

OPERATION & MAINTENANCE MANUAL

CK2500

APPLICABLE : JD02-00001~JD02-00025

BOOK CODE : S2JD10001ZE03

(c) Printed in Japan 2000.10

IMPORTANT INFORMATION

Thank you for your purchasing KOBELCO crawler crane. Our CK series full-hydraulically operated crawler crane is manufactured based on our long years of experience and expertise. This manual describes the important information about Model CK2500.

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



WARNING

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 operators cab.

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

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

SAFETY INFORMATION

Most accidents, which 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 or death of personnel. Thus, precautionary measures, or notes, written 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 the first priority. Messages of safety are indicated with  marks. The safety information contained in this manual is intended only general safety information.

Messages of safety appear in this manual and on the machine. All messages of safety are identified by the words "DANGER", "WARNING" and "CAUTION".

These words mean the following:

DANGER

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

WARNING

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

CAUTION

..... 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

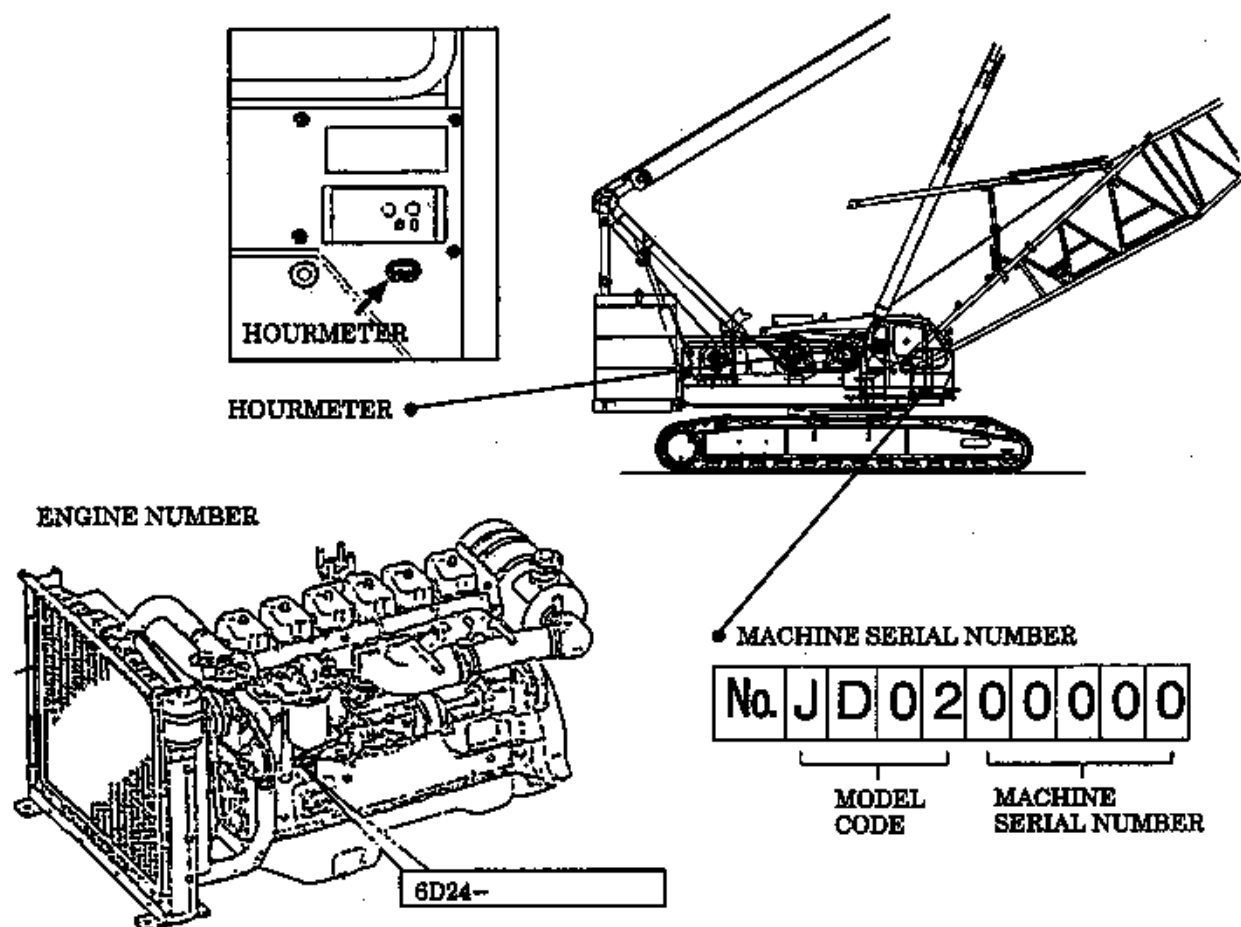
..... Supplementary explanation.

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 machine, be sure to perform work with great care, so as to not damage the machine, or let accidents occur. Please continue studying this manual until proper operation is completely understood.

■ MACHINE SERIAL NUMBER

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



■ ENTER MACHINE SERIAL NUMBER OF THIS MACHINE

MACHINE MODEL	CK2500	MACHINE SERIAL NO.	JD02	ENGINE NO.	6D24-
------------------	--------	-----------------------	------	---------------	-------

■ WARRANTY

The terms under which this machine is guaranteed are clearly defined in the accompanying WARRANTY. Trouble and damage occurred during the terms of guarantee shall be repaired at no cost to the purchaser according to the warrant description if the trouble or damage is recognized 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.

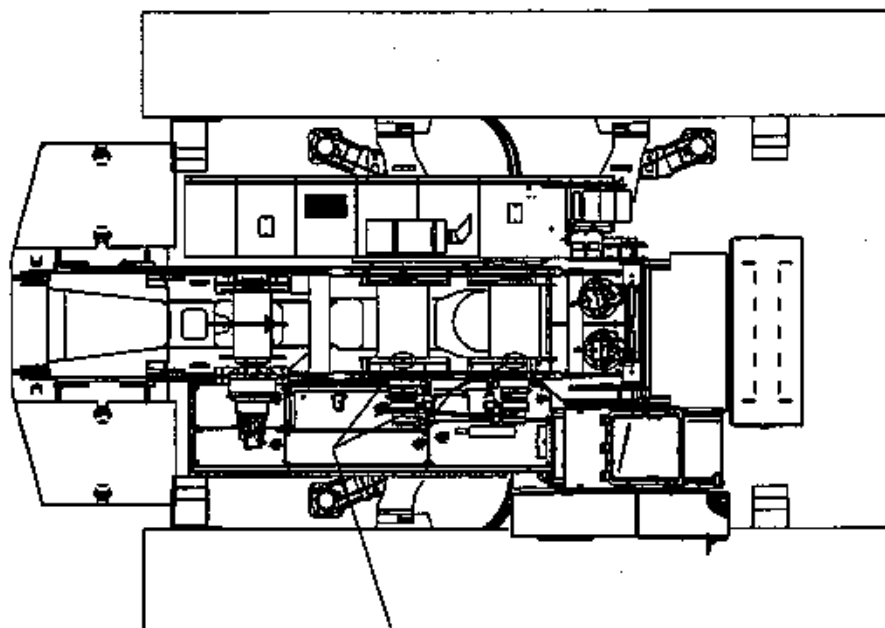
■ EXPLANATION OF WARNING LABELS

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.

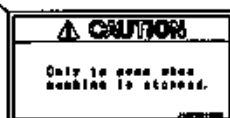
Put them to the practical use to secure safety when operating, checking and performing maintenance.

● HANDLING OF WARNING LABELS

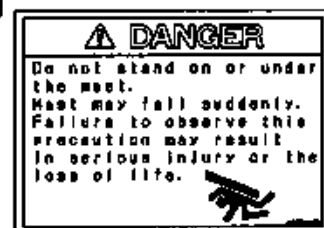
- (1) When the warning label is damaged or stained, order it to the designated service shop.
- (2) Do not remove the warning labels.
- (3) When the surface of the warning label is soiled and difficult to be seen, wipe it cleanly.



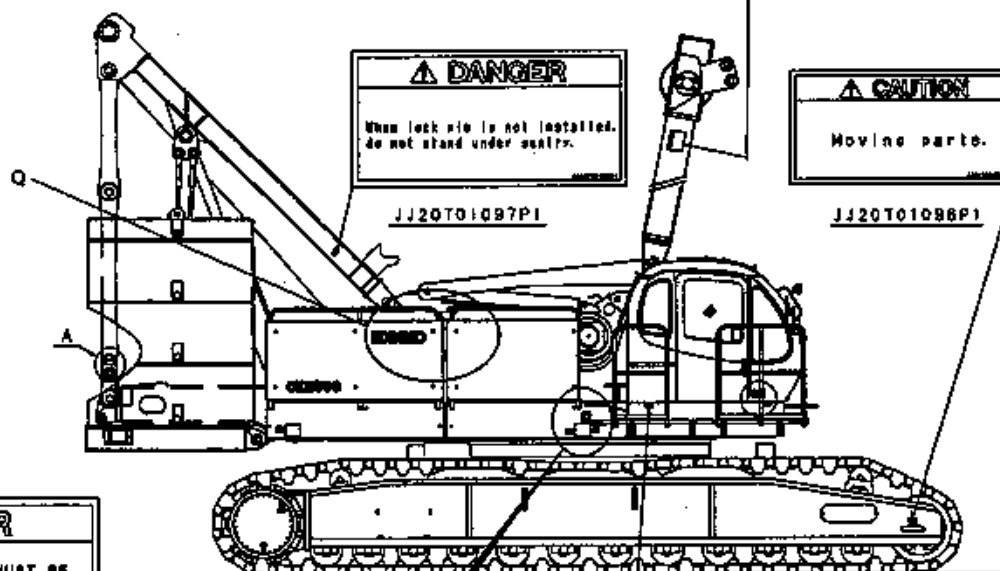
JJ20T01086P1



JJ20T01100P1



JJ20T01242P1



JJ20T01087P1



JJ20T01086P1



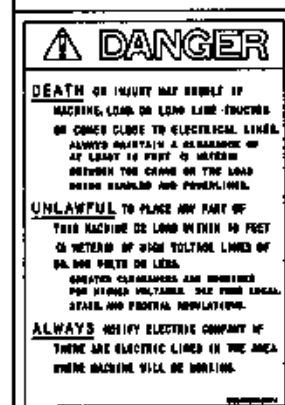
GN20T01041P1



JJ20T01102P1



JJ20T01085P1



GG20T01127P1

⚠ DANGER

Do not lower the mast assist arms until the mast is connected to the boom with the guy lines. Mast may fall backwards if raised to vertical position when assist arms are down stored. Failure to observe this precaution may result in serious injury or the loss of life.

JJ20T01243P1

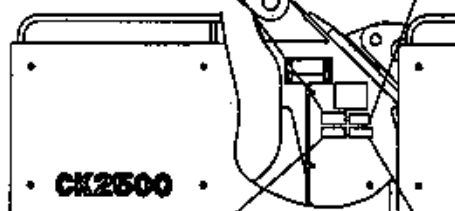
JJ20T01243P1

⚠ CAUTION

Keep the power select switch to the OFF position except mast assist arms or entry operation. Otherwise, the hydraulic valves may be damaged.

JJ20T01248P1

JJ20T01248P1



DETAIL Q

⚠ DANGER

Fully lower the mast assist arms to the backwards before raising the boom. Mast will buckle and may collapse if the mast contacts the assist arms. Failure to observe this precaution may result in serious injury or the loss of life.

JJ20T01244P1

JJ20T01244P1

⚠ CAUTION

Operate the boom hoist to keep the wire rope slack as the entry and mast are raised or lowered. Otherwise, the entry, mast or boom hoist wire rope may be damaged.

JJ20T01249P1

JJ20T01249P1

⚠ DANGER

Do not lower the mast assist arms until the mast is connected to the boom with the guy lines. Mast may fall backwards if raised to vertical position when assist arms are down stored. Failure to observe this precaution may result in serious injury or the loss of life.

JJ20T01243P1

JJ20T01243P1

⚠ 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.

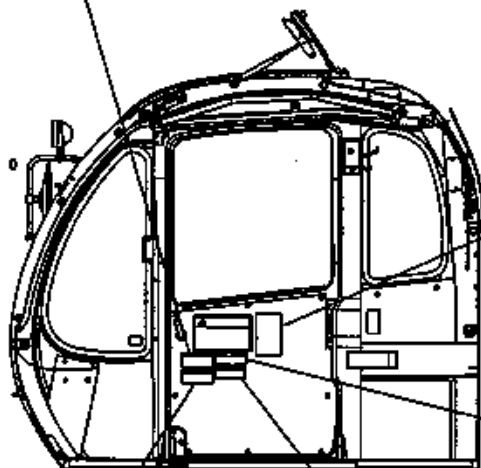
UNLAWFUL TO PLACE ANY PART OF THIS MACHINE OR LOAD WITHIN 10 FEET (3 METERS) OF HIGH VOLTAGE LINES OF 50,000 VOLTS OR LESS.

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

GG20T01127P1



⚠ WARNING

Do not lower the mast below the horizontal position in high speed. Mast will fall suddenly when lowering the mast below horizontal. Set the machine speed switch to the machine position.

JJ20T01245P1

JJ20T01245P1

⚠ DANGER

Fully lower the mast assist arms to the backwards before raising the boom. Mast will buckle and may collapse if the mast contacts the assist arms. Failure to observe this precaution may result in serious injury or the loss of life.

JJ20T01246P1

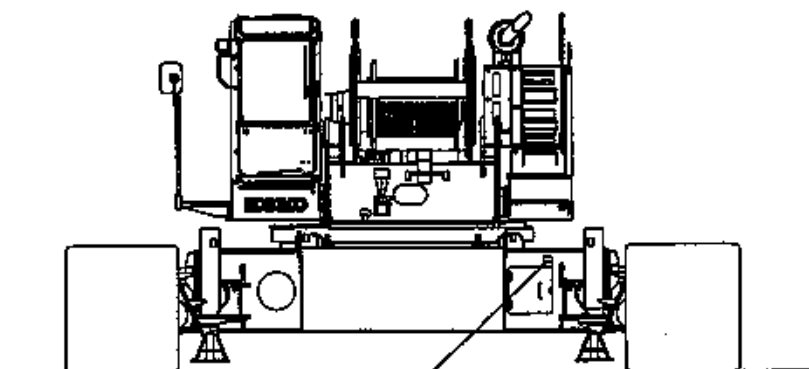
JJ20T01246P1

⚠ CAUTION

Operate the boom hoist to keep the wire rope slack as the entry and mast are raised or lowered. Otherwise, the entry, mast or boom hoist wire rope may be damaged.

JJ20T01249P1

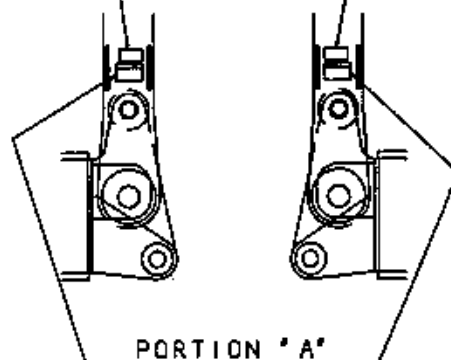
JJ20T01249P1



JJ20T01088P1



ZL11M06808



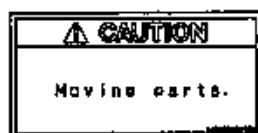
JJ20T01101P1



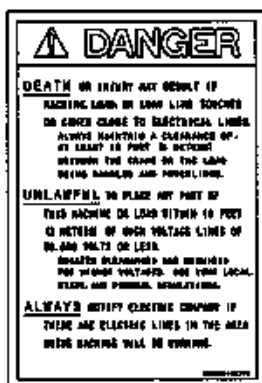
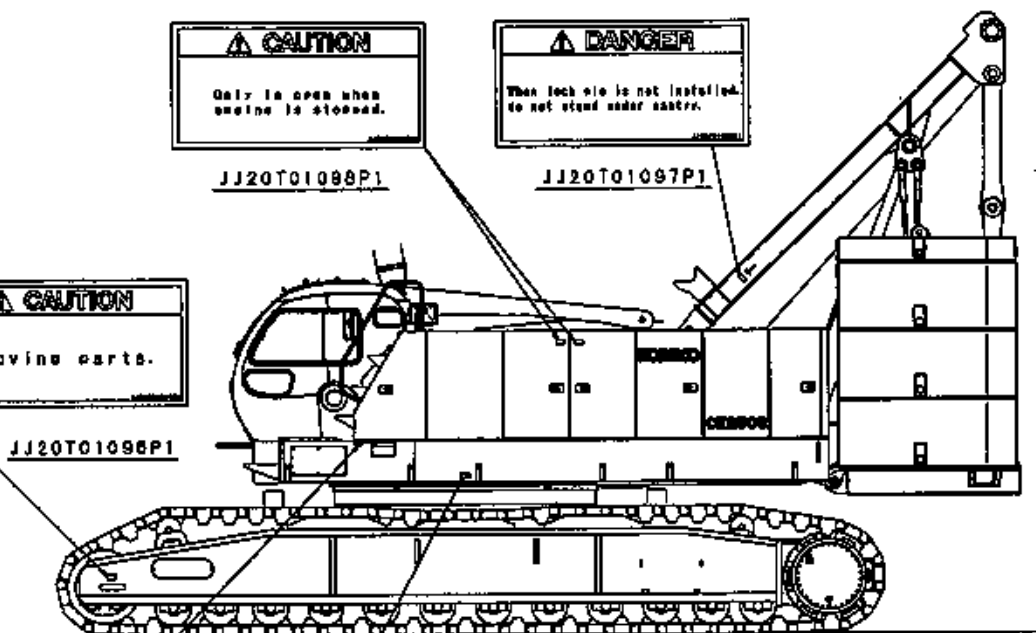
JJ20T01088P1



JJ20T01097P1



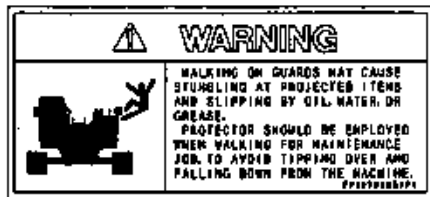
JJ20T01096P1



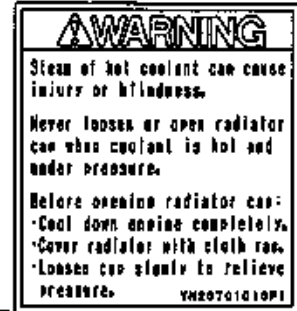
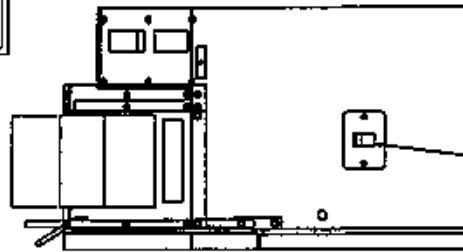
GG20T01127P1



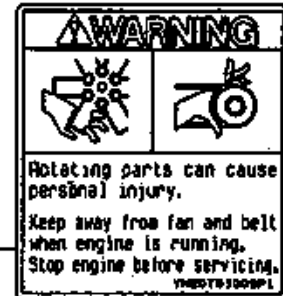
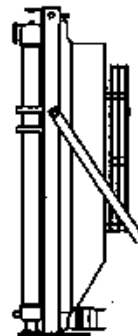
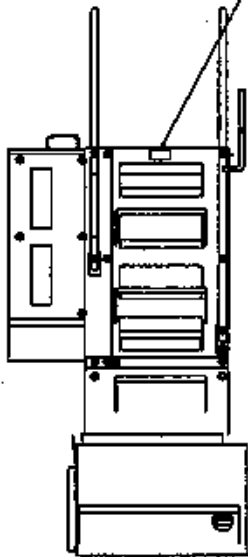
JJ20T01095P1



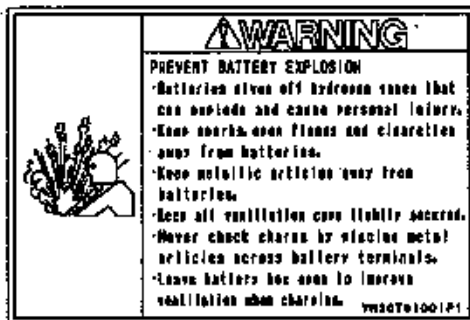
FP20T01051P1



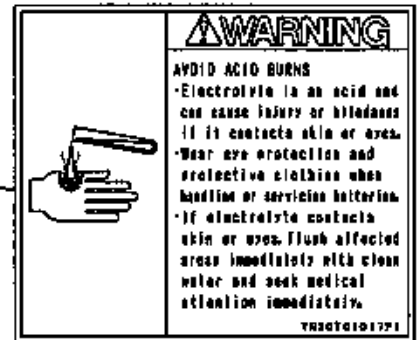
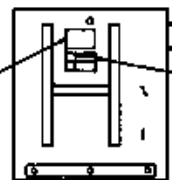
YN20T01010P1



YN20T01009P1



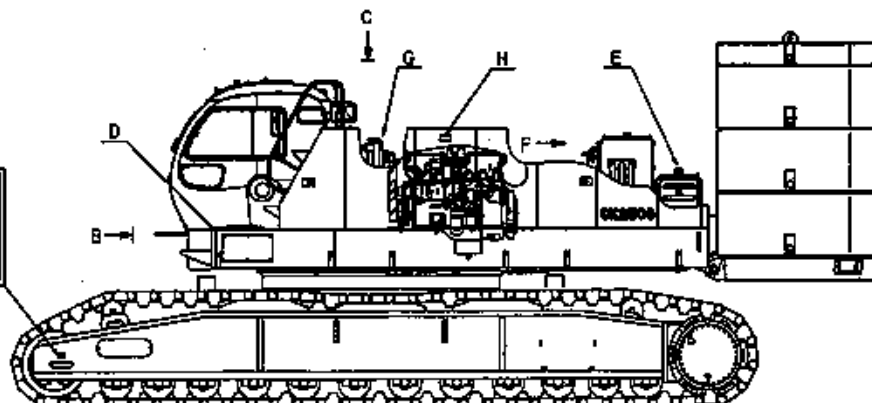
YN20T01001P1



YN20T01017P1



JJ20T01088P1

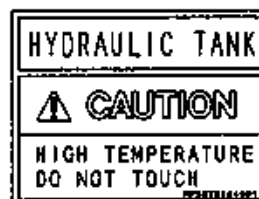




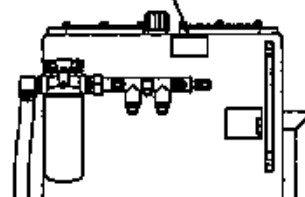
FP20T01050P1



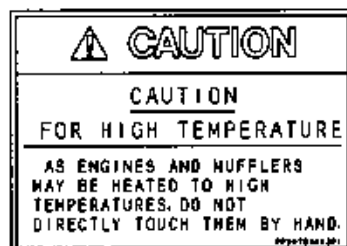
DETAIL E



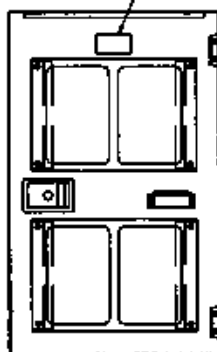
FP20T01049P1



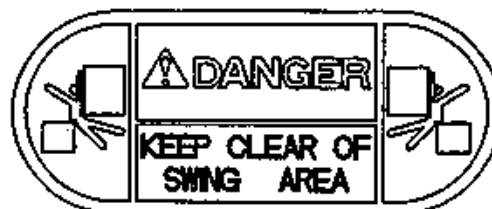
VIEW F



FP20T01043P1



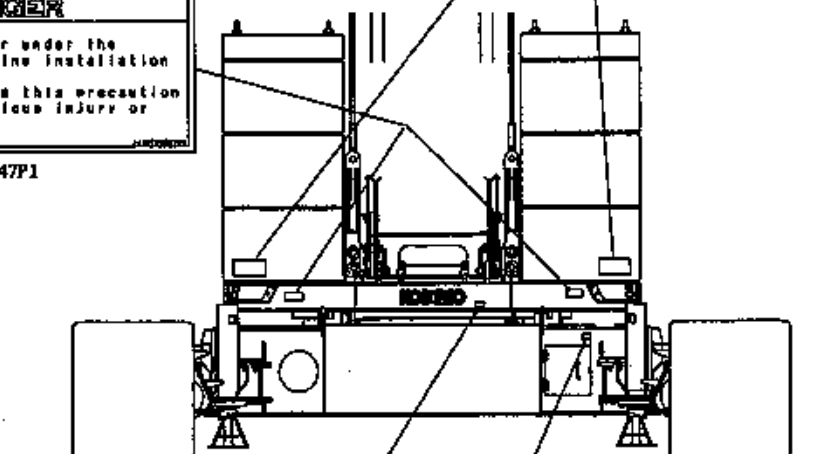
DETAIL H



YN20T01003P1



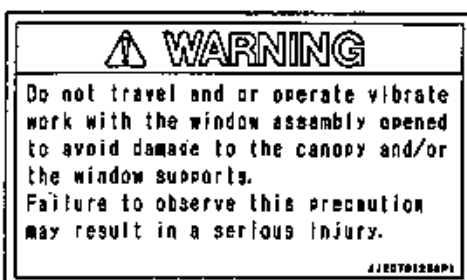
JJ20T01247P1



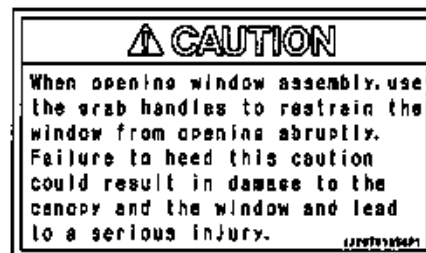
JJ20T01095P1



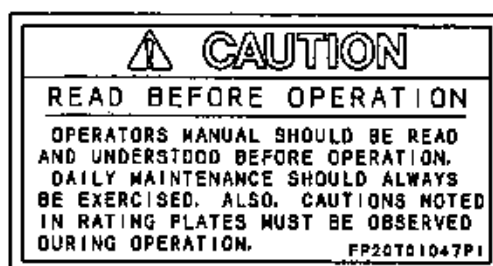
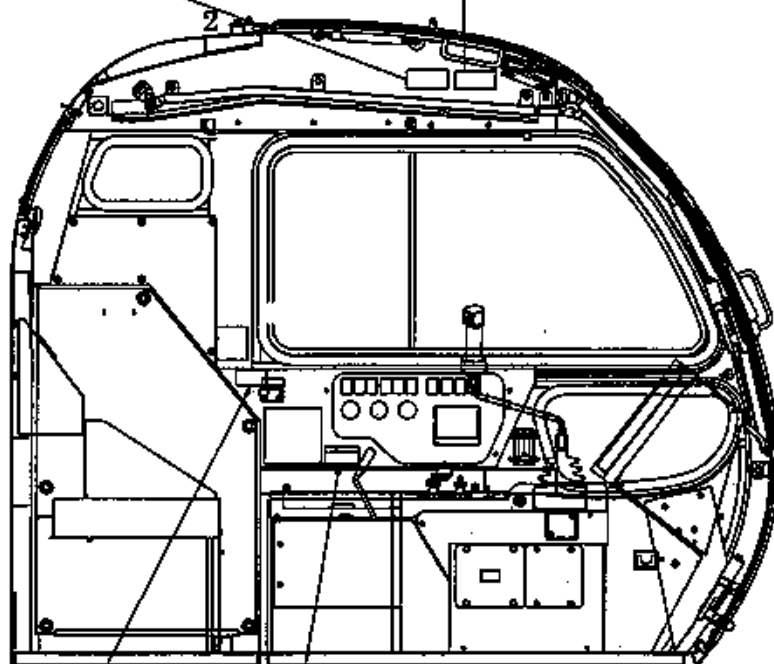
JJ20T01096P1



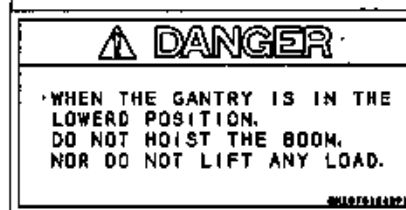
JJ20T01258P1



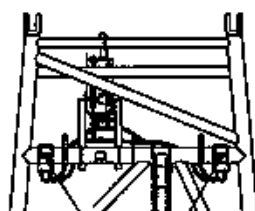
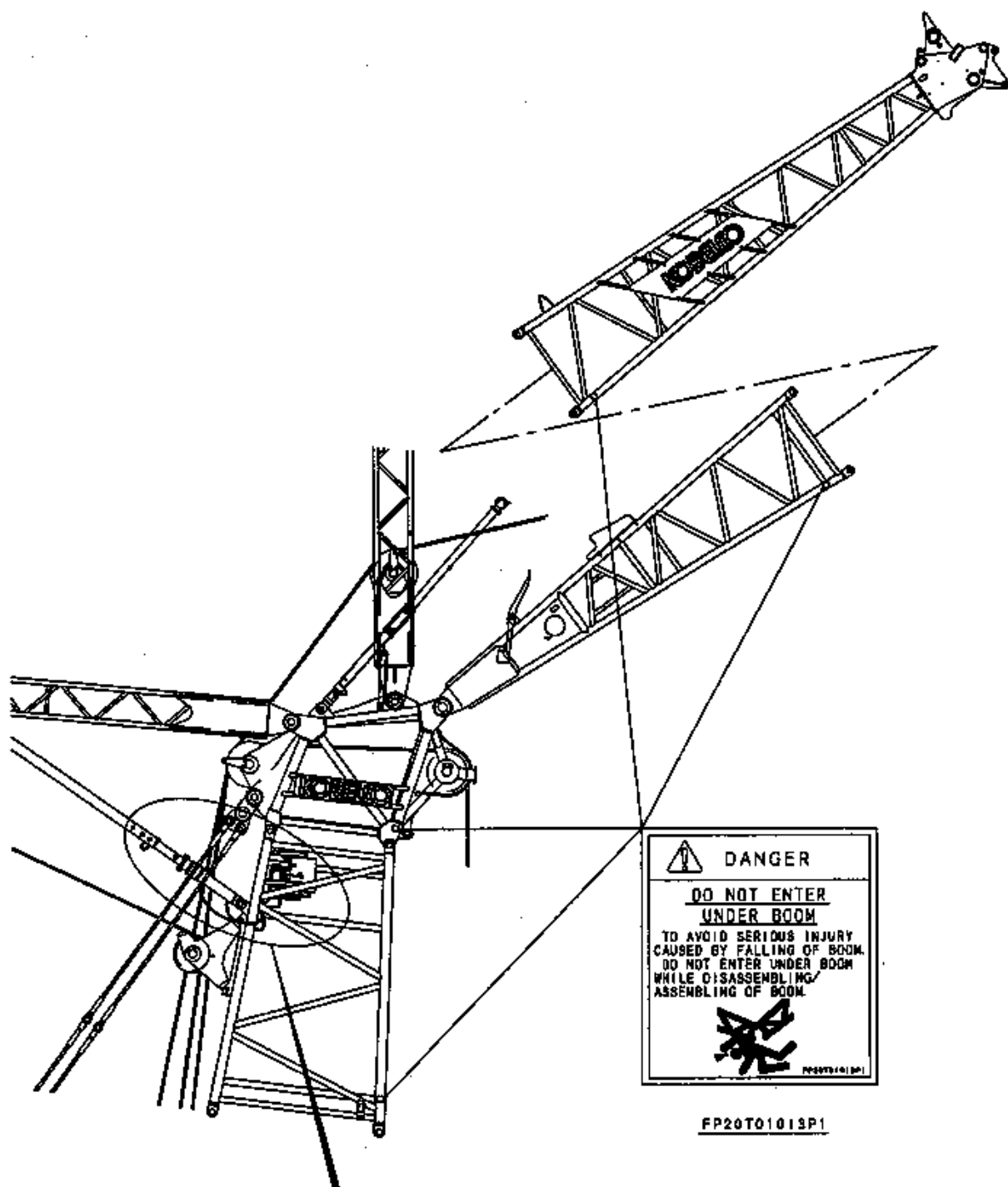
JJ20T01283P1



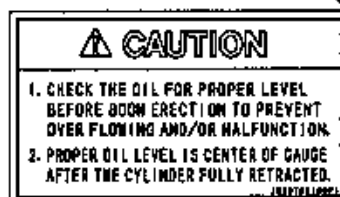
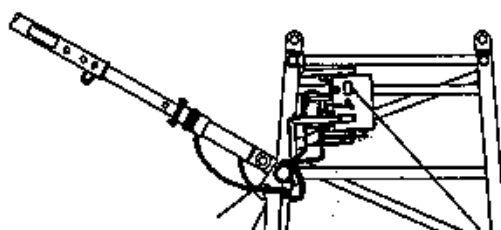
FP20T01047P1



GN20T01042P1

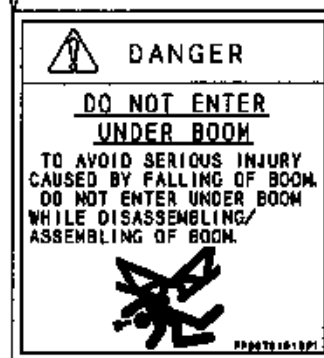
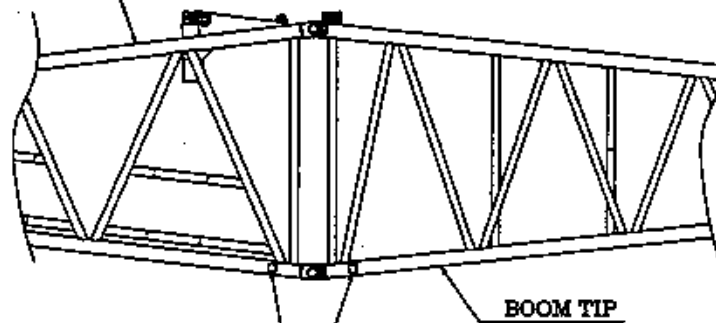


JN20T01088P1



JN20T01106P1

BOOM BASE



FP20T01013P1

TABLE OF CONTENTS

1. SAFE OPERATING PRACTICES FOR MOBILE CRANES	1- 1
Introduction	1- 1
Operator's Responsibility	1- 1
Signalman's Responsibility	1- 2
Responsibilities of All Crew Members	1- 2
Management Responsibility	1- 2
Planning the Job	1- 3
Operator's Check List	1- 4
Operating Precautions	1- 4
Measures for Radio Transmitters	1-16
Measure for Lighting	1-16
Measure for Earthquake	1-16
Influence of Wind	1-17
Caution of Wind	1-18
Method of Wind Velocity Measurement	1-18
2. OPERATION	2- 1
2.1 Terminology of Machine Each Part	2- 1
2.1.1 Crane Attachment	2- 1
2.1.2 Luffing Jib Attachment	2- 2
2.2 Locations and Terms of Operating Controls	2- 3
2.2.1 Handling of Each Switch	2- 8
2.2.2 Gauge Cluster	2-14
2.2.3 Handling the Air Conditioner	2-21
2.3 Crane Operation	2-23
2.3.1 Adjusting the Operator's Seat	2-23
2.3.2 Adjusting the Control Lever Direction	2-23
2.3.3 Starting and Stopping the Engine	2-24
2.3.4 Function Lock Lever	2-28
2.3.5 Propelling Operation	2-28
2.3.6 Swinging Operation	2-30
2.3.7 Boom Raising/Lowering Operation	2-32
2.3.8 Hook Raising/Lowering Operation	2-33
2.4 Luffing Jib Operation	2-35
2.4.1 Jib Raising/Lowering Operation	2-36
2.4.2 Hook Hoist Drum Control	2-37
2.5 Handling of Reeving Winch (Optional)	2-38
3. SAFETY DEVICE	3- 1
3.1 Arrangement of Equipments	3- 1
3.2 Kinds and Functions of Equipments	3- 5
3.3 Connecting Procedure of Wiring	3-10
3.3.1 Crane Attachment	3-10
3.3.2 Luffing Attachment	3-14
3.4 Necessary Actions for Alteration of Luffing and Crane	3-18
3.4.1 Change of Working Mode	3-18

3.4.2	Change of Cable for Crane Hook Overhoist or Luffing Hook Overhoist Limit Switches	3-18
3.5	Warning Alarm and Automatic Stop	3-19
3.5.1	Items of Warning Alarm and Automatic Stop	3-19
3.5.2	Contents of Automatic Stop	3-19
3.5.3	Release of Automatic Stop	3-20
3.6	Inspection	3-23
3.6.1	Inspection Before Raising the Boom After Assembly of Attachment is Completed.	3-23
3.6.2	Inspection After Erecting the Attachment	3-25
4.	UNLOADING/LOADING THE BASIC MACHINE	4- 1
4.1	Translifter	4- 2
4.2	Unload the Basic Machine from the Trailer	4- 5
4.3	Loading to the Trailer	4- 8
4.4	Upper Structure (With Car Body) Lifting Procedure	4-10
4.4.1	Installation of Boom Foot Lifting Bracket	4-10
4.4.2	Installation	4-11
5.	ASSEMBLY/DISASSEMBLY OF BASIC MACHINE	5- 1
5.1	Installation, Removal of Crawler	5- 2
5.1.1	Installation of Crawlers	5- 2
5.1.2	Removal of the Crawlers	5- 6
5.2	Raising/Lowering the Mast	5-10
5.2.1	Raising the Gantry and Mast	5-10
5.2.2	Lowering the Mast and Gantry	5-12
5.3	Installation, Removal of the Counterweight	5-14
5.3.1	Installation of the Counterweight	5-15
5.3.2	Removal of the Counterweight	5-18
5.3.3	Installation and Removal of the Carbody Weight	5-19
6.	ASSEMBLY/DISASSEMBLY OF CRANE ATTACHMENT	6- 1
6.1	Assembling the Attachment	6- 3
6.1.1	Arrangement of Boom/Jib/Guy Line	6- 3
6.1.2	Installing the Boom Base	6-12
6.1.3	Setting the Backstop	6-14
6.1.4	Connecting the Insert Boom	6-15
6.1.5	Installing the Boom Tip	6-16
6.1.6	Installation of the Guy Line	6-17
6.1.7	Main Hoist Wire Rope Reeving	6-19
6.1.8	Assembling the Jib	6-22
6.1.9	Reeving of Rear Drum Wire Rope	6-25
6.1.10	Installing the Auxiliary Sheave	6-27
6.1.11	Reeving the Rear Drum Wire Rope to the Auxiliary Sheave	6-28
6.2	Erecting the Attachment	6-29
6.2.1	Confirmation Before Erecting the Attachment	6-29
6.2.2	Erecting the Attachment	6-30
6.3	Lowering the Attachment	6-32
6.3.1	Lowering the Attachment	6-32
6.4	Disassembling the Attachment	6-33

6.4.1	Treatment of Overhoist Limit Switch Wiring	6-33
6.4.2	Winding Up the Front Drum/Rear Drum Wire Ropes	6-33
6.4.3	Disassembling the Jib	6-34
6.4.4	Removing Guy Lines	6-36
6.4.5	Removing Upper and Insert Booms	6-37
6.4.6	Storing Backstops	6-39
6.4.7	Removing Base Boom	6-40
6.5	Caution when Transporting Boom	6-41
7.	Assembly and Disassembly of Crane Attachment with Luffing Jib	7- 1
7.1	Assembly of Luffing Attachment	7- 3
7.1.1	Arrangement of Boom/Jib/Guy Line	7- 3
7.1.2	Removing Crane Boom Tip	7-10
7.1.3	Installing Insert Taper Boom	7-10
7.1.4	Connecting Luffing Boom Tip Assembly	7-10
7.1.5	Installing Jib Attachment	7-12
7.1.6	Assembly of Jib	7-12
7.1.7	Installing Strut Guy Line	7-13
7.1.8	Installing Jib Hoist Wire Rope	7-14
7.1.9	Connecting Strut Guy Line	7-14
7.1.10	Installing Strut Backstop	7-15
7.1.11	Installing Jib Guy Line	7-16
7.1.12	Reeving of Front and Rear Drum Wire Ropes	7-17
7.1.13	Connecting Safety Device	7-20
7.2	Erecting the Luffing Attachment	7-23
7.2.1	Confirmation before Erecting the Luffing Attachment	7-23
7.2.2	Erecting Luffing Attachment	7-24
7.2.3	Check Before Starting the Work	7-27
7.3	Lowering the Attachment	7-28
7.3.1	Lowering the Attachment	7-28
7.4	Disassembly of Luffing Attachment	7-31
7.4.1	Disconnection of Wiring for Safety Device	7-32
7.4.2	Winding Up the Front Drum/Rear Drum Wire Ropes	7-32
7.4.3	Disassembly of Jib	7-33
7.4.4	Disassembly of Luffing Boom Tip Assembly	7-36
7.4.5	Disassembling Insert Boom	7-37
7.4.6	Removing Base Boom	7-37
7.5	Caution When Transporting Luffing Boom Tip Assembly	7-38
8.	Wire Rope	8- 1
8.1	Handling of Wire Rope	8- 1
8.1.1	Unreeling Method of Wire Rope	8- 1
8.1.2	Winding Wire Rope Onto the Drum	8- 1
8.1.3	Installing the Rope Socket	8- 2
8.1.4	Specification of Wire Rope	8- 3
8.1.5	Wire Rope Length	8- 4

9. MAINTENANCE	9- 1
9.1 Checks	9- 6
9.1.1 Checks of the Upper	9- 6
9.1.2 Check of Lower	9-16
9.1.3 Check of Attachment	9-23
9.2 Oil/Grease Supply and Water Service	9-30
9.2.1 Upper Lubrication (Inclu. Water Supply)	9-32
9.2.2 Lower Lubrication	9-34
9.2.3 Attachment Lubrication	9-35
9.2.4 Grease	9-37
9.2.5 Engine Oil	9-45
9.2.6 Fuel	9-46
9.2.7 Coolant	9-47
9.2.8 Hydraulic Oil	9-49
9.2.9 Gear Oil	9-51
9.3 Cleaning/Washing/Change of Filter Element and Strainer	9-56
9.4 Check of Battery	9-61
9.5 Arrangement and Use of Fuse	9-62
9.6 Operation Under Unusual Conditions	9-63
9.7 Machine Storage	9-64
9.8 Tightening Torque Values	9-65
9.9 Security Parts to be Replaced Periodically	9-67
9.10 Adjustment	9-68
9.10.1 Adjustment of Front and Rear Drum Locks	9-68
9.10.2 Adjustment of Boom Drum Lock	9-68
9.10.3 Adjustment of Luffing Jib Drum Lock	9-69
9.10.4 Adjustment of Crawler Shoes	9-70
9.11 Consumable Parts List	9-71
10. REFERENCE MATERIALS	10- 1
10.1 Specification	10- 1
10.1.1 Performance	10- 1
10.1.2 Performance of Luffing Jib	10- 1
10.1.3 Outside Dimensions	10- 2
10.2 Dimensions and Weight of Each Parts	10- 4
10.2.1 Base Machine	10- 4
10.2.2 Counterweight	10- 5
10.2.3 Attachment	10- 7
10.3 Stability in Swinging and Traveling	10-12
10.4 System Schematic	10-14
10.4.1 Hydraulic System Schematic (Sheet 1/2)	10-14
10.4.2 Electrical Wiring Schematic	10-16
11. Operation of Counterweight Self Removal System	11- 1
11.1 Installation of Counterweights	11- 2
11.1.1 Assembly of the Counterweights	11- 2
11.1.2 Installation of Counterweights to Machine	11- 4
11.2 Removal of Counterweights	11- 6

11.2.1	Installation of Counterweight Lifting Guy Cable	11- 6
11.2.2	Removal of Counterweights	11- 7
11.2.3	Disassembling of Counterweights	11- 9
12.	Operation of Crawler and Carbody Weight Self Removal Device	12- 1
12.1	Installation of the Crawlers and Carbody Weights	12- 2
12.1.1	Machine Posture before Installation	12- 2
12.1.2	Reeving of Hoist Wire Rope	12- 2
12.1.3	Installation of Carbody Weights	12- 3
12.1.4	Installation of the Crawlers	12- 4
12.2	Removal of the Crawlers and Carbody Weight	12- 8
12.2.1	Removal of the Crawlers	12- 8
12.2.2	Removal of the Carbody Weights	12-13

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 which 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 which 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, judgement.

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.

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.

RESPONSIBILITIES OF ALL CREW MEMBERS

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 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 booklet. 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 which 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?

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.

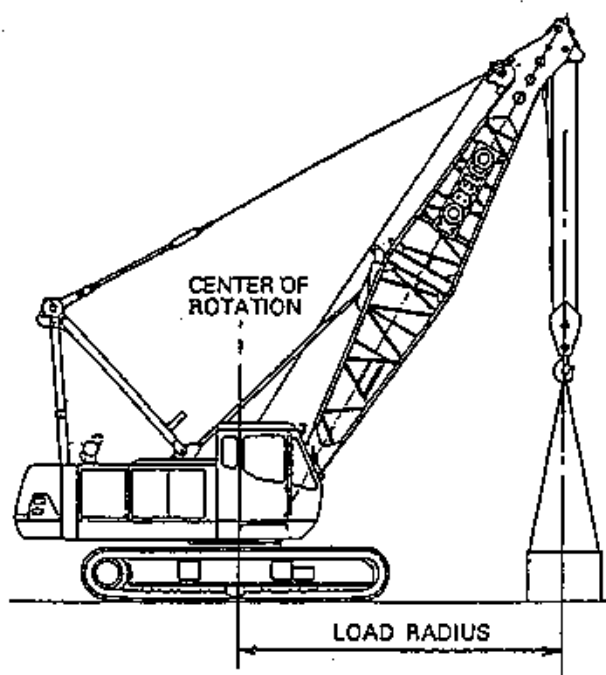
OPERATING PRECAUTIONS

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:

- A. 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.



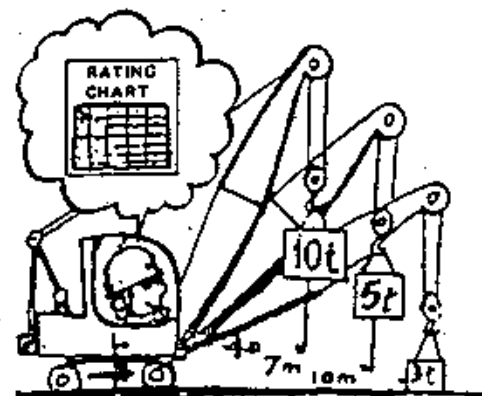
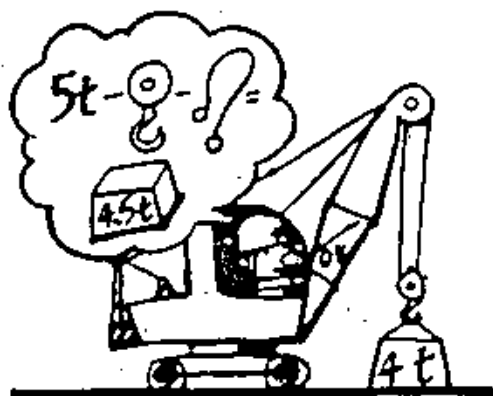
B. Weight of the load, hook, and rigging.

C. Boom length, jib, parts of line, and operating area (side, rear).

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

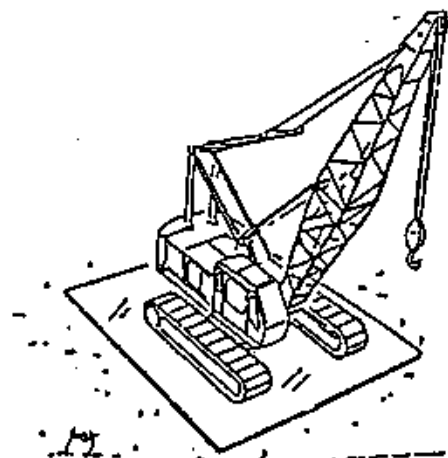
Trying to lift a load without knowing whether it is within the rated capacity while expecting the crane to start to tip to warn of an overload is very dangerous and should never be done. Cranes may suddenly tip over or collapse if the load is too heavy.

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.

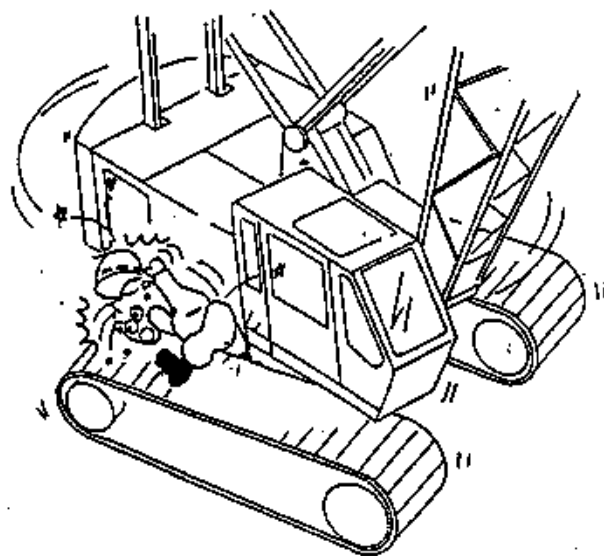
Determine the load bearing capacity of the ground or other surface on which machines will be operating. Be sure cranes are adequately supported. Avoid soft or unstable ground, sand, areas with high water tables, and partially frozen ground. When machines are working near trenches, the trenches should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



3. The rated capacity of a crane is determined with the crane leveled within 1% of grade (1 foot drop or rise in 100 foot distance). Out of level more than 1% 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.

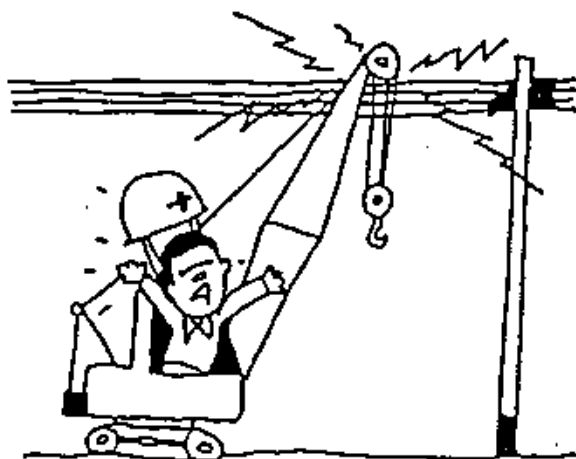
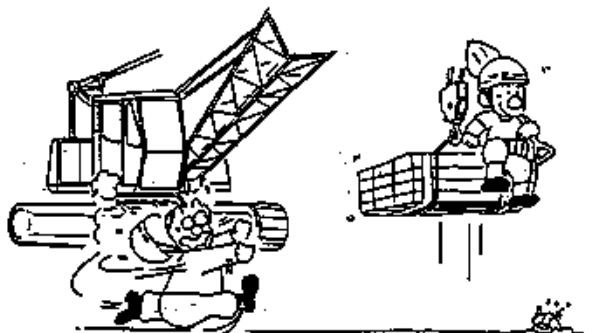
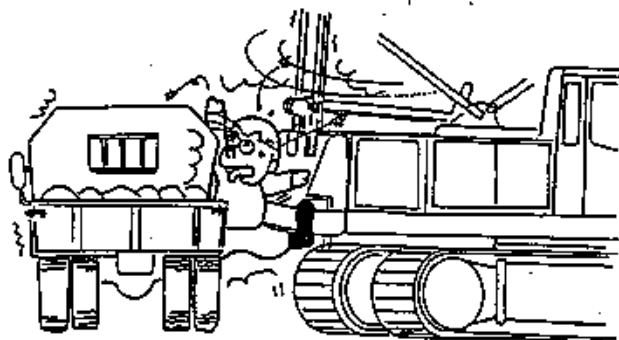
Never permit anyone to ride loads, slings, hooks, etc., for any reason.

7. Power electrical lines have killed or seriously 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 ten (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.

- A. Notify the electrical power Company before beginning work.
- B. 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.
- C. 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.
- D. 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.



Required Clearances for Operation
Near High Voltage Power Lines

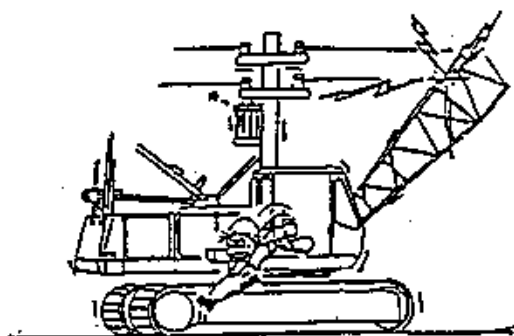
Normal Voltage, kV (Phase to Phase)	Minimum Required Clearance, ft (m)
Operation Near High Voltage Power Lines	
to 50	10 (3.05)
Over 50 to 200	15 (4.60)
Over 200 to 350	20 (6.10)
Over 350 to 500	25 (7.62)
Over 500 to 750	35 (10.67)
Over 750 to 1000	45 (13.72)
Operation While Traveling Without Load and Boom, Gantry and/or Mast Lowered	
to 0.75	4 (1.22)
Over 0.75 to 50	6 (1.83)
Over 50 to 345	10 (3.05)
Over 345 to 750	16 (4.87)
Over 750 to 1000	20 (6.10)

(extracted from ASME/ANSI Standard B30.5-1989)
SAFE MAINTENANCE PRACTICES

- E. 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.

