed. Sudden start and stop must be avoided.
4. Prevent the wire rope from catching and kink in the tip end of the boom and jib.
5. For the combination of the boom of all length, place steel plates between the ends of the crawlers and the ground.

WARNING

Before operating the boom ensure the area above and beneath the boom is clear of all obstructions and personnel. Failure to observe this precaution may result in serious injury or death.

5.1.1 LOWERING THE ATTACHMENT

1. Lower the boom at a low speed.
2. Lower the hook onto the ground.
3. By lowering the boom more, the hook overhoist limit switch operates, and the boom lowering is automatically stopped. Operate the hook overhoist release switch to the RELEASE side, and lower the boom onto the ground.



5. DISASSEMBLY OF THE ATTACHMENT

5.2 LOWERING THE LUFFING ATTACHMENT

This section explains about lowering and disassembly of luffing jib.

Before starting the work, check the following items.

1. Location

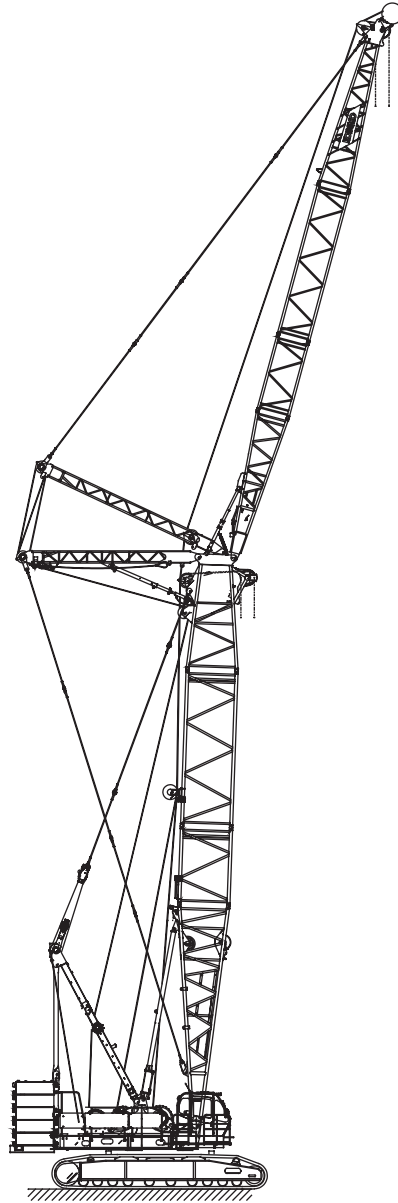
- (1) Care should be taken so that the attachment is lowered in front or rear side of the crawlers. Ensure that the working area is wide enough to disassemble the attachment and the ground is level and firm. The ground must be cured or steel plates must be laid between the machine and the ground if necessary.
- (2) Remove all obstacles in the working area, and keep off the area from anyone unconcerned using ropes.
- (3) Secure the area required for installation of the auxiliary crane and the entering route for carriers transporting materials necessary for disassembly.

2. Arrangement for working procedures and safety precautions

Prior to disassembly, all the staffs concerned must hold the meeting to arrange for working procedures and safety precautions and specify their roles and responsibilities.

3. Check before operation

Thoroughly check the machine before starting operation.



5.2.1 LOWERING THE ATTACHMENT

WARNING

To prevent possible serious injury or death from being caught in a suddenly lowered attachment, do not enter the area under attachment. Post a watchman if necessary.

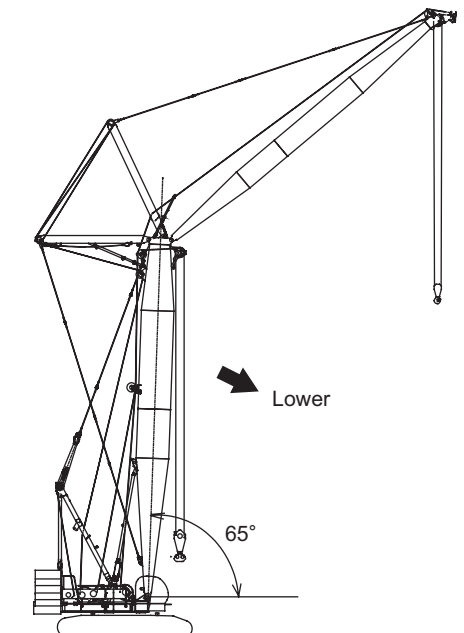
CAUTION

Precautions for lowering the luffing attachment

1. Lower the attachment to the front or rear of the crawlers; Not over the side.
2. Operate the attachment slowly and avoid abrupt starting or stopping.
3. Prevent the wire rope at the top of the boom or jib from being caught in or kinked.
4. Ensure that the ground is flat and level in the area where the jib point rollers move. Place steel plates between the machine and the ground if the ground is not flat or level.
5. Keep all personnel from in front of or behind the jib point rollers.

1. Preparation before Lowering the Attachment

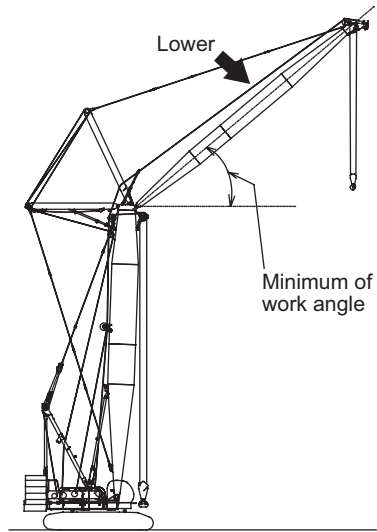
- (1) Set the boom angle to the minimum working angle in the luffing working angle.
- (2) Return the boom hoist lever to the neutral position.



5. DISASSEMBLY OF THE ATTACHMENT

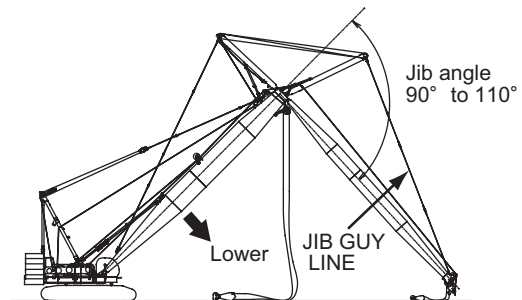
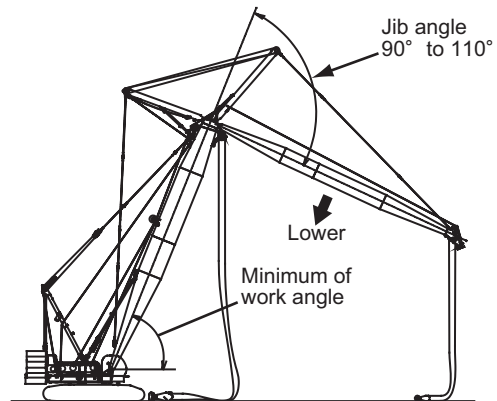
2. Lowering the Jib

- (1) Lower the jib slowly.
- (2) Stop lowering the jib when it reaches the maximum working radius.
- (3) Lower the hook blocks to the ground.
- (4) Keep lowering the jib until the jib offset angle becomes 90 to 110 degrees.
Regardless of the table of jib offset angle which enables jib point to lift off the ground, set the jib offset angle from approx. 90 to 110 degrees.



WARNING

Do not let the jib point contact the ground before reaching the appropriate offset angle. Failure to follow this procedure could result in the machine becoming unstable, and may tip over.



3. Lowering the Boom

- (1) Lower the boom slowly.
- (2) When the hook overhoist limit function is actuated, and boom lowering stops, set the boom/jib automatic stop release switch to the RELEASE position.
- (3) Continue lowering the boom, until the jib point contacts the ground.

- Lowering the boom after the jib reaches the ground, operate the jib hoist function to keep the jib guy lines from becoming slack.

CAUTION

If the jib guy lines become excessively slack, the connectors may slide on the surface of the jib (inserts) and damage the lattice pipe.

WARNING

Take care not to erect the front strut excessively. Otherwise, it interferes with the rear strut, leading to damages on the struts.

- Before the boom point reaches the ground, ensure that the jib backstop point is on the stopper of the jib.

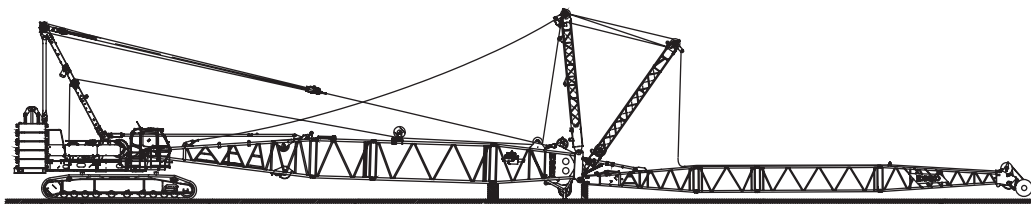
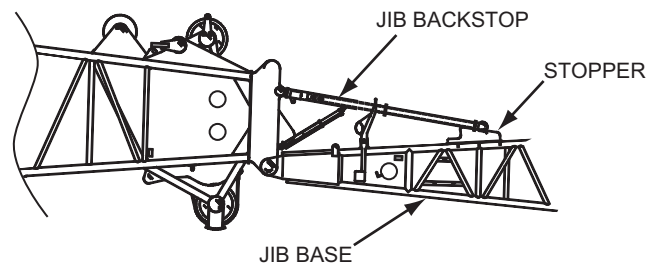
CAUTION

If the boom is lowered without the jib backstop point placed on the stopper, the jib backstop, boom or jib may be damaged.

- Continue lowering the boom and support the luffing boom tip on wooden block(s).

CAUTION

Take measures to prevent the jib assembly's bottom surface from contacting the ground.



Take care to bottom surface of jib coming into contact with ground surface

5. DISASSEMBLY OF THE ATTACHMENT

5.3 WINDING UP THE FRONT DRUM/REAR DRUM WIRE ROPES

1. Ensure that the hook block will not tip over while resting on the ground.
2. Remove the rope socket and clamps at the end of wire rope.
3. Slowly operate the control lever of front drum or rear drum, and wind the wire rope up on the drum, taking care to prevent the wire rope from being caught in the sheaves.

At this time, care should be taken so that the jib hoist wire rope does not prevent the main and auxiliary wire ropes from being wound up.



Do not touch the wire rope directly with bare hands. If wire protrude, you could be injured. Work gloves are recommended.

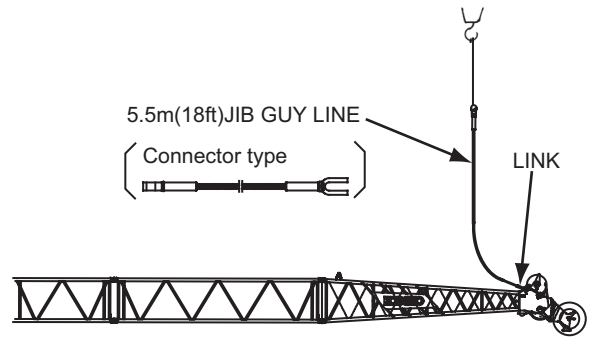
Keep hands and clothing clear of the rotating drum and moving wire rope.

Failure to observe this precaution may result in serious injury or death.

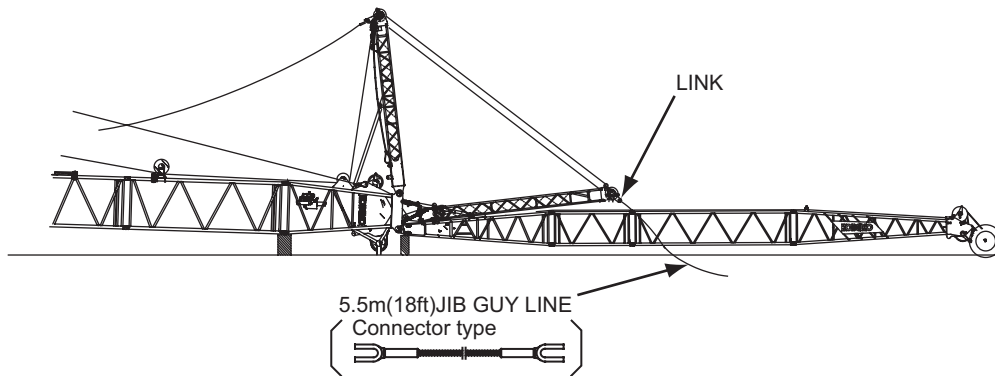
5.4 REMOVING JIB GUY LINE

5.4.1 REMOVE THE JIB GUY LINE OF THE FRONT STRUT SIDE

1. Disconnect the 5.5 m (18 ft) guy line from the guy line link on the jib tip.



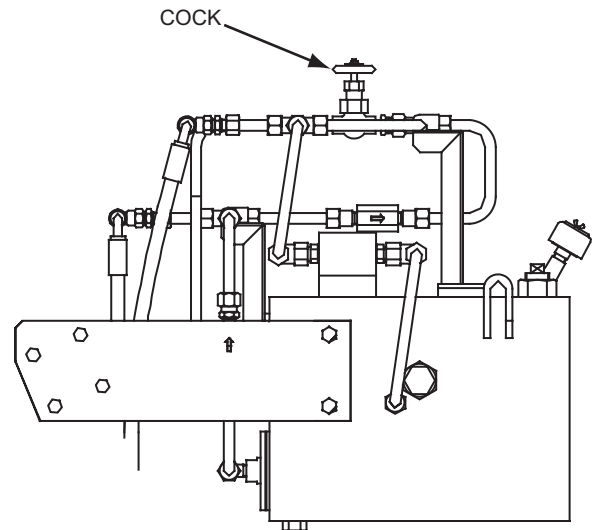
2. Swing down the front strut toward the jib side.
3. Disconnect the 5.5 m (18 ft) guy line from the guy line link on the front strut.



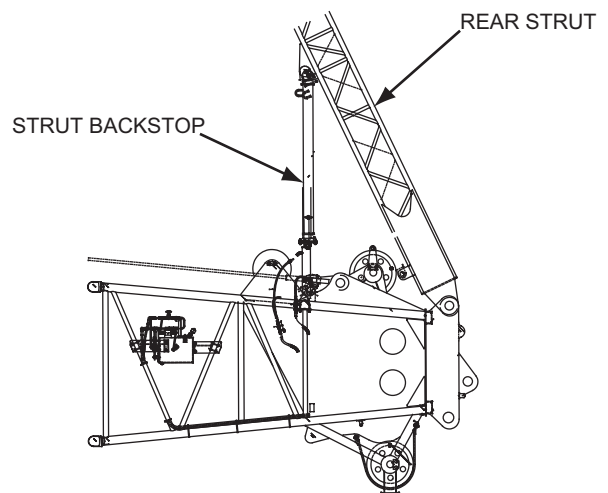
5. DISASSEMBLY OF THE ATTACHMENT

5.4.2 REMOVE THE JIB GUY LINE OF THE REAR STRUT SIDE

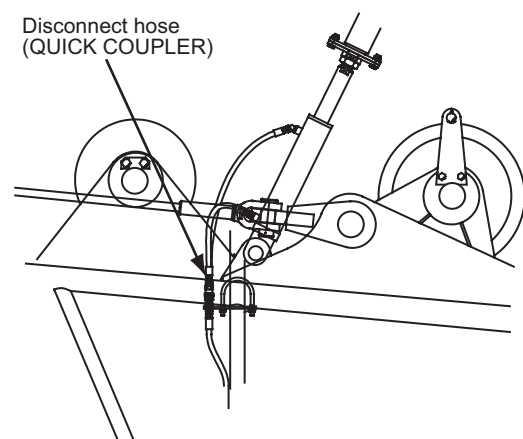
1. Securely open the cock on top of the hydraulic tank
(Turn the cock counterclockwise to open it).



2. Swing down the rear strut backward, and retract the strut backstop.

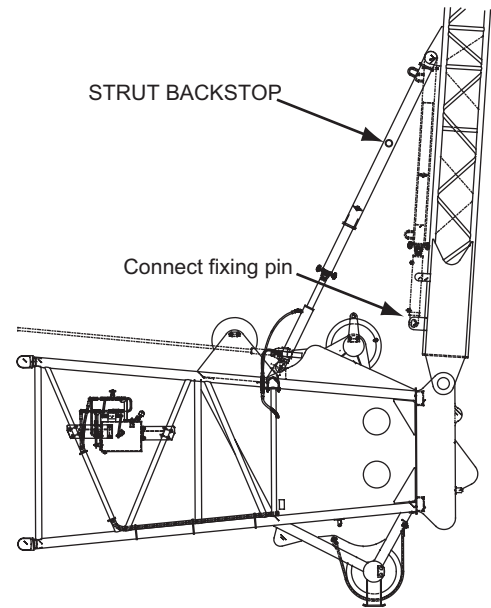


3. Disconnect the strut backstop cylinder hose from the quick coupler.

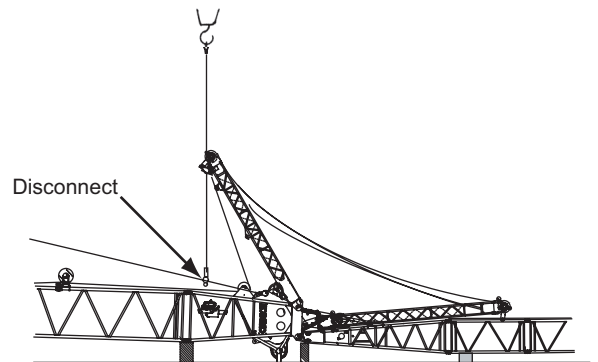


5. DISASSEMBLY OF THE ATTACHMENT

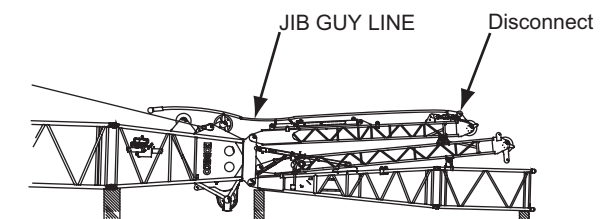
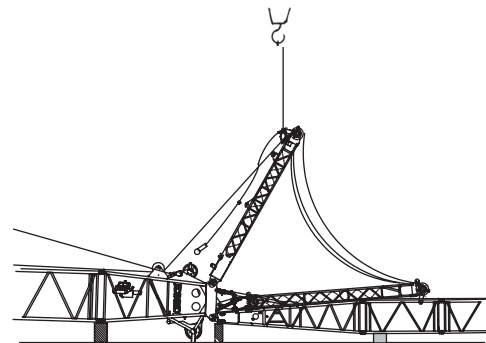
4. Remove the pin connecting the strut backstop and the boom tip, and store the strut backstop into the rear strut.



5. Lower rear strut toward the machine until the strut guy line can be disconnected.



6. Swing down the rear strut toward the front strut side to take a transporting posture.
7. Disconnect the jib guy line on the rear strut side.
8. Wind up the jib hoist wire rope.



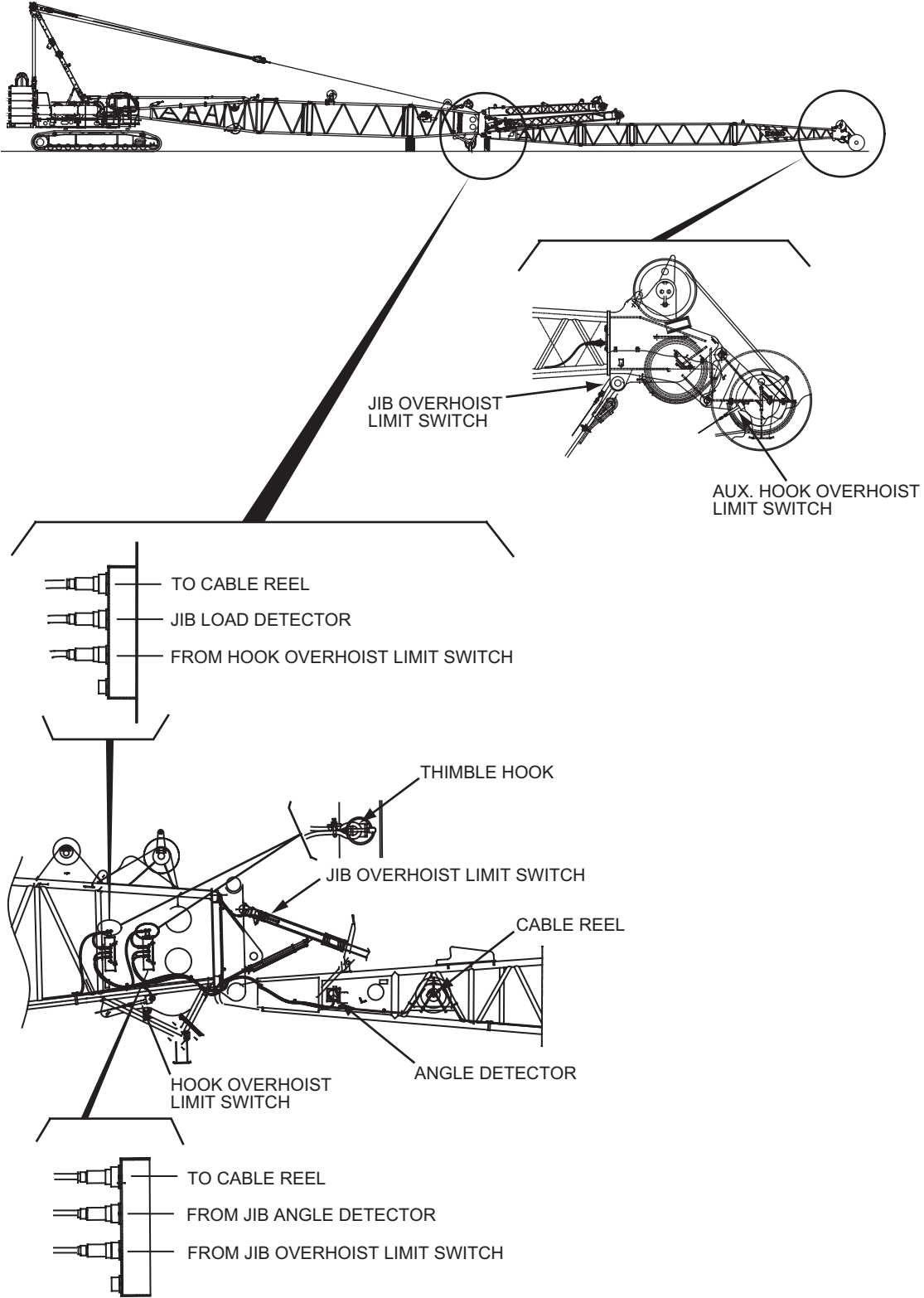
5. DISASSEMBLY OF THE ATTACHMENT

5.5 DISCONNECTING THE WIRING FOR SAFETY DEVICE

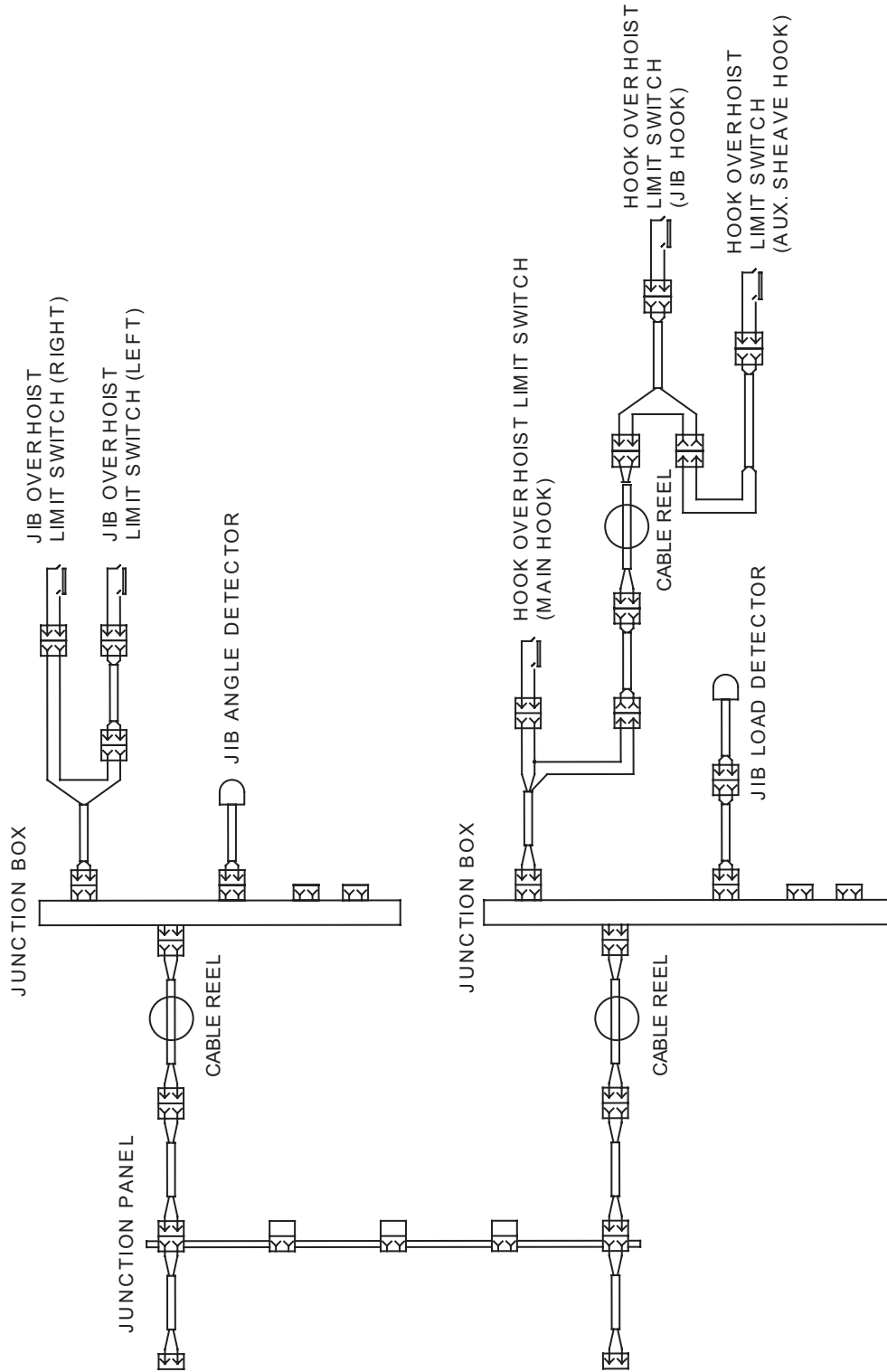
1. Disconnect the cable for hook overhoist limit switch at jib point.
2. Wind the anti-two block cable on to the reel on the jib base.
3. Disconnect the cable for hook overhoist limit switch at boom tip.
4. Disconnect the extension cable from the boom tip junction box, wind the anti-two block cable on the reel at the boom base.

 **CAUTION**

Securely install water-proof caps or shortcircuit caps to the disconnected cable connectors. If any water enters the connectors, malfunction may occur.



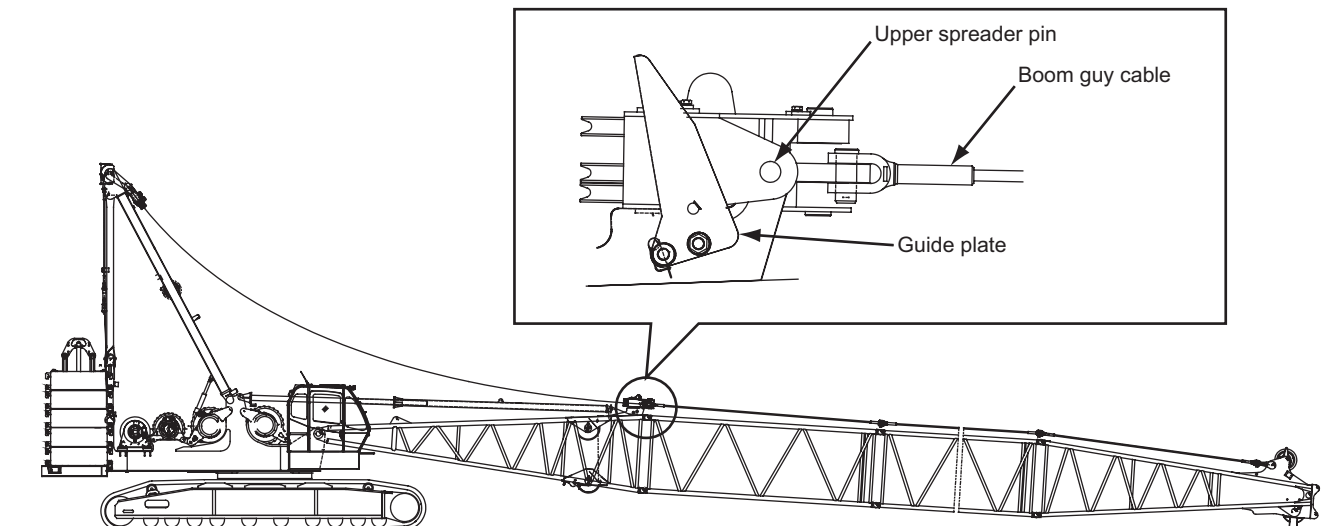
5. DISASSEMBLY OF THE ATTACHMENT



5.6 REMOVING THE BOOM GUY LINE

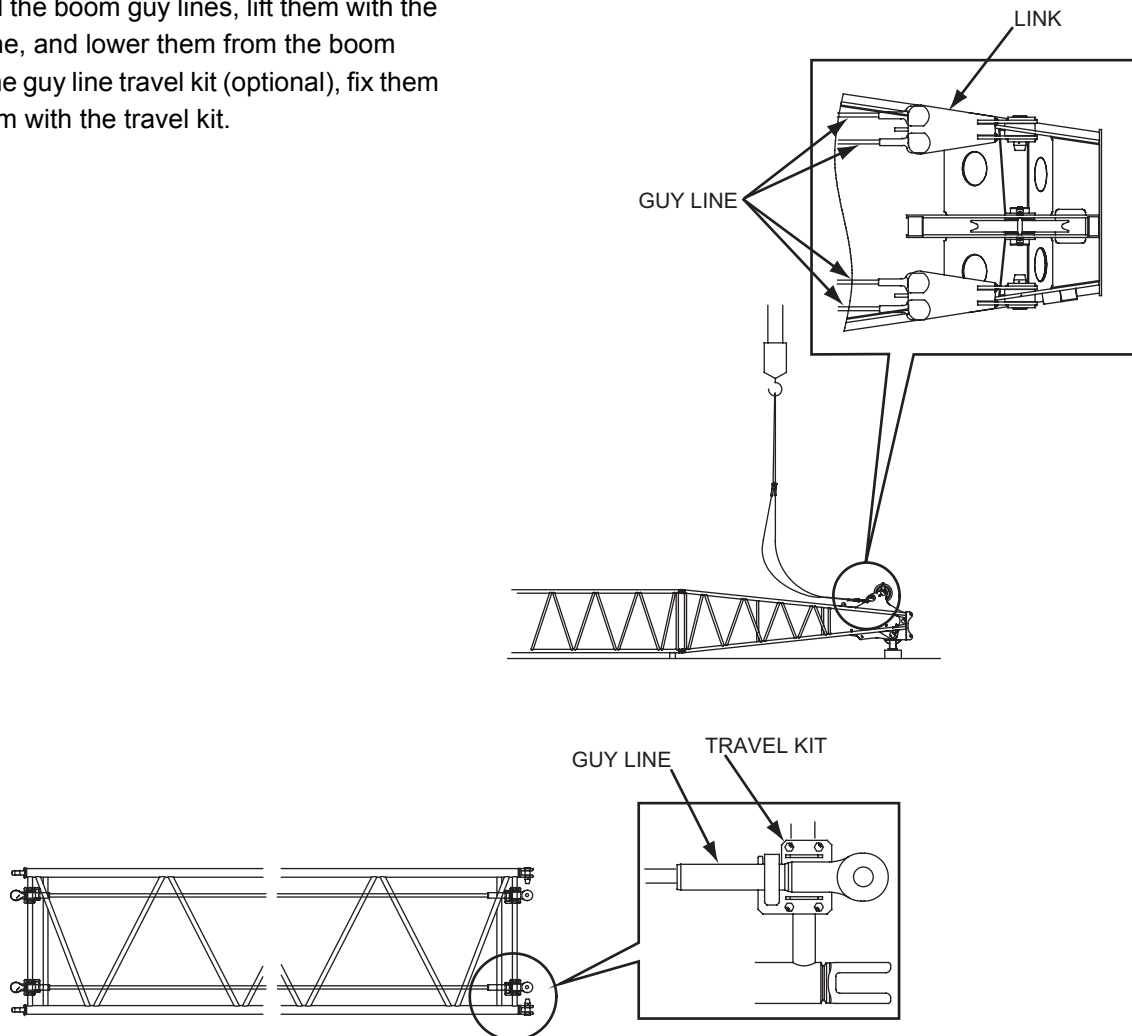
5.6.1 INSTALLATION OF THE UPPER SPREADER TO THE BOOM BASE

1. Connect the upper spreader to the boom base with the spreader guide. (Refer to page 4-60.)



5.6.2 REMOVE THE BOOM GUY LINE

1. Disconnect all the boom guy lines, lift them with the auxiliary crane, and lower them from the boom. If you have the guy line travel kit (optional), fix them onto the boom with the travel kit.



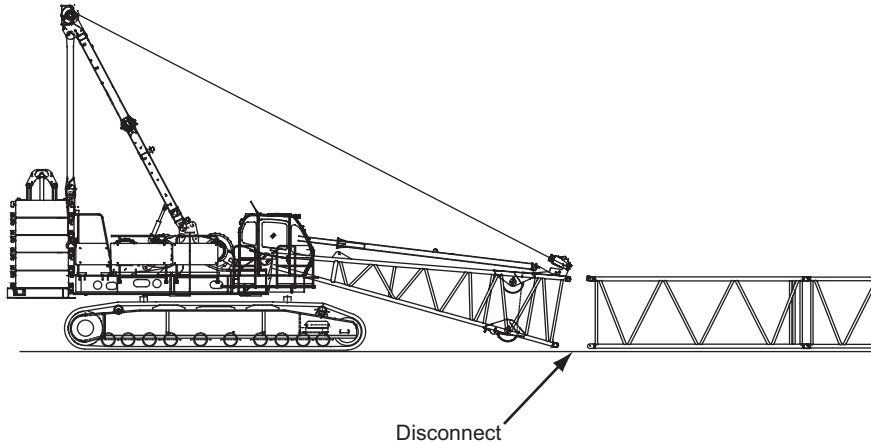
5. DISASSEMBLY OF THE ATTACHMENT

5.7 REMOVE THE COUNTER-WEIGHTS

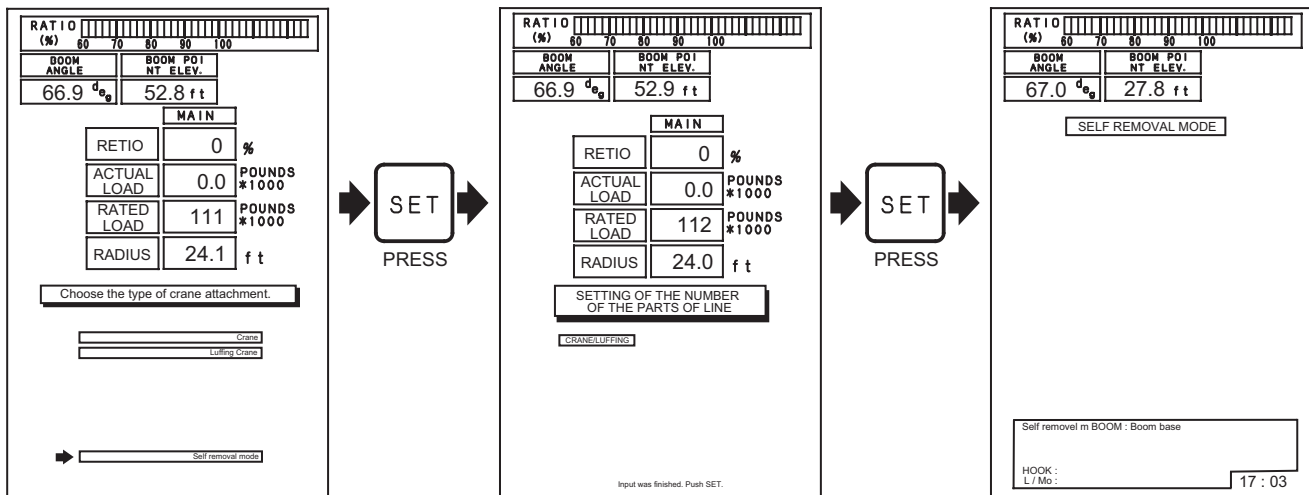
5.7.1 DISCONNECT THE BOOM BASE FROM THE INSERT BOOM

1. Separating insert boom

- (1) Support the joint of the insert boom with the assisting crane.
- (2) Remove the lower side connector pins.
- (3) Remove the upper side connector pins.

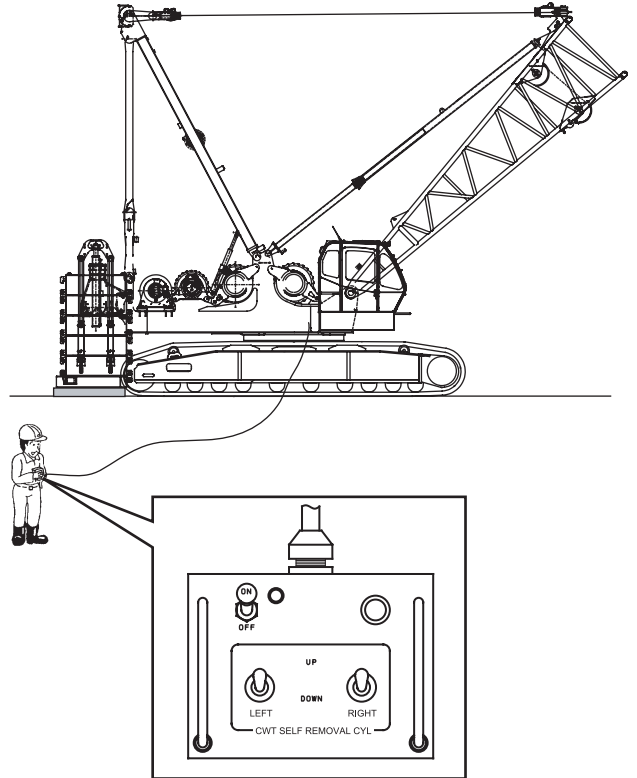


2. When setting up the load safety device, select the "C/W SELF REMOVAL MODE"
(Refer to section 3.7)

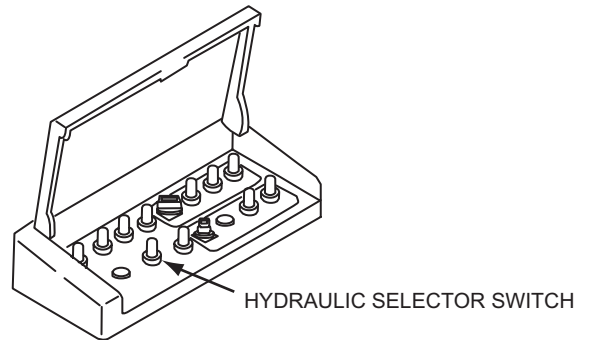


5.7.2 REMOVE THE COUNTERWEIGHTS FROM THE MACHINE

1. Connect the remote control cable to the receptacle located under the operator cabin.

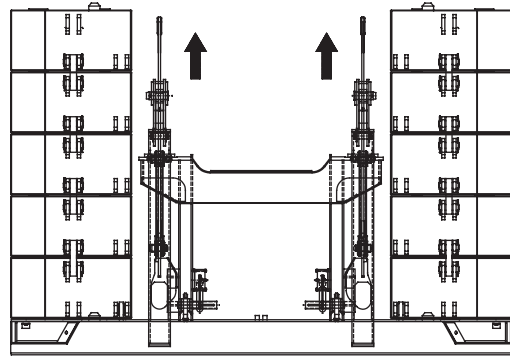
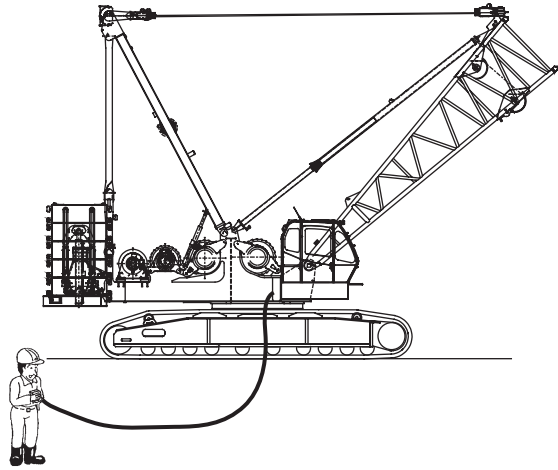


2. Move the hydraulic selector switch located on the side stand panel in the operator cabin toward of the gantry/tag line position. Set the engine speed to about 1000 rpm.

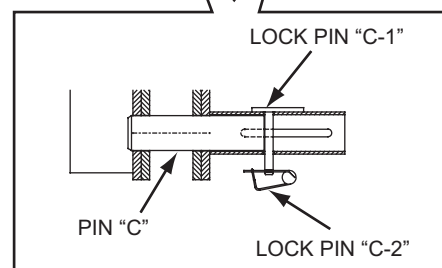
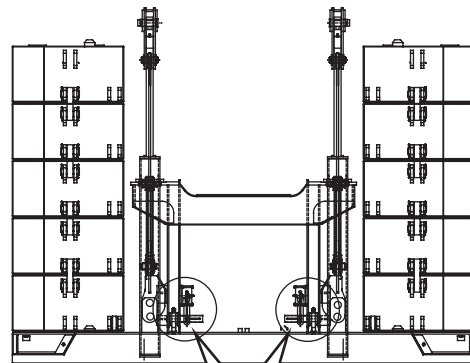
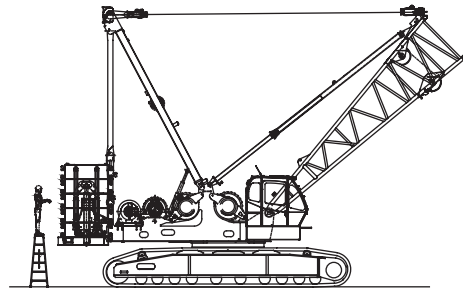


5. DISASSEMBLY OF THE ATTACHMENT

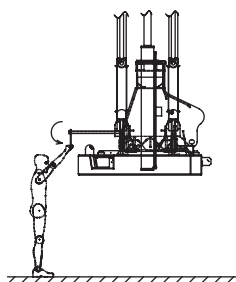
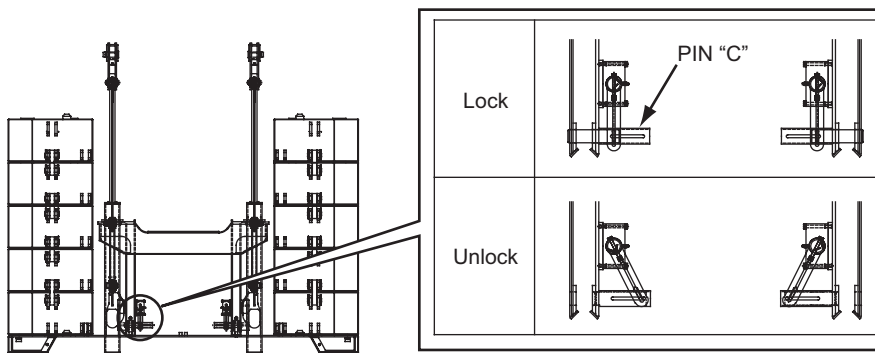
3. Fully extend the cylinder.



4. Go up onto counterweight (A) using the ladder.
5. Pull out the lock pins "c-1" and "c-2".



6. Pull out the weight support pin "C" using an extension bar.



7. Operate the remote control to lower the counterweight.

⚠ DANGER

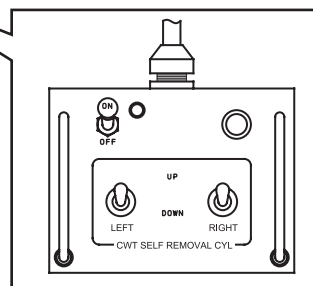
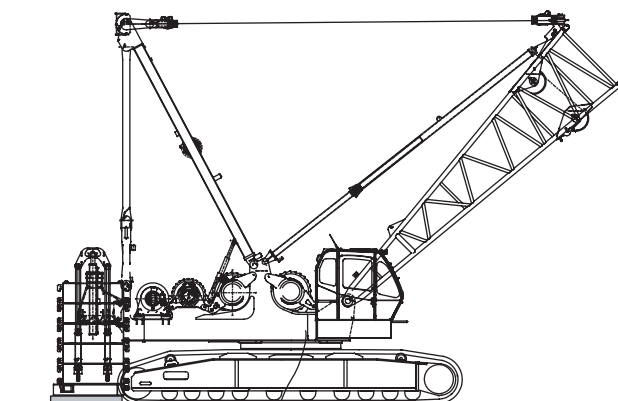
Slowly lower the counterweight.

Failure to observe this precaution may result in serious injury or death.

⚠ DANGER

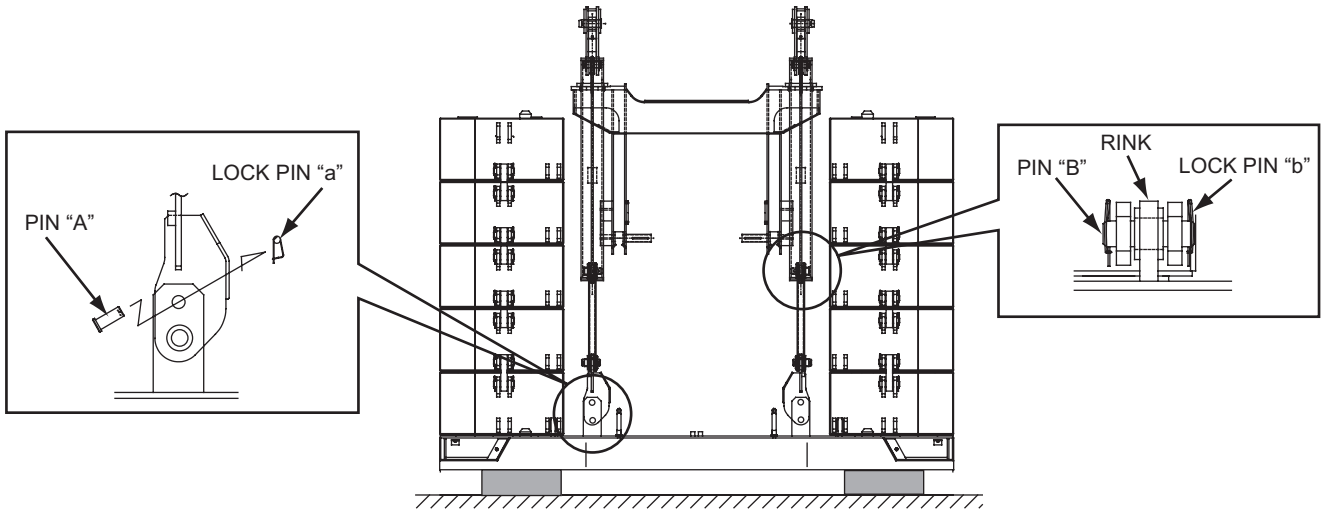
When lower the counterweights, equalize the motions of the right and the left cylinders to keep horizontality.

Failure to observe this precaution may result in serious injury or death.

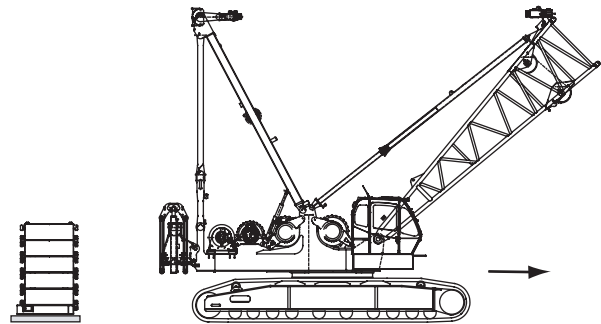


5. DISASSEMBLY OF THE ATTACHMENT

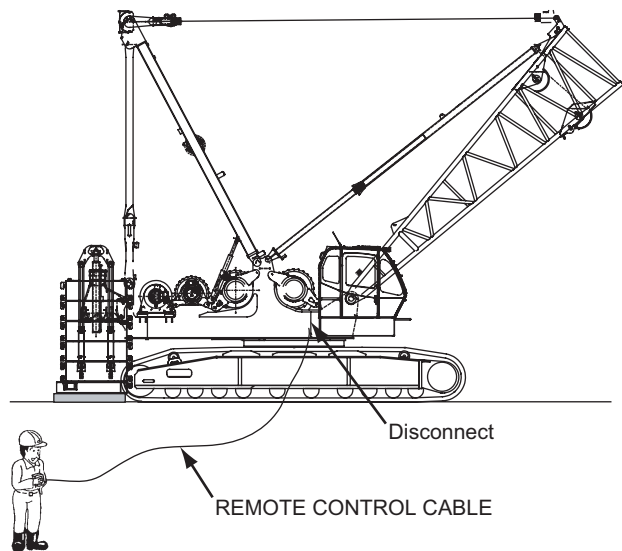
8. Disconnect the links by removing pin "B" and "b".



9. Disconnect the links by removing pin "B" and "b".



10. Disconnect the remote control cable from the base machine.

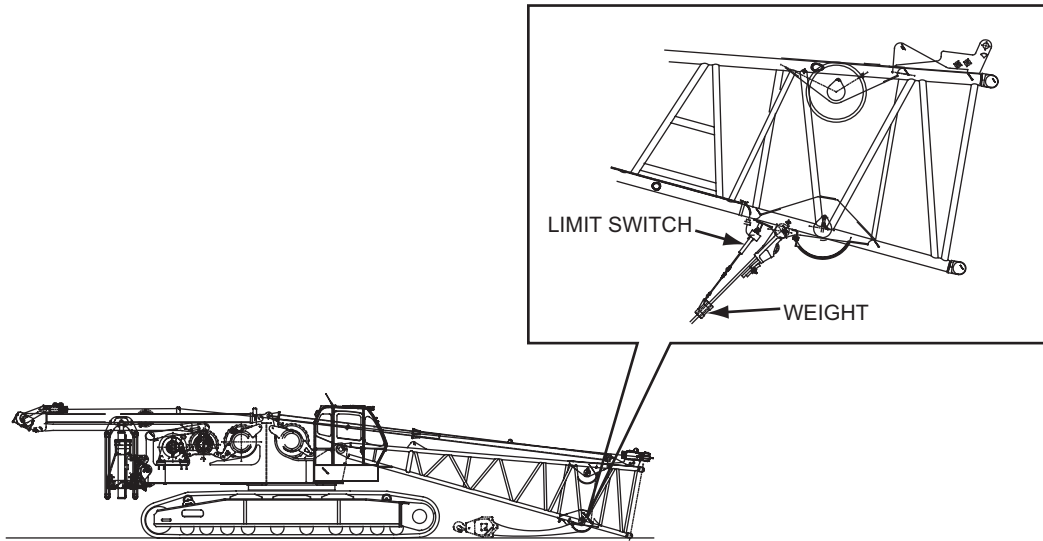


5.7.3 INSTALLATION OF THE HOOK BLOCK TO THE BOOM BASE

1. Lower the base boom to the height appropriate for reeving.
2. Install the limit switch and weight to the boom base hook.
3. Unwind the wire rope on the front drum, and reeve it through the base boom sheave, weight for the limit switch and hook block. (2-wire rope reeving)

WARNING

Do not touch a wire rope directly with bare hands. If wire protrude, you could be injured. Working gloves are recommended. Keep hands and clothing clear of the rotating drum and running wire rope. Failure to observe this precaution may cause serious injury or death.



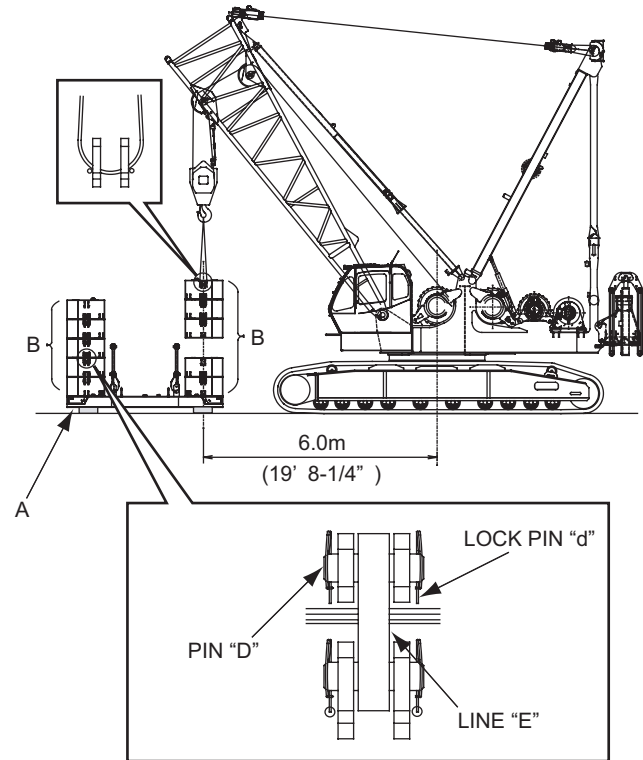
5. DISASSEMBLY OF THE ATTACHMENT

5.7.4 DISASSEMBLY OF THE COUNTERWEIGHT

1. Remove the counterweight (B) by disconnecting pin "D", lock pin "d" and link "E".

WARNING

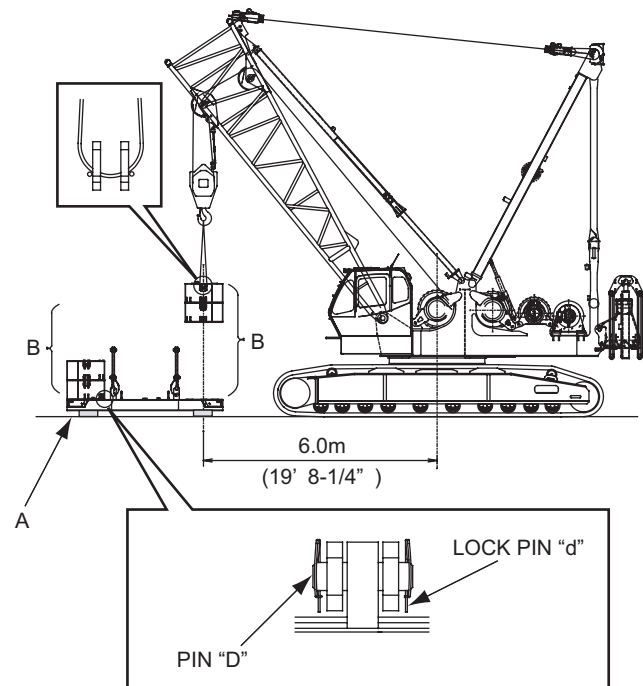
Do not lift more than three weights at a time. Lifting brackets may break. Failure to observe this precaution may result in serious injury or death.



2. Remove the counterweight (B) from the counterweight "A" by disconnecting pin "D" and lock pin "d".

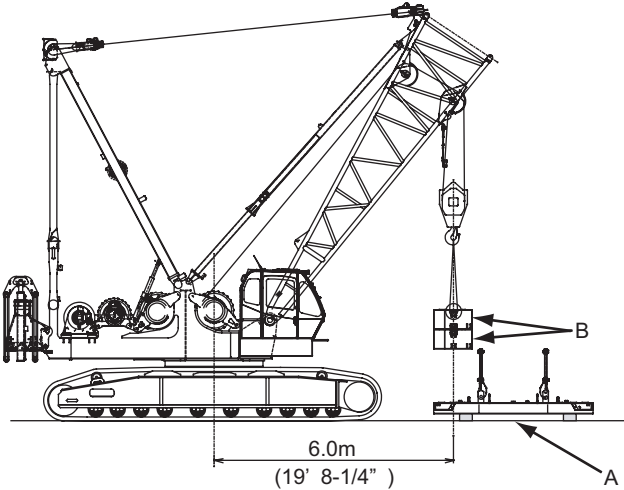
WARNING

Up to three counterweights can be piled up and lifted. When lifting them, reeve the wire rope or sling as shown in the right figure. Failure to observe this warning may result in serious injury or death.

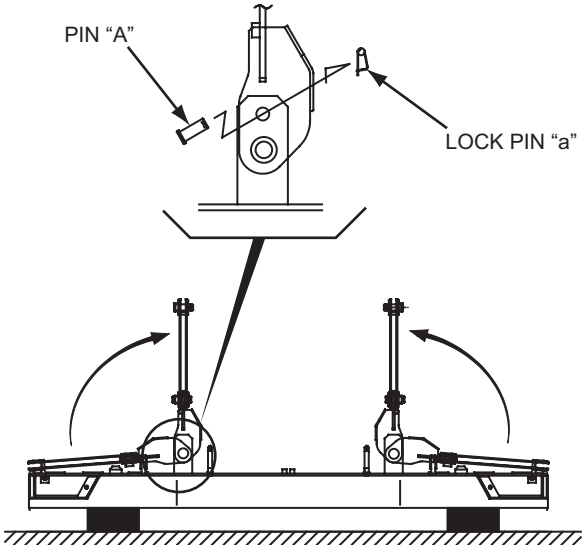


5. DISASSEMBLY OF THE ATTACHMENT

3. Remove the counterweight (B) from the counterweight (A).



4. Lower the links by removing pin "A" and lock pin "a".



5. DISASSEMBLY OF THE ATTACHMENT

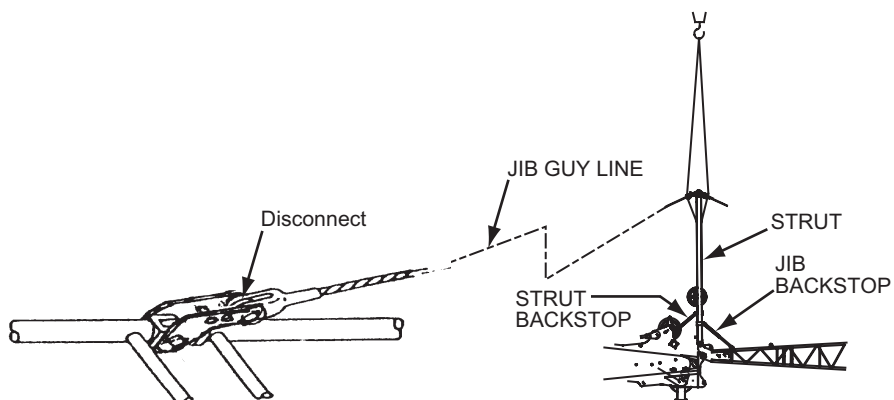
5.8 DISASSEMBLING THE ATTACHMENT

5.8.1 DISASSEMBLING THE JIB

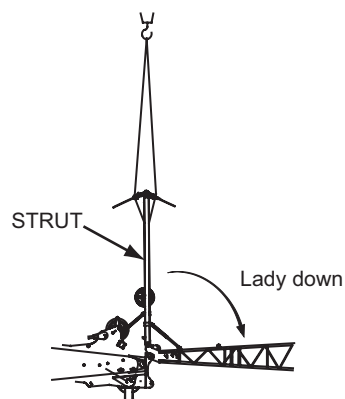


Do not stand or work under, inside or on the jib structure when assembling jib. Failure to observe this precaution may result in serious injury or death.

1. While holding the jib strut with the assisting crane, disconnect the jib guy line from the insert boom.

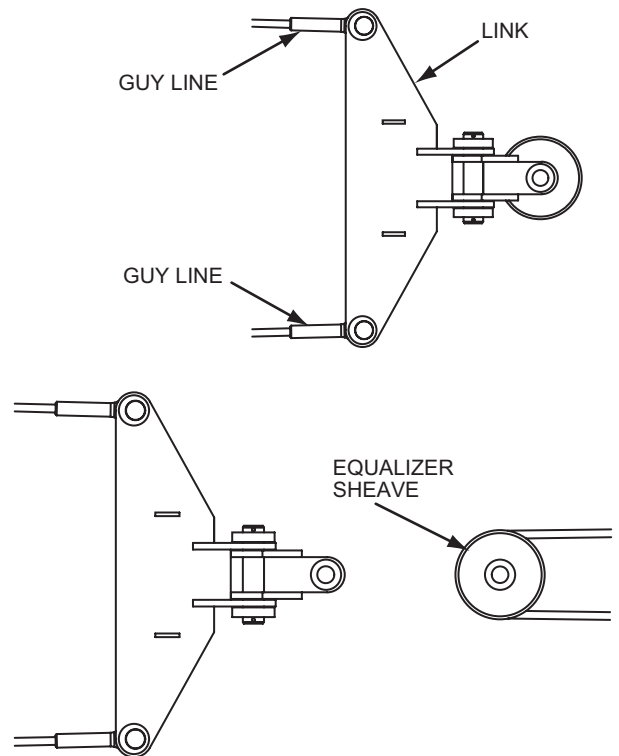


2. Remove the backstop from the strut, and lay down the strut to the jib side.

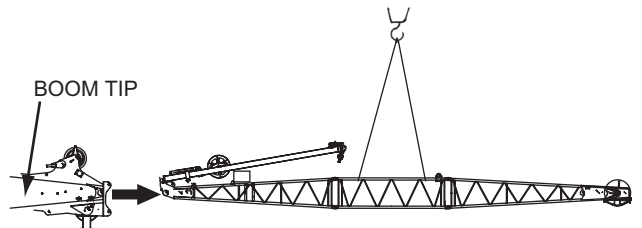


5. DISASSEMBLY OF THE ATTACHMENT

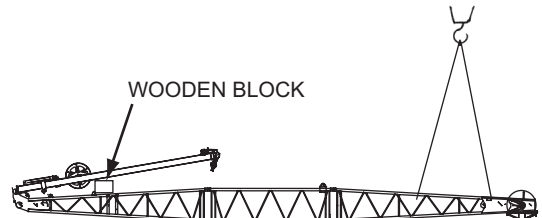
3. Take off the jib side jib guy line from the jib tip end.
4. Take off the jib side and boom side guy lines from the strut.