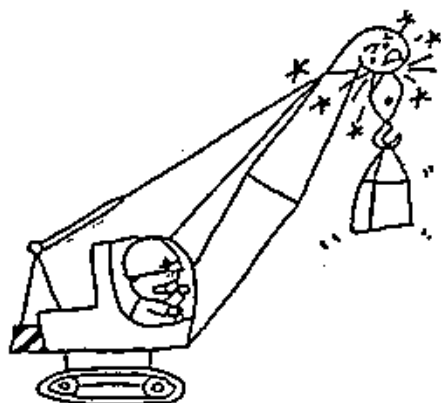
Careful planning and supervision offer better protection than any known hardware. Insulated boom cages, proximity warning devices, and insulating links have limitations and can fail without warning. Insulated boom cages and links only protect part of the crane and can break down electrically if contaminated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



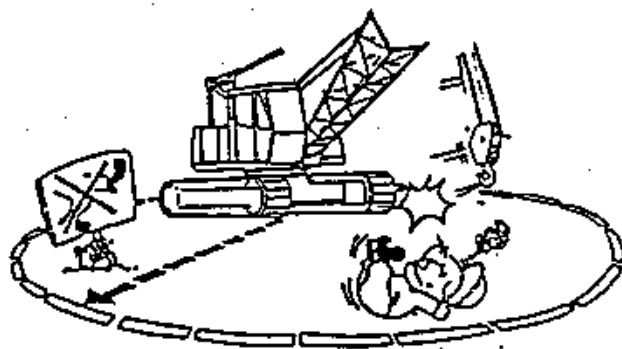
8. The load line can break if the hook block contacts the end of the boom. This is called "two blocking". Two blocking, for example, can be caused by hoisting the hook into the end of the boom or lowering the boom without paying out load line. Two blocking can pull jibs and lattice booms over backwards 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.



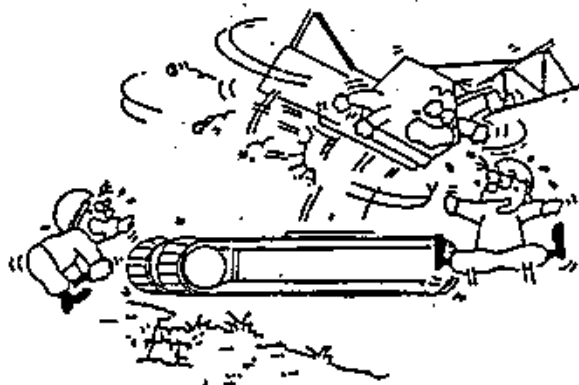
9. People can be injured if the hook, boom, load or outriggers are moved when personnel are nearby.

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.



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.

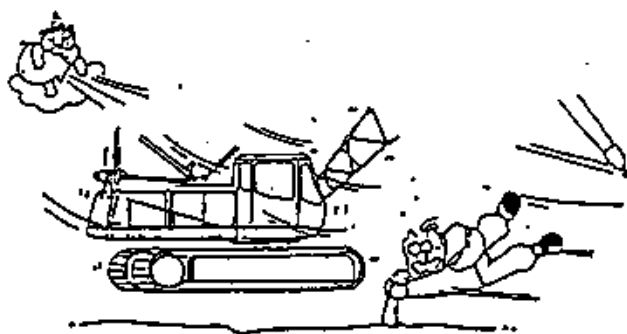
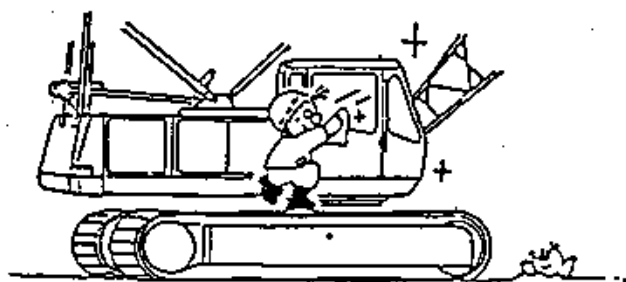
Moderate winds may create a hazard for long booms or loads with large surface areas.

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.



15. Damaged crane booms may collapse. Lattice type booms will be weakened by damaged chords, bent or missing lacings, or cracked welds.

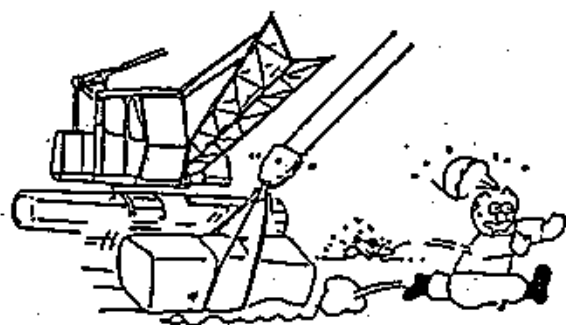
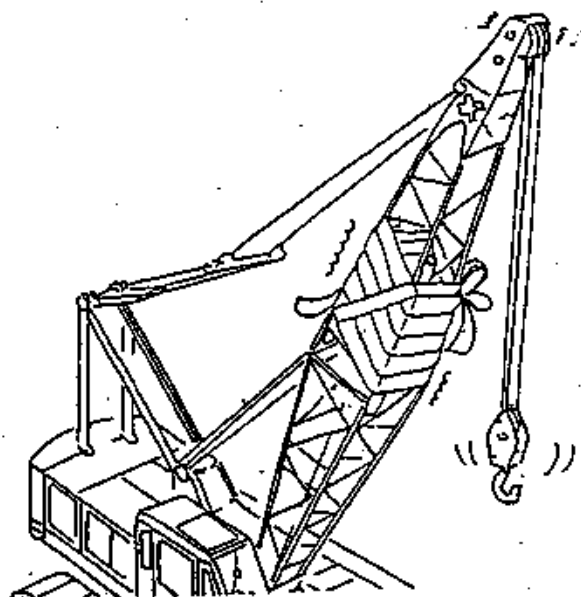
Inspect the crane boom daily for damage. Do not use damaged booms.

 CAUTION

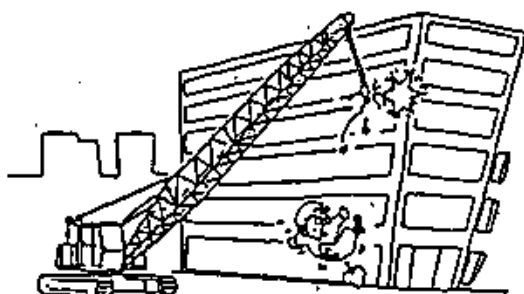
Due to the high strength steels used in booms, and jibs special repair procedures are required. Consult your local authorized KOBELCO distributor for instructions.

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.



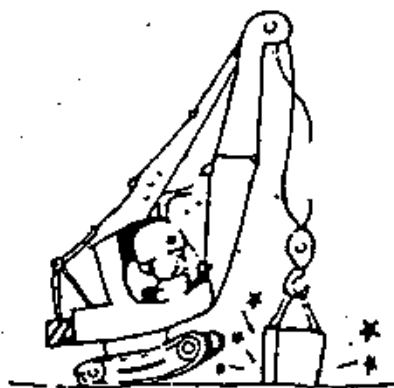
17. If the load strikes the boom or the boom hits a building or other object, the boom may collapse. Never let the load or any other object contact the boom.



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.

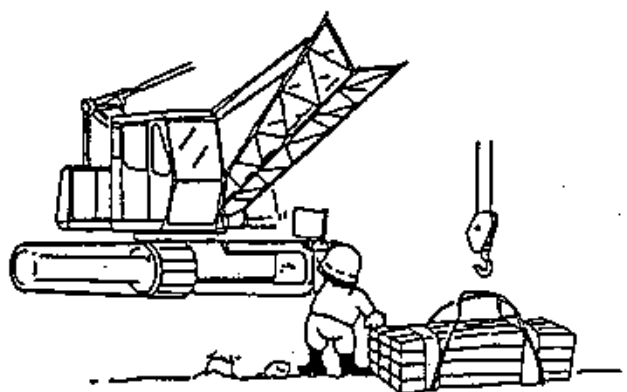


20. Trying to lift a load which is stuck, frozen or attached to something else may result in tipping, boom collapse or other damage.

Be sure that loads are free before lifting.

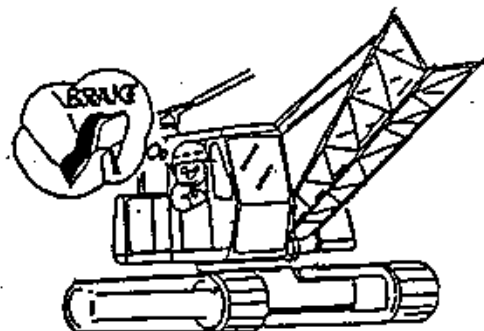
21. If there is not enough wire rope on the drum the rope can snap loose.

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



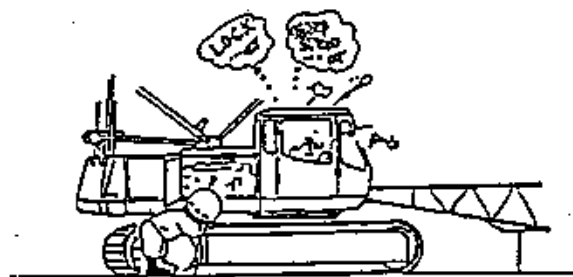
22. Foot pedal brake locks are furnished on some cranes to allow the operator to rest his legs when suspending the load for short periods of time.

Keep your feet on the pedals while foot pedal brake locks are in use. Brakes may cool allowing the load to fall.



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.

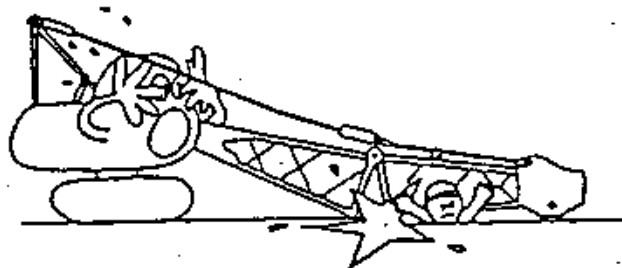


24. Pressure in hydraulic systems can be retained for long periods of time. If not properly released before maintenance people attempt to work on the hydraulic systems, this pressure can let machinery move or cause hot oil and hose ends to shoot out at high speed.

Release system pressure before attempting to make adjustment or repairs.

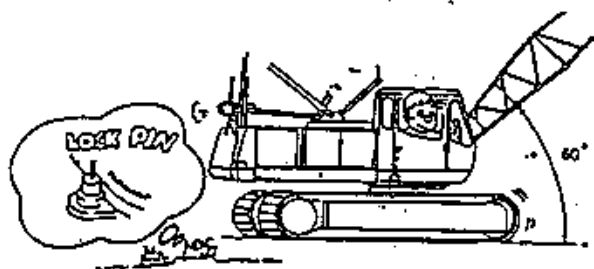
25. Pin-connected booms and jibs may fall if not properly supported when removing pins.

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.

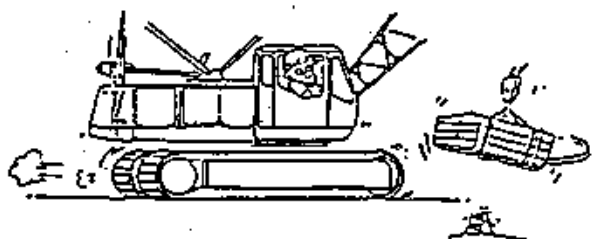


26. As with all heavy equipment, care must be taken when cranes are driven (traveled), whether on or off the jobsite.

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.



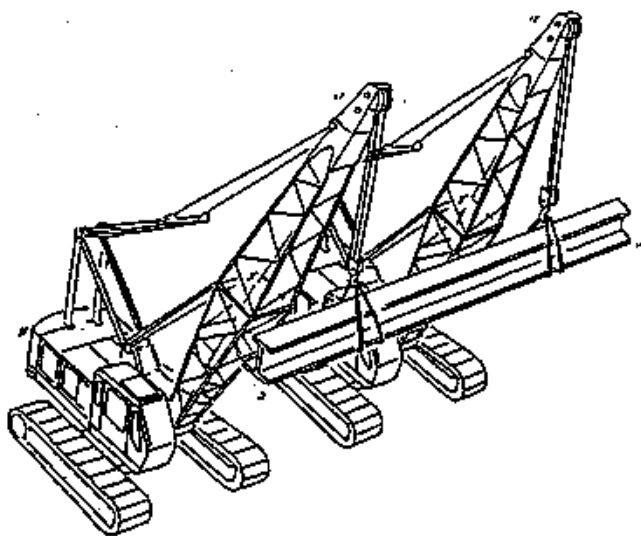
27. Load ratings for cranes are based on the machine being level and operated properly so that dynamic effects of operation do not increase the loadings on the crane. Traveling a crane with a long boom or with a load suspended involves special hazards including the increased possibility of side loading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

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 pawls.
- Set parking brakes.
- Set propel brakes or locks on crawler machines.
- Disengage the engine clutch or shut off the engine.
- Place the junction lock lever in the shut down position.

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:

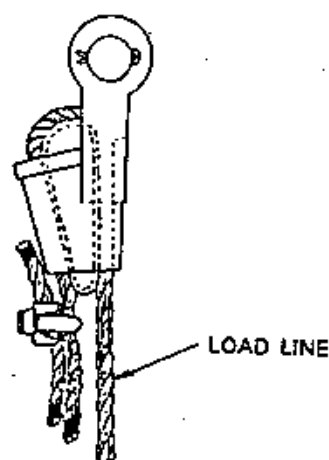
- In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay [for special conditions relating to rotation resistant rope]
- Wear of one-third the original diameter of outside individual wires;
- Kinking, crushing, bird caging, or other damage resulting 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;
 - (a) 1/64 in. (0.4 mm) for diameters up to and including 5/16 in. (8.0 mm);
 - (b) 1/32 in. (0.8 mm) for diameters 3/8 in. (9.5 mm), to and including 1/2 in. (13.0 mm);
 - (c) 3/64 in. (1.2 mm) for diameters 9/16 in. (14.5 mm), to and including 3/4 in. (19.0 mm);
 - (d) 1/16 in. (1.6 mm) for diameters 7/8 in. (22.0 mm), to and including 1-1/8 in. (29.0 mm);
 - (e) 3/32 in. (2.4 mm) for diameter 1-1/4 in. (32.0 mm), to and including 1-1/2 in. (38.0 mm)
- 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.

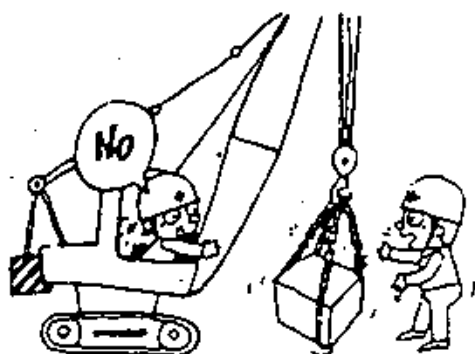
31. Improper wire rope connections may fail under load. Wire rope and connections must be installed properly and inspected daily.

- 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.

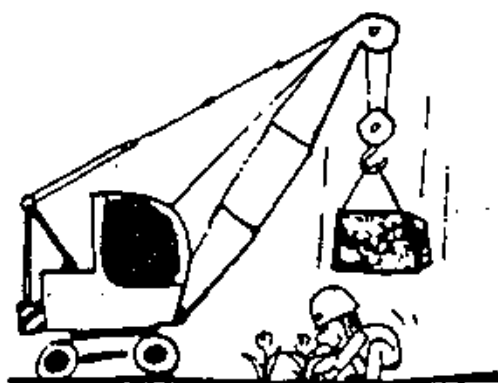


32. The operator or person in charge should see that:

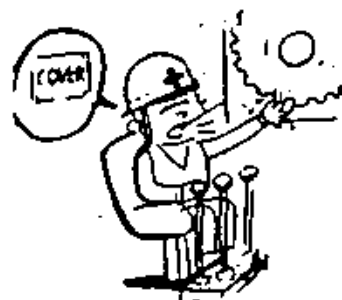
- Loads are well secured before being lifted.
- Slings are not kinked nor damaged. The load is well balanced, and the hook block is adequate for the load to be lifted. Slings are properly arranged on the hook.
- Sudden stops and starts are avoided.
- The hoist line is vertical before starting the lift.
- The crane hook is equipped with a properly functioning retainer latch.



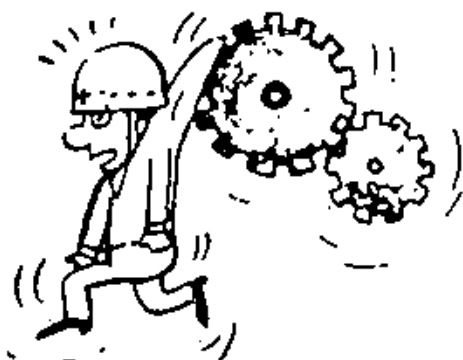
- Crane loads, grapples, or buckets do not pass over the heads of workmen nor in any way endanger their safety. All loose objects must be removed from the load. Non-operating personnel should be warned, or told to leave the immediate area, when making crane lifts.



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.



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.



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.

MEASURE 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.

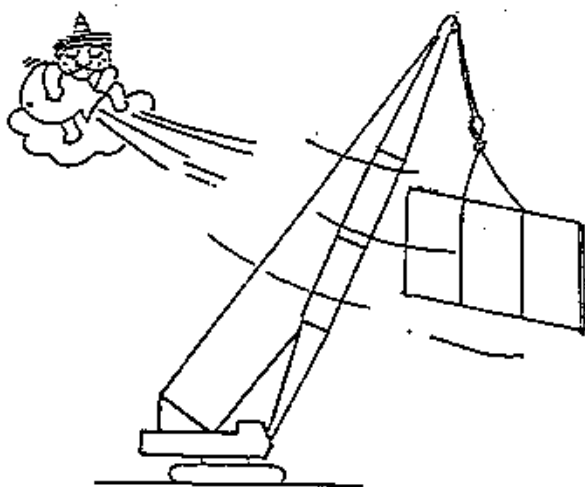
MEASURES FOR EARTHQUAKE

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.

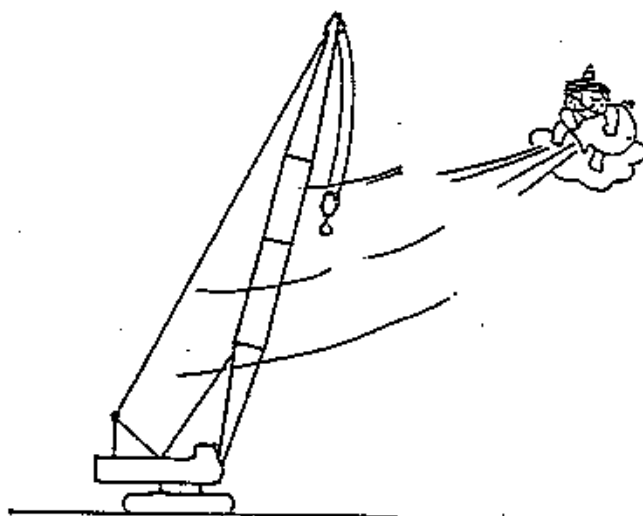
INFLUENCE OF WIND

Influence of the wind on the machine becomes larger in proportion to the size of a lifted load, lifting height, and boom length. Especially, the following cases 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.



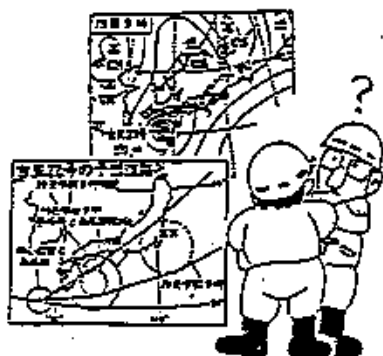
CAUTIONS FOR WIND

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.

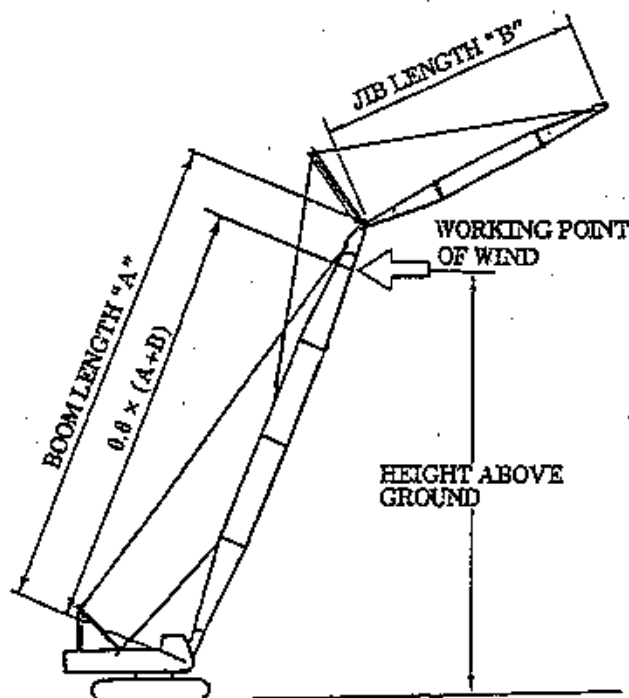
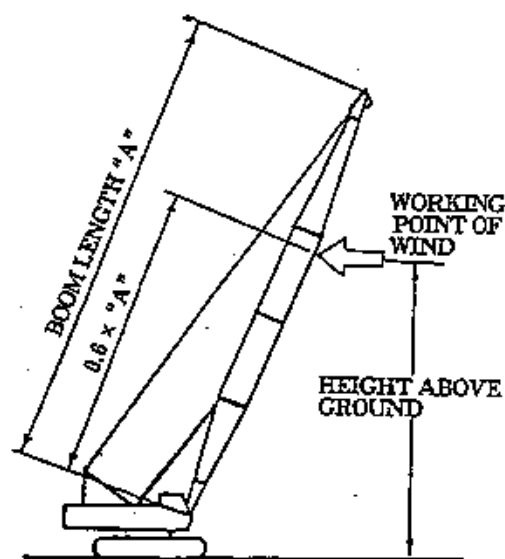
When the wind velocity exceeds 10 m/sec. (33 ft/sec.) stop the work.



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.



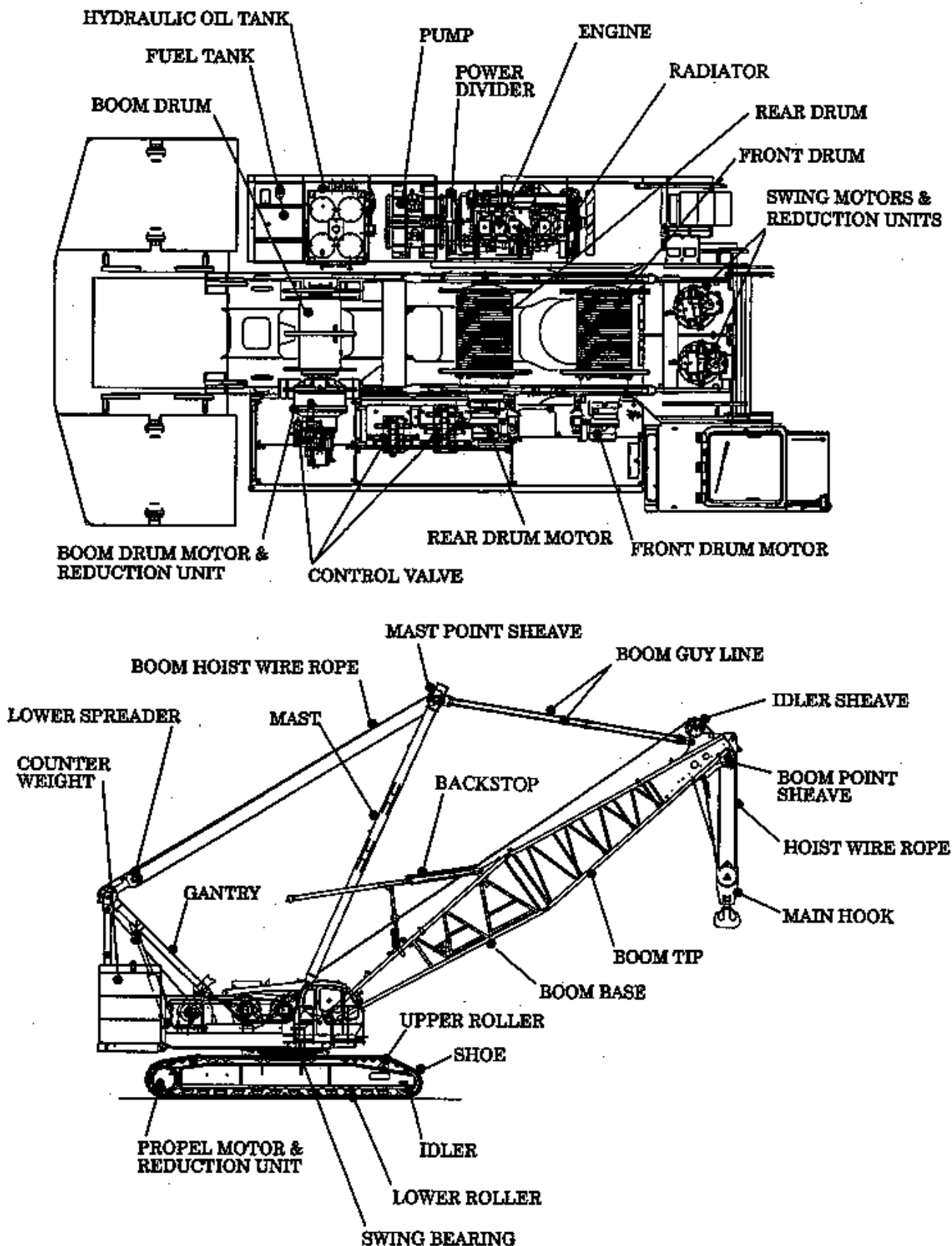
Beaufort wind scale chart

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	

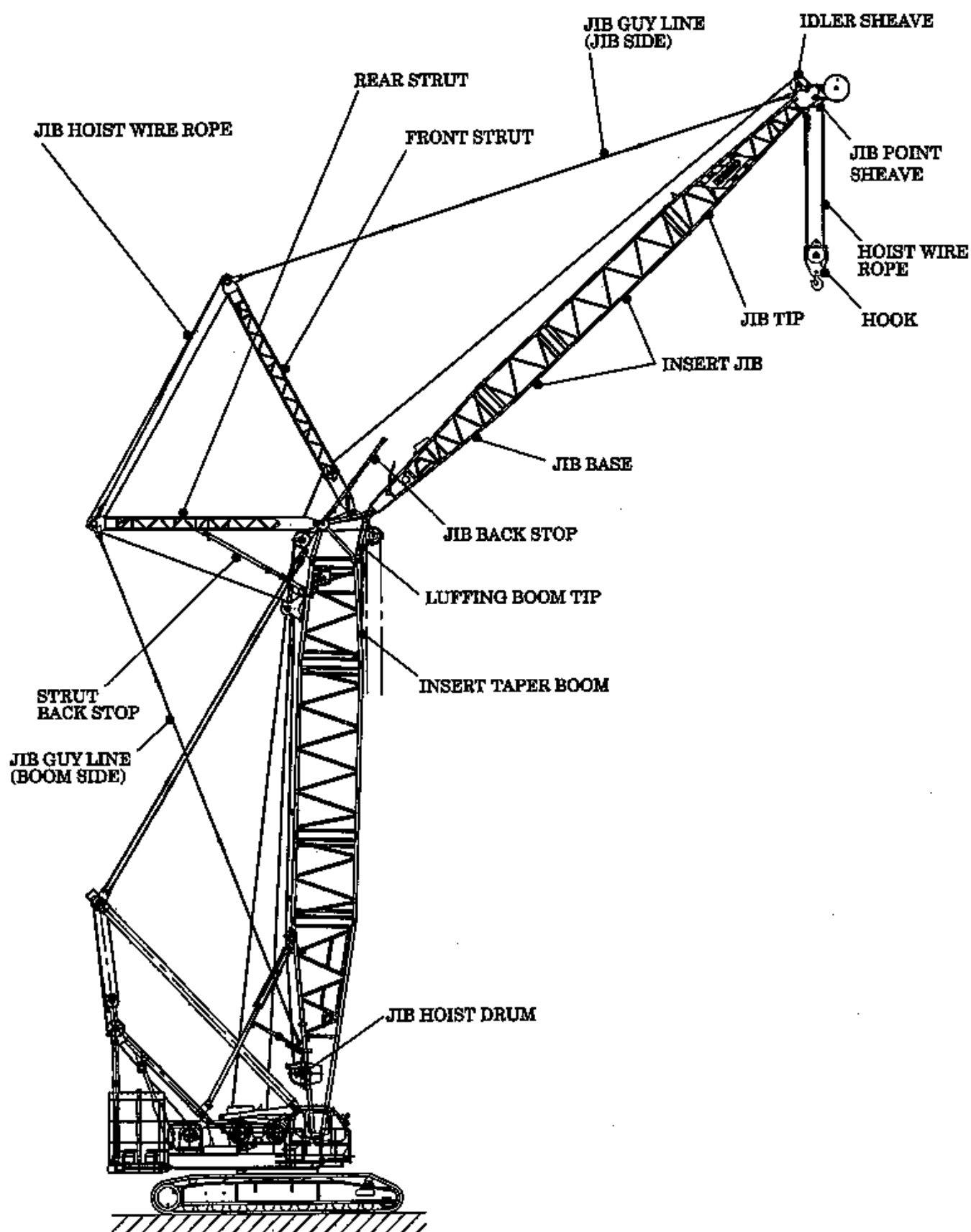
2. OPERATION

2.1 TERMINOLOGY OF MACHINE EACH PART

2.1.1 Crane Attachment



2.1.2 Luffing Jib Attachment



2.2 LOCATIONS AND TERMS OF OPERATING CONTROLS

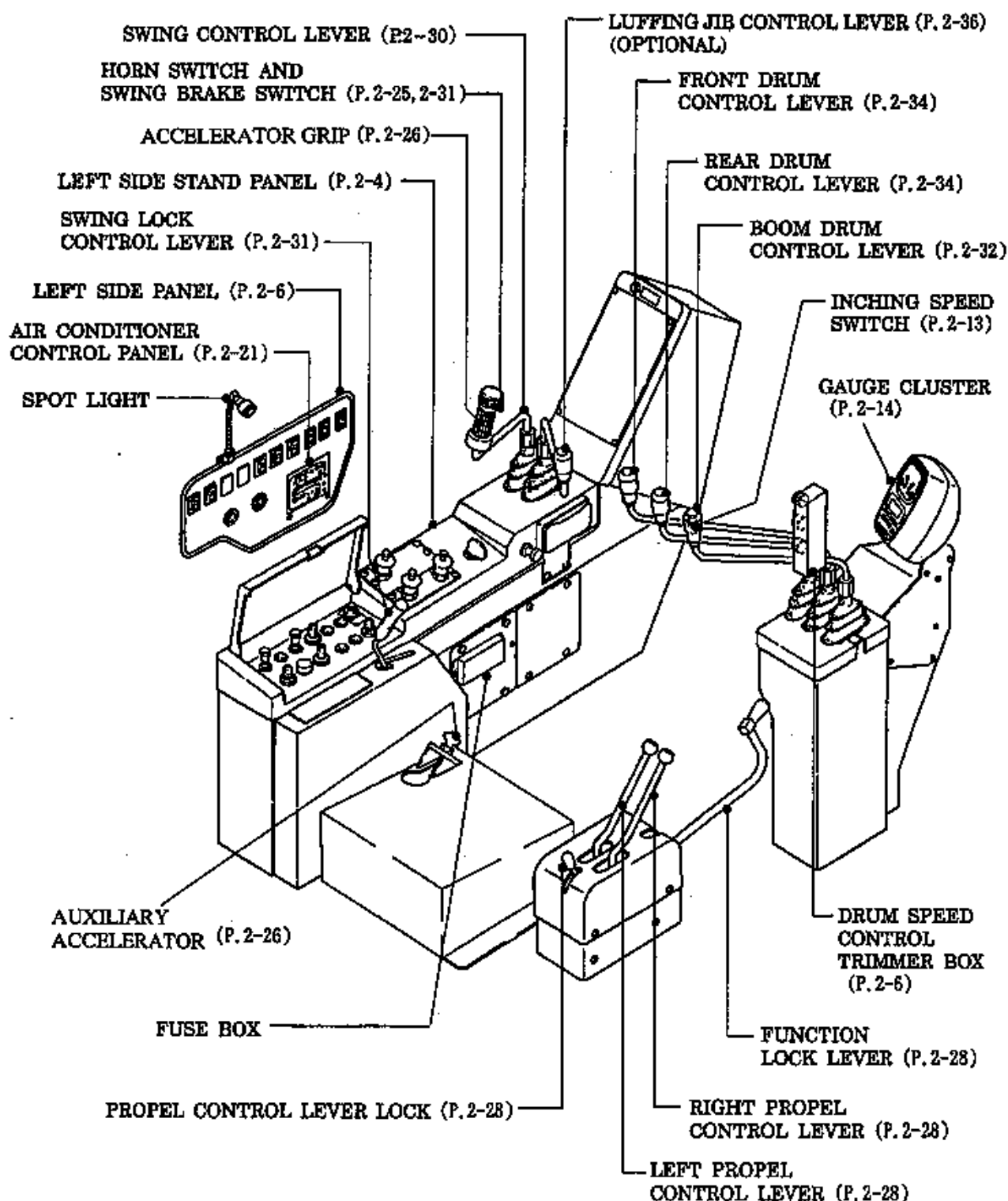


WARNING

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 loss of life.

NOTE

Optional items are also included in this figure.



LEFT SIDE STAND PANEL

7. SWING FREE INDICATOR LAMP

32. ENGINE CONTROL WARNING LAMP

(JD02-00015, JD-00016 AND
From JD02-00018)

1. FRONT DRUM LOCK KNOB

2. REAR DRUM LOCK KNOB

3. BOOM DRUM LOCK KNOB

4. ANTI TWO BLOCK RELEASE SWITCH

5. LMI RESET SWITCH

11. ATTACHMENT SELECTOR SWITCH

6. SWING BRAKE MODE SELECTOR SWITCH

8. CIGARET LIGHTOR

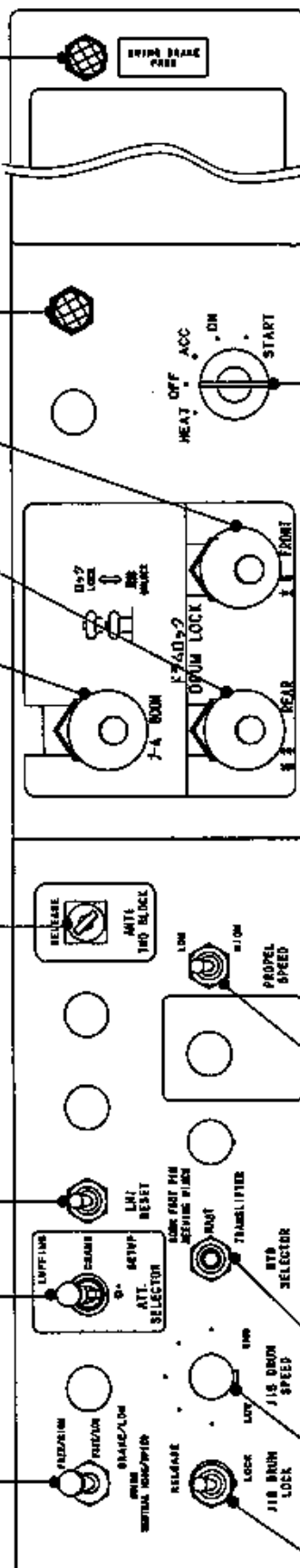
9. KEY SWITCH

10. PROPEL SPEED SELECTOR SWITCH

12. HYDRAULIC SELECTOR SWITCH

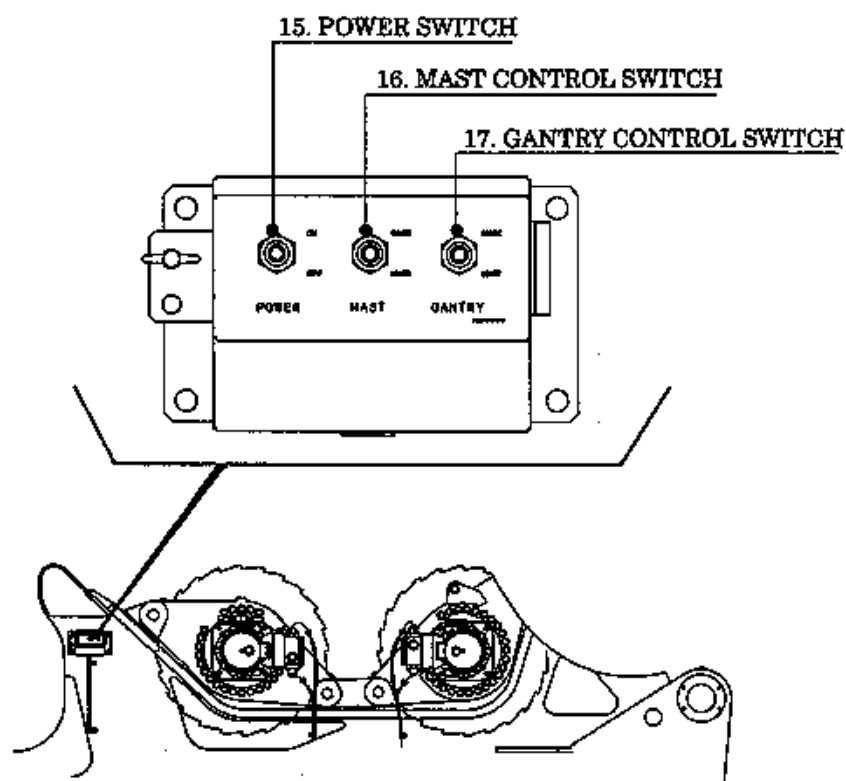
13. LUFFING JIB DRUM SPEED CONTROL KNOB(OPTIONAL)

14. LUFFING JIB DRUM LOCK SWITCH (OPTIONAL)

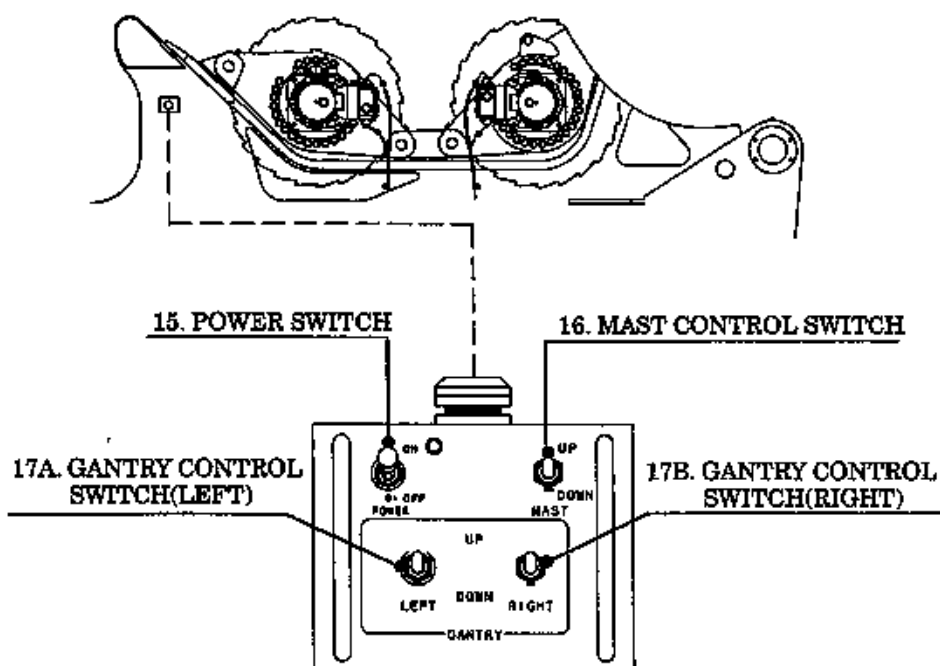


REVOLVING FRAME

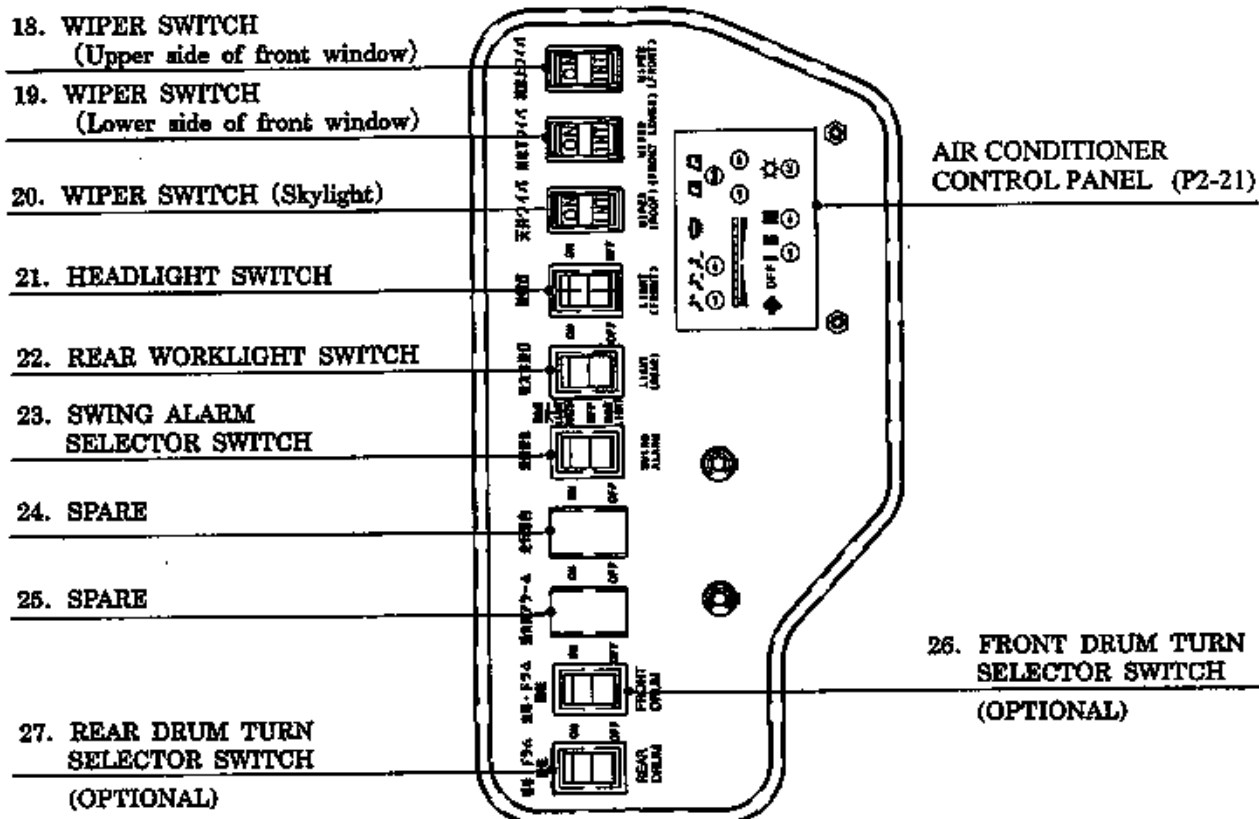
JD02-00001
To
JD02-00004



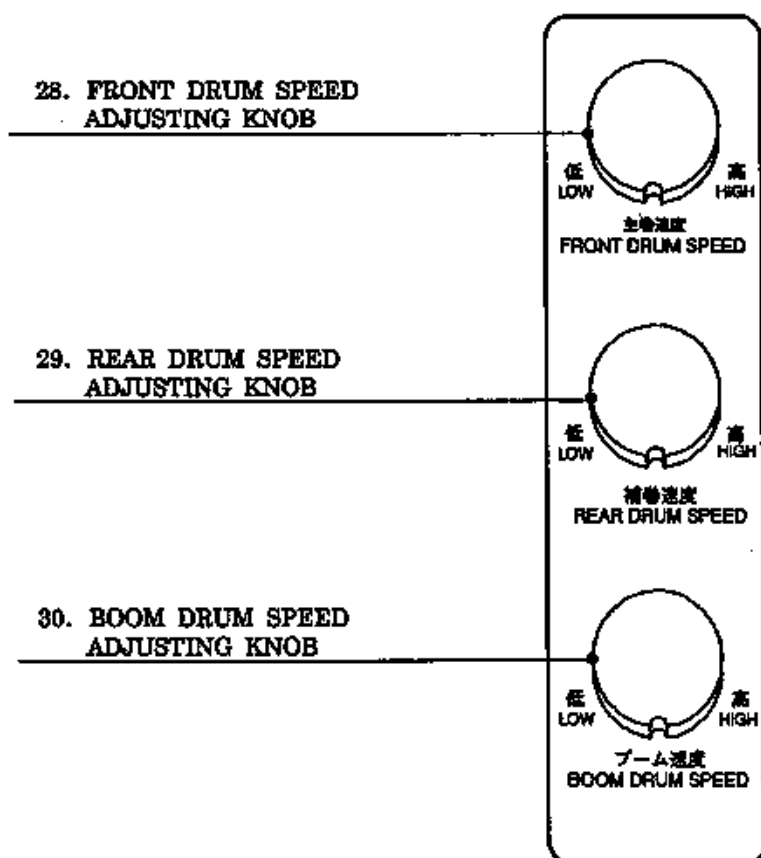
From
JD02-00005



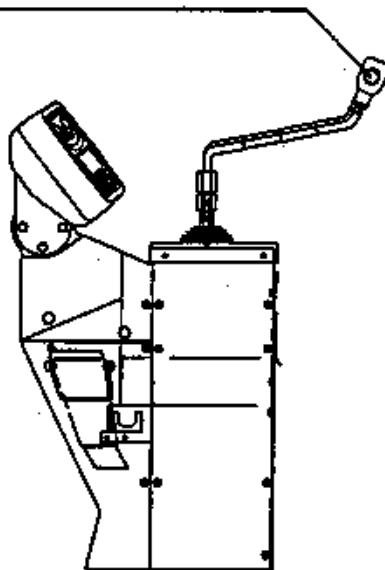
LEFT SIDE PANEL



DRUM SPEED ADJUSTING TRIMMER BOX



31. INCHING SPEED SWITCH



2.2.1 HANDLING OF EACH SWITCH

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.

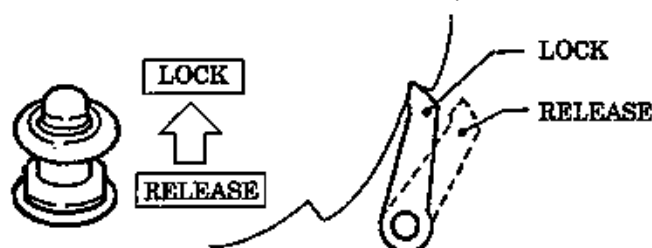
Using method of each switch is shown as follows. For operating method of each lever, see 2.3 CRANE OPERATION.

1. FRONT DRUM LOCK KNOB
2. REAR DRUM LOCK KNOB
3. 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 approx. four seconds.



4. ANTI TWO BLOCK RELEASE SWITCH

RELEASE ... Only while this switch is turned to the right, automatic stop due to hook overhoist is released.

The key is automatically returned by releasing.

The key can be taken out in the automatic stop position.

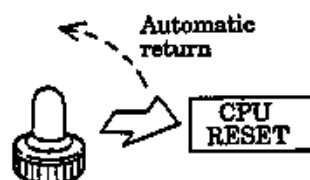


5. LMI RESET SWITCH

Operate this switch when the controller of the load safety device (optional) is abnormal.

Releasing the switch returns it automatically.

Usually it is not required to operate this switch.

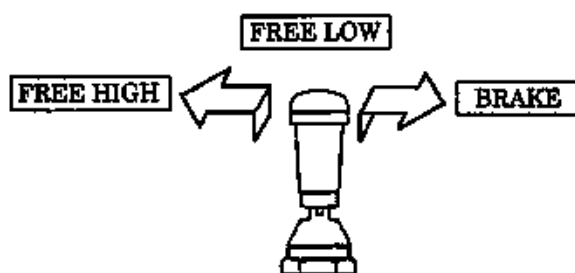


6. SWING BRAKE MODE SELECTOR SWITCH

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.

7. SWING FREE INDICATOR LAMP

This lamp lights up when the swing brake mode selector switch (item ⑥) is set to the FREE position.



ORANGE

8. 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.



9. KEY SWITCH

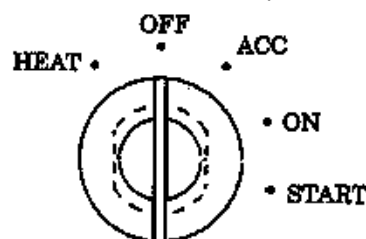
HEAT ... Position to preheat the engine.

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.



10. PROPEL SPEED SELECTOR SWITCH

HIGH SPEED...High speed is selected

LOW SPEED...Low speed is selected



11. ATTACHMENT SELECTOR SWITCH

The crane operation or luffing jib operation can be selected with this switch.

To select the crane operation, set this switch to the "CRANE" side. To select the luffing operation, set it to the "LUFFING" side.



WARNING

Be sure to select the appropriate position for the attachment operation. Wrong selection may lead to malfunction, causing damages to the machine.



12. HYDRAULIC SELECTOR SWITCH

Set to neutral position usually.

The mast can be operated when this switch is set to the neutral position.

TRANSLIFTER For translifter operation.

BOOM FOOT PIN

REEVING WINCH For boom foot pin or reeving winch operation.

NEUTRAL For mast operation.



13. LUFFING JIB DRUM SPEED CONTROL KNOB (OPTIONAL)

Right turn The rotating speeds of the luffing jib drum are accelerated.

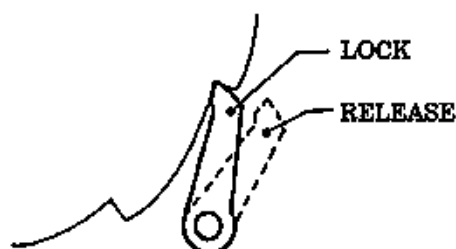
Left turn The rotating speeds of the luffing jib drum are decelerated.



14. LUFFING JIB DRUM LOCK SWITCH (OPTIONAL)

LOCK The drum lock is engaged.

RELEASE The drum lock is released.



15. POWER SWITCH

Normally, set this switch to the "OFF" side.

Set it to the "ON" side when operating the mast or gantry.

ON Operation of the mast and gantry is enabled.

OFF Operation of the mast and gantry is disabled.



CAUTION

Keep the power select switch to the OFF position except mast assist arms or gantry operation.

Otherwise, the hydraulic valves may be damaged.



16. MAST CONTROL SWITCH

RAISE..... The mast is raised up.

LOWER The mast is lowered down.

Releasing the switch returns it automatically.

NOTE

The mast can be operated when the No.12 HYDRAULIC SELECTOR SWITCH is set to the "MAST" position.



17. GANTRY CONTROL SWITCH

RAISE..... The mast is raised up.

LOWER The mast is lowered down.

Releasing the switch returns it automatically.



18. WIPER SWITCH (UPPER SIDE OF FRONT WINDOW)

19. WIPER SWITCH (LOWER SIDE OF FRONT WINDOW)

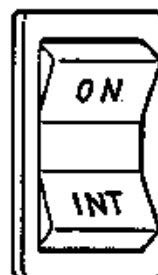
20. WIPER SWITCH (SKYLIGHT)

ON The wiper operates continuously.

INT The wiper operates intermittently.

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

To operate the washer system push the center of the switch in.

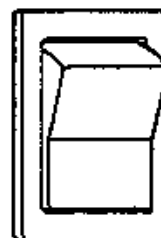


21. HEADLIGHT SWITCH

22. REAR WORKLIGHT SWITCH

ON The lights are illuminated.

OFF The lights are turned off.



ON

OFF

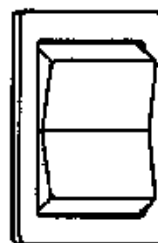
23. SWING ALARM SELECTOR SWITCH

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.

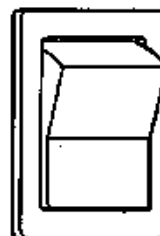


**WARNING
LAMP
BUZZER**

OFF

**WARNING
LAMP**

24. SPARE



ON

OFF

25. SPARE



ON

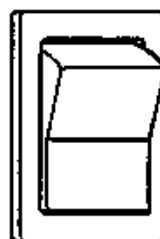
OFF

26. FRONT DRUM TURN SELECTOR SWITCH (OPTIONAL)

27. REAR DRUM TURN SELECTOR SWITCH (OPTIONAL)

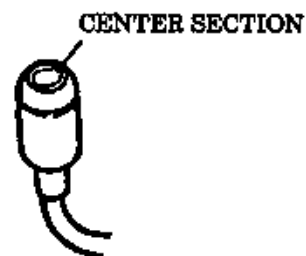
ON.....The center section of the grip moves
according to the drum rotation speed.

OFF.....Nothing operates.



ON

OFF



28.FRONT DRUM SPEED ADJUSTING KNOB.

29.REAR DRUM SPEED ADJUSTING KNOB.

30.BOOM HOIST DRUM SPEED ADJUSTING KNOB.

Right turn ... The rotating speeds of the front drum, rear drum and boom hoist drum are accelerated.

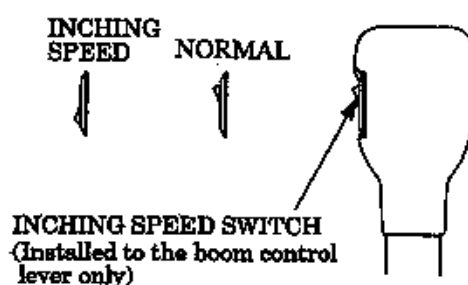
Left turn The rotating speeds of the front drum, rear drum and boom hoist drum are decelerated.



31. INCHING SPEED SWITCH

INCHING SPEED ... The front drum, rear drum, boom hoist and propel speeds are reduced to about 1/3 of the normal speeds.

NORMAL Normal speed.



32. ENGINE CONTROL WARNING LAMP

This lamp lights up when any fault occurs to the control of the engine during operation. Correct the fault immediately when the lamp lights up.

If you cannot stop operation by all means, decrease the engine speed to 1200 rpm or less as a temporary measure, and keep on working. Working with this lamp lit up will lead to malfunction of the engine.



2.2.2 GAUGE CLUSTER

1. TERMINOLOGIES AND FUNCTIONS

ENGINE COOLING WATER TEMPERATURE GAUGE

This gauge indicates the engine cooling water temperature.
While the pointer is in the white area, the temperature is normal.
If the pointer is in the red area, reduce the engine speed to lower the cooling water temperature, and wait until the pointer returns to the white area.

FUEL GAUGE

The fuel level is indicated with the pointer.

F → Full

E → Empty

MULTI-DISPLAY (LIQUID CRYSTAL DISPLAY)

The current status of the machine is displayed.

SETTING SWITCH

- ① To set the engine oil change interval and the number of the wire rope wraps on the drum, push this switch.
- ② When this switch is pushed while the normal display screen is flashing (the zero switch is pushed while faulty statuses are displayed), the screen returns to the fault indicator display screen.

ADJUSTER (+, -) SWITCHES

The engine oil change interval and the number of the wire rope layers on the drum can be adjusted with these switches.

DISPLAY SCREEN SELECTOR (Δ, ▽) SWITCHES

The multi-display screens can be selected by pushing these switches.

BUZZER SWITCH

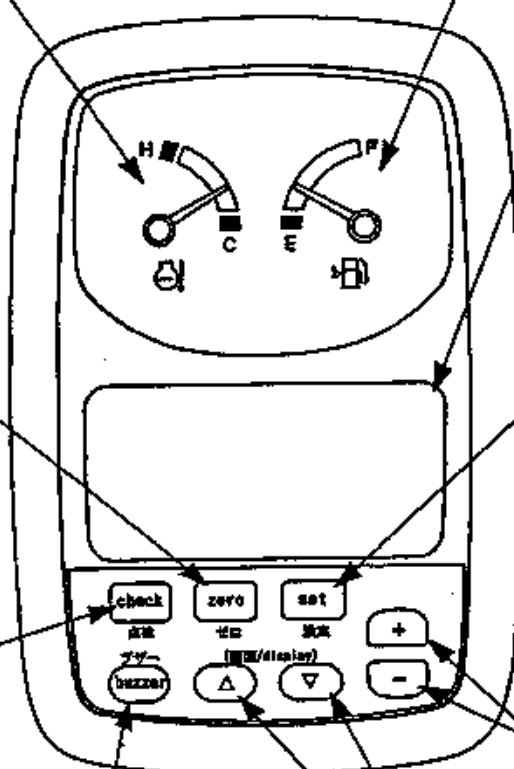
The buzzer can be stopped when this switch is pushed while the buzzer sounds (other than the buzzer sounds emitted when the engine oil pressure is decreased).

ZERO SWITCH

- ① To reset the engine oil change interval, push this switch.
- ② To reset the lifting height indicator (optional), push this switch.
- ③ When this switch is pushed for 2 seconds while faulty statuses are displayed, the display screen returns to the normal status (flashing display).

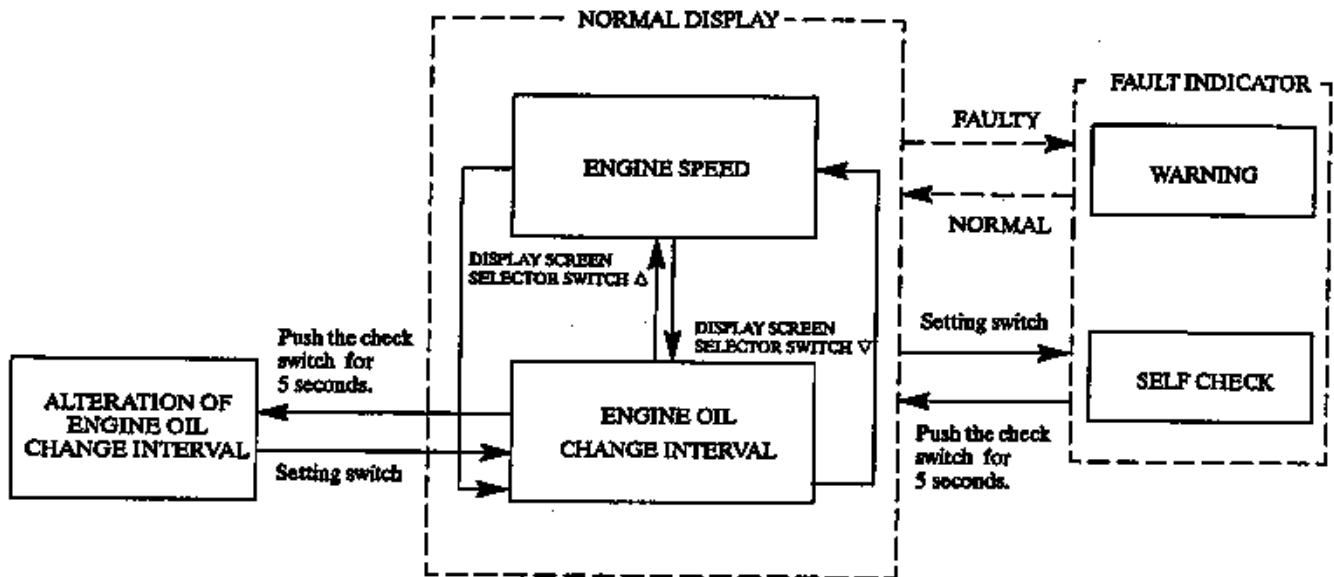
CHECK SWITCH

After this switch is pushed for 5 seconds while the engine oil change interval is displayed, the displayed values can be adjusted.



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.

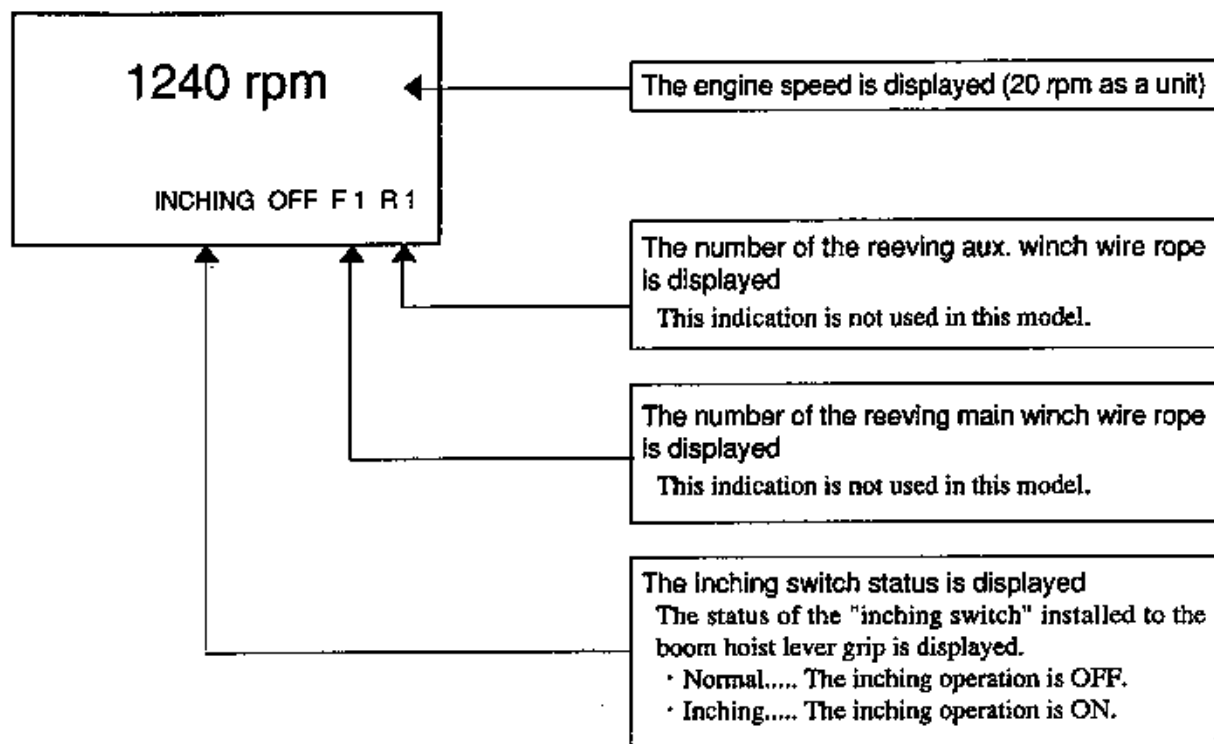


3. NORMAL DISPLAY

(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.

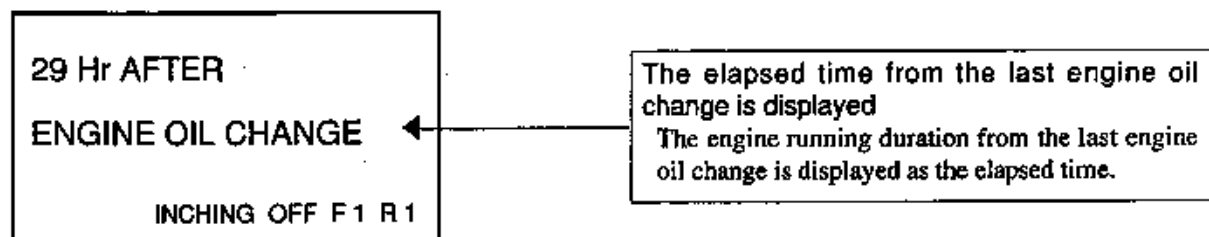
If any faulty status is displayed, refer to the page 2-17.



 Note : The number of the reeving setting switch is not provided, the number of the reeving is always displayed as "1".

(2) ENGINE OIL CHANGE INTERVAL DISPLAY SCREEN

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



4. FAULT INDICATOR DISPLAY

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

(1) WARNING DISPLAY

Displayed items	Descriptions and remedies	Buzzer
W-1  ENGINE PREHEAT	Turn the starter key counterclockwise to the "HEAT" position to preheat the engine. When the message of "FINISH PREHEAT" is displayed, start the engine.	
W-2  FINISH PREHEAT	The engine preheat is complete. Start the engine.	
W-3  CHARGING PROBLEM	The charging circuit is malfunctioned. Consult with your nearest KOBELCO service shop.	
W-4  CONTRON MAIN PRESS	The control primary pressure is abnormal. Stop the operation at once, and consult with your nearest KOBELCO service shop.	
W-5  ENGINE OIL PRESS	The engine oil pressure is abnormal. Stop the engine at once, and consult with your nearest KOBELCO service shop.	○
W-6  SUB TANK WATER LVL	The cooling water level in the sub tank of the radiator is insufficient. Refill the subtank with cooling water.	
W-7  ENGINE WATER TEMP	The cooling water temperature is excessively high. Idle the engine to lower the water temperature, and consult with your nearest KOBELCO service shop.	○
W-8  ENGINE OIL FILTER	The engine oil filter is clogged. Replace the filter.	
W-10  ENGINE AIR FILTER	The engine air cleaner is clogged. Clean or replace the element.	
W-11  LOW FUEL LEVEL	The fuel level is insufficient. Refuel.	
W-12  HYD OIL TEMP	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 service shop.	

Displayed items	Descriptions and remedies	Buzzer
H-1 CPU MECHATRO FAILURE	The CPU is malfunctioned. Consult with your nearest KOBELCO service shop.	○

*** 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).
 - : the buzzer repeatedly sounds for 0.5 seconds, with 0.5 seconds of intermittence (the buzzer can be stopped with the buzzer switch).
 - △: 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.

(2) WARNING DISPLAY (SELF CHECK)

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

When there are some malfunctions, they will be displayed by turns.

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

D-1 PSV BOOM RAISE PROPO-V.	D-15 PSV TUG-LINE PROPO-V.	A-1 POT FR-MOTOR POTENTIO.	A-13 SE FR-RAISE PRESS SENS	F-1 M STEP MOTOR CURRENT ER
D-2 PSV BOOM LOWER PROPO-V.	D-17 PSV JIB RAISE PROPO-V.	A-2 POT RE-MOTOR POTENTIO.	A-14 SE FR-LOWER PRESS SENS	F-2 M STEP MOTOR CURRENT ER
D-3 PSV FR-RAISE PROPO-V.	D-18 PSV JIB LOWER PROPO-V.	A-3 POT BOOM-MOTOR POTENTIO.	A-15 SE RE-RAISE PRESS SENS	B-24 M STEP MOTOR S/PT ERROR
D-4 PSV FR-LOWER PROPO-V.		A-6 POT TUG-LINE POTENTIO.	A-16 SE RE-LOWER PRESS SENS	H-3 CPU ROM DATA FAILURE
D-5 PSV RE-RAISE PROPO-V.	C-2 SV FR-MOTOR SOL.	A-7 POT GRIP POTENTIO.	A-23 POT BOOM ANGLE POTENTIO.	H-4 CPU MECHATRO SET ERROR
D-6 PSV RE-LOWER PROPO-V.	C-3 SV RE-MOTOR SOL.	A-8 POT FOOT-THROT POTENTIO.	A-24 POT JIB MOTOR POTENTIO.	H-6 RECEIVE ER MECHATRO
D-9 PSV SWING PROPO-V.	C-15 SV FR-BOOST SOL.	A-11 SE SWING-PUMP PRESS SENS		
D-12 PSV MAIN PUMP PROPO-V.	C-16 SV RE-BOOST SOL.			
D-13 PSV BOOM PUMP PROPO-V.	C-18 SV FR-GRIP SOL.			
D-14 PSV SWING REAC PROPO-V.	C-19 SV RE-GRIP SOL.			

**(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 at this status, perform the steps described in the right.

-  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".

29 Hr AFTER
ENGINE OIL CHANGE

INCHING OFF F 1 R 1

- ② Push the check switch for more than 5 seconds.
Then, the displayed oil change interval flashes.

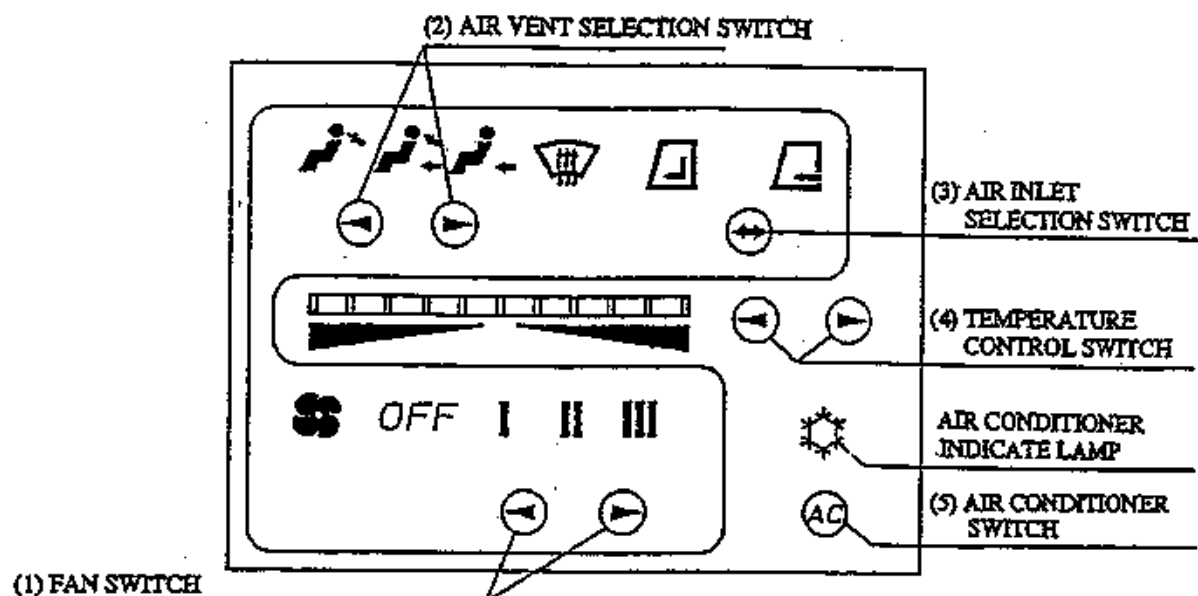
- ③ When the zero switch is pushed for more than a second, the oil change interval is reset to "0".
To set to the interval other than "0", whenever the adjuster "+" switch is pushed, the displayed oil change interval increases by 1. The interval can be continuously increased by pushing this switch.
Whenever the adjuster "-" switch is pushed, the displayed oil change interval decreases by 1. The interval can be continuously decreased by pushing this switch.

- ④ Push 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 pushing the setting switch.
Then, the alteration will be canceled.

2.2.3 HANDLING THE AIR CONDITIONER

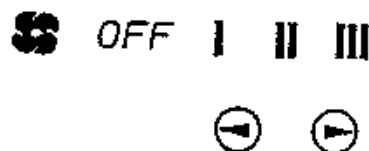
1. CONTROL PANEL



(1) FAN SWITCH

The switches control the air conditioner ON/OFF function and the blower speed.

- I position ----- Low
- II position ----- Medium
- III position ----- High



(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.



(3) AIR INLET SELECTION SWITCH

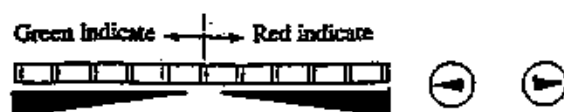
This switch selects the open or close position of air inlet.

	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.

(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).

1. Push the left switch (◀), and the range of the GREEN lights decrease and the air temperature goes down.
2. Push the right switch (▶), and the range of the LED lights increase and the air temperature goes up.



(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.

2. CAUTION WHEN USING

- (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.

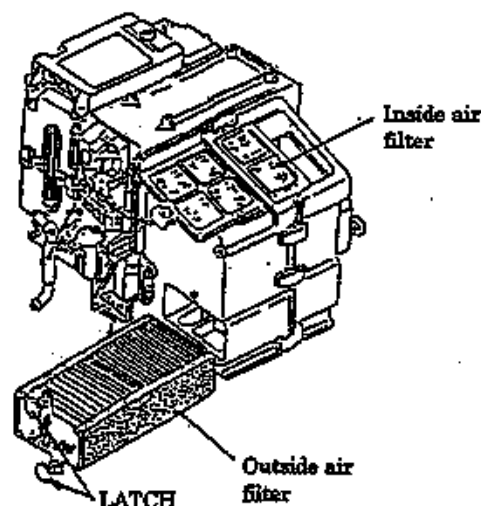
Check the filter; clean or replace if it is dirty (Every 3 months).

(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.



2.3 CRANE OPERATION

2.3.1 ADJUSTING THE OPERATOR'S SEAT

1. ADJUSTING BACK AND FORTH

Pull the lever (item no.1) to adjust the seat back and forth within 6.3 inch (160mm) of range. After adjusting, release lever to fix the seat.

2. ADJUSTING HEIGHT

Pull up the lever (item no. 3) to lift the back of the seat, then push down the lever 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 fix the back.

4. ADJUSTING TILTING ANGLE

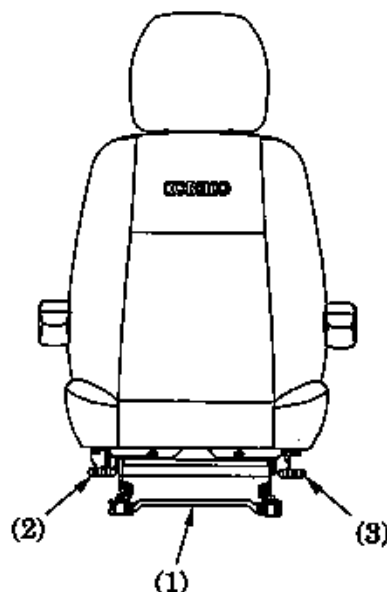
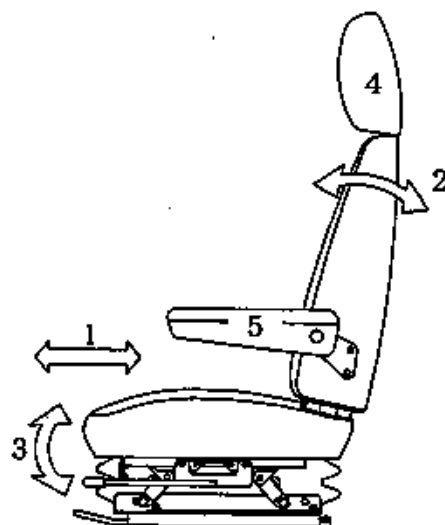
Pull the lever (item no. 3) to set the seat tilting angle to the most suitable angle. After adjusting, release the lever to fix the seat.

5. HEADREST

The headrest can be pulled up.

6. ARMREST

The armrest can be turn 180 ° backward.



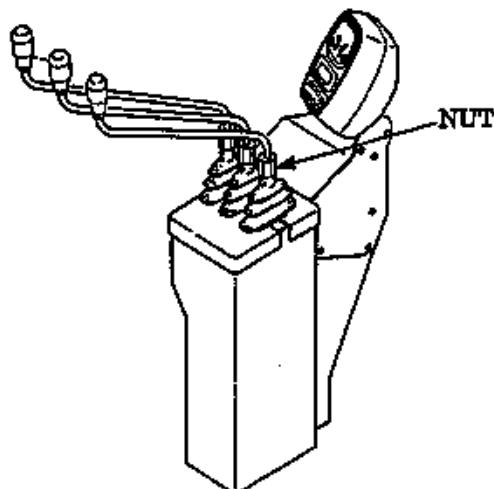
2.3.2 ADJUSTING THE CONTROL LEVER DIRECTION

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



CAUTION

Nut must be retightened before using crane.

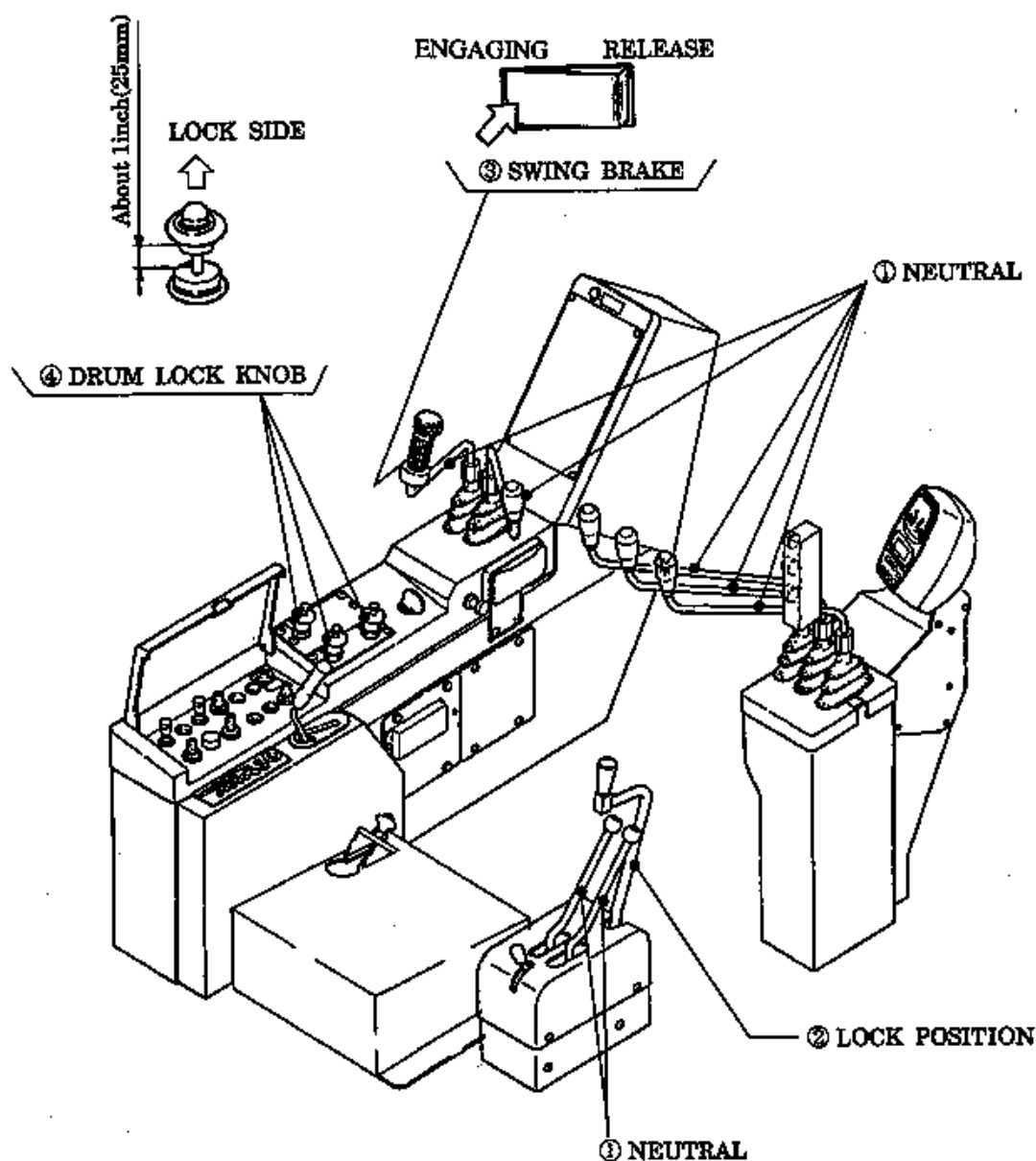


2.3.3 STARTING AND STOPPING THE ENGINE

1. STARTING THE ENGINE

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

- ① Boom hoist, front drum, rear drum, swing and propel control levers ----- Neutral
- ② Function lock lever ----- Lock position
- ③ Swing brake switch ----- Engaging side
- ④ Front drum and rear drum lock knobs ----- Lock side





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 loss of life.

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

- (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) When it is difficult to start the engine due to low atmosphere temperature, turn the key to the left (HEAT position) to preheat the engine, then start the engine.

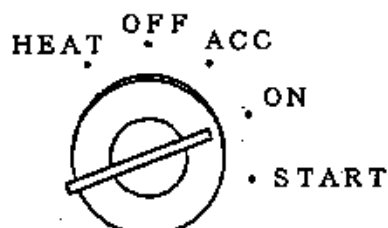
The standard preheating time is 15 to 20 seconds.

Do not preheat for more than 40 seconds continuously.

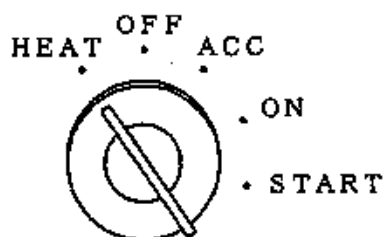
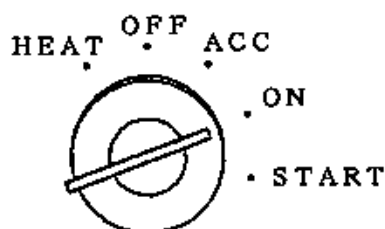
- (4) After the engine starts, immediately, check the monitor for abnormality. If the readings are improper, stop the engine immediately, and determine the cause.



HORN SWITCH



HORN SWITCH



- (5) 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.

Auxiliary accelerator is only for emergency use when electric accelerator system is malfunctioning.



CAUTION

Do not operate auxiliary accelerator when the system works properly.

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

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

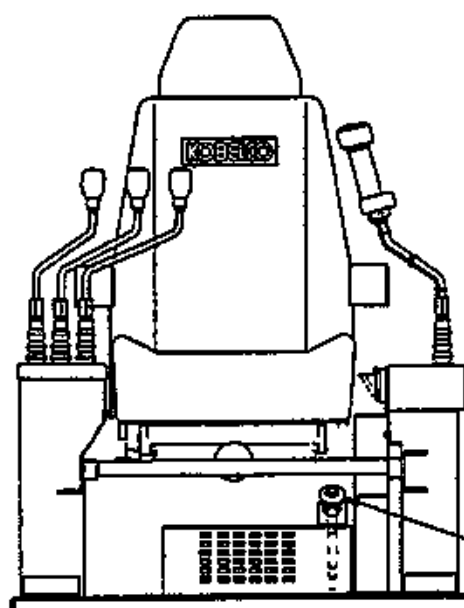
If the crane is operated immediately without warming up the engine, the engine and the hydraulic components will be worn out earlier than usual or will become damaged.

ACCELERATION

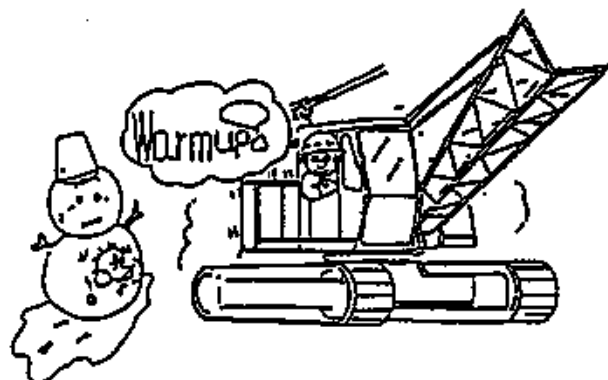


Desired control is available in the range of 120°

DEACCELERATION



AUXILIARY ACCELERATOR

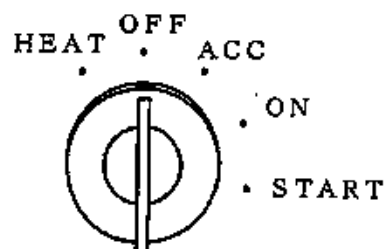


3. STOPPING THE ENGINE

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

- ① Boom hoist, front drum, rear drum, swing and propel control levers ----- Neutral
- ② Function lock lever ----- Lock position
- ③ Swing brake switch ----- Engaging side
- ④ Front drum and rear drum lock knobs ----- Lock side

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



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

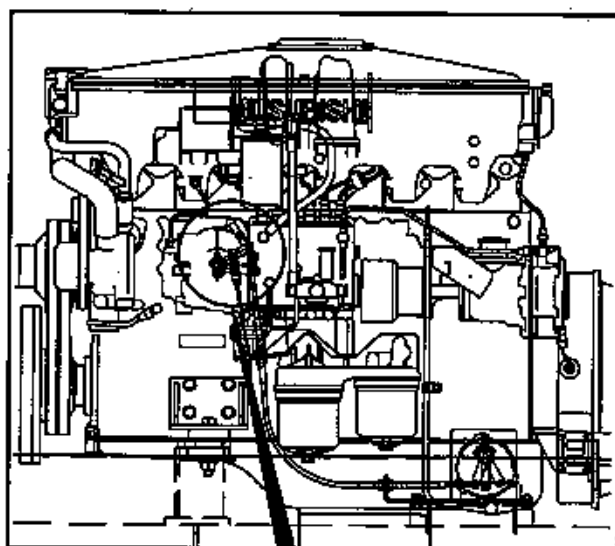
4. EMERGENCY STOPPING THE ENGINE

If the engine cannot be stopped with the key switch, open the left-hand access door, and shift the governor lever to the "Stop" side.

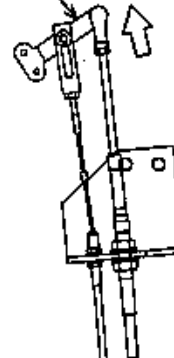


DANGER

Be sure to wear gloves to avoid burns.



GOVERNOR LEVER
STOP SIDE



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.



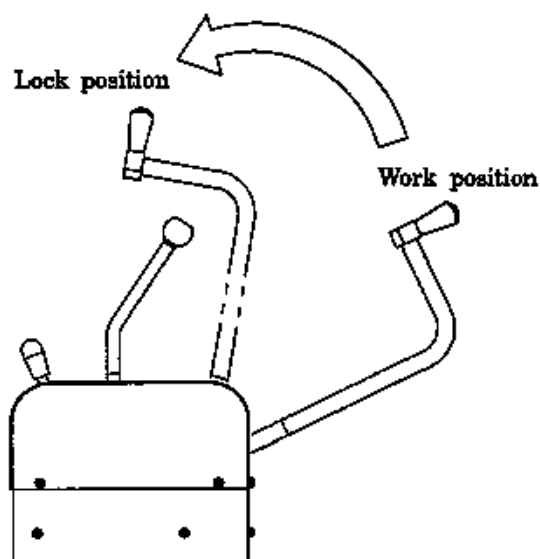
DANGER

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 loss of life.

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



2.3.5 PROPELLING OPERATION

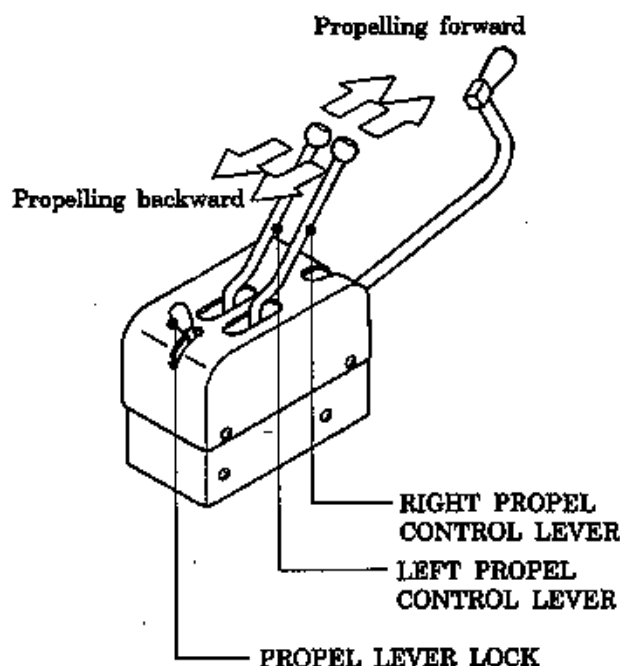


DANGER

Before propelling the machine strictly observe the following procedures.

- Confirm that people and obstacles are kept out of the propelling area.
- Before propelling the machine, sound the horn to warn the surrounding people.
- Be especially careful, when the boom is long, when the boom angle is large, when ground is uneven, or when a load is lifted.
- For stability of swinging and traveling, see page 10-12.
- Use a signal person to direct operation.

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



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

High speed - Use this speed on a good condition of ground.

Low speed -- Use this speed when a tractive force is required on a bad condition of ground.

- ① When the propel speed selector switch is placed in the **HIGH SPEED** side, 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 in the propel motor side, propelling operation only is reverse, so be careful.

- (1) Release the propel control lever lock.
- (2) By operating the left and right propel control levers, propelling forward, propelling backward, pivot turn, counterrotating and turn with large radius can be operated.



WARNING

Do not start or stop travel or steering functions suddenly.

Extreme care is required when hoisting or lowering load during propelling.

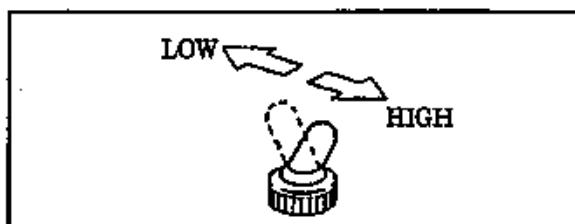
Failure to observe this precaution may result in serious injury or loss of life.



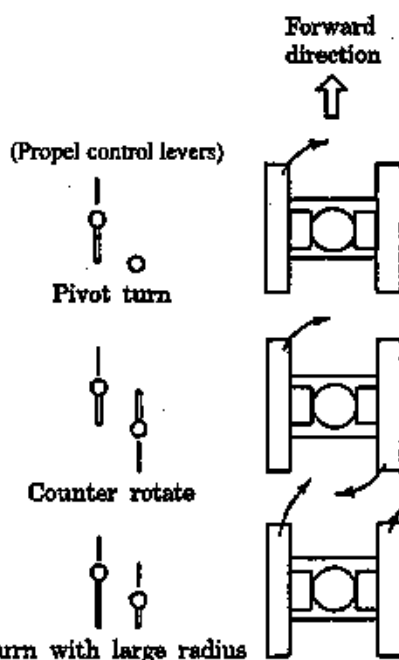
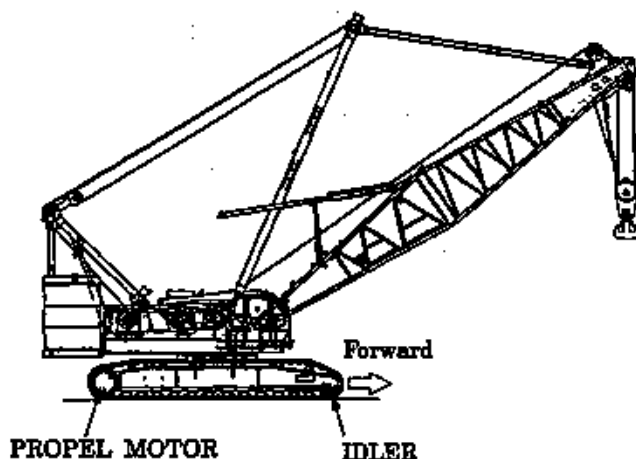
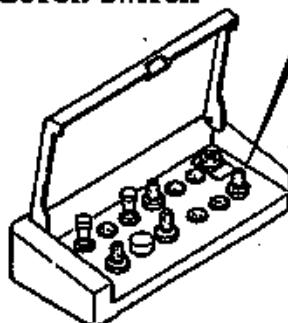
WARNING

Do not travel and or operate vibratory work with the window assembly opened to avoid damage to the canopy and/or the window supports.

Failure to observe this precaution may result in a serious injury.



PROPEL SPEED
SELECTOR SWITCH

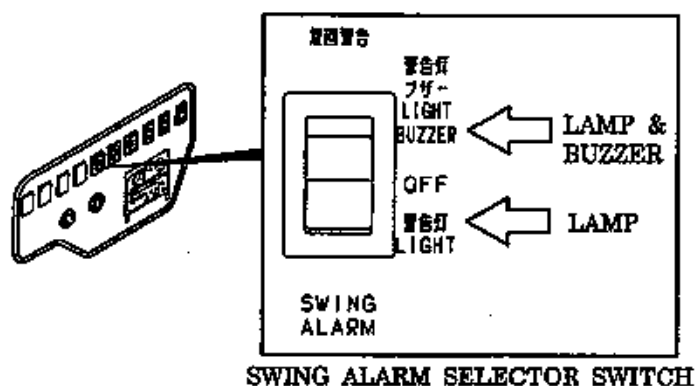


2.3.6 SWINGING OPERATION



DANGER

- Before initiating any swing operations, ensure the area in the swing path of the hook and/or load, as well as the tail swing area, is clear of all obstructions and personnel.
 - Sound horn to warn personnel.
 - For stability of swinging, see page 10-12.
- Failure to observe this precaution may result in serious injury or loss of life.



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

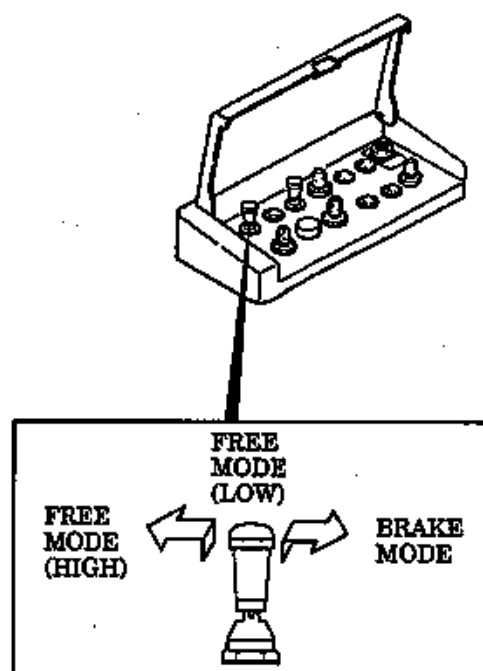
1. According to working condition, select the alarm with the swing alarm selector switch.

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 slow.



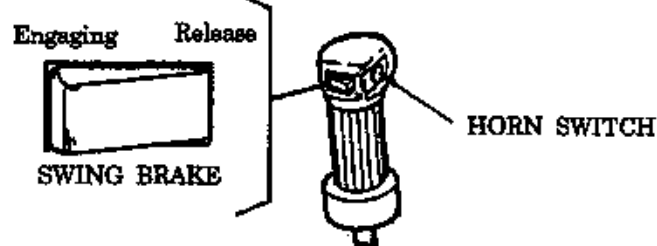
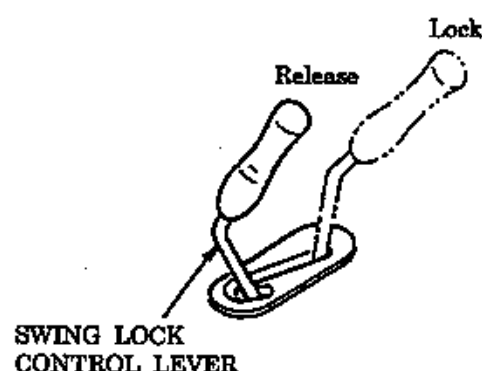
CAUTION

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



SWING BRAKE MODE SELECTOR SWITCH

3. Release the swing lock pin and swing brake.



4. Push the swing control lever forward to swing the upper to the left, and pull the lever to backward this side to swing the upper to the right. To stop the swing motion, slowly move the lever in the opposite direction.



CAUTION

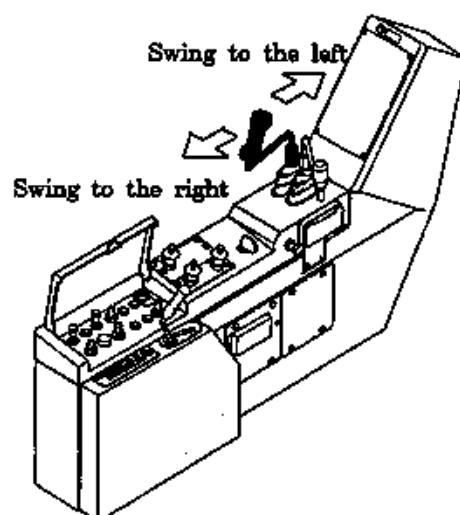
- Avoid rapid swings or sudden starts and stops.
- After the swing motion has been completely stopped, engage the swing parking brake.



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 loss of life.

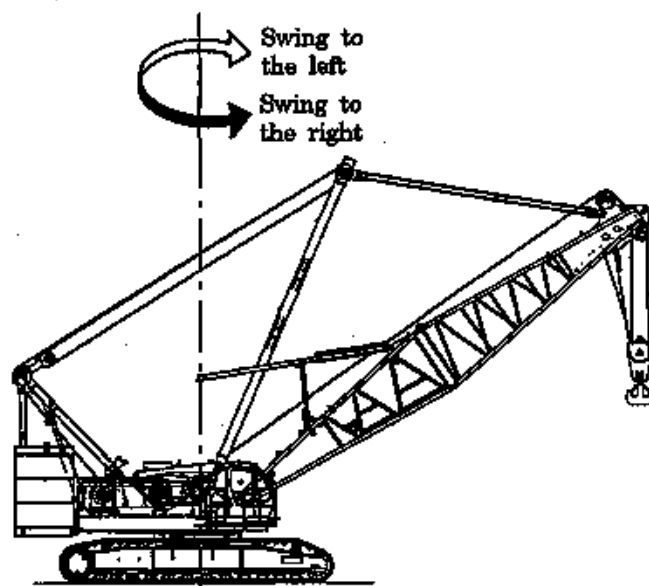


5. When pausing operations, orient the machine straight ahead, and then, actuate the swing lock.



CAUTION

The actuation of the swing lock and swinging operation with the machine other than in the swing lock posture (when the machine does not oriented straight ahead) may lead to the damaged 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 loss of life.

1. Release the drum lock.
2. Push the boom hoist control lever forward to lower the boom, and pull the lever toward this side 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 loss of life.

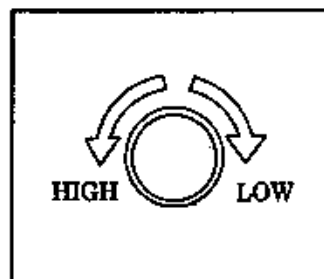
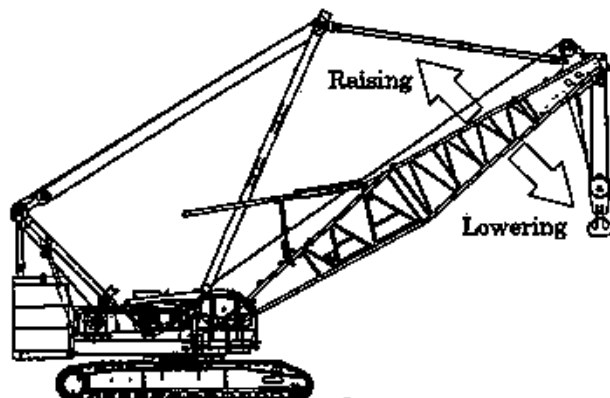
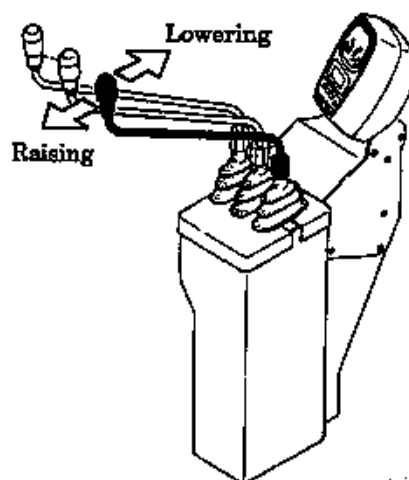
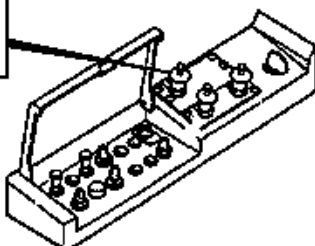
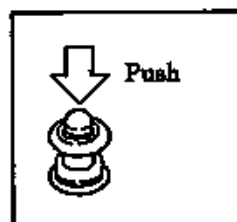
When the boom is not lowered even by operating the boom hoist control lever to the boom lowering side, it is considered that the drum lock is engaged in the ratchet of the drum. In this case, move the boom hoist control lever to the boom raising side slightly, then move the lever to the lowering side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



DANGER

Do not actuate the drum lock while the boom 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. Be sure to stop the engine, and engage the drum lock before leaving the operator 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 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 loss of life.

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

1. Release the drum lock.

When the hook is not lowered even by operating the drum control lever to the lowering side, it is considered that the lock is engaged in the ratchet of the drum.

In this case, slightly operate the control lever to the raising side, then operate to the lowering side again.

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

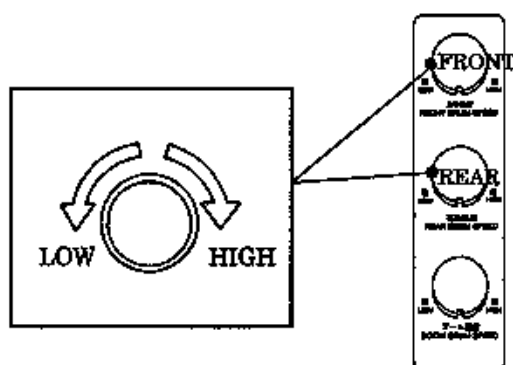
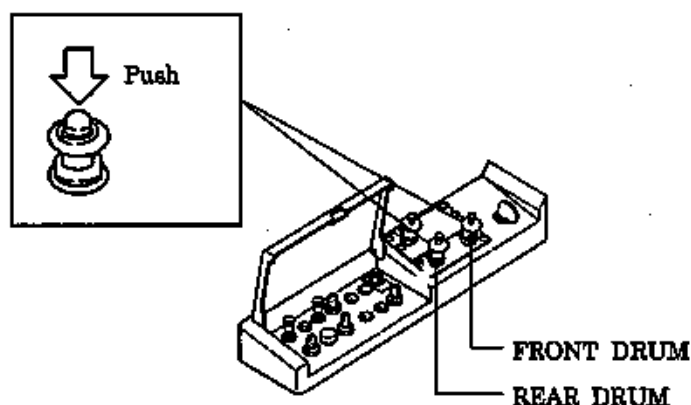


WARNING

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 loss of life.



(1) **HOISTING**

Pull the drum control lever toward this side to raise a load.

(2) **LOWERING**

Push the drum control lever forward to lower the load.

NOTE

This machine is equipped with the over-unwinding preventive device.

When the number of layers of the remaining wire ropes on the drums is three, lowering operation is automatically stopped. (FRONT AND REAR)

(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.

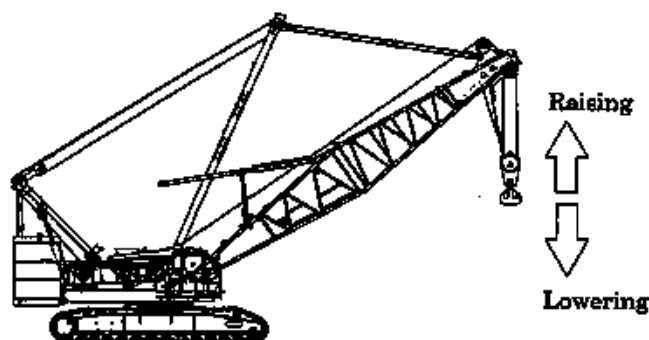
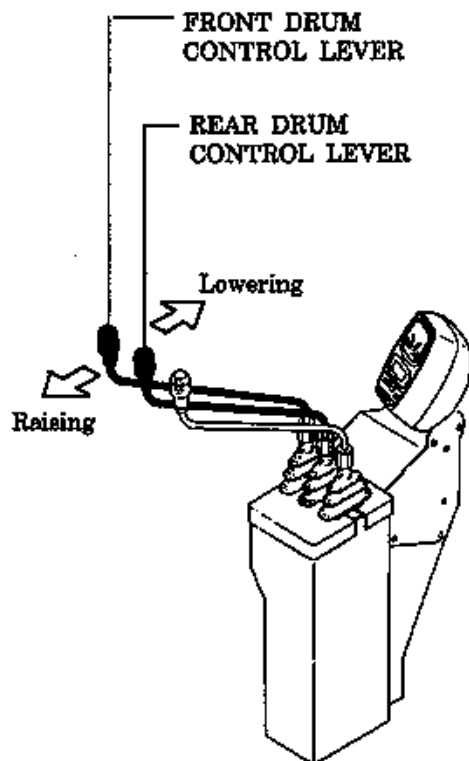


DANGER

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

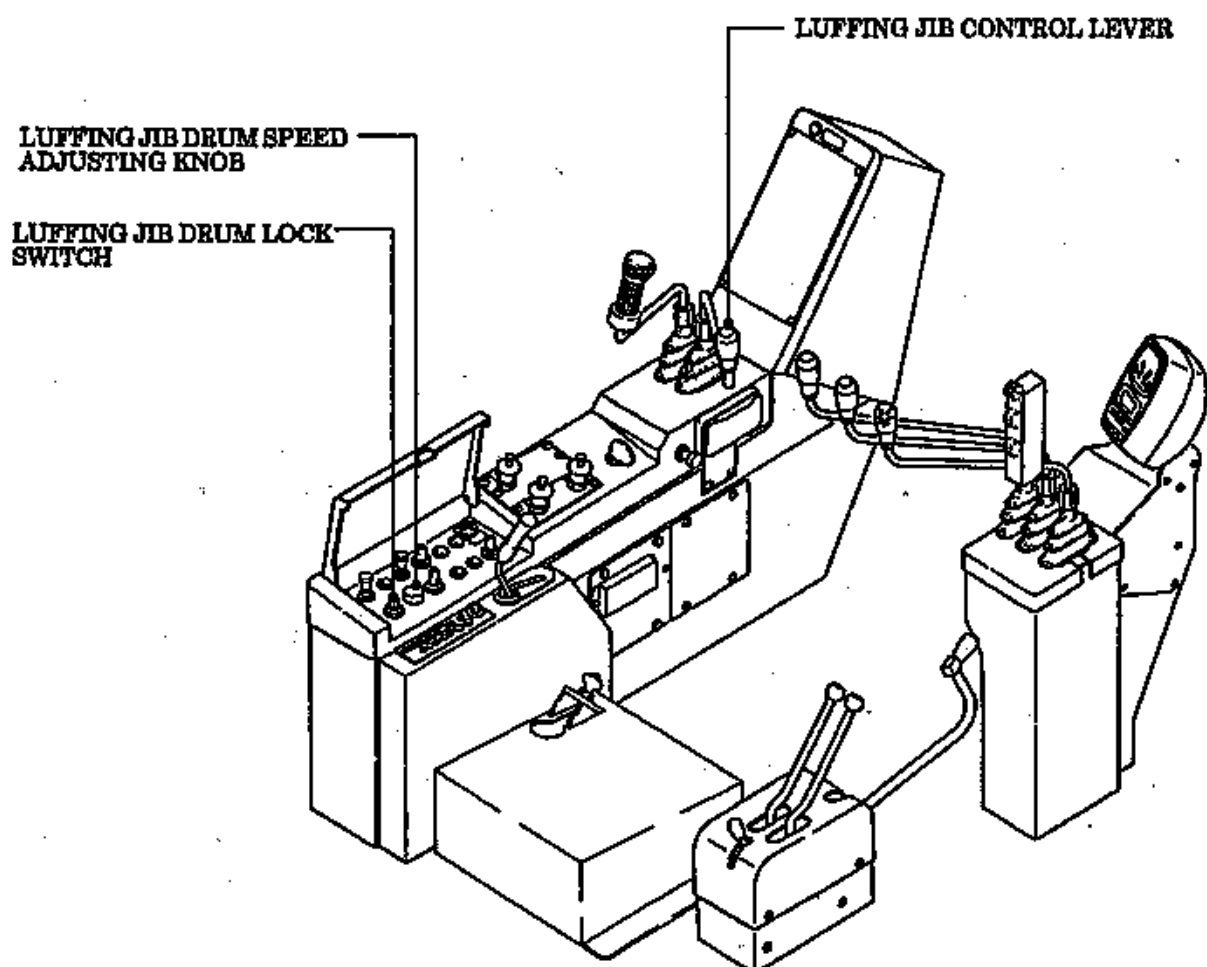
NOTE

The 1st speed of the front drum and 2nd speed of the rear drum cannot be operated simultaneously due to the limitations of hydraulic system.