5. With the jib held with the assisting crane, detach the jib from the boom.
Place the jib on blocking.



6. Disassemble the jib.
Draw out the top connecting pins first, then draw out the bottom connecting pins. To prevent the jib from jumping up when the jib connecting section is disconnected, support the jib with blocking, etc.



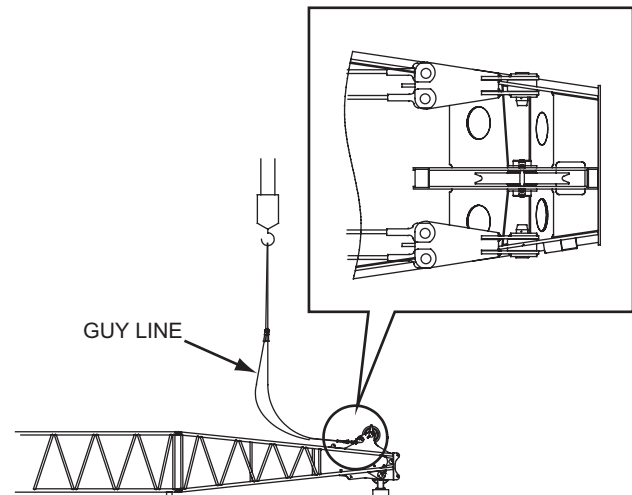
5. DISASSEMBLY OF THE ATTACHMENT

5.8.2 REMOVING GUY LINES

⚠ DANGER

- Do not stand under the boom or inside the boom structure when removing the connector pins.
- Do not climb, stand, or walk on boom.
- Use a ladder or similar device to reach only necessary areas.

Failure to observe this precaution may result in serious injury or death.



1. Remove all the guy lines, except for the guy line connected to the link at the upper spreader.
2. Remove the guy lines in order.
3. Place guy lines onto the ground, taking care not to damage the boom.

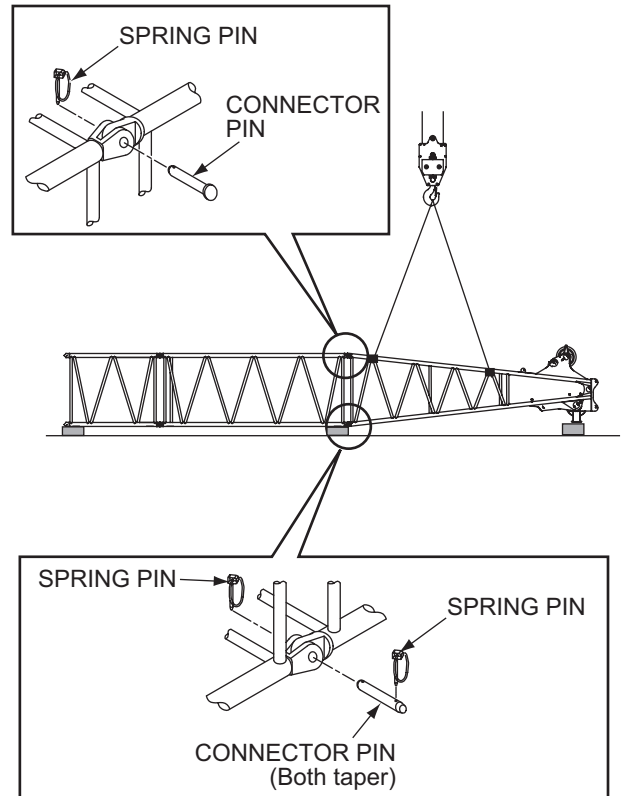
5.8.3 REMOVING UPPER AND INSERT BOOMS

⚠ DANGER

To prevent people from being crushed under fallen boom, never let people enter the area inside or under the boom when removing the boom connector pins.

Separating boom tip

1. Support the boom tip with the assisting crane.
2. Remove the lower side connector pin.
3. Remove the upper side connector pin to separate the boom tip.



5.9 DISASSEMBLY OF LUFFING ATTACHMENT

Basically, disassembly should be carried out in the reverse order of assembly procedures. This section describes the procedures not included in the assembly.

⚠ DANGER

Do not sit stand, or work under, inside, or on the boom structure when removing the connector pins. Failure to observe this precaution may result in serious injury or death.

⚠ WARNING

To prevent any accidental falls, be sure to use a safety belt during the work at high places; use a scaffold during the work on the boom. Failure to observe this precaution may result in serious injury or death.

⚠ WARNING

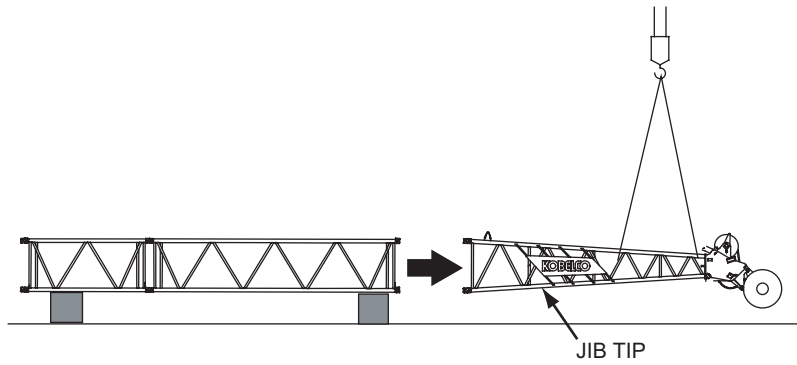
Keep clear of the connector pins to avoid any possible injury from metal particles (shavings) when tapping pins for removal. Failure to observe this precaution may result in serious injury.

5. DISASSEMBLY OF THE ATTACHMENT

5.9.1 DISASSEMBLING THE LUFFING JIB

1. Removing Jib Tip

- (1) Use an assist crane to support the jib tip.
- (2) Remove the pins connecting the jib tip to the jib insert, and place it on a wooden block.



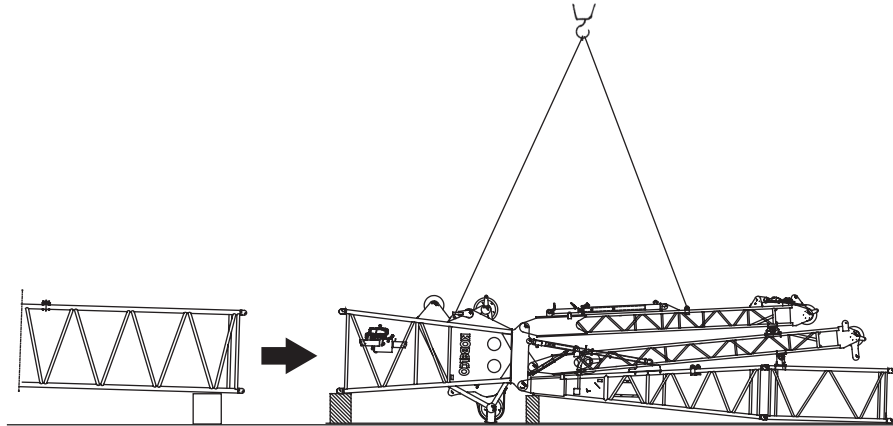
2. Removing Insert Jib

Use an assist crane to support the jib inserts.

5.9.2 DISASSEMBLING THE LUFFING BOOM TIP ASSEMBLY

1. Removing Luffing Boom Tip Assembly

- (1) Support the luffing boom tip assembly with the auxiliary crane.



- (2) Detach the connecting pins from the boom tip assembly and insert boom to remove the luffing boom tip assembly.

⚠ DANGER

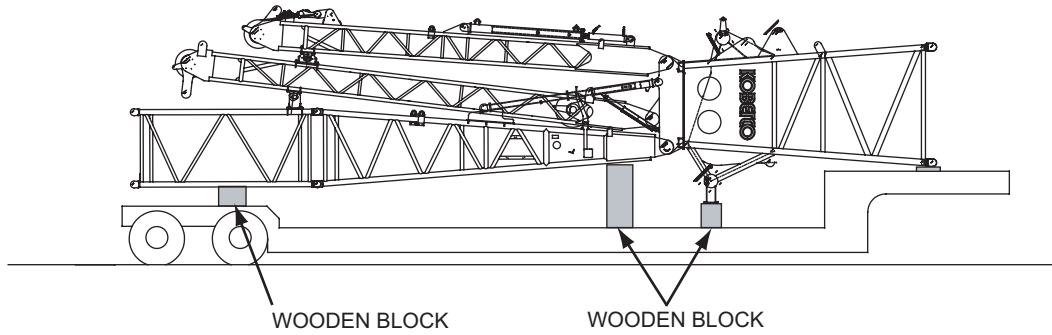
Do not stand under, inside, or on the boom structure when disconnecting luffing boom tip and strut assembly.

Failure to observe this precaution may result in serious injury or death.

5. DISASSEMBLY OF THE ATTACHMENT

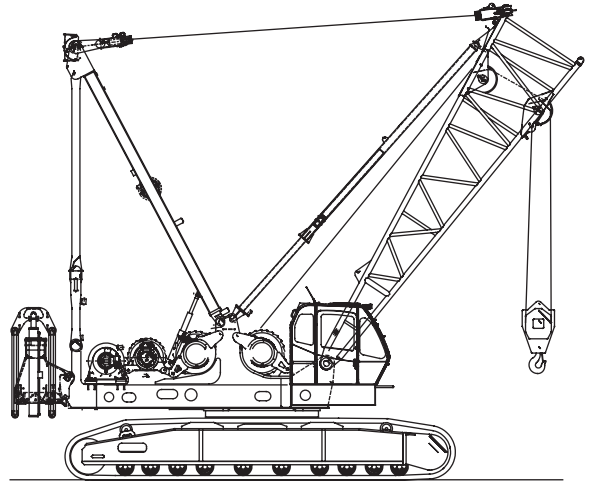
5.9.3 CAUTION WHEN TRANSPORTING LUFFING BOOM TIP ASSEMBLY

When transporting the boom tip assembly with a trailer, be sure to place three wooden blocks under the assembly. Supporting the boom tip assembly with only two wooden blocks may lead to damages to the assembly.



5.10 REMOVAL OF THE CRAWLERS

1. Place the basic machine on the level and firm ground.
2. Face the upper machinery to forward propel direction and engage the swing brake and swing lock.



5.10.1 SETTING THE TRANSLIFTER (Refer to 4.3.1.)

5.10.2 REMOVAL OF THE CRAWLERS

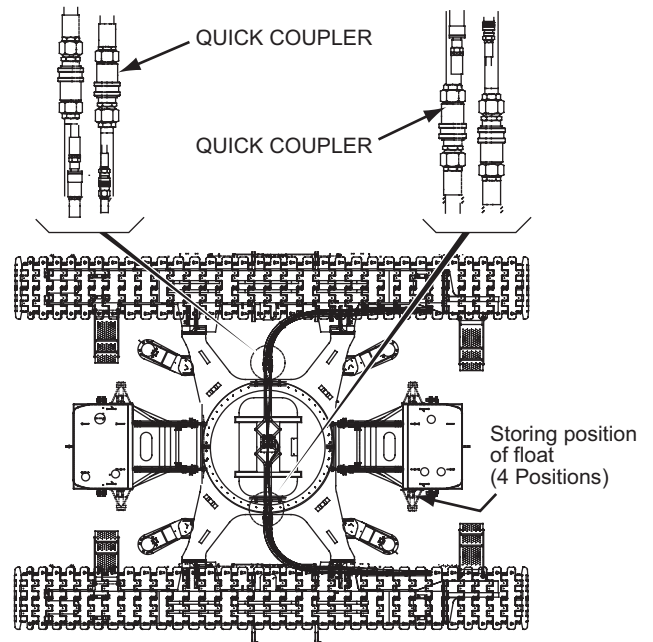
1. Disconnect all hydraulic hoses for propel (both left and right) at the quick couplers.

⚠ DANGER

Do not swing when connecting or disconnecting hydraulic hose of crawler to avoid accident of being caught. Failure to observe this precaution may result in serious injury or death.

⚠ CAUTION

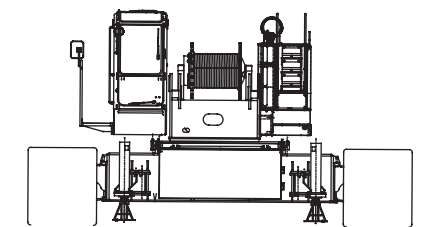
Wipe out any dust or dirt and install the provided dust cap after disconnecting hose. If coupler ring is tight, tap it with wooden hammer. Do not hit with steel hammer.



2. Set the transliifter to the work position and set them and install the floats.

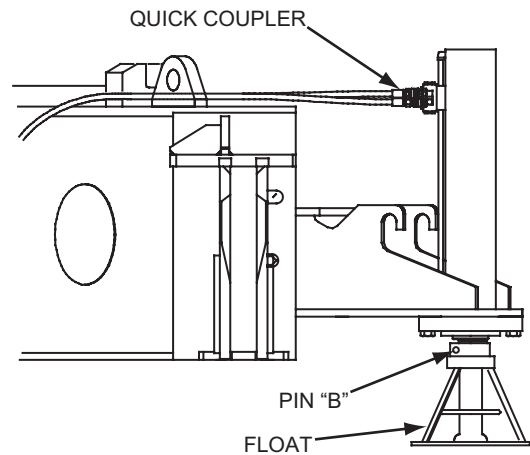
⚠ CAUTION

Float weight about 35 kg (77 lbs). It is recommended to install or remove it by two persons to avoid injury to your body.

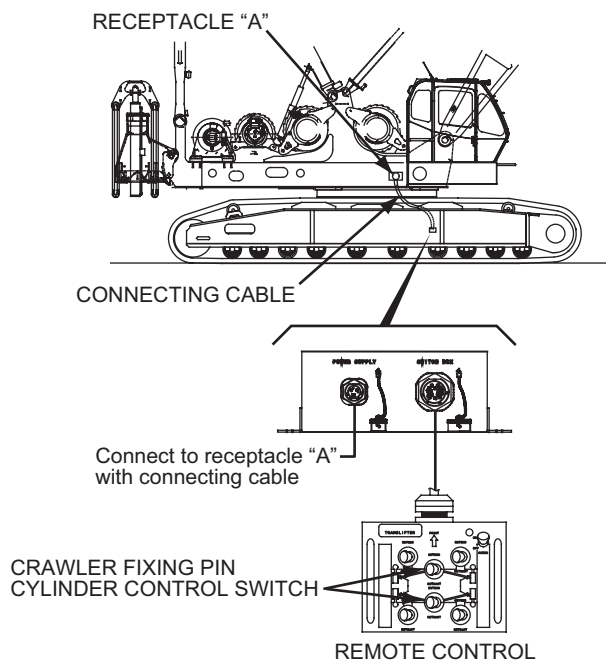


5. DISASSEMBLY OF THE ATTACHMENT

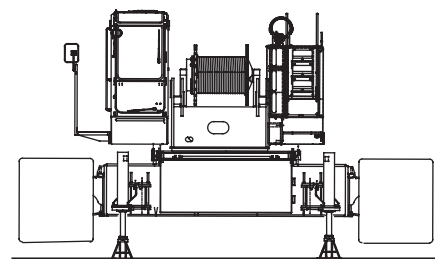
3. Connect the hydraulic hoses to the translifter cylinders with quick couplers.
Confirm that the hydraulic hoses are securely connected to the vertical cylinders by pulling them.



4. Connect remote control switch.



5. Start the engine and set the speed to low (about 1000 rpm).
By operating the translifter, lift the basic machine until clearance appears between crawler and ground.
Watch the level during work to keep the basic machine in leveled position.
Make sure all four floats sit firmly on the ground.



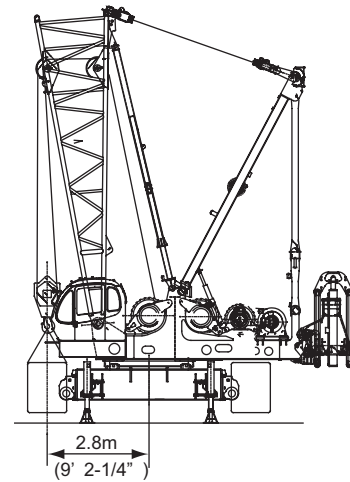
6. Swing the upper structure 90° to orient it toward the crawler.

5. DISASSEMBLY OF THE ATTACHMENT

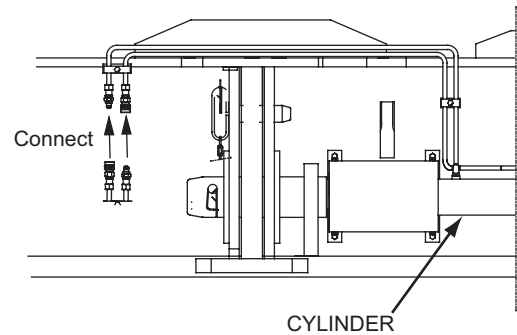
- Hold one of crawlers.
When lifting the crawler, use corner protective materials so that wire does not bite into shoes.
[Weight: 18,600 kg (41,012 lbs)]

WARNING

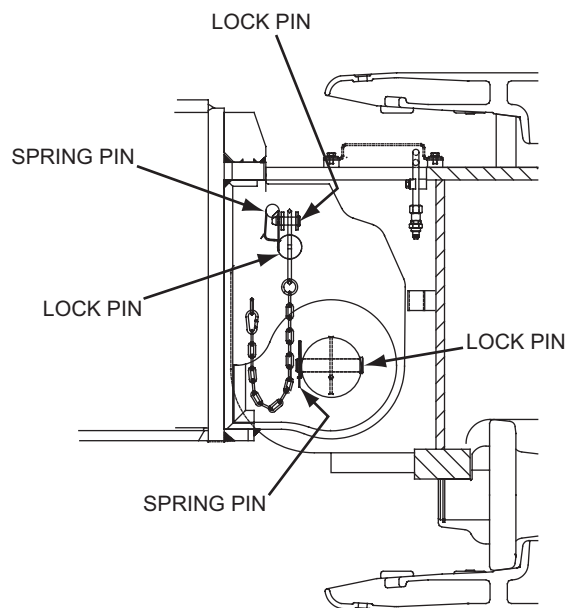
- Make sure that the cylinder bracket fixing pin is installed.
 - Ensure that the gantry fixing link is installed.
- Failure to observe these precautions may result in serious injury or death.



- Connect the hydraulic hose for the connecting pin cylinder with quick coupler.



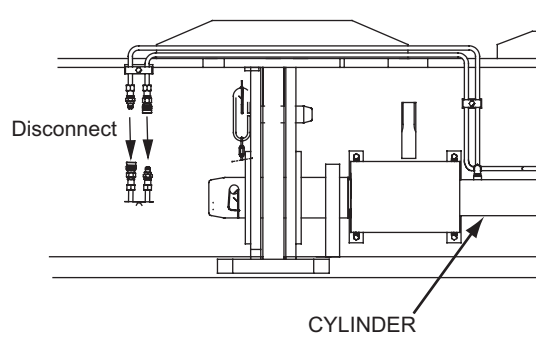
- Remove the lock pin for the connecting pin.
- Remove the fixing pins (2 pos.). If they are hardly removed, align the pin holes.



- Operate the remote control switch, and completely remove the two crawler connecting pins.

5. DISASSEMBLY OF THE ATTACHMENT

12. Ensure that the connecting pins are completely removed, and stop the engine.
13. Remove the hydraulic hose for the connecting pin cylinder with quick coupler.

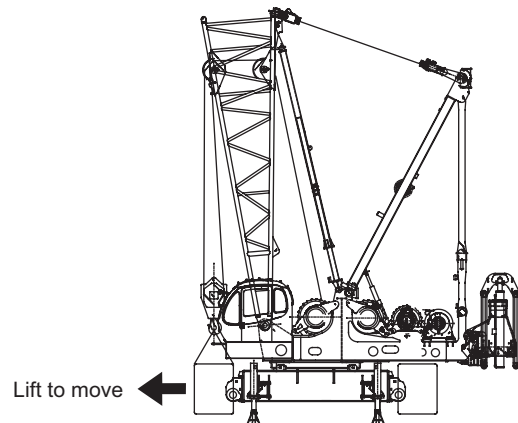


14. Restart engine and lift the crawler to move it away from the machine, and lay it onto the trailer or the ground.

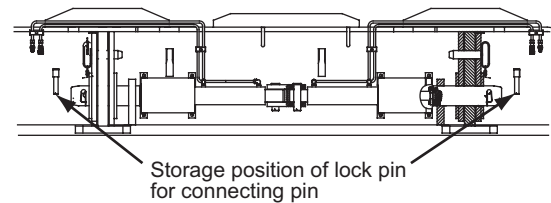
! DANGER

Keep away from the spaces under the lifted crawler frame or between the machine and the crawler frame to avoid being caught in.

Failure to observe this precaution may result in serious injury or death.



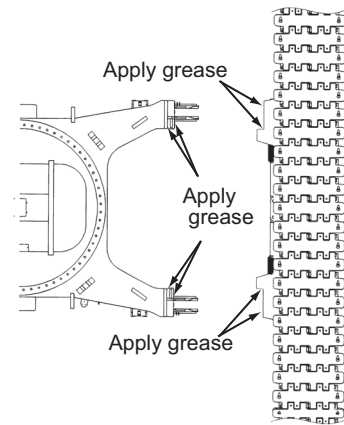
15. Apply grease to the fixing pins, and insert them into the pin holes on the carbody side. Then, lock them with the lock pins. Store the lock pins for the connecting pins at the specified position on the crawler frame side, and lock them with the spring pins.



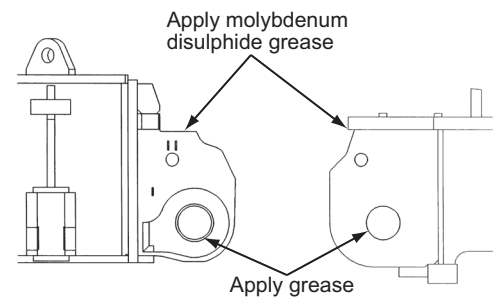
! DANGER

After storing the lock pins, be sure to lock them to avoid them from missing.

16. Apply grease to the engaging sections on the upper surfaces of the connecting sections of the lower structure with the crawler frames, and the connecting pin holes to prevent rust occurrence.



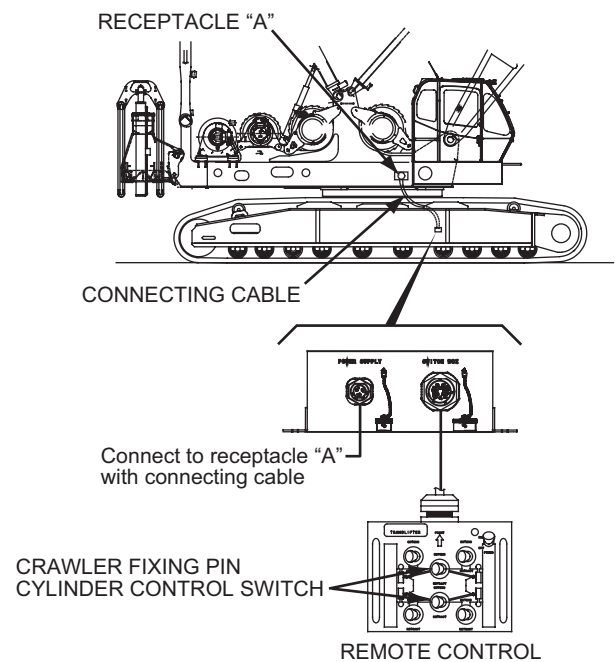
17. Remove the other crawler in the same manner.
The connecting pin removal/installation cylinder hydraulic hose is common to the right and left sides.
After installing one crawler, use the hose for the other crawler.



⚠ DANGER

Do not swing the machine abruptly with only one crawler installed. Failure to observe this precaution may result in serious injury or death.

18. Remove the remote control switch and connecting cable.



5. DISASSEMBLY OF THE ATTACHMENT

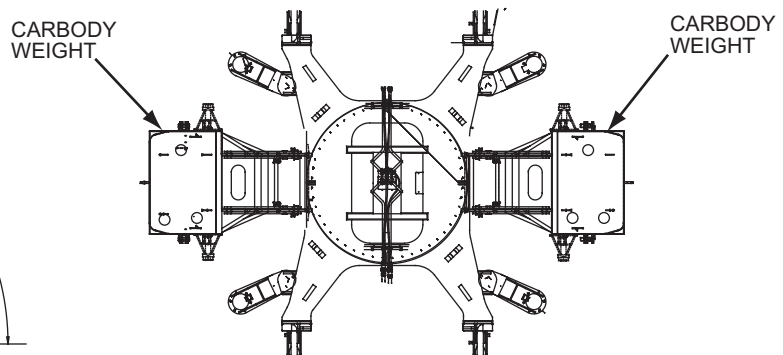
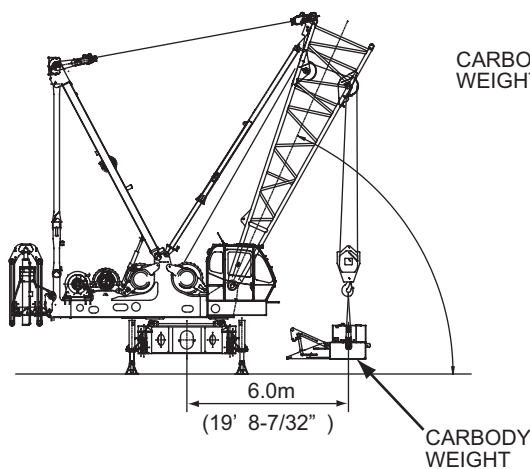
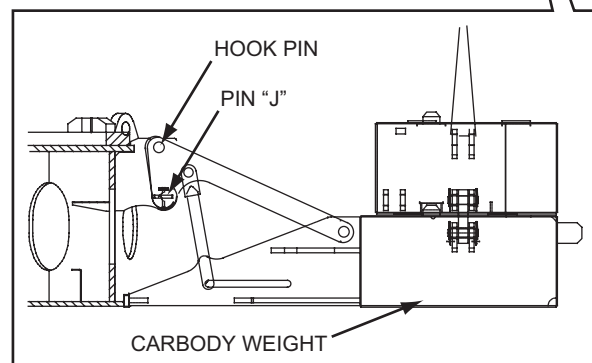
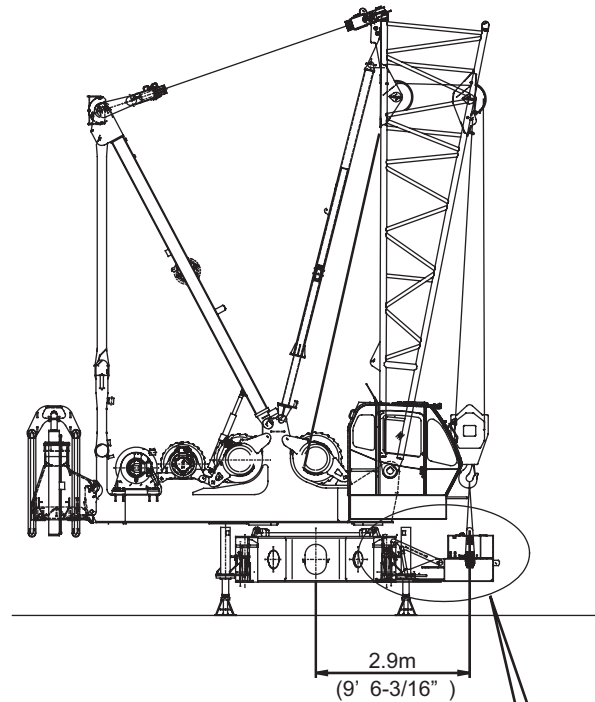
5.11 REMOVAL OF THE CARBODY WEIGHTS

1. Swing the upper structure 90° to orient it toward the carbody weight.
2. Lift the carbody weight, and remove it from the machine.
[Weight : 5,000 kg x 2 (11,025 lbs x 2)]
3. Similarly remove the other carbody weight.

WARNING

- Make sure that the cylinder bracket fixing pin is installed.
- Ensure that the gantry fixing link is installed.

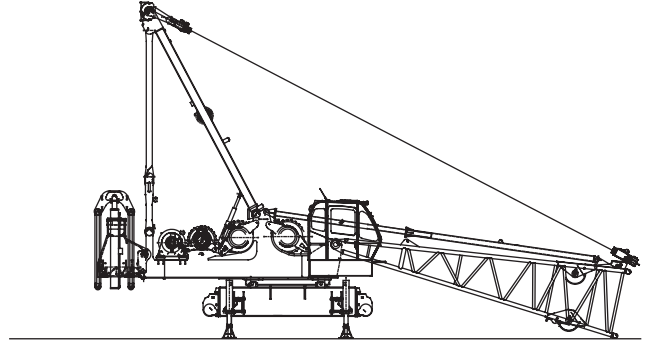
Failure to observe these precautions may result in serious injury or death.



5.12 REMOVAL OF THE HOOK BLOCK FROM BASE BOOM

Remove the hook.

1. Lower the base boom and hook block.
2. Spool the wire rope to the front drum.



5. DISASSEMBLY OF THE ATTACHMENT

5.13 LOADING THE BASE MACHINE

5.13.1 LOADING THE BASE MACHINE ON THE TRAILER

1. Swing the basic machine until it comes parallel to the axle and install the swing lock pin and engage the swing brake and swing lock.
2. Lift the basic machine by extending the vertical cylinder until enough height to drive the trailer in.

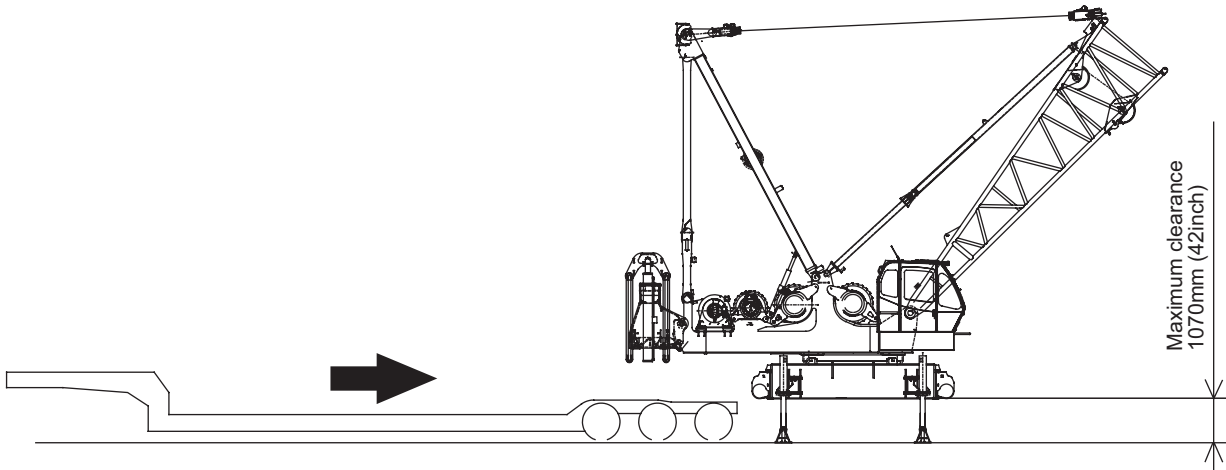
WARNING

Make sure that the ground for the floats are flat and firm to avoid turn-over of machine. Failure to observe this precaution may result in serious accident.

3. Drive in the trailer under the basic machine.

WARNING

Do not swing with the vertical cylinders retracted to avoid turn-over of the trailer. Failure to observe this precaution may result in serious accident.



5.13.2 FOLDING THE TRANSLIFTER

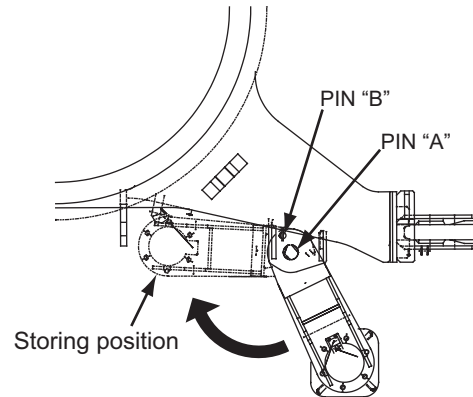
1. Set the trailer so that loading board comes just underneath the lower machinery.

WARNING

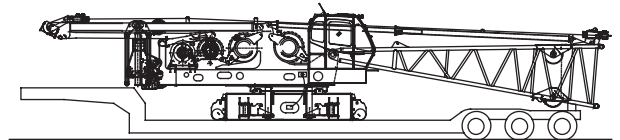
Do not swing with the vertical cylinders retracted to avoid turn-over of the trailer. Failure to observe this precaution may result in serious accident.

5. DISASSEMBLY OF THE ATTACHMENT

2. Retract the four vertical cylinders by operating the remote control switch and stop the engine.
Then disconnect the cylinder hoses at the couplers.
3. Remove the connecting cable and remote control switch cable and store them to the storing location.
4. Store the translifter arms and fix them in the storing position.



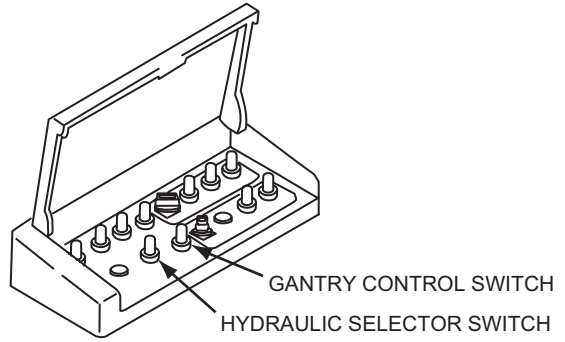
5. Lower the gantry following the step. Refer to Section 5.13.3.
6. Tie down the basic machine to the trailer.



5. DISASSEMBLY OF THE ATTACHMENT

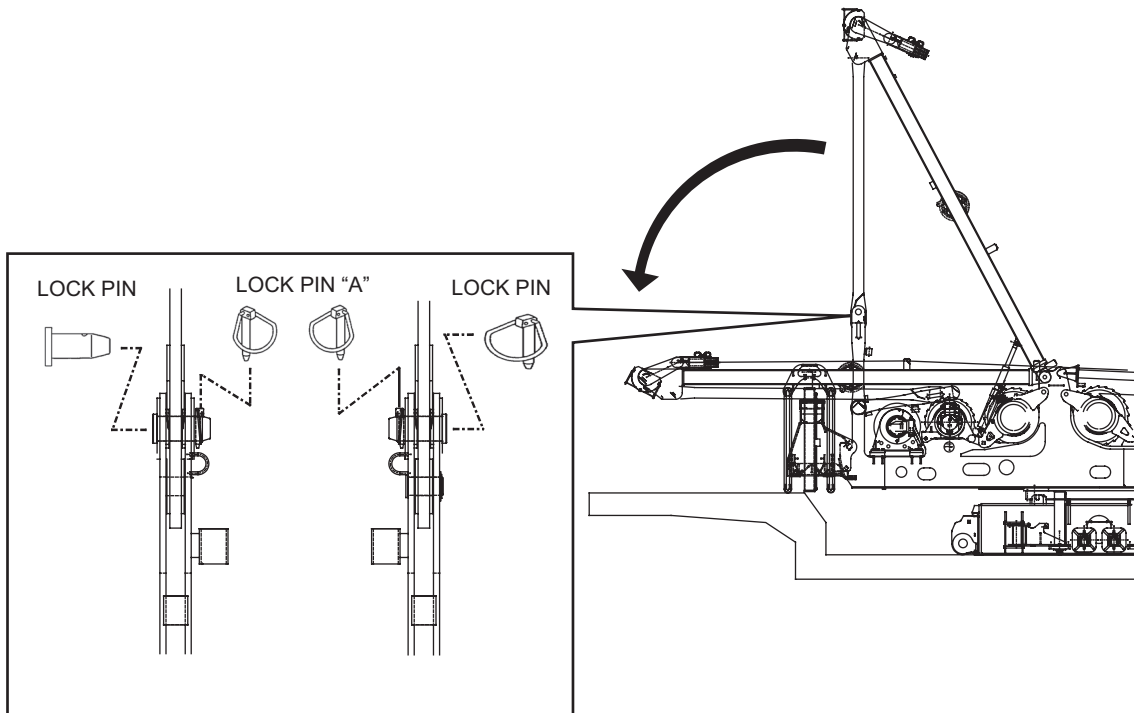
5.13.3 LOWERING THE GANTRY

1. Confirm that the gantry cylinder is installed on the gantry.
2. Start the engine and set the speed to about 1000 rpm.
3. Disconnect the fixing pin.
4. Set the hydraulic selector switch in the operator cabin side stand panel to "Neutral" position and turn the Gantry Control Switch to lower the gantry.



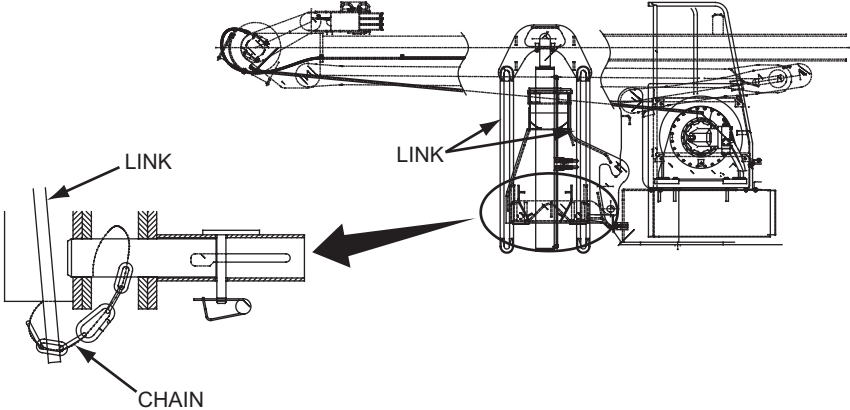
CAUTION

Do not touch the gantry operating switch when boom raising wire rope is tensioned during crane operation or boom raising.



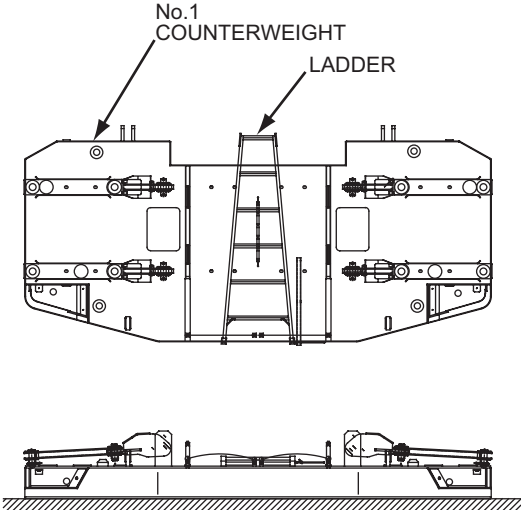
5.13.4 CAUTION WHEN TRANSPORTING THE BASE MACHINE

When transporting the base machine, fix the links with the chain.



5.13.5 TRANSPORTATION OF NO.1 COUNTERWEIGHT AND LADDER

Fix the ladder onto the No.1 weight for transportation.

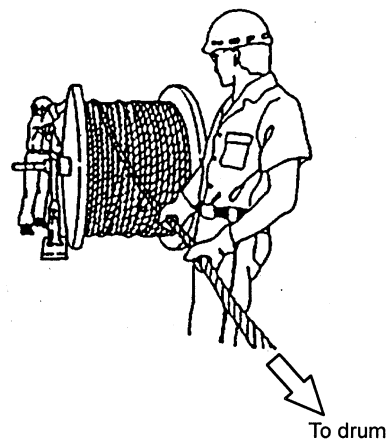


6. WIRE ROPE

6.1 UNREELING WIRE ROPE

WARNING

Do not touch a wire rope directly with bare hands. If wires protrude, you could be injured. Working gloves are recommended. Failure to observe this precaution may result in serious injury or death.



6.1.1 UNREELING WIRE ROPE

When unreeing the wire rope, take sufficient care to prevent it from kinking. It is convenient to use a jig as shown in the right figure.

If the method mentioned above is unavailable, being careful not to soil the wire rope, roll over to extend it straightly.



Unreeing method of wire rope

6. WIRE ROPE

6.1.2 WINDING WIRE ROPE ONTO DRUM

1. Pass the wire rope end through from the inside of the drum flange, and fix it with the plate so that the wire rope does not stick out from the flange circumference.

When tightening the bolts with the specified tightening torque, adjust the clearance between the plate and flange convexity is uniform.

WARNING

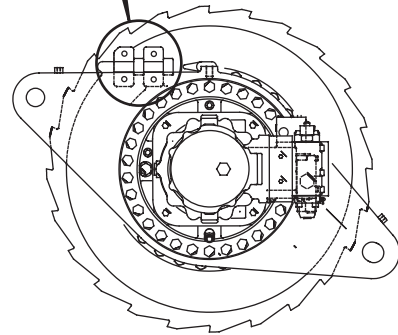
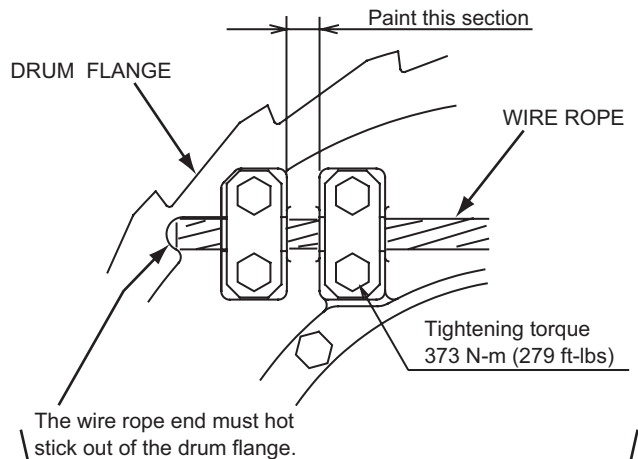
If the wire rope end is not securely fixed, it may be unfixed, causing the accidental drop of the lifted load. Be sure to securely fix the wire rope end.

When unwinding the wire rope, remember that at least three lines of the wire rope must be on the drum.

WARNING

If the number of the line of the wire rope on the drum is smaller than three, the wire rope may be unfixed, causing the accidental drop of the lifted load.

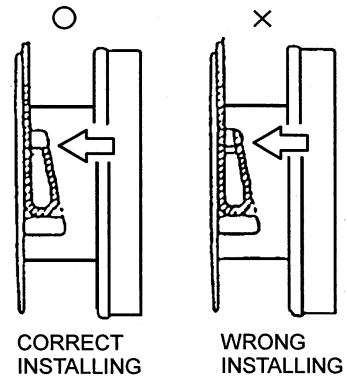
DO NOT unwind the wire rope further if three lines of the wire rope on the drum.



2. In case of the boom drum

Be careful not to allow the wire rope end to protrude from the cotter hole.

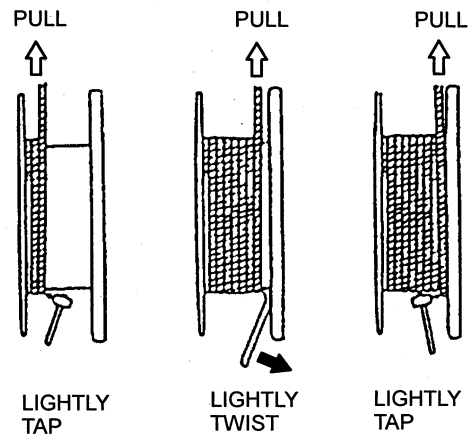
Pass the tensile end of the wire rope through the straight side of the rope socket. Surely install the wedge.



INSTALLING WIRE ROPE

3. In case of the front and rear drum Lightly tap the rope for proper alignment while slowly winding it onto the drum.

Pull slightly on the rope, with a constant pressure, to ensure it winds tightly onto the drum.



WINDING WIRE ROPE

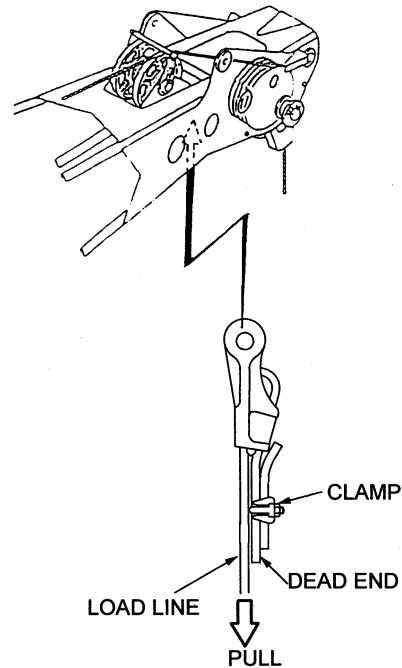
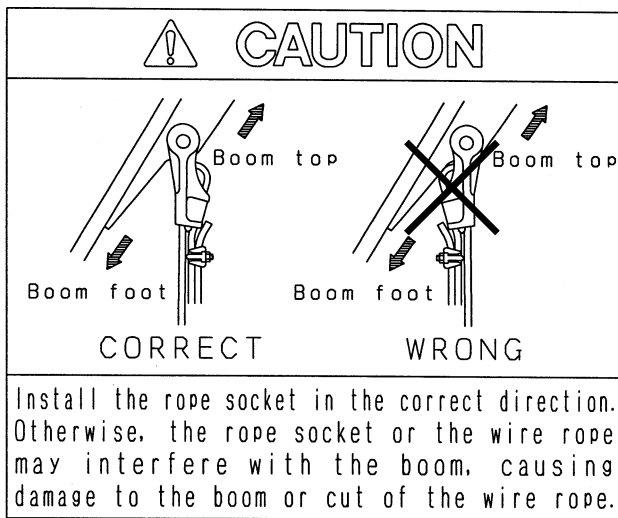
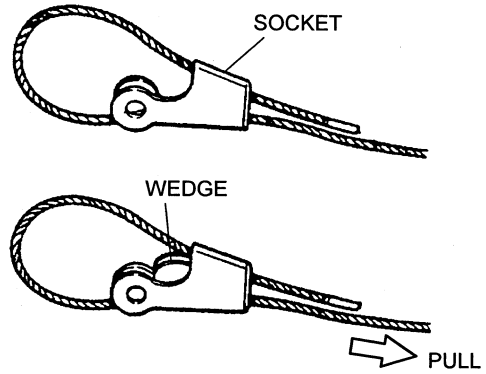
WARNING

Keep hands and clothing clear of the rotating drum and running wire rope. Failure to observe this precaution may result in serious injury or death.

6. WIRE ROPE

6.1.3 INSTALLING THE ROPES

1. Thread the wire rope through the socket and bring it around in an easy to handle loop.
The live end of the rope must be in a straight line through the socket.
2. Insert the wedge in the rope loop and pull the wedge into position.
3. After the socket is pinned to the boom or hook block, apply gradually increasing loads to the wire rope until the wedge is in its final position.
4. Secure the wire rope with the rope clamp.
The rope clamp must be correctly installed to ensure proper direction.



6.1.4 SPECIFICATION OF WIRE ROPE

1. Crane

Use	Specification		Diameter mm (inch)	Length m (ft)	Breaking Strength kN (lbs)	
Front Drum	IWRC 6 x Fi (25)	C/O	25.4 (1")	430 (1411)	460 (103,415)	
Rear Drum	IWRC 6 x Fi (25)	C/O	25.4 (1")	335 (1100)	460 (103,415)	
Boom Drum	IWRC 6 x P•WS (31)	O/O	22 (7/8")	295 (968)	397 (89,290)	
Third Drum (Luffing jib)	Hook Hoist	IWRC 6 x Fi (25)	C/O	22.2 (7/8")	265 (870)	354 (79,590)
	Jib Raise	IWRC 6 x P•WS (31)	O/O	22 (7/8")	205 (673)	397 (89,290)

6.1.5 WIRE ROPE LENGTH

1 .Main

UNIT : m (ft)

Parts of Line Boom Length	1	2	3	4	5	6	7	8	9	10	12	14
12.2 (40)	31 (102)	44 (144)	57 (187)	70 (230)	83 (272)	96 (315)	109 (358)	122 (400)	135 (443)	147 (482)	173 (568)	199 (653)
15.2 (50)	37 (122)	53 (174)	69 (226)	85 (278)	101 (331)	117 (383)	133 (435)	148 (487)	164 (539)	180 (591)	212 (695)	
18.3 (60)	43 (142)	62 (204)	81 (265)	100 (328)	119 (390)	138 (452)	157 (514)	175 (576)	194 (638)	213 (700)	251 (824)	
21.3 (70)	49 (162)	71 (234)	93 (305)	115 (377)	137 (449)	159 (521)	181 (593)	203 (664)	224 (736)	246 (808)		
24.4 (80)	55 (182)	80 (263)	105 (344)	130 (427)	155 (508)	180 (590)	205 (672)	230 (753)	254 (835)	280 (919)		
27.4 (90)	61 (201)	89 (293)	117 (383)	145 (476)	173 (568)	201 (659)	229 (751)	257 (842)	285 (934)			
30.5 (100)	67 (221)	98 (323)	130 (426)	160 (525)	191 (627)	222 (728)	253 (829)	284 (931)				
33.5 (110)	73 (241)	107 (352)	142 (465)	175 (575)	209 (686)	243 (797)	277 (908)	311 (1020)				
36.6 (120)	80 (261)	116 (382)	154 (505)	190 (624)	227 (745)	264 (866)	301 (987)					
39.6 (130)	86 (281)	125 (412)	166 (544)	205 (674)	245 (804)	285 (935)	325 (1066)					
42.7 (140)	92 (301)	135 (441)	178 (583)	220 (723)	263 (864)	306 (1004)						
45.7 (150)	98 (321)	144 (471)	190 (623)	235 (772)	281 (923)	327 (1074)						
48.8 (160)	104 (340)	153 (501)	202 (662)	250 (822)	299 (982)							
51.8 (170)	110 (360)	162 (531)	214 (702)	266 (871)	317 (1041)							
54.9 (180)	116 (380)	171 (560)	226 (741)	281 (921)	335 (1101)							
57.9 (190)	122 (400)	180 (590)	236 (774)	296 (970)								
61.0 (200)	128 (420)	189 (620)	250 (820)	311 (1019)								
64.0 (210)	134 (440)	198 (649)	262 (859)	326 (1069)								
67.1 (220)	140 (459)	207 (679)	274 (898)	341 (1118)								
70.1 (230)	146 (479)	216 (709)	287 (941)	356 (1167)								
73.2 (240)	152 (499)	225 (738)	299 (980)	371 (1217)								
76.2 (250)	158 (519)	234 (768)	311 (1020)	386 (1266)								
79.2 (260)	164 (539)	243 (798)	323 (1059)	401 (1316)								
82.3 (270)	170 (559)	252 (827)	335 (1099)	416 (1365)								
85.3 (280)	176 (579)	261 (857)										

6. WIRE ROPE

Note

Too long a rope may cause rough spooling on the drum.

2. Jib

Unit : m (ft)

Jib Length	12.2 (40)		18.3 (60)		24.4 (80)	30.5 (100)
Parts of Line	1	2	1	2	1	1
Boom Length						
24.4 (80)	77 (253)	113 (372)	89 (291)	131 (429)	101 (330)	112 (369)
27.4 (90)	83 (272)	122 (401)	95 (311)	140 (459)	107 (350)	118 (389)
30.5 (100)	89 (292)	131 (431)	101 (331)	149 (489)	113 (370)	125 (409)
33.5 (110)	95 (312)	140 (461)	107 (351)	158 (518)	119 (390)	131 (428)
36.6 (120)	101 (332)	150 (491)	113 (371)	167 (548)	125 (410)	137 (448)
39.6 (130)	107 (352)	159 (520)	119 (391)	176 (578)	131 (429)	143 (468)
42.7 (140)	113 (372)	168 (550)	125 (410)	185 (608)	137 (449)	149 (488)
45.7 (150)	119 (391)	177 (580)	131 (430)	194 (637)	143 (469)	155 (508)
48.8 (160)	125 (411)	186 (609)	137 (450)	203 (667)	149 (489)	161 (528)
51.8 (170)	131 (431)	195 (639)	143 (470)	212 (697)	155 (509)	167 (548)
54.9 (180)	137 (451)	204 (669)	149 (490)	221 (726)	161 (529)	173 (567)
57.9 (190)	144 (471)	213 (698)	155 (510)	230 (756)	167 (548)	179 (587)
61.0 (200)	150 (491)	222 (728)	161 (530)	239 (786)	173 (568)	185 (607)
64.0 (210)	156 (511)	231 (758)	167 (549)	249 (815)	179 (588)	191 (627)
67.1 (220)	162 (530)	240 (788)	173 (569)	258 (845)	185 (608)	197 (647)
70.1 (230)	168 (550)	249 (817)	180 (589)	267 (875)	191 (628)	203 (667)
73.2 (240)	174 (570)	258 (847)	186 (609)	276 (905)	197 (648)	209 (687)

Note

Too long a rope may cause rough spooling on the drum.

7. MAINTENANCE

In order to use this machine safely in the best condition, preventive maintenance is required.



When inspecting the machine, lower the boom down to the ground, stop the engine and engage all locks. Also remove the keys or battery cables to prevent other personnel from starting the crane while maintenance personnel are at work. Failure to observe this precaution may result in serious injury or death.

1. PRECAUTIONS WHEN PERFORMING CHECK AND MAINTENANCE

- Carry out check and maintenance in appropriate work clothes.
- Be sure the machine is on firm and level ground, and post a notice board starting "Under Inspection".
- Inspections and maintenance on a machine section higher than 2 m (6.6 ft) are elevation works. Be sure to use a working scaffold and safety belt.
- When moving to perform inspections and maintenance, determine the fixed signals, and move the machine according to the signals.
- When performing inspections and maintenance of hydraulic equipments, be sure to prevent contamination from dust and dirt.

7. MAINTENANCE

2. INSPECTION TABLE

- The following inspection table is based on the average operating condition. Consider the inspection schedule according to the working and weather conditions.
- The inspection table covers all items, but if operators and maintenance personnel judge that additional items are necessary, add them to the schedule.
- Whenever a question arises regarding inspections and maintenance, consult the local representative.



When necessary repairs or adjustments are noted during an inspection, be sure to complete the repairs or adjustments immediately.

3. MAINTENANCE

- Maintenance
When necessary repairs or adjustments are noted during an inspection, be sure to complete the repairs or adjustments immediately.
Consult a designated KOBELCO authorize distributor if necessary.
- Parts
Use genuine KOBELCO parts for replacements, and genuine KOBELCO lubricant for maintenance, in order to ensure optimal machine performance. Consumption parts such as elements, etc. must be replaced prior to deterioration of performance in case of replacement part delays. Consult a designated KOBELCO authorize distributor if necessary.

4. PRECAUTIONS WHEN PERFORMING INSPECTIONS AND MAINTENANCE

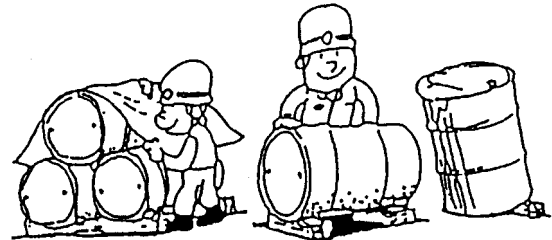
- Use genuine KOBELCO parts.
Be sure to use genuine KOBELCO parts for replacement and genuine KOBELCO lubricant for maintenance.

KOBELCO Genuine parts

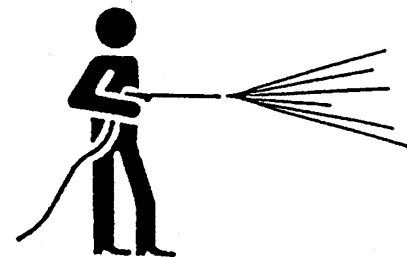

CAUTION

The warranty does not cover malfunctions caused by the use of parts other than KOBELCO genuine parts (genuine oil, grease and filter).

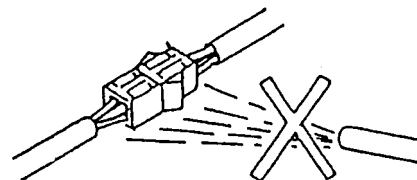
- Only use diesel fuel (ASTM 2-D)
Using substitute fuel will deteriorate engine performance.
- Use clean oil and grease.
Keep oil and grease containers clean and store them away from dust and water.
Be sure to use clean oil and grease that has not been exposed to water.



- Clean carrier.
Thoroughly washing the carrier will assist in finding oil leaks, cracks, loosened parts, or other repair conditions. It is especially important to clean grease fittings, breathers and oil level gauge parts (oil inspection window).

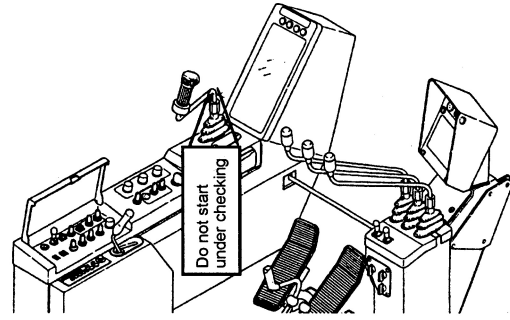


- Immediately dispose of spilled oil.
Promptly wipe away any spilled oil when refilling or replacing fuel, hydraulic oil, or other lubricants. Spilled oil left unattended is a serious fire hazard.
- Use caution when washing the machines.
Do not aim water stream directly at electrical parts or connectors.

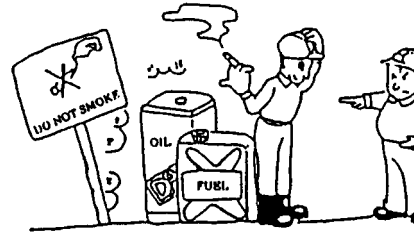


7. MAINTENANCE

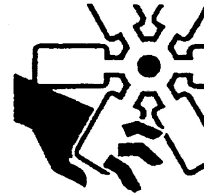
- Place a warning plate during inspections.
When performing inspections and maintenance, be sure to place the following warning notice on the key switch. "Do Not Start. Under Checking."



- Fire disposal of waste products is prohibited.
Wastes that may be combustible should be stored in a safe place and disposed of properly.
Confirm the location and use all fire extinguishers in case of an emergency.



- Use caution near rotating parts.
When inspecting fan belt tension or water pump, it may become entangled in moving machinery. Stop the engine before beginning work.

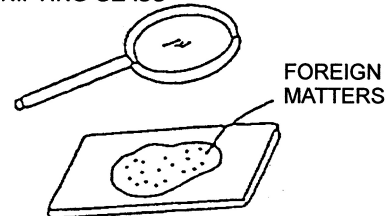


- Note water and oil temperatures.
Proper water and oil temperatures must be considered before performing maintenance in order to avoid injury. Draining oil or water, or replacing filter just after the engine stops, is dangerous. Wait until the temperature lowers to perform these tasks. If the oil is too cold, it must be warmed [approximately 20°C to 50°C (68°F to 122°F)], in order for it to drain properly.

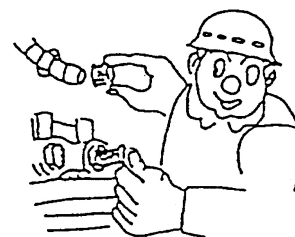


- Inspect drained oil and old filter.
When replacing oil or filter, inspect the old oil and filter for an abundance of metallic powder or foreign debris.

MAGNIFYING GLASS

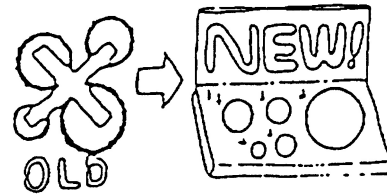


- Avoid contamination from dust and debris.
Put the blind plug and cap on the oil holes of the removed hydraulic hoses and hydraulic equipment to prevent contamination from dust and debris.



- Clean mounting surfaces.
When sealing sections of O-rings and gaskets are removed, clean the mounting surfaces and replace with new ones.
When assembling, apply a thin coat of oil to the seals.

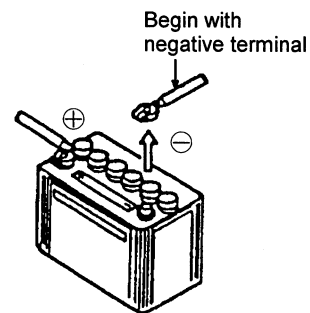
O-RING KIT



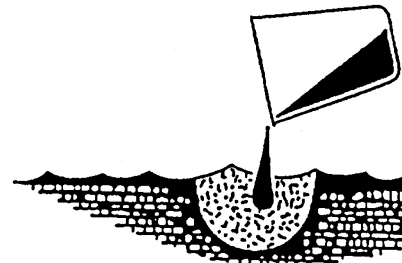
- Release internal pressure.
When removing hydraulic system, air system, fuel system, cooling system piping and connectors, or other related parts that have internal pressure, bleed internal pressure first.