2.4 LUFFING JIB OPERATION

Controls peculiar to luffing jib operation are described here.



2.4.1 JIB RAISING/LOWERING OPERATION



WARNING

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

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

1. Release the drum lock.
2. Push the jib hoist control lever forward to lower the jib, and pull the lever toward this side 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 loss of life.

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.

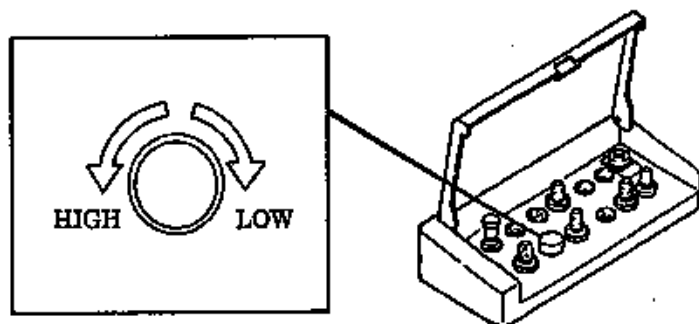
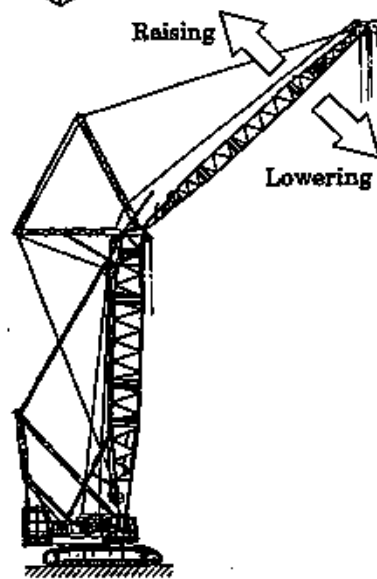
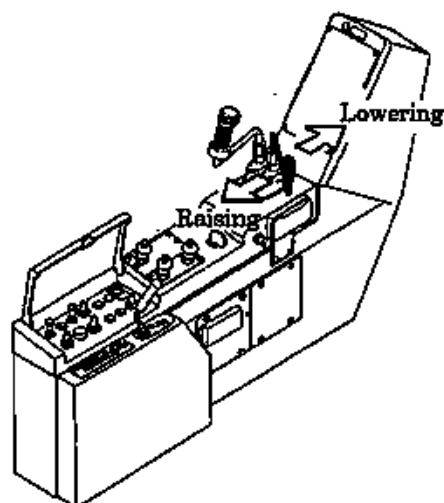
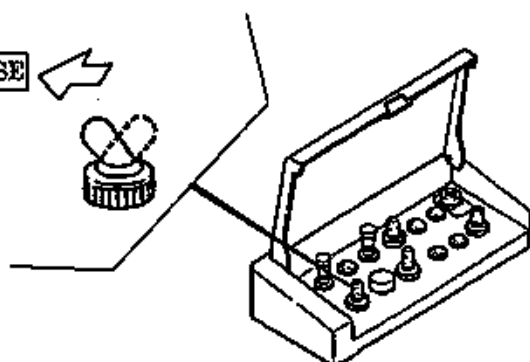


DANGER

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. 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.

RELEASE



2.4.2 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.

1. Release the drum lock.

HOOK HOIST DRUM CONTROL

(1) RAISE

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

(2) LOWER

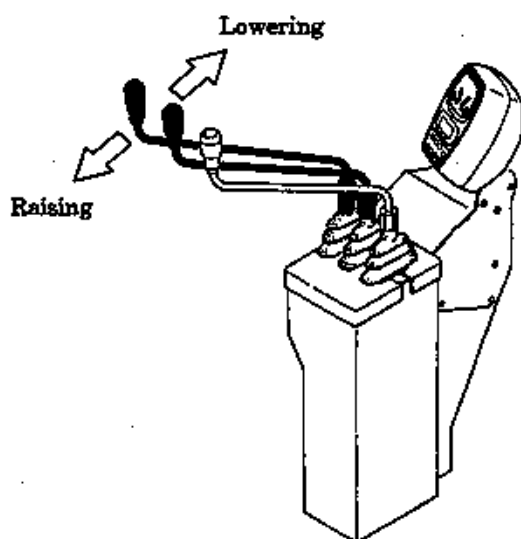
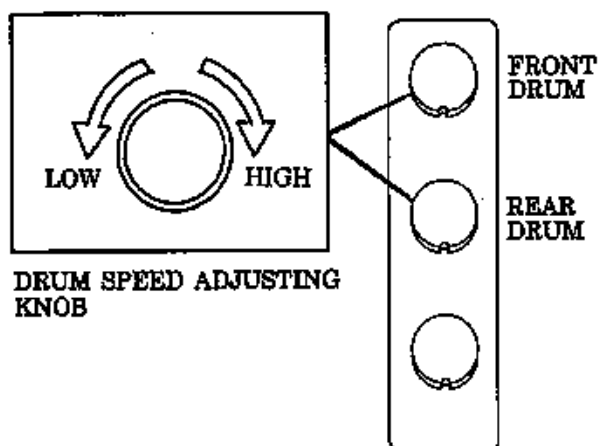
Push the hook hoist drum lever forward to lower the load.

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

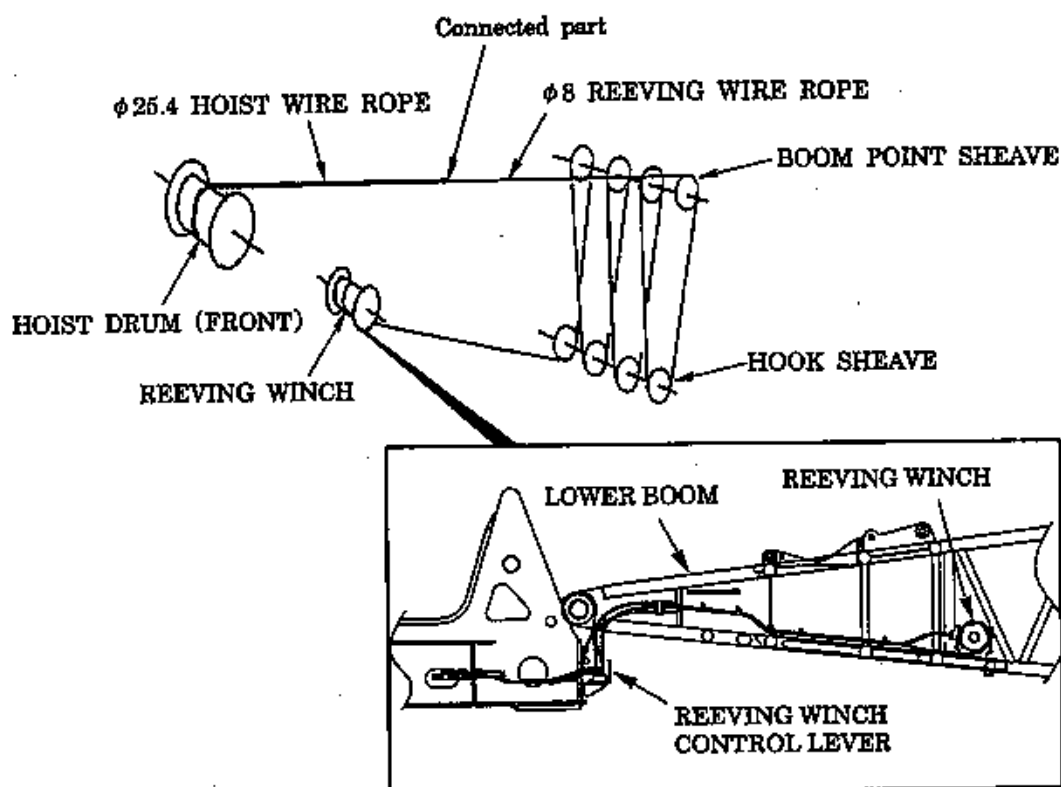
Return the hook hoist drum control lever to the neutral position to set the brake automatically and to hold the load.

Set the drum pawl lock when the load will be suspended in the air for the long time.

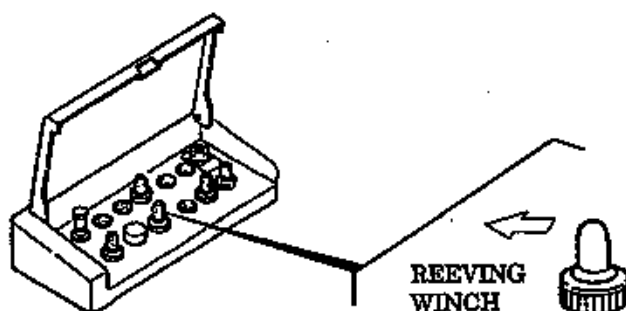


2.5 HANDLING OF REEVING WINCH (OPTIONAL)

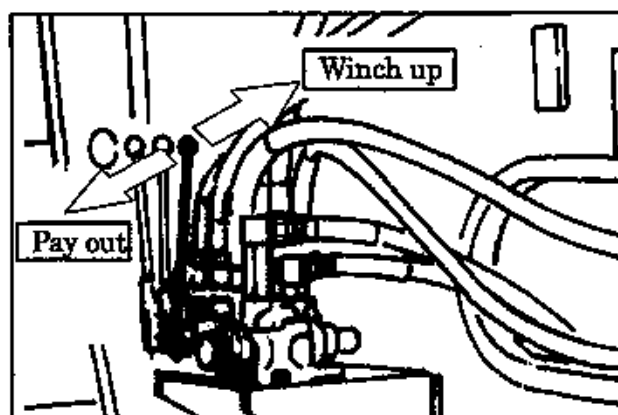
Use the reeving winch when reeving the hoist wire rope through the boom point sheaves and the hook sheaves.



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



2. Start the engine, and swing down the reeving winch control lever forward. Then, the wire rope is wound up. To pay out the wire rope, swing down the control lever backward.



3. SAFETY DEVICE

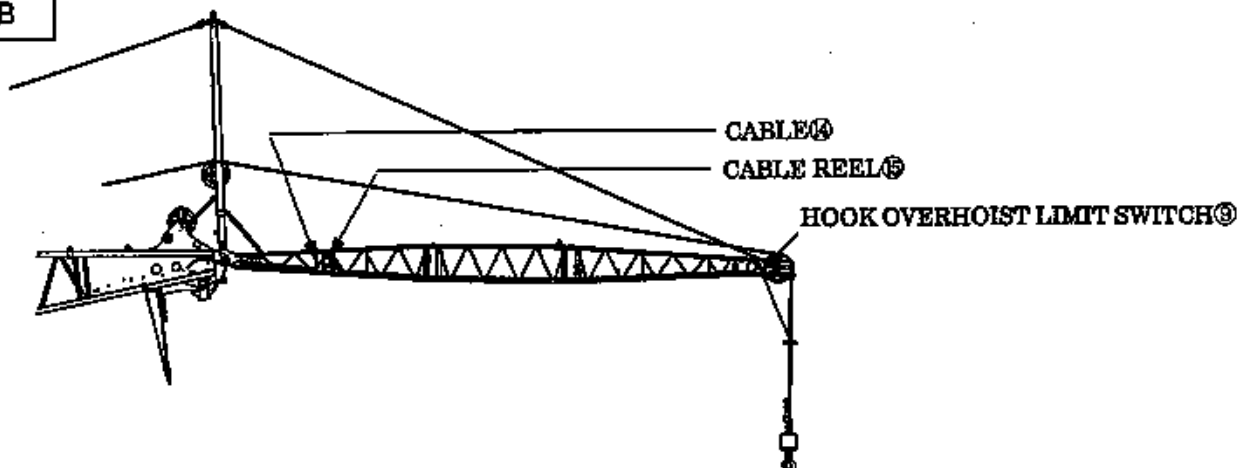
The boom and hook overhoist preventive device is a safety device which is provided in order to prevent damage to the machine and/or overturn accident due to an overhoist. Therefore, be sure to use this device in order to perform crane operation more safely.

This chapter describes the safety device of the typical model, taking as an example. Note that the drawings or the mounting positions of various apparatuses in this chapter may differ from those of the model you use.

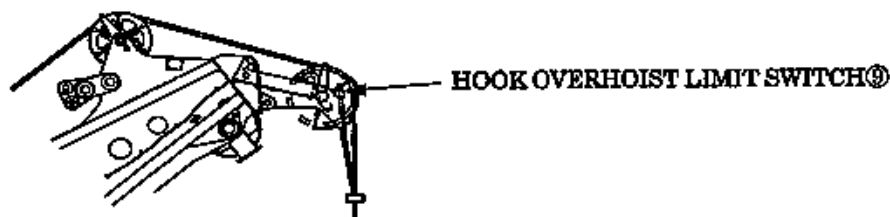
3.1 ARRANGEMENT OF EQUIPMENTS

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

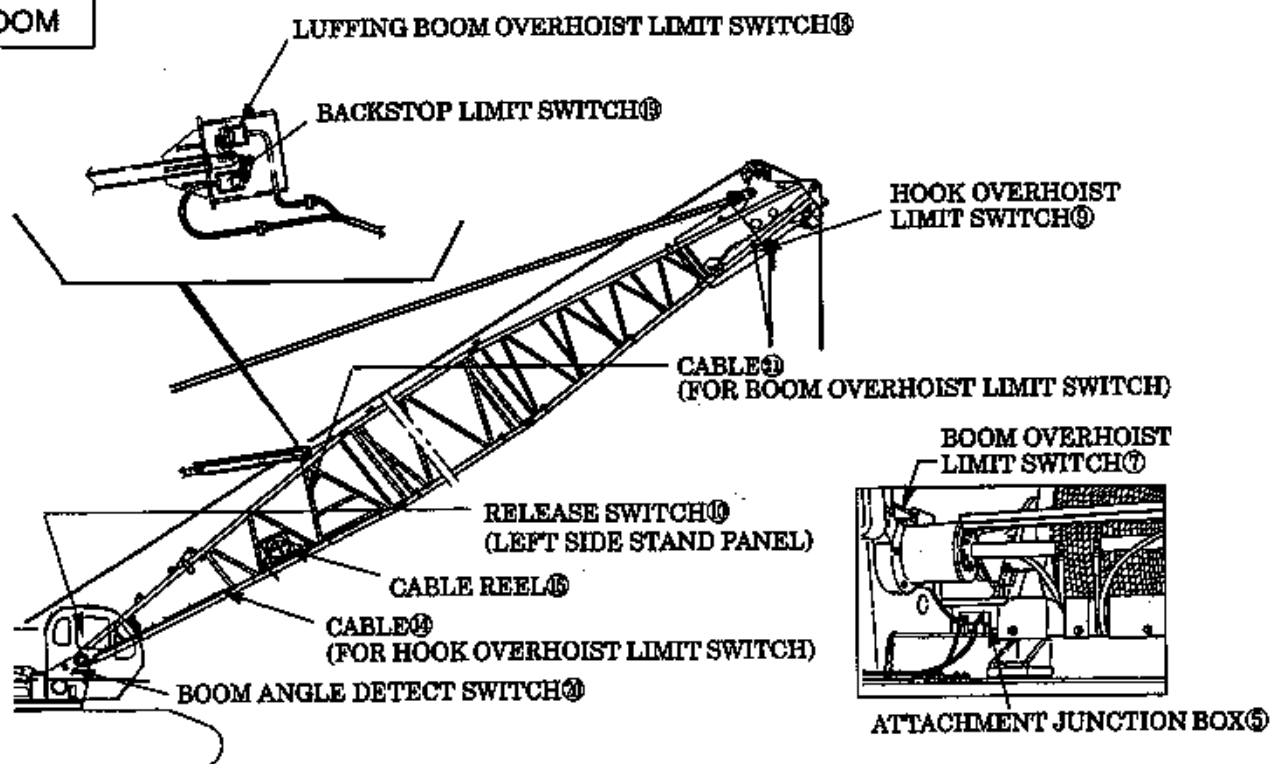
JIB



AUXILIARY SHEAVE



BOOM



LUFFING

LUFFING JIB OVERHOIST
LIMIT SWITCHS③
(LEFT&RIGHT)

HOOK OVERHOIST
LIMIT SWITCH②

CABLE REEL⑤

HOOK OVERHOIST LIMIT SWITCH②

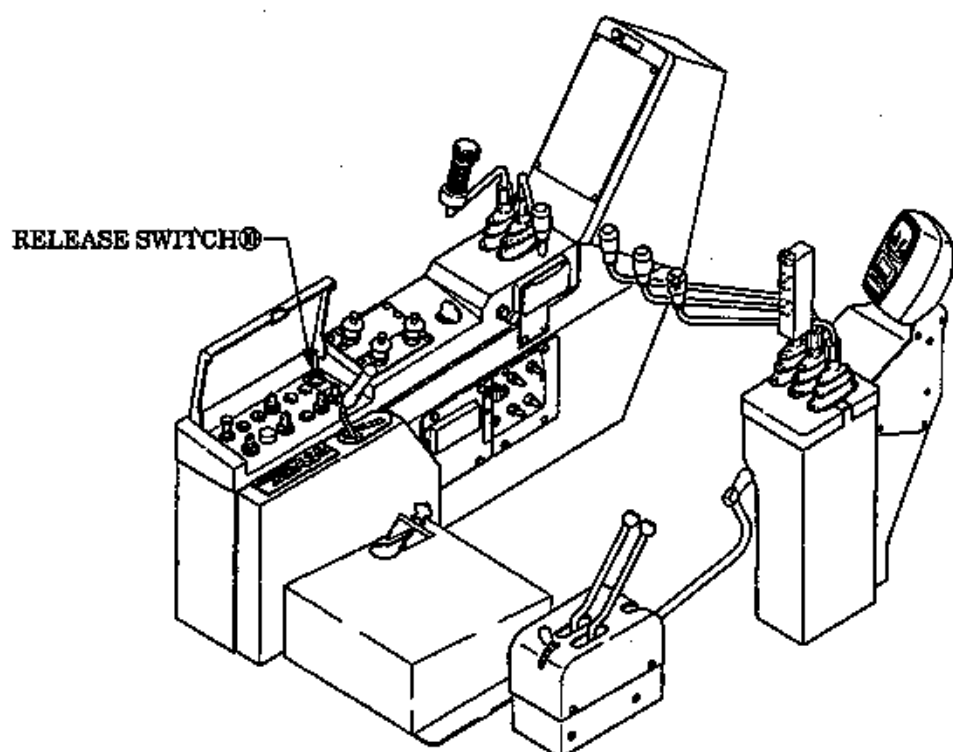
JUNCTION BOX⑥

CABLE REEL⑤
(FOR LUFFING)

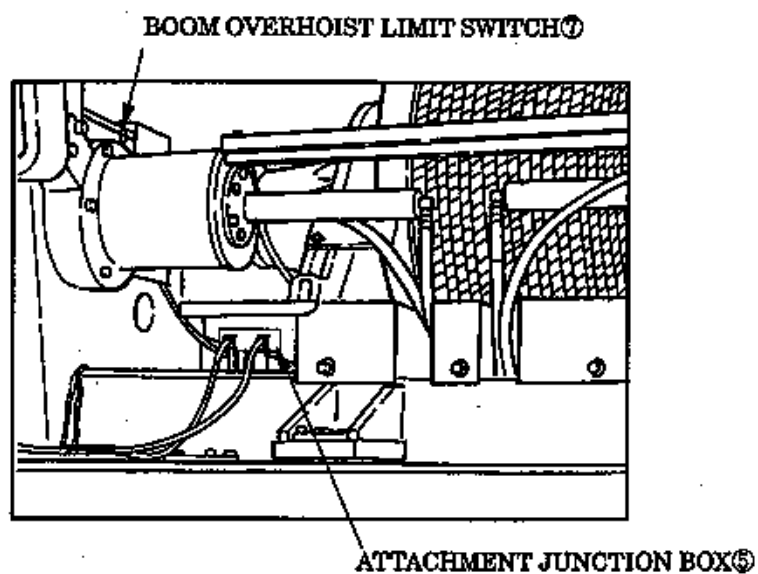
LUFFING BOOM OVERHOIST
LIMIT SWITCH③

BACKSTOP LIMIT SWITCH④

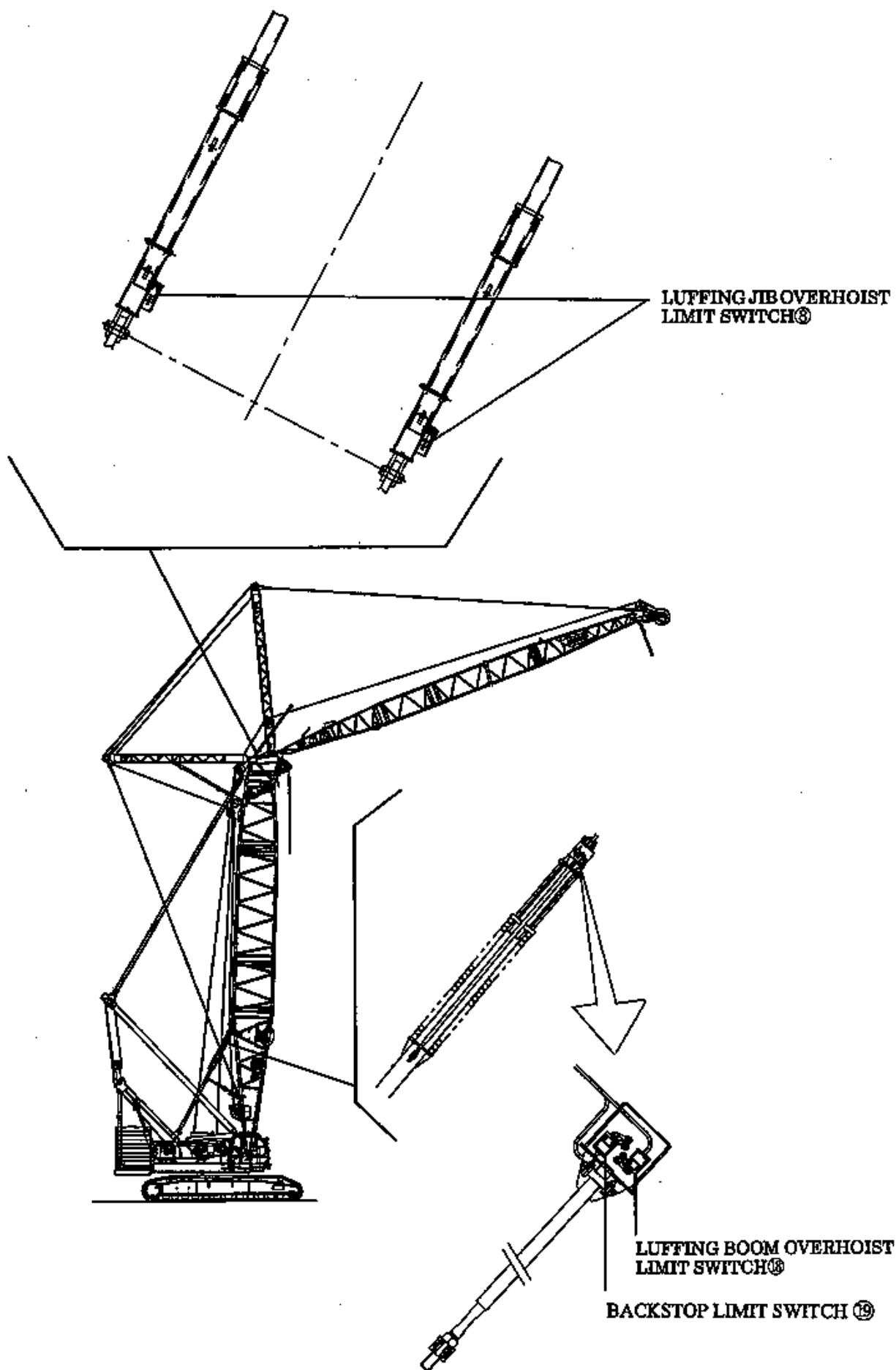
DETAIL OF OPERATOR'S ROOM INSIDE



FRONT OF UPPER



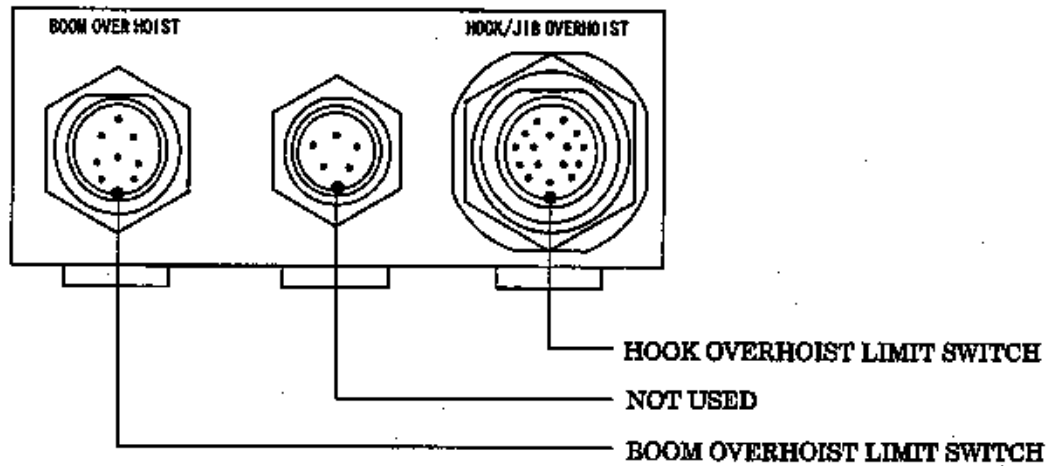
DETAIL OF BOOM BACKSTOP & LUFFING JIB BACKSTOP



3.2 KINDS AND FUNCTIONS OF EQUIPMENTS

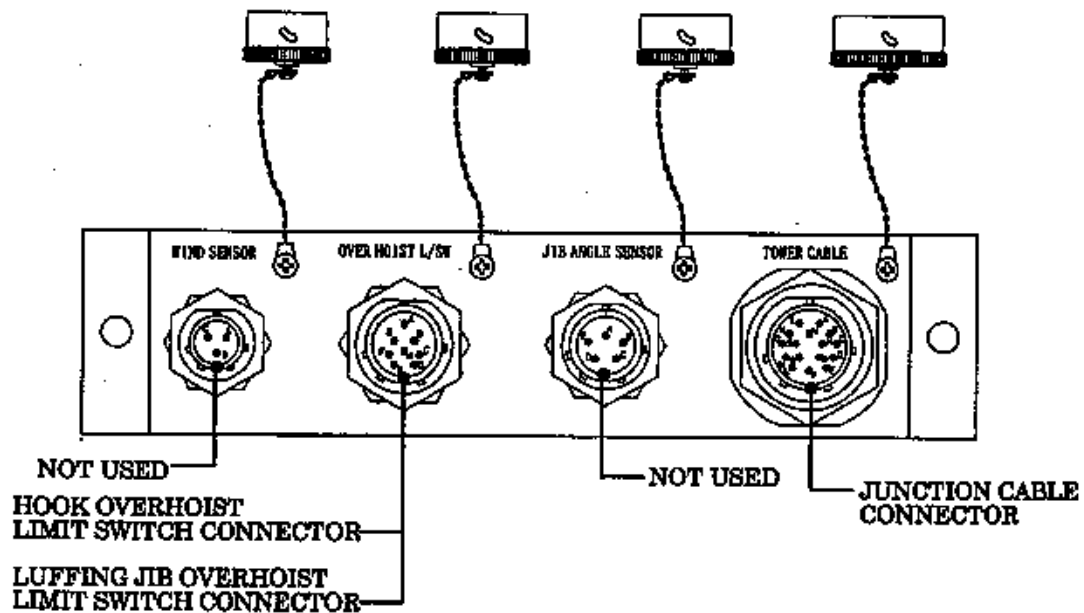
ATTACHMENT JUNCTION BOX ⑤

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



LUFFING JUNCTION BOX ⑥

This is the junction box for detector and limit switch.



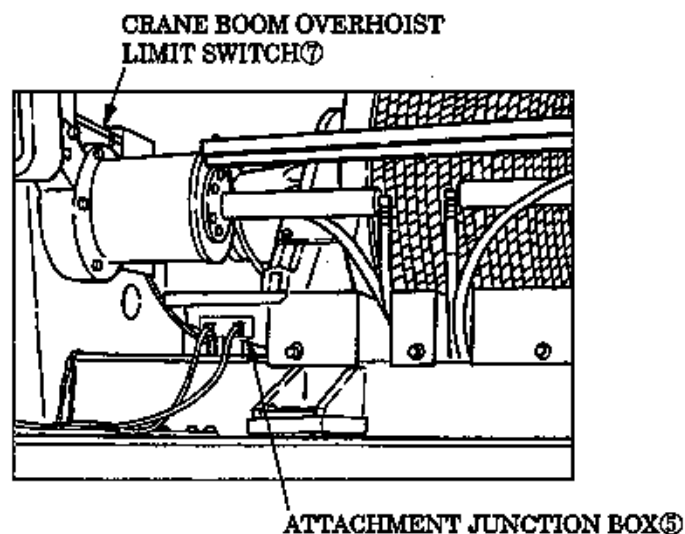
CRANE BOOM OVERHOIST LIMIT SWITCH ⑦

This prevents the boom from overhoisting.

When the boom hoist operation is stopped by the boom overhoist limit switch, the stop function cannot be released by the boom overhoist limit switch.

While the luffing jib is operated, the automatic stop function will not work even if the boom overhoist limit switch ⑦ is activated.

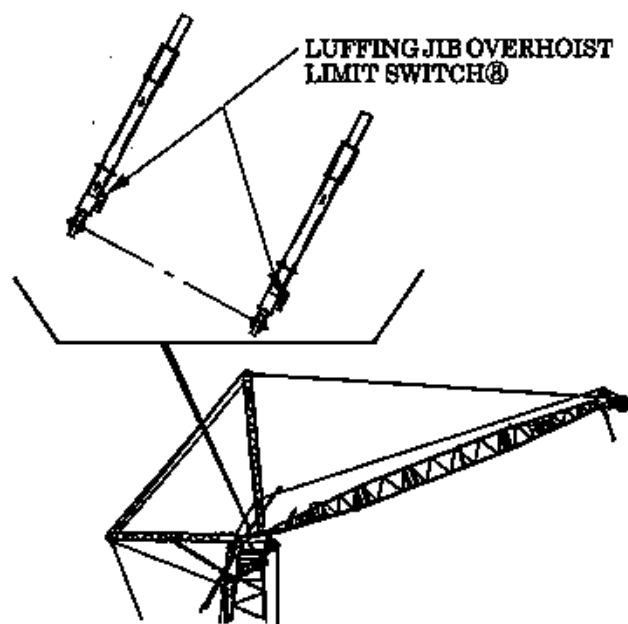
FRONT OF UPPER

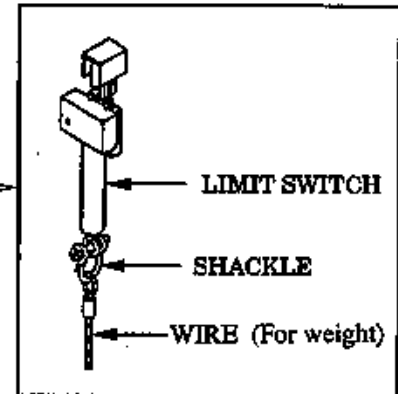


LUFFING JIB OVERHOIST LIMIT SWITCH ⑧

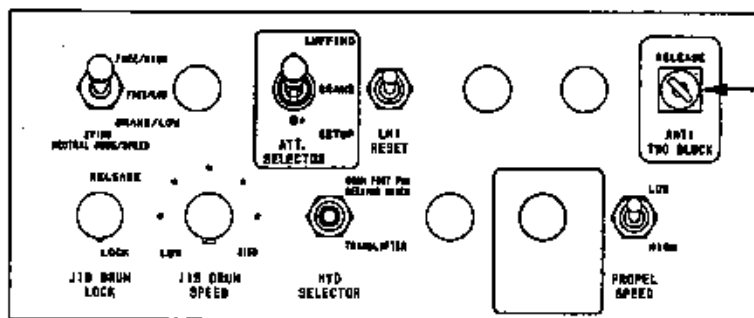
This prevents the luffing jib from overhoisting.

When the luffing jib operation is stopped by the luffing jib overhoist limit switch, the stop function can not be released by the release switch.



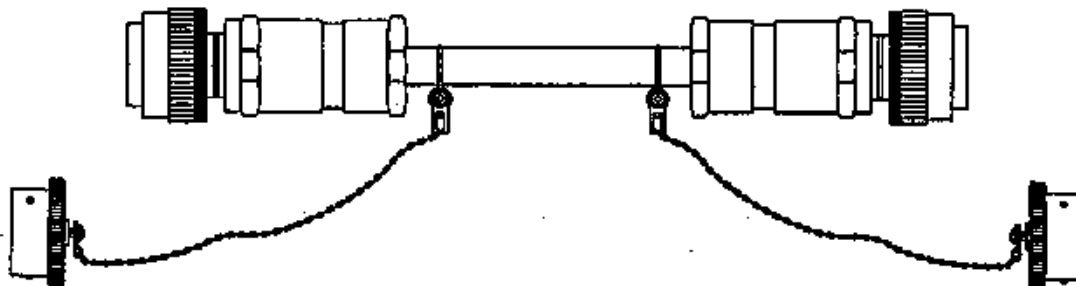


This is used to release automatic stop and alarm sound (see page 2-4).



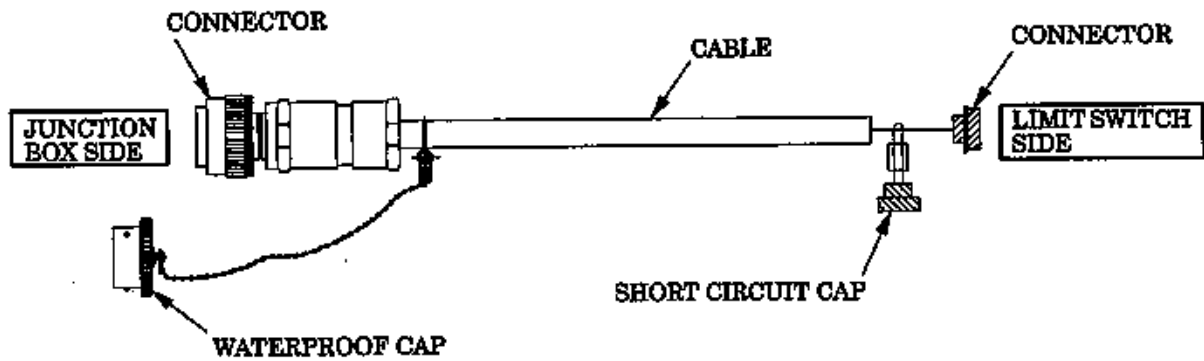
**- HOOK OVERHOIST
RELEASE SWITCH
(ANTI TWO BLOCK)**

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



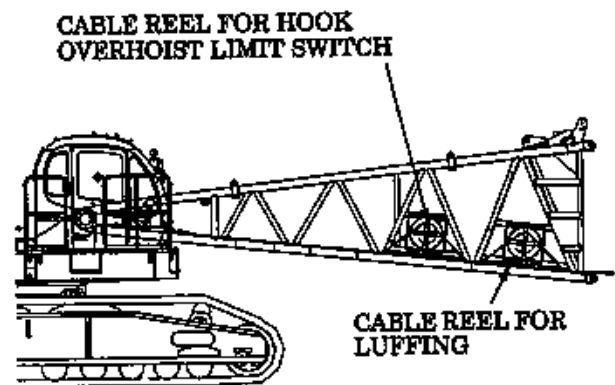
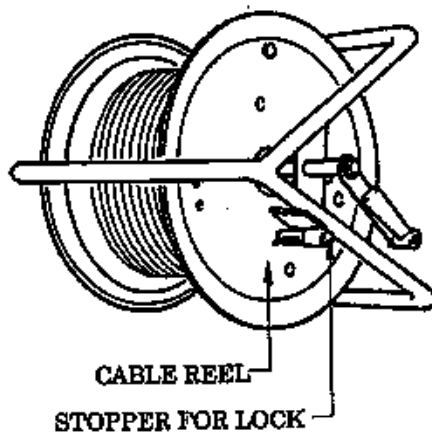
CABLE FOR HOOK OVERHOIST LIMIT SWITCH ⑭

This cable connects the limit switch and the junction box.



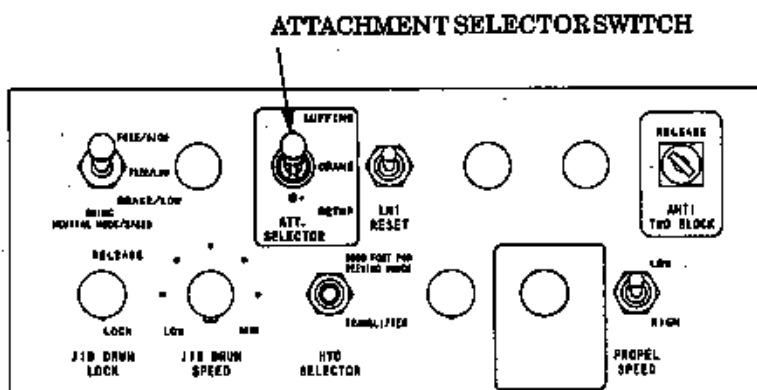
CABLE REEL ⑮

A cable can be wound onto this cable reel.



ATTACHMENT SELECTOR SWITCH ⑯

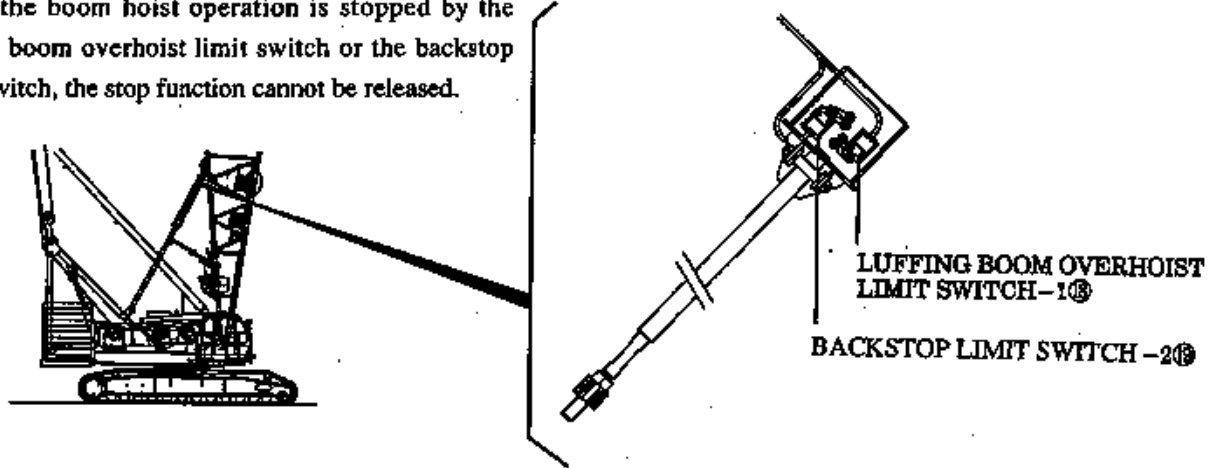
With this switch, any working mode required can be selected among the three modes, including the crane, luffing, and setup modes.



LUFFING BOOM OVERHOIST LIMIT SWITCH ⑱, ⑲

This prevents the boom from overhoisting.

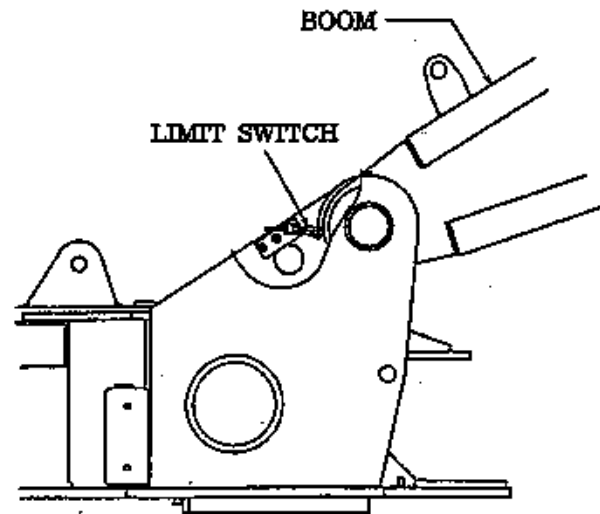
When the boom hoist operation is stopped by the luffing boom overhoist limit switch or the backstop limit switch, the stop function cannot be released.



BOOM ANGLE DETECT SWITCH ⑳

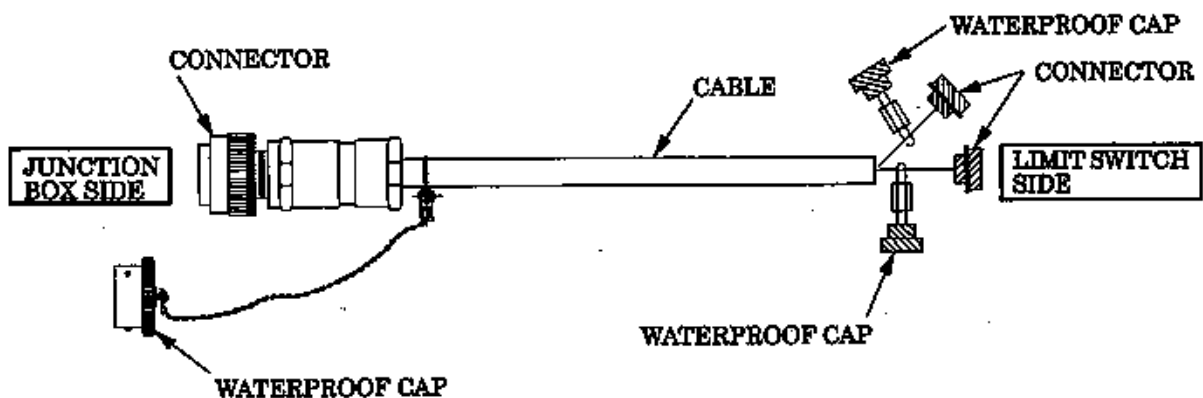
This switch is operated when the boom angle is over approx. 15°.

When this switch is operated, the automatic stop function is activated even if the "ATTACHMENT SELECTOR SWITCH" is set to the "SET UP" position. In order to restart the functions, change the switch mode to "Crane" or "Luffing" mode.



CABLE FOR BOOM OVERHOIST LIMIT SWITCH ㉑

This cable connects the limit switch and the junction box.

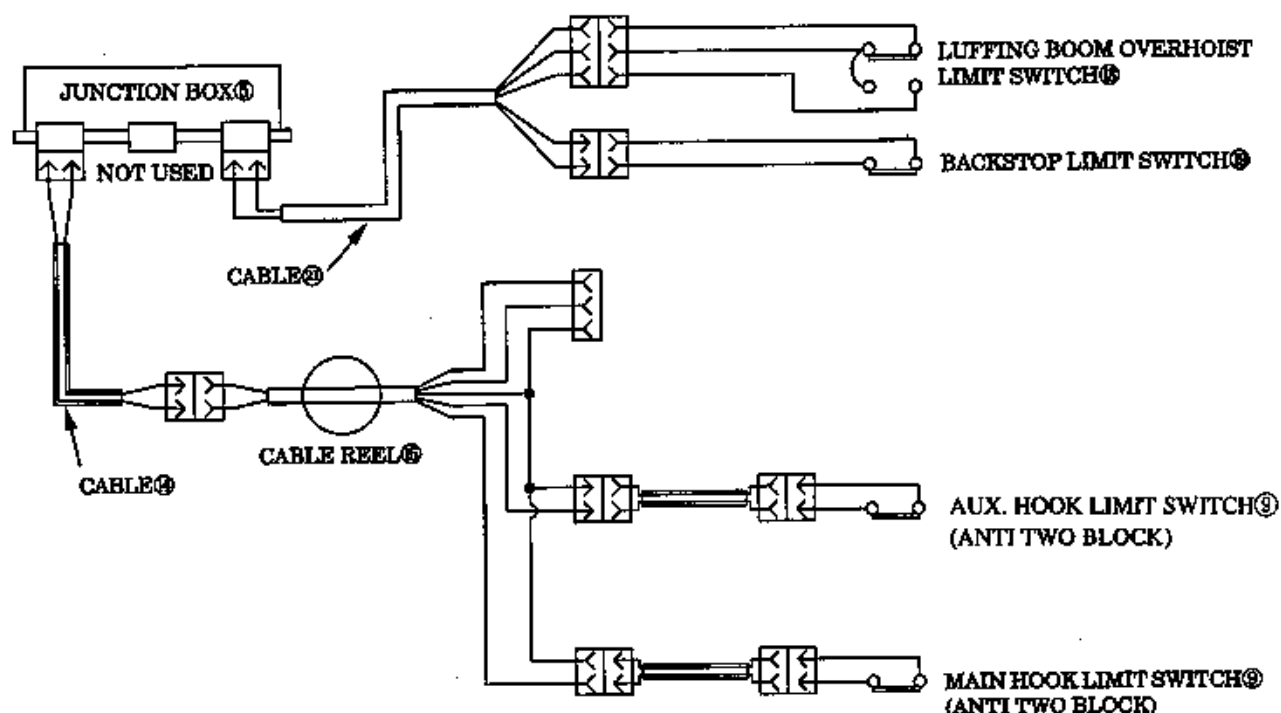


3.3 CONNECTING PROCEDURE OF WIRING

3.3.1 CRANE ATTACHMENT

1. DIAGRAM OF SYSTEM

(1) Crane



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.

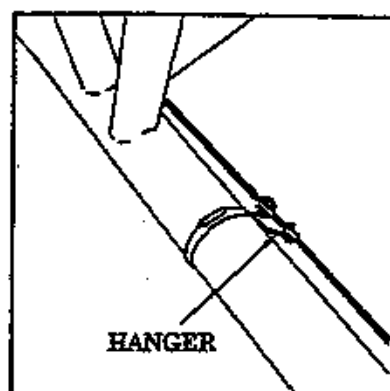
Prior to the connection of the connector, first, make sure that no water remains in the connecting section of the connector to avoid any water intrusion.

Be sure to remove water completely before the connection.

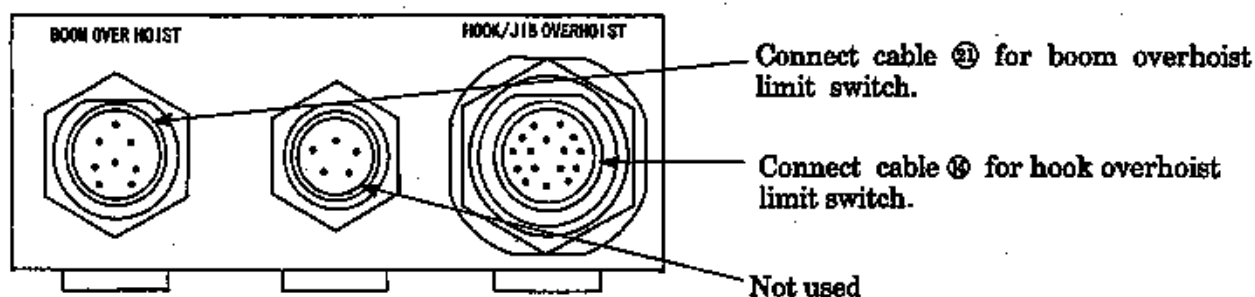
1. Tighten with hands fully securely.
2. Connect the removed caps each other, too.
3. After disconnecting, install the cap securely.

 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 and jib with the hangers.

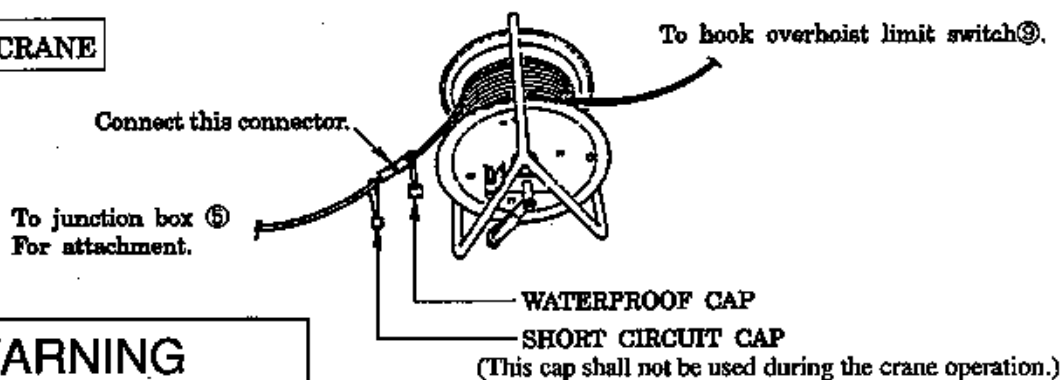


(1) CONNECTING JUNCTION BOX ⑤ FOR ATTACHMENT



(2) CONNECTING CABLE REEL ⑮

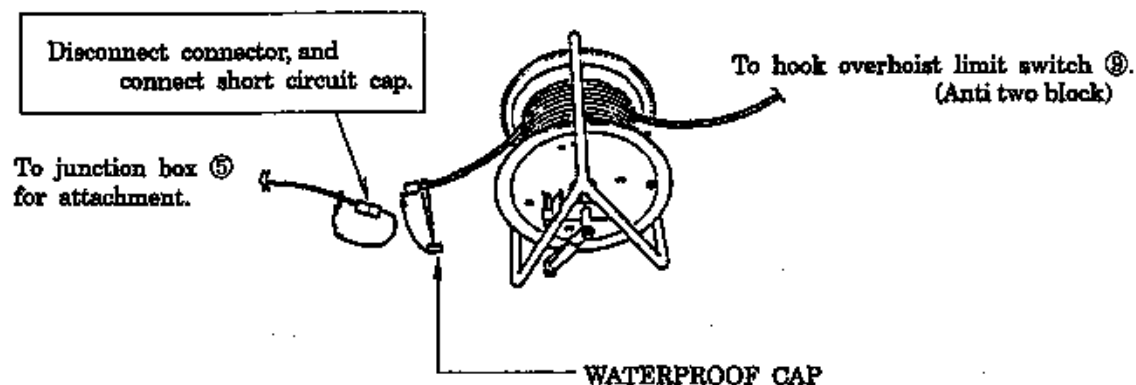
FOR OPERATING CRANE



WARNING

Do not operate crane with connecting short circuit cap, because automatic stop and alarm do not work when the hook is overhoisted.

FOR TRANSPORTATION

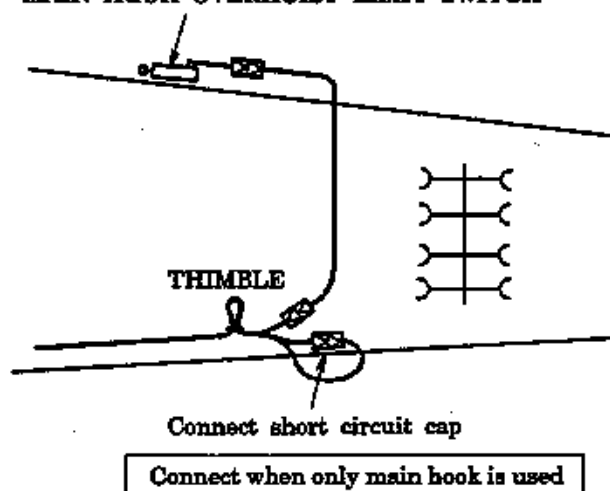


(3) CONNECTION OF CABLES AT BOOM TIP SECTION

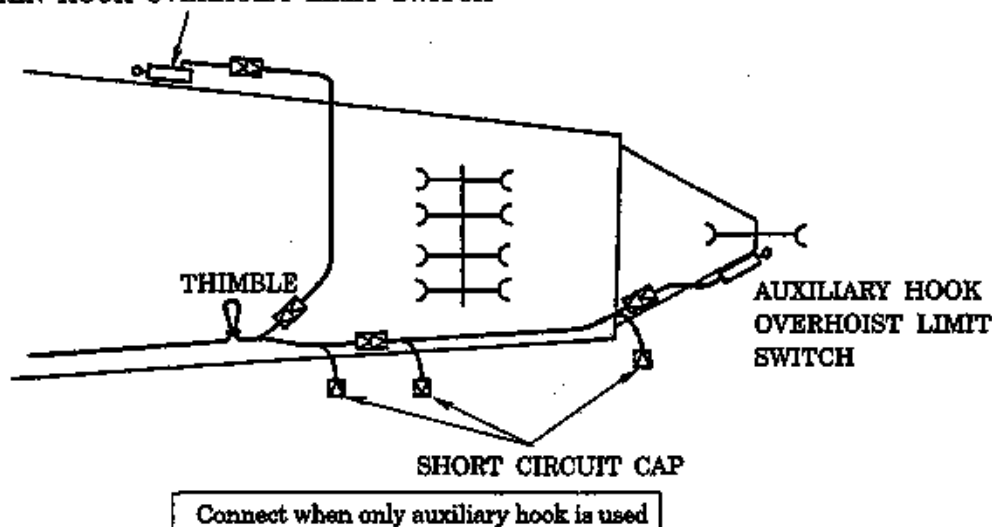
A thimble hook for supporting the cable is provided on the boom tip section. If the cable is not hung to this hook, excessive force is loaded to the connector for connecting the hook limit switch. Be sure to hang the thimble to this hook.

(4) CONNECTION OF THE HOOK OVERHOIST LIMIT SWITCH SECTION

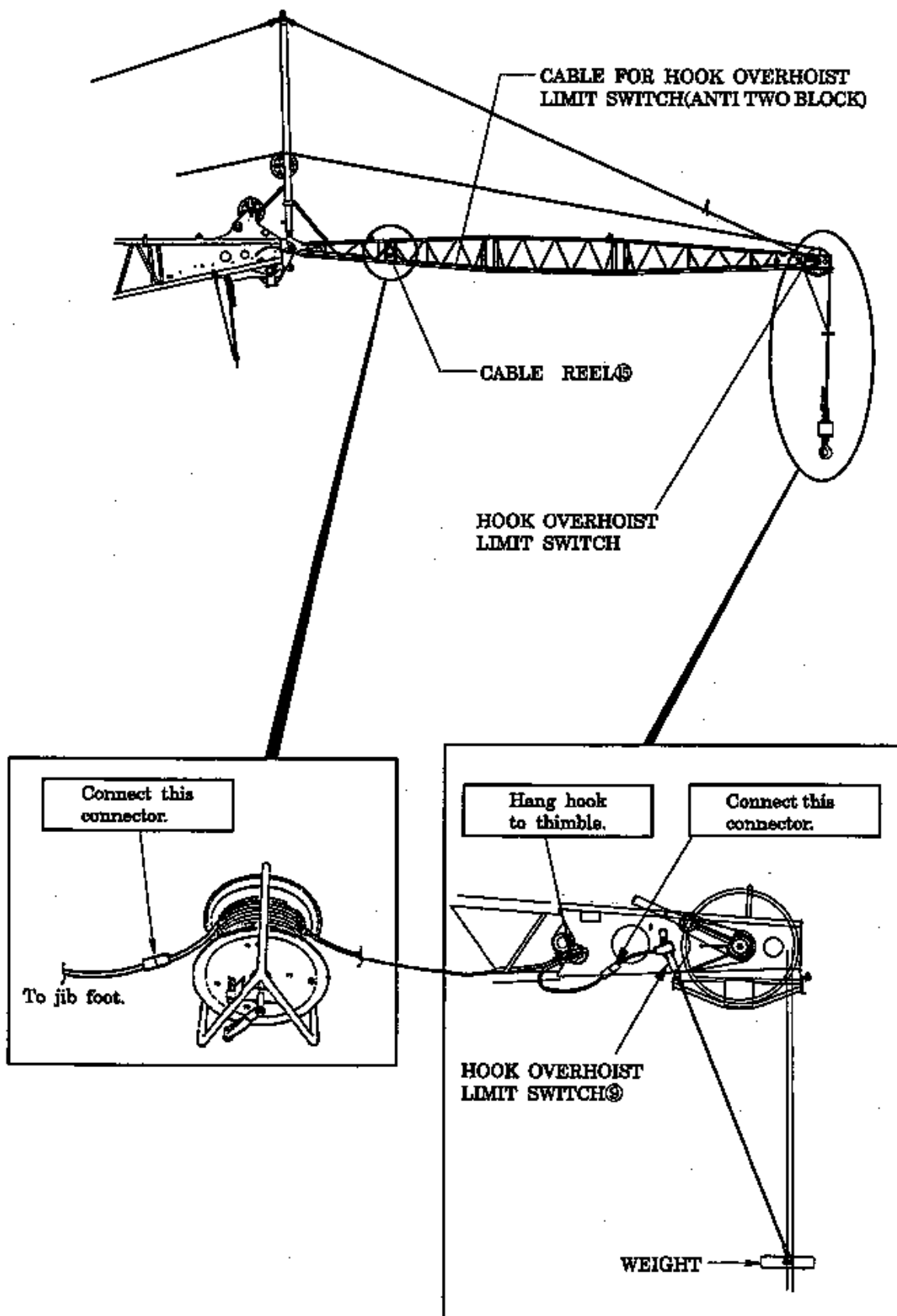
MAIN HOOK OVERHOIST LIMIT SWITCH



MAIN HOOK OVERHOIST LIMIT SWITCH

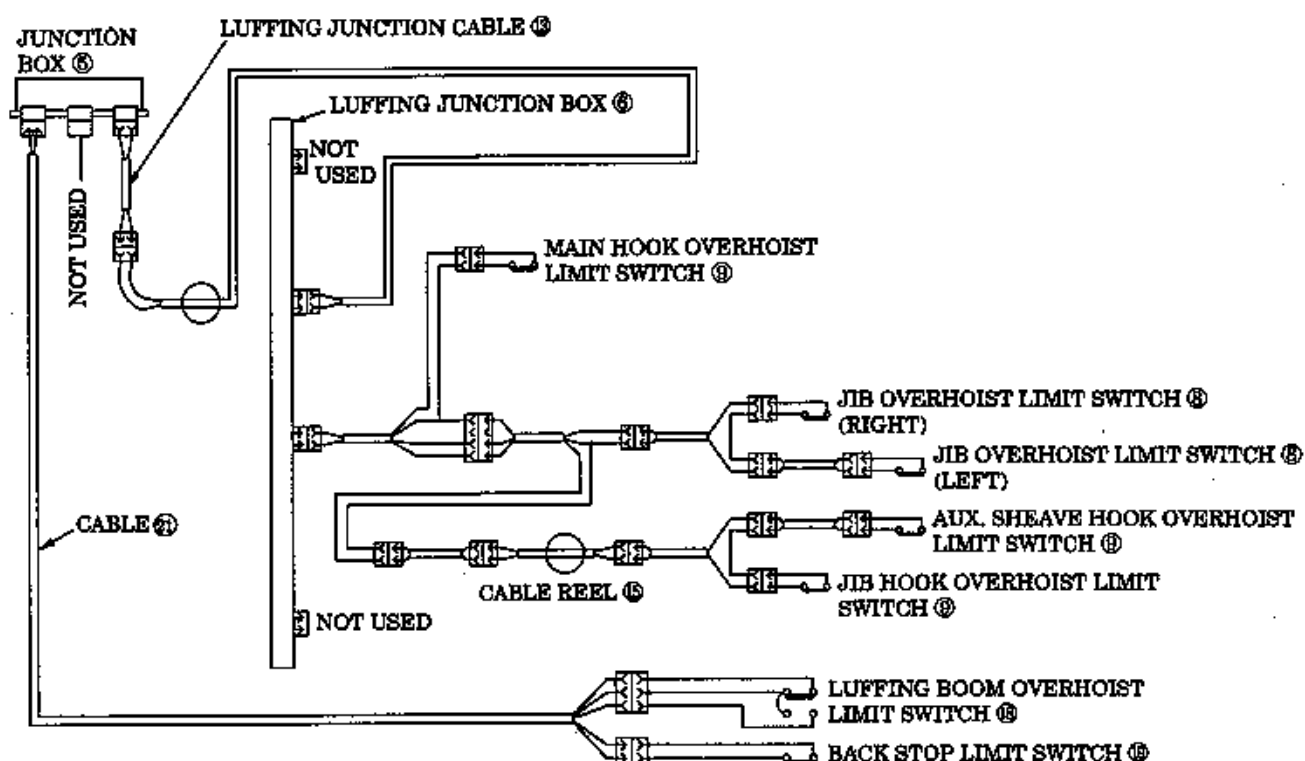


(5) CONNECTING THE JIB SECTION (WITH FIXED JIB)



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.

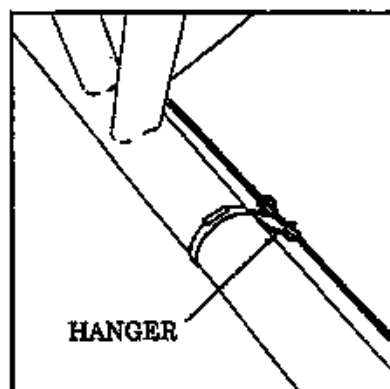
1. Tighten with hands fully securely.
2. Connect the removed caps each other, too.
3. After disconnecting, install the cap securely.



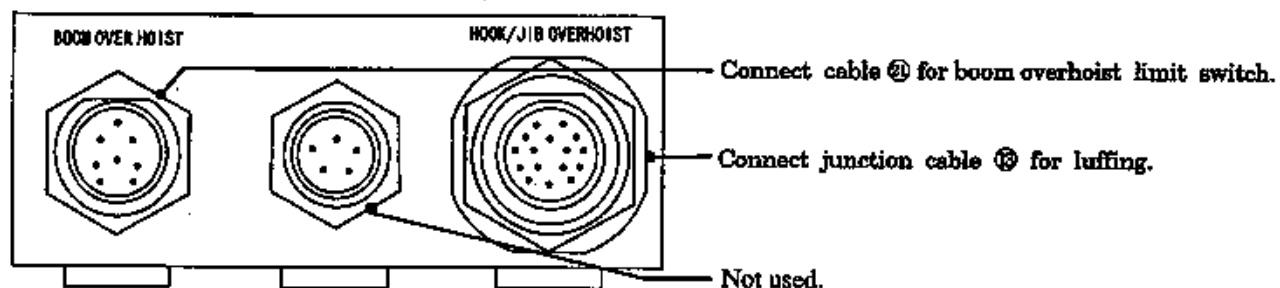
CAUTION

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

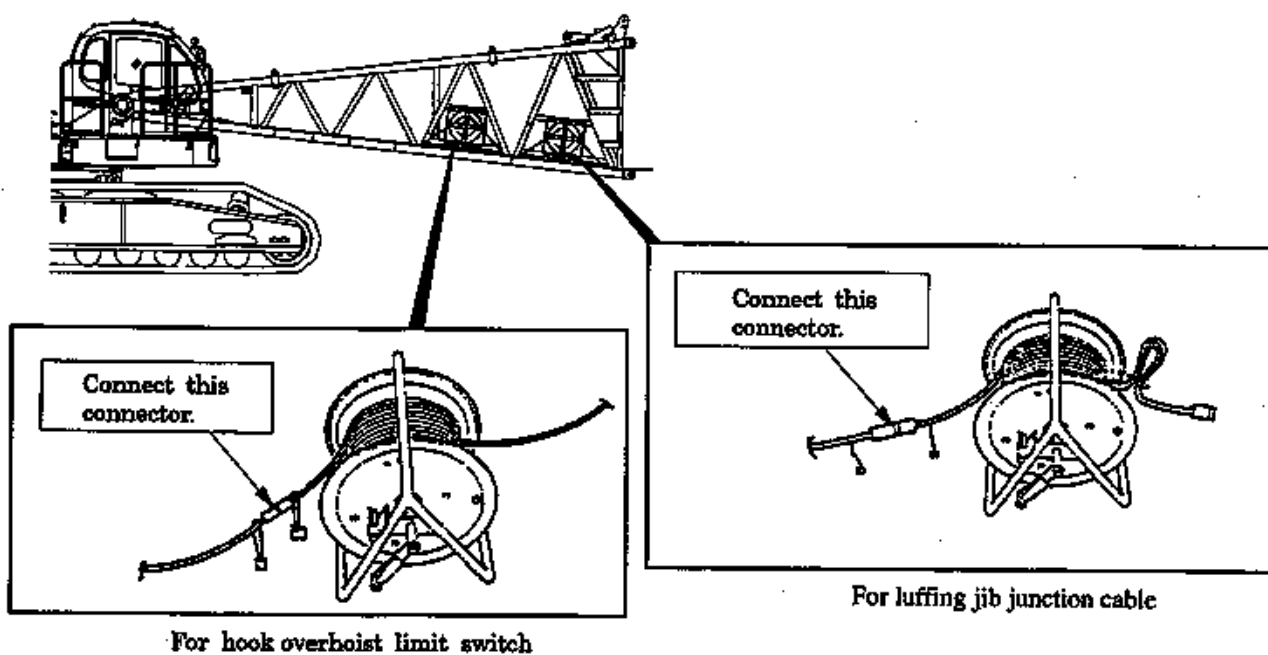
Fix the junction cables and cables for the limit switches to the boom with the hangers.

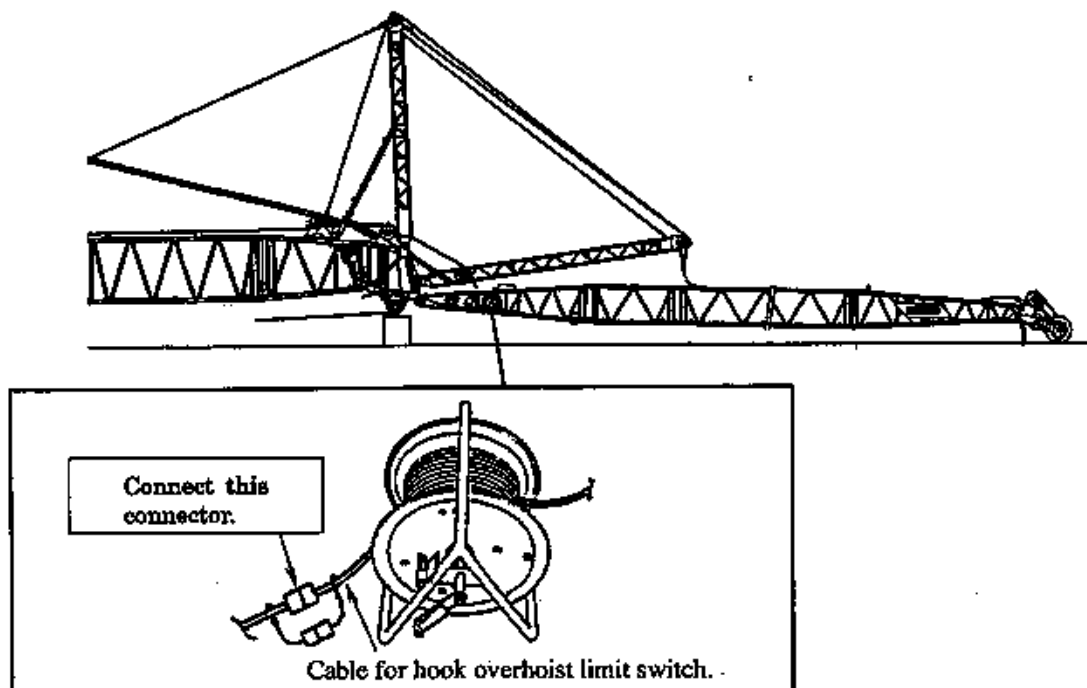


(1) CONNECTIONS OF JUNCTION BOX ⑤ FOR ATTACHMENT

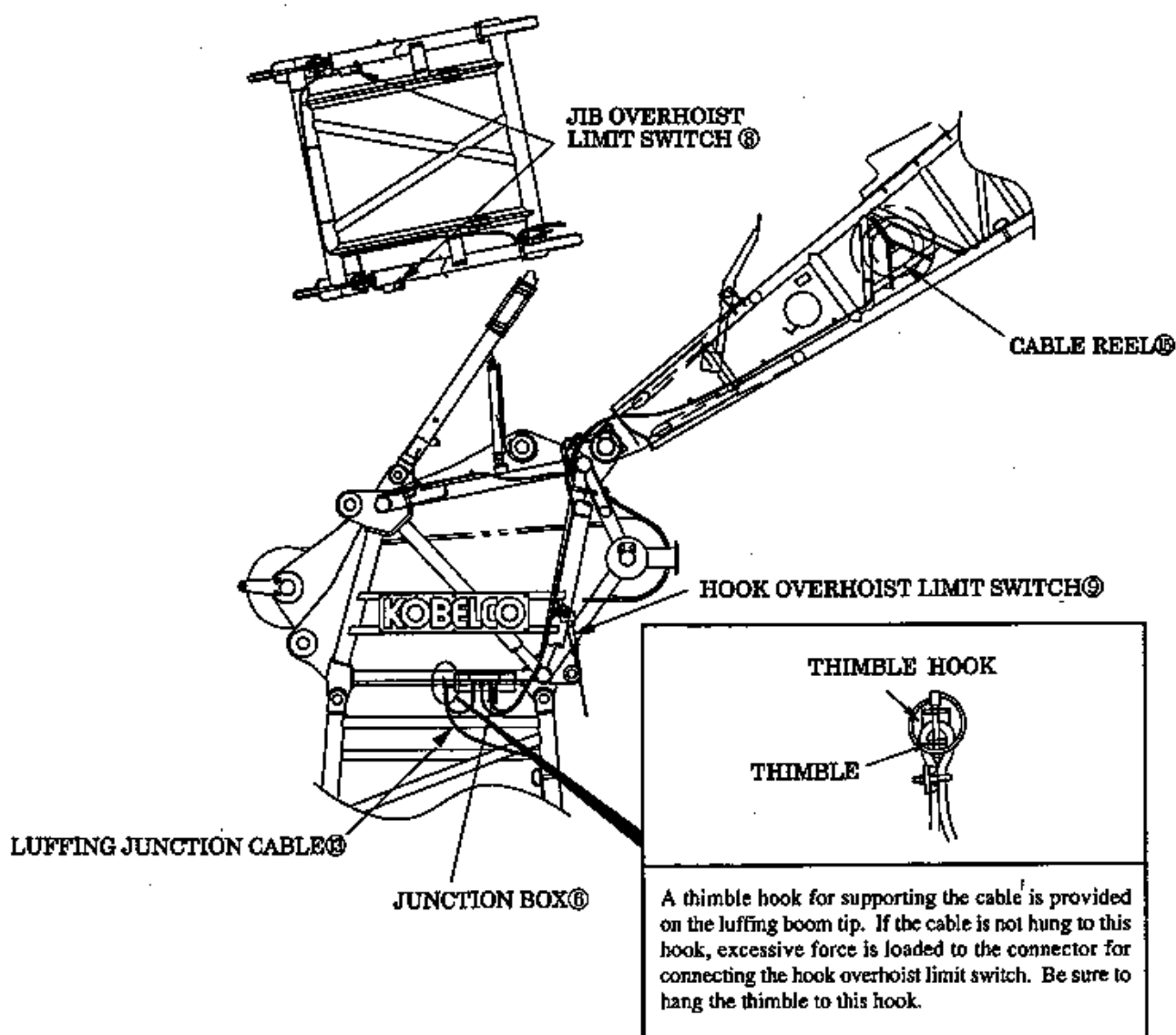


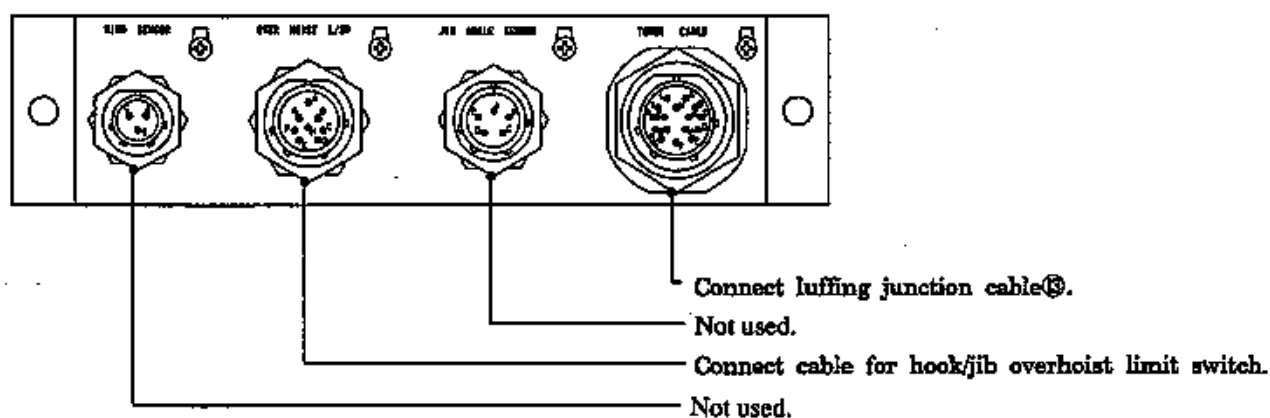
(2) CONNECTION OF CABLE AT CABLE REEL



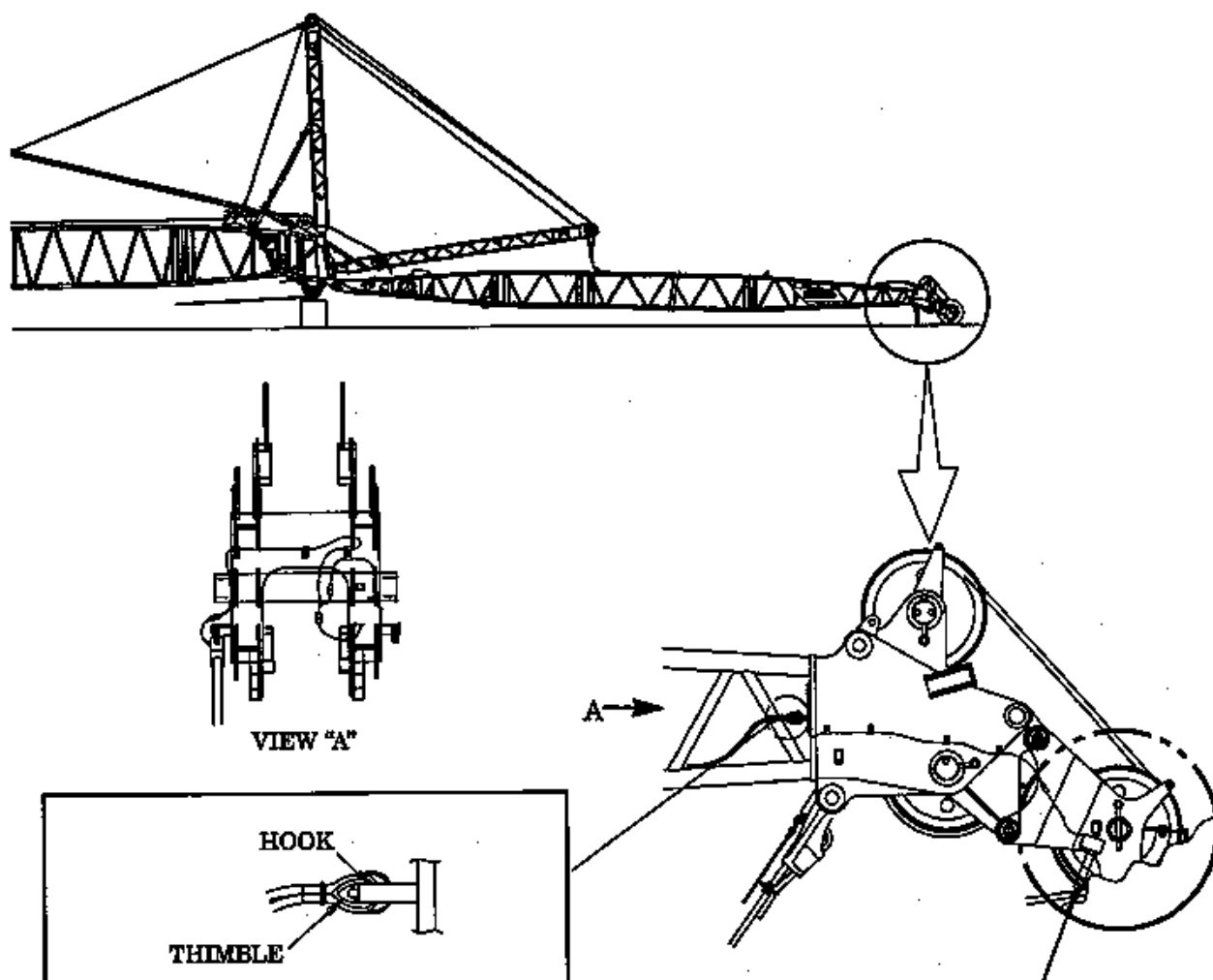


(3) CONNECTION OF CABLE AT LUFFING BOOM TIP





(4) CONNECTION OF CABLE AT LUFFING JIB POINT



A thimble hook for supporting the cable is provided on the jib tip section.
 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.

3.4 NECESSARY ACTIONS FOR ALTERATION OF LUFFING AND CRANE

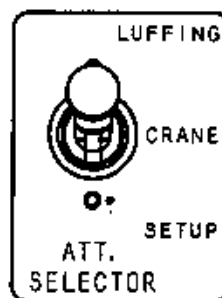
3.4.1 CHANGE OF WORKING MODE

Select working mode by shifting attachment selector switch according to crane or luffing attachment.

DANGER

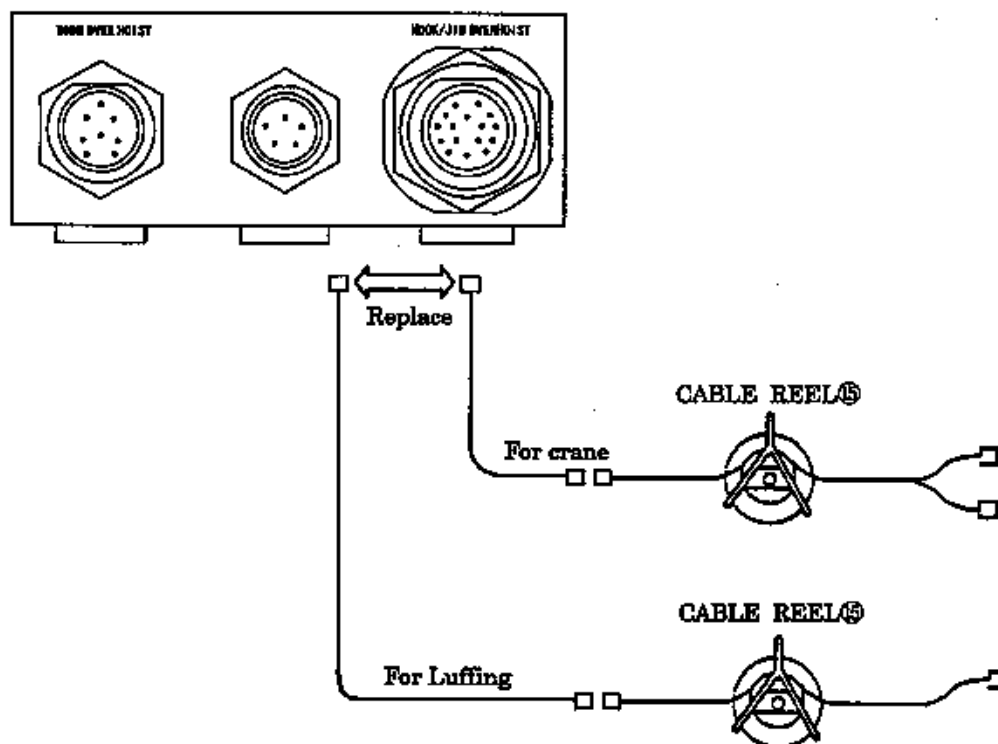
DO NOT select the "SET UP" mode during working.

Failure to observe this precaution may lead to overturning or collapsing of the crane and result in serious injury or loss of life.



3.4.2 CHANGE OF CABLE FOR CRANE HOOK OVERHOIST OR LUFFING HOOK OVERHOIST LIMIT SWITCHES

Release connectors as shown below.



3.5 WARNING ALARM AND AUTOMATIC STOP

3.5.1 ITEMS OF WARNING ALARM AND AUTOMATIC STOP

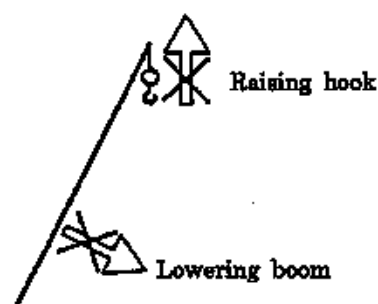
3.5.2 CONTENTS OF AUTOMATIC STOP

When the machine stops automatically due to respective hazardous condition, the machine cannot be operated in the direction with "X" mark in the following figures. Since the direction without the X mark is safe 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 safe side.

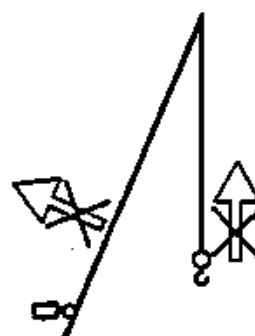
CRANE OPERATION

① ANTI-TWO-BLOCK (HOOK OVERHOIST)



② BOOM OVERHOIST

(Controlled by boom overhoist limit switch)



Generally, when the boom is overhoisted, the limit switch functions to stop boom hoist automatically. The automatic stop in this time cannot be released.

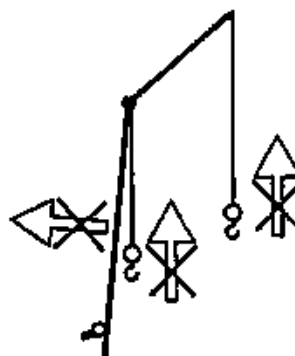
CRANE WITH LUFFING JIB OPERATION

① ANTI-TWO-BLOCK (HOOK OVERHOIST)



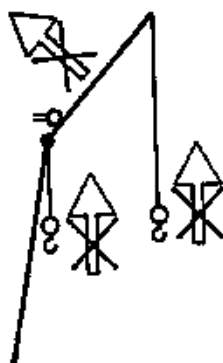
② BOOM WITH LUFFING JIB OVERHOIST

(Controlled by backstop limit switches)



③ LUFFING JIB OVERHOIST

(Controlled by luffing jib overhoist limit switch)



Generally, when the boom or luffing jib is overhoisted, the limit switch functions to stop boom hoist automatically. The automatic stop in this time cannot be released.

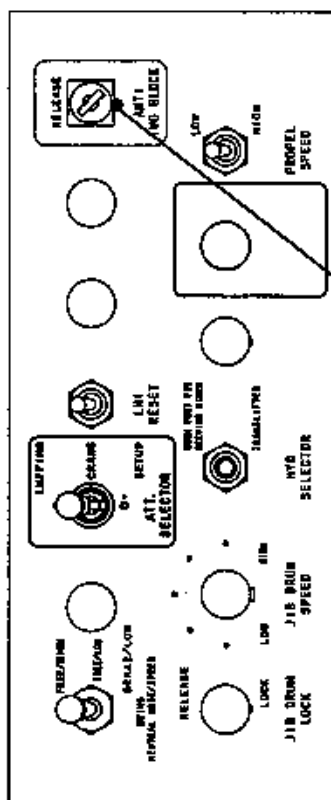
3.5.3 RELEASE OF AUTOMATIC STOP

(1) AUTOMATIC STOP RELEASE SWITCH



DANGER

Do not operate crane with keeping the release switches fixed in the RELEASE position. Failure to do so may lead to overturning or collapsing of the crane and result in serious injury or loss of life.



ANTI-TWO-BLOCK (HOOK OVERHOIST)
RELEASE SWITCH

(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.

• HOOK ANTI-TWO-BLOCK (OVERHOIST) RELEASE SWITCH



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

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

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

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



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 loss of life.

(3) 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.

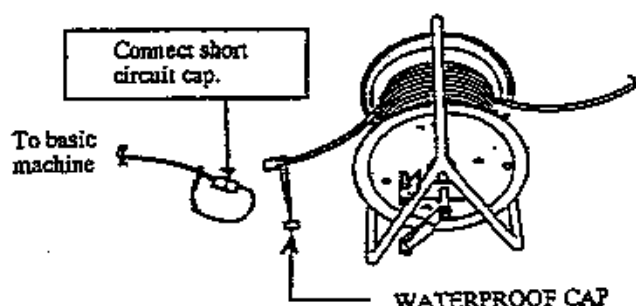
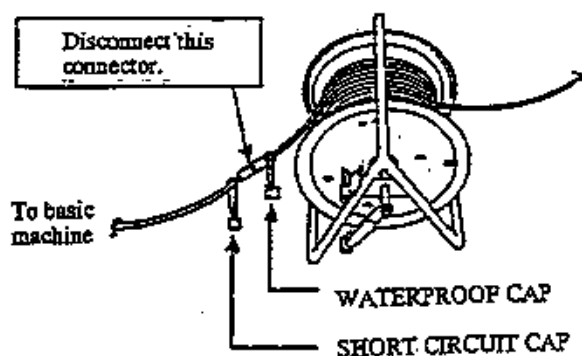
Using the short circuit cap, short-circuit the cable for the hook overhoist limit switch in the place of the cable reel for the boom base section.



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 injury or loss of life.

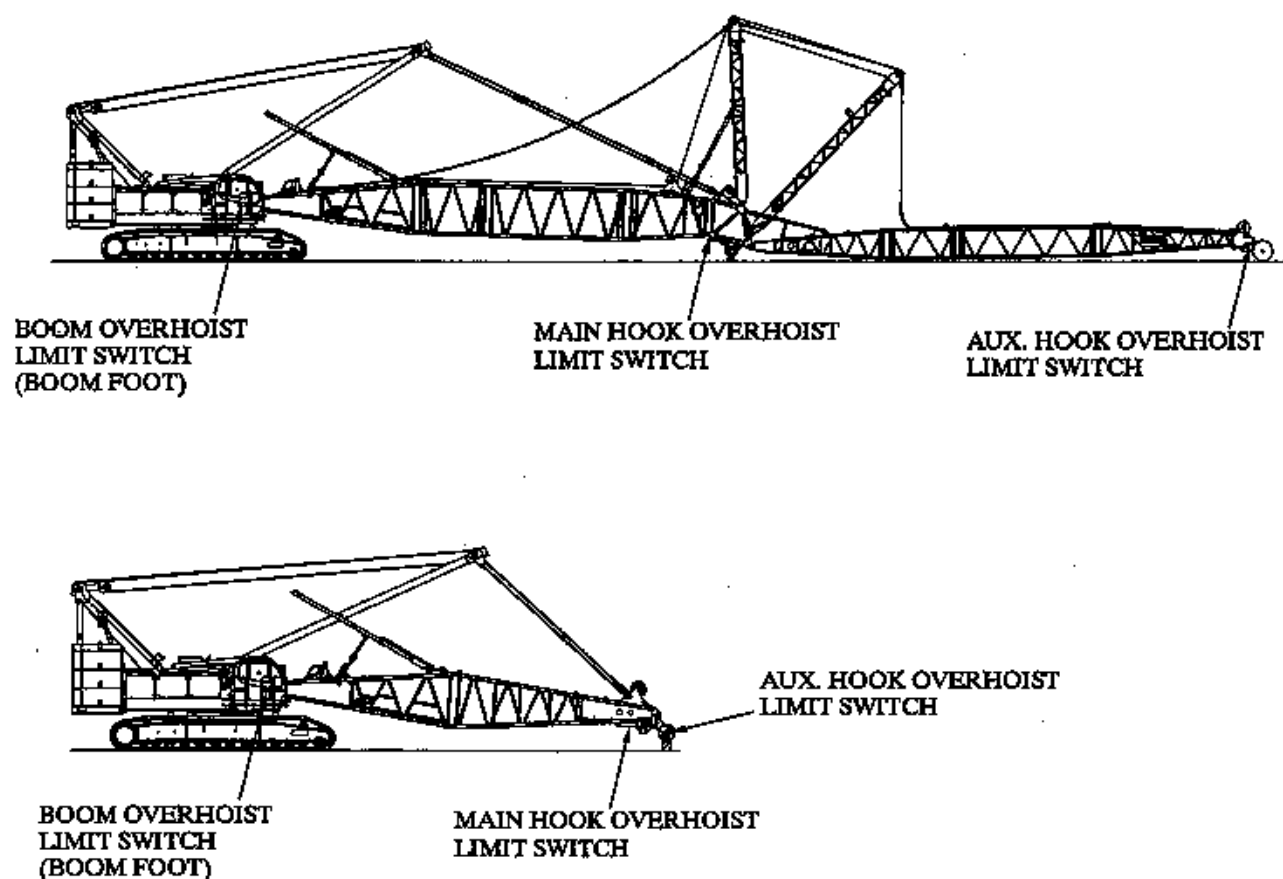


3.6 INSPECTION

3.6.1 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 operates, pull the limit switch once to set to the safe condition, then inspect respectively as follows:



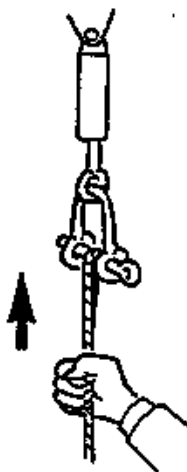
- **Inspection of Boom Overhoist Limit Switch**

Push the roller of the limit switch with hand, and confirm that the alarm buzzer is sounding.



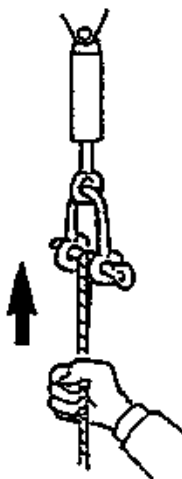
- **Inspection of Main Hook Anti-two-block (Overhoist) Limit Switch**

Push up the weight lifting rope of the limit switch to confirm that the alarm buzzer is sounding, and pull the rope with hand to confirm that the alarm buzzer is stopped.



- **Inspection of Auxiliary Hook Anti-two-block (Overhoist) Limit Switch**

Push up the weight lifting rope of the limit switch to confirm that the alarm buzzer is sounding, and pull the rope with hand to confirm that the alarm buzzer is stopped.



- Inspection of Luffing Jib Overhoist Limit Switch (Refer to page 3-16.)
Push the roller of the limit switch with hand, and confirm that the alarm buzzer is sounding.



3.6.2 INSPECTION AFTER ERECTING THE ATTACHMENT

Operate the machine up to the respective hazardous condition, and confirm that the automatic stop/warning alarm functions. The automatic stop angle of the boom in the overhoist side is shown in the following table.

Classification	Kind of Overhoist	Classification of Stop	Boom Automatic Stop Angle
Crane	Boom overhoist	Limit switch	Approx. 83 degrees
Crane with Luffing jib	Boom overhoist	Limit switch	Approx. 88.5 degrees
Crane with Luffing jib	Backstop	Limit switch	Approx. 89.1 degrees

4. UNLOADING/LOADING THE BASIC MACHINE

This chapter describes load and unload of the basic machine to and from the trailer. Here, attachment, counterweight and crawlers are removed and gantry and mast are already in the transporting position.

This chapter describes load and unload of the basic machine from 50 ton class trailer.



WARNING

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.

4.1 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.

Translifter must be operated on the flat and firm ground, paying trailer access direction, location of crawler lifting auxiliary crane [70 ton class] into account.

Vertical cylinder load of the translifter may reach to maximum (41.0 ton) per each cylinder and ground must stand for it.

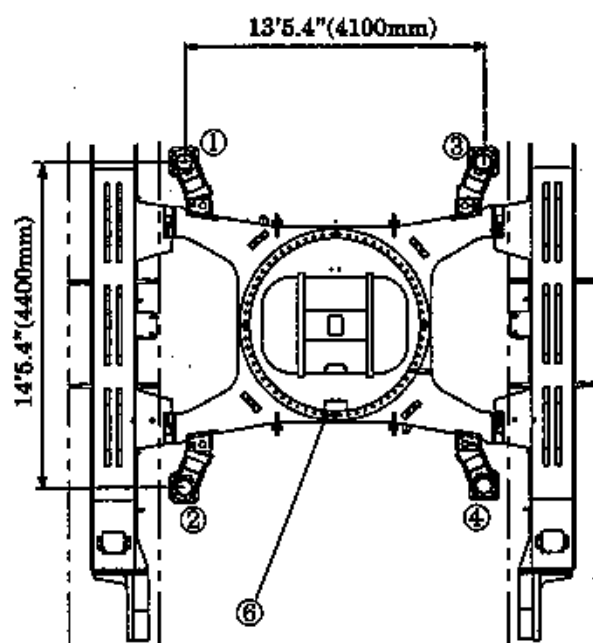
As safety practice, place steel plate under each float.

Float dimension : □1.6 inch (□40 mm)



WARNING

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.

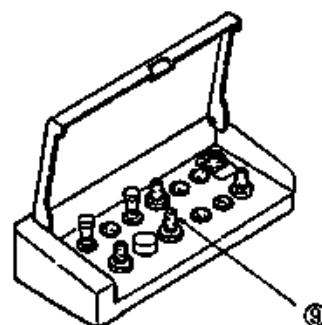
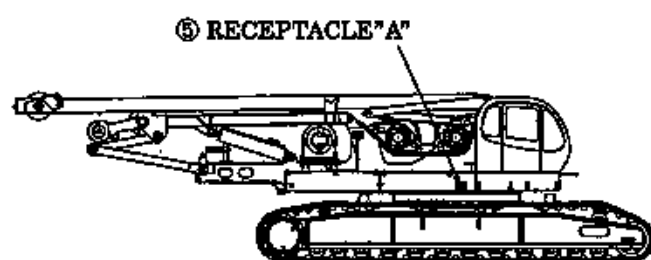


1. Composition of the translifter.

Translifter is composed of following equipment and parts.

equipment and parts.

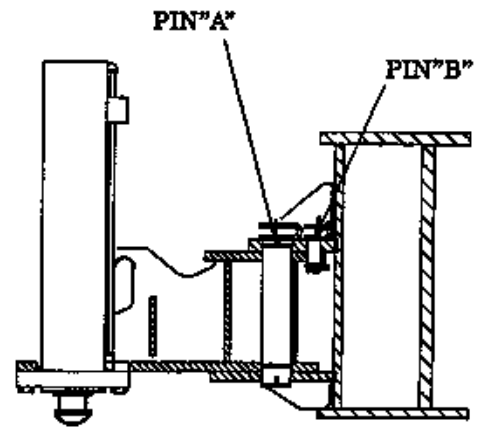
- (1) Four cylinders to lift up the basic machine
----- ①, ②, ③, ④
- (2) Receptacle "A" located under the operator cabin.
----- ⑤
- (3) Terminal box on the carbody side (CN-2, CN-3, CN-4) ----- ⑥
- (4) Remote control switch (Stored in the operator coop) ----- ⑦ Not shown
- (5) Translifter connecting cable (Stored in tool box) ----- ⑧ Not shown
- (6) Hydraulic selector switch (Side stand panel in the operator cabin) ----- ⑨



2. Handling of transfliter ①~④

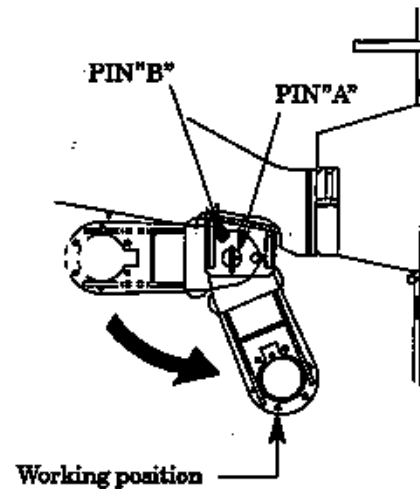
(1) Vertical cylinder

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



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

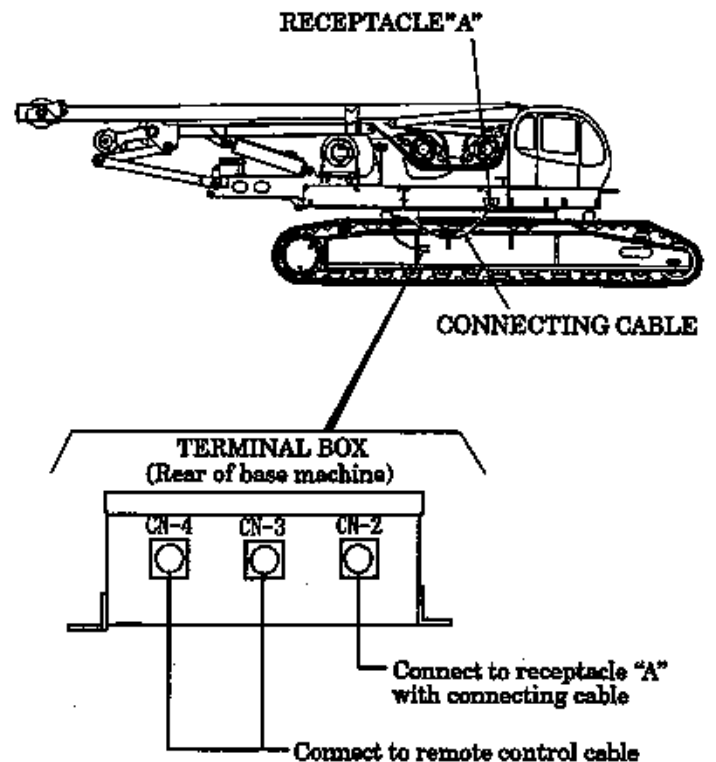
Connect to the Receptacle (CN-2) on the carbody side with the connecting cable.



(3) Terminal box (CN-2, CN-3, CN-4) in the carbody side. ⑥

Connect CN-2 to Receptacle "A" under the operator cabin with the connecting cable.

Connect CN-3 and CN-4 to two remote control cable.



(4) Remote control switch ⑦

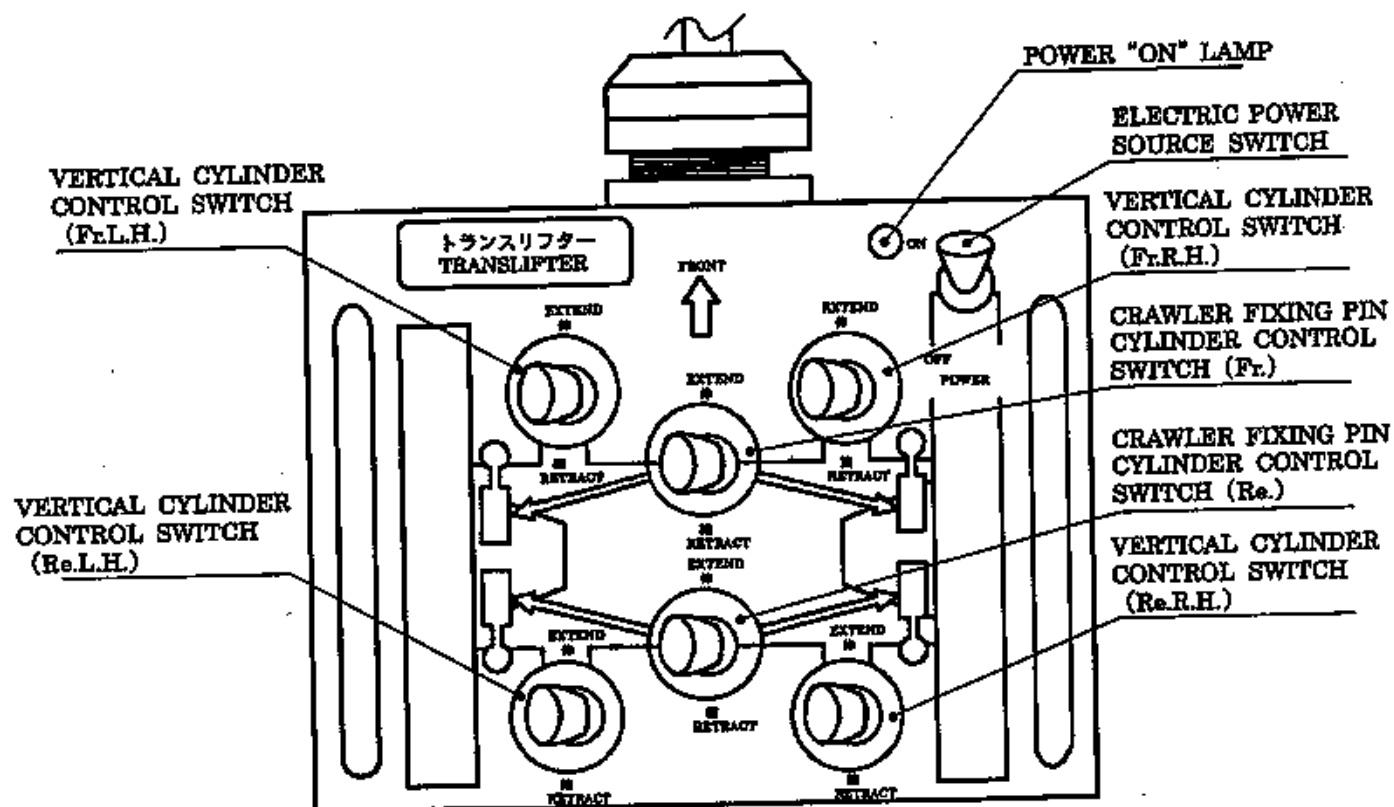
This is the control switch for operating the vertical and crawler fixing pin cylinders.

After power is "ON" and depress EXTEND or RETRACT selector switch and each cylinder switch, then cylinder starts to move and stop when hand is off.

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.



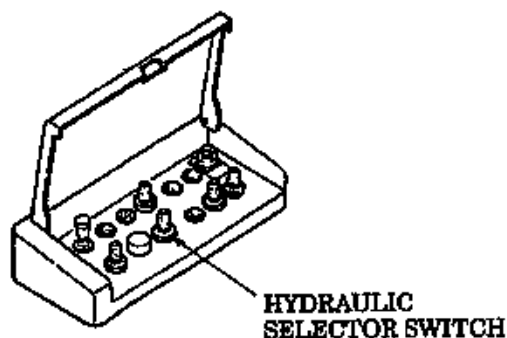
(5) Connecting cable ⑧

They are the connecting cables between the upper machinery and lower machinery.

(Connection between receptacle "A" and the receptacle CN-2 in the terminal box.)