- Precaution when welding.
 1. Turn off power supply (turn the key switch off).
 2. Disconnect the cable on the [-] side of the battery.
 3. Do not apply voltage more than 200 volts continuously.
 4. Provide ground within 1 m (3 ft) from the welding section.
 5. Do not allow a seal and bearing to enter between the welding section and ground section.
 6. When welding near the load safety device and controller, remove them to prevent damage.



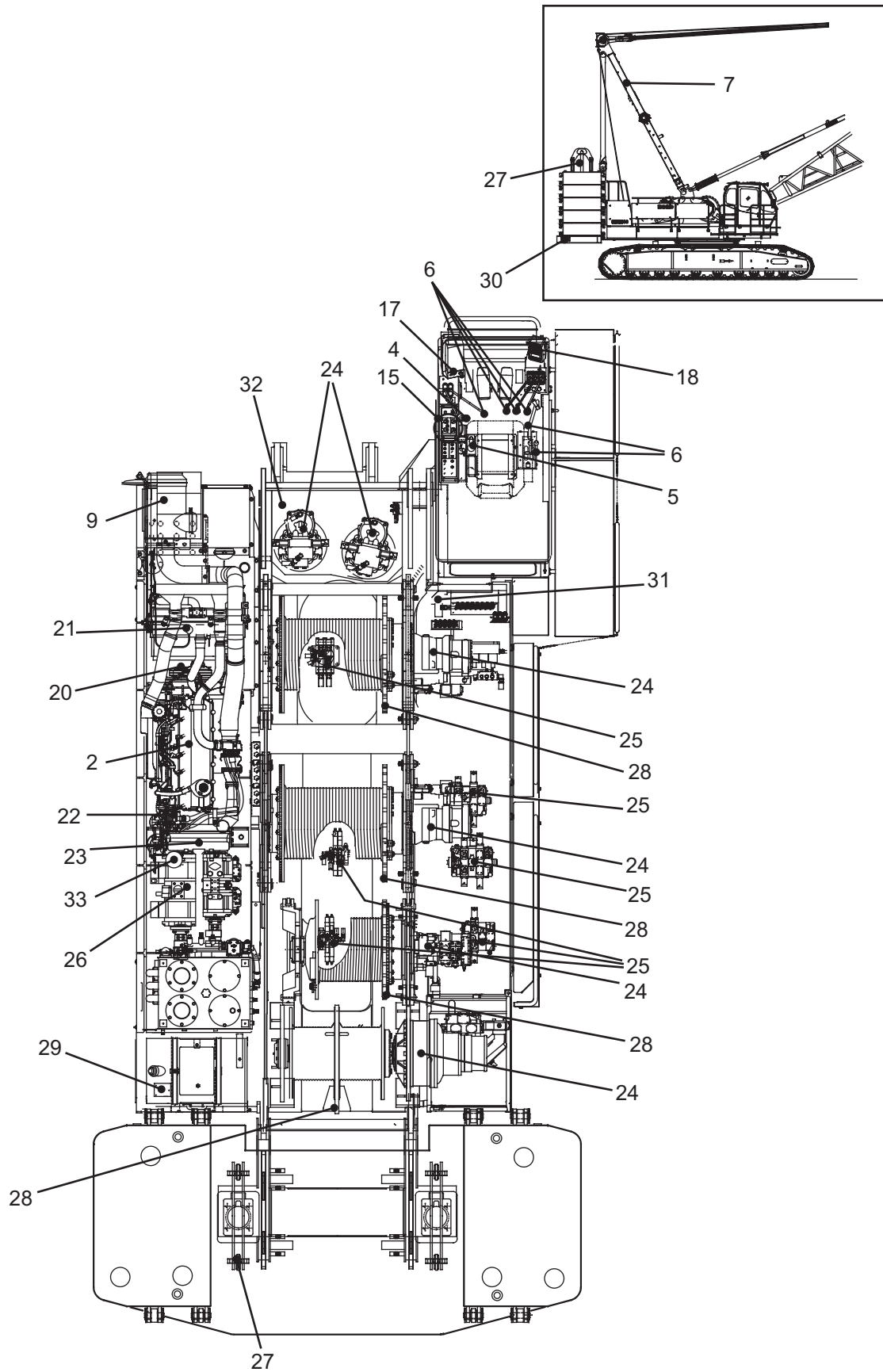
- Treatment of discarded oil.
Be sure to drain discarded oil into an appropriate container and treat it as industrial discharges.



7. MAINTENANCE

7.1 INSPECTIONS

7.1.1 UPPER STRUCTURE PARTS AND DEVICES TO BE INSPECTED



7. MAINTENANCE

Check Interval	Item No.	Identification	Check Item	Check Method	Reference page
Daily or every 8 hours	1	Fuel and hydraulic system hose	Damage	Visual check	7-8
	2	Engine	Starting, leak, unusual noise	Starting, check by hearing	7-8
	3	Hose, piping, connector	Oil leak	Visual check	7-8
	4	Swing brake	Effectiveness	Operation	7-8
	5	Swing lock	Performance	Operation	7-9
	6	Control lever	Play, deformation	Operation, visual check	7-9
	7	Gantry	Deformation, crack	Visual check	7-9
	8	Horn, head light, wiper	Performance	Operation, visual check	7-9
	9	Air cleaner	Clogging(indicator)	Visual check	7-10
	10	Pin, link, cotter pin	Damage, falling off	Visual check	7-10
	11	Bolt, nut	Looseness, falling off	Visual check	7-10
	12	Hook overhoist preventive device	Performance	Operation	7-10
	13	Boom overhoist preventive device	Performance	Operation	7-10
	14	Load safety device	Performance	Operation	7-10
	15	Drum lock knob	Performance	Operation	7-11
	16	Window glass, step, handle, guard	Damage, crack, falling off	Visual check	7-11
	17	Swing neutral free indicator lamp	Filament is gone	Operation, visual check	7-11
	18	Drum brake free fall indicator lamp	Filament is gone	Visual check	7-12
	19	Drum brake disk	Wear	Visual check	7-12
Weekly or every 50 hours	33	Fuel pre-filter (Option)	Water level	Visual check	7-18
Monthly or every 100 hours	20	Fan belt	Looseness, damage	Push with finger, visual check	7-12
	21	Radiator, oil cooler	Oil leak, damage	Visual check	7-13
	22	Engine mounting bolt, rubber mount	Looseness, damage	Visual check, test hammer	7-13
	23	Power divider	Oil leak, unusual noise	Visual check, check by hearing	7-14
	24	Hydraulic motor, Reduction unit	Oil leak, unusual noise	Visual check, check by hearing	7-14
	25	Valve, etc.	Oil leak	Visual check	7-15
	26	Hydraulic pump	Oil leak, unusual noise	Visual check, check by hearing	7-15
	27	Gantry cylinder, Counterweight self removal cylinder	Oil leak, damage	Visual check	7-15
	28	Drum lock	Wear, damage	Visual check	7-15
	29	Fuel supply pump, hose	Performance, damage	Operation, visual check	7-16
	30	Swing alarm lamp	Alarm sound, Filament is gone	Operation, visual check	7-16

7. MAINTENANCE

Check Interval	Item No.	Identification	Check Item	Check Method	Reference page
Semi-annually or very 600 hours	31	Accumulator	Oil leak, damage	Visual check	7-17
	32	Frame	Damage, crack	Visual check	7-17

- The item numbers in the above table correspond to the numbers in the following description.
- The item numbers, 1, 3, 8, 10, 11, 12, 13, 14, 16 and 19 are not indicated in the drawing.

7.1.1.1 UPPER STRUCTURE INSPECTIONS-DAILY OR EVERY 8 HOURS

1. FUEL SYSTEM HOSE

Inspect the fuel system hose for damage and for fuel leak.



If fuel leak is observed, repair leak and remove excess fuel immediately.

2. ENGINE

Start the engine to confirm proper starting condition and listen for unusual noise.

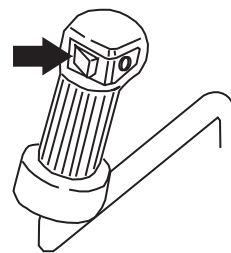
3. HOSE, PIPING AND CONNECTOR, ETC.

Inspect the hose, piping and connector, etc. for oil leaks and for damage.

4. SWING BRAKE

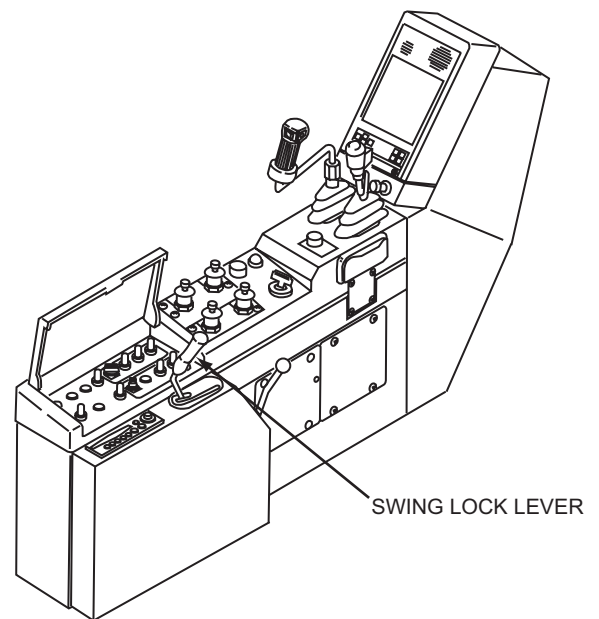
Confirm that the swing brake is functioning properly.

With the swing brake switch placed in the ON position, operate the swing control lever to confirm that the swing brake is functioning properly. When the swing brake is engaged, swinging is impossible.



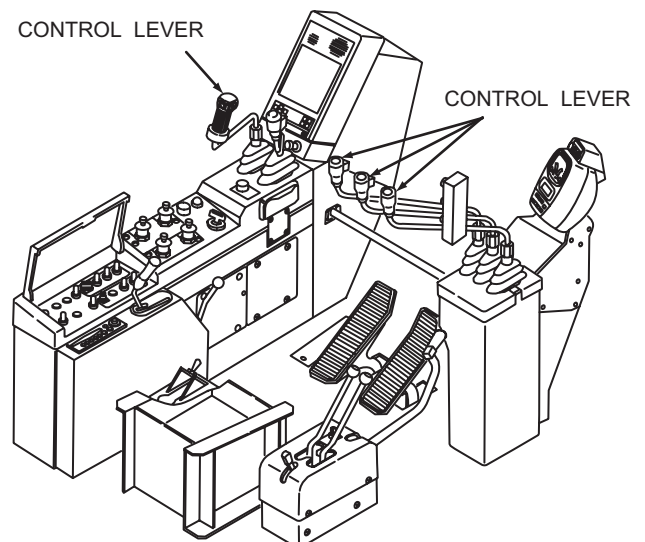
5. SWING LOCK

Confirm that the swing lock pin is inserted smoothly.
Check the lock pin and rod for deformities.



6. CONTROL LEVER

Inspect the control lever and brake pedal for unusual play and for damage.

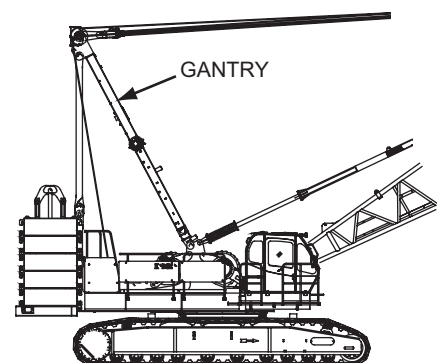


7. GANTRY

Inspect the gantry for damage.

CAUTION

Due to the high strength steels used in gantry and mast manufacturing, special repair procedures are required. Consult your local authorized KOBELCO authorize distributor for instructions.



8. HORN, HEAD LIGHT AND WIPER

Confirm that the horn, headlight and wiper operate normally by switch operate.

7. MAINTENANCE

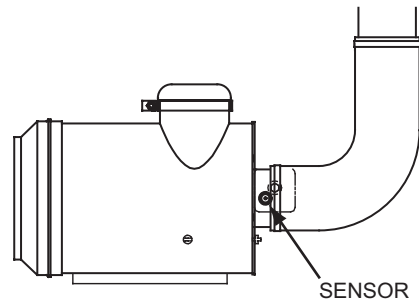
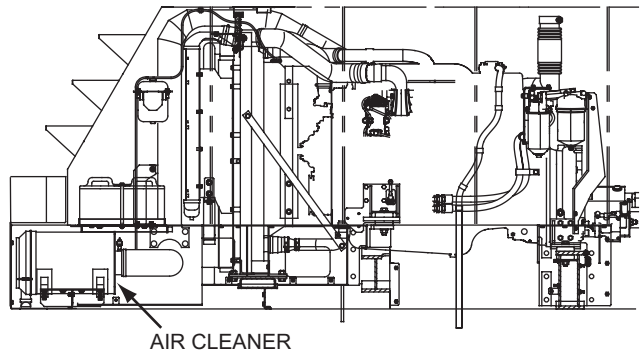
9. AIR CLEANER

Use the indicator to determine if the air cleaner is clogged.

When the air cleaner is clogged the error code will be indicated on the gauge cluster as below.



The engine air cleaner is clogged.
Clean or replace the element.



10. PIN, LINK AND COTTER PIN

Inspect the pin, link and cotter pin for damage and to determine if they are loose or missing.

11. BOLT AND NUT

Inspect the bolt and nut to determine if they are loose or missing.

12. HOOK OVERHOIST PREVENTIVE DEVICE

Confirm that the hook over hoist preventive device operates normally. (Refer to chapter 3.7)

13. BOOM OVERHOIST PREVENTIVE DEVICE

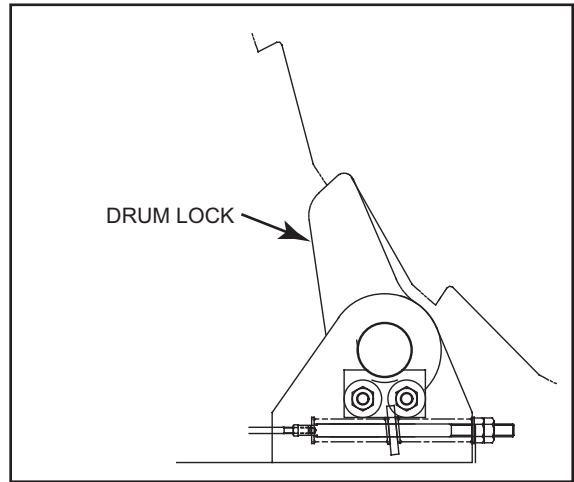
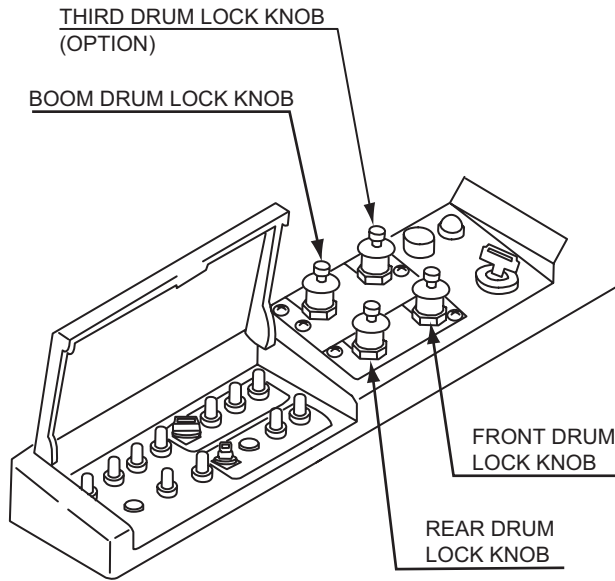
Confirm that the boom overhoist limit switch operates normally. (Refer to chapter 3.7)

14. LOAD SAFETY DEVICE

Confirm that operation is automatically stopped.
(Refer to chapter 3.7)

15. DRUM LOCK

Confirm that the drum lock functions normally.



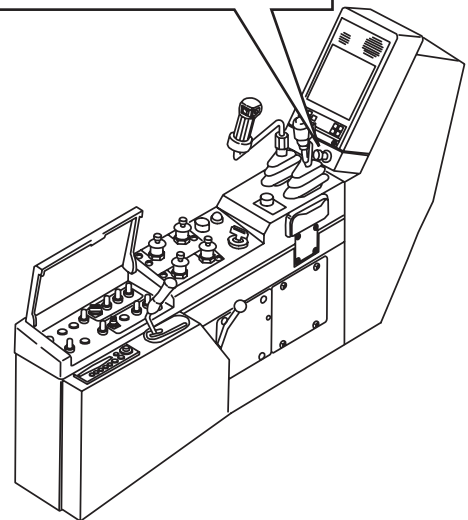
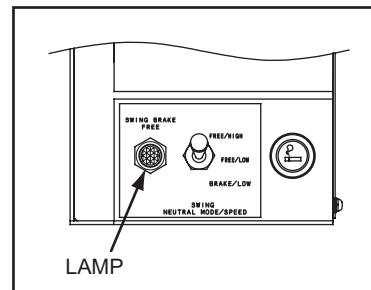
16. WINDOW GLASS, STEP, HANDLE AND GUARD

Always clean the window glass, step, handle and guard, etc.

Immediately remove any grease and oil.

17. SWING NEUTRAL FREE INDICATOR LAMP

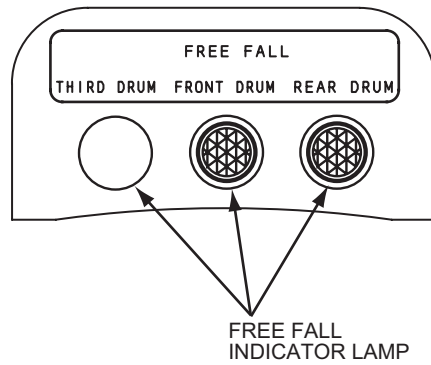
Set the swing mode selector switch to the "FREE" position and ensure that the swing neutral free indicator lamp lights up.



7. MAINTENANCE

18. DRUM BRAKE FREE FALL INDICATOR LAMP

Make sure that the free fall indicator lamp lights up when a drum brake selector switch is shifted to free fall position after the engine starts.



⚠ DANGER

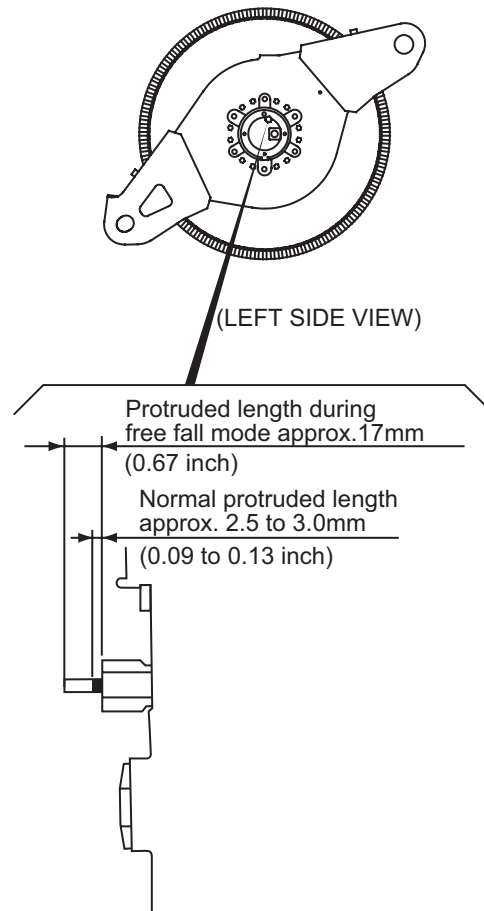
Be sure to lower the hook block onto the ground to prevent it from dropping abruptly.

19. DRUM BRAKE DISK

Check the wear of the brake disk with the indicator. If the FREE FALL mode is selected, the indicator is protruded by approximately 17 mm (5/8"). Stop the engine and press the indicator. If the indicator protrudes from the end face by approximately 2.5 to 3.0 mm (3/32" to 1/8"), the brake disk is normal. If the protruded length of the indicator is 0 mm (0 inch) or shorter, winching may be impossible. In such a case, replace the brake disk or contact your nearest KOBELCO authorize distributor.

⚠ DANGER

Be sure to lower the hook block onto the ground to prevent it from dropping abruptly.



7.1.1.2 UPPER STRUCTURE INSPECTIONS-MONTHLY OR EVERY 100 HOURS

20. FAN BELT

Inspect the fan belt for proper tension.
 Firmly push a middle of the fan belt with a finger.
 Deflection of 10 to 15 mm (13/32" to 19/32") is normal.



Turn the engine off before inspecting the fan belt.
 Failure to observe this precaution may result in serious injury or death.

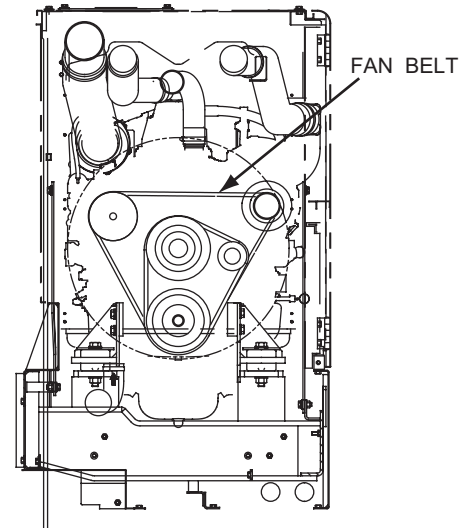
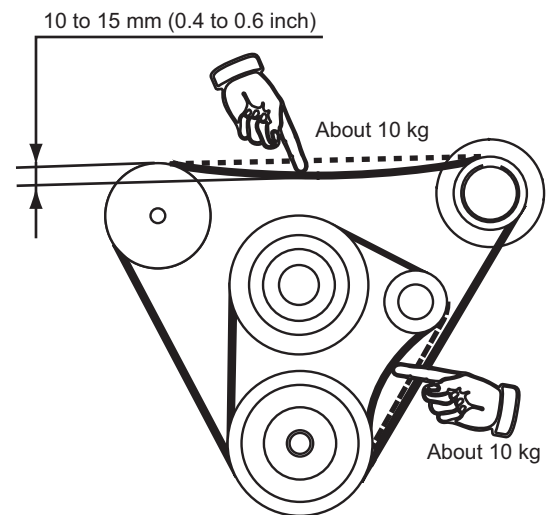


Figure where engine was viewed from the front

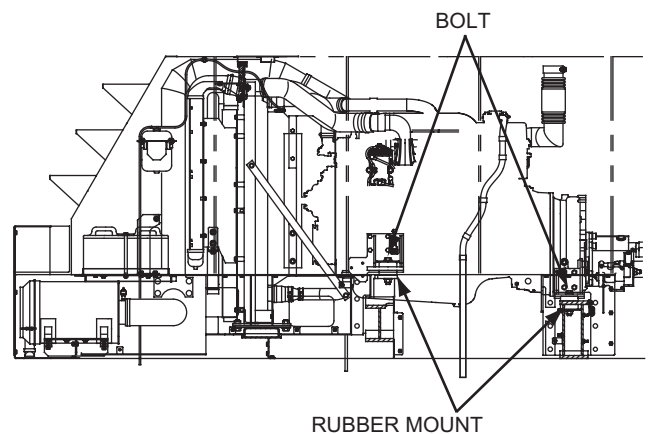


21. RADIATOR AND OIL COOLER

Clean the radiator core. Inspect the radiator and oil cooler for abnormalities.

22. ENGINE MOUNTING BOLT AND RUBBER MOUNT

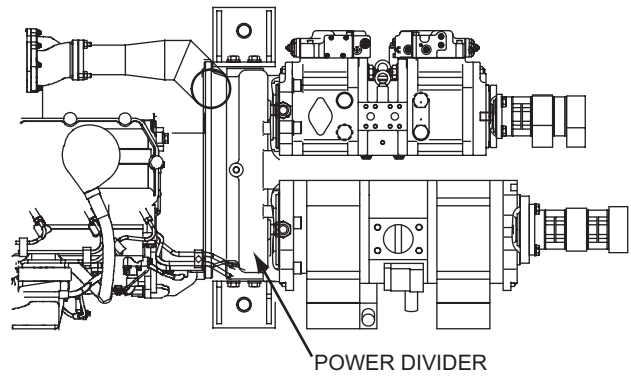
Inspect the engine mounting bolt for looseness, and the rubber mount for damage.



7. MAINTENANCE

23. POWER DIVIDER

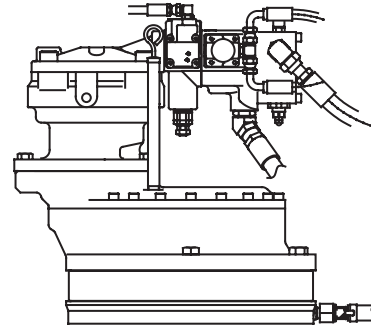
Check the power divider for oil leak and unusual noise.



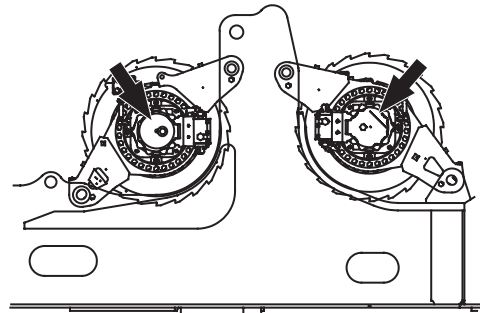
24. HYDRAULIC MOTOR AND REDUCTION UNIT

Inspect the following for oil leaks and unusual noise.

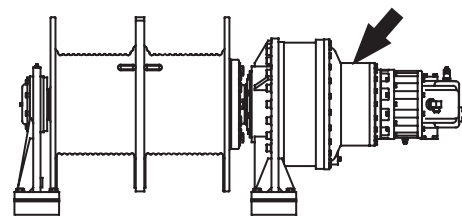
- Swing motor and reduction unit.
- Front and rear drum motors and reduction units.
- Boom hoist drum motor and reduction unit.



SWING MOTOR and REDUCTION UNIT



FRONT and REAR DRUM MOTORS and REDUCTION UNITS



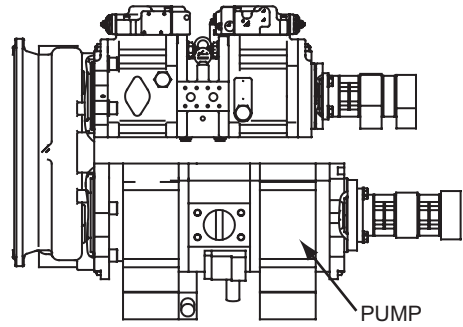
BOOM HOIST DRUM MOTOR and REDUCTION UNIT

25. VALVE

Inspect each valve for oil leaks.

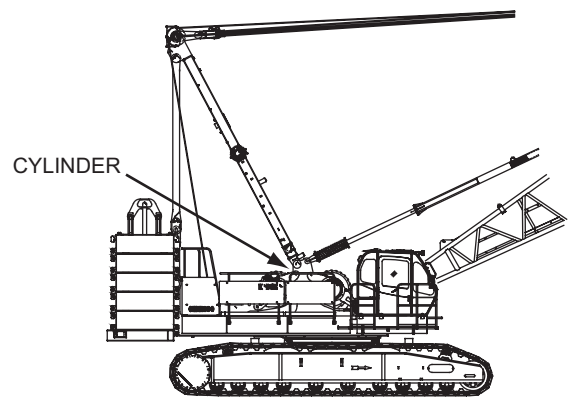
26. HYDRAULIC PUMP

Inspect the hydraulic pump for oil leaks and for unusual noise.



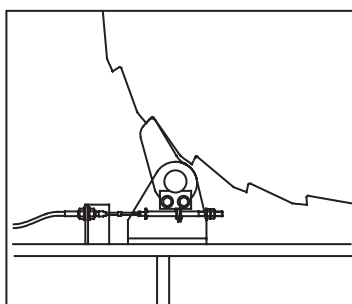
27. GANTRY CYLINDERS COUNTERWEIGHT SELF REMOVAL CYLINDERS

Inspect the gantry cylinder for oil leaks and damage.

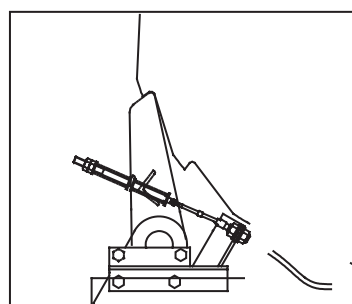


28. DRUM LOCK

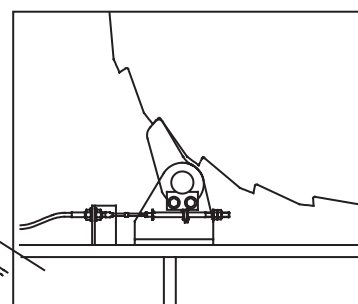
Inspect the drum lock and drum ratchet for wear and damage.



FRONT & REAR DRUM LOCK



BOOM DRUM LOCK

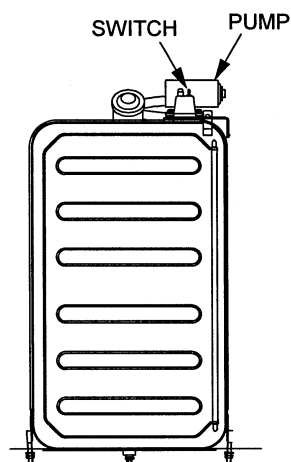


LUFFING JIB DRUM LOCK

7. MAINTENANCE

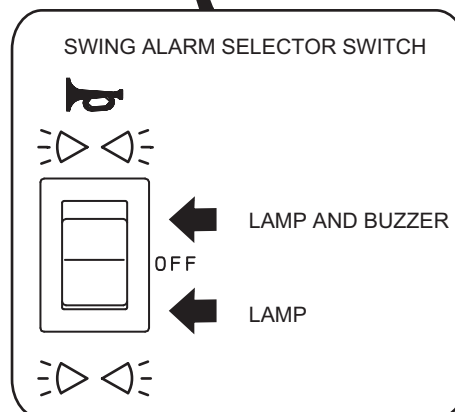
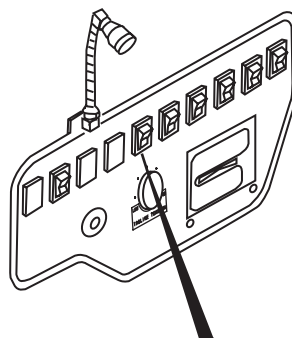
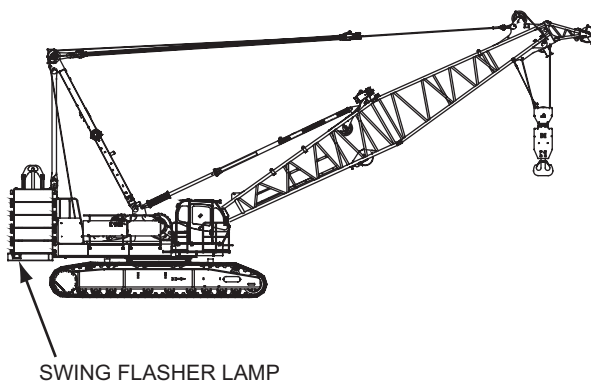
29. FUEL SUPPLY PUMP AND HOSE (OPTION)

Inspect the fuel supply pump for normal operation, and check the supply hose for damage.



30. SWING ALARM

Make sure that the swing alarm and swing flasher function properly while operating machine swing.



7.1.1.3 UPPER STRUCTURE INSPECTIONS-SEMI-ANNUALLY OR EVERY 600 HOURS

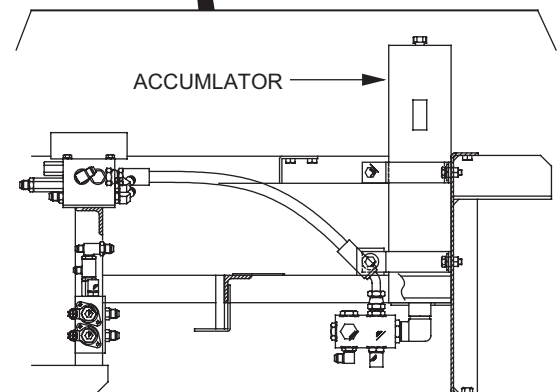
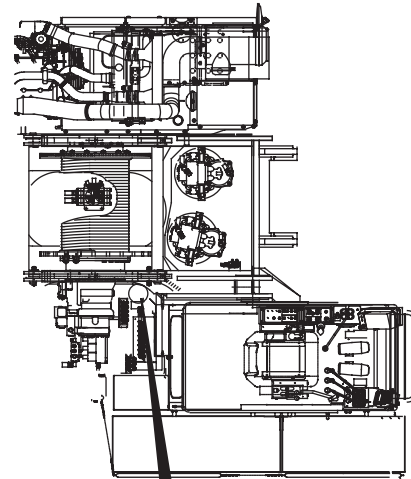
31. ACCUMULATOR

Inspect the accumulator for oil leaks.

WARNING

1. Do not handle the accumulator roughly.
2. Do not store or handle the accumulator near the heat of fire.
3. Do not weld or machine the accumulator.
4. Do not remove valve cap, except when charging or discharging gas.
5. Do not step on, or place heavy material on, the accumulator.
6. Inspect the accumulator for gas pressure every two years.
7. Ask your authorized KOBELCO authorize distributor to charge the gas.
8. Do not disassemble the accumulator.

The accumulator is charged with Nitrogen gas under pressure of 3400 to 3700 kPa (493 to 537 psi).



32. FRAME

Inspect the frame for cracks and deformities.

7. MAINTENANCE

7.1.1.4 UPPER STRUCTURE INSPECTIONS-WEEKLY OR EVERY 50 HOURS

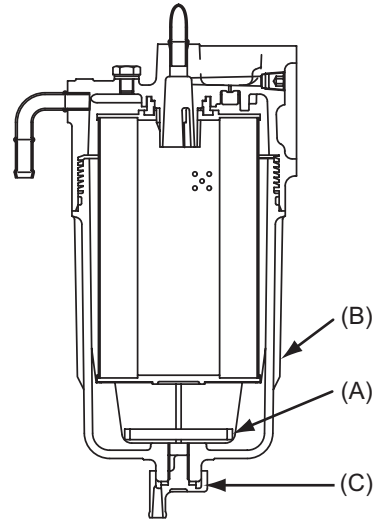
33. FUEL PRE-FILTER (OPTION)

DRAIN WATER FROM FUEL PRE-FILTER

If the red ring (A) of the pre-filter is on the bottom of the case (B), water does not get in.

When the red ring (A) floats, the water reaches up to the ring. Drain the water in accordance with the following procedures.

1. Place a container to receive the drained water under the drain hose.
2. Loosen the water draining plug (C) of the fuel pre-filter to drain water gathered at the bottom of the fuel pre-filter case.



CAUTION

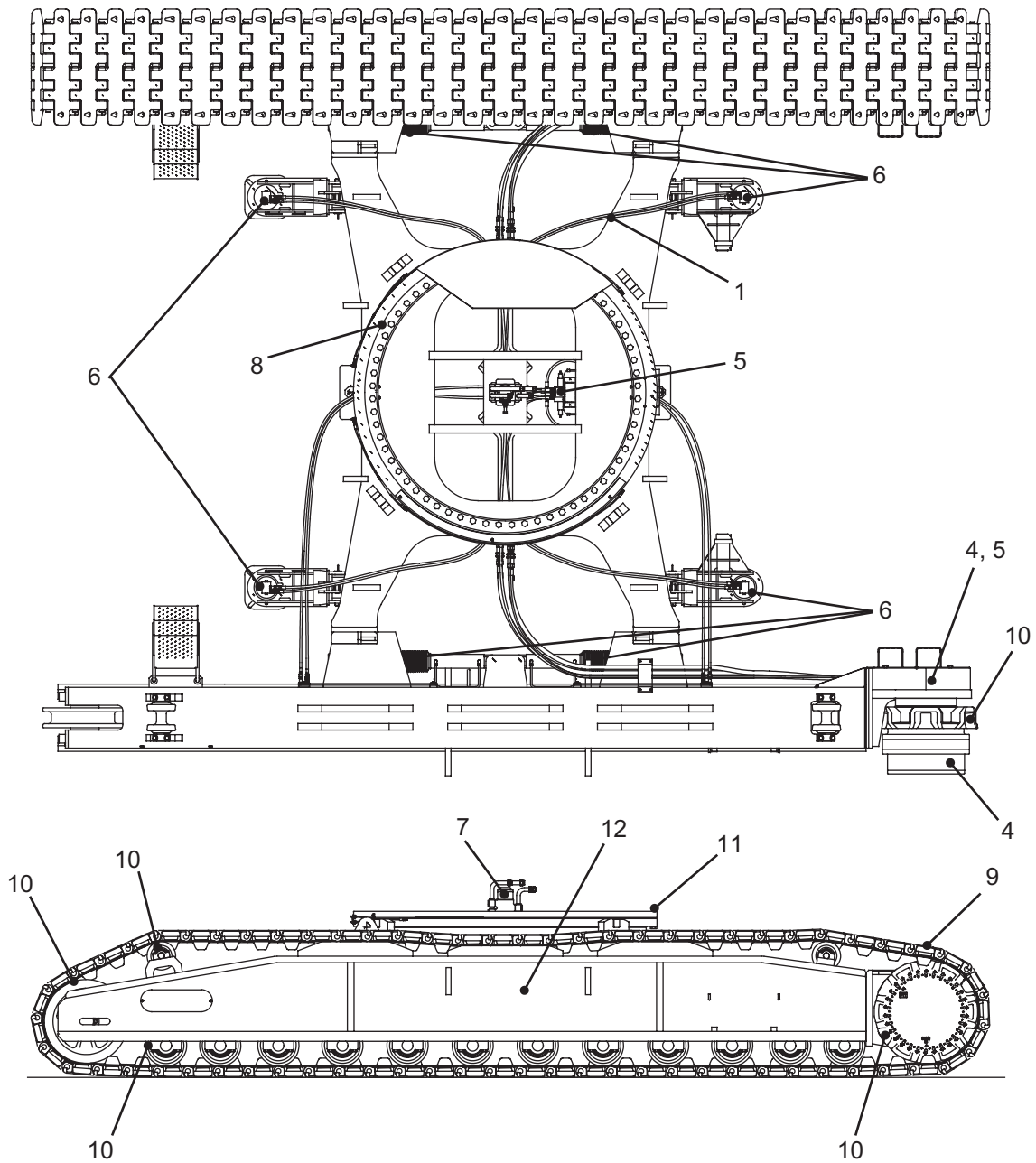
Drained water contains fuel, therefore, follow the processing regulation specified in each region, when disposing of it.

3. Tighten the water draining plug (C).
4. Actuate the priming pump and bleed air from the fuel system.

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7. MAINTENANCE

7.1.2 LOWER STRUCTURE PARTS AND DEVICE TO BE INSPECTED



Check Interval	Item No.	Identification	Check Item	Check Method	Reference page
Daily or every 8 hours	1	Hose, piping, Connector	Oil leak, damage	Visual check	7-21
	2	Pin, link, Cotter pin	Damage, falling off	Visual check	7-21
	3	Bolt, Nut	Looseness, falling off	Visual check	7-21
Monthly or every 100 hours	4	Hydraulic motor, Reduction unit	Oil leak, unusual noise	Visual check	7-22
	5	Valve, etc.	Oil leak	Visual check	7-22
	6	Translifter and crawler fixing pin cylinder (4 places)	Oil leak, damage	Visual check	7-22
	7	Swivel joint	Oil leak	Visual check	7-22
	8	Slewing ring bearing	Unusual noise	Check by hearing	7-22
	9	Crawler shoe	Extension, damage, wear	Visual check	7-23
Quarterly or every 250 hours	10	Drive sprocket, Crawler idler, Upper and lower rollers	Oil leak, damage	Visual check	7-24
	11	Slewing ring bearing mounting bolt	Looseness, falling off	Visual check	7-24
Semi-annually or every 600 hours	12	Frame	Damage, crack	Visual check	7-24

- The item number in the above table correspond to numbers in the following description.
- The item numbers, 2, and 3 are not indicated in the drawing.

7.1.2.1 LOWER STRUCTURE INSPECTIONS-DAILY OR EVERY 8 HOURS

1. HOSE, PIPING AND CONNECTOR

Inspect the hose, piping and connector, etc. for oil leaks and damage.

2. PIN, LINK AND COTTER PIN

Inspect the pin, link and cotter pin for damage, and to determine if they are loose or missing.

3. BOLT AND NUT

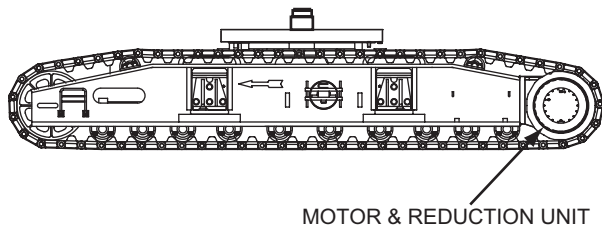
Inspect the bolt and nut to determine if they are loose or missing.

7. MAINTENANCE

7.1.2.2 LOWER STRUCTURE INSPECTIONS-MONTHLY OR EVERY 100 HOURS

4. HYDRAULIC MOTOR AND REDUCTION UNIT

Inspect the propel motor and reduction unit for oil leaks and unusual noise.

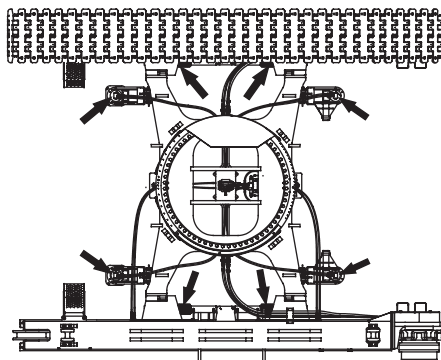


5. VALVE

Inspect the valve, etc. for oil leaks.

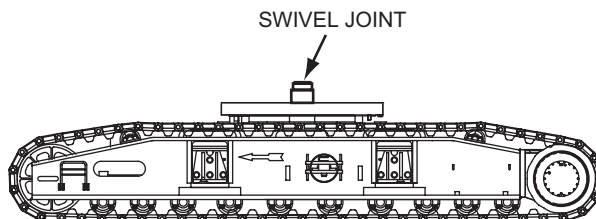
6. TRANSLIFTER AND CRAWLER EXT./RET. CYLINDERS

Inspect the translifter cylinders and the crawler extend/retract cylinders for oil leaks and damage.



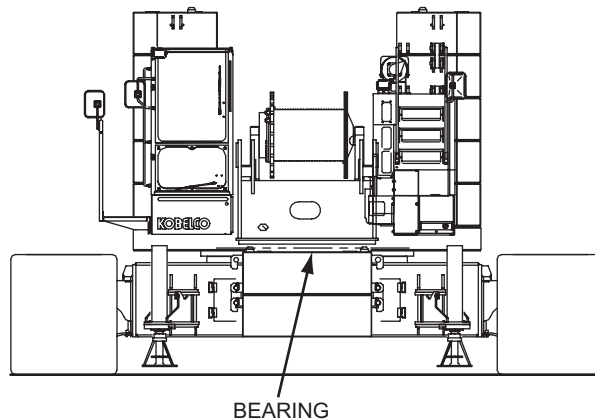
7. SWIVEL JOINT

Inspect the swivel joint for oil leaks.



8. SLEWING RING BEARING

Inspect the slewing ring bearing for unusual noise.

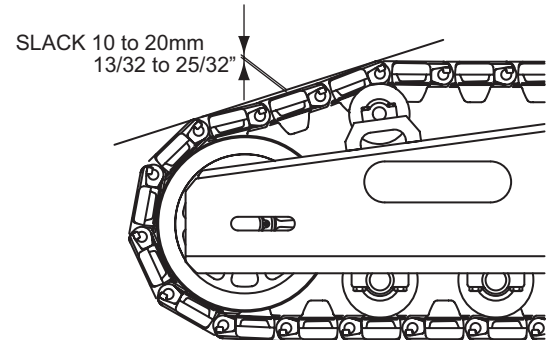
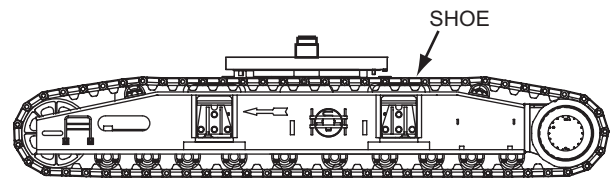


9. CRAWLER SHOE

Inspect the crawler shoes for damage or wear, and to determine if they are loose. If the shoes are too loose, the shoes may ride off the drive sprocket and idler wheel during propelling.

If the crawler shoes are too tight, the shoes wear quickly and connecting part of the shoes could break.

The slackening of 10 to 20 mm ($13/32$ to $25/32$ ") is normal after propelling the machine forward (about one crawler length). The slackening then appears on the top of the crawler.

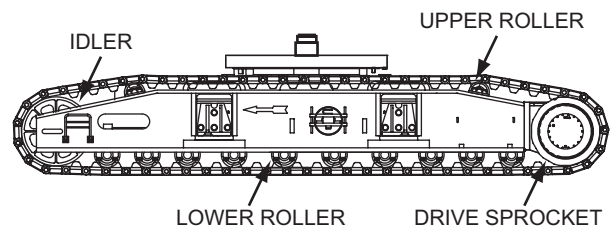


7. MAINTENANCE

7.1.2.3 LOWER STRUCTURE INSPECTIONS-QUARTERLY OR EVERY 250 HOURS

10. DRIVE SPROCKET, CRAWLER IDLER AND UPPER/LOWER ROLLERS

Inspect the drive sprocket, crawler idler and upper/lower rollers for oil leaks and damage.

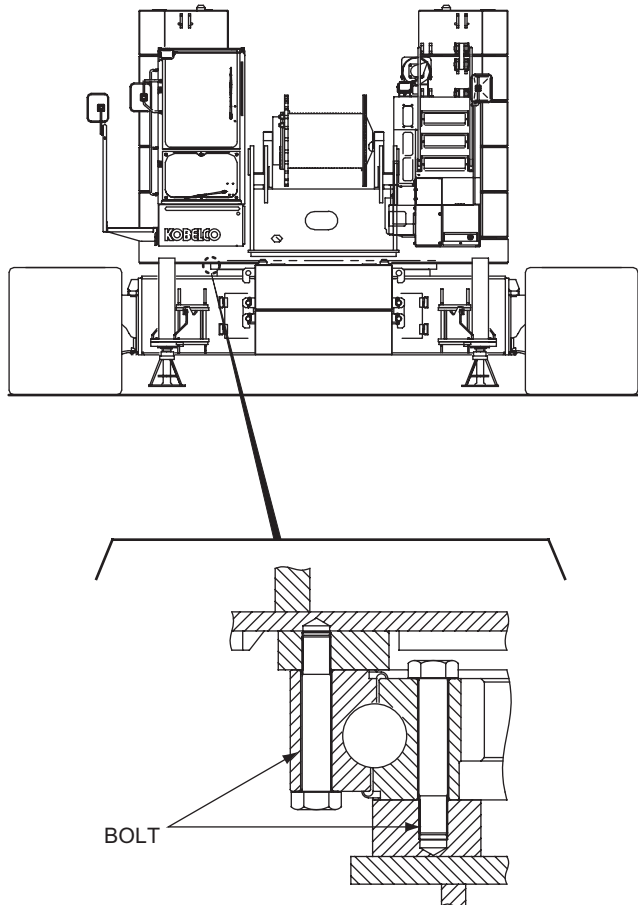


11. SLEWING RING BEARING MOUNTING BOLT

Inspect the slewing ring bearing mounting bolt to determine if it is loose or missing.

If the bolt is loose, remove and check the bolt. If the bolt is damaged, replace it with new one. If the bolt is not damaged, clean and coat it with Loctite #242 or equivalent, then securely tighten it.

Tightening torque : Inner bolt 2060 ft-lbs (2.8 KN-m)



7.1.2.4 LOWER STRUCTURE INSPECTIONS-SEMI-ANNUALLY OR EVERY 600 HOURS

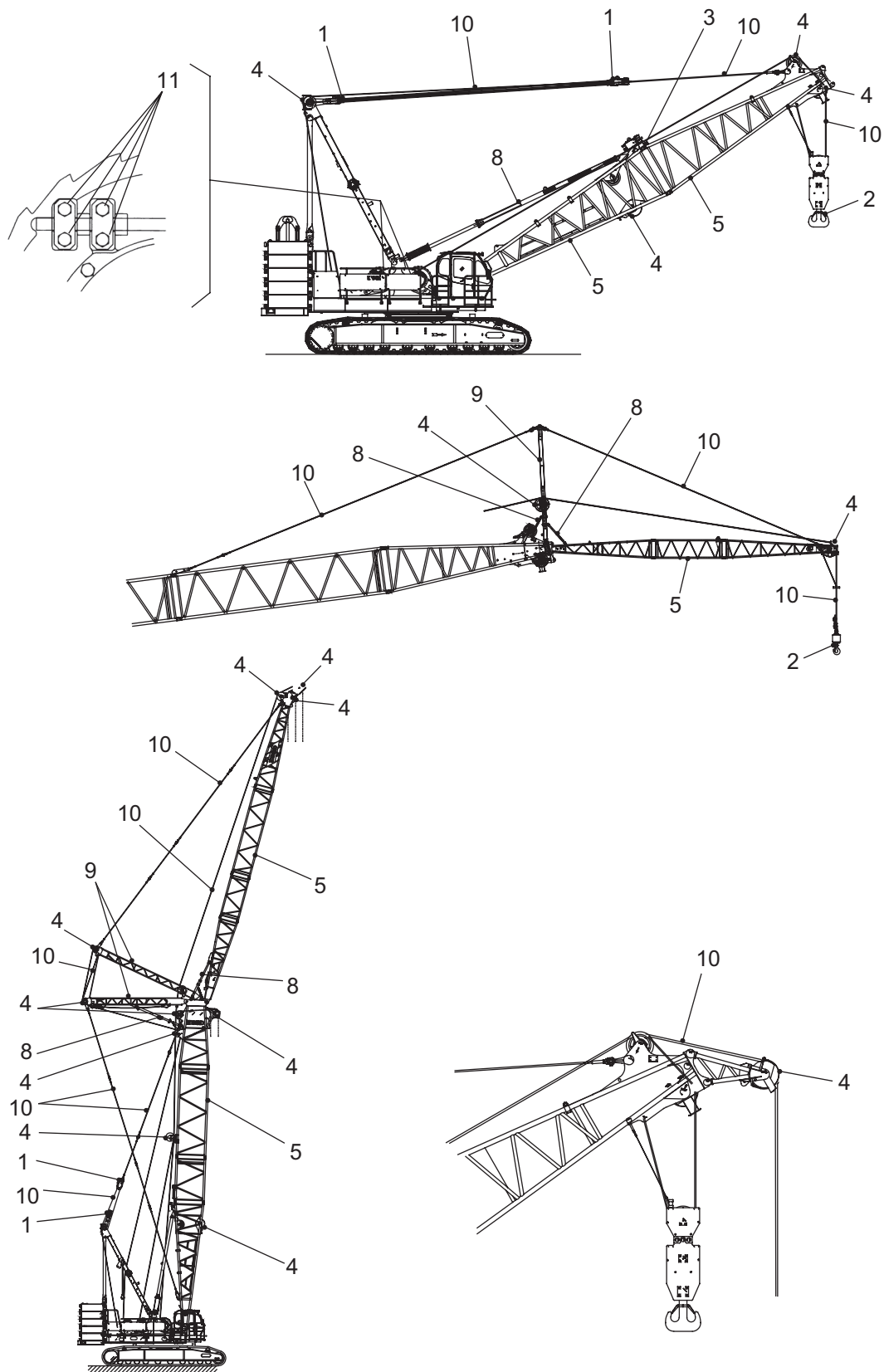
12. FRAME

Inspect the carbody and crawler frame for cracks and damage.

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7. MAINTENANCE

7.1.3 ATTACHMENT PARTS AND DEVICES TO BE INSPECTED



7. MAINTENANCE

Check Interval	Item No.	Identification	Check Item	Check Method	Reference page
Daily or every 8 hours	1	Upper spreader, Lower spreader	Deformation, crack	Visual check	7-28
	2	Hook, Wire Lock	Damage, deformation, wear	Visual check	7-28
	3	Cable roller	Damage, deformation, wear	Visual check	7-28
	4	Sheave	Damage, deformation, wear	Visual check	7-29
	5	Boom, Jib	Damage, deformation	Visual check	7-29
	6	Pin, Link, Cotter pin	Damage, falling off	Visual check	7-29
	7	Bolt, Nut	Looseness, falling off	Visual check	7-30
	8	Backstop	Damage, deformation	Visual check	7-30
	9	Strut	Damage, deformation, wear	Visual check	7-30
	10	Wire rope, Guy line	Damage, deformation, wear	Visual check	7-31
	11	Hoist wire rope clamp belt	Damage, looseness	Visual check	7-31

- The item number in the above table correspond to numbers in the following description.
- The item numbers, 6, and 7 are not indicated in the drawing.

7. MAINTENANCE

7.1.3.1 ATTACHMENT INSPECTIONS-DAILY OR EVERY 8 HOURS

1. UPPER SPREADER AND LOWER SPREADER

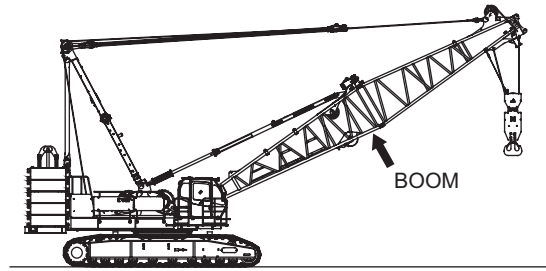
Inspect the sheave and frame of the upper and lower spreaders for damage.

WARNING

Do not touch a wire rope directly with bare hands. Protruding wires may cause injury. Working gloves are recommended. Failure to observe this precaution may result in serious injury or death.

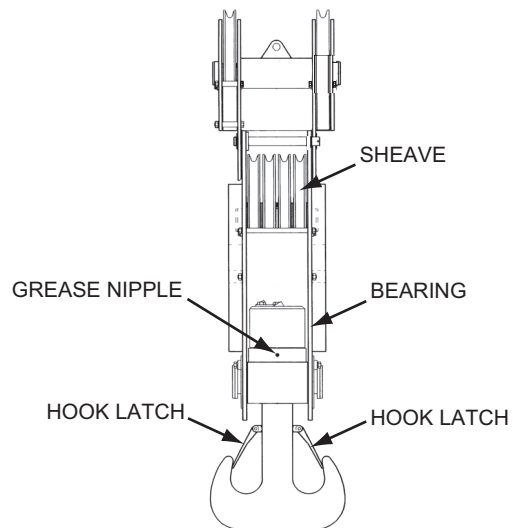
WARNING

Before climbing on machine, make certain that the guard and walk ways are clean and dry, and use a safety belt in order to prevent falls due to slippery surface. Failure to observe this precaution may result in serious injury or death.



2. HOOK, WIRE LOCK

Inspect the sheave, bearing and hook latch of the hook block for damage, and inspect the bolt and nut for falling off. (See page 7-32)



3. CABLE ROLLER

Inspect the following parts for damage, deformation, and wear.

- Cable roller for insert boom
- Cable roller for upper boom

4. SHEAVE

Inspect the following parts for damage, deformation, and wear.

- Boom point sheave
- Idler sheave
- Auxiliary sheave
- Jib point sheave
- Strut sheave

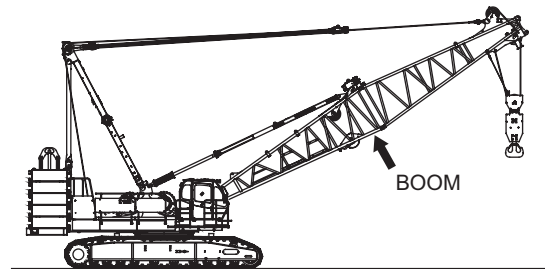
5. BOOM AND JIB

Inspect the boom and jib for damage and deformation. Do not use the damaged and/or deformed boom and jib.

Be sure to repair or replace the damaged boom or jib.

CAUTION

Due to the high strength steels used in boom and jibs manufacturing, special repair procedures are required. Consult your local authorized KOBELCO authorize distributor for instruction.



6. PIN, LINK AND COTTER PIN

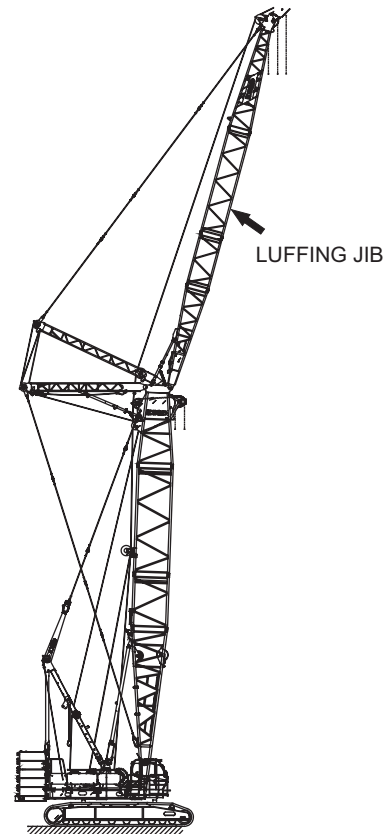
Inspect the pin, link and cotter pin for damage and to determine if they are loose or missing.

- Boom backstop
- Jib backstop
- Strut backstop

7. MAINTENANCE

7. BOLT AND NUT

Inspect the bolt and nut to determine if they are loose or missing.

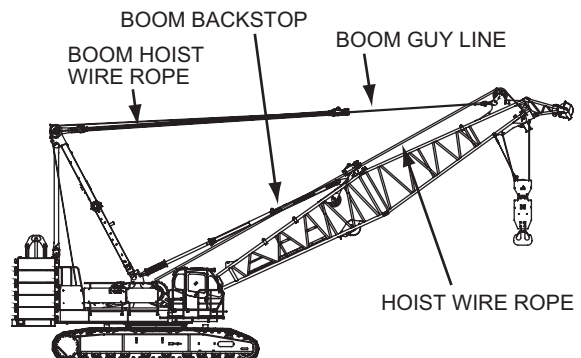


8. BACKSTOP

Inspect these backstops for damage and deformities.

CAUTION

Special procedures required for repair. Consult your local authorized KOBELCO authorize distributor for instruction.

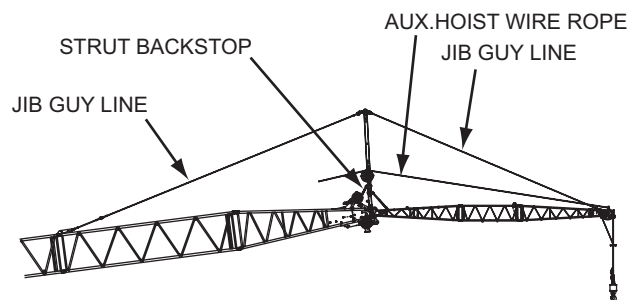


9. STRUT

Inspect the jib strut for damage and deformities.

CAUTION

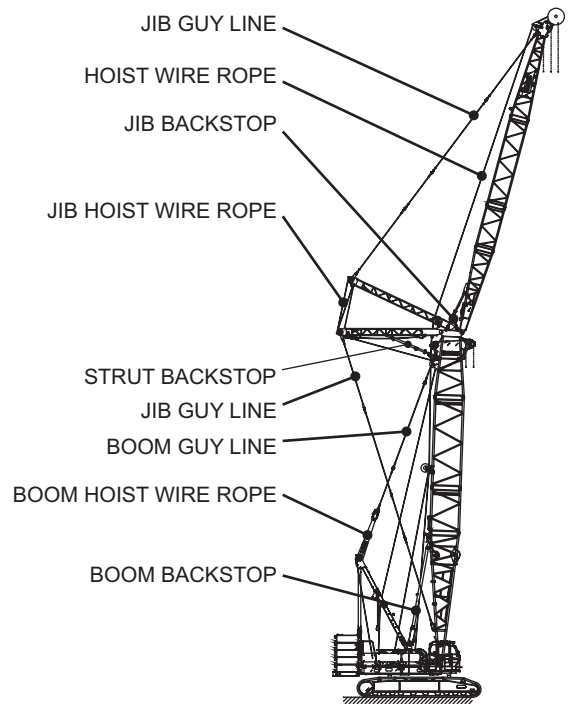
Special procedures are required for repair. Consult your local authorized KOBELCO authorize distributor for instruction.



10. WIRE ROPE AND GUY LINE

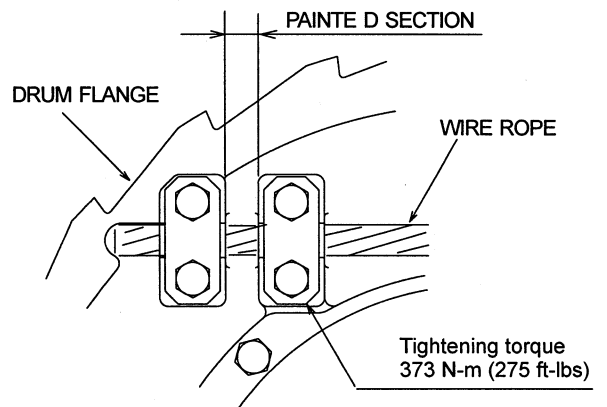
Inspect the wire rope and guy line for damage and deformities. Do not use the wire rope or guy lines that are broken or kinked.