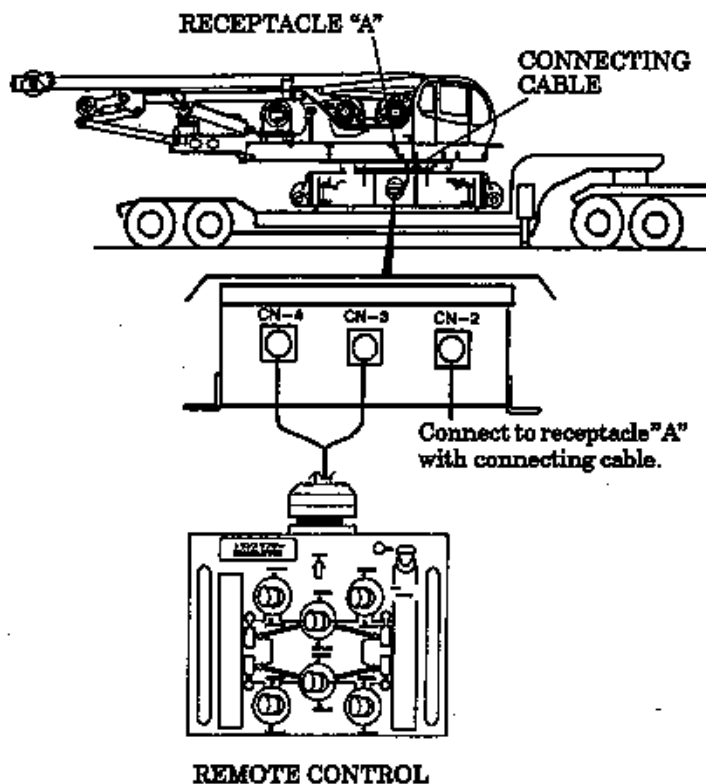
(6) Hydraulic selector switch ⑨

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

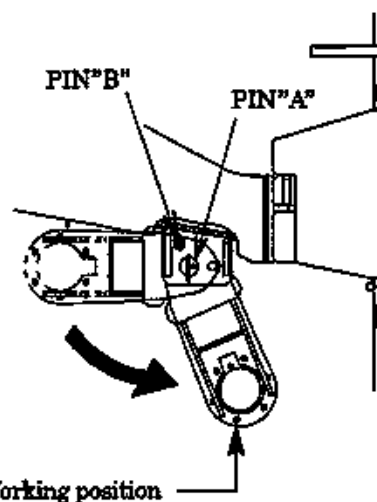
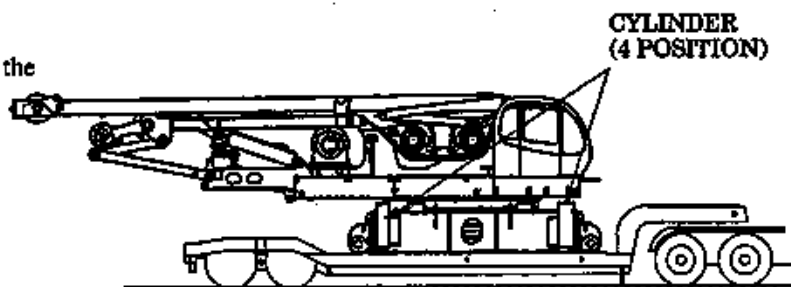


4.2 UNLOAD THE BASIC MACHINE FROM THE TRAILER

1. Check the ground condition before parking the trailer.
2. Connect the receptacle "A" under the operator's cabin to the receptacle CN-2 in the carbody side terminal box with the connecting cables.
3. Connect the receptacle CN-3 and CN-4 in the carbody terminal box with cables (two) from remote control.



4. Install the translifter cylinder assemblies 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".

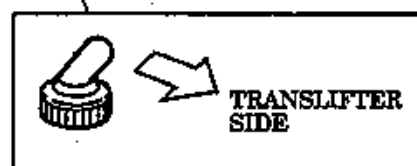
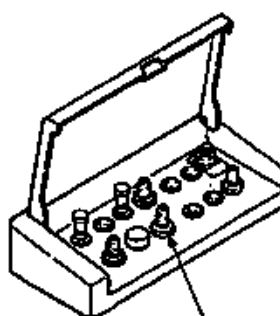
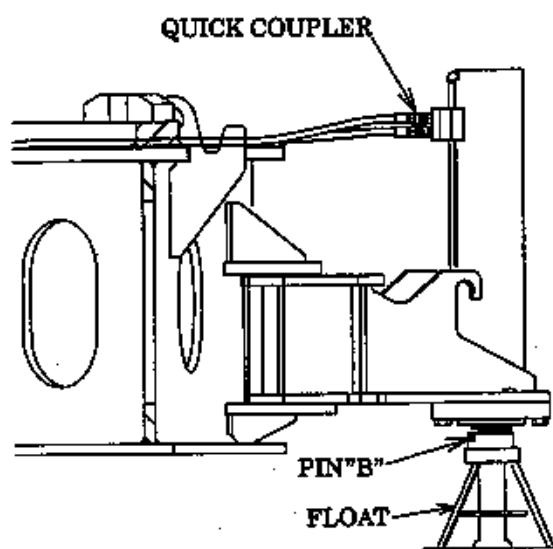


CAUTION

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. Swing down the hydraulic selector switch located on the side stand panel in the operator's cab forward to the translifter position.



HYDRAULIC
SELECTOR SWITCH

- Extend the vertical cylinder by remote control switch until the lower surface of the basic machine lifted slightly from trailer board surface.

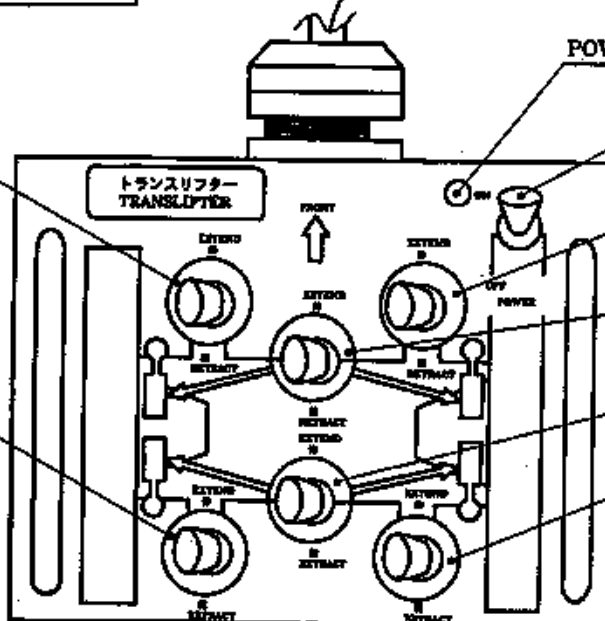


WARNING

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

VERTICAL CYLINDER
CONTROL SWITCH
(Fr.L.H.)

VERTICAL CYLINDER
CONTROL SWITCH
(Re.L.H.)



POWER ON

ELECTRIC POWER
SOURCE SWITCH

VERTICAL CYLINDER
CONTROL SWITCH
(Fr.R.H.)

CRAWLER FIXING PIN
CYLINDER CONTROL
SWITCH (Fr.)

CRAWLER FIXING PIN
CYLINDER CONTROL
SWITCH (Re.)

VERTICAL CYLINDER
CONTROL SWITCH
(Re.R.H.)

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.



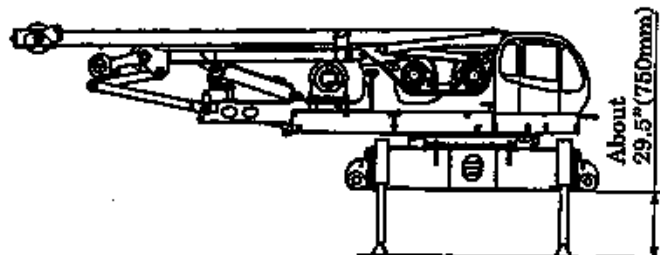
WARNING

Engage the swing brake and swing lock when operating transliifter to avoid turn-over of machine.

Failure to observe this precaution will result in serious accident.

- Lift the basic machine further and drive out the trailer from under the basic machine.
- Retreat the vertical cylinder until the distance between bottom surface and ground becomes about 750 mm.

In case when basic machine is assembled after this, refer to Chapter 5. ASSEMBLY/DISASSEMBLY OF BASIC MACHINE.



(The space increases or decreases depending on the looseness of the shoe.)

4.3 LOADING TO 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.

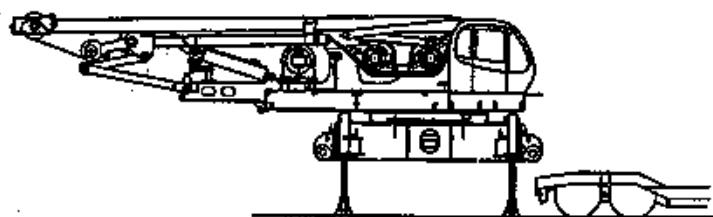
After then, prepare the translifter following the step 2. - 7. of Section 4.2.

2. Lift the basic machine by extending the vertical cylinder until enough height to drive the trailer in.

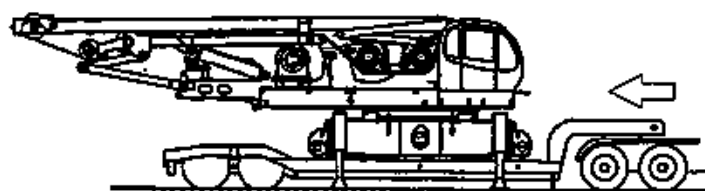


WARNING

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.

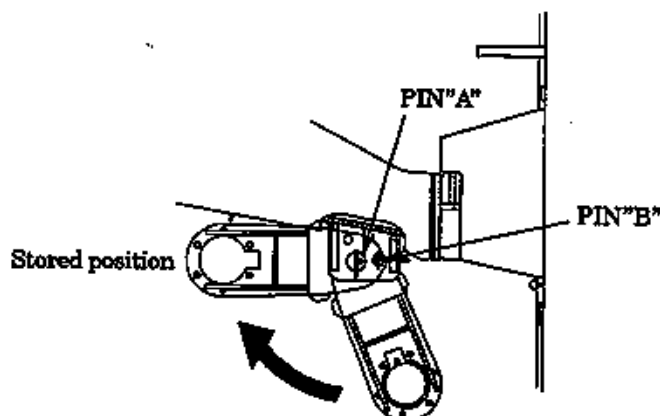


4. Set the trailer so that loading board comes just underneath the lower machinery.

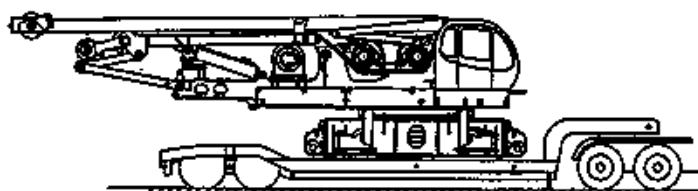


WARNING

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.

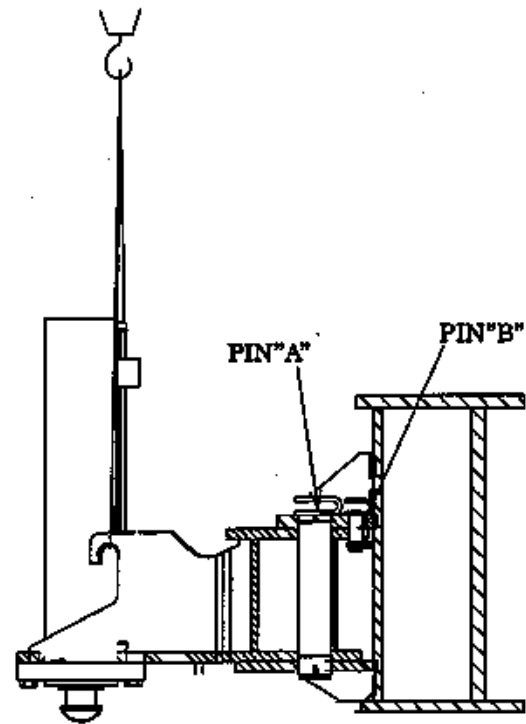


5. Retract the four vertical cylinders by operating the remote control switch and stop the engine. Then disconnect the cylinder hoses at the couplers.



6. When removing the translifters from the machine, support them by the sling rope hooked to the vertical cylinder mounting arms. Then, remove the mounting pins "A" and "B" to detach the cylinder assemblies (for all the 4 pcs.).

The float should have been removed in advance.



794 lbs(860kg) :Without float

7. Remove the connecting cable and remote control switch cable and store them to the storing location.
8. Tie down the basic machine to the trailer.

4.4 UPPER STRUCTURE (WITH CAR BODY) LIFTING PROCEDURES

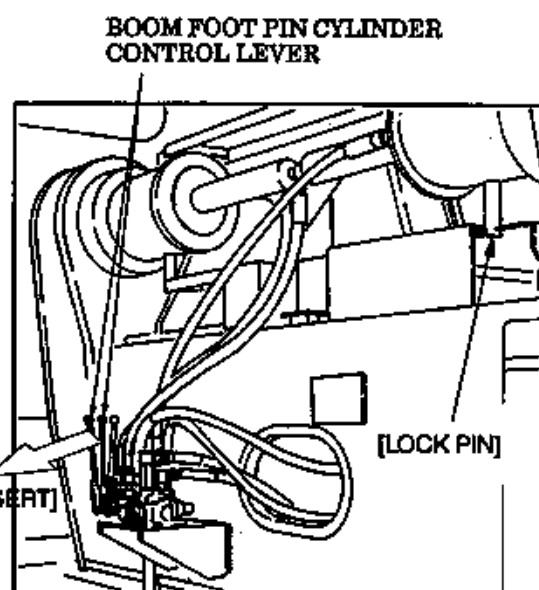
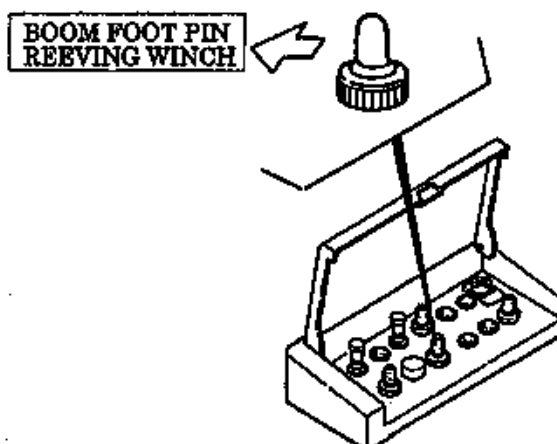
4.4.1 INSTALLATION OF BOOM FOOT LIFTING BRACKET

1. 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 (backward) to insert the foot pins.

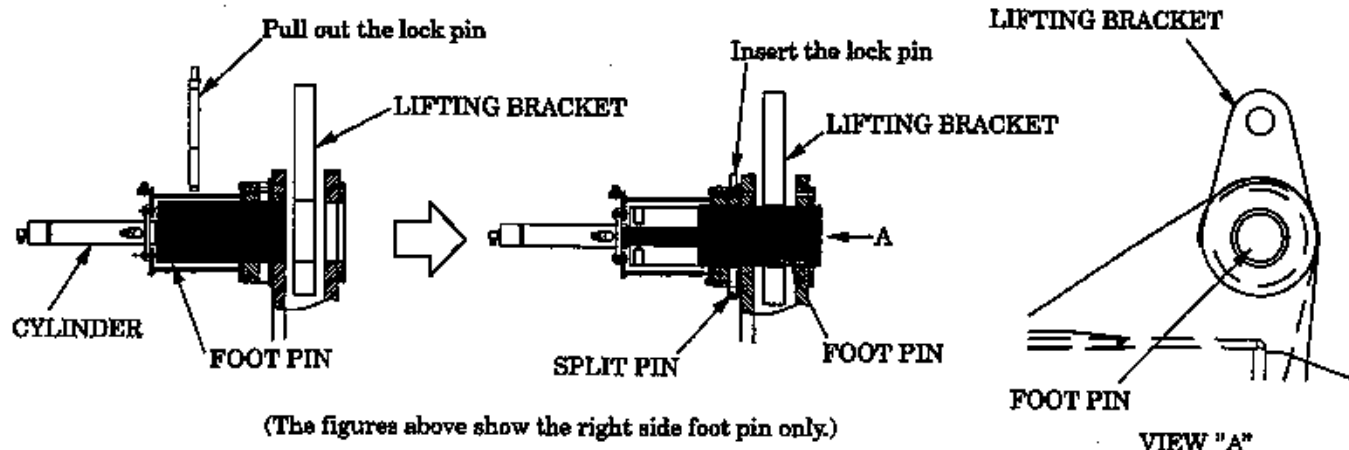
(3) Insert the lock pins from upside, and lock them with the fixing pins.



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 loss of life.



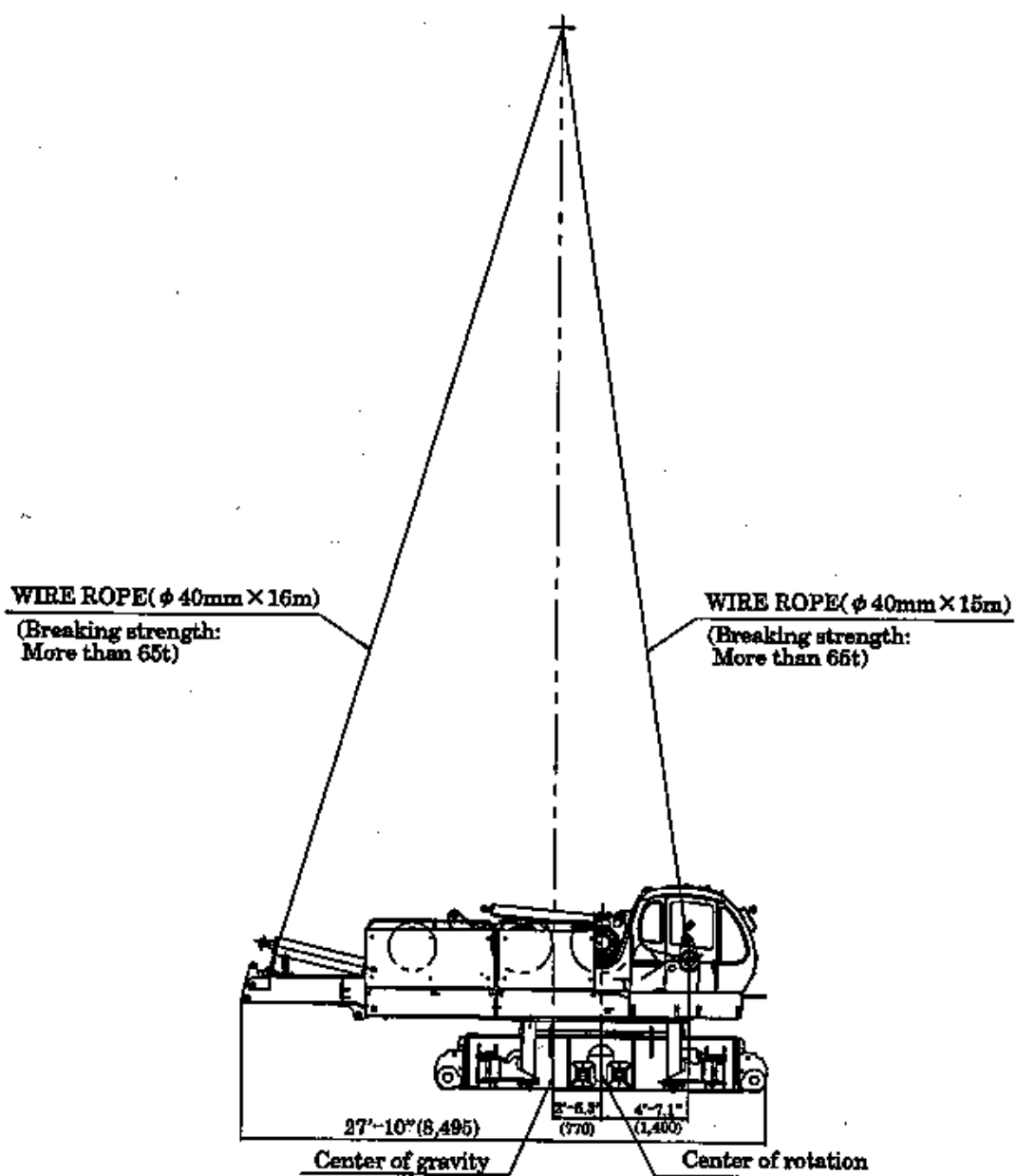
4.4.2 INSTALLATION

1. Install the lifting wire rope to the lifting bracket on the boom foot pin side and the bracket on the revolving frame 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.



Weight : Approx. 35t

5. ASSEMBLY/DISASSEMBLY OF BASIC MACHINE

This chapter describes installation, removal of crawler, raising and lowering of the gantry and installation, removal of the counterweight.

In case translifter work is necessary, refer to the Chapter 4. Unloading/Loading The Basic Machine.



WARNING

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.

5.1 INSTALLATION, REMOVAL OF CRAWLER

(Tool) :

- One set of attached tools.
- Assisting crane [14335 lbs (65 ton class)]
- Corner protective materials
- Grease
- Wire rope 1.1" (28mm) dia × 26'2" (8m) 2sets

5.1.1 INSTALLATION OF CRAWLERS

1. Swing the upper machinery 90° against axles to install the crawlers.

Engage swing brake and swing lock after swing motion in order to avoid machine turn-over.

Make sure that the four vertical cylinders with floats contacted on the ground.

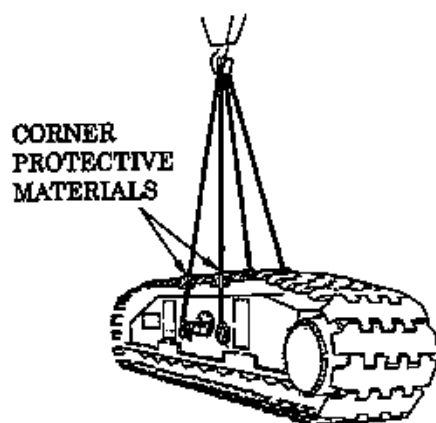
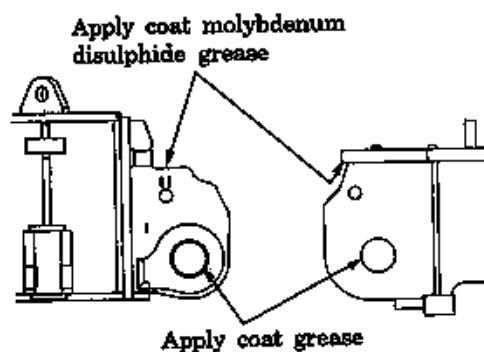
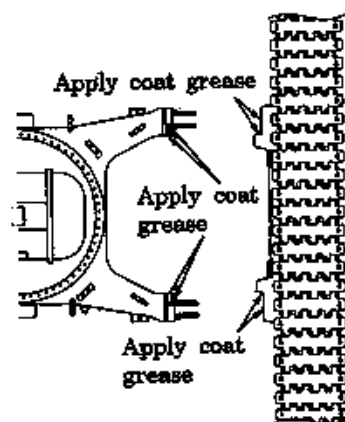
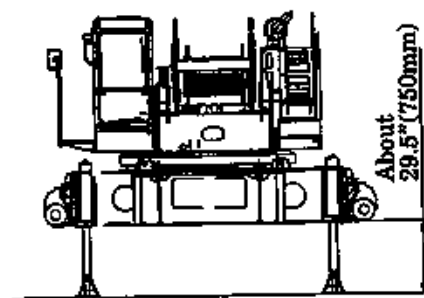
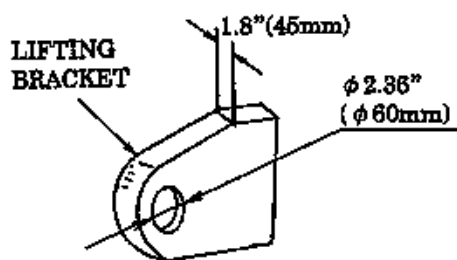
Set the distance from lower surface of the axles and the ground about 29.5" (750 mm).

2. 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.

3. Ensure that the crawler connecting pins located on the crawler frame side are not protruded. Then, remove the fixing pins (2 pos. on one side).

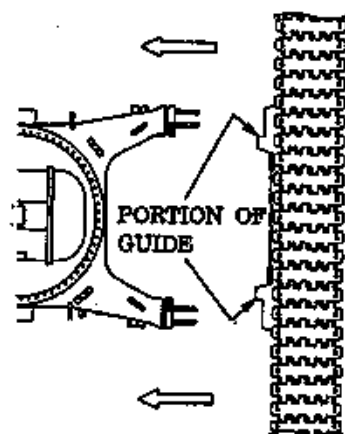
4. Lift one of crawlers [about 51817 lbs (23.5 ton)] with assisting crane.

When lifting the crawler, use corner protective materials so that wire not bite into shoes.

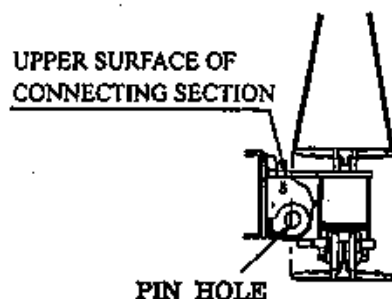


5. Slowly move the crawler toward the mounting side of the lower structure.

 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 loss of life.



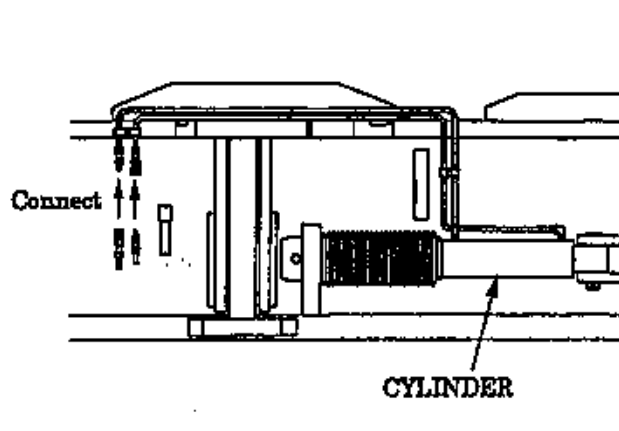
6. Fit the crawler frame along with the guide section of the lower structure to engage the upper surface of the connecting section.



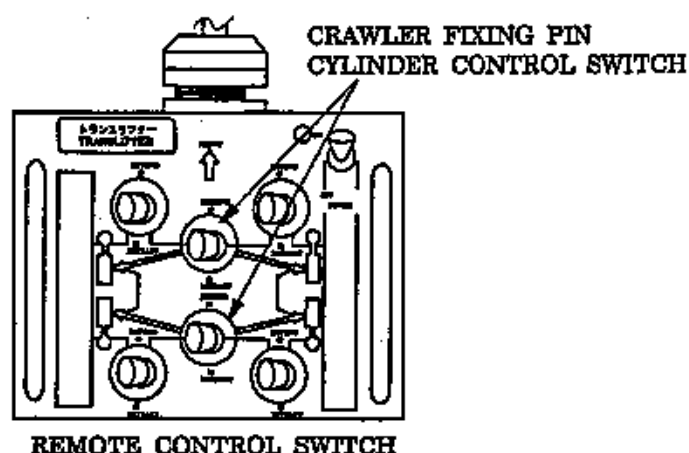
7. While lowering the crawler frame slowly, align the pin holes on the car body and the crawler frame. If the shoe comes in contact with the ground, and the pin holes cannot be aligned correctly, lift the machine with the translifter cylinder until the shoe does not come in contact with the ground.

 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 loss of life.

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 with the assisting crane.

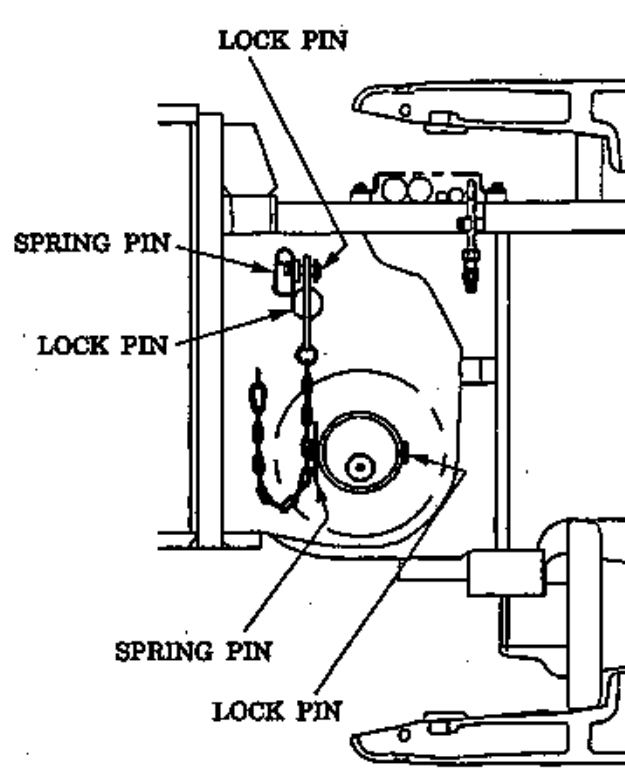


10. After fully inserting the two crawler connecting pins, stop the engine. Then, insert the fixing pin while supporting the crawler with the assisting crane. Attach the lock pin to the inserted fixing pin, and lock it with the spring pin.

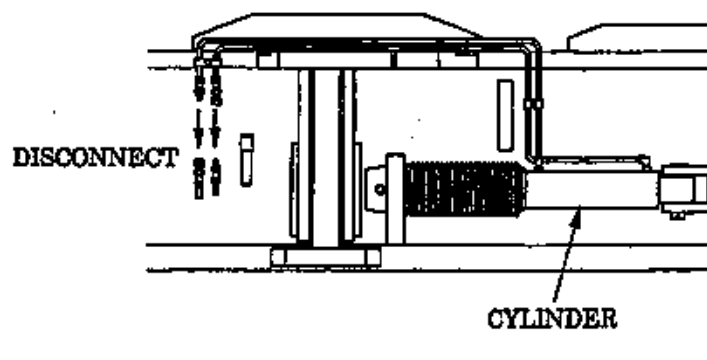
 WARNING
Be sure to attach the lock pin and the spring pin to avoid any accident due to the coming-off the fixing pin.

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 connecting pin removal/installation cylinder hose.



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

14. Install the other crawler in the same way as above.
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.



DANGER

Do not swing the machine with only one crawler installed. Failure to observe this precaution may result in serious injury or loss of life.

15. After installing the both crawlers, retract the transifter cylinder until the crawlers come in contact with the ground completely.

16. Remove the floats and store them in the storing position.



CAUTION

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

17. 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

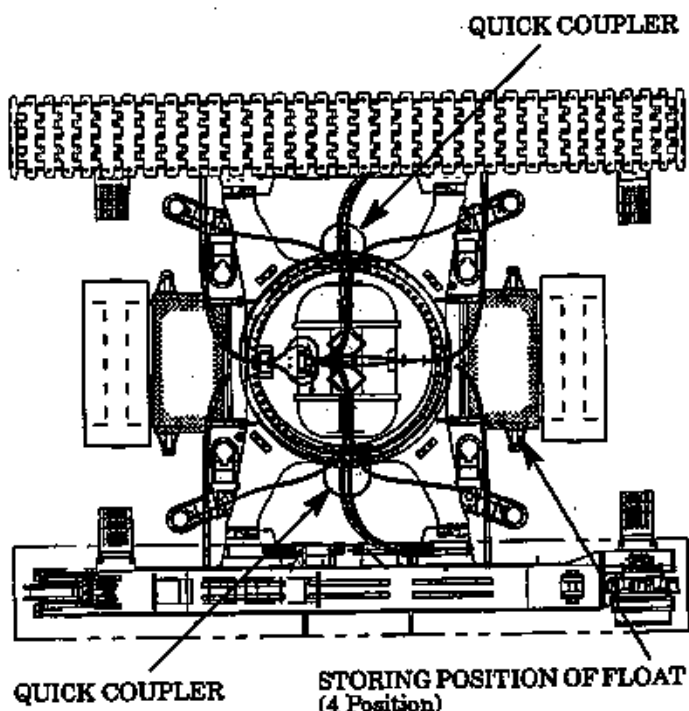
Do not swing when connecting or disconnecting hydraulic hose of crawler to avoid accident of being caught.

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



CAUTION

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



5.1.2 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.
3. Disconnect all hydraulic hoses (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 loss of life.

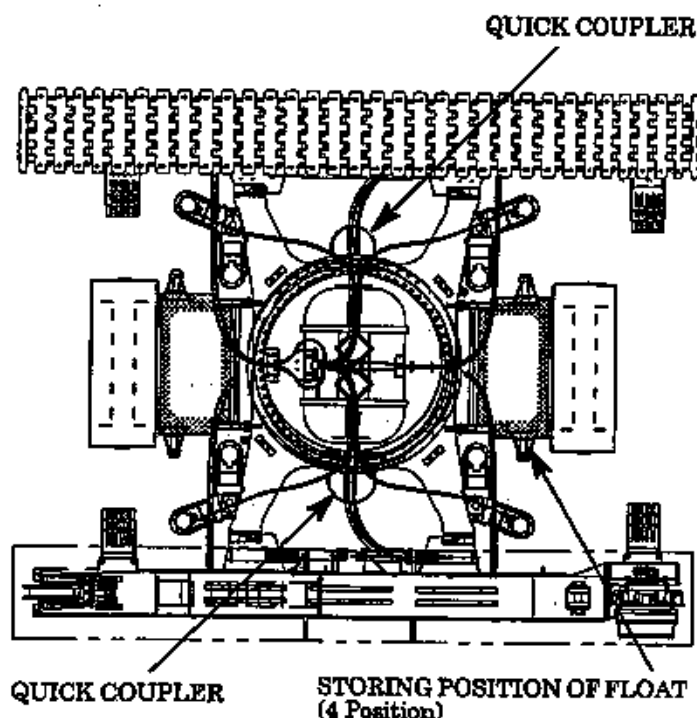


CAUTION

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 iron hammer.

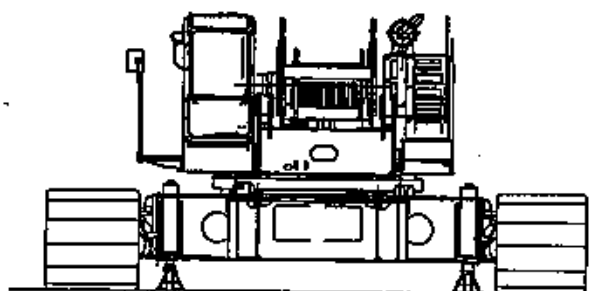


4. Set the transliifter to the work position and set them and install the floats.



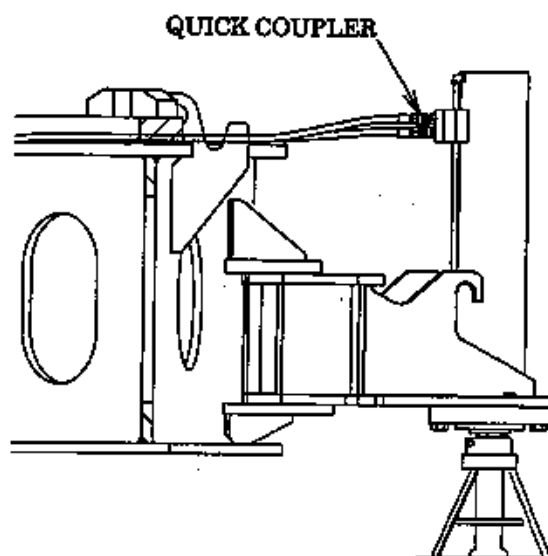
CAUTION

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



5. Connect the hydraulic hoses to the transliifter cylinders with quick couplers.

Confirm that the hydraulic hoses are securely connected to the vertical cylinders by pulling them.

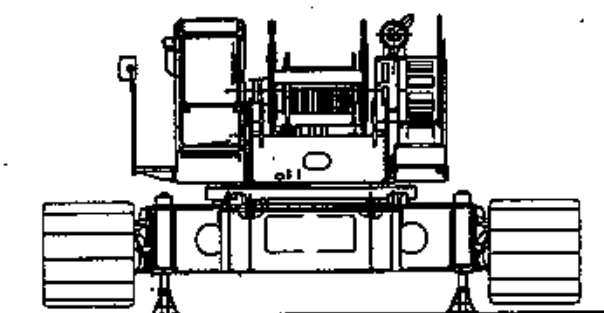


6. Start the engine and set the speed to low (about 1000rpm).

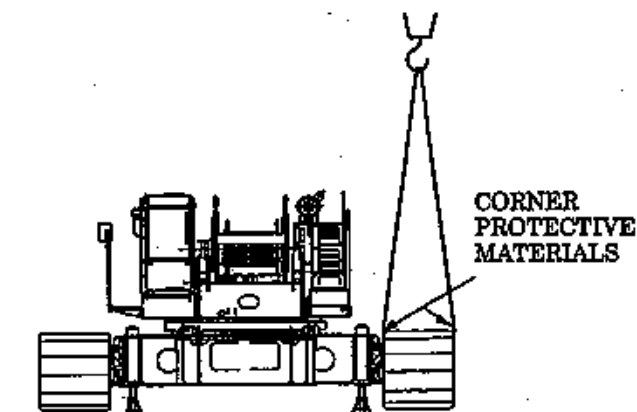
By operating the transifter, lift the basic machine until clearance appears between crawler and ground.

Watch the level during work to keep the basic machine in leveled position.

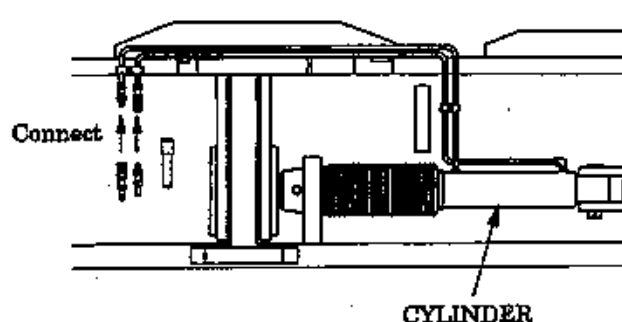
Make sure all four floats sit firmly on the ground.



7. Hold one of crawlers with the assisting crane.
When lifting the crawler, use corner protective materials so that wire does not bite into shoes.



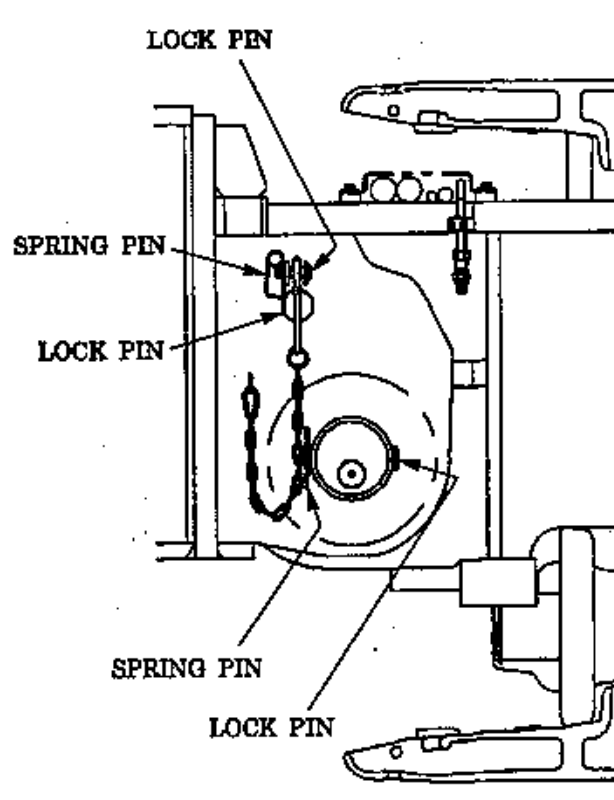
8. Connect the connecting pin removal/installation cylinder hose.



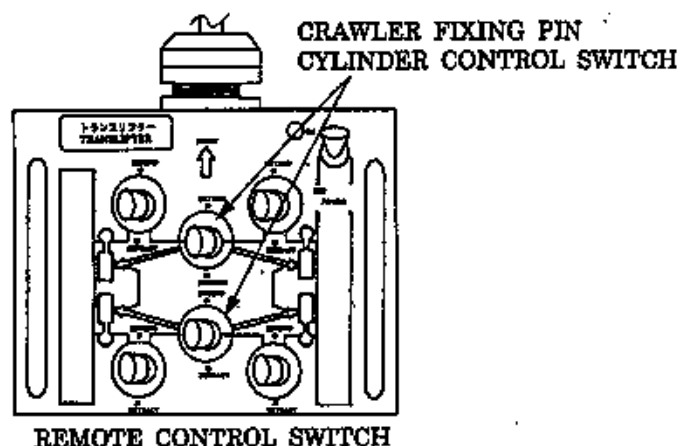
9. Remove the lock pin for the connecting pin.

10. Remove the fixing pins (2 pos.).

If they are hardly removed, align the pin holes with the assisting crane.

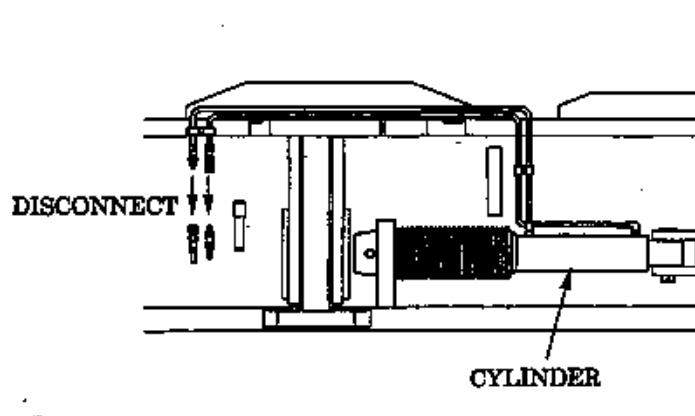


11. Operate the remote control switch, and completely remove the two crawler connecting pins.



12. Ensure that the connecting pins are completely removed, and stop the engine.

13. Remove the connecting pin removal/installation cylinder hose.

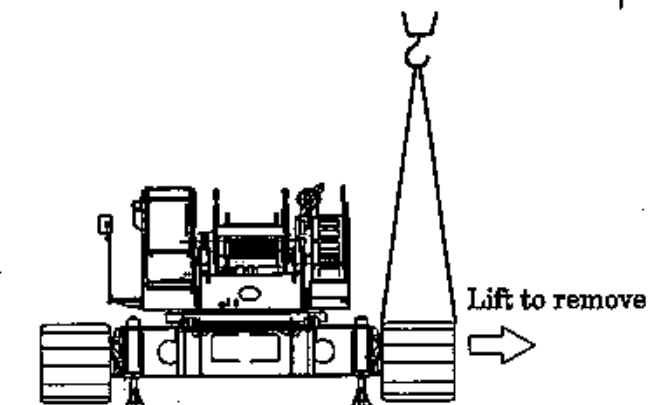


14. Lift the crawler with the assisting crane to move it away from the machine, and lay it onto the trailer or the ground.



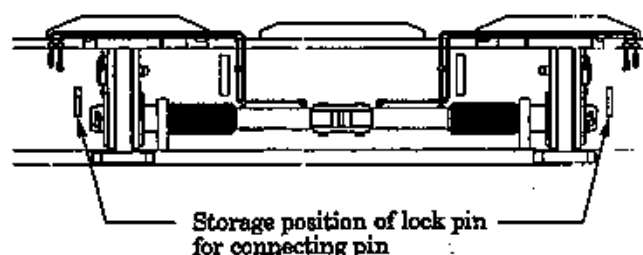
DANGER

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 loss of life.



15. Apply grease to the fixing pins, and insert them into the pin holes on the car body side. Then, lock them with the lock pins.

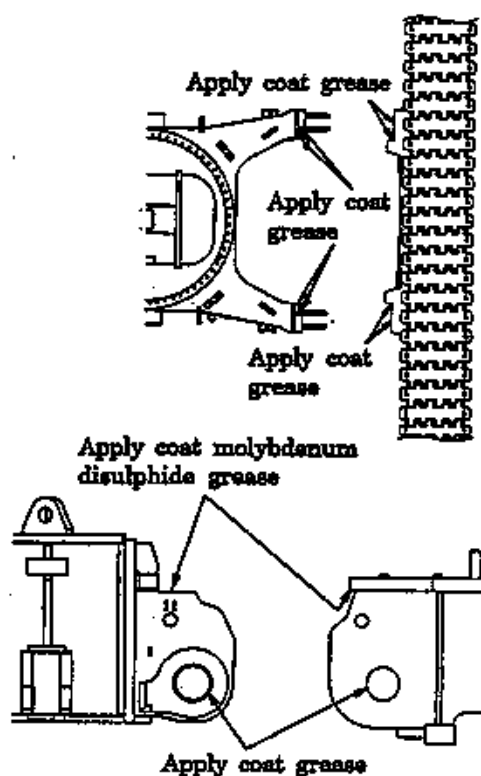
Store the lock pins for the connecting pins at the specified position on the crawler frame side, and lock them with the spring pins.



CAUTION

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 a crawler, use the hose for the other crawler.



DANGER

Do not swing the machine with only one crawler installed. Failure to observe this precaution may result in serious injury or loss of life.

5.2 RAISING/LOWERING THE MAST



CAUTION

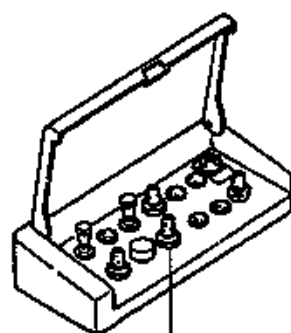
Place the boom on the ground when erecting or lowering the gantry.

Watch for tension of boom raising wire rope.

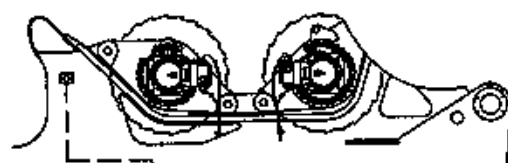
5.2.1 RAISING THE GANTRY AND MAST

Raising the gantry and mast 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 "MAST" position.
4. Turn the power switch ON, and set the gantry control switch to the "RAISE" position. Then, the gantry can be raised with the mast at a time.
5. Install the fixing pin "A" 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.

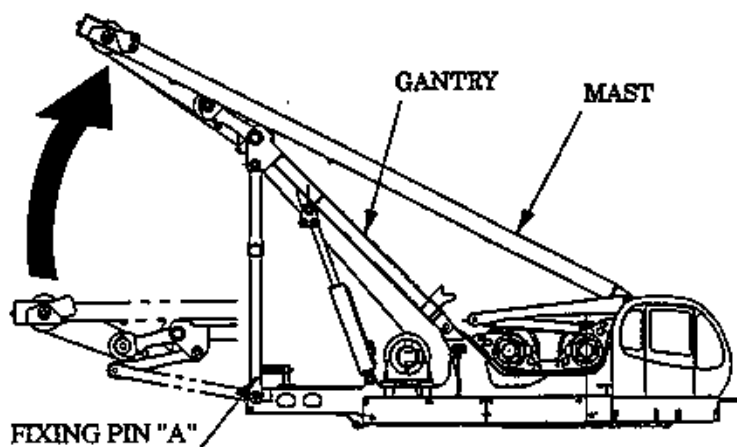
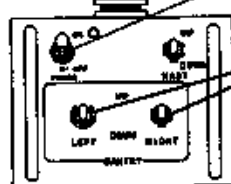


HYDRAULIC SELECTOR SWITCH



POWER SWITCH

GANTRY CONTROL SWITCH



CAUTION

Operate the boom hoist to keep the wire rope slack as the gantry and mast are raised or lowered.

Otherwise, the gantry, mast or boom hoist wire rope may be damaged.

6. Set the mast control switch to the "RAISE" position, and raise the mast by unwinding the boom hoist wire rope.

NOTE

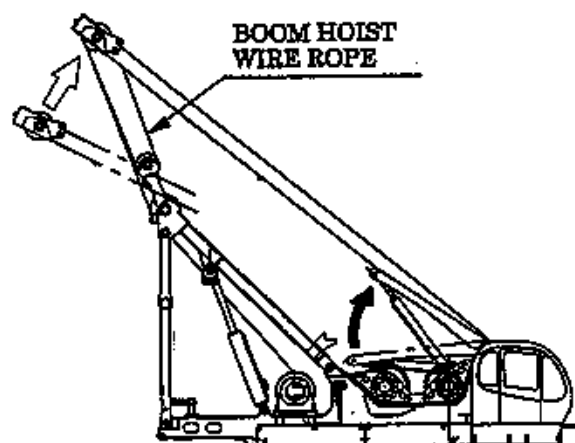
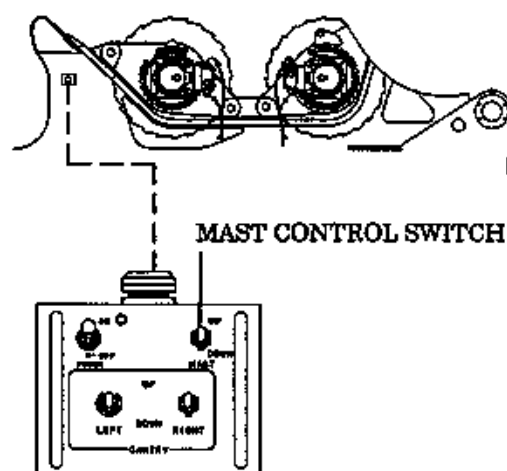
Unwind the boom hoist wire rope according to the raising of the mast. When the mast uprights, support it with the boom hoist wire rope.



CAUTION

Operate the boom hoist to keep the wire rope slack as the gantry and mast are raised or lowered.

Otherwise, the gantry, mast or boom hoist wire rope may be damaged.



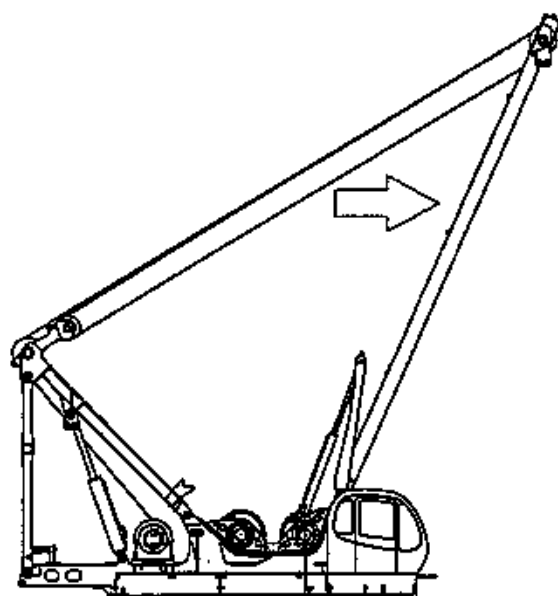
7. Slowly unwind the boom hoist wire rope to incline the mast forward.



CAUTION

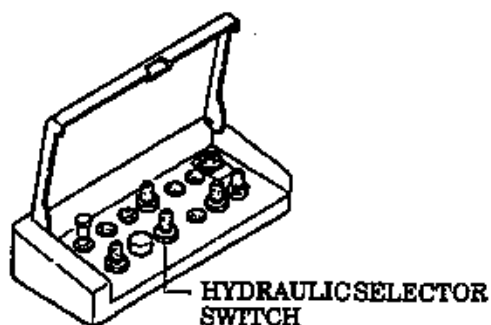
Keep the power select switch to the OFF position except mast assist arms or gantry operation.

Otherwise, the hydraulic valves may be damaged.



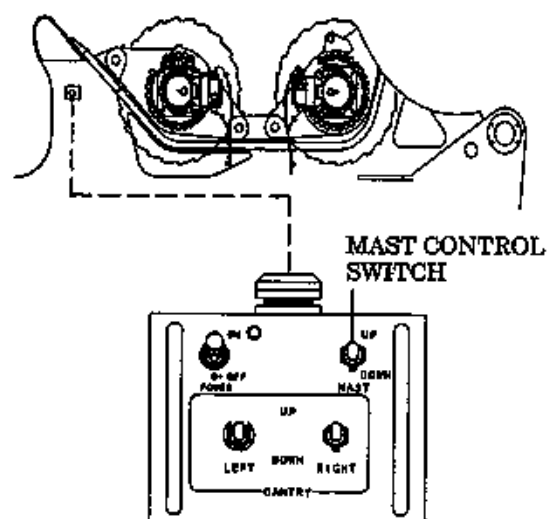
5.2.2 LOWERING THE MAST AND GANTRY

1. Set the hydraulic selector switch in the operator cabin side stand panel to "MAST" position.

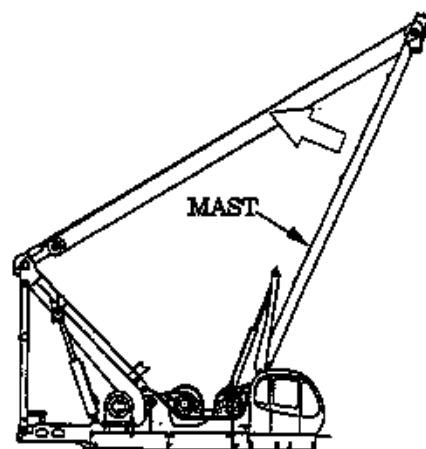


2. Turn the power switch ON. Then, set the mast control switch to the "RAISE" position, and fully raise the mast assist arms.

 DANGER
Fully raise the mast assist arms before raise the mast.
Mast may fall backwards if raised to vertical position when assist arms are down stored.
Failure to observe this precaution may result in serious injury or loss of life.



3. Wind the boom hoist wire rope to raise the mast against the mast assist arms.



- (4) Set the mast control switch to the "LOWER" position, and lower the mast until it rests on the gantry.

Wind the boom hoist wire rope with the lowering of the mast.



WARNING

Do not stand under the mast to avoid accident of being caught due to sudden drop of mast. Failure to observe this precaution may result in serious injury or loss of life.



CAUTION

Operate the boom hoist to keep the wire rope slack as the gantry and mast are raised or lowered.

Otherwise, the gantry, mast or boom hoist wire rope may be damaged.

NOTE

Turn the spreader to backwards by winding the boom hoist wire rope.

- (5) Fully lower the mast assist arms.

- (6) Hold the gantry with the gantry raising cylinder and remove the fixing pin "A".