(See the following page for examples.)



11. HOIST WIRE ROPE CLAMP BOLT

Ensure that the bolts securing the hoist wire rope to the drum flange are securely tightened, and the painted section of the wire rope is correctly positioned.



7. MAINTENANCE

7.1.4 REPLACEMENT STANDARDS FOR WIRE ROPE

1. CHECK AND REPLACEMENT STANDARDS OF WIRE ROPE

If the wire rope breaks during operation, it could cause a serious accident. Therefore, periodically check the rope. Never use wire ropes that are subject to wire-cut, abrasion, corrosion and other defects. The wire rope described below in Items 1 to 4 must be immediately replaced with new rope. Wire rope subject to damage (mentioned in Items 5 through 7) should be replaced with new ones as soon as possible, according to the degree of damage.

Kind of Wire rope
<ul style="list-style-type: none">• HOIST WIRE ROPE• GUY LINE• TAGLINE ROPE (OPTION)• REEVING WINCH ROPE (OPTION)• BOOM, JIB HOIST WIRE ROPE

- (1) Wire rope with 10% or more of the steel wires broken (not including filler wires) in one lay of wire. Inspection of internal breakage of wire is difficult. To check wire breakage in the valley section ropes, bend the rope sharply. Broken element wires, if any, will be exposed.

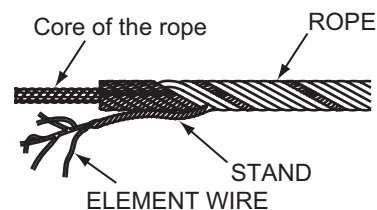
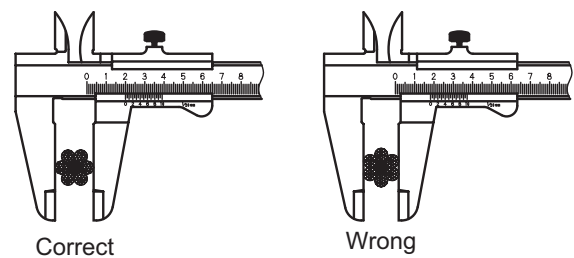
If wire breakage in the valley section is found, it is assumed that internal wires breakage has also developed. In other words, fatigue of the whole rope may have developed. The rope should be replaced immediately.

- (2) Wire rope of more than 7 % reduction of diameter from the nominal diameter, caused by abrasion.

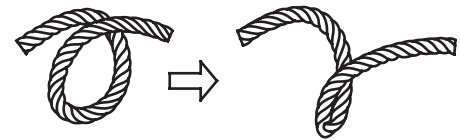


Band rope sharply to expose breakage

Method of measuring rope diameter



(3) Wire rope that is kinked.



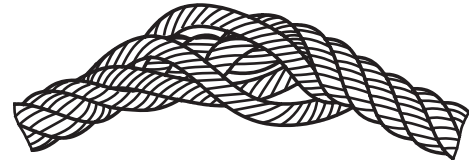
(4) Wire rope with excessive deformities or corrosion.



(5) Wire rope with excessive elongation due to overloading or derailment from sheaves.



(6) Wire rope where an electrical short circuit has been formed.



(7) Wire rope that has been exposed to fire or spark by electric current, gas welding, or high temperatures.

7. MAINTENANCE

2. REPLACEMENT STANDARD FOR GUYLINE

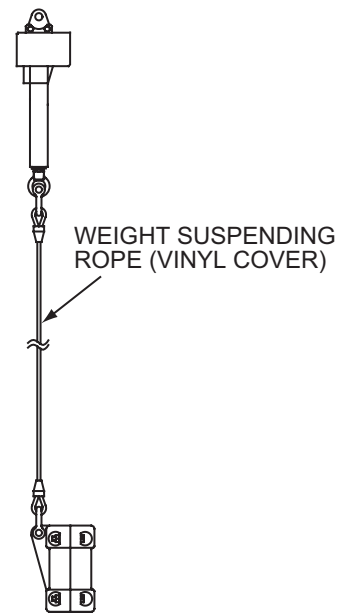
Since damage and corrosion are caused by fatigue on the inside of a boom guy line, replacement time cannot be judged by appearance.

If progressing internal damage and/or corrosion breaks the guy line, it could cause a serious accident. Be sure to periodically replace the guy line. Replacement time, according to the type of work performed, is shown in the table to the right.

Contents of Work	Replacement Interval
Lifting magnet or clamshell work only	2 years
Both crane and clamshell work, or frequent crane work such as landing work	4 years
Normal crane work	6 years

3. REPLACEMENT STANDARD OF WEIGHT SUSPENDING ROPE FOR OVER-WIND LIMIT SWITCH AND HOOK FIXING ROPE

If the vinyl cover of the wire rope is broken, or the rope itself has damages as mentioned in item 1, replace the rope at once.



MAIN AND AUX. HOOK MAINTENANCE STANDARD

The operating condition of main and aux. hook can change daily with use; therefore, they must be inspected daily (at start of each shift) and observed during operation for any defects which could affect their safe operation. Correct all defects before using the hook block or ball hook.

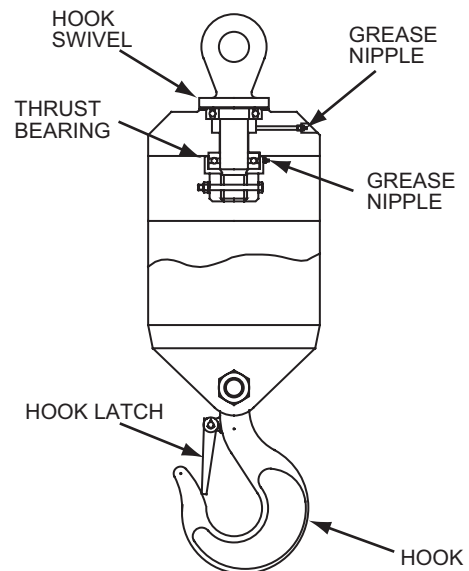
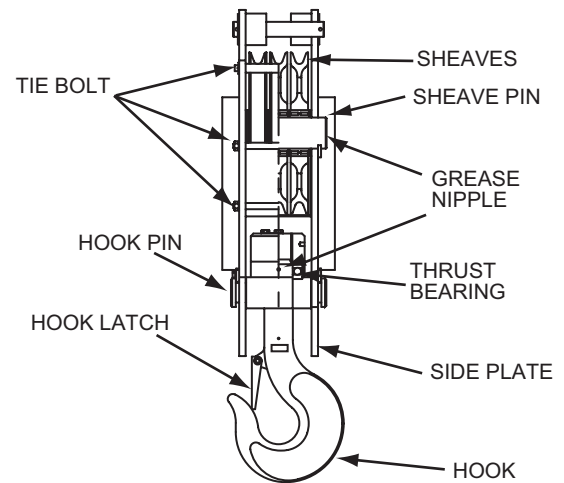
Daily inspection and maintenance will include the following points.

- (1) Clean the hook block or the ball hook.
- (2) Lubricate the sheaves (if fittings provided), the hook swivel, and any other part equipped with a grease fitting at the intervals specified in the "Lubrication Guide (Page 7-48)".
- (3) Tighten loose tie-bolts, capscrews, and setscrews. Check that all cotter keys are installed and opened.
- (4) Check the sheaves for uneven wear in the grooves and on the flanges. Check for loose or wobbly sheaves. These conditions indicate faulty bearings or bushings.
- (5) Check the fit of the wire rope in the groove of each sheave. An oversize wire rope can crack the lip of the sheave flange causing rapid wear of the wire rope and sheave. The groove must be larger than the wire rope, and the groove must be free of rough edges and burrs.

Note

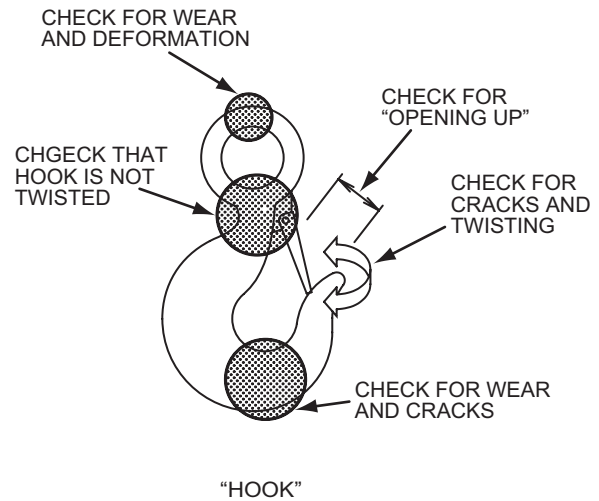
The groove in a plastic sheave must be the same size as the wire rope.

- (6) Check that the hook, the trunnion, and the swivel rotate freely without excessive play. Faulty operation indicates faulty bushings or bearings or inadequate lubrication.



7. MAINTENANCE

- (7) Check the swivel of the hook for the following conditions:
Overloading: Spin the swivel by hand; if the motion is rough or has a ratchet-like effect, the swivel bearings are damaged.
- (8) Check the main hook for signs of overloading: spread side plates, elongated holes, bent or elongated tie-bolts, and cracks.
- (9) Check the wire rope for wear and broken wires at the point the wire rope enters the dead-end socket. Check the socket for cracks. Tighten the wire-rope clips at the dead end of the wire rope.
- (10) Check that each hook is equipped with a hook latch and that the hook latch operates properly. The latch must not be wired open or removed.



CAUTION

Hook latch must retain slings or other rigging in hook under slack conditions. Hook latch is not intended as anti-fouling device, and caution must be taken to prevent hook latch from supporting any part of load. Slings or other rigging must be seated in hook when handling load; they must never be in position to foul hook latch.

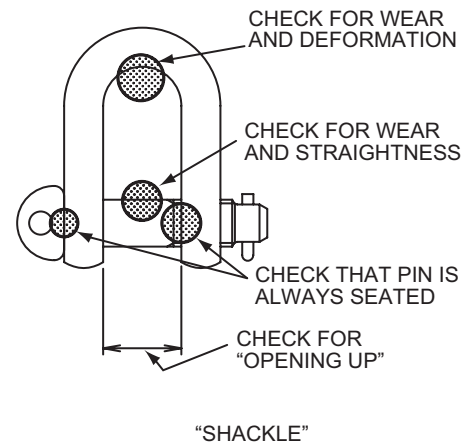
-
- (11) Inspect each hook and shackles for damage.

Note

Check each hook and shackle at least yearly for cracks using a dye penetrant test, MAG particle test, ultrasonic test, or by X-raying.

CAUTION

Do not attempt to repair cracks in hooks and shackles by welding. Furthermore, do not weld on any load bearing component unless proper welding methods are used (contact Service Department at factory for material and welding specifications)



7.2 OIL/GREASE SUPPLY AND WATER SERVICE

To ensure proper operation of this machine, all points requiring lubrication must be serviced with the correct lubricant (oil, grease and water) at the proper interval.

Standard oil (Water) Supply Capacity Table (not including Greasing Point)

	Points of Lubrication	Kind	Symbol	Capacity ltr. (gals)
UPPER	Engine	Engine oil SAE #10W-30	MO	30 (7.92)
	Radiator	Water (soft water)	-	40 (10.56)
	Fuel tank	Light oil JIS #2		400 (105.6)
	Hydraulic oil tank (Main)	Hydraulic oil #46	HO	540 (142.7)
	Hydraulic oil tank (luffing jib)	Hydraulic oil #46	HO	15 (4.0)
	Power divider	Gear oil #90	GO	3.1 (0.8)
	Front/rear drum reduction unit	Gear oil 80W-90	GO	22/each (5.8/each)
	Boom hoist drum reduction unit	Gear oil #90 or 80W-90	GO	16 (4.2)
	Third (luffing jib hoist) drum reduction unit	Gear oil #90 or 80W-90	GO	18 (4.8)
	Swing reduction unit	Gear oil #90	GO	9.4/each (2.5/each)
Lower	Propel reduction unit	Gear oil #90	GO	62/each (16.4/each)
	Idler wheel	Gear oil #140	GO	0.3/each (0.08each)
	Lower roller	Gear oil #140	GO	0.25/each (0.07/each)
	Upper roller	Gear oil #140	GO	0.13/each (0.03/each)

Note

1. The radiator is supplied with coolant combined with Long Life Coolant (antifreeze) of 30% to 50% concentration by volume.
2. When using the machine in extreme cold or extreme heat, see pages 7-31 and 7-32.

KOBELCO Genuine Lubricant Chart

Kind	Symbol	Specification	Part Number
Hydraulic oil	HO	KW46 (for general use)	20 ltr.can →2421R157D5 200ltr.can→2421R157D6
		KW32S (for cold region)	20 ltr. can →2421R157D3 200 ltr.can→2421R157D4
Extreme pressure grease	EPG		2121Z183
High temperature grease	HPG		2421Z183D2
Molybdenum disulphide grease	GL		2421Z183D3
Gear oil	GO	#90	20 ltr.can →KSPSP90020 200 ltr.can→KSPSP90200
		SAE #30 (class CD in API)	20 ltr.can →2421Z353D1 200 ltr. can→2421Z353D2
Engine oil	MO	SAE #10W (class CD in API)	20 ltr.can →2421Z354D1 200 ltr. can→2521Z354D2
		#10W-30 (CF4/DH-1)	20 ltr. can →YN01T01053D1 200 ltr. can →YN01T01053D2
		Long life coolant	18 ltr.can→KSPLL95-18 20 ltr. can→KSPLL95-20
Antifreeze	-	Permanent	18 ltr.can→KSPPT95-18 20 ltr.can→KSPPT95-20

7. MAINTENANCE

LUBRICATION CHART

Lubricant	Symbol	Recommended Lubricant (Initial Factory Fill)			
Hydraulic Oil	HO	Hydraulic oil with anti-wear, anti-oxidant an anti-harmful foaming			
		55 °C to 5 °C (131 °F to 41 °F)	40 °C to 5 °C (104 °F to 41 °F)	30 °C to -25 °C (86 °F to -13 °F)	15 °C to -30 °C (59 °F to -22 °F)
		ISO VG68	ISO VG46	ISO VG32	ISO VG22
Gear Oil	GO	Extreme pressure gear oil #90 Grade GL-4 by API classification			
Grease	EPG	Extreme pressure Multipurpose grease NLGI No.2 Lithium base grease EP type			
	GL	NLGI No.1 Lithium base with Mo52 grease			
Engine Oil	MO	Above 40 °C (104°F)	40 °C to 0 °C (104 °F to 32 °F)	40 °C to -30 °C (104 °F to -22 °F)	
		SAE40	SAE30	SAE10W-30	

RECOMMENDED HYDRAULIC OIL

	VG32 KW32S	VG32 KW32	VG46 KW46	VG68 KW68
ESSO	-	NUTO H32	NUTO H46	NUTO H68
MOBIL	DTE 13	DTE 24	DTE 25	DTE 26
CALTEX	-	RANDO HD32	RANDO HD46	RANDO HD68
SHELL	-	TELLUS 32	TELLUS 46	TELLUS 68
GULF	-	HARMONY 32AW	HARMONY 46AW	HARMONY 68AW

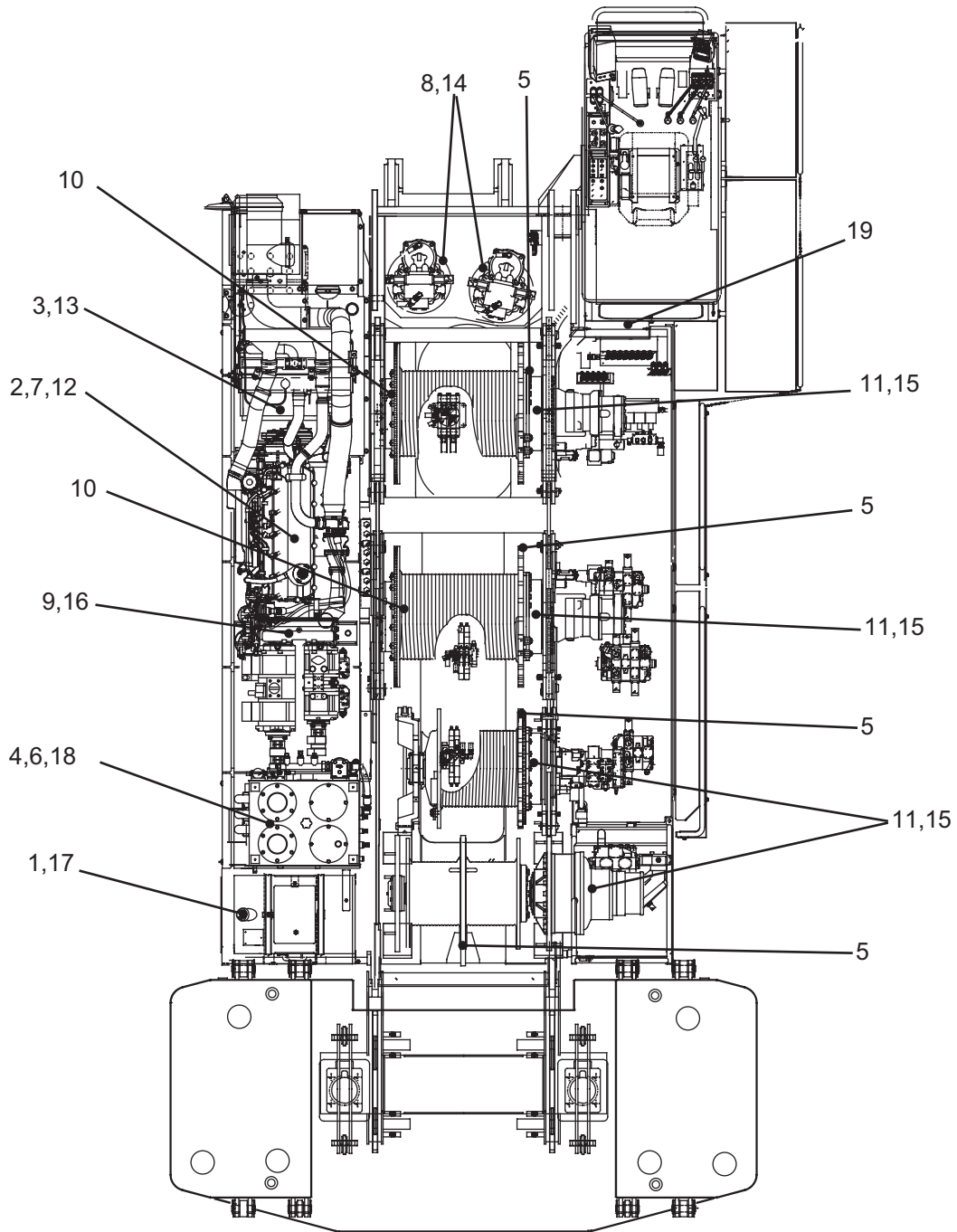
CAUTION

- Do not mix different brands of oil.
- Do not mix the original factory supplied oil with recommended hydraulic oil.

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7. MAINTENANCE

7.2.1 UPPER STRUCTURE LUBRICATION (INCLUDING WATER SUPPLY)

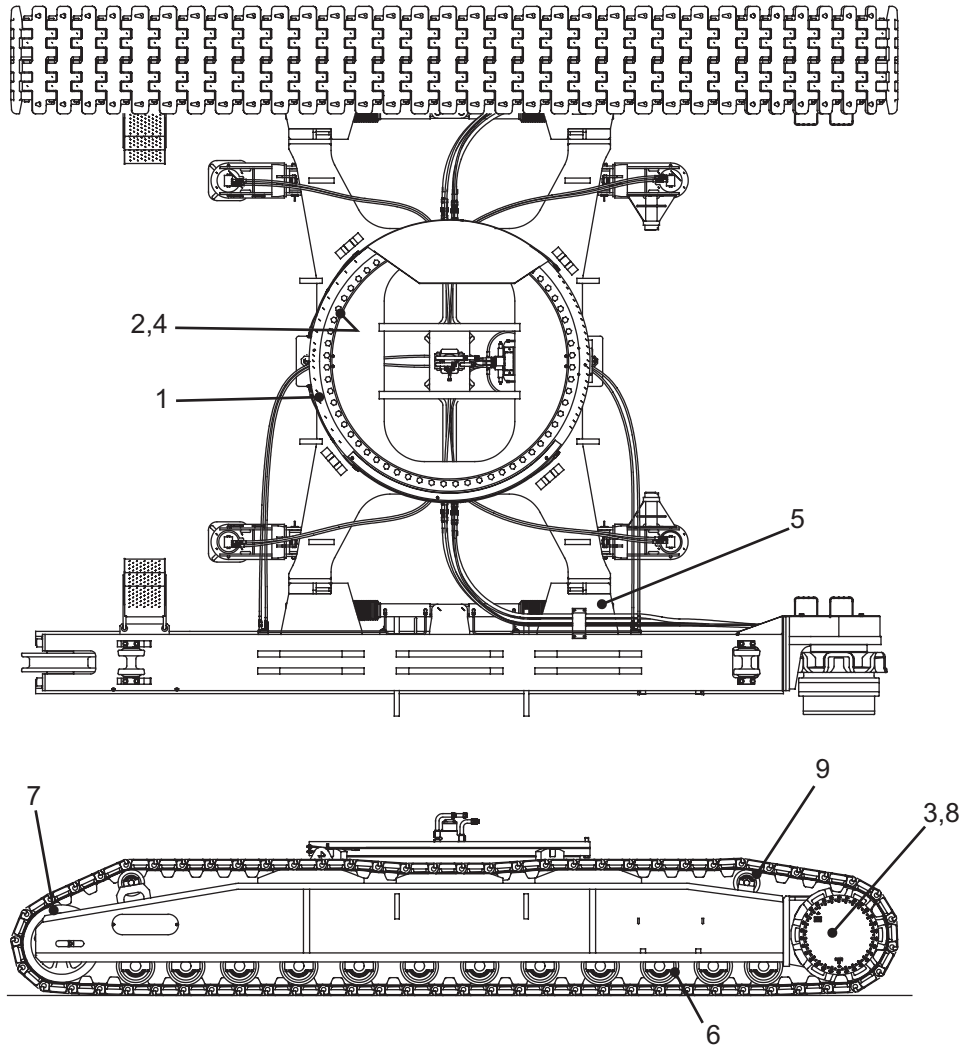


Upper Lubrication Table

Check and Lubrication Interval	Item No.	Check and Lubrication Place	Required Service	Kind of Lubricant	Reference Page
Daily or every 8 hours	1	Fuel tank	Supply fuel	Light oil	7-55
	2	Engine	Check oil level	MO	7-54
	3	Radiator	Check coolant level	Soft water	7-56
	4	Hydraulic oil tank	Check oil level	HO	7-58
Weekly or every 50 hours	5	Drum lock (Front, Rear, Third, Boom drums)	Grease	EPG	7-48
	6	Hydraulic oil tank	Drain		7-58
First time only (50 hours)	7	Engine	Replace oil	MO	7-54
Monthly or every 100 hours	8	Swing reduction unit	Check oil level	GO	7-61
	9	Power divider	Check oil level	GO	7-64
Quarterly or every 250 hours	10	Drumshaft bearing	Grease	EPG	7-49
	11	Winch reduction unit (Front, Rear, Boom)	Check oil level	GO	7-57,7-63
	12	Engine	Replace oil	MO	7-54
Half a year or 500 hours	17	Fuel tank	Drain		7-55
Annually or every 1000 hours	13	Radiator	Replace coolant		7-56
	14	Swing reduction unit	Replace oil	GO	7-62
	15	Winch reduction unit (Front, Rear, Boom)	Replace oil	GO	7-62,7-63
	16	Power divider	Replace oil	GO	7-64
Every 2 years or 2000 hours	18	Hydraulic oil tank	Replace oil	HO	7-59
	19	Washer tank	Supply liquid	Washer liquid	

7. MAINTENANCE

7.2.2 LOWER STRUCTURE LUBRICATION



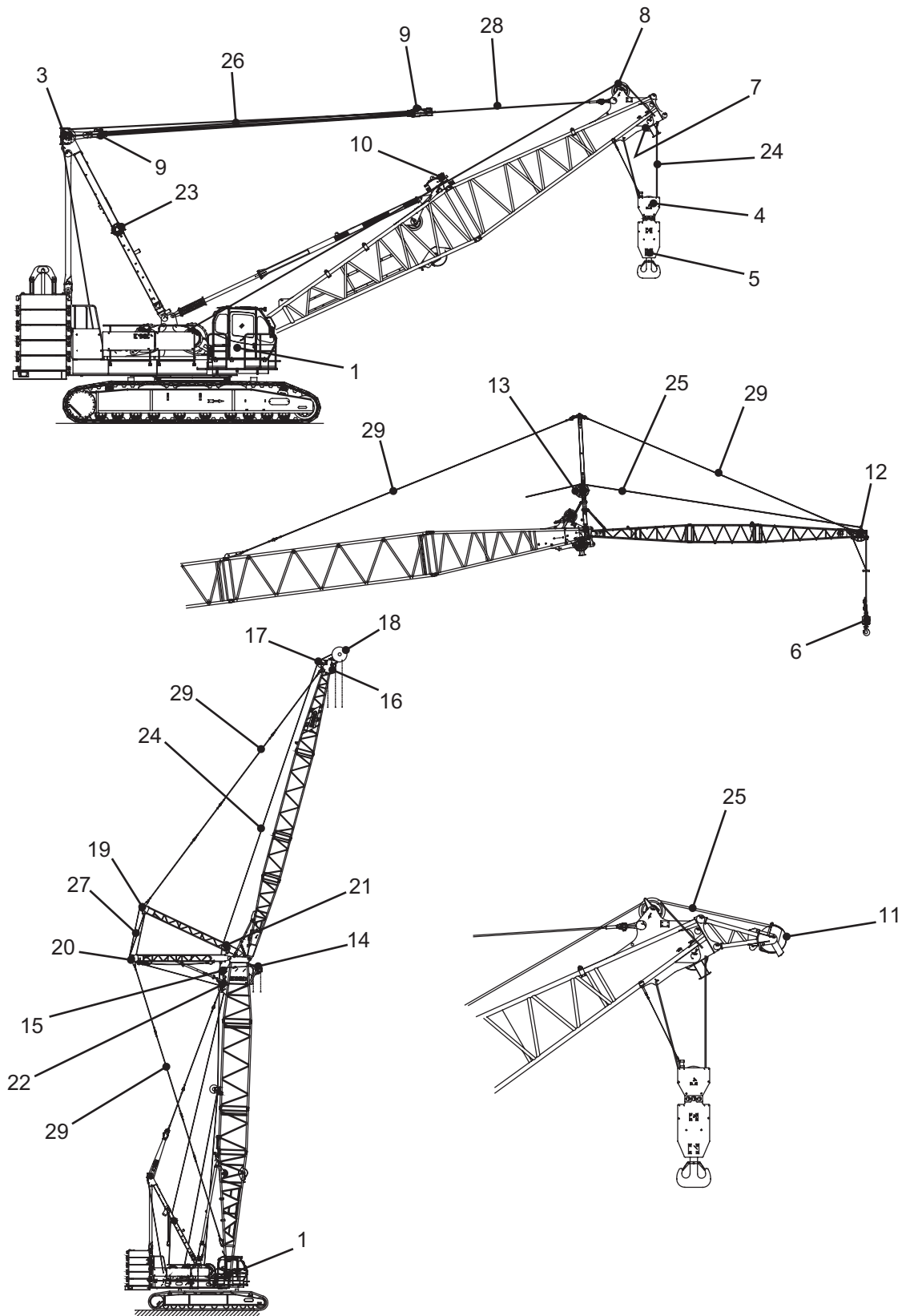
Check and Lubrication Interval	Item No.	Check and Lubrication Place	Required Service	Kind of Lubricant	Reference Page
Weekly or every 50 hours	1	Slewing ring bearing	Grease	EPG	7-49
	2	Slewing ring gear (When operating clamshell or lifting magnet)	Grease	GL	7-50
Quarterly or every 250 hours	3	Propel reduction unit	Change oil level	GO	7-64
	4	Slewing ring gear	Grease	GL	7-49
	5	Clawler connecting pin (4points)	Grease	EPG	7-50
Annually or every 1000 hours	6	Lower roller	Check oil level	GO	7-65
	7	Idler wheel	Check oil level	GO	7-65
	8	Propel reduction unit	Check oil leak	GO	7-64
	9	Upper roller	Check oil level	GO	7-65

- As for items 3,4 and 5 check for oil leaks. If any leak is found, overhaul is required.

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7. MAINTENANCE

7.2.3 ATTACHMENT LUBRICATION



Lubrication Interval	Item No.	Lubrication Place	Required Service	Kind of Lubricant	Reference Page
Daily or every 8 hours	1	Boom foot pin	Grease	EPG	7-47
	2	Gantry link	Grease	EPG	2.GANTRY LINK
	3	Gantry slide sheave	Grease	EPG	7-47
Weekly or 50 hours	4	Hook sheave	Grease	EPG	7-48
	5	Hook bearing	Grease	EPG	7-49
	6	Ball hook bearing	Grease	EPG	7-49
See Note 1.	7	Boom point sheave, Jib point sheave	Grease	EPG	7-50
	8	Idler sheave	Grease	EPG	7-37
	9	Upper and lower spreader sheave	Grease	EPG	7-51
	10	Cable roller	Grease	EPG	7-53
	11	Auxiliary sheave	Grease	EPG	7-52
	12	Jib point sheave (Fixing jib)	Grease	EPG	
	13	Strut sheave	Grease	EPG	7-52
	14	Luffing boom point sheave	Grease	EPG	7-52
	15	Luffing boom idler sheave	Grease	EPG	7-52
	16	Jib point sheave (Luffing jib)	Grease	EPG	
	17	Jib idler sheave (Luffing jib)	Grease	EPG	
	18	Auxiliary sheave (Luffing jib)	Grease	EPG	7-52
	19	Strut point sheave (Luffing jib)	Grease	EPG	7-52
	20	Strut point sheave (Luffing jib)	Grease	EPG	7-52
	21	Strut guide sheave (Luffing jib)	Grease	EPG	7-52
	22	Guide sheave (For luffing jib hoist rope)	Grease	EPG	7-52
23	Guide sheave (For luffing jib hoist rope)	Grease	EPG	7-52	
See Note 2.	24	Main hoist wire rope	Lubricate	WO	
	25	Auxiliary hoist wire rope	Lubricate	WO	
	26	Boom hoist wire rope	Lubricate	WO	
	27	Luffing jib hoist wire rope	Lubricate	WO	
	28	Boom guy line	Lubricate	WO	
	29	Jib guy line	Lubricate	WO	

Note

1. Item No. 13 to 29 are grease sealing type bearing. Lubricate or replace according to the operating conditions.
2. Lubricate wire ropes, according to the operating conditions.
To lubricate wire ropes, use a brush or spray.

7. MAINTENANCE

7.2.4 GREASE

	Greasing Place	Kind of Lubricant	Greasing Time (Hourmeter: Hrs)			
			8	50	250	Remark
1	Boom foot pin	EPG	0			
2	Gantry link	EPG	0			
3	Gantry sheave	EPG	0			
4	Drum lock (Front, Rear, Third and boom drums)	EPG		0		
5	Hook sheave	EPG		0		
6	Hook bearing	EPG		0		
7	Ball hook bearing	EPG		0		
8	Drumshaft bearing	EPG			0	
9	Slewing ring bearing	EPG		0		
10	Slewing ring gear	GL		0*	0	
11						
12	Crawler connecting pin cylinder (4 places)				0	
13	Boom point sheave	EPG				(1)
14	Idler sheave	EPG				(1)
15	Upper and lower spreader sheave	EPG				(1)
16	Auxiliary sheave (Crane)	EPG				(1)
17	Strut sheave (Fixing jib)	EPG				(1)
18	Strut sheave (Luffing jib)	EPG				(1)
19	Strut point sheave (Luffing jib)	EPG				(1)
20	Luffing boom point sheave	EPG				(1)
21	Luffing boom idler sheave	EPG				(1)
22	Guide sheave (For luffing jib hoist rope)	EPG				(1)
23	Cable roller (Upp. boom, insert boom)	EPG				(1)

*mark shows the time for clamshell and lifting magnet operation.

Before greasing, clean the grease fitting.

Wipe off the extra grease.

- These sheaves or rollers are grease sealing type bearing. Lubricate or replace according to the operating conditions.

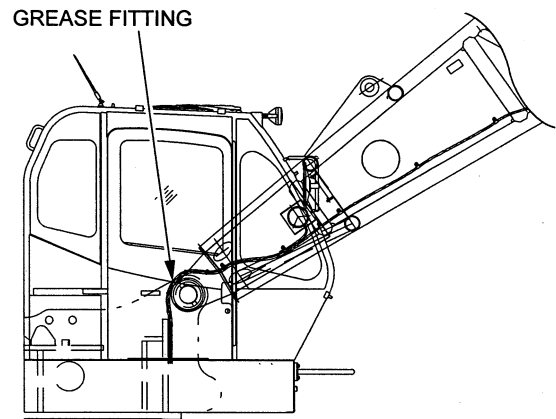


Turn the engine OFF before lubrication.

Failure to observe this precaution may result in serious injury or death.

1. BOOM FOOT PIN

Grease from the grease fittings on the revolving frame (left and right).

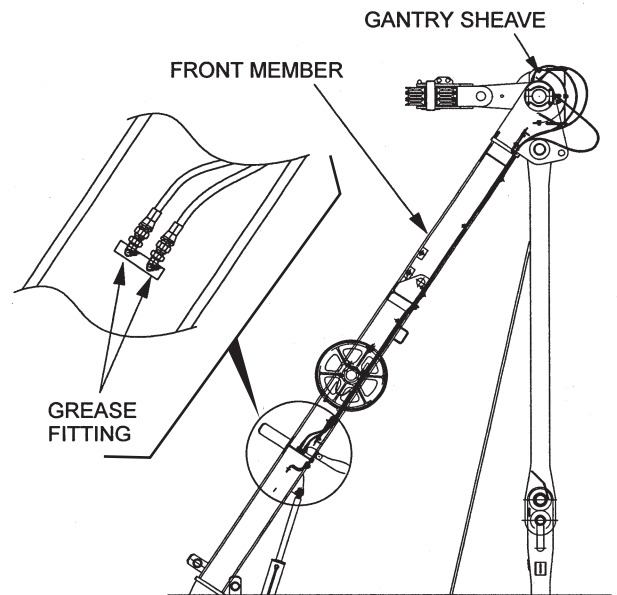


2. GANTRY LINK

Grease from the grease fittings provided on the front member.

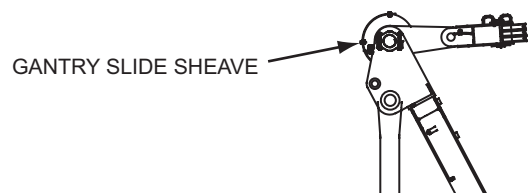


Before climbing on machine, make certain that the guard and walk ways are clean and dry, and use a safety belt in order to prevent falls due to slippery surface. Failure to observe this precaution may result in serious injury or death.



3. GANTRY SHEAVE

Grease from the grease fittings provided on the sheave.

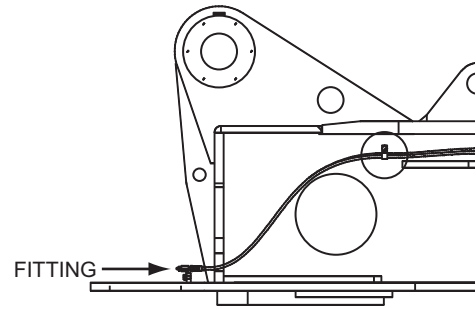


Before climbing on machine, make certain that the guard and walk ways are clean and dry, and use a safety belt in order to prevent falls due to slippery surface. Failure to observe this precaution may result in serious injury or death.

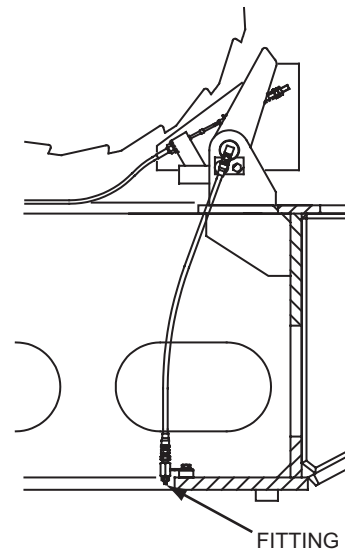
7. MAINTENANCE

4. DRUM LOCK

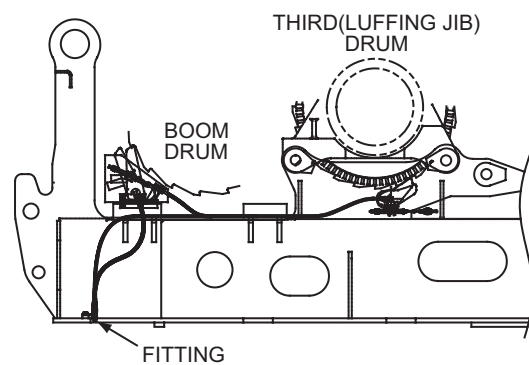
To grease the front and rear drum locks, grease from the grease fittings provided on the front of the revolving frame (two places).



To grease the boom hoist drum lock, grease from the grease fitting provided on the revolving frame.

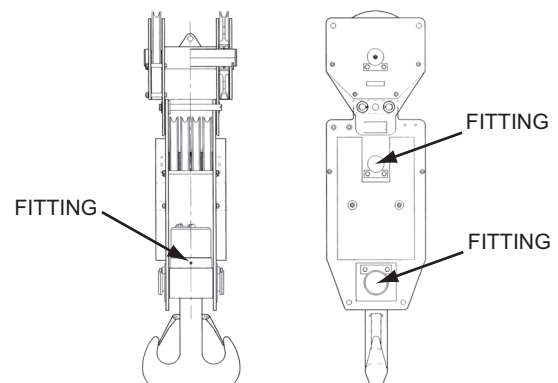


To grease the third drum lock, grease from the grease fitting provided on the front of the revolving frame.



5. HOOK SHEAVE

Grease through the grease fitting on the sheave pin.

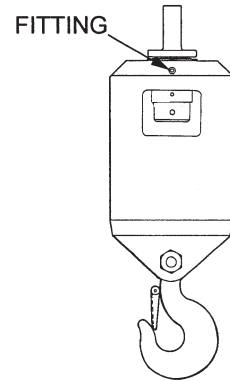


6. HOOK BEARING

Grease through the grease fitting on the bearing cap.

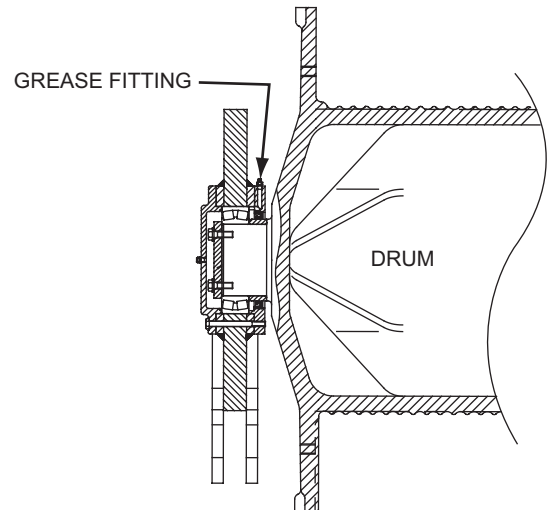
7. BALL HOOK BEARING

Grease through the grease fitting provided on the bearing cap.



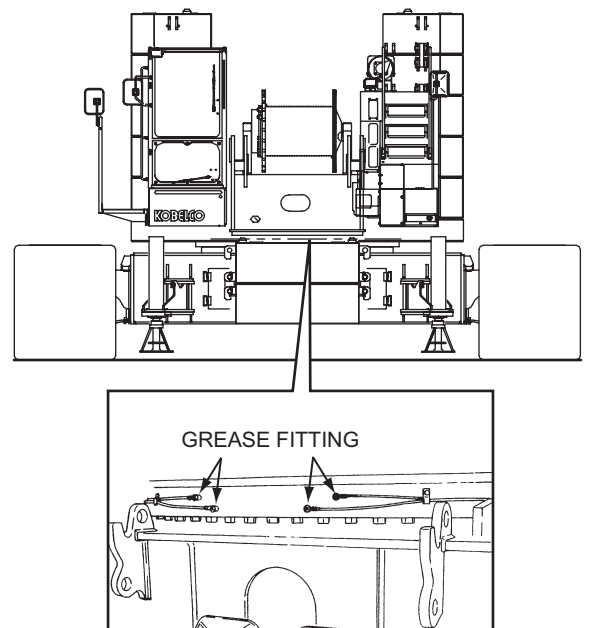
8. DRUMSHAFT BEARING

Grease from the grease fittings provided on the side stand and drum shaft bearing retainer.



9. SLEWING RING BEARING

Grease from the grease fittings provided on the slewing ring bearing.



7. MAINTENANCE

10. SLEWING RING GEAR

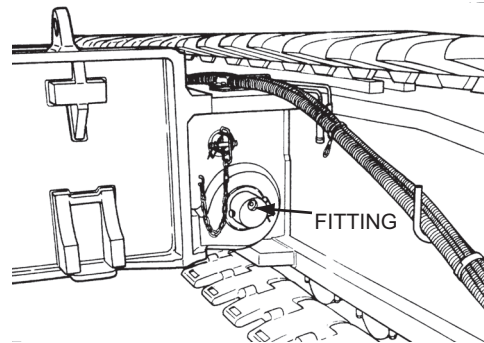
Remove the under cover, and grease from under the machine so that the whole large gear is lubricated.



To avoid injury, do not apply grease to slewing ring gear directly by hand.

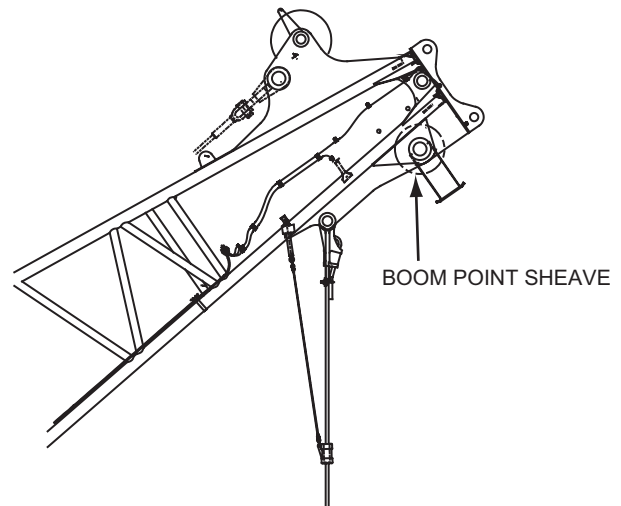
12. CRAWLER FRAME CONNECTING PIN (4 POS.)

Grease from the grease fittings on the pins.



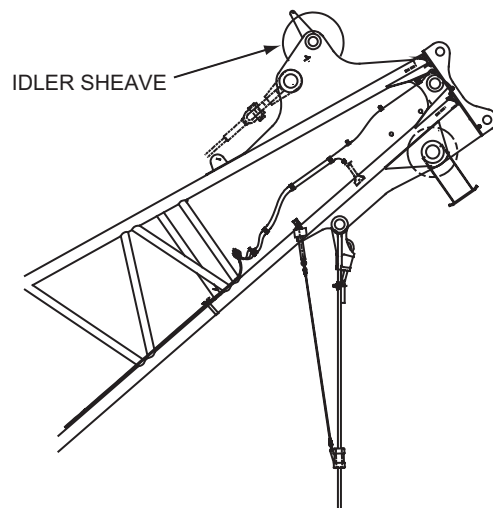
13. BOOM POINT SHEAVE

Grease from the grease fitting provided on each boom point sheave.



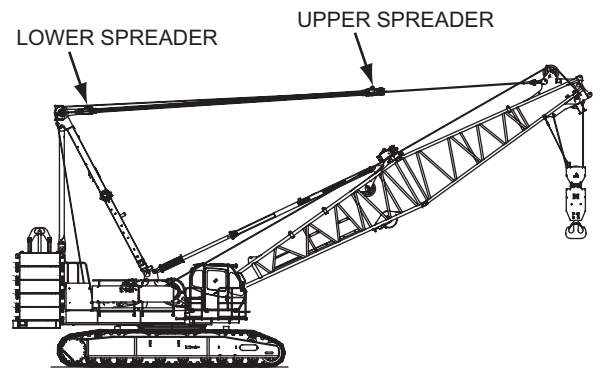
14. IDLER SHEAVE

Grease from the grease fitting provided on each idler sheave.



15. UPPER AND LOWER SPREADER SHEAVE

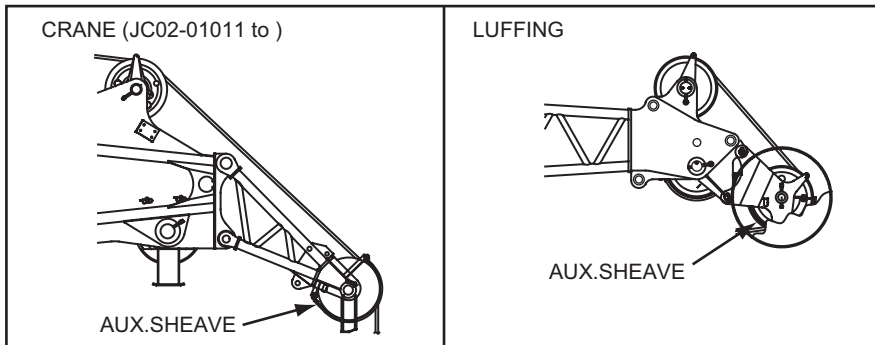
Grease from the grease fitting provided on each lower spreader sheave.



7. MAINTENANCE

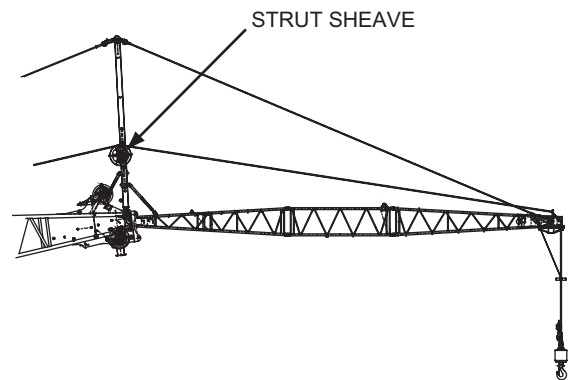
16. AUXILIARY SHEAVE

Grease from the grease fitting provided on the auxiliary sheave.



17. STRUT SHEAVE (FIXING JIB)

Grease from the grease fitting provided on the strut sheave.

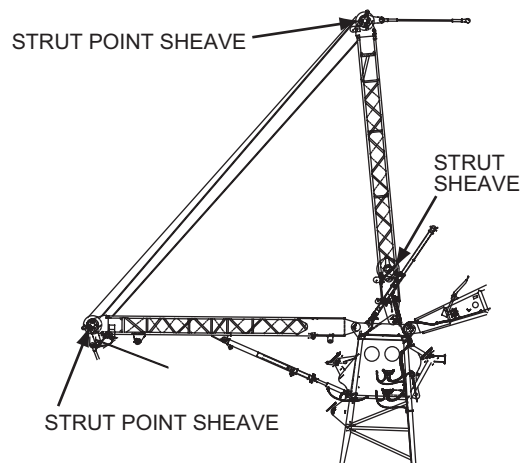


18. STRUT SHEAVE (LUFFING JIB)

Grease from the grease fitting provided on each strut sheave.

19. strut point sheave (luffing jib)

Grease from the grease fitting provided on each strut point sheave.



20. LUFFING BOOM POINT SHEAVE

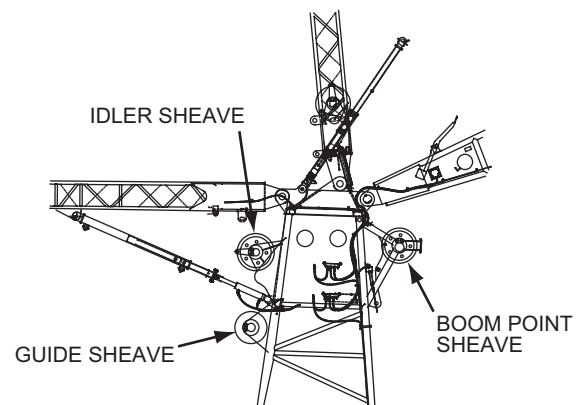
Grease from the grease fitting provided on each luffing boom point sheave.

21. LUFFING BOOM IDLER SHEAVE

Grease from the grease fitting provided on each luffing boom idler sheave.

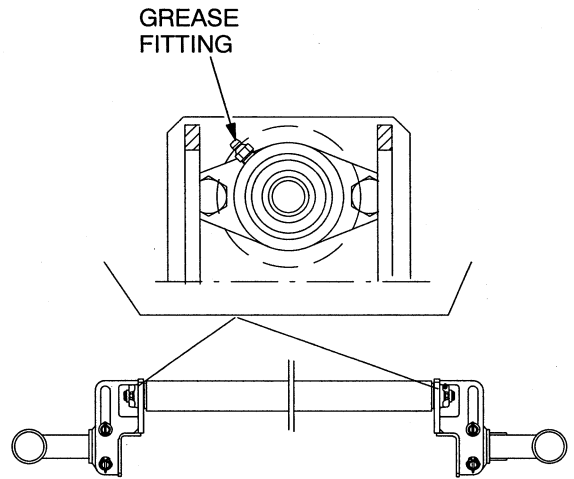
22. GUIDE SHEAVE (FOR LUFFING JIB HOIST ROPE)

Grease from the grease fitting provided on each guide sheave.



23. CABLE ROLLER

Grease from the grease fittings provided on the pillow block of the guide roller.



7. MAINTENANCE

7.2.5 ENGINE OIL

Item No.	Checking Item	Check and Change Interval (hourmeter: Hr)						Remarks
		8	50	100	250	500	1000	
1	Oil level check of engine oil	○						
	Change of engine oil (First time only)		○					
	Change of engine oil				○			30 ltr. (7.92 gal)

1. CHECKING AND CHANGING OIL FOR ENGINE

(1) CHECKING OIL LEVEL

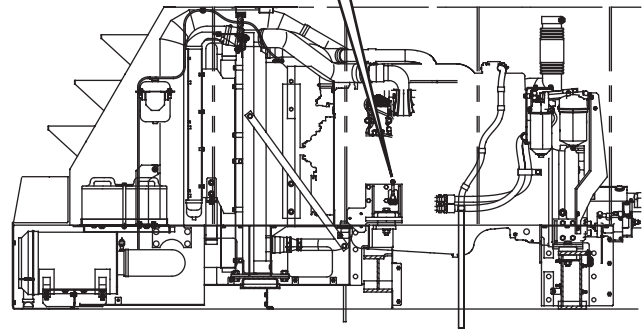
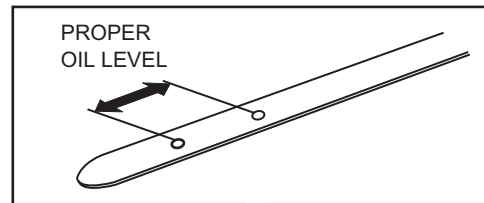
Be sure to check the engine oil level before starting operation.

After wiping the level gauge once, insert it again and check the level.

If the oil level is between the meshes of the gauge, it is normal.

Note

Crane must be on level ground when oil level is checked. Otherwise, reading may be inaccurate.



(2) CHANGING OIL

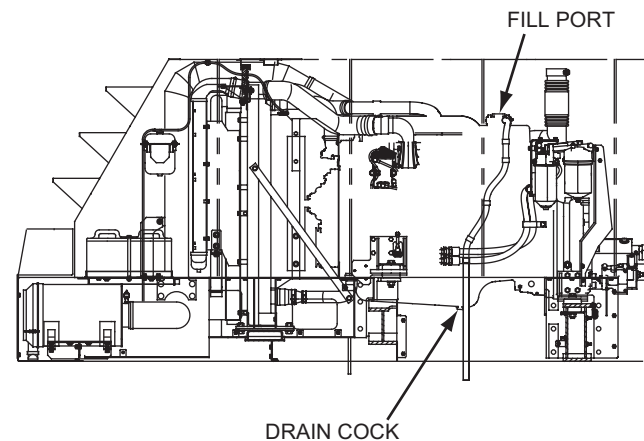
WARNING

Do not open the drain cock while the engine oil is hot. Oil will be extremely hot and may cause burns.

Failure to observe this precaution may result in serious injury or death.

- Prepare a container with a capacity of approximately 30 liters (7.9 gal).
- Loosen the drain plug and allow the oil to drain into the prepared container.
- Tighten the drain plug.
- After inspecting drained oil ensure that metal particles do not exist, refill fresh oil through the fill port.

When changing the engine oil, change the oil filter together at the same time.



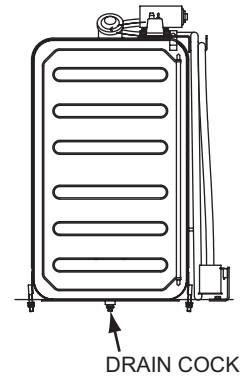
7.2.6 FUEL

Item No.	Checking Item	Check and Change Interval (hourmeter: hour)						Remarks
		8	50	250	500	1000	2000	
1	Draining fuel tank				○			
2	Adding fuel	*						400 ltr. (105.6 gal)

* As required

1. DRAINING FUEL TANK

Loosen the drain plug, and drain water and sediment from the tank.



2. ADDING FUEL

After daily work is finished, fill the fuel tank as full as possible in order to minimize condensation.

WARNING

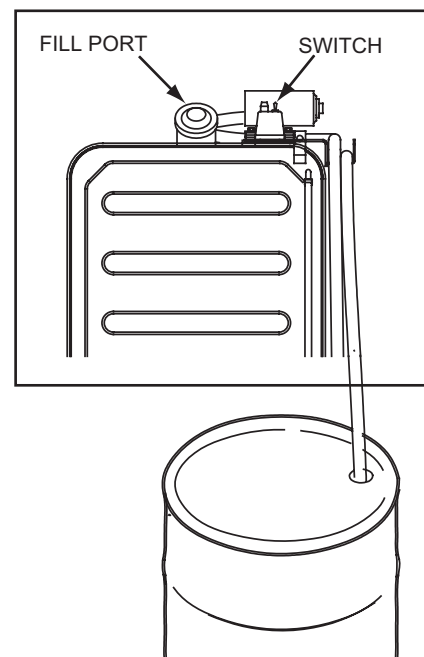
- Keep fuel away from sparks or flame.
- Never smoke cigarettes while refueling. This could ignite the fuel and cause property damage, injury to personnel, or death.

CAUTION

Never run the fuel pump empty.

Note

Only use diesel fuel (ASTM 2-D).
Using substitute fuel will deteriorate engine performance.
The engine in this machine adopts the electronically controlled, high-pressure fuel injection unit in order to achieve the satisfactory fuel consumption and exhaust gas characteristics.
The use of improper fuel may seriously affect the fuel consumption and exhaust gas characteristics, resulting in the premature damage and deterioration of the engine body as well as the fuel injection unit.



7. MAINTENANCE

7.2.7 COOLANT

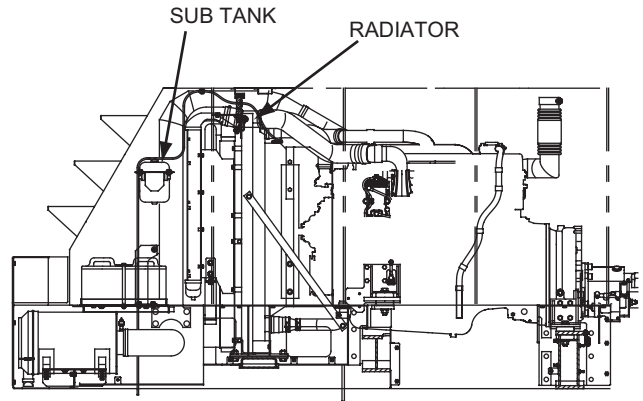
Item No.	Checking Item	Check and Change Interval (hourmeter: Hr)						Remarks
		8	50	250	500	1000	2000	
1	Check of coolant level	○						
2	Change of coolant					○	40 ltr. (10.56 gal)	

- Changing interval of coolant is for the Long Life coolant combined with soft water. Otherwise, replace coolant semi-annually.

1. CHECKING OF COOLANT LEVEL



Do not remove the radiator cap while the engine is hot. Use a heavy cloth or gloves to protect yourself while slowly loosening the cap. Wait until any sound or fluid flow stops before removing cap. Engine coolant is hot and under pressure when the engine is at operating temperature. Failure to observe this precaution may result in serious injury or death.



After removing the radiator cap, confirm coolant level, and also confirm the coolant level of the sub-tank.

- When coolant is insufficient, fill the radiator up to the foot of the water supply port. Fill the sub-tank up to the FULL mark position with soft water (city water).

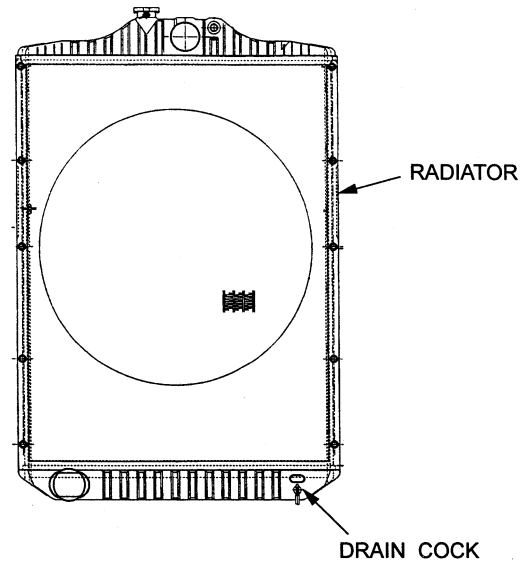
2. CHANGING COOLANT

⚠ WARNING

Do not drain the coolant while it is hot. The hot water may splatter and result in personal injury. After the water has cooled, drain the water.

Failure to observe this precaution may result in serious injury or death.

- (1) Loosen the drain cock in the bottom of the radiator, and the plug of the water jacket, and drain the coolant.
- (2) Combine soft water (city water) and Long life coolant, and fill the radiator up to the foot of the water supply port.
In order to prevent air from entering, pour water slowly. After pouring the water, confirm that the water level does not decrease, and then tighten the radiator cap.
- (3) Start and run the engine for about 1 minute.
Stop the engine, and check water level. If insufficient, add more water.



7. MAINTENANCE

7.2.8 HYDRAULIC OIL

Item No.	Checking Item	Check and Change Interval (hourmeter: Hr)						Remarks
		8	50	250	500	1000	2000	
1	Check of hydraulic oil level	Main	○					
2	Drain of hydraulic oil tank		○					
3	Change of hydraulic oil						○	540 ltr. (142.7 gal)
4	Check of hydraulic oil level	Luff- ing jib		○				
5	Change of hydraulic oil						○	15 ltr. (4 gal)

1. CHECKING HYDRAULIC OIL LEVEL

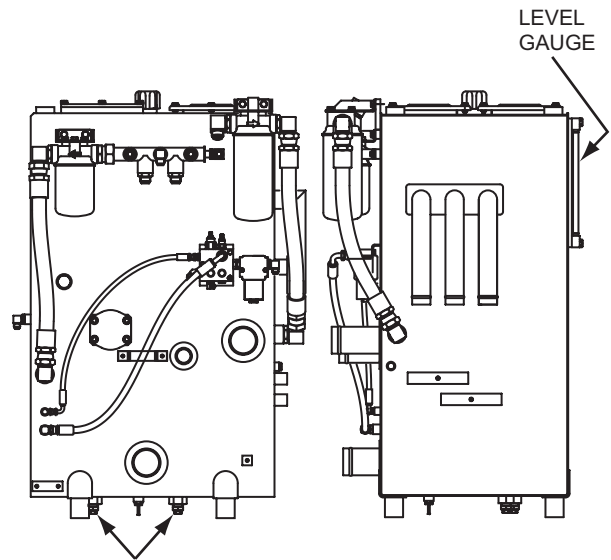
If the hydraulic oil level is in the range indicated on level gauge, with the engine running and the following conditions present, the oil level is normal.

[Oil temperature : 20°C (68°F)]

Gantry cylinder.....Extended

Crawler frame connection

pin cylinder.....Extended



2. DRAINING HYDRAULIC OIL TANK

Before starting operation, loosen the drain plug to drain water and sediment from the tank.

3. CHANGING HYDRAULIC OIL

 WARNING

Do not drain the oil when it is hot. The hot oil may splatter and result in personal injury. After the oil has cooled, drain the oil.

Failure to observe this precaution may result in serious injury or death.

 CAUTION

Extra care must be taken to ensure that the entire hydraulic tank is completely filled with oil before the engine is restarted. Failure to properly prime the hydraulic pumps could result in a catastrophic failure of the pumps.

It is standard to replace hydraulic oil every 2000 hours of the hourmeter, but if the oil is exceptionally contaminated or deteriorated, replace the oil regardless of operating hours.

- (1) Prepare a container with a capacity of approximately 540 ltr. (142.7 gal).
- (2) Remove the cap of the filler port and filter cover.
- (3) Loosen the drain plug and drain the hydraulic oil into the prepared container.
- (4) Replace the drain plug, fill the tank with the specified hydraulic oil through the filler port up to the specified level.
- (5) Reinstall the filter cover and oil supply cap.
- (6) Start and run the engine for about 1 minute.
Check the oil level again.
When changing hydraulic oil, always change the filter together at the same time.

7. MAINTENANCE

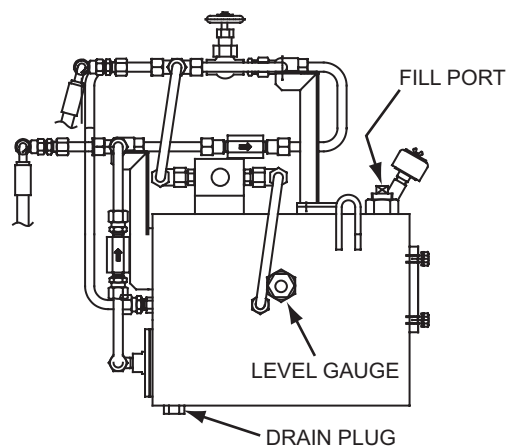
4. CHECK OF HYDRAULIC OIL LEVEL

If the hydraulic oil level is in the center of the level gauge with the following conditions and the oil level is normal.

[Oil temperature : 20°C]

Strut cylinder.....Retract

Lower the boom on to the ground.



It is standard to replace hydraulic oil every 2000 hours of the hourmeter, but if the oil is remarkably contaminated or deteriorated, replace the oil regardless of operating hours.

- (1) Prepare a container of approx. 15 ltr. (4 gal.).
- (2) Remove the cap of the filler port.
- (3) Loosen the drain plug and drain the hydraulic oil into the prepared container.
- (4) Replace the drain plug, fill the tank with the specified hydraulic oil through the filler port up to the specified level.
- (5) reinstall the oil supply cap.
- (6) When changing hydraulic oil, change the filter also of the same time.

7.2.9 GEAR OIL

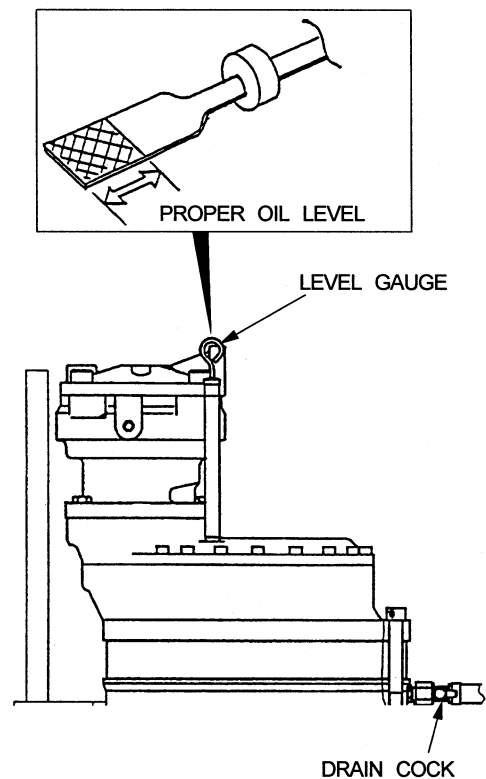
Item No.	Checking Item	Check Interval (hourmeter: Hr)						Remarks
		8	100	250	500	1000	2000	
1	Oil level check of swing reduction unit		O					
	Oil change of swing reduction unit					O		9.4 ltr. (2.5 gal)/each
2	Oil level check of front and rear drum reduction unit			O				
	Oil change of front and rear drum reduction unit					O		22 ltr. (5.8 gal)/each
3	Oil level check of boom hoist drum reduction unit			O				
	Oil change of boom hoist drum reduction unit					O		16 ltr. (4.2 gal)
4	Oil level check of Luffing jib drum			O				
	Oil change of third (luffing jib) drum					O		18 ltr. (4.8 gal.)
5	Oil level check of power divider		O					
	Oil change of power divider					O		3.1 ltr. (0.8 gal.)
6	Oil level check of propel reduction unit			O				
	Oil change of propel reduction unit					O		62 ltr. (16.4 gal.)/ each
7	Oil change of lower roller							0.25 ltr. (0.08 gal)/each
8	Oil change of upper roller							0.13 ltr. (0.03 gal.)/eac
9	Oil change of idler wheel							0.55 ltr. (0.15 gal.)/each

- Replace the oil for the parts with item nos. 7, 8 or 9 at overhaul if there is no failure such as oil leak.

1. CHECKING AND CHANGING FOR SWING REDUCT ON UNIT

(1) CHECKING OIL LEVEL

If the oil level is in the meshes of the gauge stick, it is normal.



7. MAINTENANCE

(2) CHANGING OIL



Do not drain the oil when it is hot. The hot oil may splatter and result in personal injury. After the oil has cooled, drain the oil.

Failure to observe this precaution may result in serious injury or death.

With the gauge stick drawn out, remove the drain cock, and drain the oil into a prepared container.

2. CHECKING AND CHANGING OIL FOR FRONT AND REAR DRUM REDUCTION UNITS

(1) CHECKING OIL LEVEL

If the oil level in the front and rear drum reduction unit is up to the red color mark on the level gauge, it is normal.

(2) CHANGING OIL

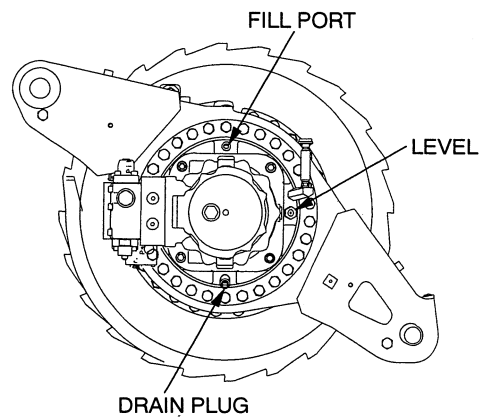


Do not drain the oil while it is hot. The hot oil may splatter and result in personal injury. After the oil has cooled, drain the oil.

Failure to observe this precaution may result in serious injury or death.

Prepare a container with a capacity of approximately 22 ltr. (5.8 gal.). With the oil fill plug removed, turn the lever of the drain cock to drain the oil into the prepared container.

Return the lever of the drain cock to the original position, and supply the specified oil through the oil fill port until the oil level reaches the specified oil level.



FRONT & REAR DRUM

3. CHECKING AND CHANGING OIL FOR BOOM HOIST DRUM REDUCTION UNIT

(1) CHECKING OIL LEVEL

If the oil level is located on the level plug, it is normal.

(2) CHANGING OIL

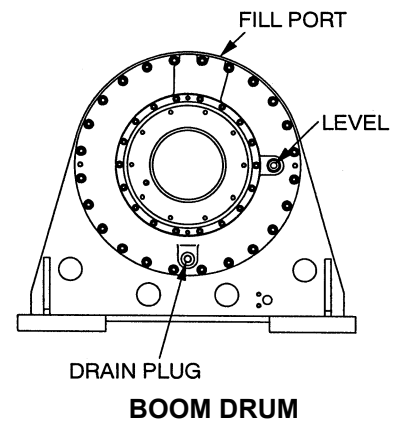


Do not drain the oil when it is hot. The hot oil may splatter and result in personal injury. After the oil has cooled, drain the oil.

Failure to observe this precaution may result in serious injury or death.

Prepare a container with a capacity of approximately 20 ltr. (5.3 gal.).

With the level plug removed, remove the drain plug to drain the oil into the container. Return the drain plug to the original position and supply the specified oil through the oil fill port until the oil level reaches the specified level.



BOOM DRUM

4. CHECKING AND CHANGING OIL FOR THIRD (Luffing jib) DRUM REDUCTION UNIT

(1) CHECKING OIL LEVEL

If the oil level is located on the level plug, it is normal.

(2) CHANGING OIL

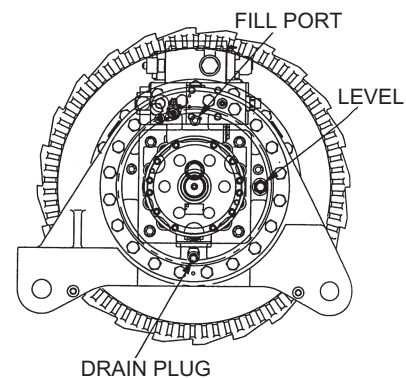


Do not drain the oil when it is hot. The hot oil may splatter and result in personal injury. After the oil has cooled, drain the oil.

Failure to observe this precaution may result in serious injury or death.

Prepare a container with a capacity of approximately 20 ltr. (5.3 gal.)

With the level plug removed, remove the drain plug to drain the oil into the container. Return the drain plug to the original position and supply the specified oil through the oil fill port until the oil level reaches the specified level.



THIRD (LUFFING JIB) DRUM

7. MAINTENANCE

5. CHECKING AND CHANGING OIL FOR POWER DIVIDER

(1) CHECKING OIL LEVEL

If the oil level is up to the red color mark of the level gauge, it is normal.

(2) CHANGING OIL

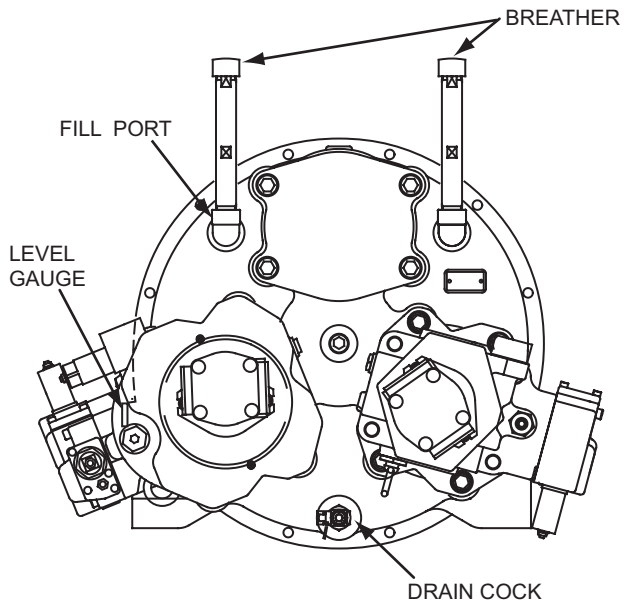
WARNING

Do not drain the oil when it is hot. The hot oil may splatter and result in personal injury. After the oil has cooled, drain the oil. Failure to observe this precaution may result in serious injury or death.

Prepare a container with a capacity of approximately 5 ltr. (1.3 gal.).

Remove the oil supply port cap and turn the lever of the drain cock to drain the oil into the container.

Return the lever of the drain cock to the original position, pour the specified oil through the oil supply port until the oil level reaches the specified level.



6. CHECKING AND CHANGING OIL FOR PROPEL REDUCTION UNIT

(1) CHECKING OIL LEVEL

With the drain plug positioned at the bottom, remove the level plug. If the oil level is up to the bottom of the level plug opening, it is normal.

(2) CHANGING OIL

WARNING

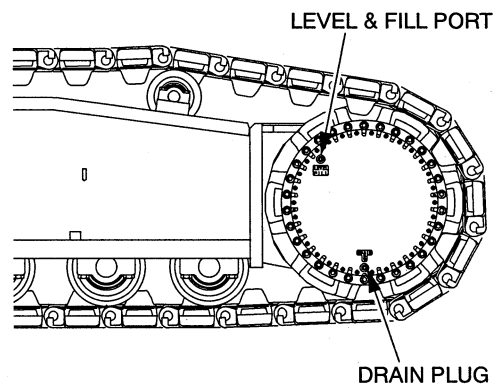
Do not drain the oil when it is hot. The hot oil may splatter and result in personal injury. After the oil has cooled, drain the oil.

Failure to observe this precaution may result in serious injury or death.

Prepare a container with a capacity of approximately 62 ltr. (16.4 gal.).

Remove the breather pipe and turn the lever of the drain cock to drain the oil into the container.

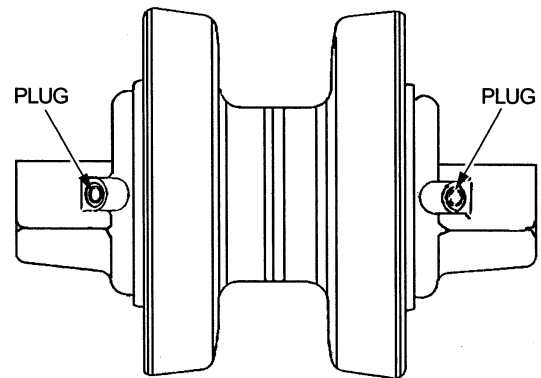
Return the lever of the drain cock to the original position, pour the specified oil through the oil supply port until the oil level reaches the specified level.



7. CHANGING OIL FOR LOWER ROLLER

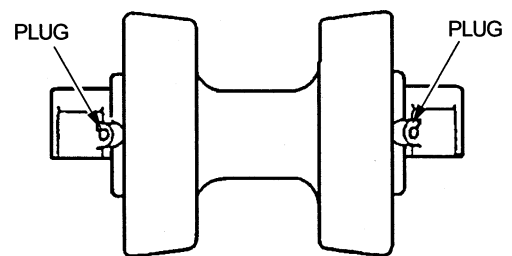
Remove the both end plugs to drain the oil.

Supply the specified oil in the specified amount. To change oil type, consult your local KOBELCO authorize distributor.

**8. CHANGING OIL FOR UPPER ROLLER**

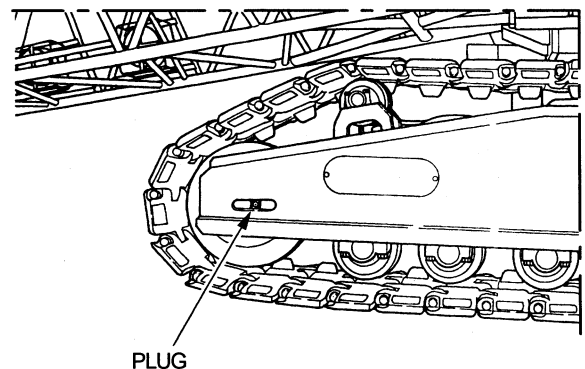
Remove the both end plugs to drain the oil.

Supply the specified oil in the specified amount. To change oil type, consult your local KOBELCO authorize distributor.

**9. CHANGING OIL FOR IDLER WHEEL**

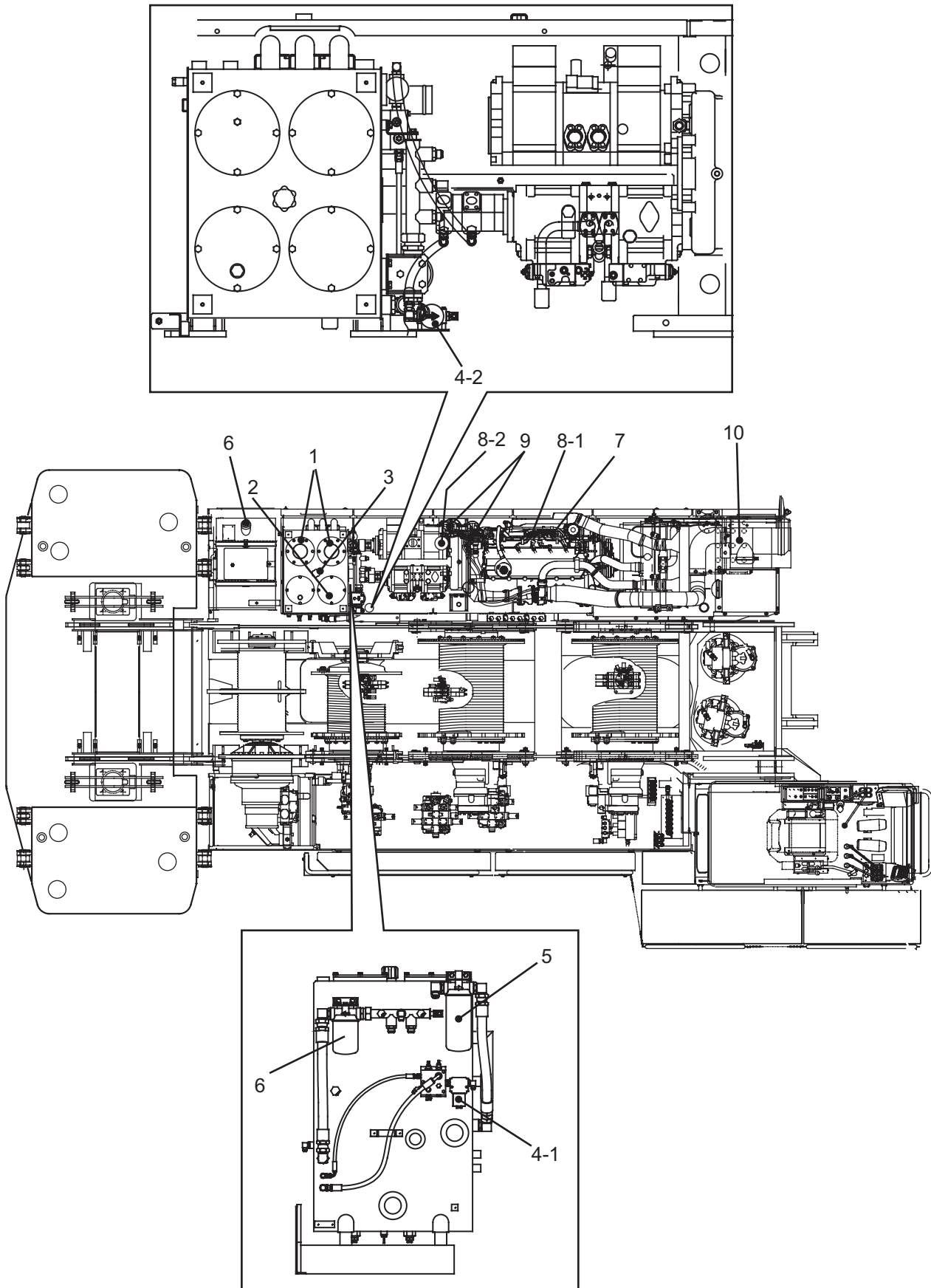
Remove the plug of the sliding block to drain the oil.

Supply the specified oil in the specified amount. To change oil type, consult your local KOBELCO authorize distributor.



7. MAINTENANCE

7.3 CLEANING/WASHING/CHANGING FILTER ELEMENT AND STRAINER



Item No.	Service Item		Cleaning/Washing/Changing Interval (hourmeter: Hr)					Part No.	Quantity
			for the first time (50)	100	250	500	1000		
1	Hydraulic oil tank	Change of return filter					O	LS52V01001R100 (Repair kit)	2
2		Change of suction filter						O GB50V00004S001 (element) ZD11G22000(O-ring)	2
3		Washing of oil fill port strainer						O	
4-1	Washing of line filter						O	R36P0019 (element) 45Z91D84 (O-ring) [to JC04-02035] 2446U346S5 (O-ring) [JC04-02036 to]	1
4-2							O	2446R183S2 (element) 45Z91D84 (O-ring)	1
5	Change of cooling line filter (cartridge)		O		O			2446U254S3	1
6	Change of drain filter (cartridge)		O		O			2446U146S3	1
7	Washing of fuel tank fill port strainer				O				1
8-1	Change of fuel filter					O		23401-1690 (Hino Parts)	1
8-2	Change of fuel Pre-Filter (Option)					O		YN21P01036R100	1
9	Change of engine oil element				O			S1560-72340 S1560-72360 (Hino Parts)	1 1
10	Cleaning and change of air element			Cleaning O			change O	EB11P00001S002	1

7. MAINTENANCE

1. CHANGE OF HYDRAULIC OIL TANK RETURN FILTERS

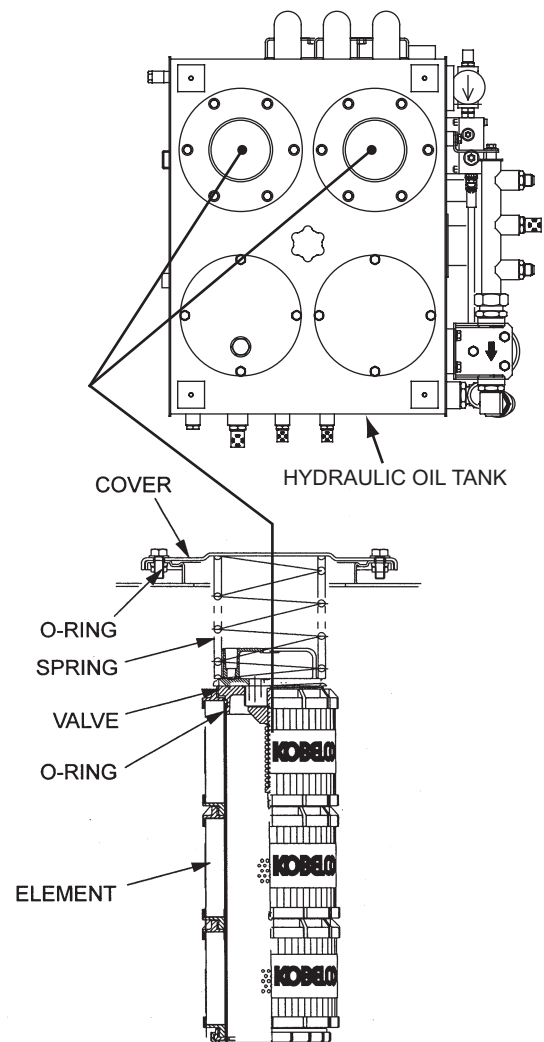
WARNING

Do not change hydraulic oil filter when hydraulic oil is hot.

After the oil has cooled and the pressure has been released, change the filter.

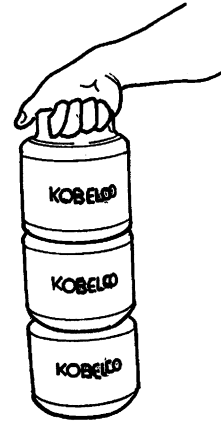
Failure to observe this precaution may result in serious injury or death.

Removing the filter cover, replace the element and O-ring with new ones.



Procedure of replacing the return filter

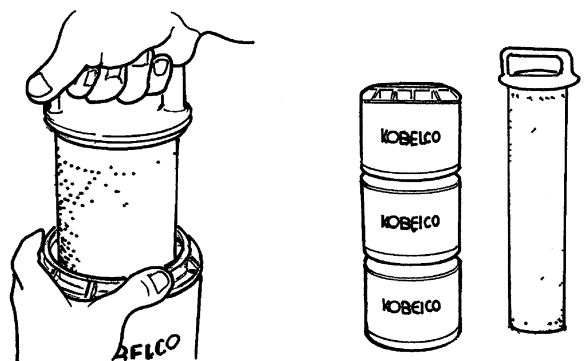
(1) Remove the filter assembly and place it on the flat surface.



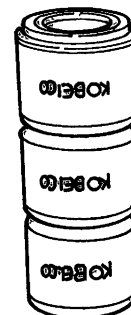
(2) Hold the top mold plate and loosen the grip.



(3) Pull out the grip assembly.



(4) Turn over the filter.

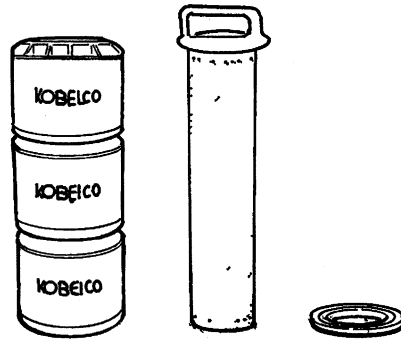


7. MAINTENANCE

(5) Hold the plate on which the end plate is attached.



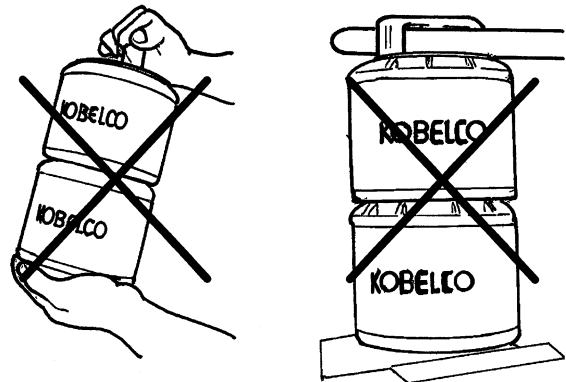
(6) Loosen the end plate and replace the packing material with new one.



CAUTION

Do not try to pull out the grip assembly by holding lower portion.

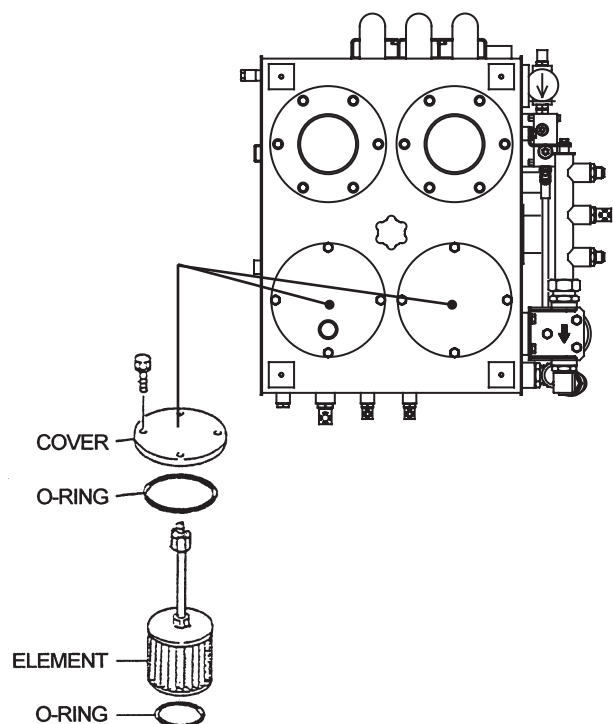
This may make disassembly harder since the element may be twisted and excessive force may be applied.



2. CHANGING HYDRAULIC OIL SUCTION FILTER

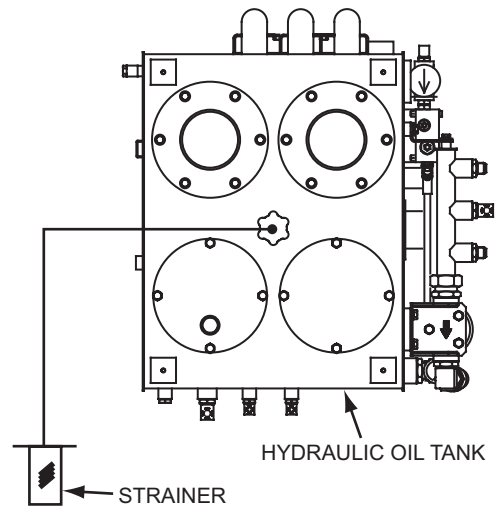
Remove the filter cover and replace the element and O-ring.

Perform this change when changing the hydraulic oil.



3. WASHING FILL PORT STRAINER

Remove the air breather cap, take out the fill port strainer, and sufficiently wash it with washing liquid.



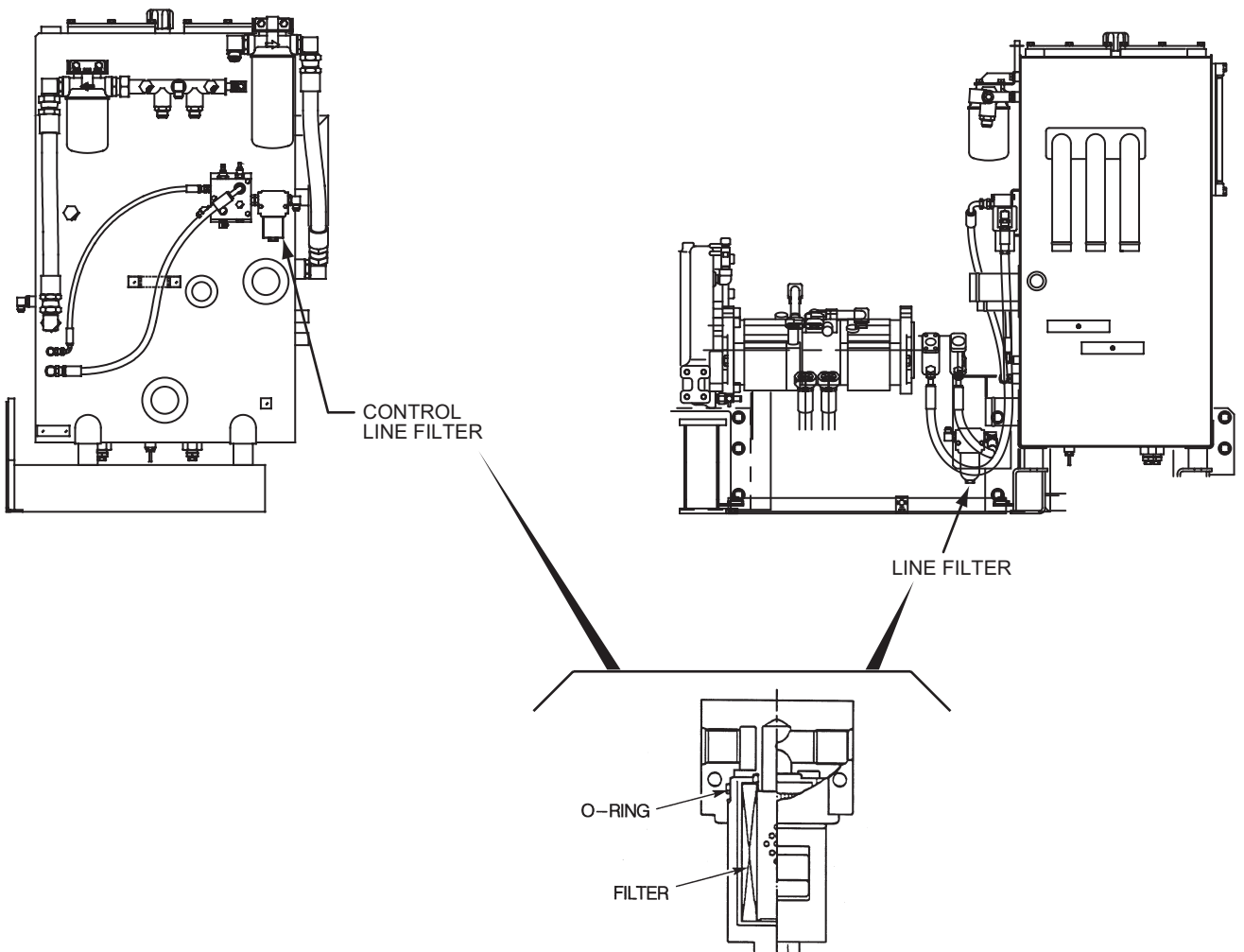
4. WASHING OF LINE FILTER



After stopping engine, wait for five minutes to release pressure.

Remove the case, take out the filter and sufficiently wash it.

Replace the O-ring with a new one.

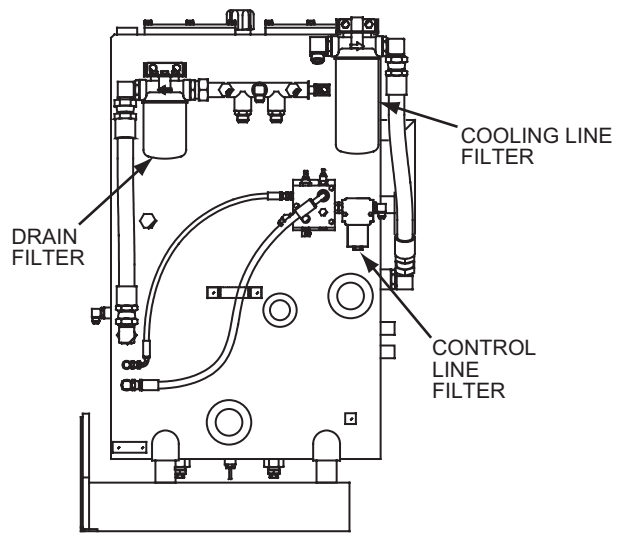


7. MAINTENANCE

5. CHANGE OF LINE FILTER FOR BRAKE COOLING LINE (CARTRIDGE)

Loosen the plug of the filter cover to remove the remaining pressure in the tank.

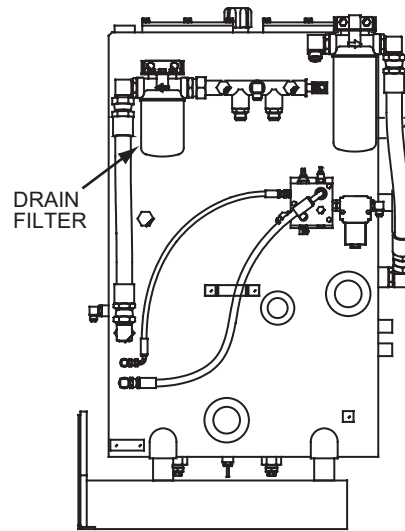
Prepare a oil receptacle under the filter, and replace the cartridge with a new one.



6. CHANGING DRAIN FILTER (CARTRIDGE)

Loosen the plug of the filter cover to remove the remaining pressure in the tank.

Prepare an oil receptacle under the filter, and replace the cartridge with a new one.

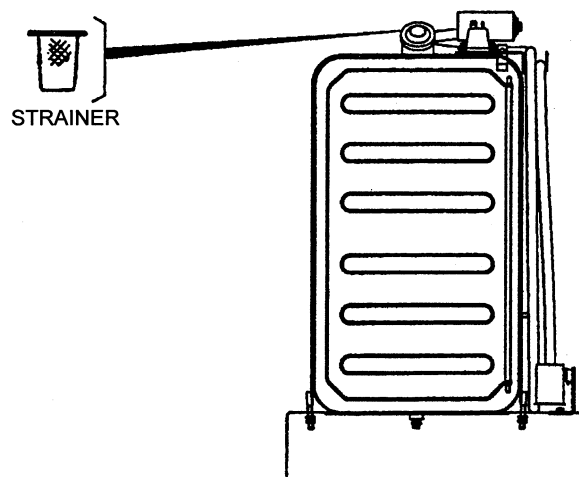


7. WASHING FUEL TANK FILL PORT STRAINER

Remove the cap, take out the strainer and sufficiently wash it with washing liquid.



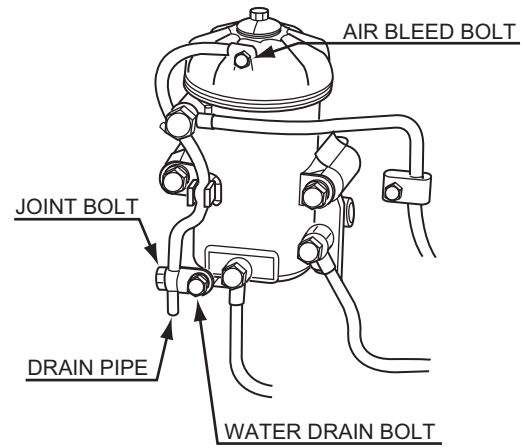
Keep fuel away from spark or flame.



8-1. CHANGE OF FUEL ELEMENT

(1) Removing the fuel filter element

- a) Prepare a suitable container to receive discharged fuel under the drain pipe.
- b) Loosen the fuel filter air bleed bolt, fuel filter water drain bolt and joint bolt to discharge fuel in the fuel filter case.
- c) Loosen the fuel filter center bolt to remove the fuel filter cap.
- d) Remove the fuel filter element.

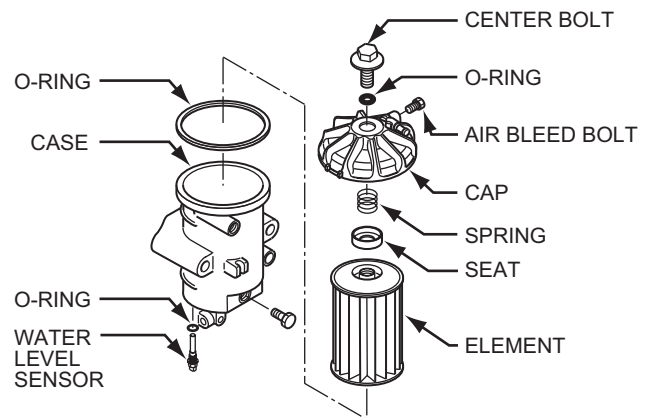


Note

Prepare a receptacle because the fuel remains in the filter.

(2) Installation of the fuel filter element

- a) Remove the contamination and foreign matter on the installation surface.
 - b) Set the fuel filter element in the fuel filter case.
 - c) Apply a light coat of fuel to the new O-ring.
 - d) Attach the O-ring and fuel filter cap and tighten the fuel filter center bolt.
- Tightening torque: 29.4 ± 4.9 N-m (22 ft-lbs)



- e) Tighten the fuel filter water drain bolt and joint bolt.
- f) Start the priming pump to bleed air in the system.

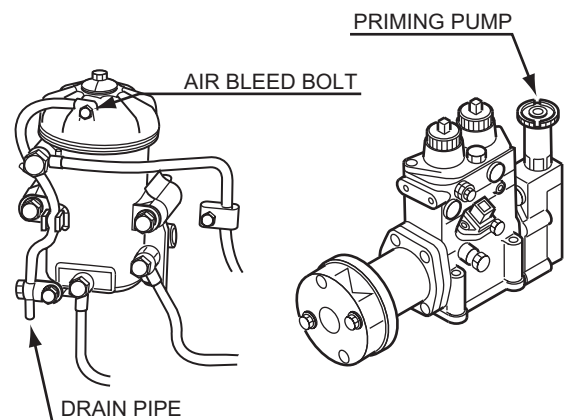
Note

Check that the fuel filter air bleed bolt is loosened.

- g) Tighten the fuel filter air bleed bolt.
- Tightening torque : 6.9 N-m (5.1 ft-lbs)

CAUTION

Wipe off spilt fuel after works and check that the fuel is not leaked once more after starting the engine.



7. MAINTENANCE

Note

- Do not reuse an element.
 - Replace the O-ring with a new one provided in the element kit.
 - Be careful that the O-ring will not be damaged by being twisted.
 - Check that the O-ring contacts the sealing surface securely.
 - Align the mating mark of the fuel filter cap with that of the fuel filter case.
-

DRAIN WATER FROM FUEL FILTER

It is displayed that water collects in the fuel filter in the gauge cluster, and draining the water.

1. Place a container to receive the drained water under the drain pipe.
2. Loosen the air bleeder bolt and the water draining bolt of the fuel filter to drain water gathered at the bottom of the fuel filter case.

CAUTION

Drained water contains fuel, therefore, follow the processing regulation specified in each region, when disposing of it.

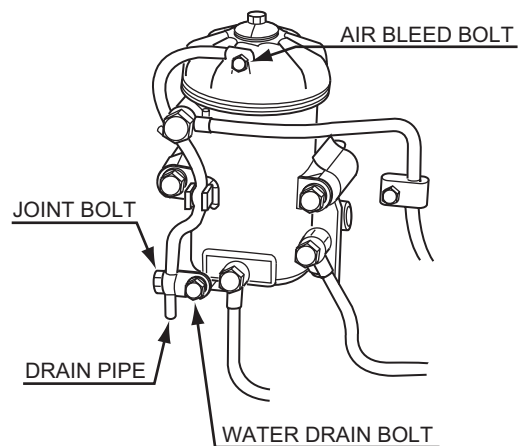
3. Tighten the water draining bolt.
 4. Actuate the priming pump and bleed air from the fuel system.
-

CAUTION

Check to see the air bleeder bolt is loosened.

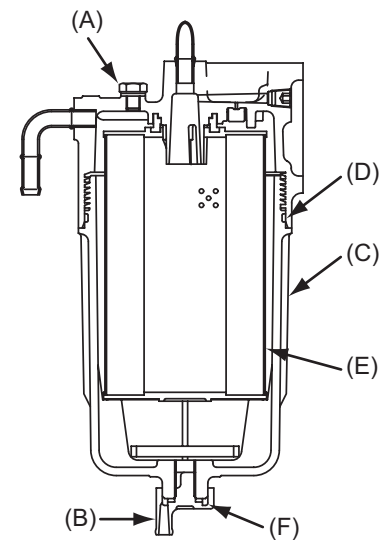
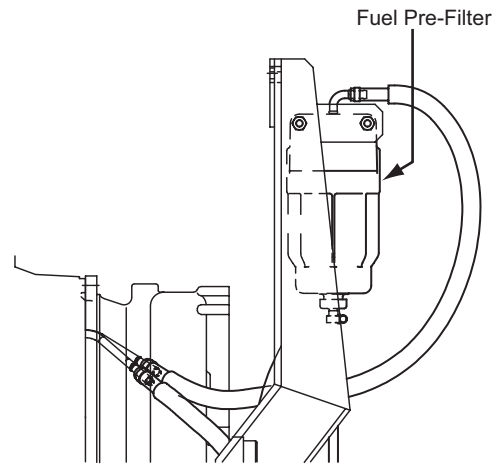
5. Tighten the air bleeder bolt.
Tightning Torque : $6.9 \pm 2\text{N}\cdot\text{m}$ ($70 \pm 20\text{kgf}\cdot\text{cm}$)

G-25
OPT FUEL FILTER
X



8-2. CHANGING OF FUEL PRE-FILTER (OPTION)

- (1) Prepare container for drain oil.
- (2) Loosen air bleeder plug (A) and drain valve (B) and drain fuel from fuel pre-filter.
- (3) Fit the specified filter wrench to the lower side of stiffening ribs and remove case (C).
Parts number : 2421R171
- (4) Remove drain valve (B).
- (5) Remove dirt and foreign matter from attaching surface.
- (6) Apply light oil to new O-rings (D), (F) thinly, set it to case (C) and replace it with new element (E).
- (7) Fit case (C) to filter head by hand securely and tighten it with filter wrench (Parts number : 2421R171).
- (8) Tighten air bleeder plug (A) and drain valve (B).
- (9) Bleed air according to the air bleeding procedure for fuel system.



CAUTION

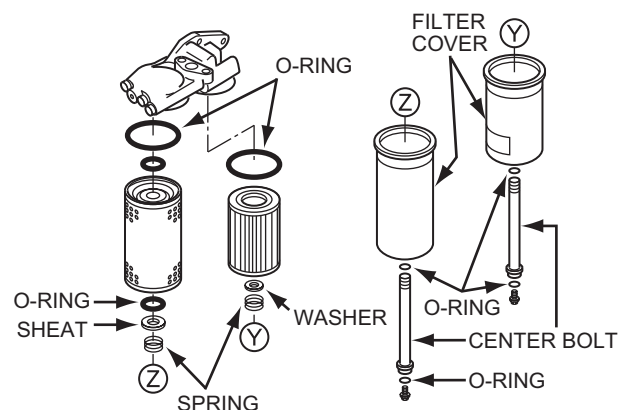
- Do not reuse the element. Replace old O-rings.
- Be careful not to damage the O-rings by twisting.
- Check to see if the O-rings firmly contact to the sealing surface.

9. CHANGING OIL FILTER ELEMENT

- (1) Removing the oil filter element
 - a) Remove the drain plug at the lower end of oil filter to remove engine oil.
 - b) Loosen the center bolt and remove the cover.
 - c) Remove the oil filter element.

Note

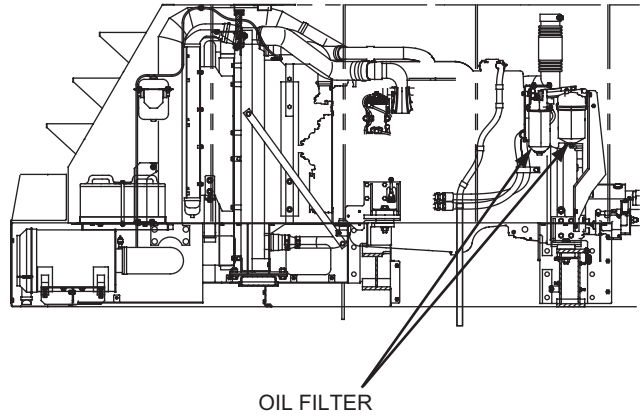
Check that the O-ring does not remain in the oil cooler case side.



7. MAINTENANCE

(2) Installation of the oil filter element

- a) Remove the contamination and foreign matter on the installation surface of oil filter element cover.
- b) Apply a light coat of engine oil to the new O-rings (large and small) for the oil filter element.
- c) Attach the oil filter element.
- d) Tighten the center bolt.
Tightening torque: 44 ± 4.9 N-m (32.5 ft-lbs)
- e) Replace the O-ring of drain plug with a new one and reset the drain plug.
Tightening torque: 17.2 ± 2.5 N-m (12.7 ft-lbs)

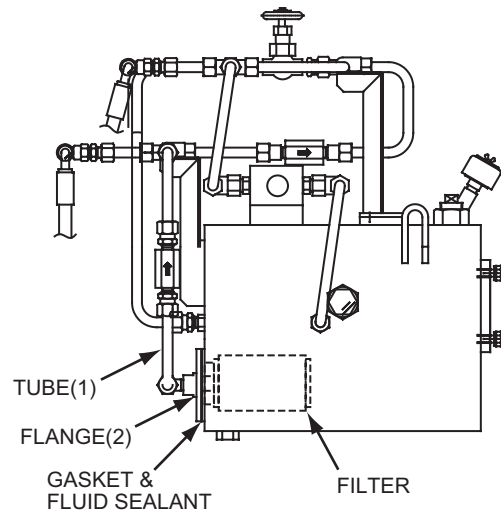


Note

- When installing, be careful that the O-ring will not be damaged by being twisted.
- Do not reuse an O-ring.
- For the oil filter element at the full flow side, do not mistake up/down directions while assembling.

10. CHANGE OF HYDRAULIC OIL SUCTION FILTER (FOR LUFFING JIB)

- (1) Prepare a vessel of approx. 15 ltr. capacity. Remove the drain plug, and drain hydraulic oil.
- (2) Remove the tube (1).
- (3) Remove the flange (2). Then, the filter can be removed together with it.
- (4) Detach the filter from the flange (2).
- (5) Set a new filter, and apply sealant to the contact face of the flange and the tank. Then, fit a new gasket.
- (6) Re-install the drain plug, and refill the tank with hydraulic oil.



7.4 BATTERY INSPECTION

Item No.	Check Item	Check Interval (hourmeter: Hr)						Remarks
		8	100	250	500	1000	2000	
1	Check of battery electrolyte level.		O					
2	Check of charge condition.							As required

1. CHECKING BATTERY ELECTROLYTE LEVEL

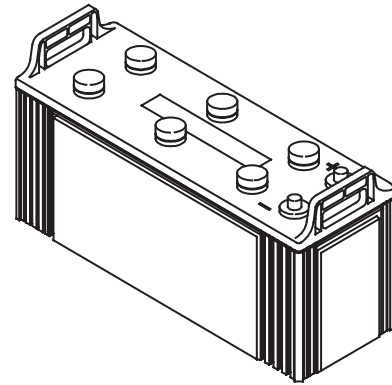
If the battery electrolyte level is up to 10 mm (0.39 inch) above the plates, it is normal.

If insufficient, add distilled water.

- (1) Checking the battery electrolyte level from the side of the battery:

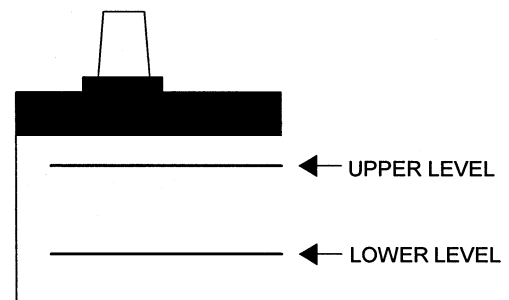
Clean around the level lines with a wet cloth, and make sure that the electrolyte level is between the upper level (U.L) and the lower level (L.L).

When the electrolyte level is lower than the level halfway between the U.L and the L.L, add battery electrolyte. After replenishment, securely tighten the plug.



⚠ DANGER

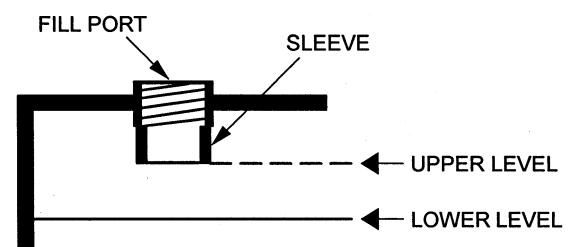
NEVER clean the battery with a dry cloth. Otherwise, static electricity occurs, leading to combustion and explosion. Failure to observe this precaution may result in serious injury or death.



- (2) When you cannot check the battery electrolyte level from the side of the battery, or no level lines are provided on the side of the battery:

Detach the plug at the top of the battery, and check the battery electrolyte level from the filling port.

If the electrolyte level is lower than the sleeve, add battery electrolyte to the bottom of the sleeve.



⚠ WARNING

- Keep battery away from flame or spark.
- Never smoke cigarettes while checking electrolyte level. This could cause the battery electrolyte to ignite and cause property damage, injury to personnel or death.



Sufficiently replenished

When the electrolyte level reaches the bottom of the sleeve, the electrolyte surface is swelled by surface tension, and the pole plates seen to be warp.



Insufficiently replenished

When the electrolyte level does not reach the bottom of the sleeve, the pole plates seen to be straight.

7. MAINTENANCE

WARNING

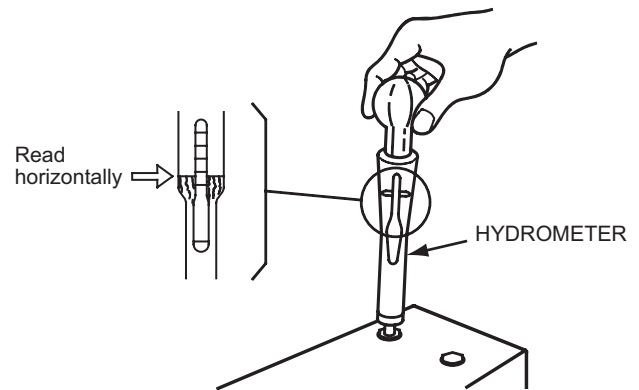
- Since the battery electrolyte is dilute sulfuric acid, avoid battery acid contact with the skin, eyes, or clothing. If accidentally contacted, immediately flush the area with water and consult a doctor immediately.
- Wear eye glasses to protect your eyes when working with electrolyte.

Failure to observe this precaution may result in serious injury or death.

WARNING

- Do not short across the battery terminals.

Failure to observe this precaution may result in serious injury or death.



2. CHECKING CHARGE CONDITION

The charge condition is judged by measuring the specific gravity of the battery electrolyte.

The normal specific gravity is 1.25 to 1.27 at 20°C (68°F) of electrolyte temperature. If the specific gravity is lower than 1.25, charge the battery.

If the battery is not used for a long time, remove the battery from the machine and store it in a cold and dark place.



NEVER use the battery when the battery electrolyte level is lower than the lower level.

Doing so will cause deterioration of the battery inside, but could also cause the battery to explode.

Failure to observe this precaution may result in serious injury or death.



Do not add battery electrolyte until the battery electrolyte level exceeds the upper level.

Otherwise, excess electrolyte leaks, causing corrosion of the periphery of the battery.



If the battery will not be used for an extended period of time, remove the battery, clean it thoroughly and store it in a cool, dry location where the temperature will not fall below 0°C (32°F).

If the battery cannot be removed and stored, then disconnect the terminals to avoid draining the battery.

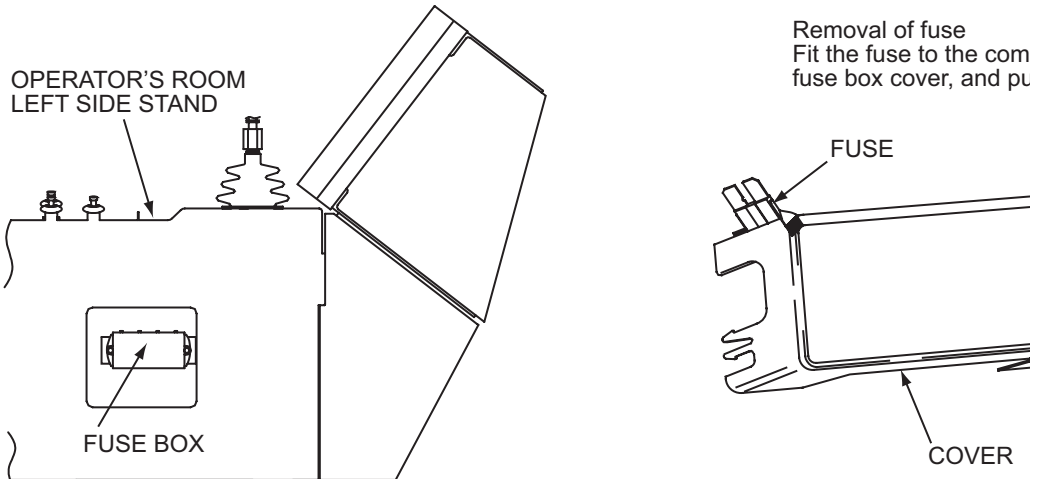
Note

If the level of battery electrolyte exceeds the upper level or lower level of the sleeve, remove excess electrolyte with a syringe until the level is at the upper level or lower level of the sleeve.

To treat the removed electrolyte, neutralize it with sodium bicarbonate, and pour it out with a great deal of water, or consult with the manufacturer of the battery.

7. MAINTENANCE

7.5 LOCATION AND USE OF FUSE

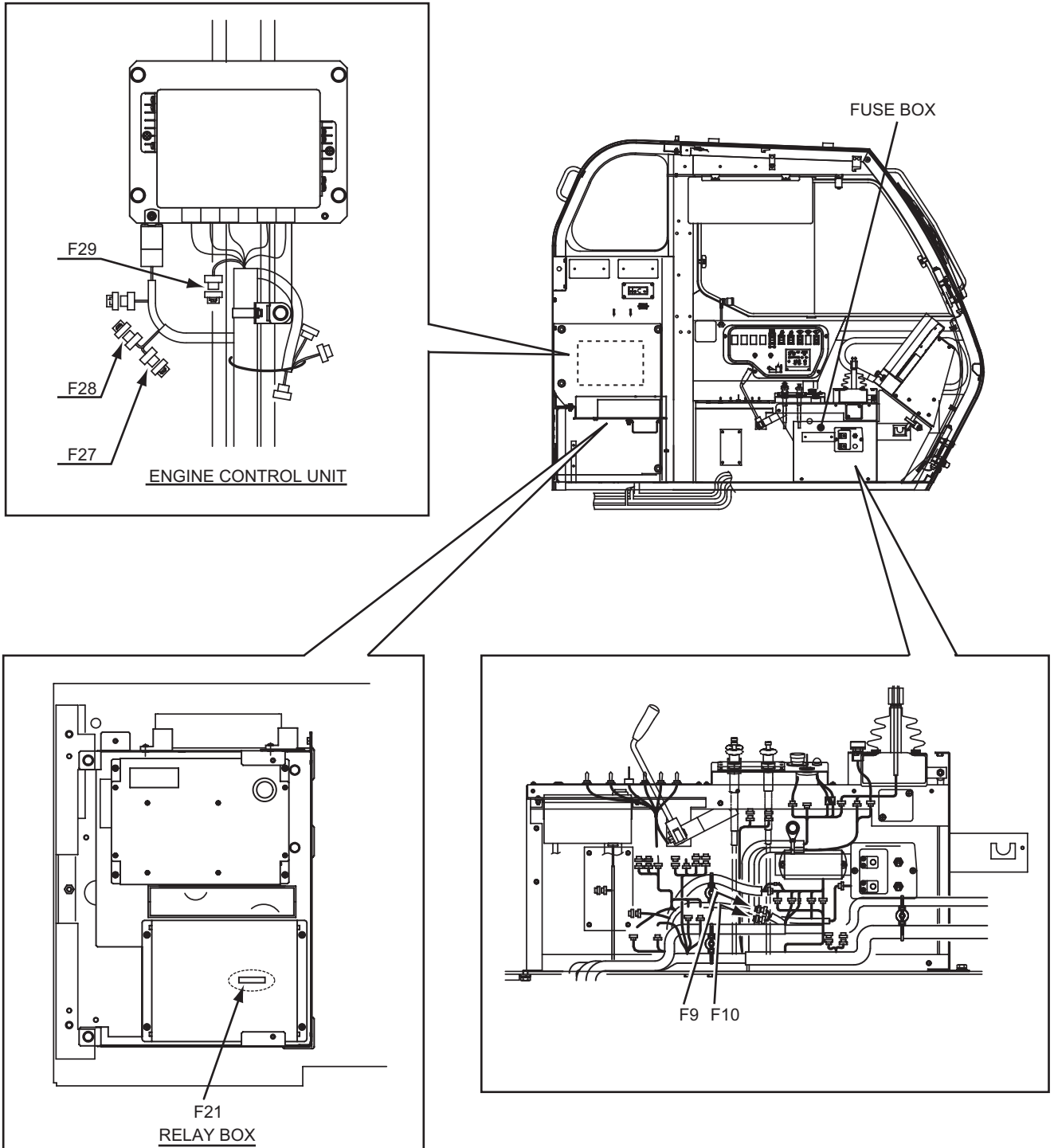


Classification of Fuse Use					
Fuse No.	Capacity	Kind	Line No.	Use	Location
F1	20A	Automotive Blade	1 - 11	Main power supply, Headlight, Horn	Fuse box
F2	5A		1 - 12	Back-up (Radio)	Fuse box
F3	5A		54 - 13	Engine start (Starter relay, ECU)	Fuse box
F4	5A		3 - 14	Hour meter	Fuse box
F5	10A		2 - 15	Drum brake pressure switch	Fuse box
F6	10A		2 - 16	Solenoid valves	Fuse box
F7	5A		2 - 17	Load safety device control power supply	Fuse box
F8	5A		2 - 18	Load safety device output power supply	Fuse box
F9	20A		2 - 19	Wiper	Fuse holder
F10	20A		2 - 20	Air conditioner	Fuse holder
F11	10A		52 - 21	Radio, One-way call	Fuse box
F12	30A		2 - 22	Total controller power supply	Fuse box
F13	10A		2 - 23	Gauge cluster, Monitor camera (Option)	Fuse box
F14	10A		2 - 24	Swing flasher	Fuse box
F15	10A		2 - 25	Cigaret lighter, Fuel pump	Fuse box
F16	10A		2 - 26	Counter weight self removal control box, Translifter control box	Fuse box
F17	10A		2 - 27	Bypass circuit	Fuse box
F18	10A		2 - 28	Spare	Fuse box
F19	10A		2 - 29	Spare	Fuse box
F20	10A		2 - 30	Solenoid valves (Select of jib or boom)	Fuse box
F21	1A		18 - 103	Over hoist / lowering circuit	Relay box
F26	15A		2 - 36	Engine control unit	Fuse box
F27	10A		879 - 877	PCV1	Fuse holder
F28	10A		879 - 878	PCV2	Fuse holder
F29	2A		2 - 39	Engine control unit	Fuse holder

Fuse part No. : 5A=2479Z2812D5, 10A=2479Z2812D7, 20A=2479Z2812D9, 30A=2479Z2812D11,
15A=2479Z2812D8, 2A=2479Z2812D2, 1A=2479Z2812D1

Classification of Fuse Use				
Fuse No.	Capacity	Kind	Line No.	Use
F21	1A	Automotive Blade	18 - 103	Overhoist / Lowering circuit
F27	10A		879 - 877	PCV1
F28	10A		879 - 878	PCV2
F29	2A		2 - 39	Engine control unit

Fuse part No. : 5A=2479Z2812D5, 10A=2479Z2812D7, 20A=2479Z2812D9, 30A=2479Z2812D11,
 15A=2479Z2812D8, 2A=2479Z2812D2, 1A=2479Z2812D1



7. MAINTENANCE

7.6 OPERATION UNDER UNUSUAL CONDITIONS

1. OPERATION IN EXTREME COLD

Item	Treatment	Caution																											
Engine Oil	<p>Use engine oil suitable to the atmospheric temperature. (See the engine manual.) Class CD, CE, CF, CF-4, CH-4, CI-4 in API service classification.</p> <table border="1"> <tr> <td>Atmospheric temperature when engine starting.</td> <td>40°C to 0°C (104°F to 32°F)</td> <td>40°C to -30°C (104°F to -22°F)</td> </tr> <tr> <td>Viscosity of oil</td> <td>SAE 30</td> <td>SAE10W-30</td> </tr> </table>	Atmospheric temperature when engine starting.	40°C to 0°C (104°F to 32°F)	40°C to -30°C (104°F to -22°F)	Viscosity of oil	SAE 30	SAE10W-30	When adding oil, do not mix different brand and quality oil.																					
Atmospheric temperature when engine starting.	40°C to 0°C (104°F to 32°F)	40°C to -30°C (104°F to -22°F)																											
Viscosity of oil	SAE 30	SAE10W-30																											
Fuel	<p>Use fuel, suitable to the atmospheric temperature.</p> <p>Before starting work, drain water. After the work is finished, fill the tank as full as possible.</p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>NOTE</p> <p>Only use diesel fuel (ASTM 2-D). Using substitute fuel will deteriorate engine performance. The engine in this machine adopts the electronically controlled, high-pressure fuel injection unit in order to achieve the satisfactory fuel consumption and exhaust gas characteristics. The use of improper fuel may seriously affect the fuel consumption and exhaust gas characteristics, resulting in the premature damage and deterioration of the engine body as well as the fuel injection unit.</p> </div>																												
Coolant	<p>Combine antifreeze (Long Life Coolant) according to the atmospheric temperature. [Capacity of coolant: 40 ltr. (10.6 gal.)]</p> <table border="1"> <thead> <tr> <th>Atmospheric temperature</th> <th>Volume of cooling water</th> <th>Volume of antifreeze</th> </tr> </thead> <tbody> <tr> <td>-4 °C</td> <td>36 ltr. (9.5 gal.)</td> <td>4 ltr. (1.1 gal.) (10%)</td> </tr> <tr> <td>-7 °C</td> <td>34 ltr. (9 gal.)</td> <td>6 ltr. (1.6 gal.) (15%)</td> </tr> <tr> <td>-13 °C</td> <td>30 ltr. (7.9 gal.)</td> <td>10 ltr. (2.6 gal.) (25%)</td> </tr> <tr> <td>-17 °C</td> <td>28 ltr. (7.4 gal.)</td> <td>12 ltr. (3.2 gal.) (30%)</td> </tr> <tr> <td>-21 °C</td> <td>26 ltr. (6.9 gal.)</td> <td>14 ltr. (3.7 gal.) (35%)</td> </tr> <tr> <td>-25 °C</td> <td>24 ltr. (6.3 gal.)</td> <td>16 ltr. (4.2 gal.) (40%)</td> </tr> <tr> <td>-31 °C</td> <td>22 ltr. (5.8 gal.)</td> <td>18 ltr. (4.8 gal.) (45%)</td> </tr> <tr> <td>-40 °C</td> <td>20 ltr. (5.3 gal.)</td> <td>20 ltr. (5.3 gal.) (50%)</td> </tr> </tbody> </table>	Atmospheric temperature	Volume of cooling water	Volume of antifreeze	-4 °C	36 ltr. (9.5 gal.)	4 ltr. (1.1 gal.) (10%)	-7 °C	34 ltr. (9 gal.)	6 ltr. (1.6 gal.) (15%)	-13 °C	30 ltr. (7.9 gal.)	10 ltr. (2.6 gal.) (25%)	-17 °C	28 ltr. (7.4 gal.)	12 ltr. (3.2 gal.) (30%)	-21 °C	26 ltr. (6.9 gal.)	14 ltr. (3.7 gal.) (35%)	-25 °C	24 ltr. (6.3 gal.)	16 ltr. (4.2 gal.) (40%)	-31 °C	22 ltr. (5.8 gal.)	18 ltr. (4.8 gal.) (45%)	-40 °C	20 ltr. (5.3 gal.)	20 ltr. (5.3 gal.) (50%)	Sometimes, combination rate may be different depending upon brands.
Atmospheric temperature	Volume of cooling water	Volume of antifreeze																											
-4 °C	36 ltr. (9.5 gal.)	4 ltr. (1.1 gal.) (10%)																											
-7 °C	34 ltr. (9 gal.)	6 ltr. (1.6 gal.) (15%)																											
-13 °C	30 ltr. (7.9 gal.)	10 ltr. (2.6 gal.) (25%)																											
-17 °C	28 ltr. (7.4 gal.)	12 ltr. (3.2 gal.) (30%)																											
-21 °C	26 ltr. (6.9 gal.)	14 ltr. (3.7 gal.) (35%)																											
-25 °C	24 ltr. (6.3 gal.)	16 ltr. (4.2 gal.) (40%)																											
-31 °C	22 ltr. (5.8 gal.)	18 ltr. (4.8 gal.) (45%)																											
-40 °C	20 ltr. (5.3 gal.)	20 ltr. (5.3 gal.) (50%)																											
Battery	<p>Sufficiently charge the battery. (Maintain the specific gravity more than 1.22.) The electrolyte in a fully charged battery will resist freezing at lower temperatures better than a battery that is not fully charged.</p>	After distilled water has been added, start and run the engine to mix water and electrolyte.																											