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 loss of life.

- (7) Turn the gantry operating switch to "LOWER" and fully lower the gantry.

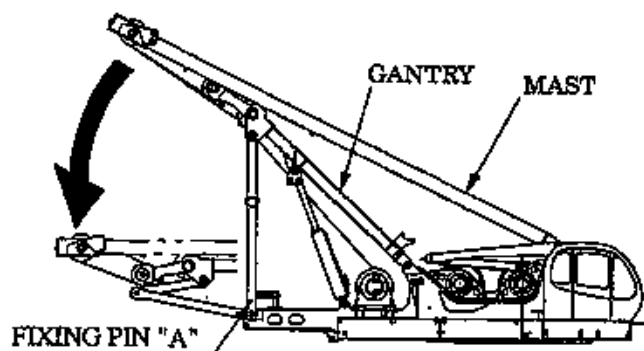
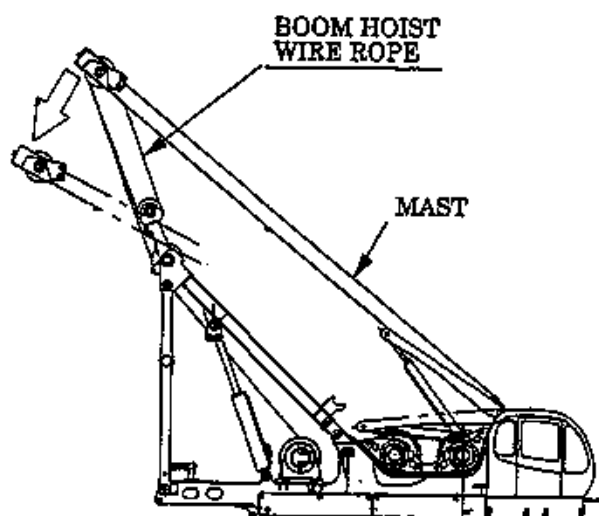
- (8) Turn the power switch "OFF".



CAUTION

Keep the power select switch to the OFF position except mast assist arms or gantry operation.

Otherwise, the hydraulic valves may be damaged.



5.3 INSTALLATION, REMOVAL OF THE COUNTERWEIGHT

The machine can be equipped with the nine counterweights and the two carbody weights.

Remove the counterweight at transportation.

Never use the weight which is not specified.

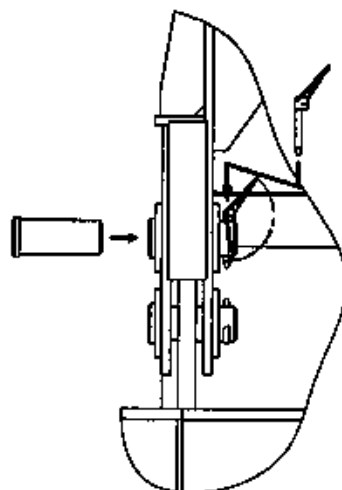
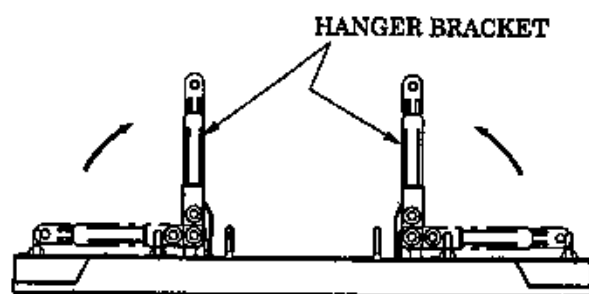
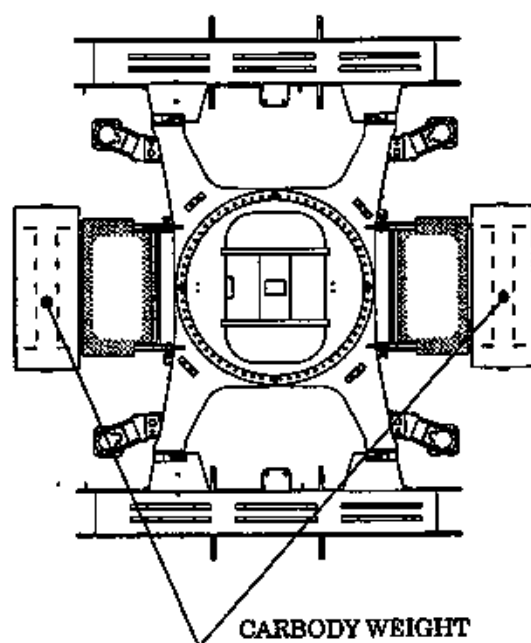
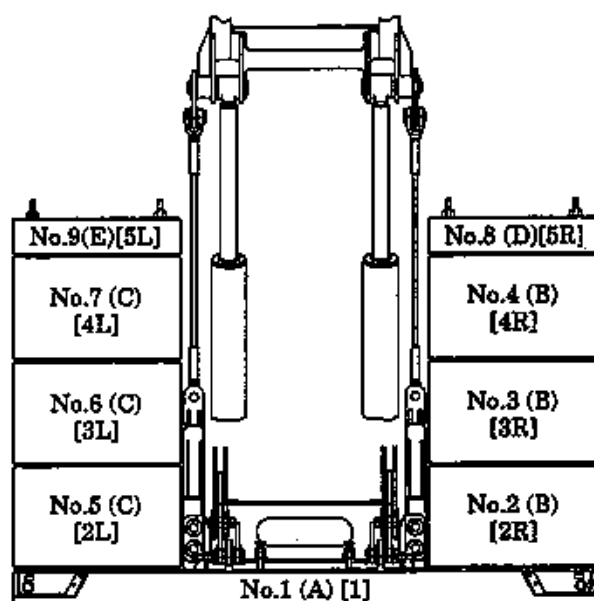
WEIGHT OF EACH SECTION

Section	Weight
No. 1 Weight (A) [1]	27,563 lbs (12.5 t)
No. 2 Weight (B) [2R]	22,050 lbs (10 t)
No. 3 Weight (B) [3R]	
No. 4 Weight (B) [4R]	
No. 5 Weight (C) [2L]	
No. 6 Weight (C) [3L]	
No. 7 Weight (C) [4L]	8,270 lbs (3.75 t)
No. 8 Weight (D) [5R]	
No. 9 Weight (E) [5L]	
Carbody weight	22,050 lbs (10 t)



CAUTION

To avoid the turnover of the machine, be sure to install the carbody weights before installing the weights.



5.3.1 INSTALLATION OF THE COUNTERWEIGHT

Prior to installation, check the following points of the basic machine.

- ① Gantry must be in the operating position.
- ② The basic machine is placed on the leveled and firm ground.



WARNING

Make sure machine is in stability range during swing and propel (refer to chapter 10) to avoid machine turn-over.

Failure to observe this precaution may result in serious accident.

- (Tool) :
- One set of attached tools.
 - Assisting crane (35 ton or 45 ton class)
 - Lifting wire rope 28 mm dia × 8 m 2sets

1. Installation of No.1 weight.

- (1) Loosen all the four bolts before installing the counterweight.

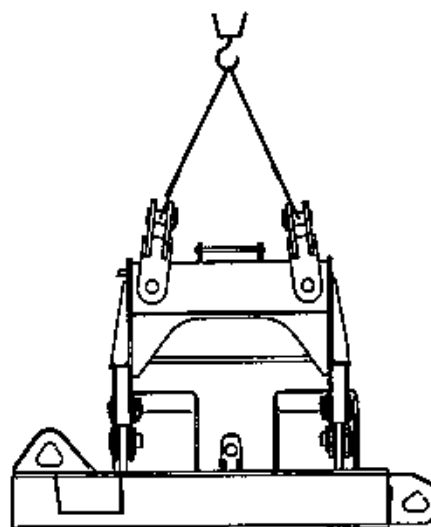
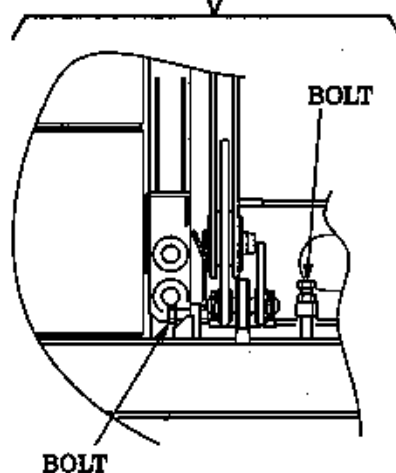
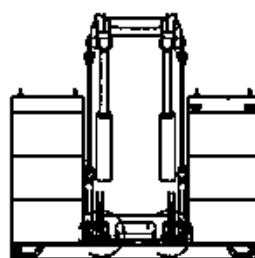
- (2) Install the lifting shackle to the lifting bracket of No.1 weight and lift it with the assisting crane.



DANGER

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

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

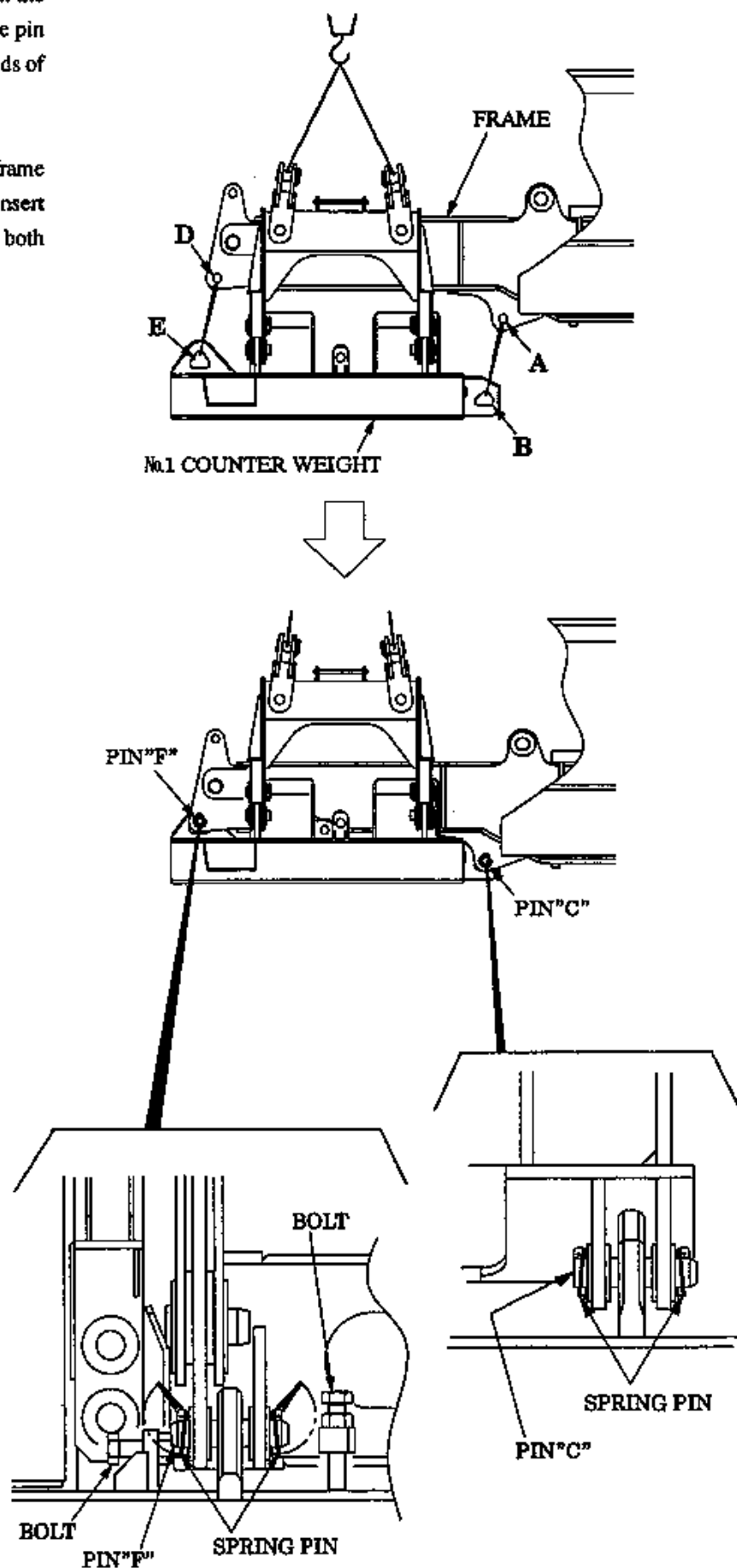


No. 1 COUNTER WEIGHT

(3) Align the pin hole "A" on the swing frame with the pin hole "B" on the No.1 weight, and insert the pin "C". Then, install the spring pins to the both ends of the pin "C".

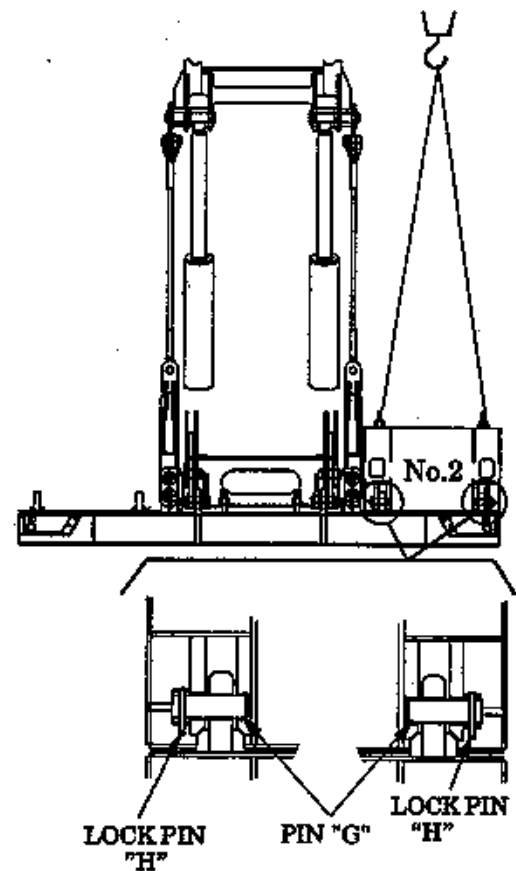
(4) Similarly align the pin hole "D" on the swing frame with the pin hole "E" on the No.1 weight, and insert the pin "F". Then, install the spring pins to the both ends of the pin "F".

(5) Tighten the bolts to fix the counterweight.



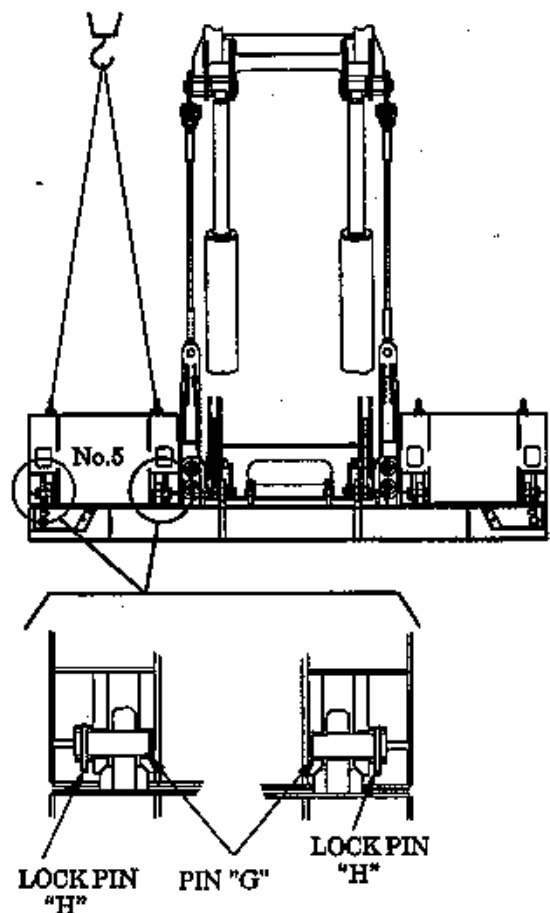
2. Installation of No.2 weight.

- (1) Lift No.2 weight with the assisting crane.
- (2) Place No.2 weight on No.1 weight in such way that the dented area of No.2 weight sit on the bracket of No.1 weight.
- (3) Insert the pin "G", and fix it with the lock pin "H".



3. Installation of No.5 weight.

- (1) Lift No.5 weight with the assisting crane.
- (2) Place No.5 weight on No.1 weight in such way that the dented area of No.5 weight sit on the bracket of No.1 weight.
- (3) Insert the pin "G", and fix it with the lock pin "H".



4. Installation of No.3, 6/No.4, 7/No.8, 9 weights
- Install other counterweights by following procedures similar to the above.
- To keep a good balance, install them to the right and left sides of the machine alternately.

5.3.2 REMOVAL OF THE COUNTERWEIGHT



DANGER

Do not stand under lifted counterweight or between counterweight and the basic machine to avoid accident of drop or being caught. Failure to observe this precaution may result in serious injury or loss of life.

1. Removal of No.9 weight

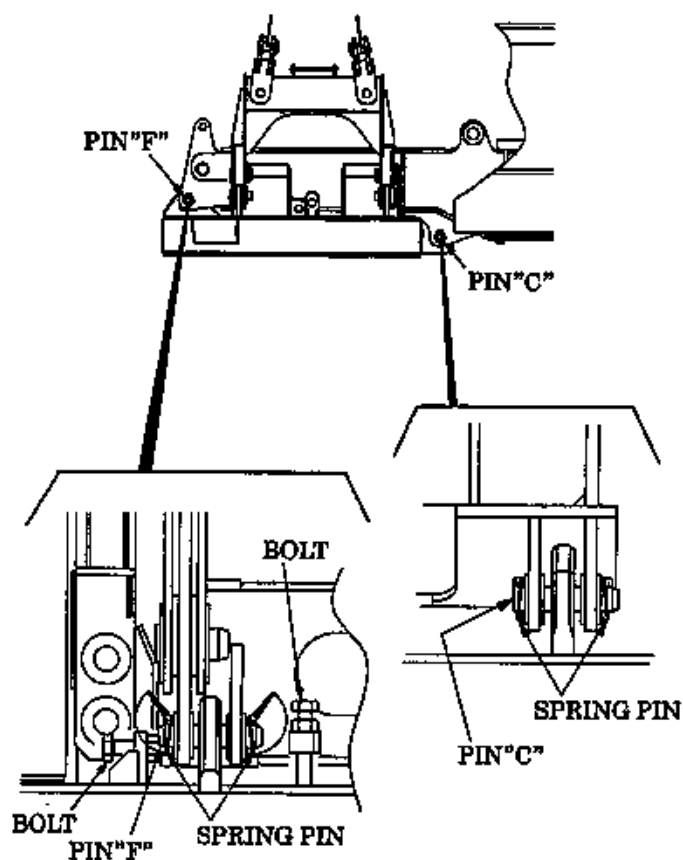
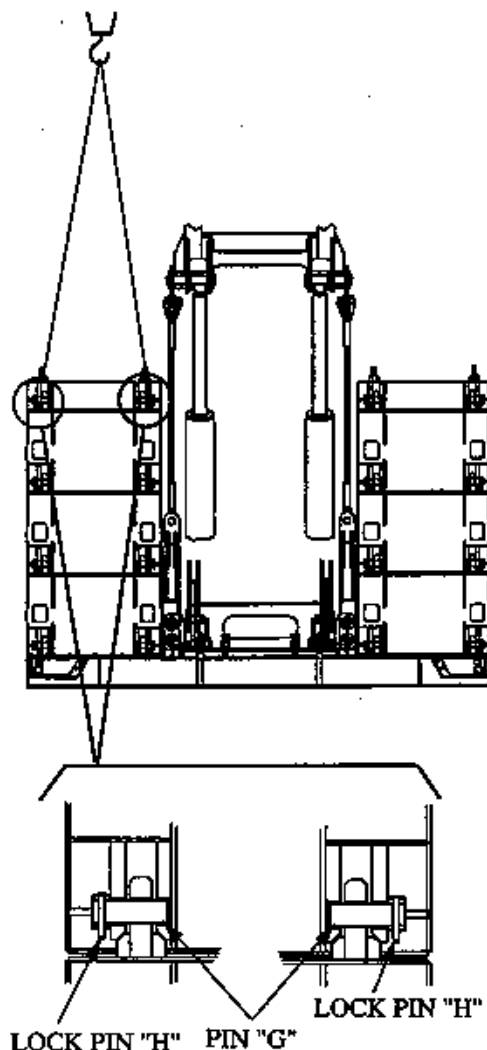
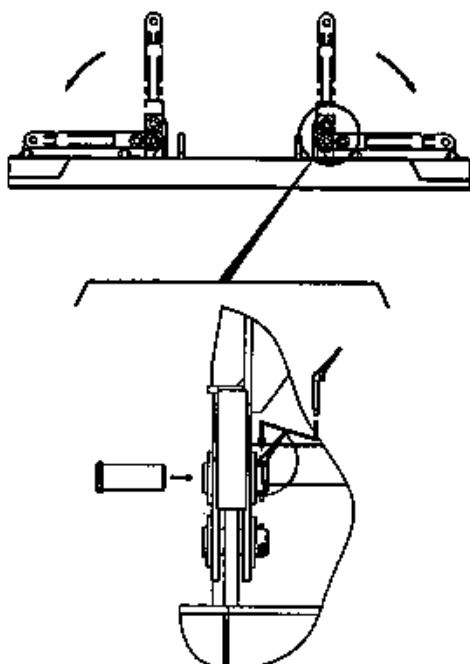
- (1) Lift the No.9 weight with the auxiliary crane, and remove the lock pin "H" and pin "G".
- (2) Remove the lifted No.9 weight from the machine.

2. Removal of No.8 to 2 weights

Similarly remove the No.8 to 2 weights.

3. Removal of No.1 weight

- (1) Lift the No.1 weight with the auxiliary crane. Remove the spring pin, lock pin "C", and pin "F".
- (2) Lower the No.1 weight onto the ground with the auxiliary crane.



5.3.3 INSTALLATION AND REMOVAL OF THE CARBODY WEIGHT



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 loss of life.

1. Installation of carbody weight

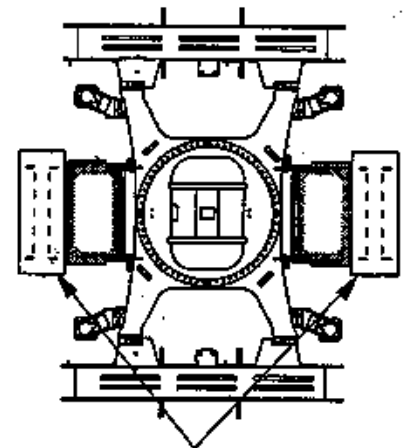
- (1) Lift the carbody weight with the assisting crane, and install it by hooking it to the bracket.

- (2) Insert the pin "J", and fix it with the split pin.

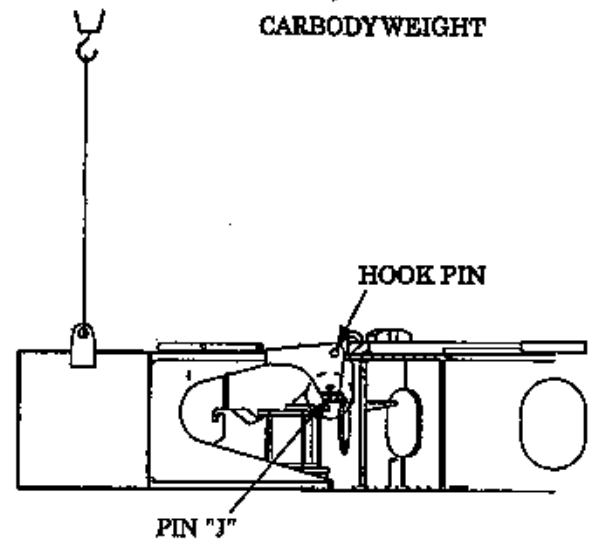
2. Removal of carbody weight

- (1) Support the carbody weight with the auxiliary crane, and remove the pin "J".

- (2) Remove the hook pin, and lower the weight onto the ground.



CARBODYWEIGHT



6. ASSEMBLY/DISASSEMBLY OF CRANE 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.

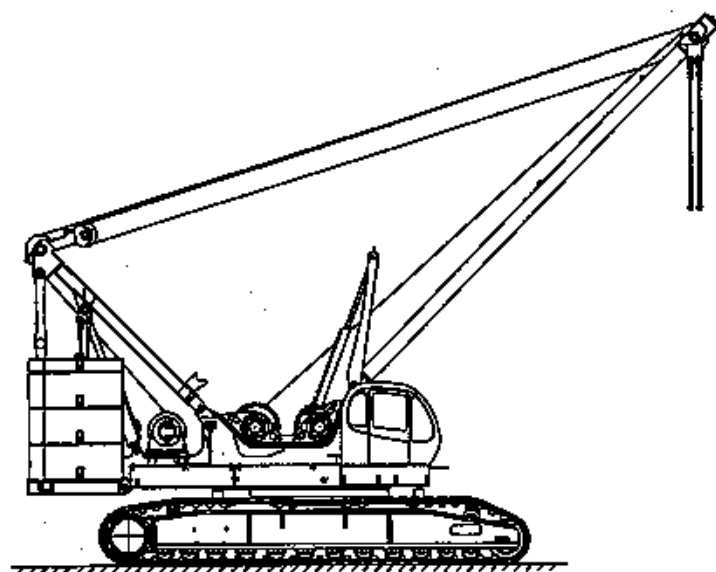
NOTE

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 (car body weight) shall be attached.

(2) Mast shall be raised.





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 loss of life.



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 loss of life.



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.

6.1 ASSEMBLING THE ATTACHMENT



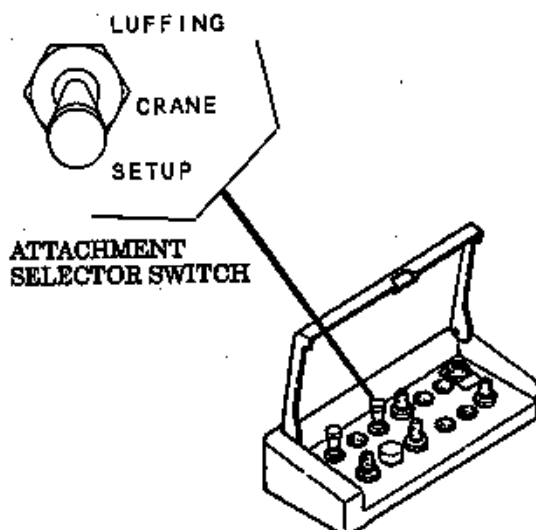
CAUTION

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 ton class)
- Sling cloths
- Lifting wire rope (fiber belt)
- Steel bar [$\phi 13/16$ inch $\times$ 12 inch ($\phi 20 \times 300$ mm)]

When assembling the crane attachment, set the "ATTACHMENT SELECTOR SWITCH" to the "SETUP" side.



6.1.1 ARRANGEMENT OF BOOM/JIB/GUY LINE

(1) PREPARATION OF BOOM/JIB/GUY LINE AND STEEL BLOCKING PLATE

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.	90 ft to 250 ft (27.4 m to 76.2 m)
Length of boom to which auxiliary sheave can be attached.	50 ft to 300 ft (15.2 m to 91.4 m)



WARNING

Do not use damaged boom section.

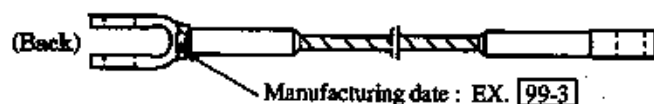
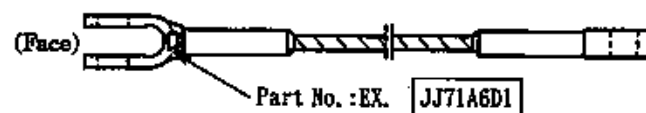
The damaged booms may collapse and cause serious injury or loss of life.

② Guy Line

Prepare the guy lines following the arrangement chart as the same as the boom/jib.

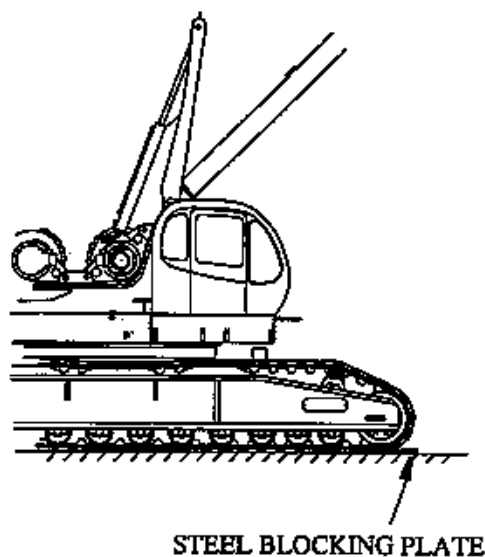
The diameter of the boom guy line is 34 mm (1.34 inch), and that of the jib guy line is 26 mm (1.02 inch).

To discriminate each guy line, see the part number stamped on the connector part.



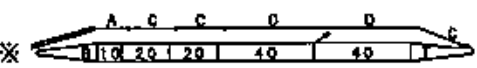
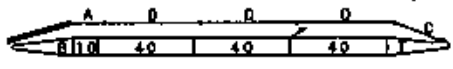
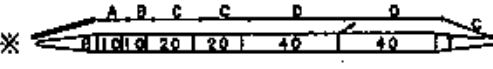
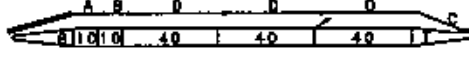
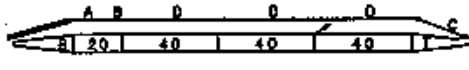
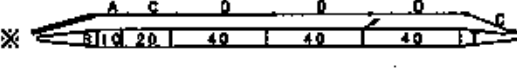
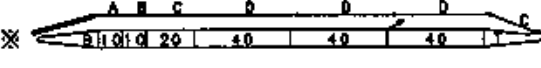
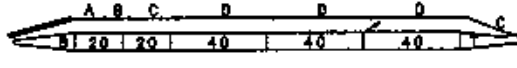
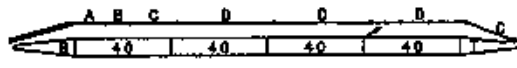
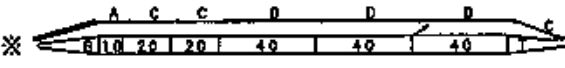
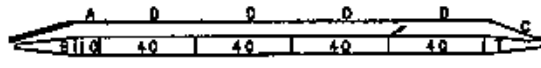
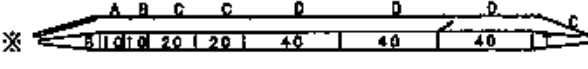
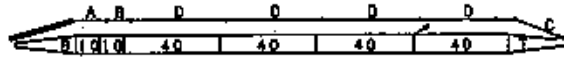
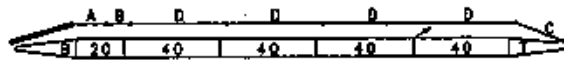
③ Steel Blocking Plate

For the combination of the boom of 290 feet (88.4 m) length or over, place steel plates between the ends of the crawlers and the ground.



Boom Length ft(m)	Boom and Guy Line Arrangement Chart(2/4)	With Aux. Sheave	With Jib	Main Hoist	Aux. Hoist
				Reeving (Parts of Line)	Reeving (Parts of Line)
120 (36.6)	※	○	○	10	1
130 (39.6)	※ 	○	○	9	1
140 (42.7)	※ 	○	○	9	1
150 (45.7)	※ 	○	○	8	1
160 (48.8)	※	○	○	8	1
170 (51.8)	※ 	○	○	8	1

○ : Attachable × : Not Attachable

Boom Length ft(m)	Boom and Guy Line Arrangement Chart(3/4)	With Aux. Sheave	With Jib	Main Hoist	Aux. Hoist
				Reeving (Parts of Line)	Reeving (Parts of Line)
180 (54.9)	 	○	○	7	1
190 (57.9)	  	○	○	7	1
200 (61.0)		○	○	6	1
210 (64.0)	  	○	○	6	1
220 (67.1)	 	○	○	6	1
230 (70.1)	  	○	○	5	1

○ : Attachable × : Not Attachable

Boom Length ft(m)	Boom and Guy Line Arrangement Chart(4/4)	With Aux. Sheave	With Jib	Main Hoist	Aux. Hoist
				Reeving (Parts of Line)	Reeving (Parts of Line)
240 (73.2)	※	○	○	5	1
250 (76.2)	※	○	○	4	1
260 (79.3)	※	○	×	4	1
270 (82.3)	※	○	×	4	1
280 (85.3)	※	○	×	4	1
290 (88.4)	※	○	×	4	1
300 (91.4)	※	○	×	4	1

○ : Attachable × : Not Attachable

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

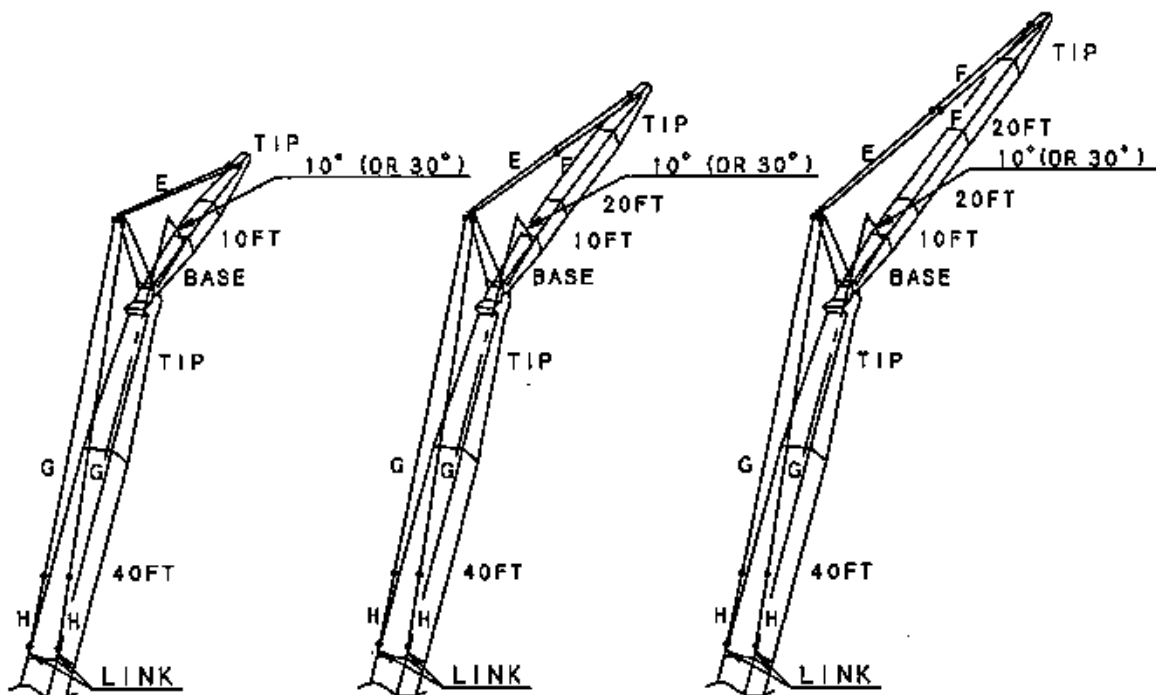
※ mark shows the standard boom arrangement which makes the boom arrangement of less than the each boom length possible.

Kind of Insert Boom	
Symbol	Boom Length
10	10 ft (3.0 m)
20	20 ft (6.1 m)
40	40 ft (12.2 m)

Boom Guy Line Chart					
Symbol	Guy Line Dimension		Part Number	Remarks [ft (m)]	Connector Type
	Diameter (mm)	Length ft (m)			
A	ø34	14.4 (4.39)	JJ71A00007D3	Tip Boom	
B	ø34	10 (3.05)	JJ71A00006D1	10 (3.0) Insert Boom	
C	ø34	20 (6.10)	JJ71A00006D2	20 (6.1) Insert Boom	
D	ø34	40 (12.19)	JJ71A00006D4	40 (12.2) Insert Boom	

JIB AND GUY LINE ARRANGEMENT

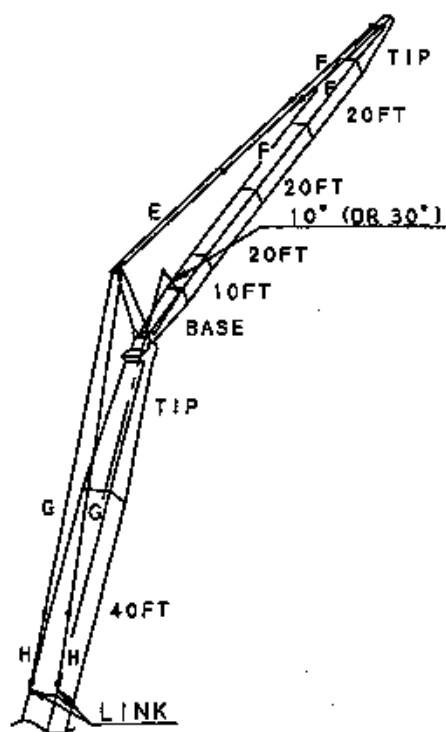
The length of the boom to which the jib is attached is 90 feet (27.4 m) to 250 feet (76.2 m).



40ft Jib

60ft Jib

80ft Jib



100ft Jib

Arrangement of Guy Line in Boom Side	
Boom Arrangement	(Boom Tip + 40 ft) Arrangement
10°	G
30°	G + H

H: Additional guy line when the offset angle is 30°

Arrangement of Guy Line in Jib Side			
40 ft Jib	60 ft Jib	80 ft Jib	100 ft Jib
E	E + F	E + F + F	E + F + F + F

Kind of Guy Line			
Symbol	Diameter (mm)	Length (ft (m))	Part Number
E	ø26	87.2 (26.58)	2430R307D2
F	ø26	38.5 (11.73)	2430R302D28
G	ø26	65.9 (20.08)	2430R302D36
H	ø26	5.3 (1.63)	2430R302D21

6.1.2 INSTALLING THE BOOM BASE



DANGER

Do not stand under, inside, or on the boom when installing or removing the connector pins. Failure to observe this precaution may result in serious injury or loss of life.

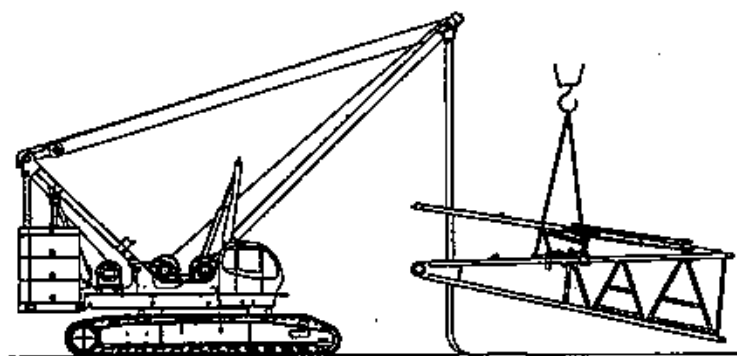
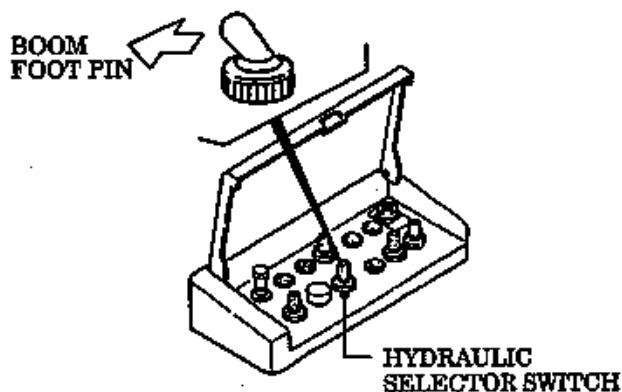
Before starting work, confirm the machine condition.

- The base machine must be placed on a firm and level ground.
- (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) Using the assisting crane, lift up the boom base, and install it to the basic machine. Lift up the boom horizontally right and left.
 - (3) Align the both boom foot pins with the holes surely.



WARNING

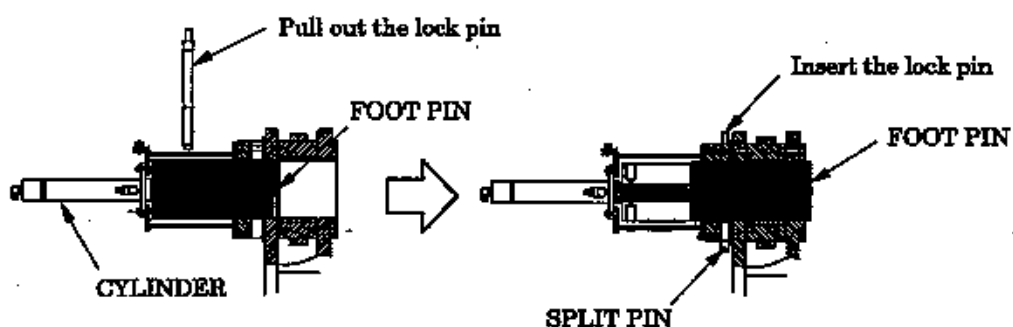
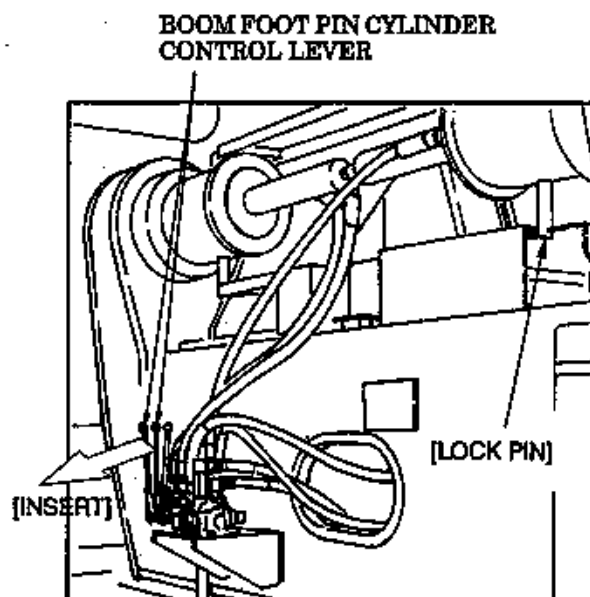
Do not insert your hand or finger to pin hole to align or check holes. Failure to observe this precaution may result in serious injury or loss of life.



(4) 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 (backward) to insert the foot pins.

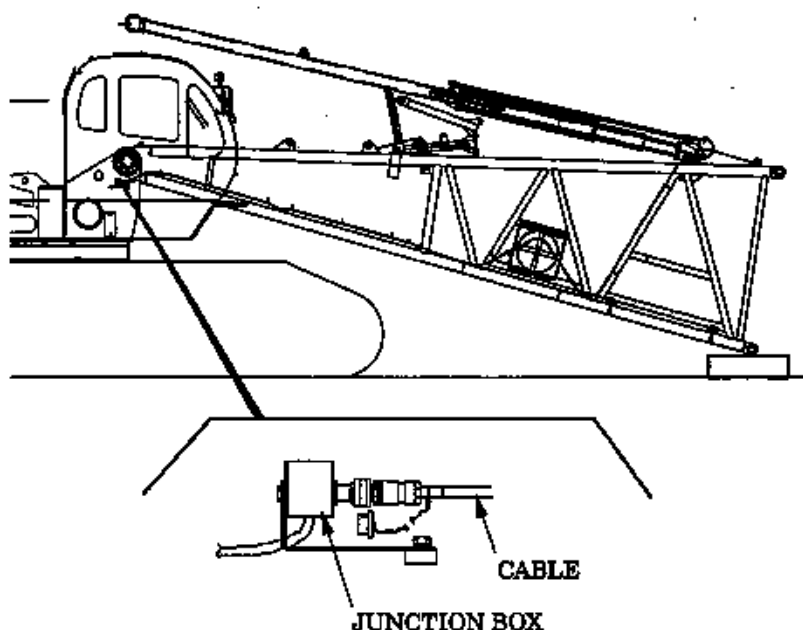
(5) Insert the lock pins from upside, and lock them with the fixing pins.

	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 loss of life.	



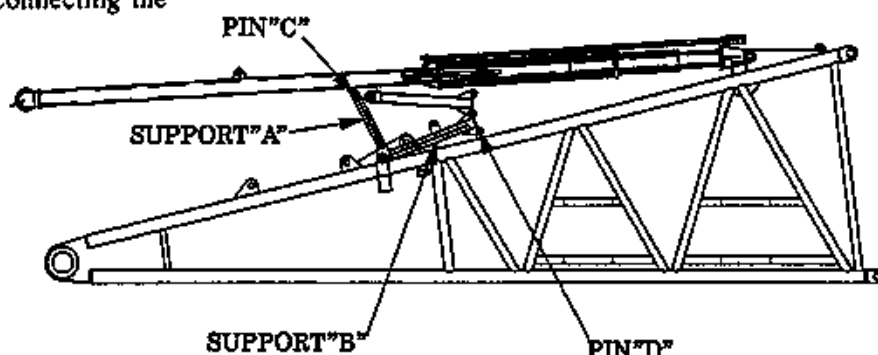
The figures above show the right side foot pin only.

(6) After connecting the boom base, connect the overhoist limit switch wiring to the attachment junction box.



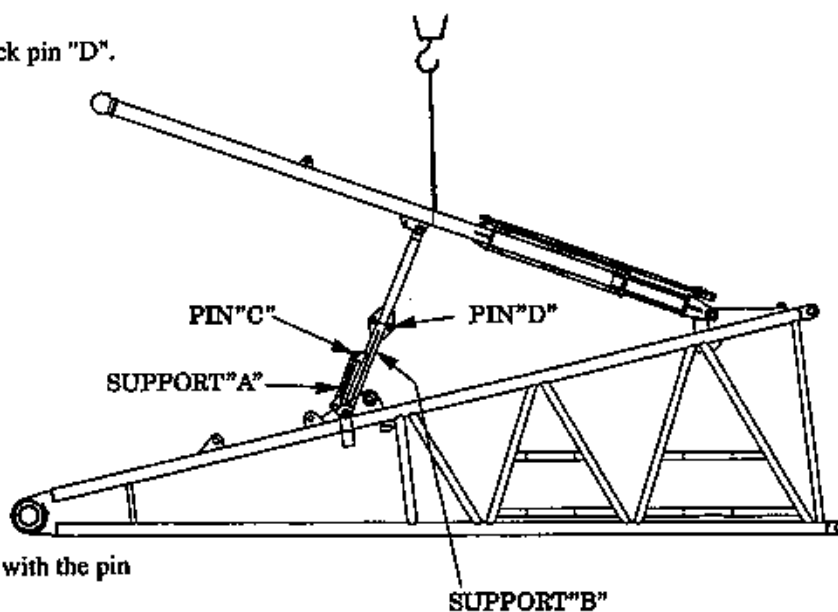
6.1.3 SETTING THE BACKSTOP AND GUIDE ROLLER

1. Support the one side backstop with the auxiliary crane, and remove the pin "C" connecting the support "A" with the backstop.



2. Remove the support lock pin "D", and lift the backstop with the auxiliary crane so that the support "B" is extended.

3. Fix the support "B" with the support lock pin "D".

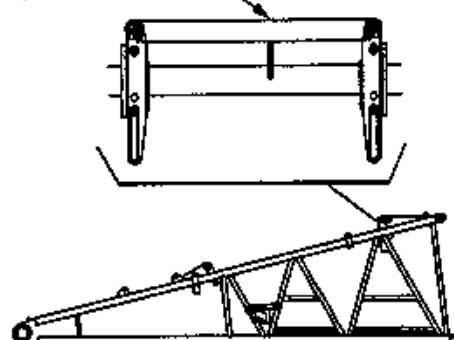


4. Fix the support "A" to the support "B" with the pin "C".

5. Similarly perform assembly for the other side.

6. Set the guide roller at low position.

GUIDE ROLLER
(LOW POSITION)



6.1.4 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.

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.



WARNING

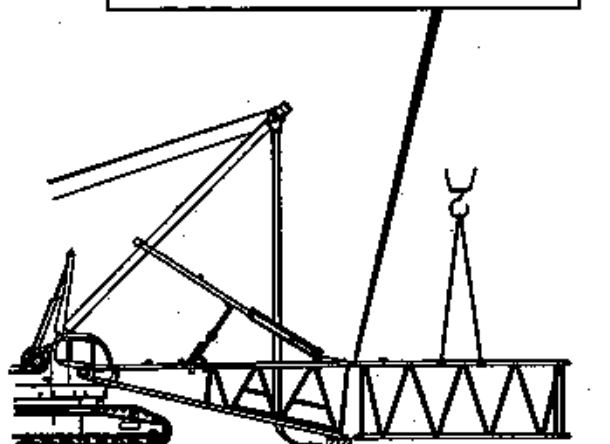
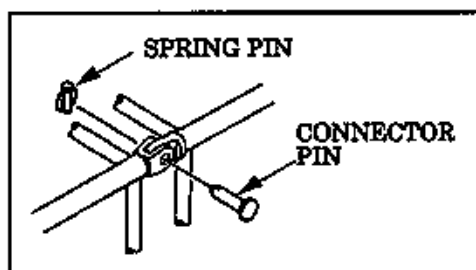
Do not insert your hand or finger into pin hole. Failure to observe this precaution may result in serious injury or loss of life.



DANGER

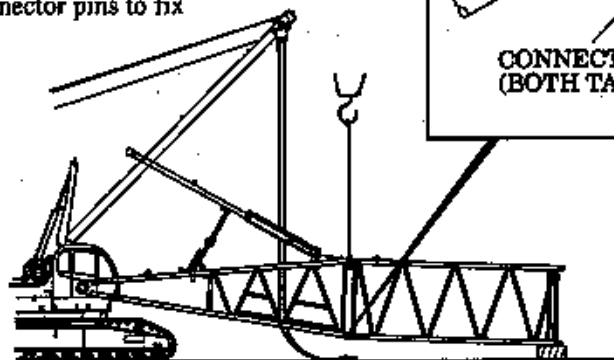
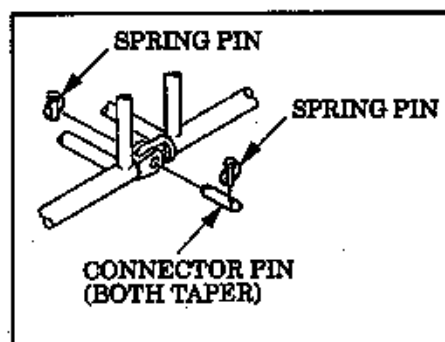
- Do not stand under the boom or inside the boom structure when removing the connector pins.
- Do not climb, stand, or walk on boom.
- Use a ladder or similar device to reach only necessary areas.

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

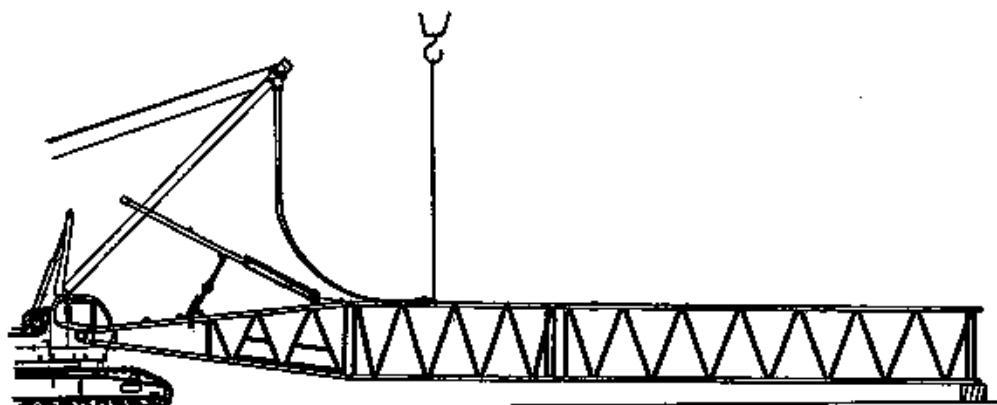


3. Lifting up the connecting section of the base boom and the insert boom, align the bottom connector pin holes, and insert the connector pins (both ends of which are tapered) into these holes.

Insert the spring pins into the connector pins to fix them.



- Referring to the boom and guy line arrangement chart, connect the insert booms in order in the same way.
- Raise the guy line from the mast onto the boom with the auxiliary crane.



6.1.5 INSTALLING THE BOOM TIP

- Align the top 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.