2. OPERATION IN EXTREME HEAT

Item	Treatment	Caution						
Engine Oil	<p>Use engine oil suitable to atmospheric temperature. (See the engine manual.) Class CD, CE, CF, CF-4, CH-4, CI-4 in API service classification.</p> <table border="1"> <tr> <td>Atmospheric temperature when starting engine</td> <td>Higher than 40°C (104°F)</td> <td>40°C to 0°C (104°F to 32°F)</td> </tr> <tr> <td>Viscosity of oil</td> <td>SAE40</td> <td>SAE30</td> </tr> </table>	Atmospheric temperature when starting engine	Higher than 40°C (104°F)	40°C to 0°C (104°F to 32°F)	Viscosity of oil	SAE40	SAE30	Do not mix different brand and quality oil.
Atmospheric temperature when starting engine	Higher than 40°C (104°F)	40°C to 0°C (104°F to 32°F)						
Viscosity of oil	SAE40	SAE30						
Coolant	<ul style="list-style-type: none"> Do not use antifreeze (Long Life Coolant), but mix anticorrosive to fresh water and pour it. Wash the inside of the radiator, too with washing liquid. 							
Battery	Always maintain the electrolyte level 10mm (0.39 inch) above the plates.							

3. OPERATION IN DUSTY PLACE

Item	Treatment	Caution
Air cleaner	Perform washing and change of the element early.	
Radiator, oil cooler	Early clean the core not to allow dust to clog the core.	
Filter, element	Early replace with new ones.	
Engine oil	Early change oil.	
Slewing ring gear	Early lubricate.	
Wire rope	Early clean and lubricate.	

4. OPERATION IN SEASIDE

Item	Treatment	Caution
Lubrication	Thoroughly and carefully lubricate each point Lubricate connector sections not equipped with grease fittings.	
Basic machine	Sufficiently wash the basic machine, radiator and oil cooler to wash salt off.	

7. MAINTENANCE

7.7 MACHINE STORAGE

(1) SHORT TERM STORAGE (Period of 30 Days or Less)

- Clean, sufficiently dry, and then carefully lubricate the entire machine.
- Cover the machine to protect it from dust.

(2) LONG TERM STORAGE (Longer than One month and less than 1 Year)

- Clean, sufficiently dry, and then carefully lubricate the entire machine.
- Sufficiently grease the slewing ring gear.
- Replace the reduction unit gear oil and hydraulic oil with fresh oil.
- Replace all filters with new ones.
- Remove the battery and store it in a cold, dark place.
- Apply thin coat of oil to places that are prone to rust.
- Completely drain coolant and post a "No Water" sign.
- Cover the entire machine to protect it from dust.

7.8 TIGHTENING TORQUE VALUES

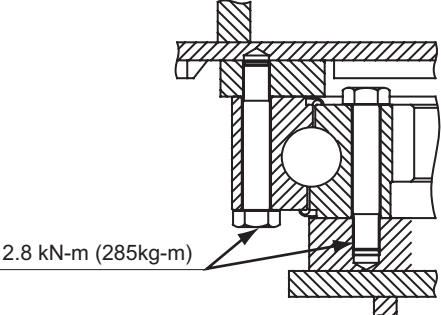
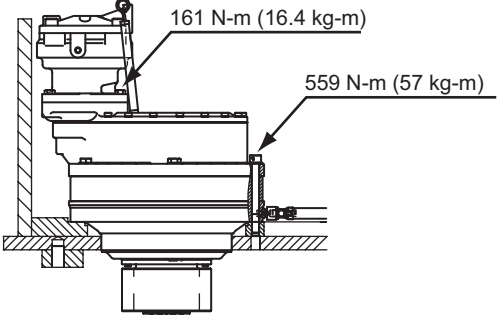
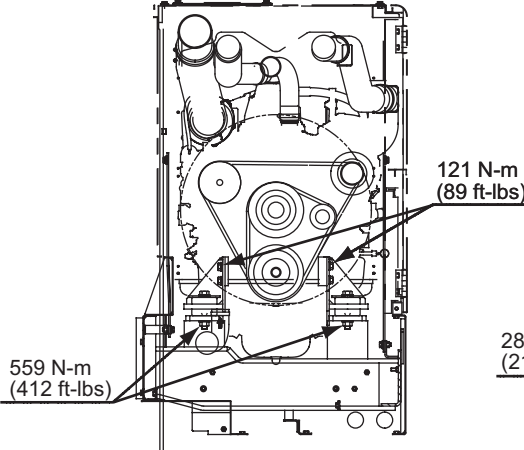
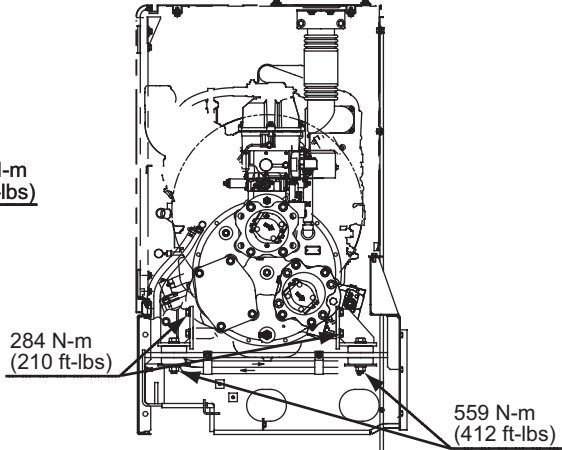
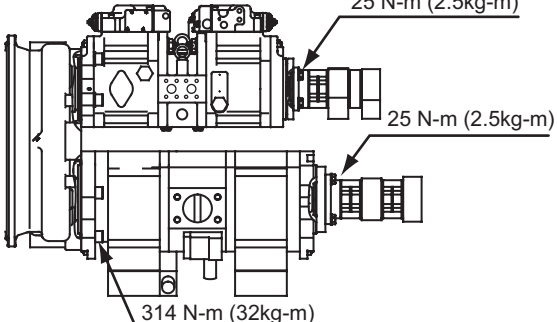
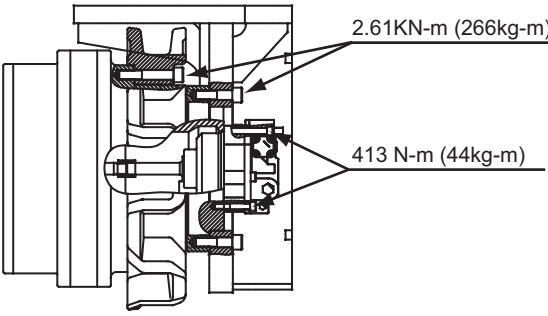
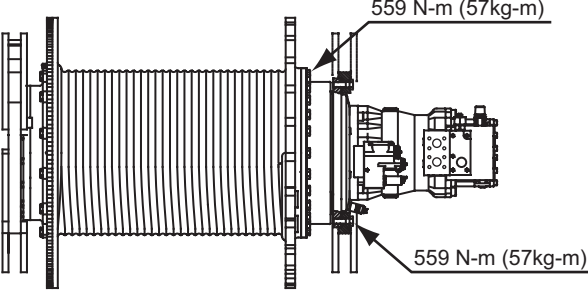
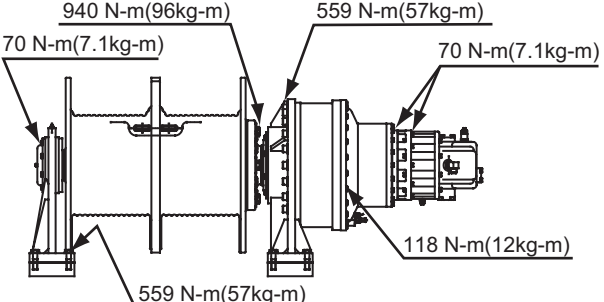
(1) Unless otherwise specified, torque all metric screws and bolts on this machine to the values shown in the table below.

Nominal	Metric Course Screw Thread			
	4T		7T	
	Tightening Torque N•m (ft•lbs)		Tightening Torque N•m (ft•lbs)	
	Dry	Lubricated	Dry	Lubricated
M6	5.1±0.5 (3.8±0.4)	4.3±0.4(3.2±0.3)	11.1±1.1 (8.2±0.8)	9.3±0.9 (6.9±0.7)
M8	12.3±1.2 (9.0±0.9)	10.4±1.0 (7.7±0.8)	27.4±2.7 (20.2±2.0)	22.5±2.3 (16.6±1.7)
M10	24.5±2.5 (18.1±1.8)	20.6±2.1 (15.2±1.5)	52.9±5.3 (39.0±3.9)	45.1±4.5 (33.2±3.3)
M12	41.2±4.1 (30.3±3.0)	36.3±3.6 (26.7±2.7)	90.2±9.0 (66.4±6.6)	76.4±7.6 (56.3±5.6)
M14	65.7±6.6 (48.4±4.8)	55.9±5.6 (41.2±4.1)	143±14 (105±10.5)	121±12 (88.8±8.9)
M16	100±10 (73.6±7.4)	84.3±8.4 (62.1±6.2)	216±22 (159±16)	181±18 (134±13)
M18	137±14 (101±10)	117±12 (85.9±8.6)	304±30 (224±22)	255±26 (188±19)
M20	193±19 (142±14)	162±16(119±12)	421±42 (310±31)	353±35 (260±26)
M22	255±26 (188±19)	216±22 (159±16)	559±56 (412±41)	470±47 (347±35)
M24	333±33 (245±25)	265±27 (195±20)	715±72 (527±53)	578±58 (425±43)
M27	480±48(354±35)	392±39 (289±29)	1048±105 (773±77)	853±85 (643±64)
M30	657±66 (484±48)	549±55 (404±40)	1421±142 (1047±105)	1195±120 (881±88)
M33	882±88 (650±65)	735±74 (542±54)	1911±190 (1408±141)	1607±161 (1184±118)
M36	1137±114 (838±84)	951±95 (700±70)	2450±245 (1805±180)	2048±205 (1509±151)

Nominal	Metric Fine Screw Thread			
	4T		7T	
	Tightening Torque N•m (ft•lbs)		Tightening Torque N•m (ft•lbs)	
	Dry	Lubricated	Dry	Lubricated
M8	12.9±1.3 (9.5±0.9)	10.9±1.1 (8.0±0.8)	28.4±2.8 (20.9±2.1)	23.5±2.4 (17.3±1.7)
M10	25.5±2.6 (18.8±1.9)	21.6±2.2 (15.9±1.6)	54.9±5.5 (40.4±4.0)	47.0±4.7 (34.7±3.5)
M12	45.1±4.5 (33.2±3.3)	38.2±3.8 (28.2±2.8)	97.0±9.7 (71.5±7.2)	81.3±8.1 (59.9±6.0)
M16	105±11 (77.3±7.7)	88.2±8.8 (65.0±6.5)	225±23 (166±17)	191±19 (141±14)
M20	206±21 (152±15)	174±17 (129±13)	451±45 (332±33)	372±37 (274±27)
M24	353±35 (260±26)	294±29 (217±22)	764±76 (563±56)	637±64 (469±47)
M30	706±71 (520±52)	588±59 (433±43)	1548±155 (1141±114)	1284±128 (946±95)
M36	1176±118 (866±87)	980±98 (722±72)	2568±257 (1892±189)	2136±214 (1574±157)

7. MAINTENANCE

(2) The torque values required for the specified screws and bolts on this machine are shown in the table below. The allowance of the torque values shown in the table is \pm (plus and minus) 10%.

SWING BEARING	SWING REDUCTION UNIT
 <p>2.8 kN-m (285kg-m)</p>	 <p>161 N-m (16.4 kg-m) 559 N-m (57 kg-m)</p>
ENGINE	
 <p>559 N-m (412 ft-lbs) 121 N-m (89 ft-lbs)</p>	 <p>284 N-m (210 ft-lbs) 559 N-m (412 ft-lbs)</p>
PUMP	PROPEL REDUCTION UNIT
 <p>25 N-m (2.5kg-m) 25 N-m (2.5kg-m) 314 N-m (32kg-m)</p>	 <p>2.61KN-m (266kg-m) 413 N-m (44kg-m)</p>
FRONT & REAR DRUM ASSEMBLY	BOOM DRUM ASSEMBLY
 <p>559 N-m (57kg-m) 559 N-m (57kg-m)</p>	 <p>940 N-m(96kg-m) 559 N-m(57kg-m) 70 N-m(7.1kg-m) 70 N-m(7.1kg-m) 118 N-m(12kg-m) 559 N-m(57kg-m)</p>

Apply Loctite #242 or equivalence to the bolts and nuts.
For maintenance, contact our KOBELCO authorize distributor.

7.9 SECURITY PARTS TO BE REPLACED PERIODICALLY

Disrepair of parts related to brakes and clutches cause serious accidents. Therefore, periodic replacement intervals are set for these critical parts, as shown in the following table. Replacement intervals are standardized. Be sure to replace the security parts, shown in the table below, (within) every 2 years.

No.	Security Parts to be Replaced Periodically	Replacement Interval	Remarks
1	Pressure line hose (accumulator to control line)	2 years	
2	Pressure line hose (pump to line filter)	2 years	

Since damage and corrosion of boom guy line are caused by fatigue from the inside in the boom guy line, replacement time cannot be judged from the appearance only. If the guy line is broken by progressing internal damage and/or corrosion, there is possibility to cause serious accidents. Be sure to replace the guy line periodically.

Replacement time according to the content of work is shown in the following table.

Contents of Operation	Replacement Interval
Exclusive operation to lifting magnet or clamshell	2 years
Both crane and clamshell operation, or frequent crane operation such as landing work	4 years
Normal crane operation	6 years

7. MAINTENANCE

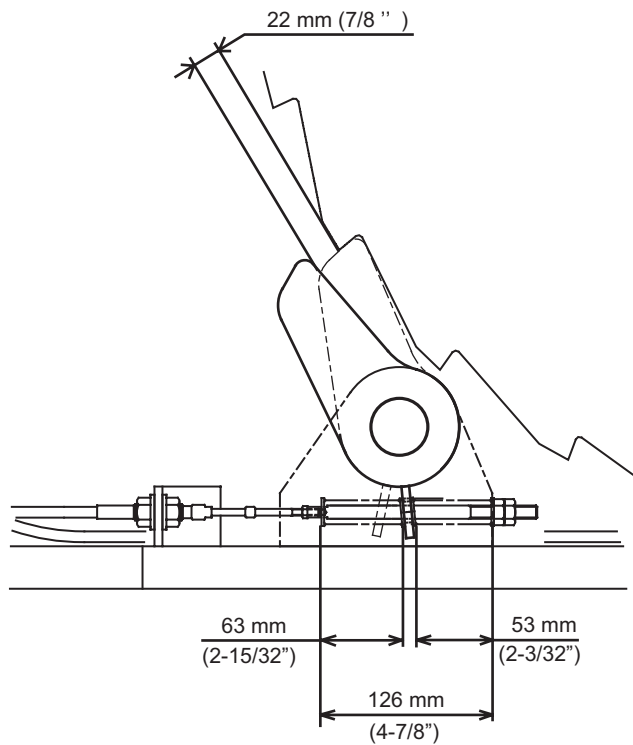
7.10 ADJUSTMENT

7.10.1 ADJUSTMENT OF FRONT AND REAR DRUM LOCKS



Do not adjust the drum locks until the boom, hook block, and load have been lowered to the ground. Failure to observe this precaution may result in serious injury or death.

1. Pull the drum lock knob in the LOCK position and check to see that the pawl is engaged in the bottom of the drum ratchet.
If the pawl is not engaged in the bottom of the ratchet, adjust the spring length to allow the pawl to be engaged.
2. With the RELEASE position, adjust the respective dimension as shown in the figure to the right.
3. Push the drum lock knob in the RELEASE position and check to see that the pawl is clear of the ratchet by at least 22 mm (7/8").
Operate the knob to the LOCK position, and to the RELEASE position and confirm that the pawl moves smoothly.

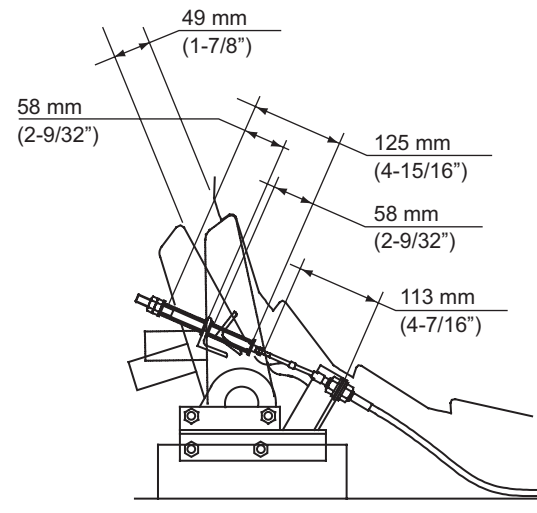


7.10.2 ADJUSTMENT OF BOOM DRUM LOCK

WARNING

Do not adjust the boom hoist drum lock until the boom has been lowered to the ground. Failure to observe this precaution may result in serious injury or death.

1. Pull the drum lock knob in the LOCK position and check to see that the pawl is engaged in the bottom of the drum ratchet with the drum lock condition. If the pawl is not engaged in the bottom of the ratchet, adjust the spring dimension to allow the pawl to be engaged.
2. With the RELEASE position, adjust the respective dimension as shown in the figure to the right.
3. Push the drum lock knob in the RELEASE position, and check to see that the pawl is clear of the ratchet by at least 49 mm (1-7/8"). Operate the knob to the LOCK position, and to the RELEASE position, and confirm that the pawl moves smoothly.

**WARNING**

Keep hands and clothing clear of the rotating drum. Failure to observe this precaution may result in serious injury or death.

7. MAINTENANCE

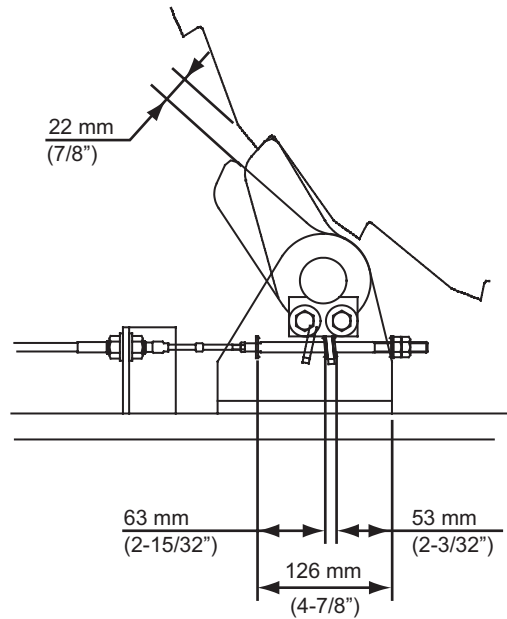
7.10.3 ADJUSTMENT OF THIRD (LUFFING JIB) DRUM LOCK

WARNING

Do not adjust the drum lock until the boom has been lowered to the ground.

Failure to observe this precaution may result in serious injury or death.

1. Shift the drum lock switch in the LOCK position and check to see that the pawl is engaged in the bottom of the drum ratchet.
If the pawl is not engaged in the bottom of the ratchet, adjust the spring length to allow the pawl to be engaged.
2. With the LOCK position, adjust the respective dimension as shown in the figure to the right.
3. Push the drum lock knob in the RELEASE position and check to see that the pawl is clear of the ratchet by at least 22 mm (7/8").
Operate the knob to the LOCK position and to the RELEASE position and confirm that the pawl moves smoothly.

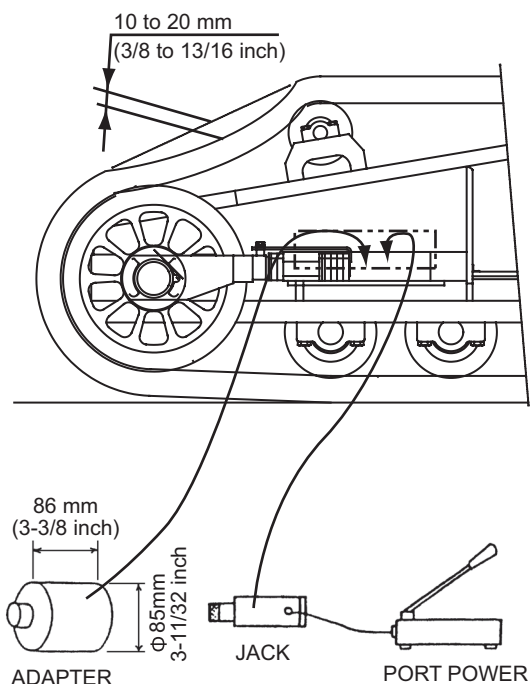
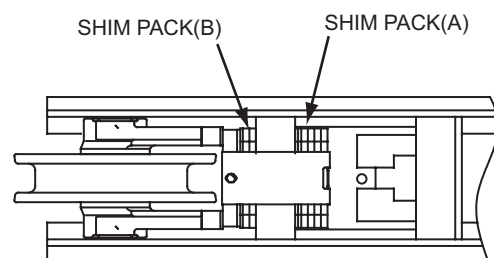


7.10.4 CRAWLER SHOES ADJUSTMENT

If the crawler shoes are too tight, the shoes wear quickly and a connection between two shoes could break. On the other hand, if the shoes are too loose, the shoes may ride off the drive sprocket and idler wheel during travel operation. To prevent these from happening, it is necessary to adjust shoe tension.

To adjust shoe tension, proceed as follows:

1. Move the machine forward about one crawler length so that the slackening in the crawler shoes appear on the top of the crawler.
2. Remove all the shims from shim pack (A).
3. Position the hydraulic jack between the bracket and block of the side frame.
Operate the jack to push the idler wheel and remove the slackening in the shoes.
4. Insert the shims removed from pack (A) in step (2) into the vacant room of pack (B).
Insert the remaining shims into pack (A).
5. Remove the hydraulic jack and adapter. Store spare shims in the shim pack (A).



Note

Equalize the tension in right and left crawler tracks.

7.11 CONSUMABLE PARTS LIST

1. OIL/GREASE

For the recommended oil and grease, refer to the "KOBELCO Genuine Lubricant Chart" on page 7-37, and be sure to use genuine KOBELCO parts. For the battery electrolyte and the window washer liquid, use commercial items.

2. FILTER ELEMENT

For the recommended filter element, refer to the chart on page 7-67.

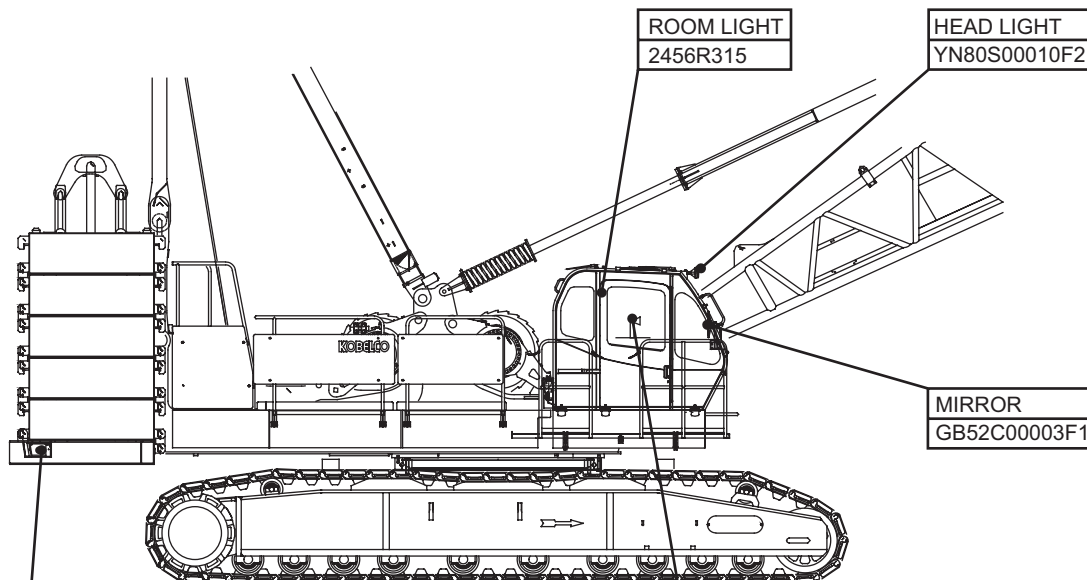
3. FUSE

For the recommended fuse, refer to the chart on page 7-80.

4. WIRE ROPE

For the recommended wire rope, refer to the of "WIRE ROPE" in Chapter 6.

5. LIGHT AND MIRROR



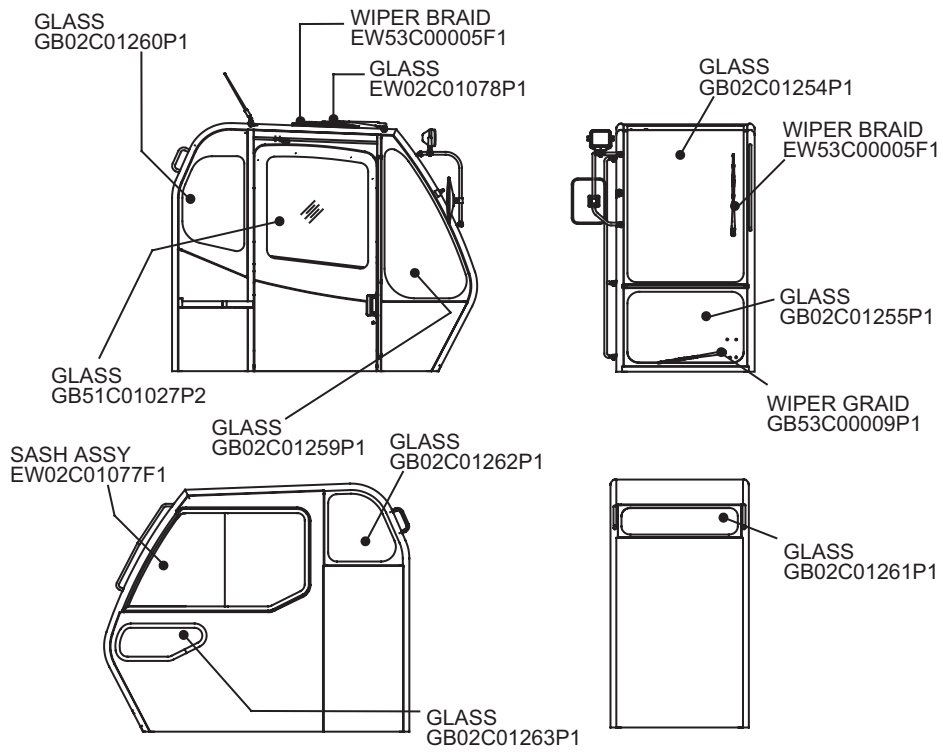
SWING FLASHER / ETAIL LIGHT	
Right	Assy JJ80S00002F1
	Bulb 2456U145S15
	Lens(Red) GB80S00002S002
Left	Lens (Transparent) GB80S00002S001
	Assy JJ80S00001F1
	Bulb 2456U145S15
Left	Lens(Red) GB80S00001S002
	Lens (Transparent) GB80S00001S001

PANEL LIGHT
GB80S00011P1

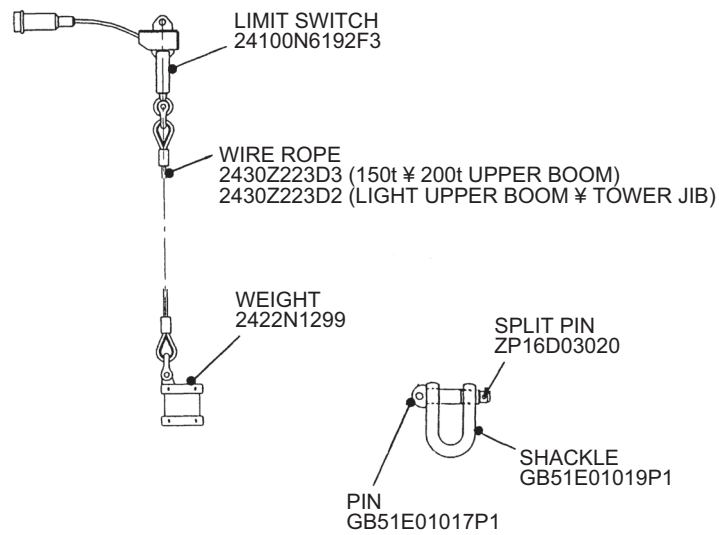
LOAD SAFETY DEVICE ALARM LAMP	
(OPTION)	
LAMP ASSY	EZ53E00013F1
BULB	FOCUS 24V10W

7. MAINTENANCE

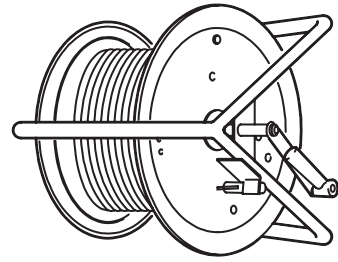
6. GLASS AND WIPER



7. HOOK OVER HOIST LIMIT SWITCH



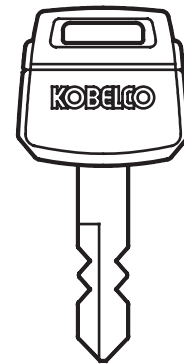
8. CABLE REEL FOR LOAD SAFETY DEVICE



Cable reel

Crane Jib	GG82S00002F1
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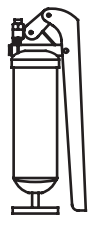
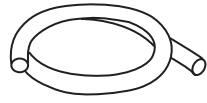


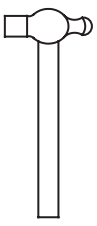

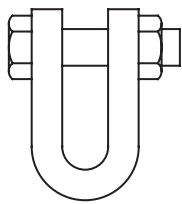








9. KEY




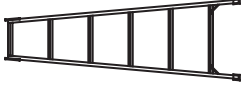

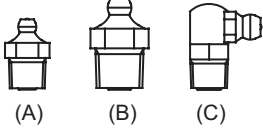

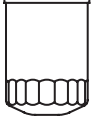
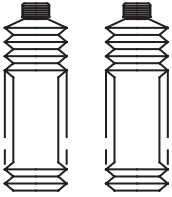


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7. MAINTENANCE

10. TOOL

<p>JACK (When adjustment of shoe)</p>  <p>2421Z228D18</p>	<p>GREASE PUMP</p>  <p>2421R107</p>	<p>VINYLE HOSE</p>  <p>2420Z718D200</p>	<p>HOSE (For grease pump)</p>  <p>44Z186</p>
<p>TOOL BOX</p>  <p>4027R1</p>	<p>HUMMER</p>  <p>2421R397</p>	<p>HUMMER</p>  <p>21Z72D4</p>	<p>SHACKLE</p>  <p>2420Z605D7 X 2 (For 2.0t) 2420Z2134D1 X 4 (For 10.0t)</p>
<p>ADJUST WRENCH</p>  <p>ZT12D20000 (24mm) ZT12D37500 (41mm)</p>	<p>PLIERS</p>  <p>2421R393</p>	<p>RATCHET HANDLE</p>  <p>2420R527 (12.7)</p>	<p>(-) DRIVER</p>  <p>2421R395D2 (5.5mm)</p>
<p>(+) DRIVER</p>  <p>GB01T01008D1</p>	<p>EXTENSION BAR</p>  <p>2406Z623D4 (12.7)</p>	<p>SPANNER</p>  <p>ZT12A55000 (55mm)</p>	<p>PIPE (For wrench)</p>  <p>2420T3100</p>

<p>SOCKET</p>  <p>2408R587D1 (17mm) 2408R587D2 (19mm) 2408R587D3 (22mm) 2408R587D4 (24mm) ZT32A3000 (30mm) ZT32A55000 (55mm)</p>	<p>ADAPTER (When adjustment of shoe)</p>  <p>2416T9379</p>	<p>FILTER WRENCH</p>  <p>2421R171</p>	<p>RADDER</p>  <p>2429Z291</p>
<p>GEAR OIL (For swing gear)</p>  <p>21Z16D5</p>	<p>GREASE NIPPLE</p>  <p>(A) ZG91S02000 (PT1/8) (B) ZG91S04000 (PT1/4) (C) ZG91U02000 (PT1/8)</p>	<p>CARTRIDGE</p>  <p>2446U254S3</p>	<p>CARTRIDGE, MODE</p>  <p>2446U146S3</p>
<p>GREASE</p>  <p>2421R114D11</p>			

8. REFERENCE MATERIALS

8.1 SPECIFICATION

8.1.1 PERFORMANCE

Type	Crawler mounted, fully revolving
Max. lifting capacity (with 40 ft heavy boom)	400,000 lbs. x 12.3 ft (181.4 t x 3.75 m)
Max. boom length	280 ft (85.3m)
Max. boom & jib length	240 ft boom + 100 ft jib (73.2 m boom + 30.5 m jib)
Basic boom length	50 ft (15.2 m)
Working weight (Including upper and lower machine, counterweights, carbody weights, 50 ft boom, hook block)	Approx. 362,200 lbs (164.3 ton)
Average ground pressure	Approx. 13.24 psi (91.2 kPa)
Greadability (tanq)	30%
Engine	Hino P11C-UN 247kw/2000min ⁻¹
Hoist line speed (front and rear drum)	330 ft/min. (100 m/min.)
Lowering line speed (front and rear drum)	330 ft/min.(100 m/min.)
Boom raising rope speed	89 x 2 ft/min. (27 x 2 m/min.)
Boom lowering rope speed	89 x 2 ft/min. (27 x 2 m/min.)
Swing speed	2.6 min ⁻¹ (2.6 rpm)
Propel speed	0.68 to 0.41 miles/h (1.1/0.66 km/h)

1. The main lifting/lowering rope speed, the auxiliary lifting/lowering rope speed, and the propel speed vary depending on the load.
2. The rope speed is of the first layer on the drum.

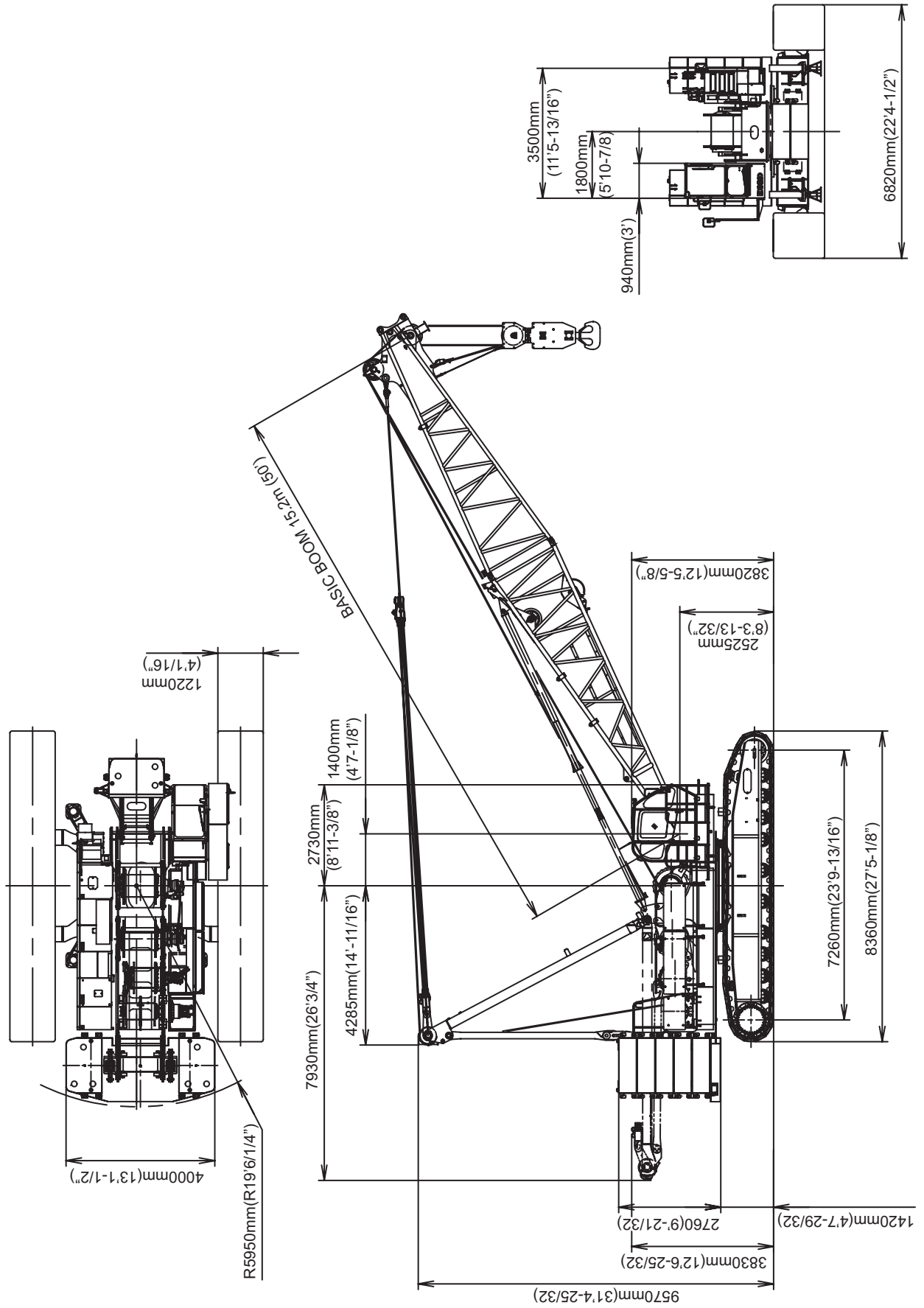
8.1.2 PERFORMANCE OF LUFFING JIB

Max. lifting capacity	107,100 lbs. x 30 ft (48.6 t x 9.14 m)
Max. boom length + Jib length	180 ft boom + 170 ft jib (54.9 m boom + 51.8 m jib)
Working weight	Approx. 377,600 lbs. (171 t) [Including upper and lower machine, counterweights, carbody weights 70 ft boom + 70 ft jib (21.3 m boom + 21.3 m jib), hook block]
Average ground pressure	Approx. 13.8 psi (95 kPa) [Including upper and lower machine, counterweights, carbody weights 70 ft boom + 70 ft jib (21.3 m boom + 21.3 m jib), hook block]
Jib raising/lowering rope speed	144 ft/min. (44 m/min.)

8. REFERENCE MATERIALS

8.1.3 OUTSIDE DIMENSIONS

Height above ground of cab	3820mm (12'-6 1/8")
Width of upper machine with operator's cab	3500mm (11'-5 13/16")
Radius of rear end (with counterweight)	5950mm (19'-6 1/4")
Counterweight ground clearance	1420mm (4'-7 7/8")
Center of rotation to boom foot pin	1400mm (4'-7 1/8")
Height above ground of boom foot pin	2525mm (8'-3 7/16")
Height to top of gantry (working position)	9570mm (31'-4 3/4")
Overall length of crawlers	8360mm (27'-5 1/8")
Distance between centers of tumblers	7260mm (23'-9 13/16")
Overall width of crawlers	6820mm (22'-4 1/2")
Width of crawler shoe	1220mm (4'-1/16")
Ground clearance of carbody	430 (1'-4 15/16")

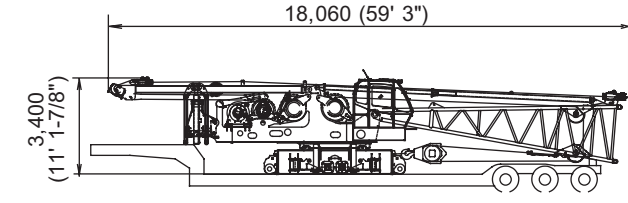
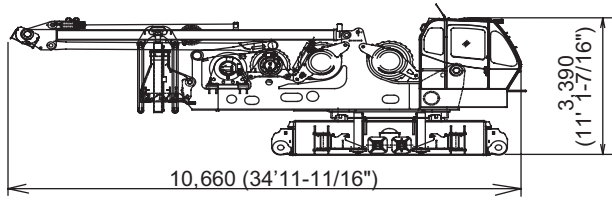
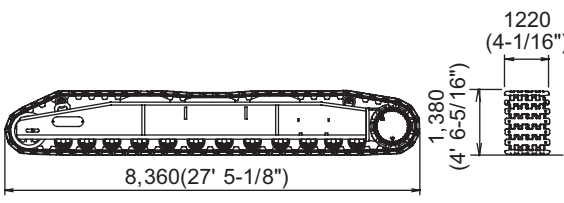
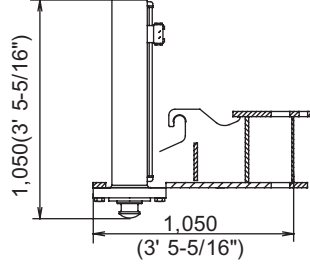
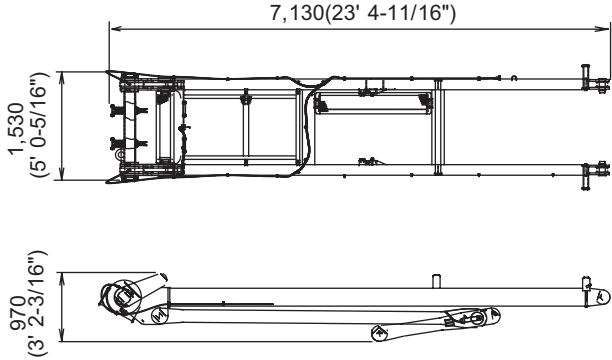


8. REFERENCE MATERIALS

8.2 DIMENSIONS AND WEIGHT OF EACH PARTS

For your reference, the chart below shows the dimensions and weight of each parts.

8.2.1 BASE MACHINE

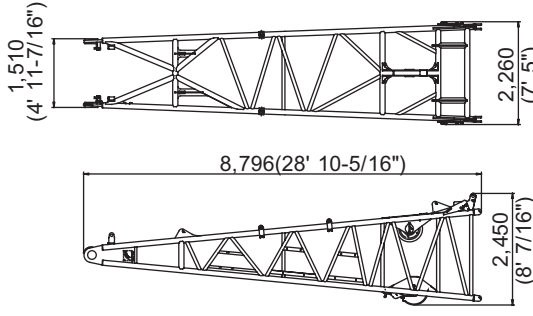
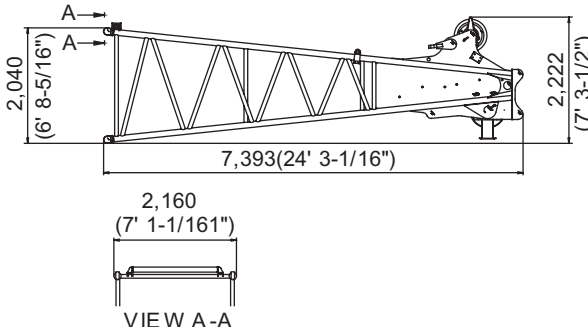
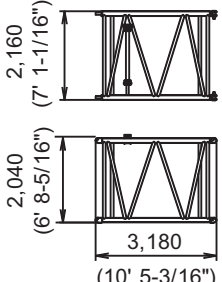
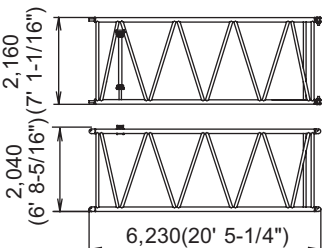
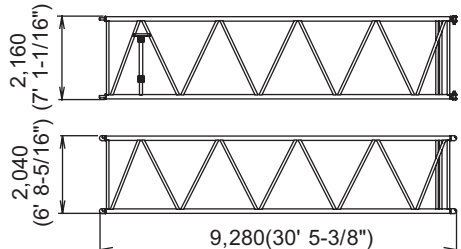
Name	Dimension mm (ft-in)	Weight kg (lbs)
Base machine		43,450 (95,800)
Base machine		38,150 (84,100)
Crawler		18,500 (40,800)
Translifter		360 (800)
Gantry		2,950 (6,500)

8.2.2 COUNTERWEIGHT

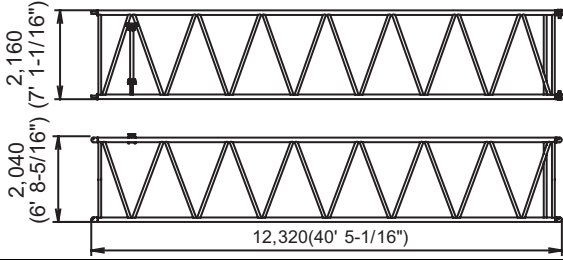
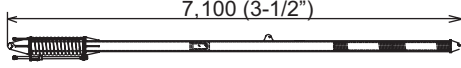
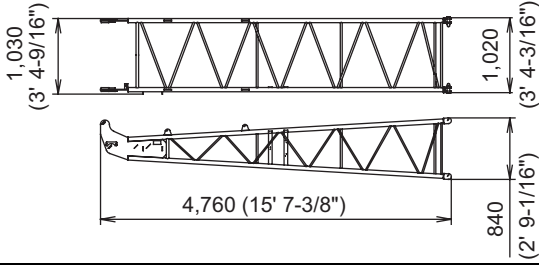
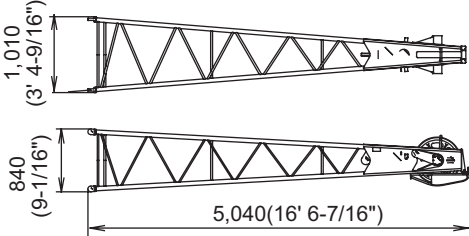
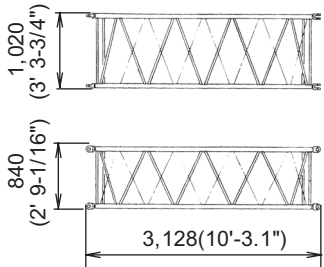
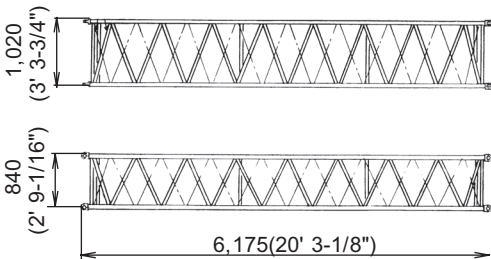
Name	Dimension mm (ft-in)	Weight kg (lbs)
Counterweight No.1	<p>Technical drawing of Counterweight No.1. The top view shows a rectangular component with a length of 4,000 mm (13' 1-1/2") and a height of 1,850 mm (6' 0-13/16"). The side view shows a depth of 280 mm (0' 10-13/16") and a width of 1,470 mm (4' 9-7/8").</p>	10,000 (22,050)
Counterweight No.2	<p>Technical drawing of Counterweight No.2. The top view shows a rectangular component with a height of 1,750 mm (5' 8-7/8") and a width of 965 mm (3' 2"). The side view shows a height of 1,490 mm (4' 10-21/32") and a width of 550 mm (1' 9-5/8").</p>	5,000/1 piece (11,020/1 piece)
Carbody weight	<p>Technical drawing of Carbody weight. The top view shows a rectangular component with a height of 1,750 mm (5' 8-7/8") and a length of 2,415 mm (7' 11-1/16"). The side view shows a height of 540 mm (1' 9-1/4").</p>	5,000/1 piece (11,020/1 piece)

8. REFERENCE MATERIALS

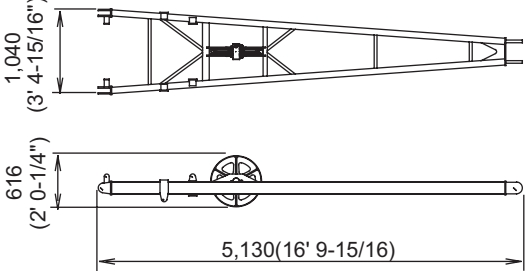
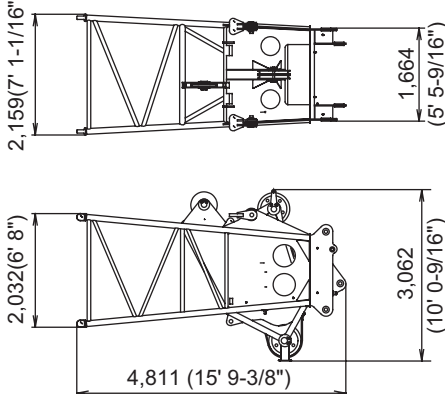
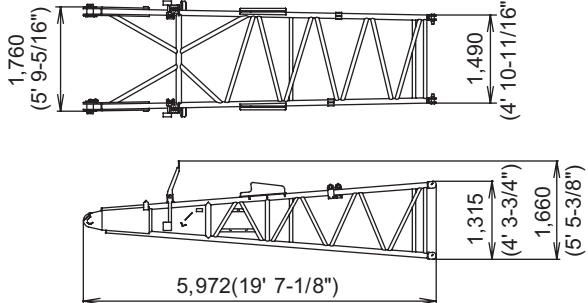
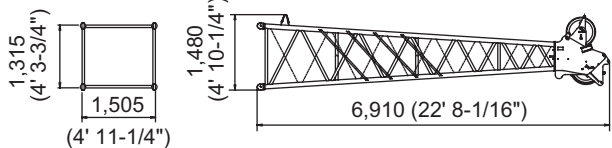
8.2.3 ATTACHMENT

Name	Dimension mm (ft-in)	Weight kg (lbs)
Boom base		2,620 (5,776)
Boom tip		2,100 (4,630)
3.0m (10ft) Insert boom		530 (1,170)
6.1m (20ft) Insert boom		880 (1,940)
9.1m (30ft) Insert boom		1,220 (2,690)

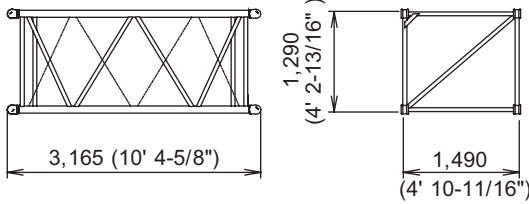
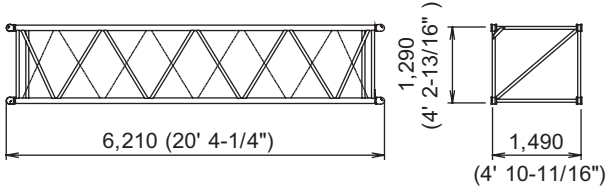
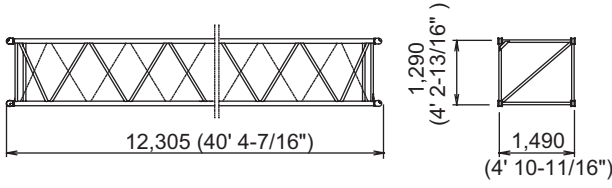
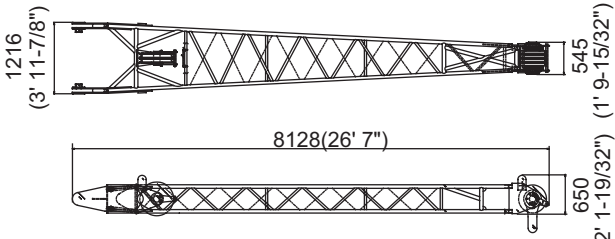
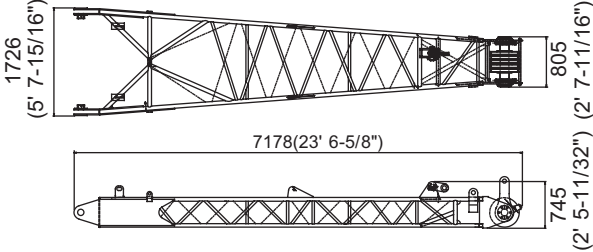
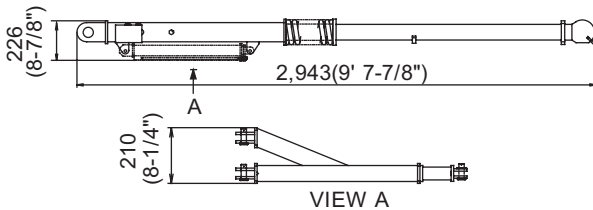
8. REFERENCE MATERIALS

Name	Dimension mm (ft-in)	Weight kg (lbs)
<p>12.2m (40ft) Insert boom</p>		<p>1,450 (3,197)</p>
<p>Boom backstop</p>		<p>740/1 piece (1,630/1 piece)</p>
<p>Jib base (for crane)</p>		<p>210 (463)</p>
<p>Jib tip (for crane)</p>		<p>315 (697)</p>
<p>3.0m (10ft) (Insert jib)</p>		<p>110 (243)</p>
<p>6.1m (20ft) (Insert jib)</p>		<p>190 (420)</p>

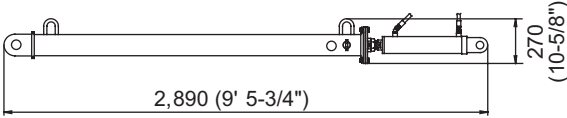
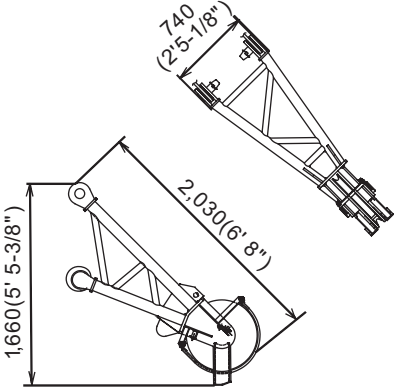
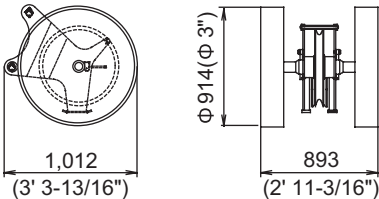
8. REFERENCE MATERIALS

Name	Dimension mm (ft-in)	Weight kg (lbs)
Jib strut		300 (662)
Luffing upper Boom		2,345 (5,170)
Luffing jib base		1,140 (2514)
Luffing jib tip		1,170 (2,580)

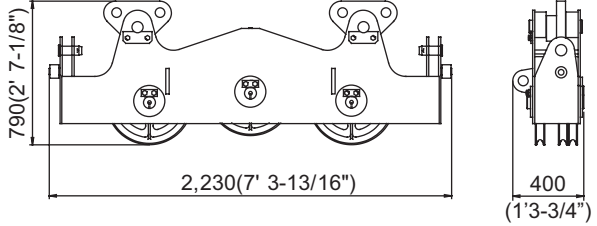
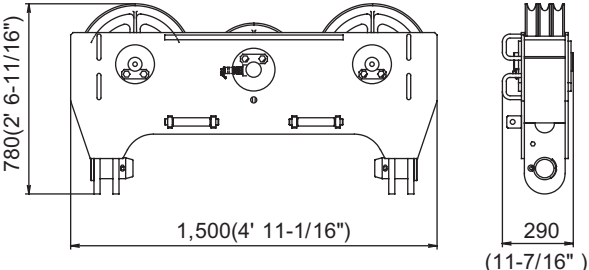
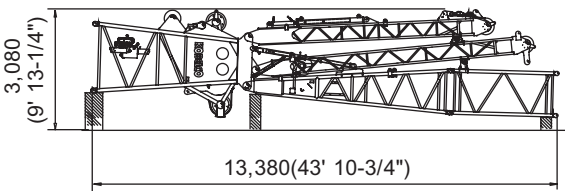
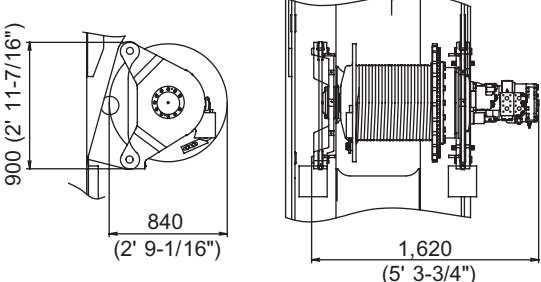
8. REFERENCE MATERIALS

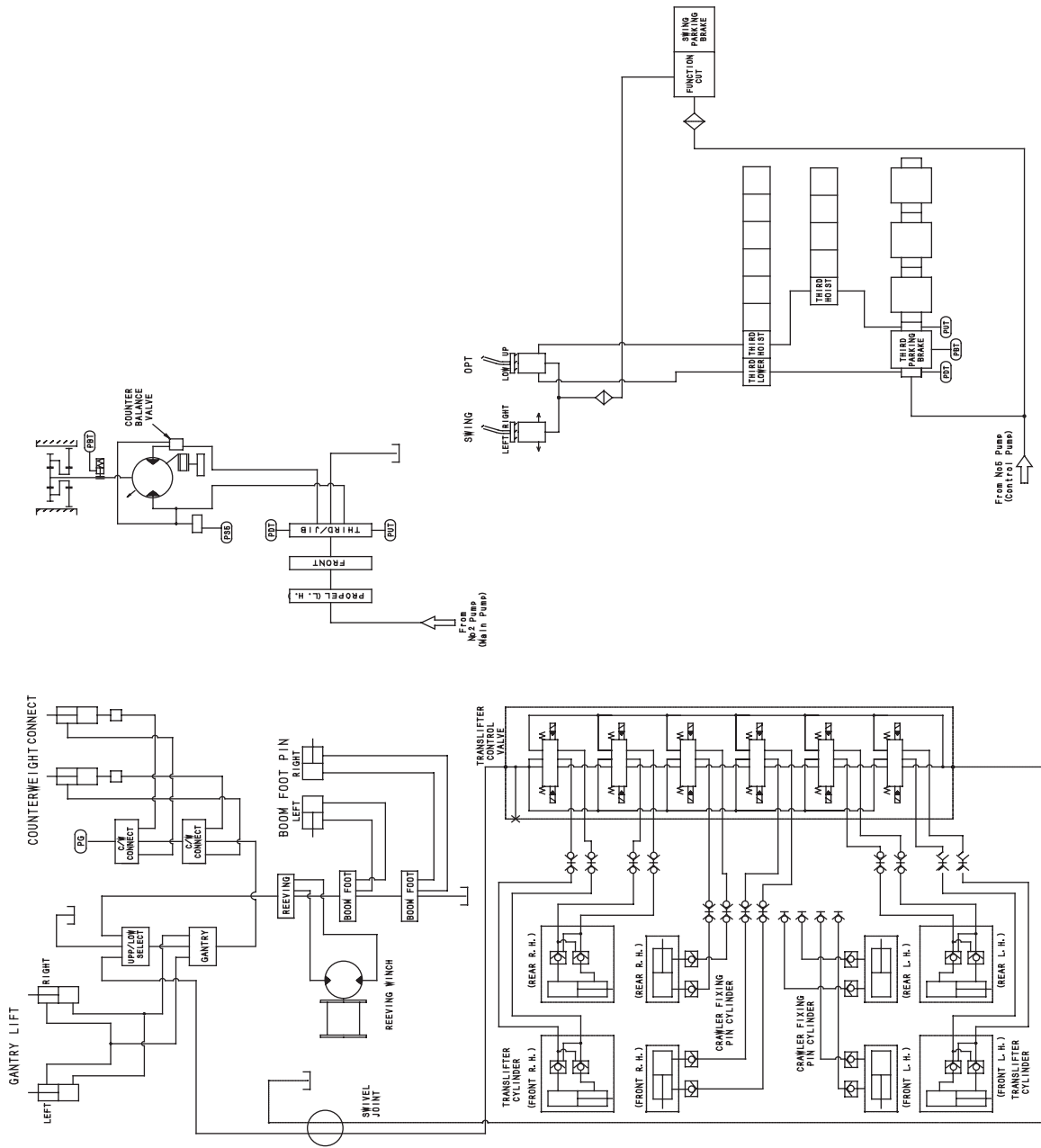
Name	Dimension mm (ft-in)	Weight kg (lbs)
3.0m (10ft) Insert jib		310 (684)
6.1m (20ft) Insert jib		540 (1,147)
12.2m (40ft) Insert jib		960 (2,117)
Front strut (Luffing Jib)		997 (2,200)
Rear strut (Luffing Jib)		1,088 (2,400)
Luffing jib backstop		100/1 piece (220/1 piece)

8. REFERENCE MATERIALS

Name	Dimension mm (ft-in)	Weight kg (lbs)
Strut backstop (Luffing jib)		180/1 piece (397/1 piece)
Aux. sheave		300 (661)
Aux. sheave (For luffing jib)		380 (838)

8. REFERENCE MATERIALS

Name	Dimension mm (ft-in)	Weight kg (lbs)
Upper spreader		590 (1,300)
Lower spreader		400 (880)
Luffing boom tip assembly		6,600 (14,550)
Luffing jib drum		1,470 (3,241)

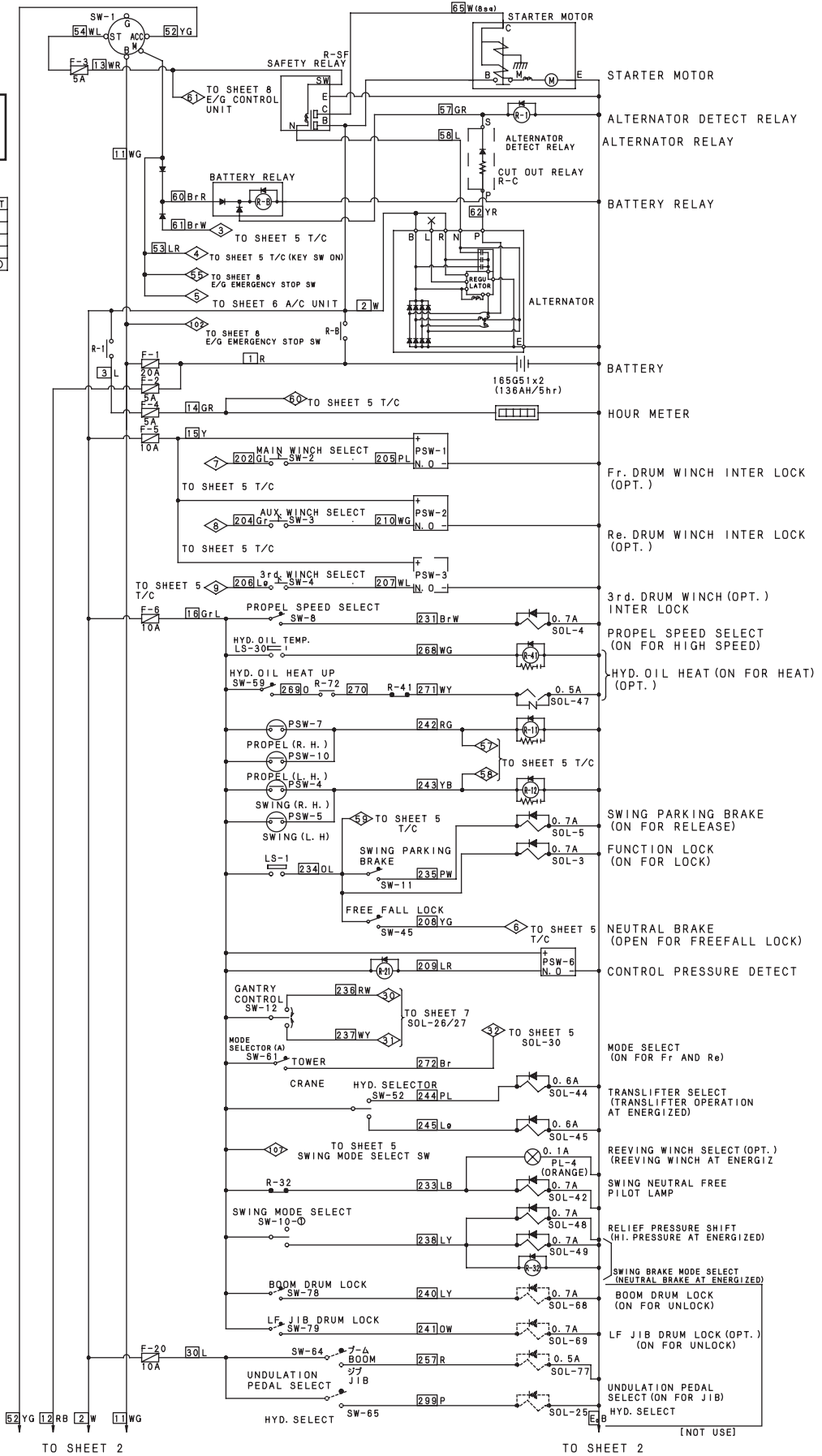


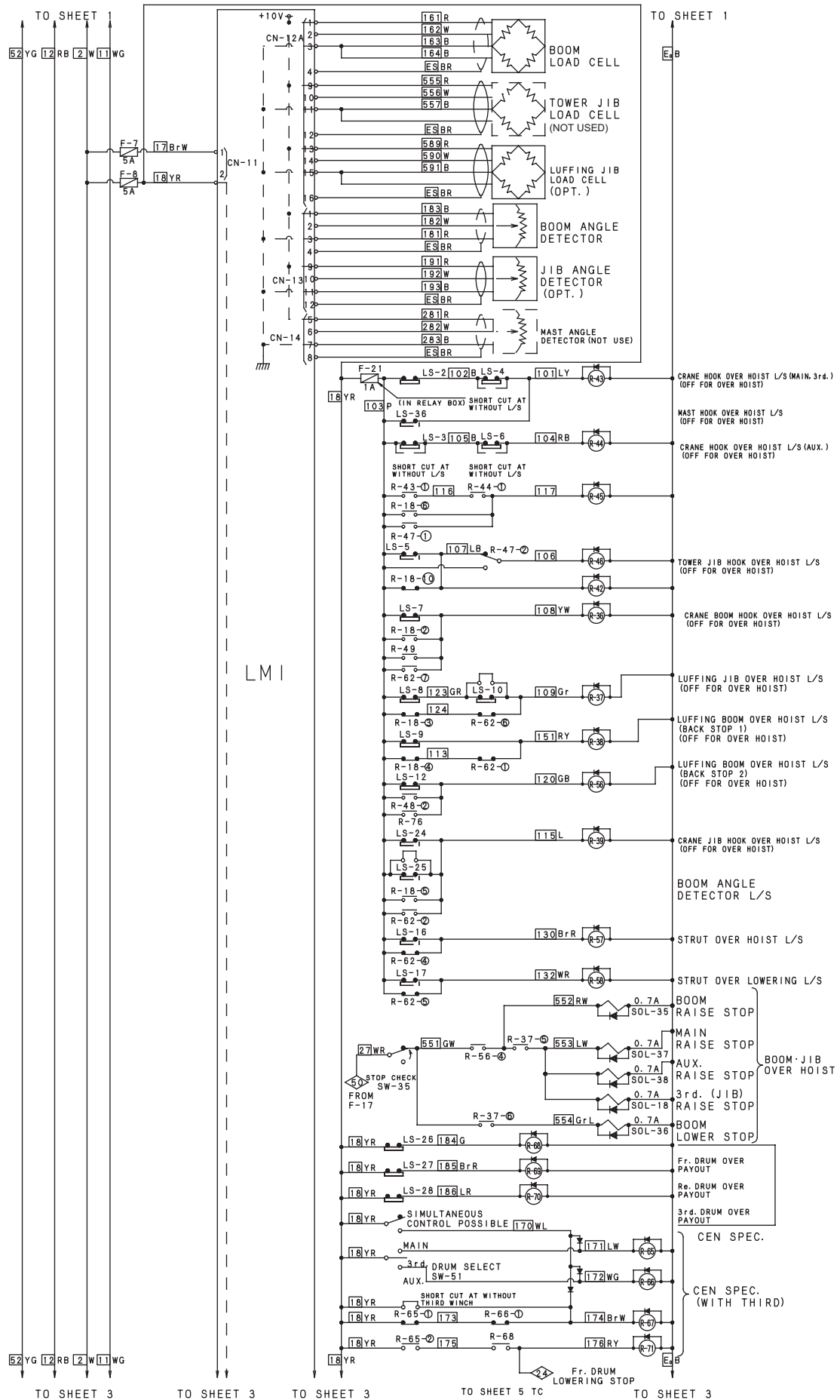
8. REFERENCE MATERIALS

8.3.2 ELECTRIC SYSTEM SCHEMATIC

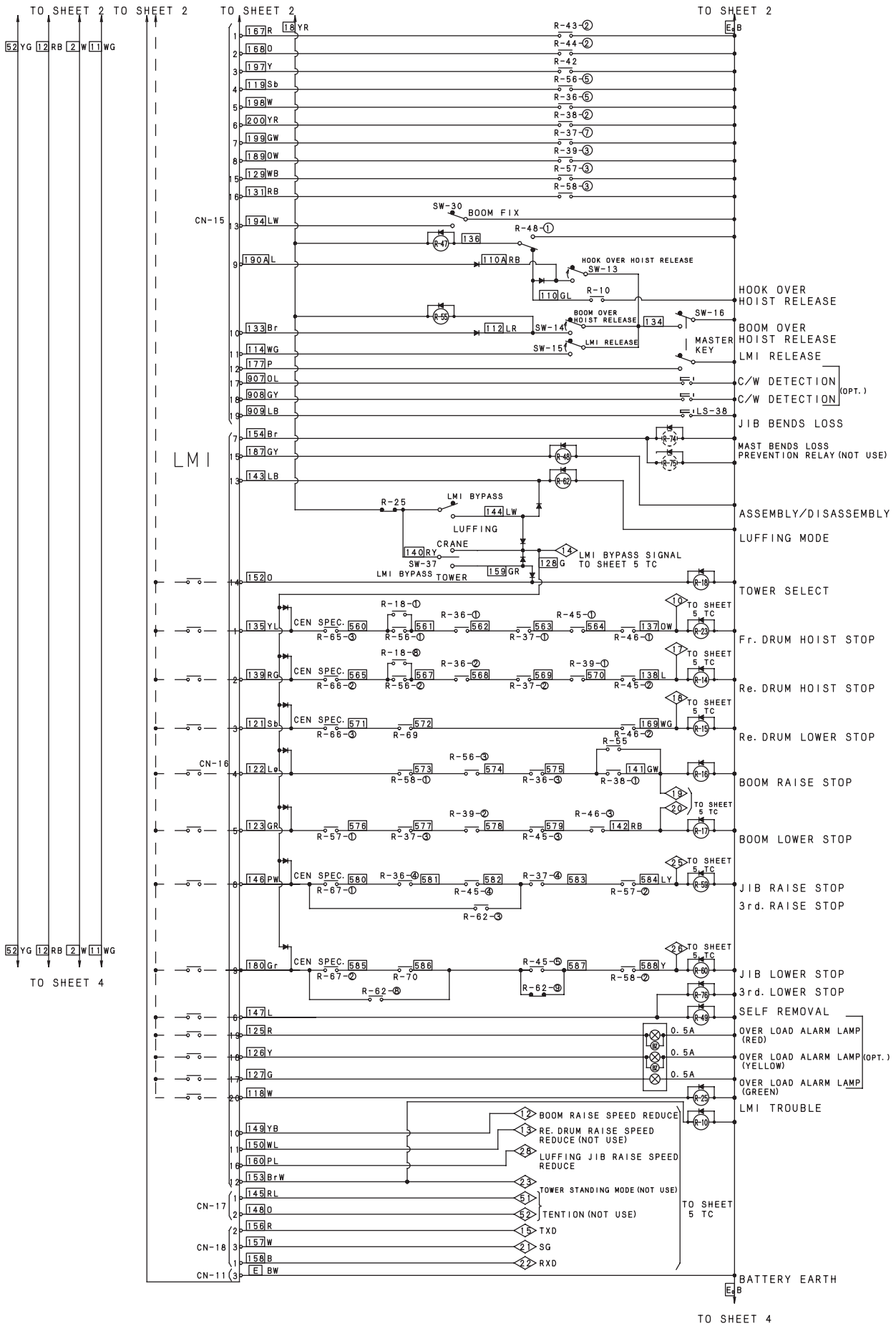
Note : Devices indicated in dotted line are not used in this model.

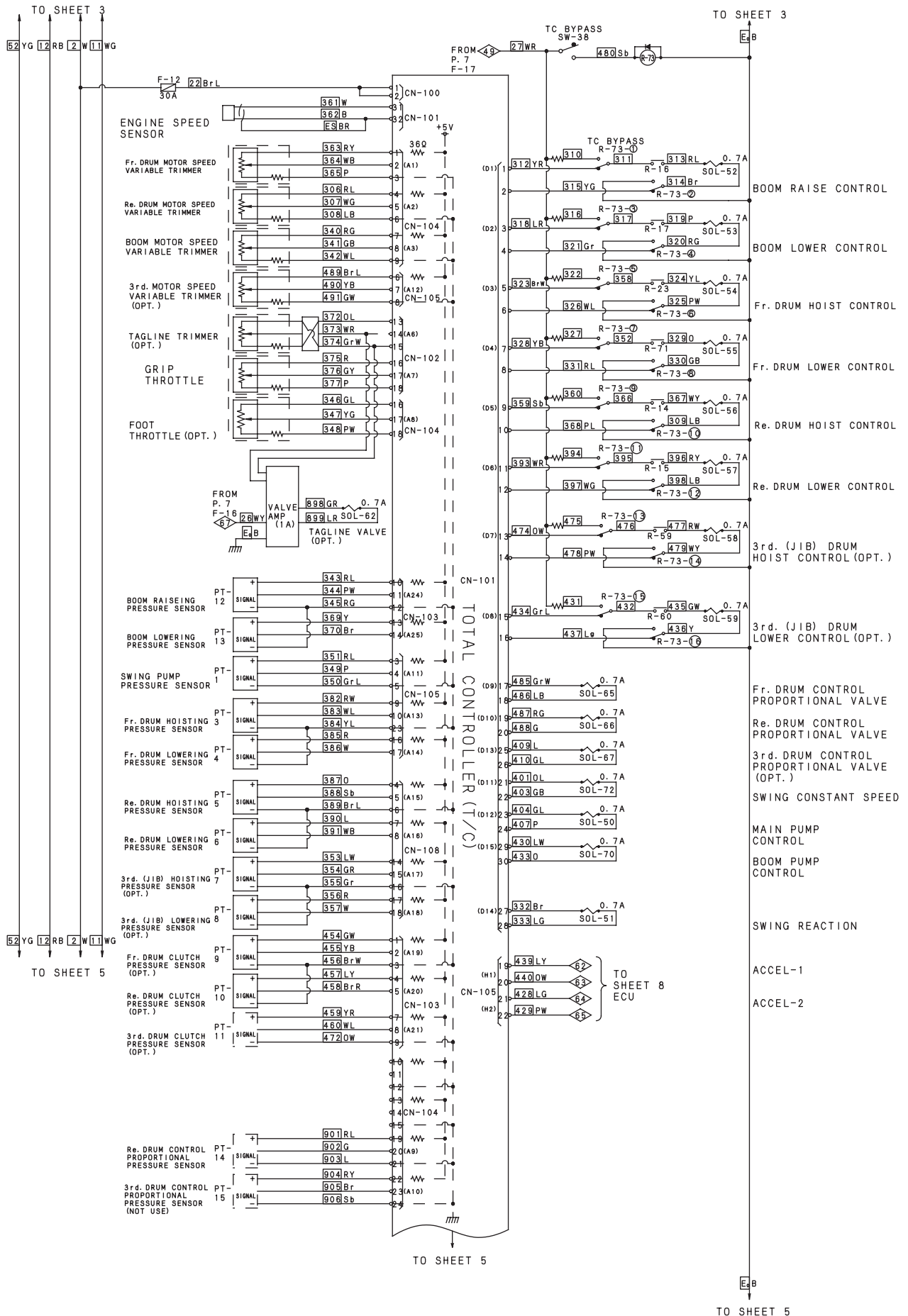
KEY SWITCH					
	B	G	ACC	M	ST
HEAT	○	○	○	○	○
OFF	○	○	○	○	○
ACC	○	○	○	○	○
ON	○	○	○	○	○
START	○	○	○	○	○



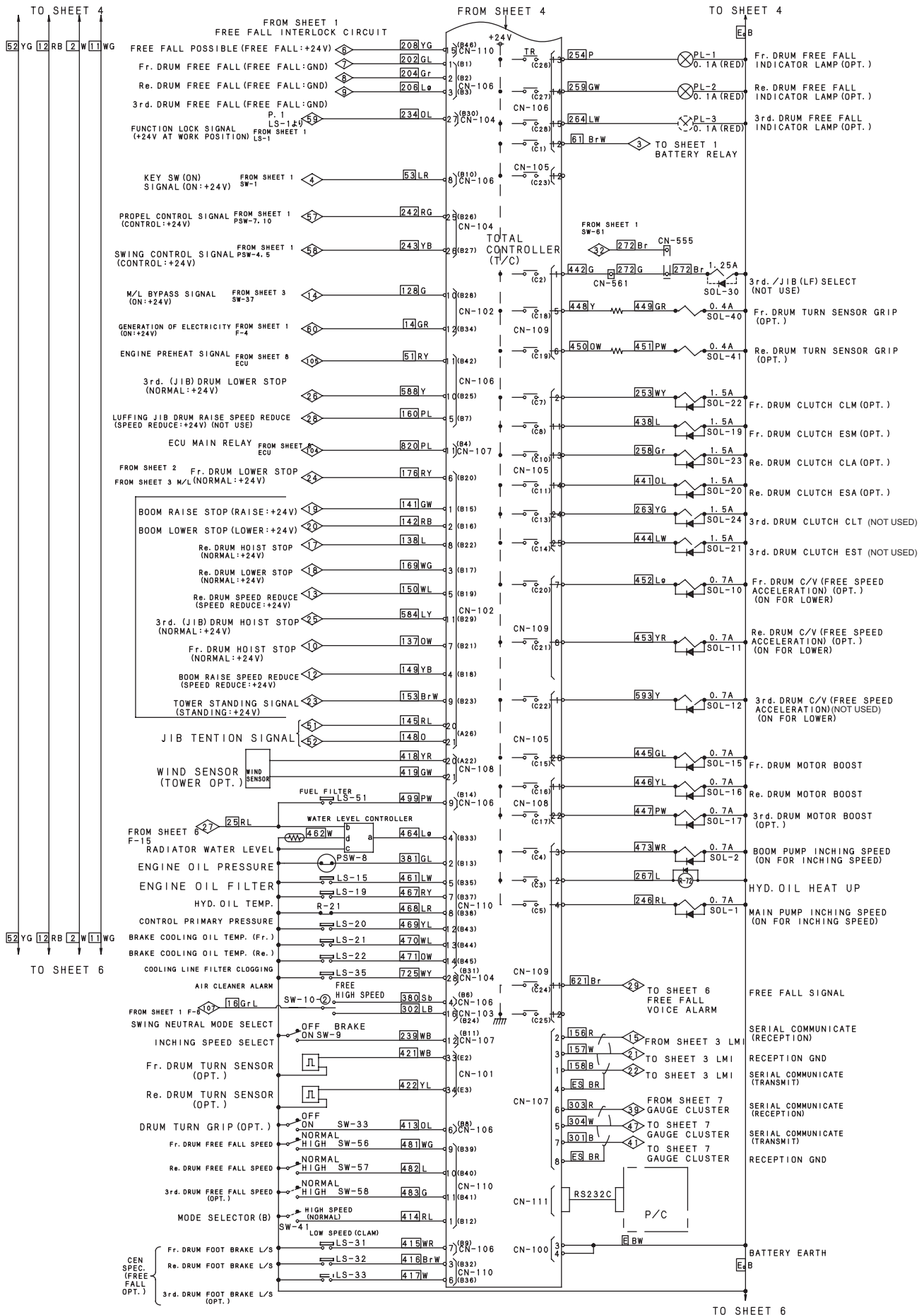


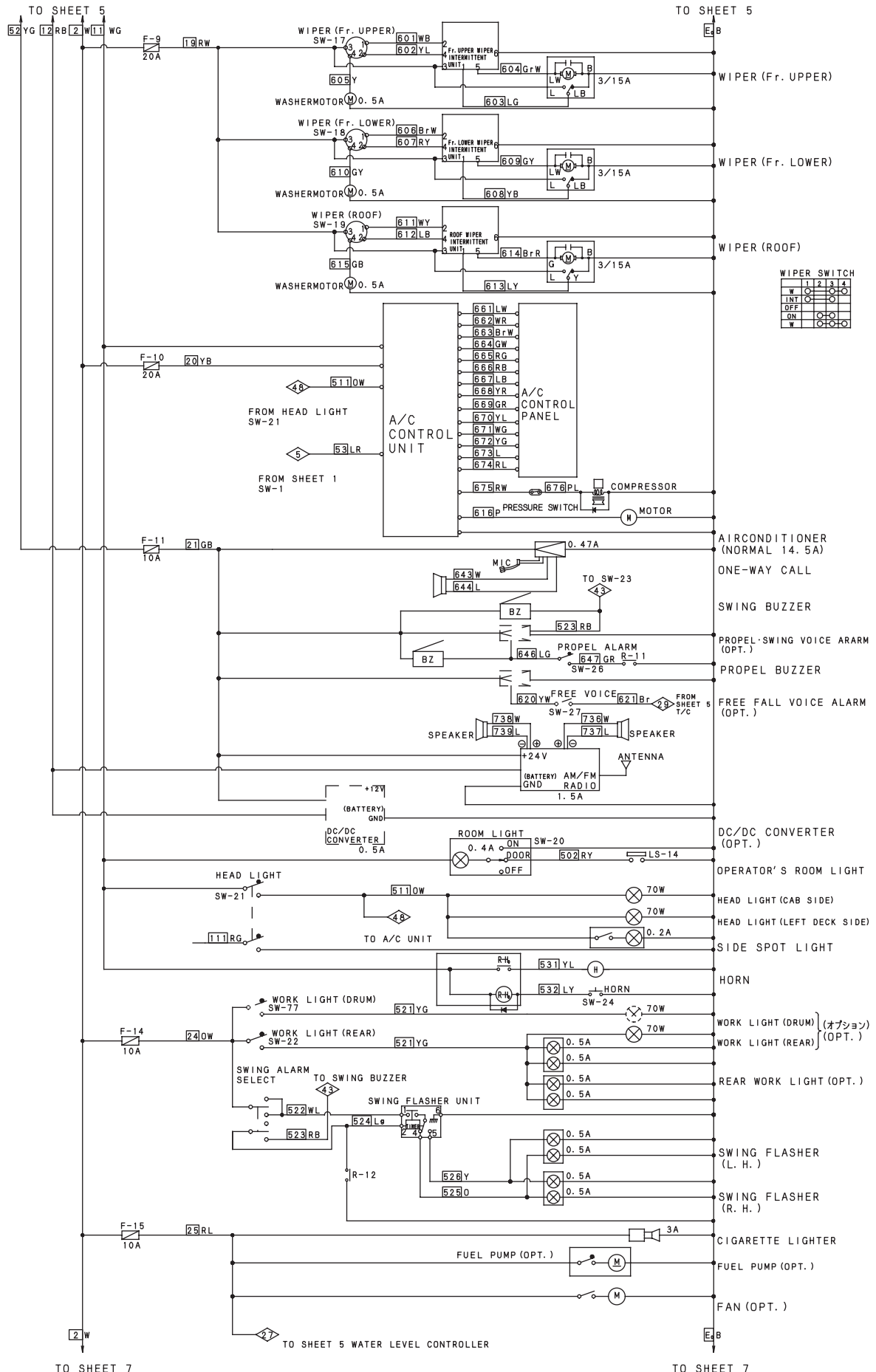
8. REFERENCE MATERIALS





8. REFERENCE MATERIALS





8. REFERENCE MATERIALS

S W I T C H					
SW-NO.	LINE NO.	U S E	SHEET NO.	KOBELCO PART NO.	
SW-1	11-51 52 53 54	ENG. KEY	1	YN50S00026F1	
SW-2	202-205	Fr. DRUM WINCH SELECT	1	GG50E00006F3	
SW-3	204-210	Re. DRUM WINCH SELECT	1	GG50E00006F3	
SW-4	206-207	3rd. DRUM WINCH SELECT	1	GG50E00006F4	
SW-8	16-231	PROPEL SPEED SELECT	1	JJ50S00014P1	
SW-9	E4-239	INCHING SPEED SELECT	5	(GG50M01032F1)	
SW-10	16-238 18-380 302	SWING MODE SELECT	1, 5	2479R2387	
SW-11	234-235	SWING PARKING BRAKE	1	(GB20E00001F3)	
SW-12	16-236 237	GANTRY CONTROL	1	2479Z293	
SW-13	134-110A	HOOK OVERHOIST RELEASE	3	2479Z348	
SW-14	134-112	HOOK OVERHOIST RELEASE	3	2479Z348	
SW-15	134-114	LMI RELEASE	3	2479Z348	
SW-16	E4-134 E4-177	MASTER KEY	3	JJ50S00015P1	
SW-17	19-601 602 605	WIPER (FRONT UPPER)	6	EZ50S00015P1	
SW-18	19-606 607 610	WIPER (FRONT LOWER)	6	EZ50S00015P1	
SW-19	19-611 612 615	WIPER (ROOF)	6	EZ50S00015P1	
SW-20	11-E4 502	ROOM LIGHT	6	2456R315	
SW-21	11-511 111-E4	HEAD LIGHT	6	GB50S00007D1	
SW-22	24-521	WORK LIGHT (REAR)	6	GB50S00007D1	
SW-23	24-522 523-524	SWING ALARM SELECT	6	GB50S00008D1	
SW-24	532-E4	HORN	6	(GB20E00001F3)	
SW-26	646-647	PROPEL SWING VOICE ALARM	6	2479Z1813	
SW-27	620-621	FREE FALL VOICE ALARM	6	2479Z1813	
SW-30	194-E4	BOOM FIX	3	GB50S00045P1	
SW-33	E4-413	DRUM TURN DETECT GRIP	5	2479Z1813	
SW-35	27-551	STOP CHECK	2	2479Z348	
SW-36	140-144	LMI BYPASS (LUF)	3	7921657	
SW-37	140-128 159	LMI BYPASS (TW&CR)	3	7921657	
SW-38	27-480	TC BYPASS	4	2479Z2872	

SW-41	414-E4	MODE SELECTOR (B)	5	2479Z2872
SW-45	234-208	FREE FALL LOCK	1	GG50S00005P1
SW-50	18-170	SIMULTANEOUS CONTROL POSSIBLE	2	JJ50S00005P1
SW-51	18-171 172	WINCH SELECTOR	2	GB50S00038P1
SW-52	16-244 245	HYD SELECTOR	1	7921657
SW-56	E4-481	Fr. DRUM FREE FALL SPEED	5	2479Z2872
SW-57	E4-482	Re. DRUM FREE FALL SPEED	5	2479Z2872
SW-58	E4-483	3rd. DRUM FREE FALL SPEED	5	FY50E00007P1
SW-59	16-269	HYD. OIL HEAT UP	1	FY50E00007P1
SW-62	872-873	EMERGENCY ACCELE	8	FY50E00007P1
SW-64	30-257	UNDULATION PEDAL SELECT	1	FY50E00007P1
SW-65	30-299	HYDRAULIC SELECT	1	2479Z2872
SW-71	11-857 53-858	E/G EMERGENCY STOP	8	GG50S00022P1
SW-72	27-874	ACCELE BYPASS	8	2479Z2872
SW-77	24-521	WORK LIGHT (DRUM)	6	2479Z1813
SW-78	16-240	BOOM DRUM LOCK	1	FY50E00007P1
SW-79	16-241	LF JIB DRUM LOCK	1	FY50E00007P1

L I M I T S W I T C H					
LS-NO.	TYPE	LINE NO.	U S E	SHEET NO.	KOBELCO PART NO.
LS-1	N. O.	18-234	FUNCTION LOCK	1	GB50S00036F1
LS-2	N. C.	103-102	MAIN HOOK OVERHOIST	2	24100N6192F5
LS-3	N. C.	103-105	AUX. HOOK OVERHOIST	2	24100N6192F5
LS-4	N. C.	102-101	3rd. HOOK OVERHOIST	2	24100N6192F5
LS-5	N. C.	103-107	TOWER JIB HOOK OVERHOIST	2	24100N6192F5
LS-6	N. C.	105-104	LUFFING JIB AUX. SHEAVE OVERHOIST	2	24100N6192F5
LS-7	N. C.	103-108	CRANE BOOM OVERHOIST	2	GG50S00004P1
LS-8	N. C.	103-123	TOWER JIB OVERHOIST LUFFING JIB OVERHOIST	2	JJ50S00001D1
LS-9	N. C.	103-151	TOWER BOOM OVERHOIST LUFFING BOOM OVERHOIST (NO. 1)	2	GK50S00001P1
LS-10	N. C.	123-109	LUFFING JIB OVERHOIST	2	-
LS-12	N. C.	103-120	TOWER BOOM OVERHOIST LUFFING BOOM OVERHOIST (NO. 2)	2	GK50S00001P1

L I M I T S W I T C H					
LS-NO.	TYPE	LINE NO.	U S E	SHEET NO.	KOBELCO PART NO.
LS-14	N. O.	502-E4	ROOM LIGHT	6	2479R638
LS-15	N. O.	461-E4	ENG. OIL FILTER ALARM	5	-
LS-19	N. O.	467-E4	HYD. OIL TEMP.	5	2479U285
LS-20	N. O.	469-E4	BRAKE COOLING OIL TEMP. (Fr. DRUM)	5	GG50S00002D1
LS-21	N. O.	470-E4	BRAKE COOLING OIL TEMP. (Re. DRUM)	5	GG50S00002D1
LS-22	N. O.	471-E4	LINE FILTER ALARM	5	(GG50V00001F1)
LS-26	N. C.	18-184	Fr. DRUM OVER PAY OUT (CEN)	2	GG50S00013P1
LS-27	N. C.	18-185	Re. DRUM OVER PAY OUT (CEN)	2	GG50S00013P1
LS-28	N. C.	18-186	3rd. DRUM OVER PAY OUT (CEN)	2	GG50S00013P1
LS-30	N. O.	16-268	HYD. OIL TEMP.	1	GG50S00002D2
LS-31	N. O.	415-E4	Fr. DRUM FOOT BRAKE	5	GB52S00002P1
LS-32	N. O.	416-E4	Re. DRUM FOOT BRAKE	5	GB52S00002P1
LS-33	N. O.	417-E4	3rd. DRUM FOOT BRAKE	5	GB52S00002P1
LS-35	N. O.	725-E4	AIR CLEANER ALARM	5	-
LS-36	N. C.	103-101	MAST HOOK OVERHOIST	2	24100N6192F5
LS-38	N. O.	909-E4	JIB BENDS LOSS	3	-
LS-51	N. O.	25-499	FUEL FILTER	5	-

P I L O T L A M P					
PL-NO.	LINE NO.	U S E	SHEET NO.	KOBELCO PART NO.	
PL-1	254-E4	Fr. DRUM FREE FALL	5	GG80S00003F1	
PL-2	259-E4	Re. DRUM FREE FALL	5	GG80S00003F1	
PL-3	264-E4	3rd. DRUM FREE FALL	5	GG80S00004F1	
PL-4	233-E4	SWING BRAKE FREE MODE	1	GB80S00007F2	
PL-7	856-89	CHECK E/G LAMP	8	JJ80S00006D1	

F U S E					
F-NO.	RATED	LINE NO.	U S E	SHEET NO.	KOBELCO PART NO.
F- 1	20A	1-11	ELECTRIC POWER SOURCE	1	2479Z2812D9
F- 2	5A	1-12	BACK-UP	1	2479Z2812D5
F- 3	5A	54-13	ENG. START	1	2479Z2812D5
F- 4	5A	3-14	HOUR METER	1	2479Z2812D5
F- 5	10A	2-15	WINCH	1	2479Z2812D7
F- 6	10A	2-16	EACH SOLENOID	1	2479Z2812D7
F- 7	5A	2-17	CONTROL POWER SOURCE	2	2479Z2812D5
F- 8	5A	2-18	LMI OUT PUT POWER SOURCE	2	2479Z2812D5
F- 9	20A	2-19	WIPER	6	2479Z2812D9
F-10	20A	2-20	AIR CONDITIONER	6	2479Z2812D9
F-11	10A	52-21	ONE-WAY · RADIO	6	2479Z2812D7
F-12	30A	2-22	TOTAL CONTROLLER	4	2479Z2812D11
F-13	10A	2-23	GAUGE CLUSTER MONITOR · CAMERA	7	2479Z2812D7
F-14	10A	2-24	SWING FLASHER	6	2479Z2812D7
F-15	10A	2-25	FUEL PUMP · FUN	6	2479Z2812D7
F-16	10A	2-26	COUNTER WEIGHT SELF REMOVAL CONTROL BOX	7	2479Z2812D7
F-17	10A	2-27	REDUNDANCY CIRCUIT	7	2479Z2812D7
F-18	10A	2-28	SPARE	7	2479Z2812D7
F-19	10A	2-29	SPARE	7	2479Z2812D7
F-20	10A	2-30	HYDRAULIC SELECT	1	2479Z2812D7
F-21	1A	18-103	OVER HOIST	2	2479Z2812D1
F-26	15A	2-36	E/G CONTROL UNIT	8	2479Z2812D8

F U S E					
F-NO.	RATED	LINE NO.	U S E	SHEET NO.	KOBELCO PART NO.
F-27	10A	879-877	PCV1	8	2479Z2812D7
F-28	10A	879-878	PCV2	8	2479Z2812D7
F-29	2A	2-39	E/G CONTROL UNIT	8	2479Z2812D2

P R E S S U R E S E N S O R					
PT-NO.	LINE NO.	U S E	SHEET NO.	KOBELCO PART NO.	
PT- 1	351-350 349	SWING PUMP PRESSURE SENSOR	4	LC52S00012P1	
PT- 3	382-384 383	Fr. DRUM HOISTING PRESSURE SENSOR	4	LC52S00011P1	
PT- 4	385-384 386	Fr. DRUM LOWERING PRESSURE SENSOR	4	LC52S00011P1	
PT- 5	387-389 388	Re. DRUM HOISTING PRESSURE SENSOR	4	LC52S00011P1	
PT- 6	390-389 391	Re. DRUM LOWERING PRESSURE SENSOR	4	LC52S00011P1	
PT- 7	353-355 354	3rd. (JIB) DRUM HOISTING PRESSURE SENSOR	4	LC52S00011P1	
PT- 8	356-355 357	3rd. (JIB) DRUM LOWERING PRESSURE SENSOR	4	LC52S00011P1	
PT- 9	454-456 455	Fr. DRUM CLUTCH PRESSURE SENSOR	4	GN52S00002P1	
PT-10	457-456 458	Re. DRUM CLUTCH PRESSURE SENSOR	4	GN52S00002P1	
PT-11	459-472 460	3rd. DRUM CLUTCH PRESSURE SENSOR	4	GN52S00002P1	
PT-12	343-345 344	BOOM RAISE PRESSURE SENSOR	4	LC52S00011P1	
PT-13	369-345 370	BOOM LOWER PRESSURE SENSOR	4	LC52S00011P1	
PT-14	901-903 902	Re. DRUM CONTROL ROPORTIONAL PRESSURE SENSOR	4	LC52S00011P1	
PT-15	904-906 905	3rd. DRUM CONTROL ROPORTIONAL PRESSURE SENSOR	4	LC52S00011P1	

8. REFERENCE MATERIALS

R E L A Y							
R NO.	COIL	SHEET NO.	T E R M I N A L			SHEET NO.	KOBELCO PART NO.
	LINE NO.		LINE NO.	TYPE	U S E		
R-B	57-E _d 60	1	1-2	N. O.	BATTERY	1	EZ24S00027F1
R-C	57-62	1	-	-	CUT OUT RELAY	1	(27730-1050)
R-H	51-E _d	8	2-55	N. O.	AIR HEATER RELAY	8	(28620-1180)
R-H ₀	11-532	6	11-531	N. O.	HORN	6	4079222
R-P	861-EGD	8	2-879	N. O.	PCV RELAY	8	(85920-2630)
R-SF	13-58	1	2-65	N. O.	SAFETY RELAY	1	(28410-1292)
R-1	57-E _d	1	2-3	N. O.	GENERATION OF ELECTRICITY SENSOR	1	EZ24S00010P1
R-10	153-E _d	3	110-E _d	N. O.	TOWER STANDING MODE	3	EZ24S00010P1
R-11	242-E _d	1	647-E _d	N. O.	PROPEL OPRETION	6	GG24E00024F1
R-12	243-E _d	1	524-E _d	N. O.	SWING ALARM	6	
R-14	138-E _d	3	366-367	N. O.	Re. DRUM HOIST STOP	4	
R-15	169-E _d	3	395-396	N. O.	Re. DRUM LOWER STOP	4	
R-16	141-E _d	3	311-313	N. O.	BOOM RAISE STOP	4	
R-17	142-E _d	3	317-319	N. O.	BOOM LOWER STOP	4	
R-18	152-E _d	3	560-561	N. O.	TOWER SELECT	3	
			103-108	N. O.	TOWER SELECT	2	
			103-124	N. C.	TOWER SELECT	2	
			103-113	N. C.	TOWER SELECT	2	
			103-115	N. O.	TOWER SELECT	2	
			565-567	N. O.	TOWER SELECT	3	
			18-117	N. O.	TOWER SELECT	2	
			103-107	N. C.	TOWER SELECT	2	
R-21	16-209	1	468-E _d	N. C.	CONTROL PRESSURE DETECT	5	
R-23	137-E _d	3	358-324	N. O.	Fr. DRUM HOIST STOP	4	
R-25	118-E _d	3	18-140	N. C.	LMI ABNORMAL	3	
R-32	238-E _d	1	16-233	N. C.	SWING BRAKE MODE	1	
R-36	108-E _d	2	561-562	N. O.	CRANE BOOM OVER HOIST	3	
			567-568	N. O.	CRANE BOOM OVER HOIST	3	
			574-575	N. O.	CRANE BOOM OVER HOIST	3	
			580-581	N. O.	CRANE BOOM OVER HOIST	3	
			198-E _d	N. O.	CRANE BOOM OVER HOIST	3	
				N. O.	CRANE BOOM OVER HOIST	3	

R E L A Y							
R NO.	COIL	SHEET NO.	T E R M I N A L			SHEET NO.	KOBELCO PART NO.
	LINE NO.		LINE NO.	TYPE	U S E		
R-37	109-E _d	2	562-563	N. O.	TOWER JIB OVER HOIST LUFFING JIB OVER HOIST	3	GG24E00024F1
			568-569	N. O.	TOWER JIB OVER HOIST LUFFING JIB OVER HOIST	3	
			576-577	N. O.	TOWER JIB OVER HOIST LUFFING JIB OVER HOIST	3	
			582-583	N. O.	TOWER JIB OVER HOIST LUFFING JIB OVER HOIST	3	
			552-553	N. O.	TOWER JIB OVER HOIST LUFFING JIB OVER HOIST	2	
			551-554	N. O.	TOWER JIB OVER HOIST LUFFING JIB OVER HOIST	2	
			199-E _d	N. O.	TOWER JIB OVER HOIST LUFFING JIB OVER HOIST	3	
R-38	151-E _d	2	575-141	N. O.	TOWER BOOM OVER HOIST LUFFING BOOM OVER HOIST (I)	3	
			200-E _d	N. O.	TOWER BOOM OVER HOIST LUFFING BOOM OVER HOIST (II)	3	
R-39	115-E _d	2	569-570	N. O.	CRANE JIB OVER HOIST	3	
			577-578	N. O.	CRANE JIB OVER HOIST	3	
			189-E _d	N. O.	CRANE JIB OVER HOIST	3	
R-41	268-E _d	1	270-271	N. C.	HYD. OIL TEMP.	1	
R-42	107-E _d	2	197-E _d	N. O.	TOWER JIB HOOK OVER HOIST	3	
R-43	101-E _d	2	103-116	N. O.	CRANE MAIN HOOK OVER HOIST	2	
			167-E _d	N. O.	CRANE MAIN HOOK OVER HOIST	3	
R-44	104-E _d	2	116-117	N. O.	CRANE AUX. HOOK OVER HOIST	2	
			168-E _d	N. O.	CRANE AUX. HOOK OVER HOIST	3	
R-45	117-E _d	2	563-564	N. O.	HOOK OVER HOIST	3	
			570-138	N. O.	HOOK OVER HOIST	3	
			578-579	N. O.	HOOK OVER HOIST	3	
			581-582	N. O.	HOOK OVER HOIST	3	
			586-587	N. O.	HOOK OVER HOIST	3	
				N. O.	HOOK OVER HOIST	3	

R E L A Y								
R NO.	COIL LINE NO.	SHEET NO.	T E R M I N A L		SHEET NO.	KOBELCO PART NO.		
			LINE NO.	TYPE U S E				
R-46	106-E _d	2	564-137	N. O.	TOWER JIB HOOK OVER HOIST	3	GG24E00024F1	
			572-169	N. O.	TOWER JIB HOOK OVER HOIST			3
			579-142	N. O.	TOWER JIB HOOK OVER HOIST			3
R-47	18-136	3	103-117	N. O.	HOOK OVER HOIST RELEASE	2		
			108-107	N. C.	HOOK OVER HOIST RELEASE	2		
			103	N. O.	HOOK OVER HOIST RELEASE	2		
R-48	187-E _d	3	136-E _d	N. O.	SET UP MODE	3		
			110	N. C.	SET UP MODE	3		
			103-120	N. O.	SET UP MODE	2		
R-49	147-E _d	3	103-108	N. O.	SELF REMOVAL.	2		
R-55	18-112	3	575-141	N. O.	BOOM OVER HOIST RELEASE	3		
R-56	120-E _d	2	560-561	N. O.	TOWER BOOM OVER HOIST LUFFING BOOM OVER HOIST (NO. 2)	3		
			565-567	N. O.	TOWER BOOM OVER HOIST LUFFING BOOM OVER HOIST (NO. 2)	3		
			573-574	N. O.	TOWER BOOM OVER HOIST LUFFING BOOM OVER HOIST (NO. 2)	3		
			551-552	N. O.	TOWER BOOM OVER HOIST LUFFING BOOM OVER HOIST (NO. 2)	2		
			119-E _d	N. O.	TOWER BOOM OVER HOIST LUFFING BOOM OVER HOIST (NO. 2)	3		
R-57	130-E _d	2	123-576	N. O.	STRUT RAISE OVER HOIST	3		
			583-584	N. O.	STRUT RAISE OVER HOIST	3		
			129-E _d	N. O.	STRUT RAISE OVER HOIST	3		
R-58	132-E _d	2	122-573	N. O.	STRUT LOWER OVER HOIST	3		
			587-588	N. O.	STRUT LOWER OVER HOIST	3		
			131-E _d	N. O.	STRUT LOWER OVER HOIST	3		
R-59	584-E _d	3	476-477	N. O.	JIB/3rd. HOIST STOP	4		
R-60	588-E _d	3	432-435	N. O.	JIB/3rd. LOWER STOP	4		

R E L A Y							
R NO.	COIL LINE NO.	SHEET NO.	T E R M I N A L		SHEET NO.	KOBELCO PART NO.	
			LINE NO.	TYPE U S E			
R-62	143-E _d	3	113-151	N. C.	LUFFING SELECT	2	GG24E00024F1
			103-115	N. O.	LUFFING SELECT	2	
			146-582	N. O.	LUFFING SELECT	3	
			103-130	N. C.	LUFFING SELECT	2	
			103-132	N. C.	LUFFING SELECT	2	
			124-109	N. C.	LUFFING SELECT	2	
			103-108	N. O.	LUFFING SELECT	2	
			180-586	N. O.	LUFFING SELECT	3	
			586-587	N. C.	LUFFING SELECT	3	
			R-65	171-E _d	2	18-173	
18-175	N. O.	Fr. DRUM SELECT (CEN)				2	
135-560	N. O.	Fr. DRUM SELECT (CEN)				3	
R-66	172-E _d	2	173-174	N. C.	Re. DRUM SELECT (CEN)	2	
			139-565	N. O.	Re. DRUM SELECT (CEN)	3	
			121-571	N. O.	Re. DRUM SELECT (CEN)	3	
R-67	174-E _d	2	146-580	N. O.	3rd. DRUM SELECT (CEN)	3	
			180-585	N. O.	3rd. DRUM SELECT (CEN)	3	
R-68	184-E _d	2	175-176	N. O.	Fr. DRUM OVER PAY OUT (CEN)	2	
R-69	185-E _d	2	571-572	N. O.	Re. DRUM OVER PAY OUT (CEN)	3	
R-70	186-E _d	2	585-586	N. O.	3rd. DRUM OVER PAY OUT (CEN)	3	
R-71	176-E _d	2	352-329	N. O.	Fr. DRUM LOWER STOP	4	

8. REFERENCE MATERIALS

R E L A Y						
R NO.	C O I L		T E R M I N A L		SHEET NO.	KOBELCO PART NO.
	LINE NO.		LINE NO.	TYPE U S E		
R-72	267	E _d	269-270	N. O.	5	GG24E00024F1
R-73	480	E _d	311-310	N. O.	4	GG24E00024F1
				N. C.		
			312	N. O.	4	
				N. C.		
			314	N. O.	4	
				N. C.		
			315	N. O.	4	
				N. C.		
			317	N. O.	4	
				N. C.		
			318	N. O.	4	
				N. C.		
			320	N. O.	4	
				N. C.		
			321	N. O.	4	
				N. C.		
			358	N. O.	4	
				N. C.		
			322	N. O.	4	
				N. C.		
323	N. O.	4				
	N. C.					
325	N. O.	4				
	N. C.					
326	N. O.	4				
	N. C.					
352	N. O.	4				
	N. C.					
327	N. O.	4				
	N. C.					
328	N. O.	4				
	N. C.					
330	N. O.	4				
	N. C.					
331	N. O.	4				
	N. C.					
366	N. O.	4				
	N. C.					
359	N. O.	4				
	N. C.					
309	N. O.	4				
	N. C.					
368	N. O.	4				
	N. C.					
395	N. O.	4				
	N. C.					
394	N. O.	4				
	N. C.					
393	N. O.	4				
	N. C.					
398	N. O.	4				
	N. C.					
397	N. O.	4				
	N. C.					
476	N. O.	4				
	N. C.					
474	N. O.	4				
	N. C.					

R-73	480	E _d	4	479	E _d	N. O.	TOTAL CONTROLLER REDUNDANCY	4	GG24E00024F1			
						N. C.	TOTAL CONTROLLER REDUNDANCY	4				
						432	431	N. O.		TOTAL CONTROLLER REDUNDANCY	4	
								N. C.		TOTAL CONTROLLER REDUNDANCY	4	
						436	E _d	437		N. O.	TOTAL CONTROLLER REDUNDANCY	4
										N. C.	TOTAL CONTROLLER REDUNDANCY	4
R-76	147	E _d	3	103-120	N. O.	SELF REMOVAL	2	EZ24S00010P1				

P R E S S U R E S W I T C H					
PSW-NO.	RATED	LINE NO.	U S E	SHEET NO.	KOBELCO PART NO.
PSW- 1		15	Fr. DRUM FOOT BRAKE PRESSURE SW.	1	GG50S00006P1
PSW- 2	N. O.	15	Re. DRUM FOOT BRAKE PRESSURE SW.	1	GG50S00006P1
PSW- 3	N. O.	15	3rd. DRUM FOOT BRAKE PRESSURE SW.	1	GG50S00006P1
PSW- 4	N. O.	16-243	SWING CONTROL DETECT SW. (R. H.)	1	GG50S00007F1
PSW- 5	N. O.	16-243	SWING CONTROL DETECT SW. (L. H.)	1	GG50S00007F1
PSW- 6	N. O.	16	CONTROL PRIMARY PRESSURE DETECT SW.	1	GG50S00006P1
PSW- 7	N. O.	16-242	PROPEL CONTROL DETECT SW. (R. H.)	1	GG50S00007F1
PSW- 8	N. C.	381-E _d	ENGINE OIL PRESSURE SW.	5	-
PSW-10	N. O.	16-242	PROPEL CONTROL DETECT SW. (L. H.)	1	GG50S00007F1

S O L E N O I D V A L V E					
SOL NO.	LINE NO.	U S E	SHEET NO.	KOBELCO PART NO.	
SOL- 1	246	MAIN PUMP INCHING SPEED	5	YN35V00020F1	
SOL- 2	473	BOOM PUMP INCHING SPEED	5	YN35V00020F1	
SOL- 3	234	FUNCTION LOCK	1	YN35V00020F1	
SOL- 4	231	PROPEL SPEED SELECT	1	YN35V00020F1	
SOL- 5	235	SWING PARKING	1	YN35V00020F1	
SOL-10	452	Fr. DRUM C/V	5	YN35V00020F1	
SOL-11	453	Re. DRUM C/V	5	YN35V00020F1	
SOL-12	593	3rd. DRUM C/V	5	YN35V00020F1	

SOL-15	445 -E _d	Fr. DRUM MOTOR BOOST	5	YN35V00020F1	SOL-59	435 - 436	3rd. DRUM LOWER CONTROL	4	YN35V00018F1
SOL-16	446 -E _d	Re. DRUM MOTOR BOOST	5	YN35V00020F1	SOL-62	898 - 899	TAGLINE	4	(GB22V00007F1)
SOL-17	447 -E _d	3rd. DRUM MOTOR BOOST	5	YN35V00020F1	SOL-65	485 - 486	Fr. DRUM CONTROL PROPORTIONAL VALVE	4	YN35V00018F2
SOL-18	553 -E _d	3rd. HOIST STOP (NO. 2)	2	YN35V00020F1	SOL-66	487 - 488	Re. DRUM CONTROL PROPORTIONAL VALVE	4	YN35V00018F2
SOL-19	438 -E _d	Fr. DRUM CLUTCH ESM	5	GG35V00001F1	SOL-67	409 - 410	3rd. DRUM CONTROL PROPORTIONAL VALVE	4	YN35V00018F2
SOL-20	441 -E _d	Re. DRUM CLUTCH ESA	5	GG35V00001F1	SOL-68	240 -E _d	BOOM DRUM LOCK	1	YN35V00020F1
SOL-21	444 -E _d	3rd. DRUM CLUTCH EST	5	GG35V00001F1	SOL-69	241 -E _d	LF JIB DRUM LOCK	1	YN35V00020F1
SOL-22	253 -E _d	Fr. DRUM CLUTCH CLM	5	JJ35V00011F1	SOL-70	430 - 433	BOOM PUMP CONTROL	4	YN35V00018F2
SOL-23	258 -E _d	Re. DRUM CLUTCH CLA	5	JJ35V00011F1	SOL-72	401 - 403	SWING CONSTANT SPEED	4	YN35V00018F2
SOL-24	263 -E _d	3rd. DRUM CLUTCH CLT	5	JJ35V00011F1	SOL-77	257 -E _d	BOOM/JIB PEDAL SELECT	1	EN35V00038F1
SOL-25	299 -E _d	HYDRAULIC SELECT	1	-	SOL-80	800 -E _d	VERTICAL EXT. (Fr. R. H.)	7	GB35V00002S801
SOL-26	236 -E _d	GANTRY UP	7	(GG30V00019F1)	SOL-81	801 -E _d	VERTICAL EXT. (Re. R. H.)	7	GB35V00002S801
SOL-27	237 -E _d	GANTRY DOWN	7	(GG30V00019F1)	SOL-82	802 -E _d	CRAWLER FIXING PIN (Re. EXT)	7	GB35V00002S801
SOL-30	272 -E _d		5	GG35V00011F1	SOL-83	803 -E _d	CRAWLER FIXING PIN (Fr. EXT)	7	GB35V00002S801
SOL-35	552 -E _d	BOOM RAISE STOP (NO. 2)	2	YN35V00020F1	SOL-84	804 -E _d	VERTICAL EXT. (Re. L. H.)	7	GB35V00002S801
SOL-36	554 -E _d	BOOM LOWER STOP (NO. 2)	2	YN35V00020F1	SOL-85	805 -E _d	VERTICAL EXT. (Fr. L. H.)	7	GB35V00002S801
SOL-37	553 -E _d	Fr. DRUM HOIST STOP (NO. 2)	2	YN35V00020F1	SOL-86	806 -E _d	VERTICAL RET. (Fr. R. H.)	7	GB35V00002S801
SOL-38	553 -E _d	Re. DRUM HOIST STOP (NO. 2)	2	YN35V00020F1	SOL-87	807 -E _d	VERTICAL RET. (Re. R. H.)	7	GB35V00002S801
SOL-40	449 -E _d	Fr. DRUM TURN DETECT GRIP	5	GB50M01093F1	SOL-88	808 -E _d	CRAWLER FIXING PIN (Re. RET)	7	GB35V00002S801
SOL-41	451 -E _d	Re. DRUM TURN DETECT GRIP	5	GB50M01093F1	SOL-89	809 -E _d	CRAWLER FIXING PIN (Fr. RET)	7	GB35V00002S801
SOL-42	233 -E _d	PRESS. RELIEF SHIFT	1	YN35V00020F1	SOL-90	810 -E _d	VERTICAL RET. (Re. L. H.)	7	GB35V00002S801
SOL-44	244 -E _d	TRANSLIFTER SELECT	1	(JJ20V00003F1)	SOL-91	811 -E _d	VERTICAL RET. (Fr. L. H.)	7	GB35V00002S801
SOL-45	245 -E _d	REEVING WINCH SELECT	1	(JJ20V00003F1)	SOL-95	754 -E _d	LEFT CYLINDER RET.	7	(GB30V00016F1)
SOL-47	271 -E _d	HYD. OIL HEAT	1	(GG27V00001F1)	SOL-96	753 -E _d	LEFT CYLINDER EXT.	7	(GB30V00016F1)
SOL-48	238 -E _d	SWING NEUTRAL. MODE SELECT	1	GB35V00002F2	SOL-97	752 -E _d	RIGHT CYLINDER RET.	7	(GB30V00016F1)
SOL-49	238 -E _d	SWING NEUTRAL. MODE SELECT	1	GB35V00002F2	SOL-98	751 -E _d	RIGHT CYLINDER EXT.	7	(GB30V00016F1)
SOL-50	404 - 407	MAIN PUMP CONTROL	4	YN35V00018F2					
SOL-51	332 - 333	SWING REACTION	4	YN35V00019F1					
SOL-52	313 - 314	BOOM RAISE CONTROL	4	YN35V00018F1					
SOL-53	319 - 320	BOOM LOWER CONTROL	4	YN35V00018F1					
SOL-54	324 - 325	Fr. DRUM HOIST CONTROL	4	YN35V00018F1					
SOL-55	329 - 330	Fr. DRUM LOWER CONTROL	4	YN35V00018F1					
SOL-56	367 - 309	Re. DRUM HOIST CONTROL	4	YN35V00018F1					
SOL-57	396 - 398	Re. DRUM LOWER CONTROL	4	YN35V00018F1					
SOL-58	477 - 479	3rd. DRUM HOIST CONTROL	4	YN35V00018F1					

Harness line Color

Basic single color

Color Sign	Color Name	
B	Black	
W	White	
R	Red	
G	Green	
Y	Yellow	
Br	Brown	
L	bLue	
Gr	Gray	
O	Orange	
Sb	Skyblue	
P	Pink	
Lg	Lite green	

Multi color

Color Sign	Base Color	Line Color
WB	White	Black
RB	Red	Black
GB	Green	Black
YB	Yellow	Black
BrB	Brown	Black
LB	bLue	Black
GrB	Gray	Black
OB	Orange	Black
SbB	Skyblue	Black
PB	Pink	Black
LgB	Light blue	Black
BW	Black	White
RW	Red	White
GW	Green	White
YW	Yellow	White
LW	bLue	White
WL	White	bLue
YL	Yellow	bLue
GrL	Gray	bLue
SbL	Skyblue	bLue
PL	Pink	bLue
LgL	Light green	bLue
WR	White	Red

Color Sign	Base Color	Line Color
YR	Yellow	Red
GrR	Gray	Red
SbR	Skyblue	Red
PR	Pink	Red
LgR	Lite green	Red
BY	Black	Yellow
BR	Black	Red
WY	White	Yellow
WG	White	Green
RY	Red	Yellow
RG	Red	Green
RL	Red	bLue
GR	Green	Red
GY	Green	Yellow
GL	Green	bLue
YG	Yellow	Green
BrW	Brown	White
BrR	Brown	Red
BrY	Brown	Yellow
LR	bLue	Red
LY	bLue	Yellow
LgY	Lite green	Yellow
LgW	Lite green	White

9. INITIAL ASSEMBLY OF THE MACHINE

Check the following points before starting actual work.

1. Yard
 - (1) Ground must be flat and firm, with adequate steel plates placed if necessary.
 - (2) There is enough space for auxiliary crane and access for trailer and truck.
2. Confirmation of work procedure and safety practice.

Prior to assembly work, all personnel concerned must confirm work procedure and safety practice and set for individual's role and responsibility.
3. Machine inspection before work.

Basic machine must be inspected before work.

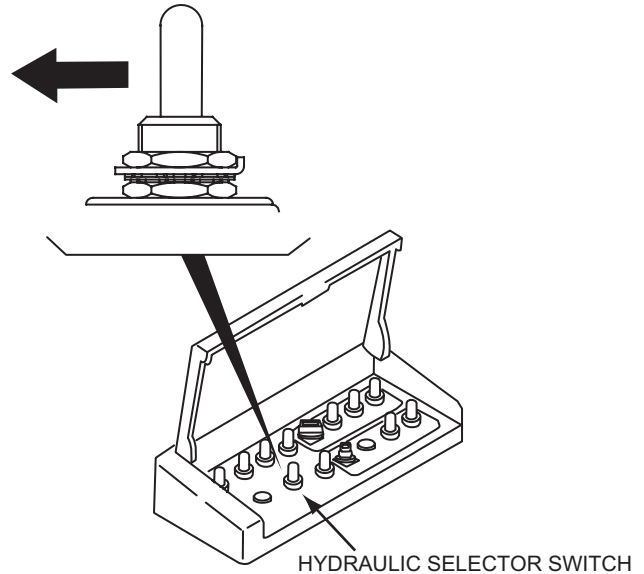
9. INITIAL ASSEMBLY OF THE MACHINE

9.1 UPPER STRUCTURE (WITH CARBODY) LIFTING PROCEDURES

9.1.1 INSTALLATION OF BOOM FOOT LIFTING BRACKET

Extend the boom foot pin, and then, install the lifting bracket to it.

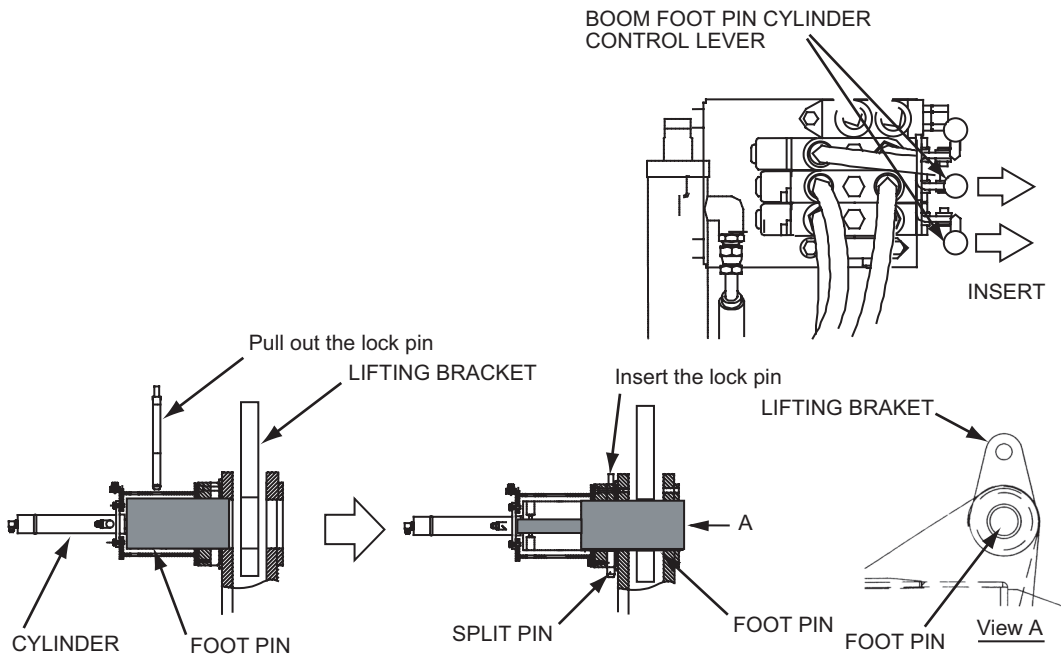
1. Start and run the engine until the engine speed reaches approx. 1000 rpm. Then, swing down the hydraulic selector switch toward the boom foot pin side.
2. Remove the lock pin for the boom foot pin. Then, swing down the right and left boom foot pin cylinder control levers toward the "insert" side (forward of the machine) to insert the foot pins.
3. Insert the lock pins from upside, and lock them with the fixing pins.



WARNING

Do not insert your hand or finger to pin hole to align or check holes.

Failure to observe this precaution may result in serious injury or death.

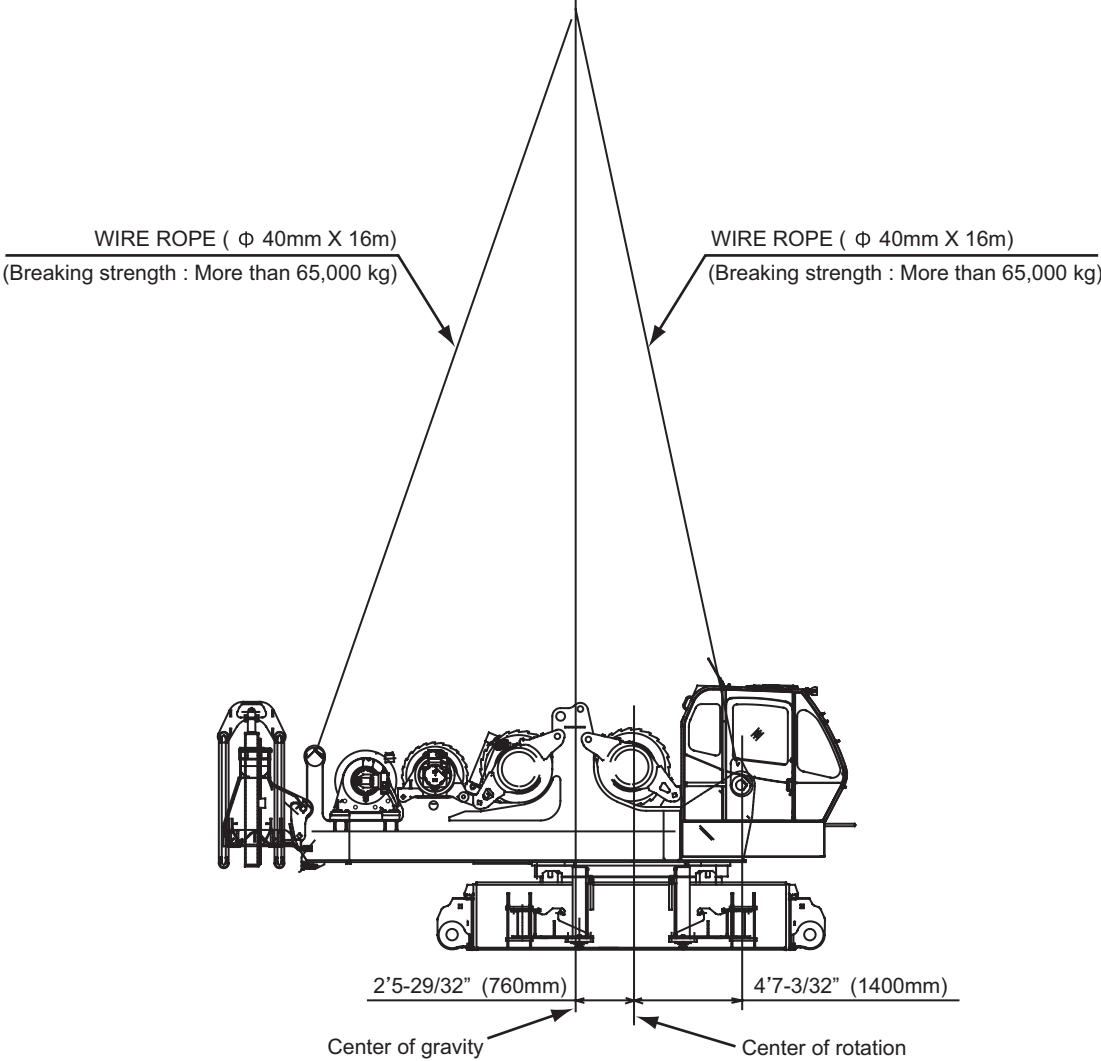
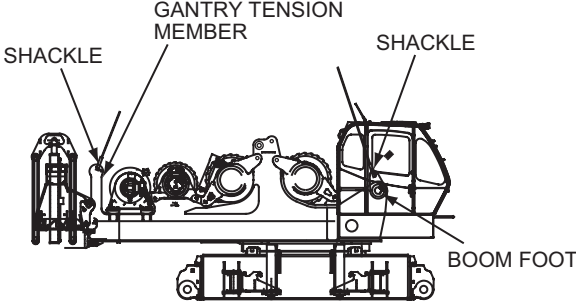


9.1.2 INSTALLATION

Install the lifting wire rope to the lifting bracket on the boom foot pin side and the gantry tension member with the shackle.

CAUTION

The use of a short wire rope or lifting with the positions other than specified may lead to damages on the machine.

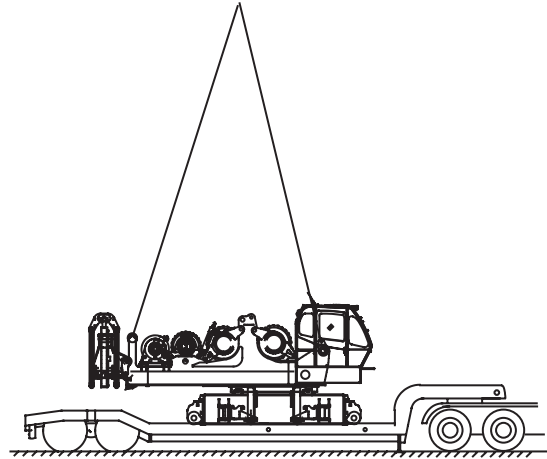


9. INITIAL ASSEMBLY OF THE MACHINE

9.2 LOADING/UNLOADING OF THE MACHINE FROM/ONTO A TRAILER

9.2.1 LOADING ONTO A TRAILER

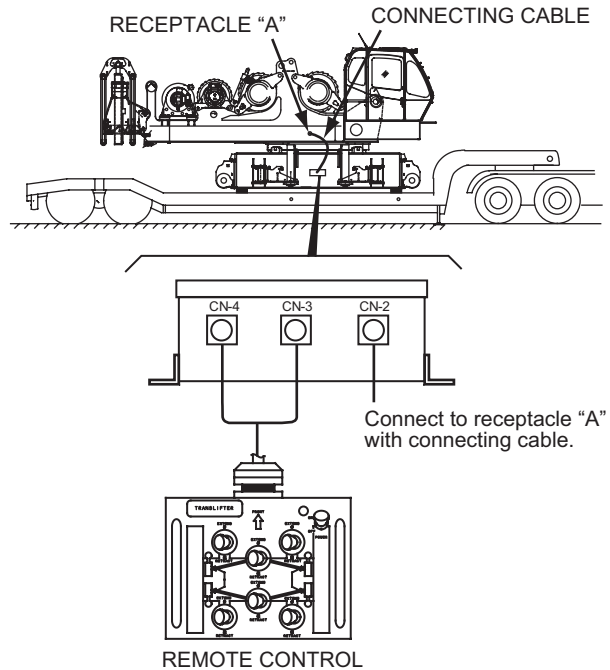
1. Guide a trailer until it is under the lifted machine, and lower the machine onto the trailer.
2. Securely fix the machine to the trailer to prevent it from being dropped.



9.2.2 UNLOADING FROM A TRAILER

Setting the translifter

1. Check the ground condition before parking the trailer.
2. Connect the receptacle "A" under the operator's cabin to the receptacle power supply in the carbody side terminal box with the connecting cables.
3. Connect the receptacle switch box in the carbody terminal box with cables from remote control.



WARNING

Do not swing with the vertical cylinders retracted to avoid turnover of the trailer.

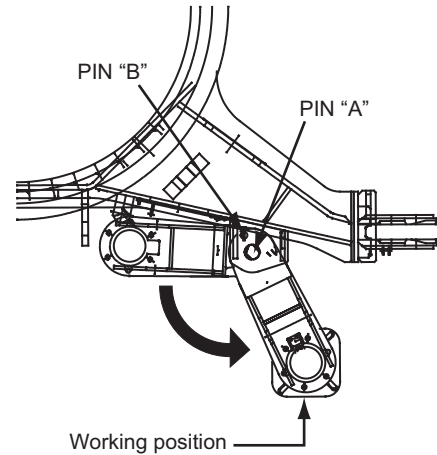
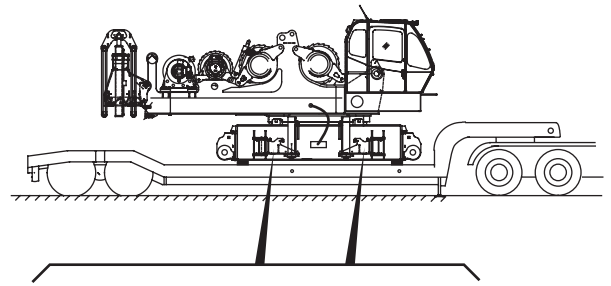
Failure to observe this precaution may result in serious accident.

WARNING

Do not swing with connecting cable CN2 connected.

9. INITIAL ASSEMBLY OF THE MACHINE

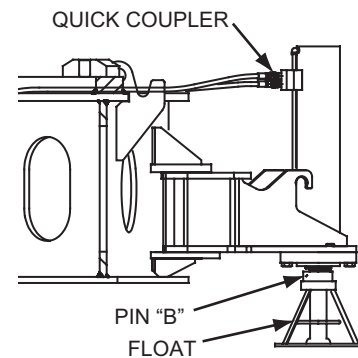
Install the translifter cylinder assemblies with auxiliary crane to the machine with the pins "A" (4 pos).
Fix the cylinder to the operating position with the pin "B".



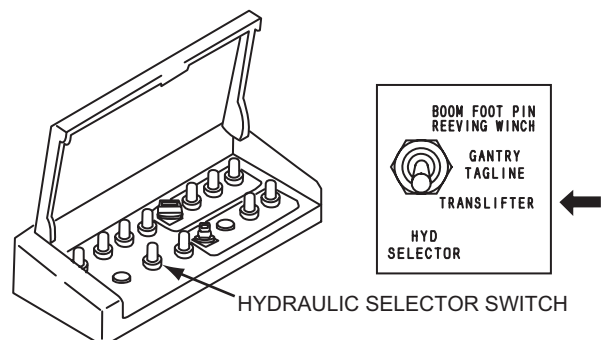
5. Connect the hydraulic hose with quick coupler to the vertical cylinder.
6. Install the float to the vertical cylinder and lock it with pin "B".

CAUTION

Float weight about 33kg. It is recommended to install or remove it by two persons to avoid injury to your body.



7. Check if vertical cylinder hose is securely connected by pulling quick coupler.
8. Start the engine and set the speed to about 1000 rpm. Move the hydraulic selector switch located on the side stand panel in the operator's cab toward to the translifter position.



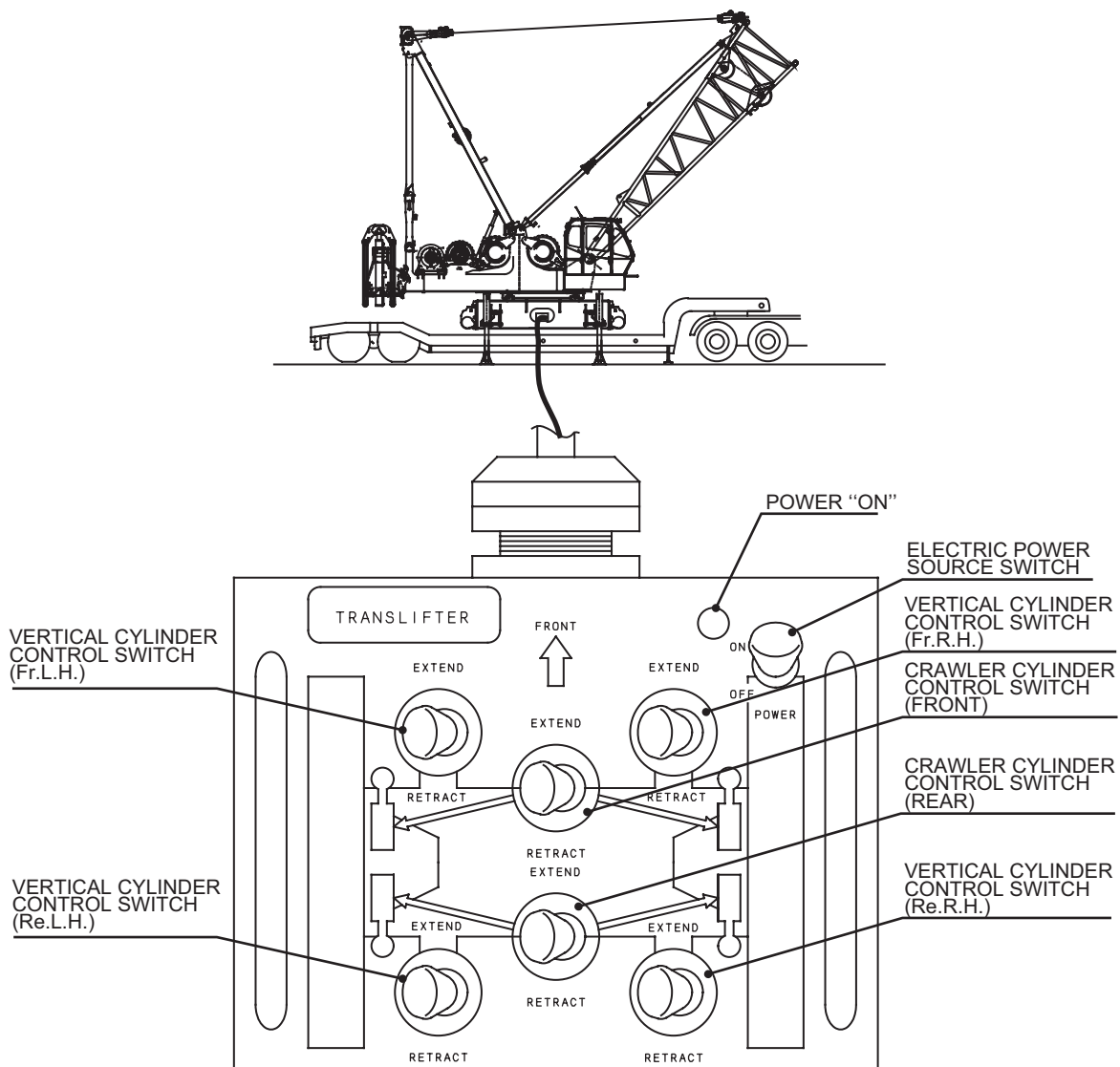
9. INITIAL ASSEMBLY OF THE MACHINE

- Extend the vertical cylinder by remote control switch until the lower surface of the translifter float just touches the floor.



Make sure that the ground for vertical cylinder is flat and firm to avoid turnover of machine.

Failure to observe this precaution may result in serious accident.

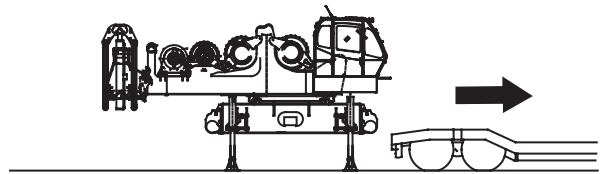


During work, watch the level and keep the basic machine always in leveled position. Make sure that the four floats sit on the ground firmly.



Engage the swing brake and swing lock when operating translifter to avoid turn-over of machine.
Failure to observe this precaution will result in serious accident.

10. Drive out the trailer from under the machine.



9. INITIAL ASSEMBLY OF THE MACHINE

9.3 INSTALLATION OF THE CARBODY WEIGHT

1. Lift the carbody weight (Weight: 10,000 kg (22,050 lbs))

WARNING

When making lifts, strictly follow the capacity charts supplied by the manufacturer for determining the loads that can be handled.

Follow good operating practice and all procedures as outlined in this manual when attempting to lift any load.

Failure to observe this precaution may result in serious injury or death.

DANGER

Do not operate the machine abruptly when the machine is standing with translifters.

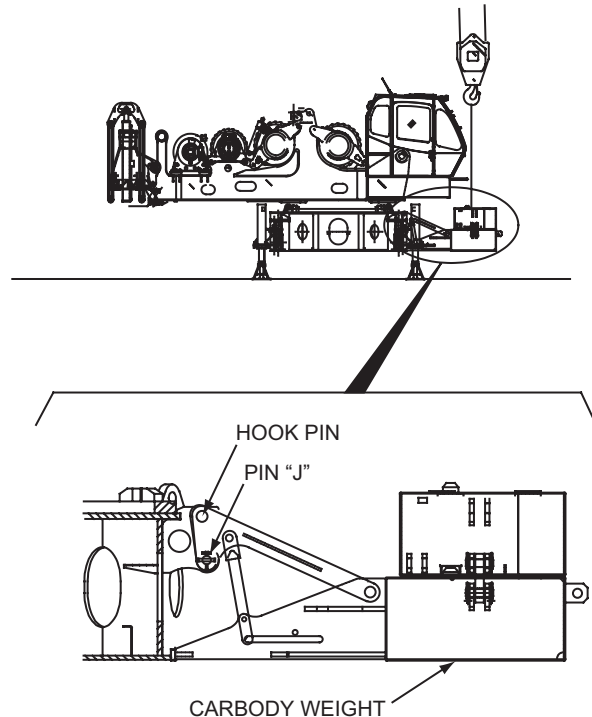
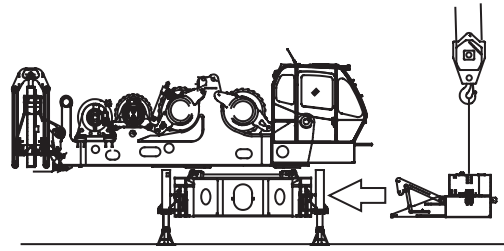
Failure to observe this precaution may result in serious injury or death.

DANGER

Do not stand under lifted or between carbody weight and the basic machine to avoid accident or drop or being caught.

Failure to observe this precaution may result in serious injury or death.

2. Install carbody weight by hooking to the bracket.
3. Insert the pin "J" and fix it with the lock pin.
4. Similarly install the other carbody weight to the machine.



9.4 INSTALLATION OF THE CRAWLER

9.4.1 INSTALLATION OF THE FIRST CRAWLER

1. Bring the trailer with first crawler as close as to the machine.
 Watch out the clearance of the carbody weight and the trailer.
 Make sure the crawler is turned in the proper direction.
 The machine can swing 360° with lifting first crawler.

CAUTION

Remove cable CN2 connection upper with lower terminal box before swinging.

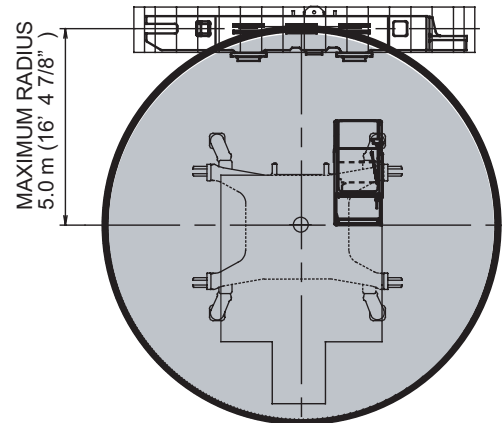
DANGER

Fit the carbody weights, before install the crawlers.
 Failure to observe this precaution may result in serious injury or death.

2. Swing the upper structure to orient it toward the crawler.
-

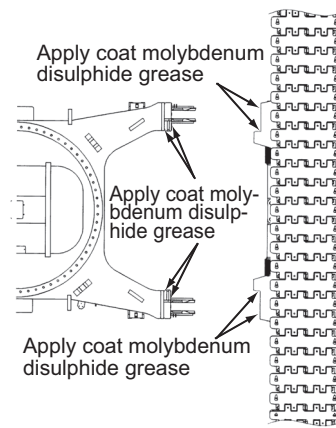
DANGER

Do not operate the machine abruptly when the machine is standing with translifter.
 Failure to observe this precaution may result in serious injury or death.

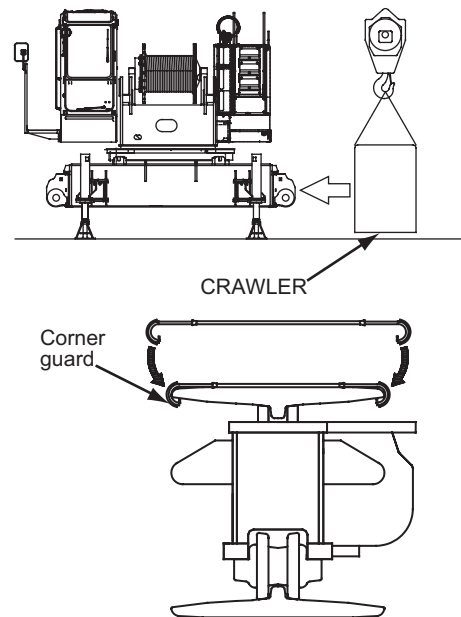
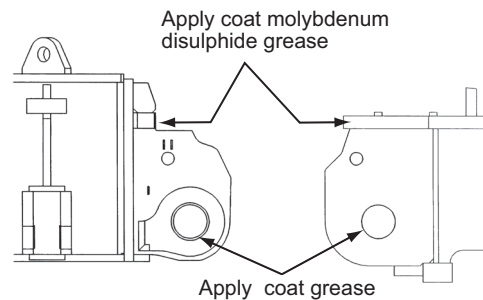


9. INITIAL ASSEMBLY OF THE MACHINE

3. Apply grease to the engaging sections on the upper surfaces of the connecting sections of the lower structure with the crawler frames, and the connecting pin holes.



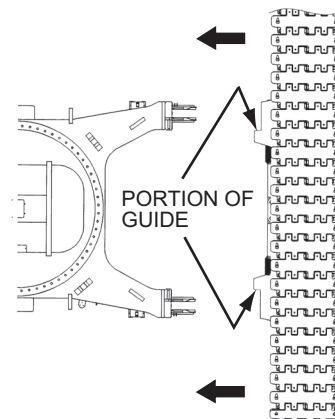
4. Rig the crawler to the hook block with 4 leg sling. Lift the crawler (about 18,500 kg (40,800 lbs)) slowly. When lifting the crawler, use the shoe corner guard so that wire is not caught into shoes.



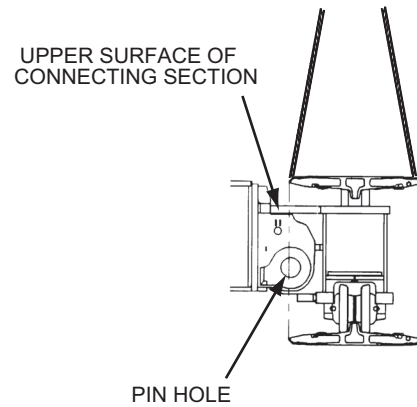
5. Slowly move the crawler toward the mounting side of the lower structure.

⚠ DANGER

Keep away from the spaces under the lifted crawler frame or between the machine and the crawler frame to avoid being caught in. Failure to observe this precaution may result in serious injury or death.



- Fit the crawler frame along with the guide section of the lower structure to engage the upper surface of the connecting section.



- While lowering the crawler frame slowly, align the pin holes on the carbody and the crawler frame. If the shoe comes in contact with the ground, and the pin holes cannot be aligned correctly, lift the machine with the translifter cylinder until the shoe does not come in contact with the ground. Crawler should be adjusted correctly to prevent from lifting too much to avoid dragging.

WARNING

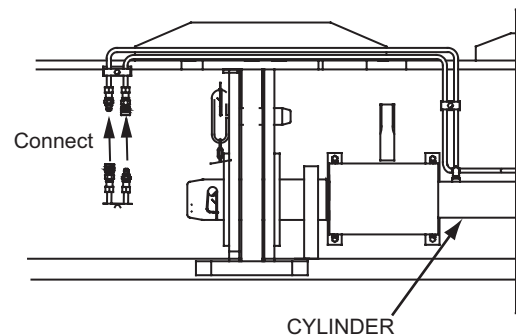
To avoid the turnover of the machine, lift the machine horizontally with the translifter.

Failure to observe this precaution may result in serious injury or death.

- Connect the hydraulic hose for the connecting pin cylinder with the quick coupler.

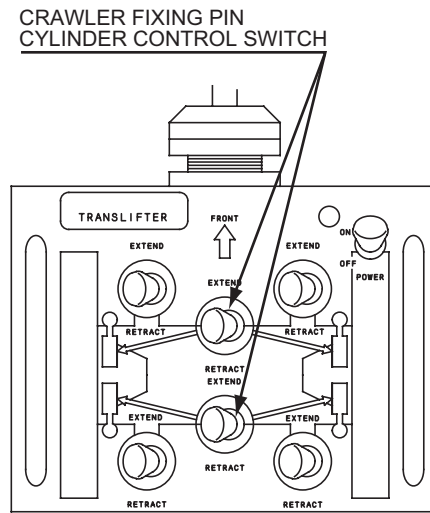
Note

When it is difficult to connect the quick couplers, reduce the pressure in the quick couplers by using the pressure reducing tool.



9. INITIAL ASSEMBLY OF THE MACHINE

9. Operate the remote control switch, and fully insert the crawler connecting pin.
If the pin is hardly inserted, adjust the pin hole position.

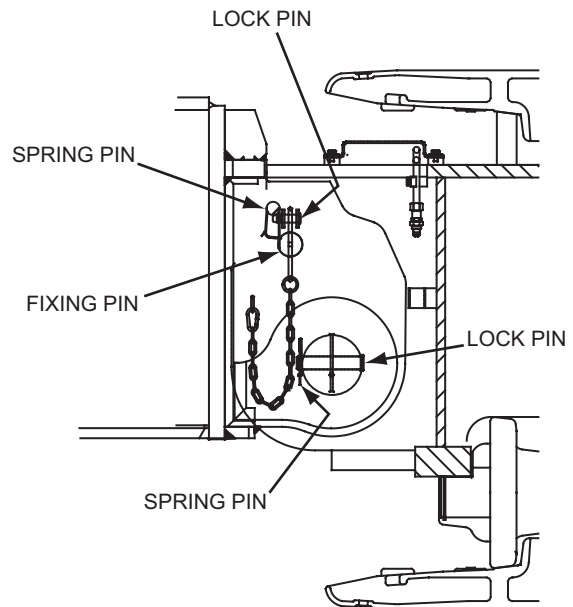


REMOTE CONTROL SWITCH

10. After fully inserting the two crawler connecting pins, stop the engine. Then, insert the fixing pin while supporting the crawler. Attach the lock pin to the inserted fixing pin, and lock it with the spring pin.



Be sure to attach the lock pin and the spring pin to avoid any accident due to the coming-off the fixing pin.

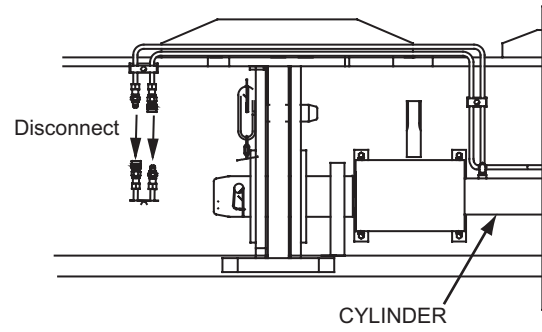


11. Attach the lock pin to the crawler connecting pin, and lock with the spring pin.



Be sure to attach the lock pin and the spring pin to avoid any accident due to the coming-off the fixing pin.

12. Remove the hydraulic hose for the connecting pin cylinder with the quick coupler.



13. Completely install the crawler to the lower structure, and remove the sling wire rope from the crawler.

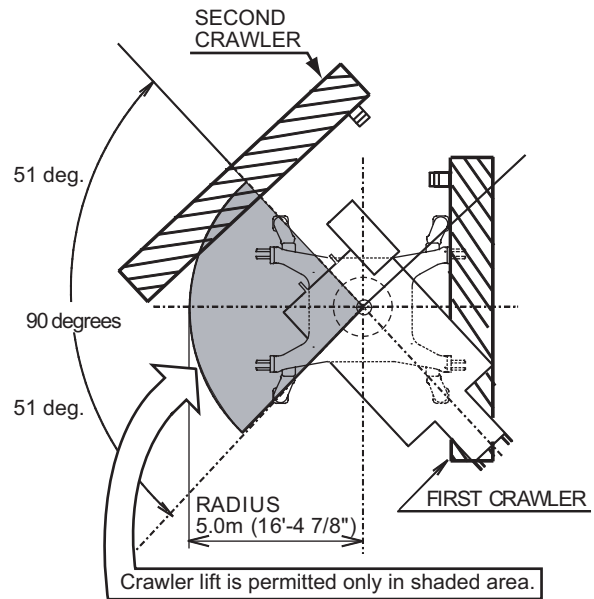
9. INITIAL ASSEMBLY OF THE MACHINE

9.4.2 INSTALLATION OF THE SECOND CRAWLER

1. Bring the trailer with second crawler as close as to the machine.
Watch out the clearance of carbody weight and trailer.
Make sure the crawler is turned in the proper direction.

⚠ DANGER

Do not swing over center of translifter cylinder (51°) while lifting the second crawler. Failure to observe this precaution may result in serious injury or death.

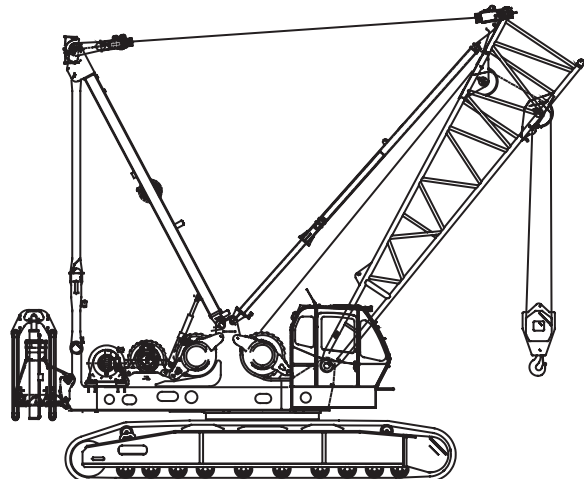


2. Swing the upper structure to orient it toward the crawler.

⚠ DANGER

Do not operate the machine abruptly when the machine is standing with translifter. Failure to observe this precaution may result in serious injury or death.

3. Install the second crawler in the same way as the first.
The connecting pin removal/installation cylinder hydraulic hose is common to the right and left sides. After installing a crawler, use the hose for the other crawler.



9. INITIAL ASSEMBLY OF THE MACHINE

4. After installing the both crawlers, retract the transfer cylinder until the crawlers come in contact with the ground completely.
5. Remove the floats and store them in the storing position.

CAUTION

Float weight about 35 kg (77 lbs). It is recommended to install or remove it by two persons to avoid injury to your body.

6. Connect all of hydraulic hoses (left and right) for propel with quick couplers. (Four hoses on each side)
After connecting, check for tightness by pulling them.

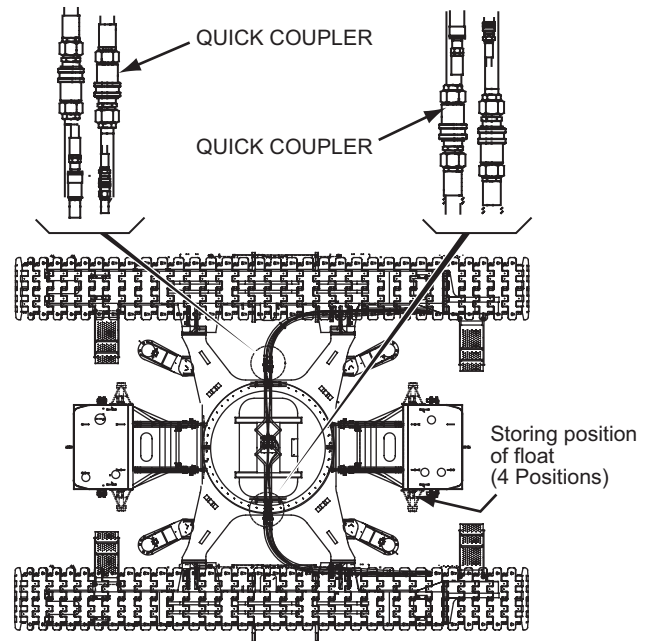
DANGER

Do not swing when connecting or disconnecting hydraulic hose of crawler to avoid accident of being caught.

Failure to observe this precaution may result in serious injury or death.

CAUTION

Incomplete connection of hose may cause damage to propel motor or reduction unit.



9. INITIAL ASSEMBLY OF THE MACHINE

9.5 INSTALLATION OF THE GANTRY TO THE SWING FRAME

1. Install the shackle to the bracket of the compression frame tip end, and lift the gantry with the auxiliary crane.

⚠ DANGER

Use the shackle and undamaged slings for lifting gantry safety.

Do not use the hook without safety latch, or damaged slings to lift the gantry.

Failure to observe this caution may lead to the sudden fall of the gantry.

2. Install the compression foot of the gantry to the basic machine.

⚠ DANGER

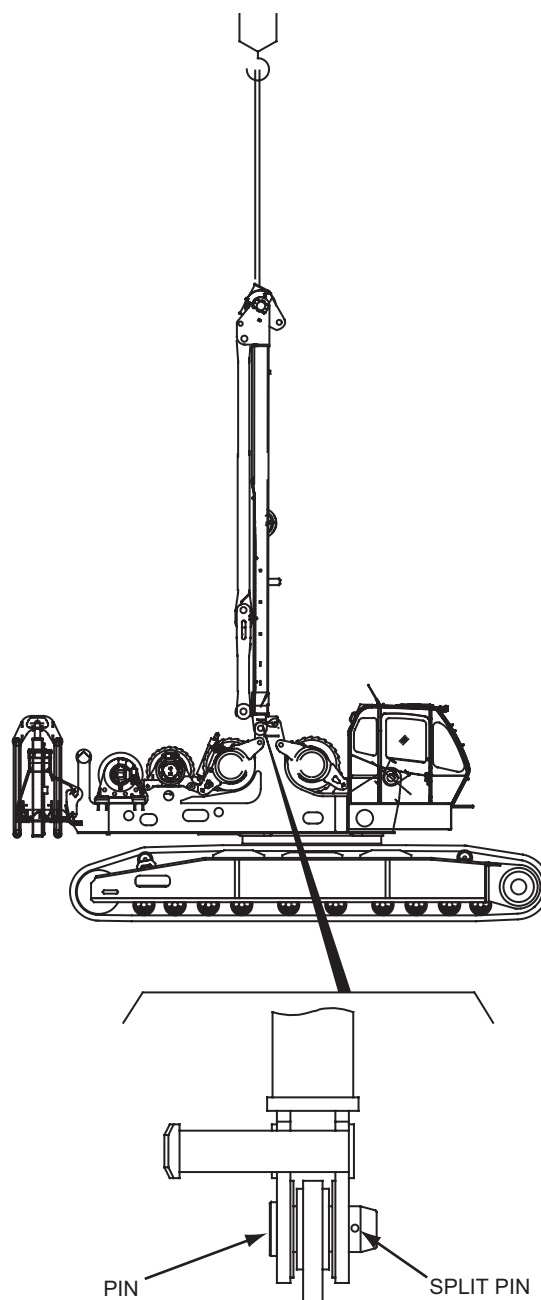
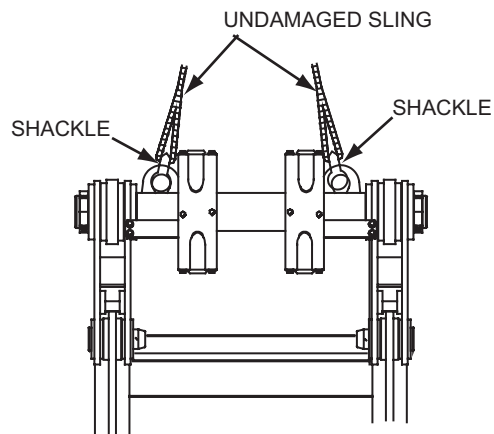
Do not stand under the gantry to avoid accident of being caught due to sudden drop of gantry. Failure to observe this precaution may result in serious injury or death.

⚠ WARNING

Do not put your finger into a pin hole.

Note

Generously apply grease to the pin hole.



3. Slowly incline the gantry toward the rear of the basic machine, and install the tension member foot to the basic machine.

WARNING

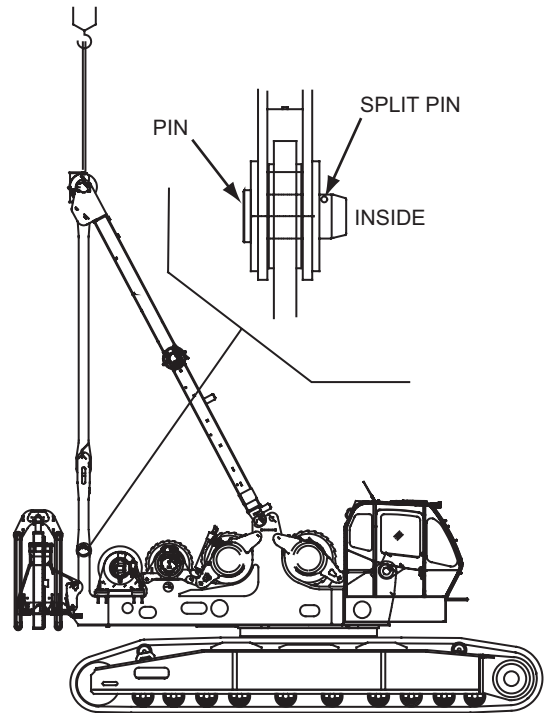
Do not stand under the gantry to avoid accident of being caught due to sudden drop of gantry. Failure to observe this precaution may result in serious injury or death.

WARNING

Do not put your finger into a pin hole.

Note

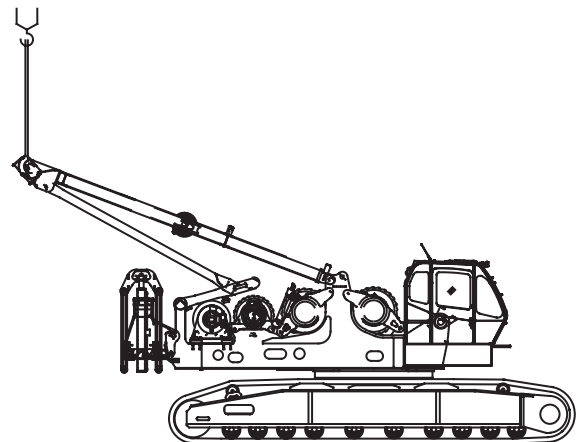
Generously apply grease to the pin hole.



4. Further incline the gantry rearward fully.

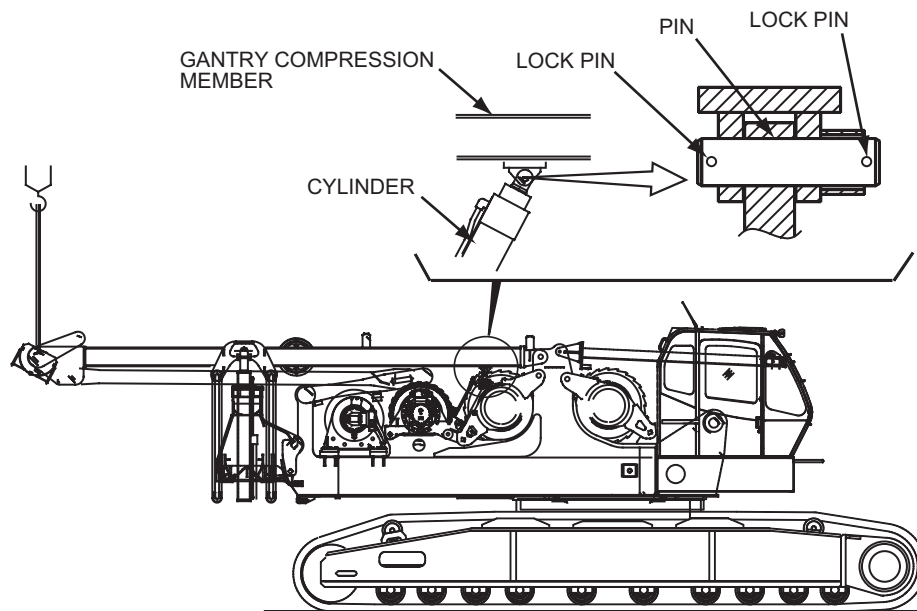
WARNING

Do not stand under the gantry to avoid accident of being caught due to sudden drop of gantry. Failure to observe this precaution may result in serious injury or death.



9. INITIAL ASSEMBLY OF THE MACHINE

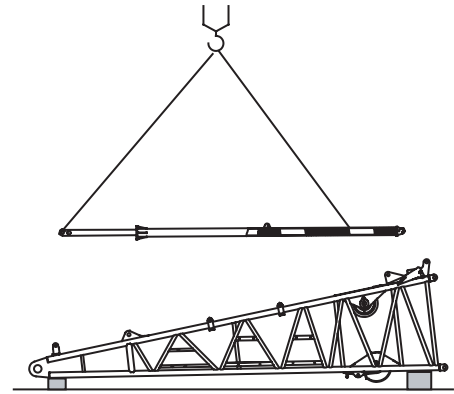
5. Retract the cylinder by operating the gantry control switch and fully lower the gantry.
6. Set the gantry cylinder to the compression member.



9.6 INSTALLATION OF THE BOOM BASE

9.6.1 REMOVAL OF THE BACKSTOP

Remove the backstop from the boom base.

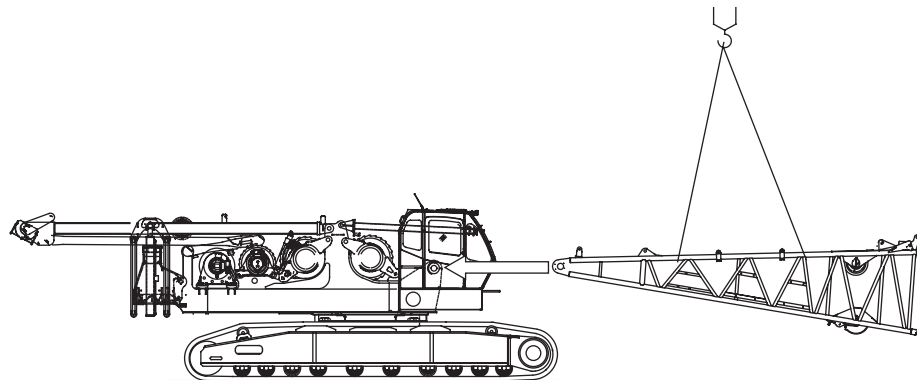


9.6.2 INSTALLATION OF THE BOOM BASE

1. Lift the boom base with the assisting crane to fit to the boom foot pin holes on the machine.

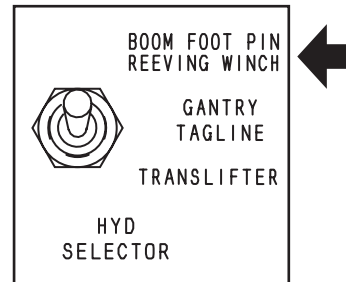
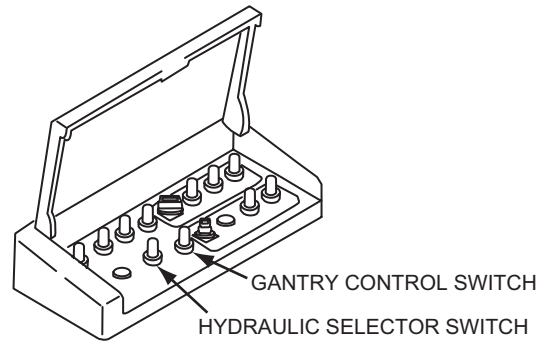
WARNING

Do not insert your hand or finger to pin hole to align or check holes. Failure to observe this precaution may result in serious injury or death.

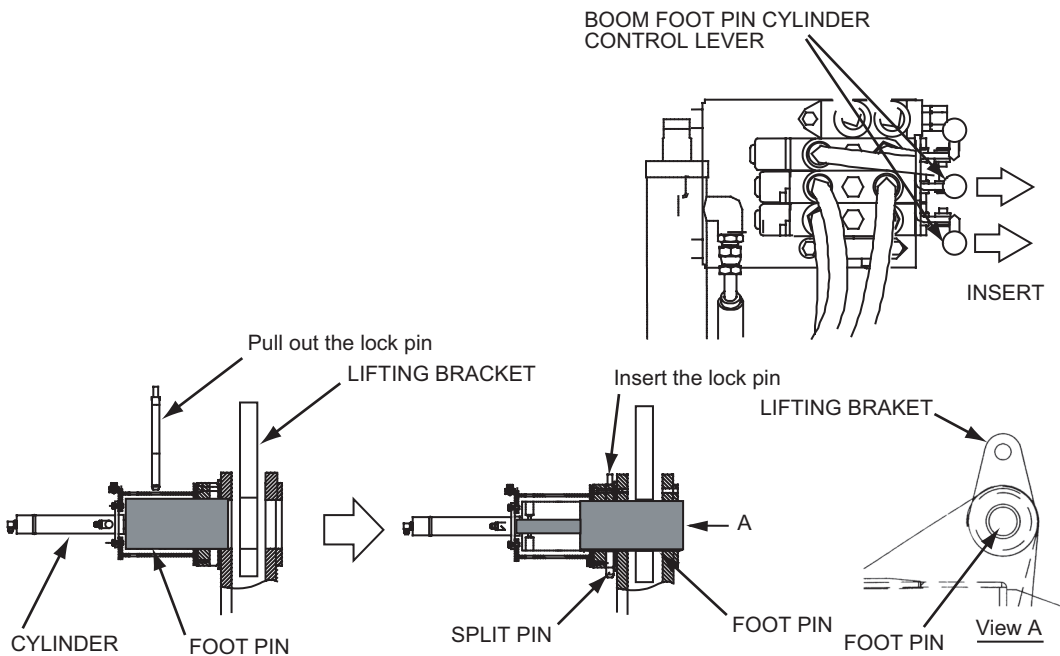


9. INITIAL ASSEMBLY OF THE MACHINE

- Set the hydraulic selector switch to the "BOOM FOOT PIN" side.



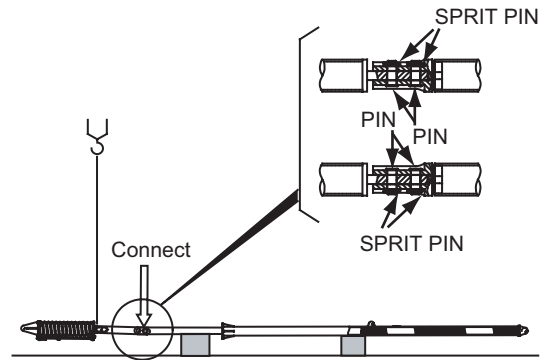
- Remove the lock pin for the boom foot pin. Then, swing down the right and left boom foot pin cylinder control levers toward the "insert" side (forward of the machine) to insert the foot pins.
- Insert the lock pins from upside, and lock them with the fixing pins.



9.7 INSTALLATION OF THE BACKSTOP

The backstop is separated in two pieces.

1. Connect the lower side backstop to the upper side backstop.



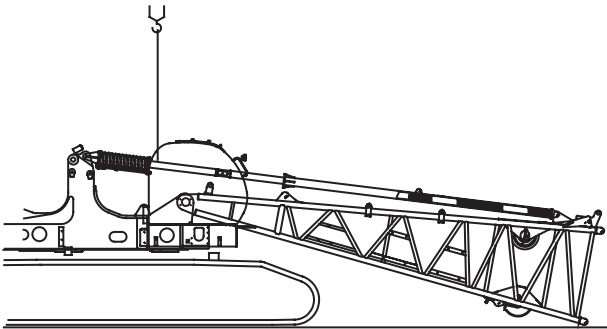
2. Install the connected backstop to the basic machine.

WARNING

NEVER get close to the area where the backstop is removed. Failure to observe this precaution may result in serious accident.

Note

Remove dusts and paint attached to the pins, and generously apply grease to the pin holes before inserting the pins.



9. INITIAL ASSEMBLY OF THE MACHINE

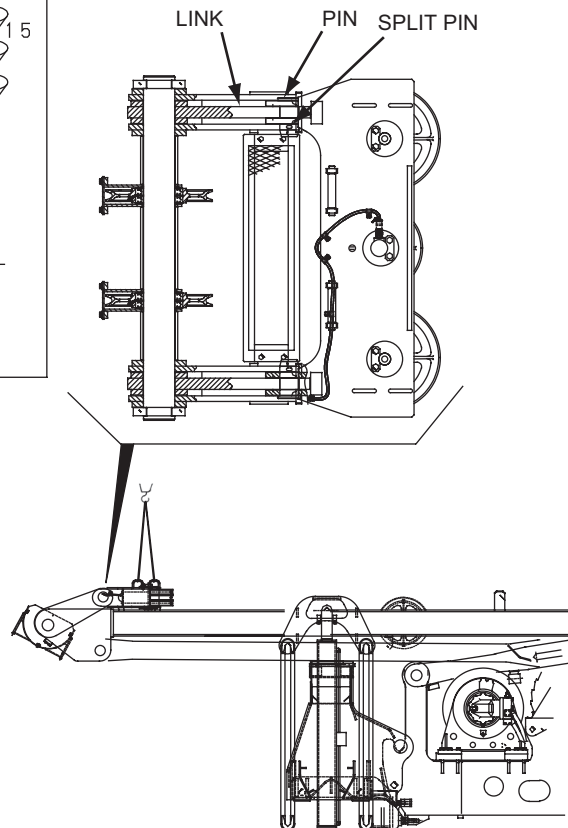
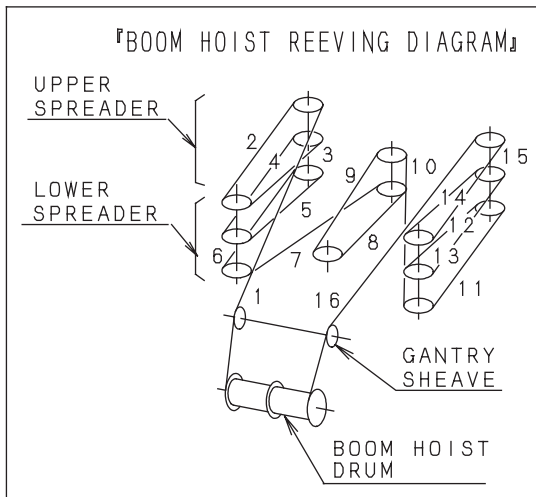
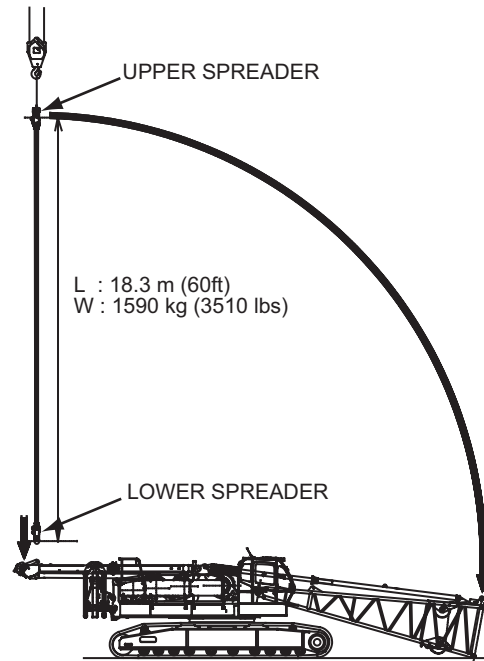
9.8 INSTALLING THE UPPER AND LOWER SPREADER

WARNING

Do not insert your hand or finger to pin hole to align or check holes.

Failure to observe this precaution may result in serious injury or death.

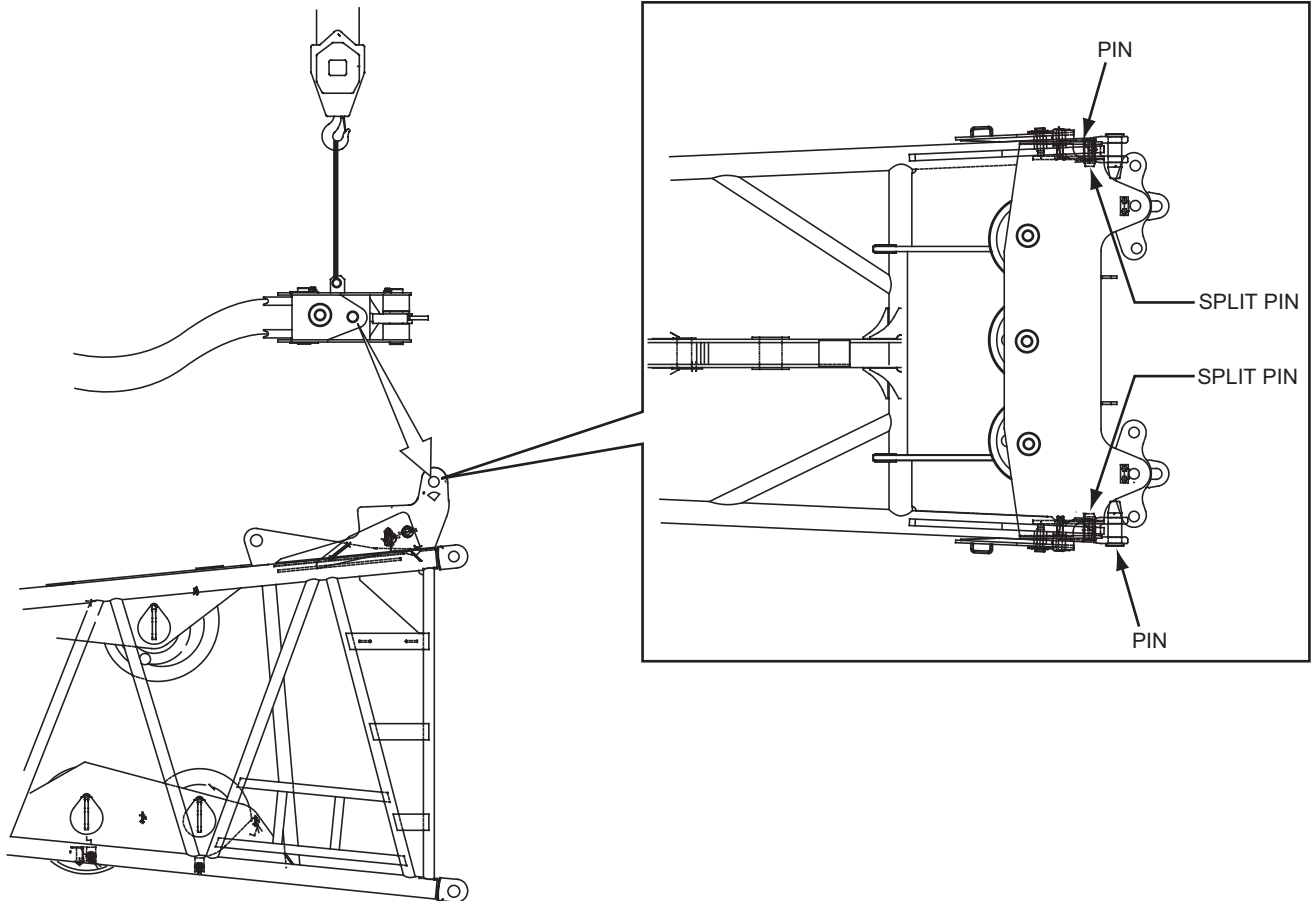
1. Lift the upper spreader with an assisting crane. Then, connect the lower spreader to the link on the gantry peak with the pin, and fix with a cotter pin.



2. Install the upper spreader to the bracket on the boom base.

WARNING

To prevent any accidental drop, be sure to use a safety belt during the operation at high places, and use a scaffolding board during the operation on the boom. Failure to observe this precaution may result in serious injury or death.



9. INITIAL ASSEMBLY OF THE MACHINE

3. Wind the boom raising wire rope onto the boom drum.

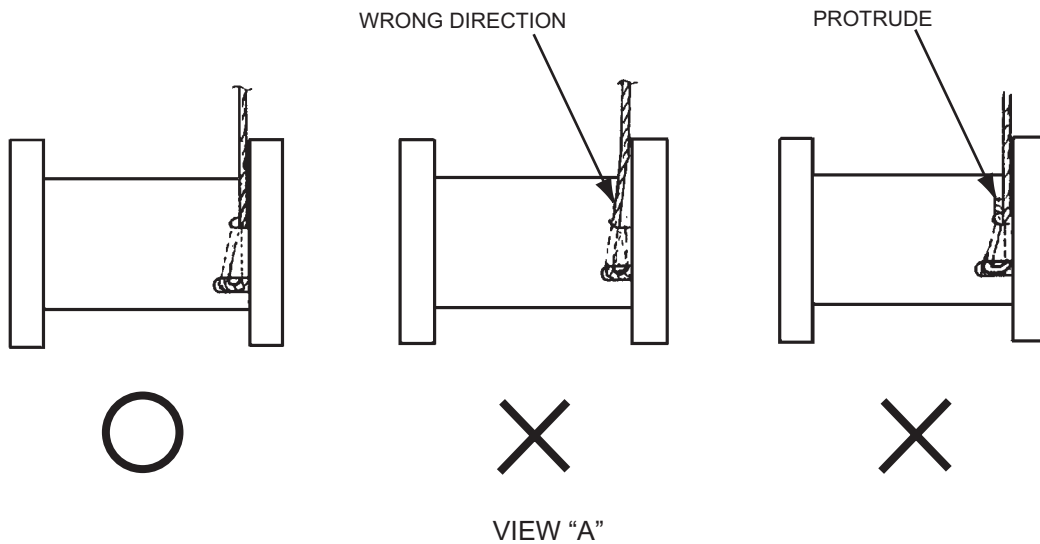
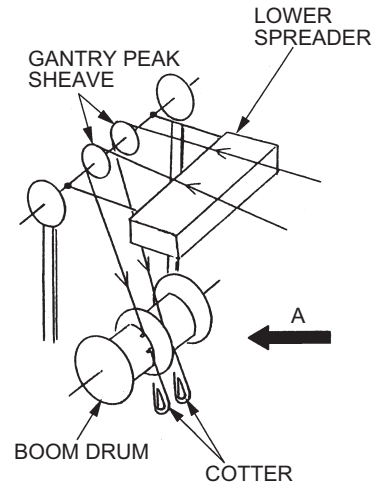
WARNING

Set the control levers to the neutral positions, and ensure the safety around the machine before starting the engine. Failure to observe this precaution may result in serious injury or death.

WARNING

Do not touch a wire rope directly with bare hands. If wire protrude, you could be injured. Working gloves are recommended. Keep hands and clothing clear of the rotating drum and running wire rope. Failure to observe this precaution may result in serious injury or death.

1. Reeve the wire rope end (10 m) on the gantry peak sheaves, and wind it onto the boom raising drum.
2. Fix the wire rope end on the boom raising drum with a cotter.
3. Wind the boom raising wire rope three to four turns.



**HINO EMISSION WARRANTY INFORMATION
FOR
HEAVY-DUTY OFF-ROAD COMPRESSION-IGNITION ENGINE
(ENGINE CODE: P11C)**

1. Defect Warranty

Hino Motors Ltd. warrants the engine is free from defects in materials and workmanship which cause the failure of the emission warranty parts below for a period of five years or 3,000 hours of operation, whichever comes first.

2. Emission Warranty Parts

I. Fuel Injection System

- a) Fuel injection system.

II. Air Induction System

- a) Intake manifold.
- b) Turbocharger systems.
- c) Charge Air Cooling Systems.

III. Exhaust Gas Recirculation (EGR) System

- a) Internal EGR system

IV. Exhaust Manifold

V. Miscellaneous Items Used in Above Systems

- a) Electronic controls.
- b) Hoses, clamps, fittings, tubing, gaskets and sealing.

3. Instructions for Maintenance and Use of Engine

Refer to the operation handbook provided by the mobile machinery manufacturer.

4. Statement Concerning Maintenance and Maintenance Schedule

Hino Motors, Ltd. recommends the heavy-duty off-road engine owners to conduct the required operation, maintenance and the other related matters pursuant the instruction handbook, such as air filter care and replacement schedule, proper fueling and fuel mixing, engine maintenance, and so on.