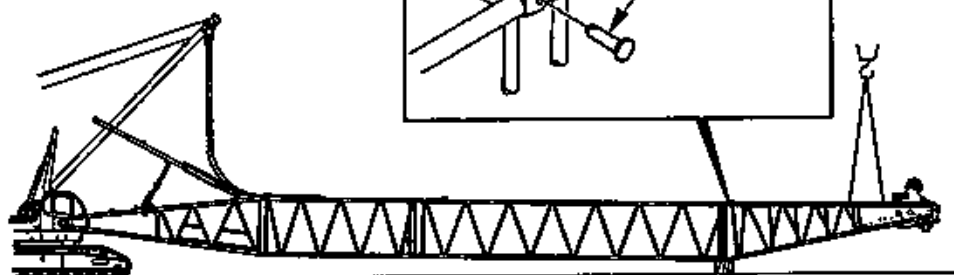
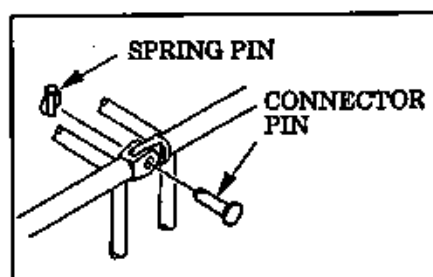
NOTE

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



WARNING

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

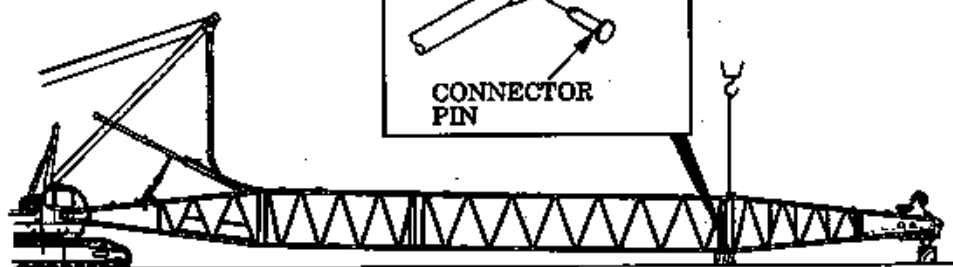
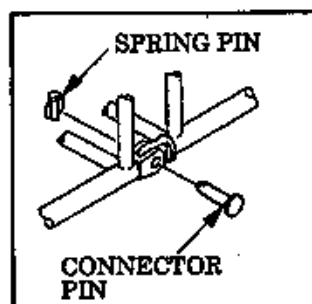


2. Hoist the insert boom until the lower pin holes are aligned with each other. Only then, tap the connector pins (pin with brim) in, and insert the spring pins into the both ends of the connector pin.



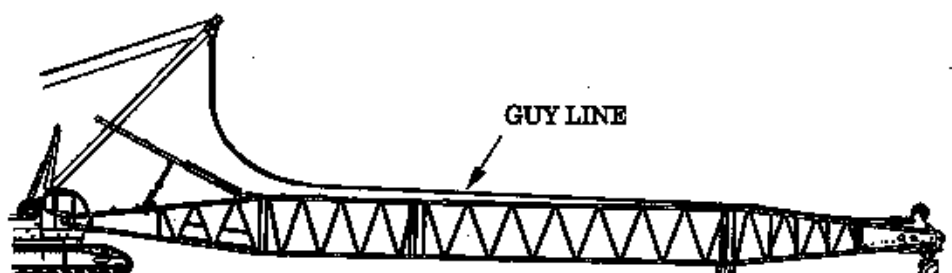
DANGER

Do not stand under, inside, or on the boom structure when connecting insert boom. Failure to observe this precaution may result in serious injury or loss of life.



6.1.6 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 mast.



3. Slowly slacken the boom raising wire rope, and lower the mast to the height at which the guy lines can be attached.



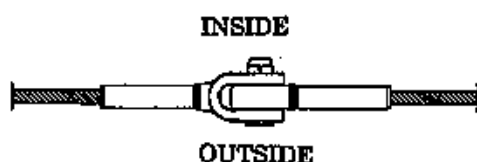
WARNING

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

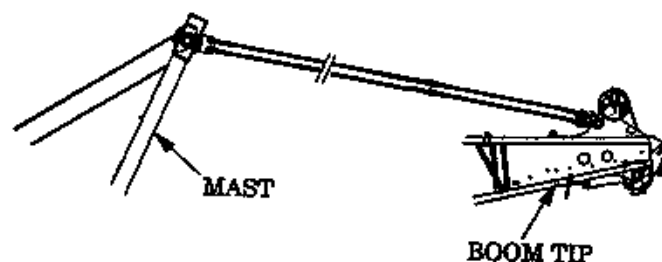
To prevent the wire rope from being caught on, insert the guy line connecting pin from inside to the outside.



DANGER

Fully lower the mast assist arms to the backwards before raising the boom. Mast will buckle and may collapse if the mast contacts the assist arms.

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



6.1.7 MAIN HOIST WIRE ROPE REEVING



WARNING

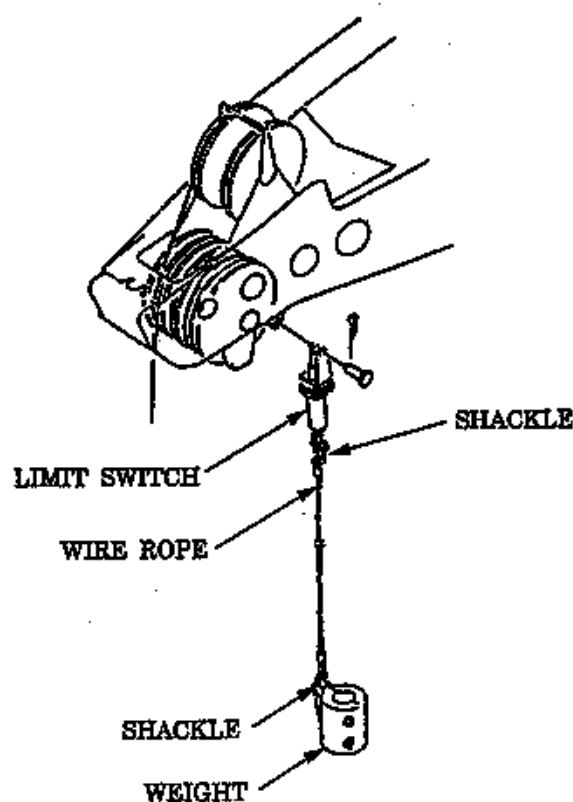
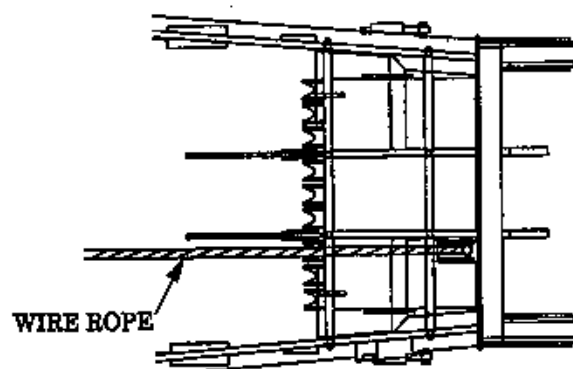
To prevent personnel from being caught by the rope, be sure to post a signal person. Failure to observe this precaution may result in serious injury or loss of life.



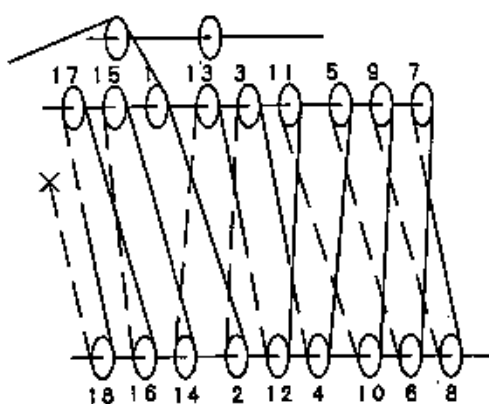
WARNING

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 loss of life.

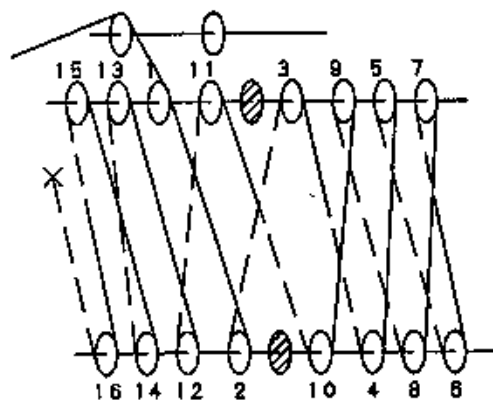
1. Prepare the hook, overhoist limit switch, weight and socket, etc. to used near the tip end of the boom.
2. Operating the front drum control lever to the lowering side to pay out the wire rope to the tip end of the boom, pass it through the third sheave from the right of the boom point.
3. Install 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.



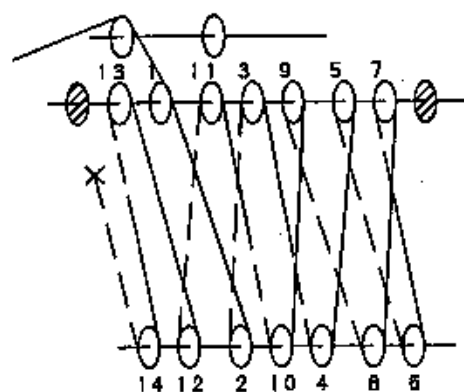
CK2500 WIRE ROPE REEVING



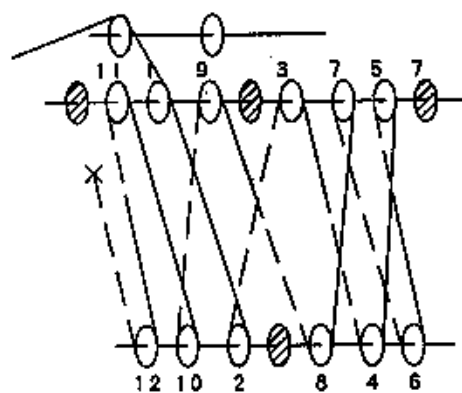
18 Parts
(Reeving in "S"
at 4 places)



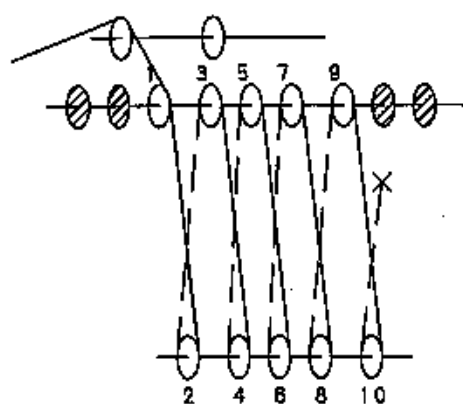
16 Parts
(Reeving in "S"
at 4 places)



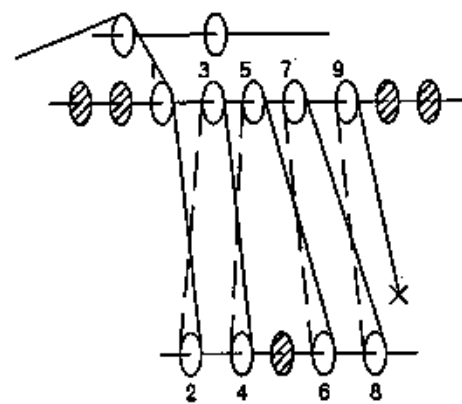
14 Parts
(Reeving in "S"
at 4 places)



12 Parts
(Reeving in "S"
at 4 places)



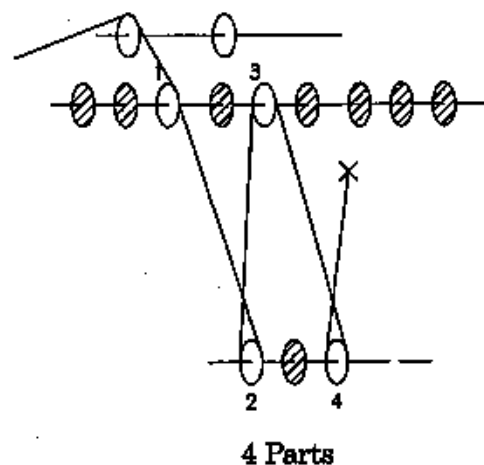
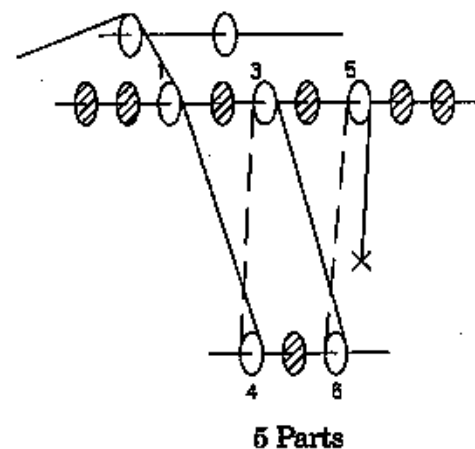
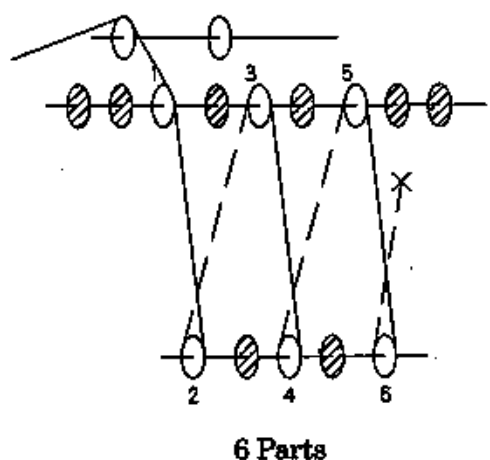
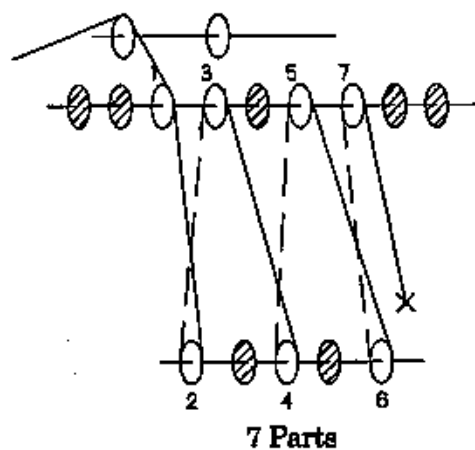
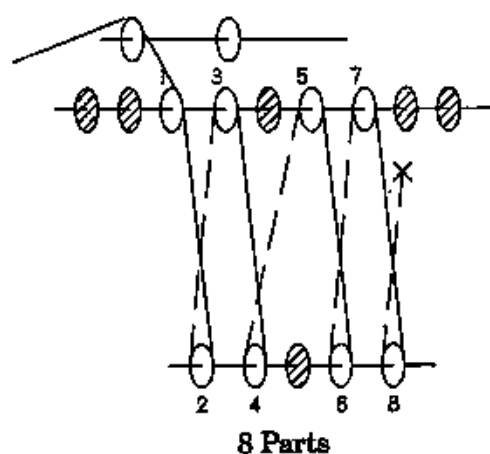
10 Parts



9 Parts

(Above figures are viewed from tip side.)

CK2500 WIRE ROPE REEVING



Note: Sheaves with shadows are not used for this reeving configuration.

(Above figures are viewed from tip side.)

6.1.8 ASSEMBLING THE JIB

For arrangement of the jib and guy line, see page 6-10 and 6-11.

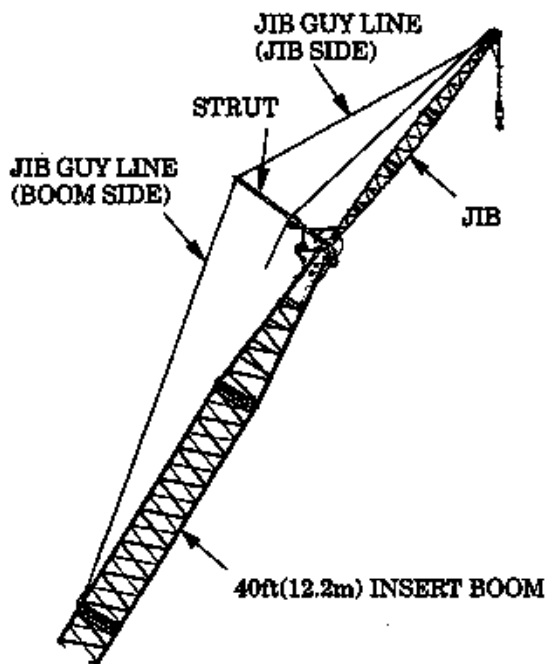
The boom length to which the jib can be attached is 90 ft (27.4 m) to 250 ft (76.2 m).



DANGER

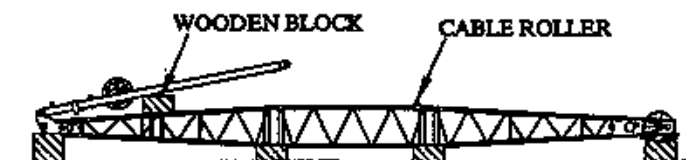
Do not stand or work under, inside or on the jib structure when assembling jib.

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

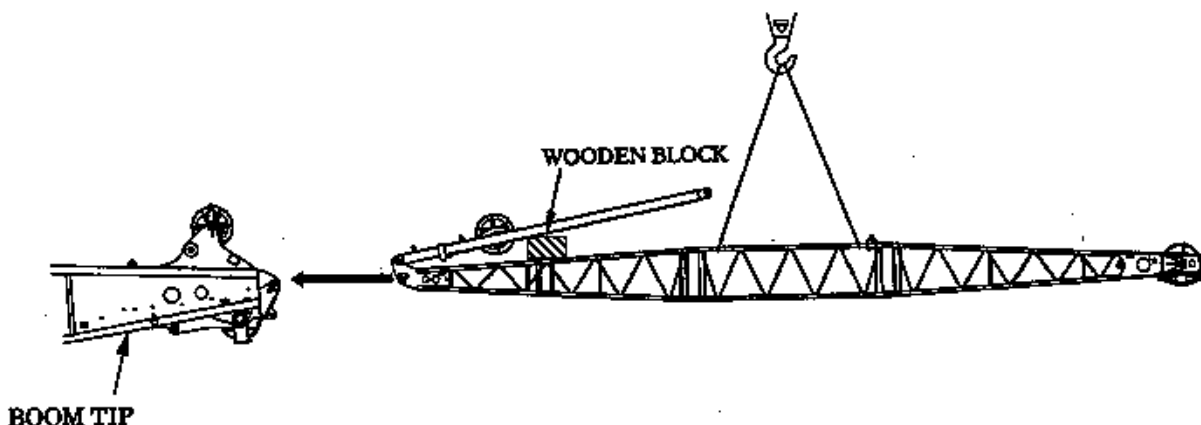


1. Assemble the jib on the extended boom top, and install the cable roller to the insert boom just under the upper jib.

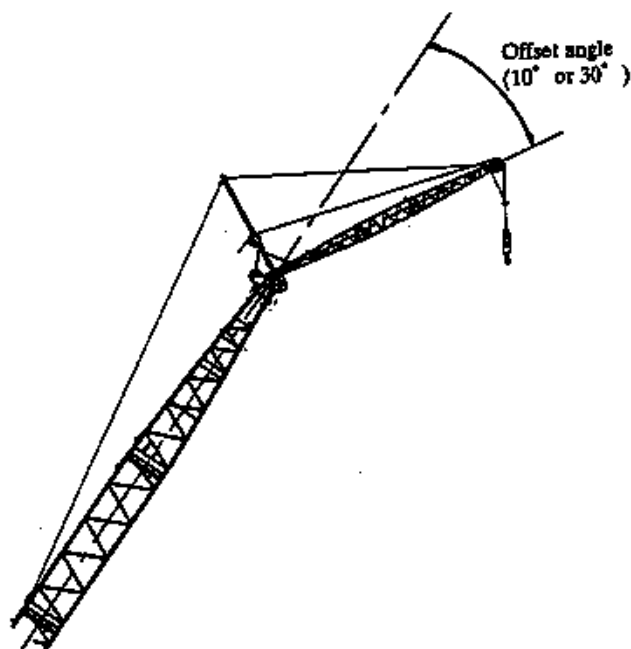
The jib connecting pins are all pins with brim.



2. Lifting up the preassembled jib, connect it to the boom tip section.



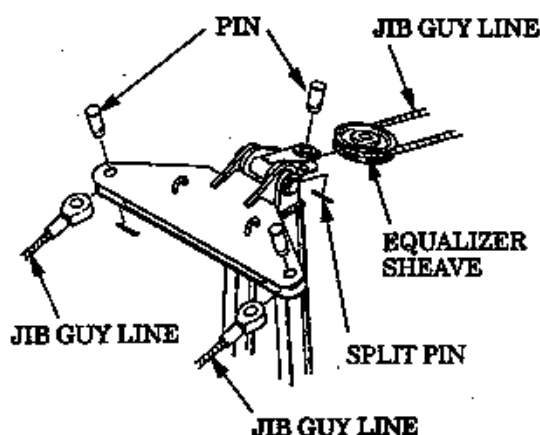
3. Prepare the jib guy lines (the jib side and boom side).
 - The length of the jib guy line of the jib side varies according to the jib length.
 - The length of the jib guy line of the boom side varies according to the jib offset angle (10° or 30°).



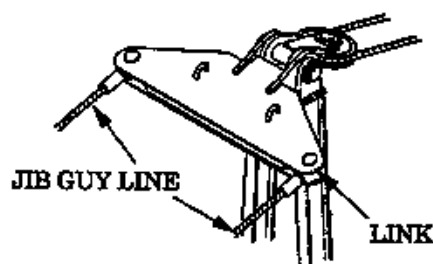
4. Remove the equalizer sheave on the jib side of the strut by pulling the pin out.
5. Insert the jib guy line to the sheave frame as shown.
6. Set the jib guy line back to the original location through the sheave groove.

NOTE

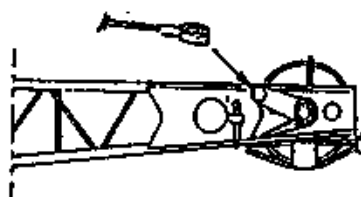
Do this work by two persons.



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.



9. Raise the strut with the assisting crane and install the strut back stop and jib back stop.

NOTE

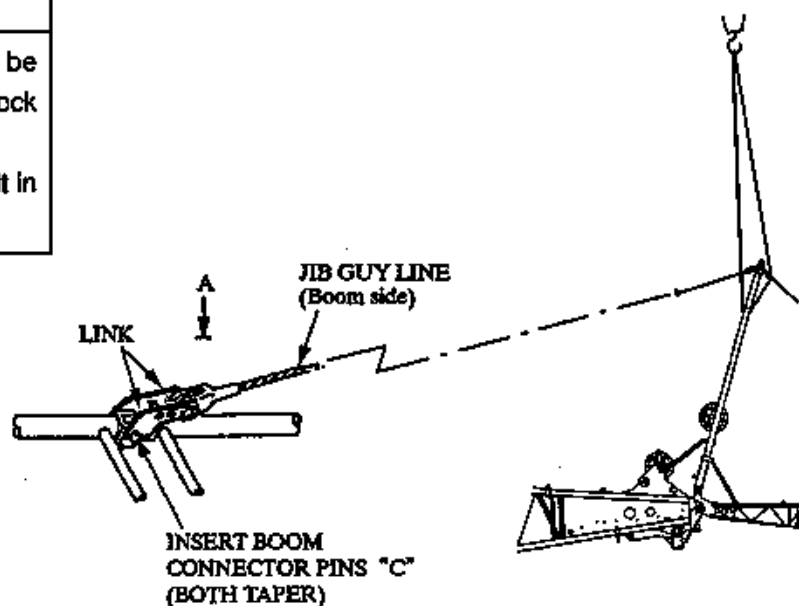
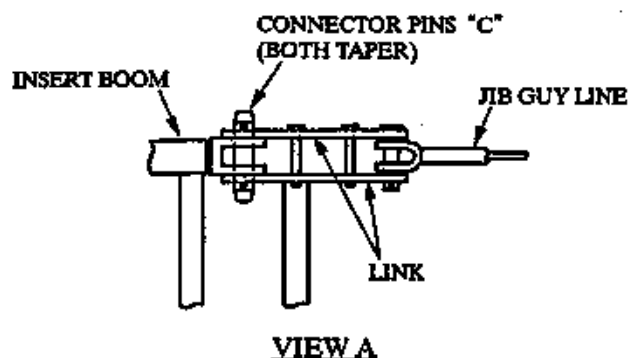
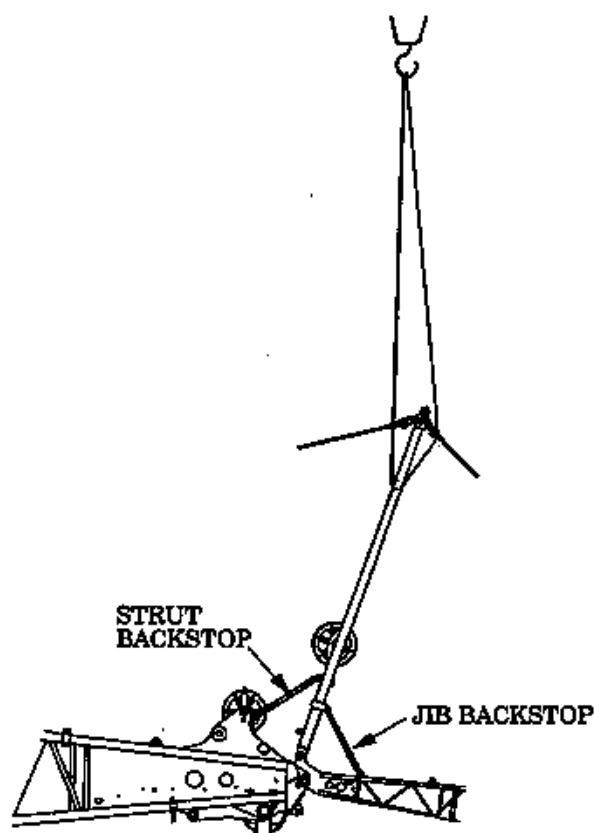
Use the long pin (both ends tapered pin) for link as the connector pin for the insert boom to the link.

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 loss of life.



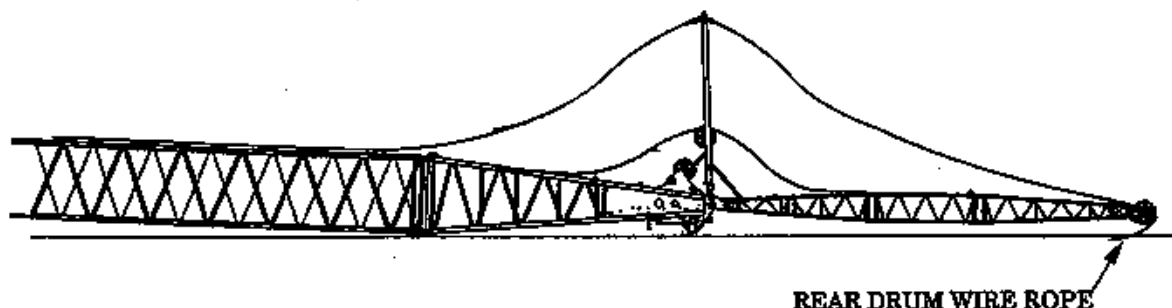
6.1.9 REEVING OF REAR DRUM WIRE ROPE



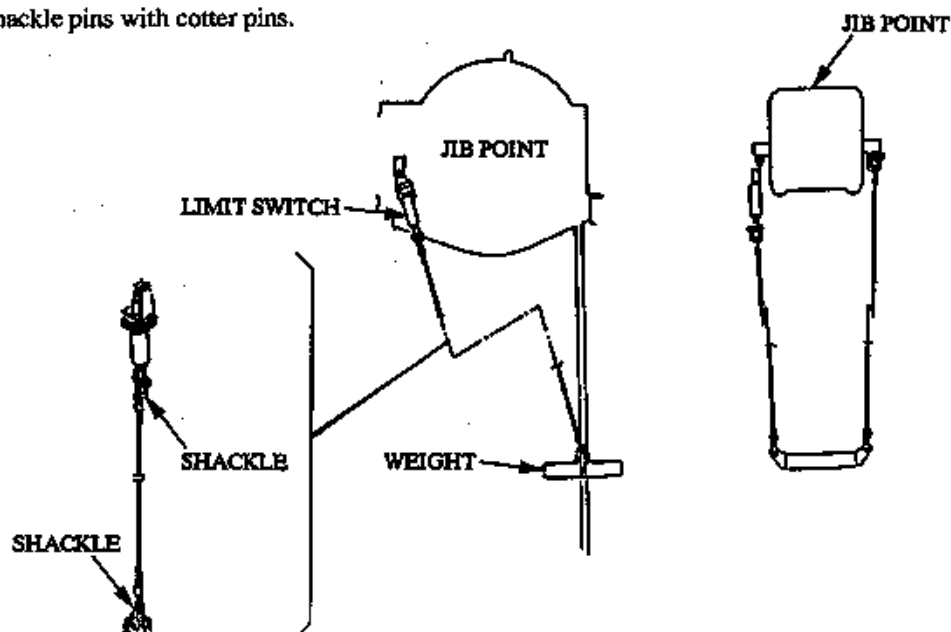
WARNING

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 loss of life.

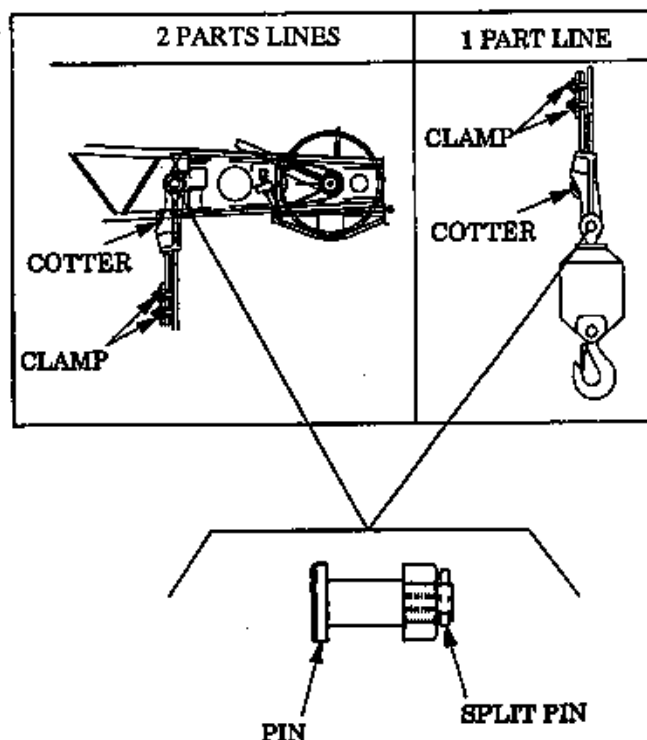
1. Place the hook near the tip end of the jib.
2. Push the rear drum control lever to the lowering side to pay out the rear drum wire rope to the tip end of the jib, and pass it through the jib point sheave.



3. Install the limit switch and weight to the jib point section.
Lock the shackle pins with cotter pins.



4. 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 Section 3 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 loss of life.



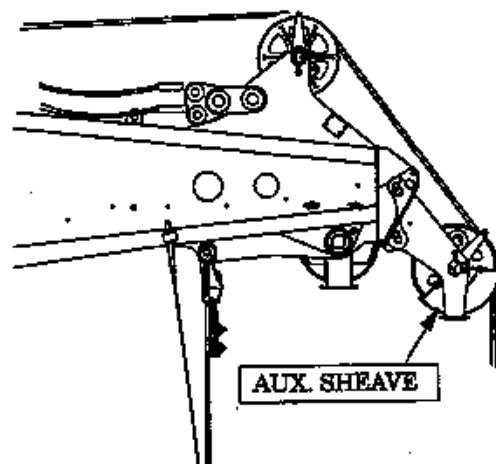
CAUTION

Check the performance of the anti-two-block alarm system.

6.1.10 INSTALLING THE AUXILIARY SHEAVE

The boom lengths with which the auxiliary sheave can be installed is 50 ft (15.3 m) to 300 ft (91.4 m).

Weight: 608 lbs (276 kg)



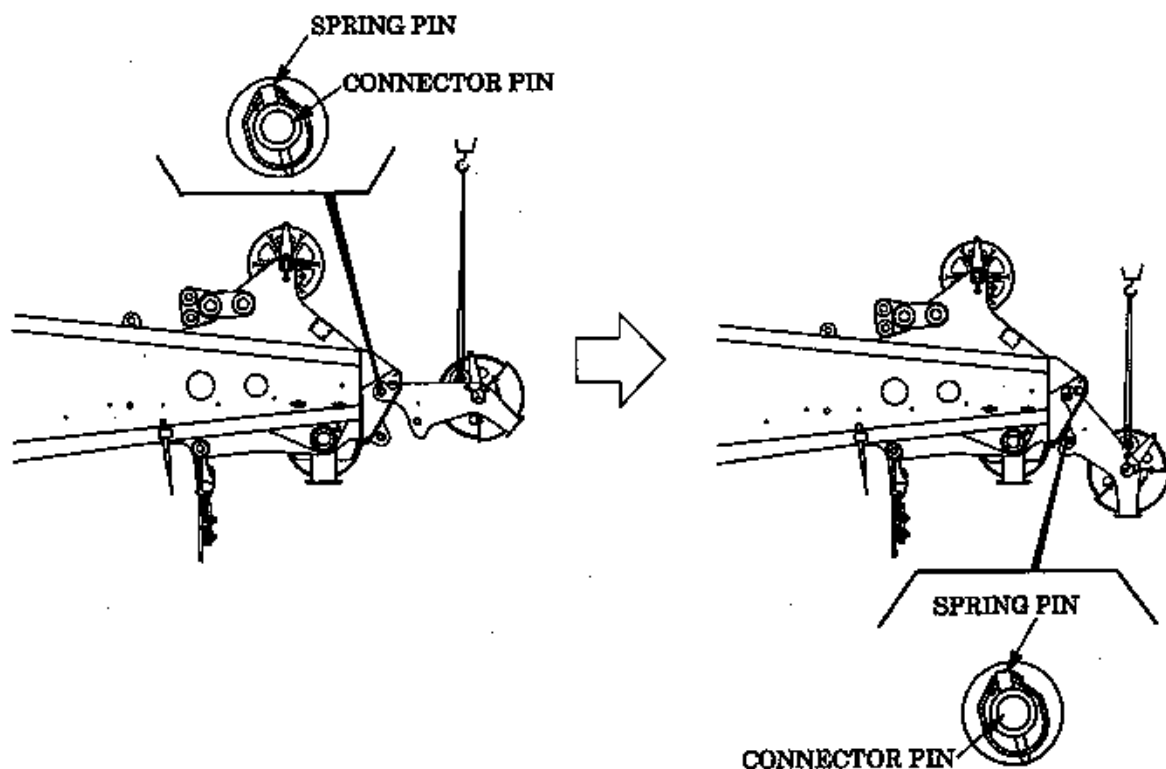
1. Lift the auxiliary sheave with the assisting crane. Then, fix it to the boom top with the pins, and lock them with spring pins (2 pos., both upper and lower sides).



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 loss of life.



6.1.11 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.

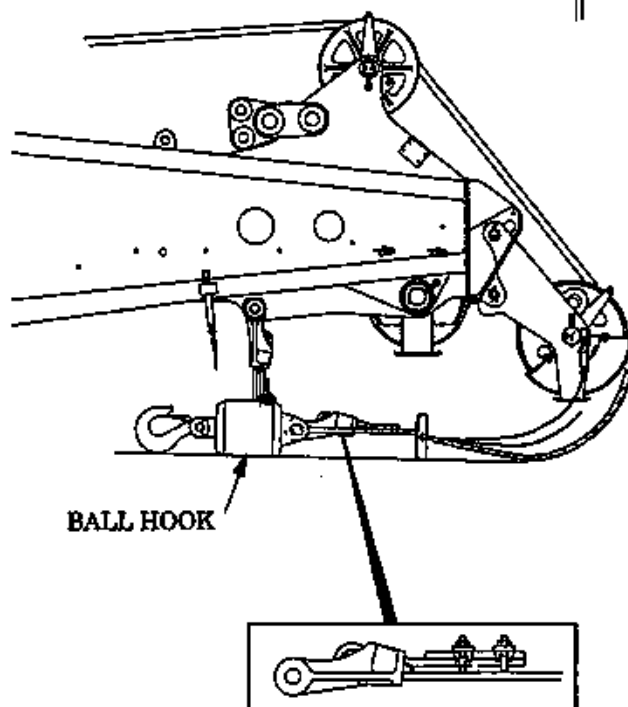
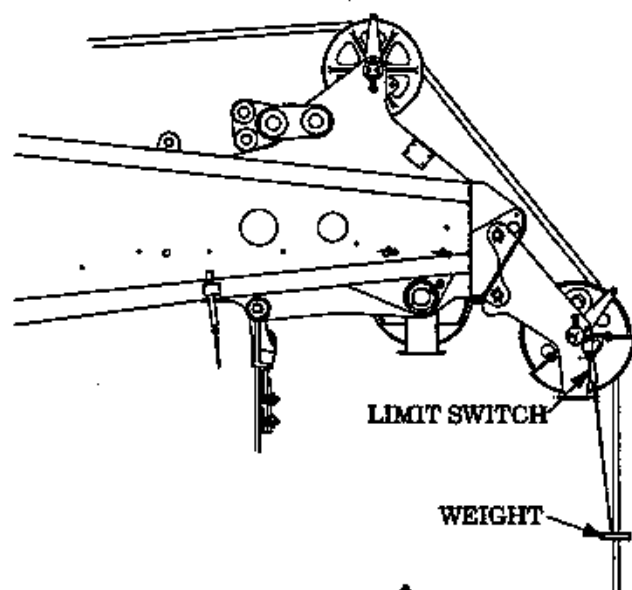
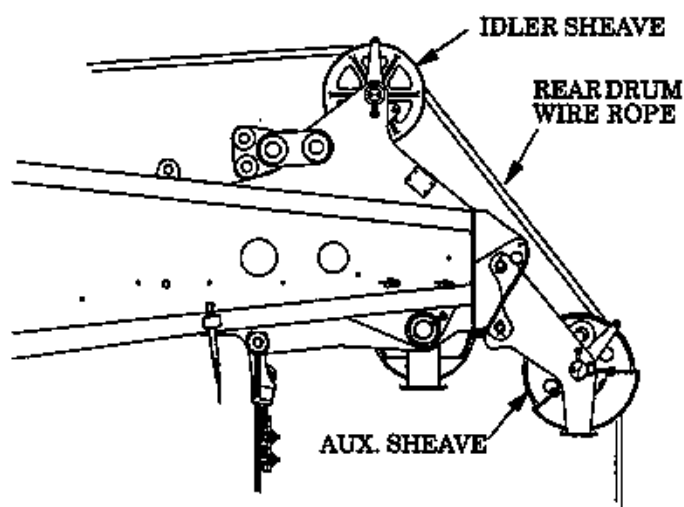


WARNING

- Do not touch a wire rope directly with bare hands. If wire protrude, you could be injured. Working gloves are recommended.
- Keep away from rope end when removing the wire rope. It may suddenly jump and cause injury.
- Keep hands and clothing clear of the rotating drum and running wire rope. Failure to observe this precaution may result in serious injury or loss of life.

The number of the wire rope part line for the auxiliary sheave must be always one.

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 Safety Device.

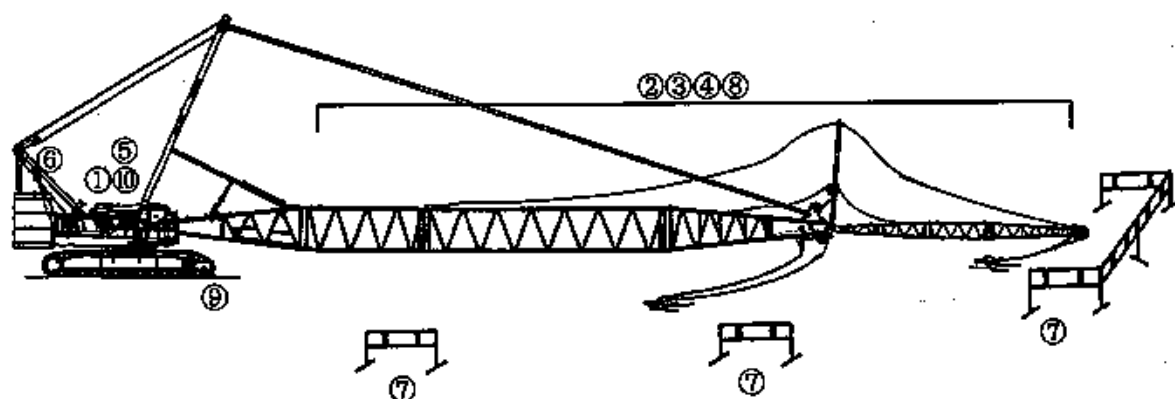


6.2 ERECTING THE ATTACHMENT

6.2.1 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 Mast assist arms are in the fully lower position.
- ⑥ Power select switch for mast and gantry is in the OFF position.
- ⑦ The off limiting step to the surrounding area of the attachment was taken,
- ⑧ The wirings for the boom, main and auxiliary hook overhoist limit switches correctly connected,
- ⑨ For the combination of the boom of 290 feet (88.4 m) length and over, place blocking steel plates between the ends of the crawlers and the ground.
- ⑩ The ATTACHMENT SELECTOR SWITCH is set to the "CRANE" side.



6.2.2 ERECTING THE ATTACHMENT



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 loss of life.

(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.

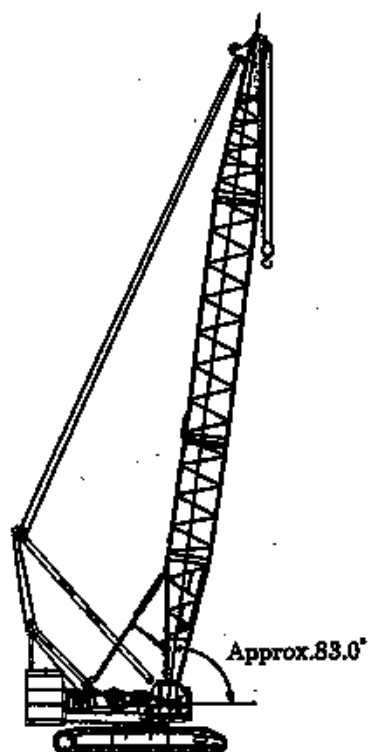
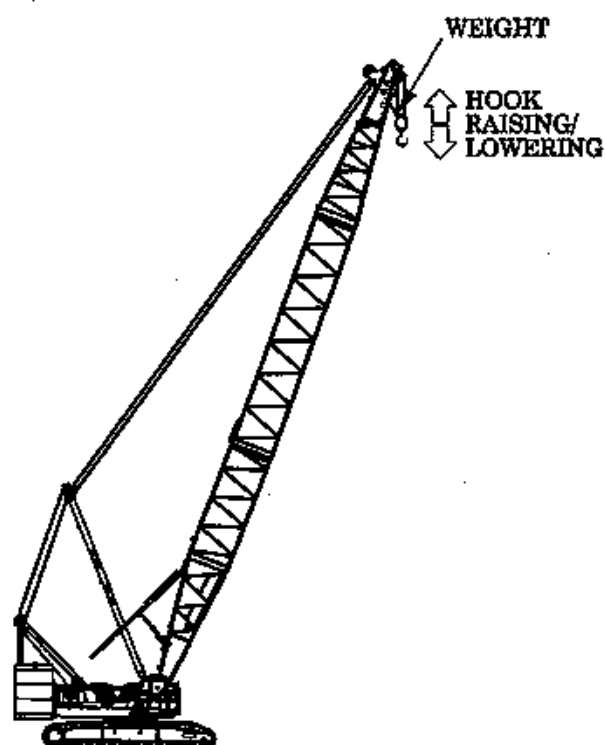
(3) Operate the boom hoist control lever toward the RAISING side to raise the boom slowly.

(4) Paying close attention to catching and kink of the hoist wire rope, raise the hook.

(5) 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 83.0 degrees of boom angle, boom raising must be stopped.



6.3 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 290 feet (88.4 m) length and over, place steel plates between the ends of the crawlers and the ground.



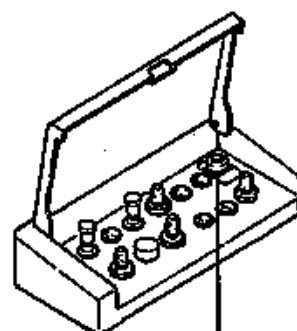
WARNING

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

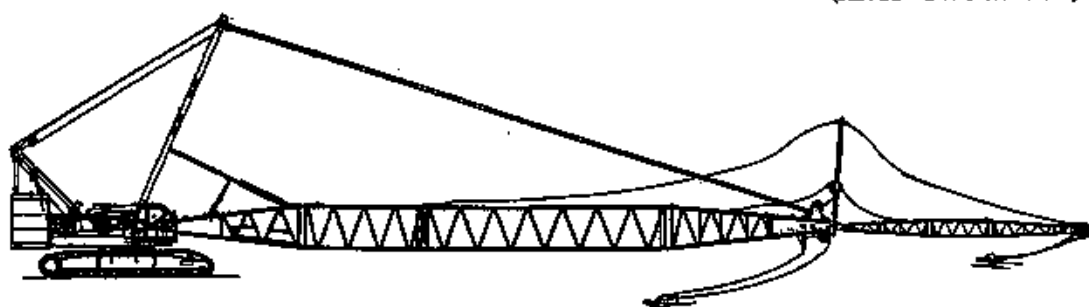
Failure to observe this precaution may result in serious injury or loss of life.

6.3.1 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.



HOOK OVERHOIST
RELEASE SWITCH
(ANTI-TWO BLOCK)



6.4 DISASSEMBLING THE ATTACHMENT

6.4.1 TREATMENT OF OVERHOIST LIMIT SWITCH WIRING

- (1) Disconnect the overhoist limit switch wiring in the boom tip end, and wind it up onto the cable reel.
- (2) Disconnect the wiring between the cable reel and the basic machine side, and install the short circuit cap to the basic machine side wiring.
- (3) If the jib is attached, wind up the jib side wiring onto the cable reel in the same way.

6.4.2 WINDING UP THE FRONT DRUM/REAR DRUM WIRE ROPES

- (1) Confirm that the hook is set in the stabilized condition.
- (2) Remove the rope socket and clamp from the wire rope end.
- (3) Slowly operate the front drum or rear hoist drum control lever to wind up the hoist wire rope onto the appropriate drum, being careful for being caught to the sheave.



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 loss of life.

6.4.3 DISASSEMBLING THE JIB

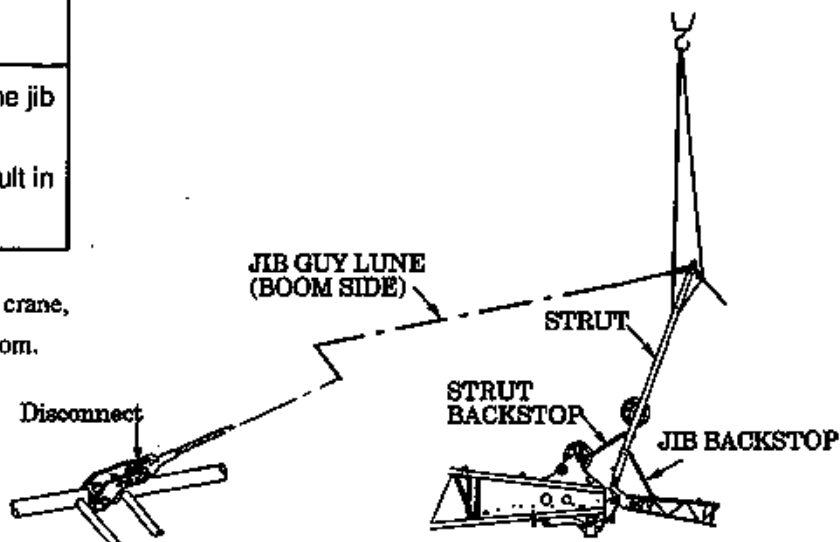


WARNING

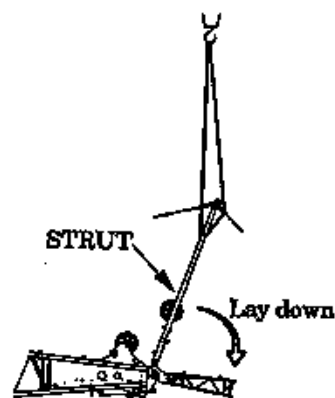
Do not stand or work under, inside or on the jib structure when assembling jib.

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

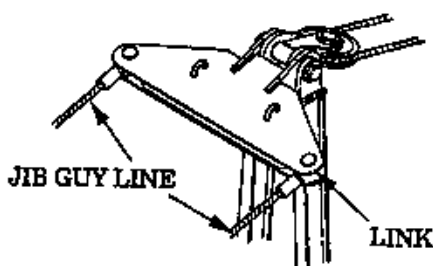
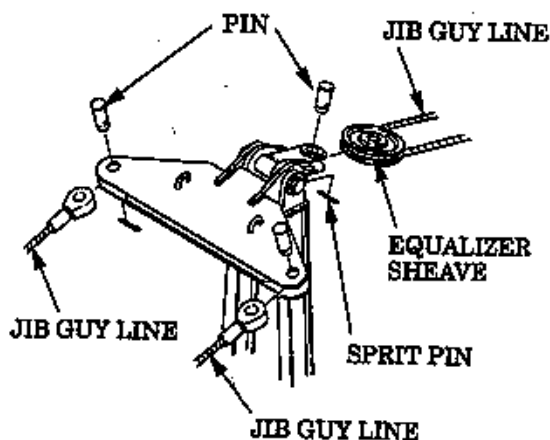
- (1) While holding the jib strut with the assisting crane, disconnect the jib guy line from the insert boom.



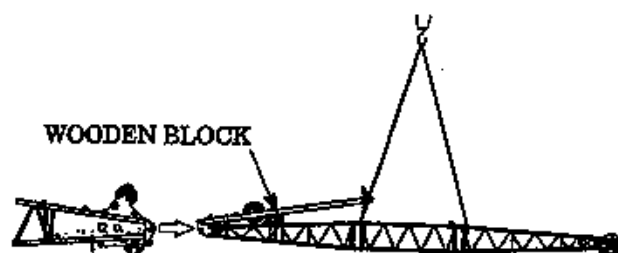
- (2) Remove the backstop from the strut, and lay down the strut to the jib side.



- (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.



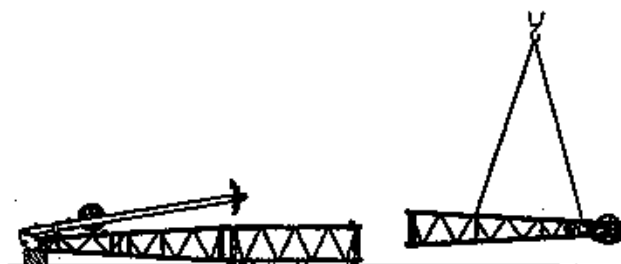
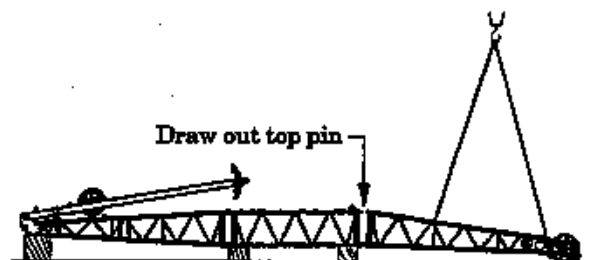
- (5) With the jib held with the assisting crane, detach the jib from the boom.
Place the jib on blocking.



- (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.



6.4.4 REMOVING GUY LINES

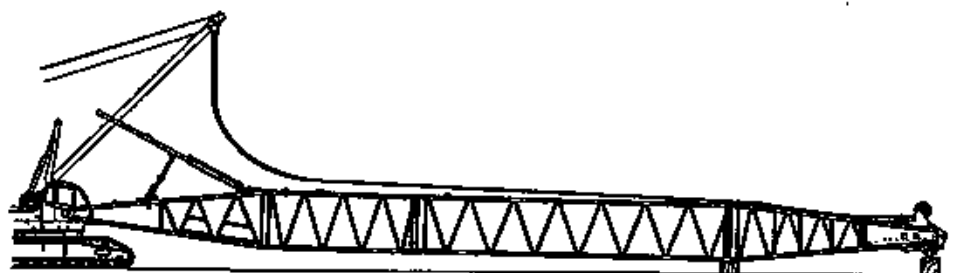
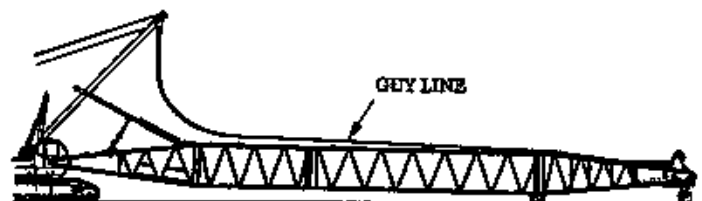


DANGER

- 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 loss of life.

- (1) Slowly slacken boom hoist wire rope to lower the mast until the guy line can be removed.
- (2) Remove all the guy lines, except for the guy line connected to the link at the top of the mast.
- (3) Remove the guy lines in order.
- (4) With the assisting crane, place guy lines onto the ground, taking care not to damage the boom.



6.4.5 REMOVING UPPER AND INSERT BOOMS

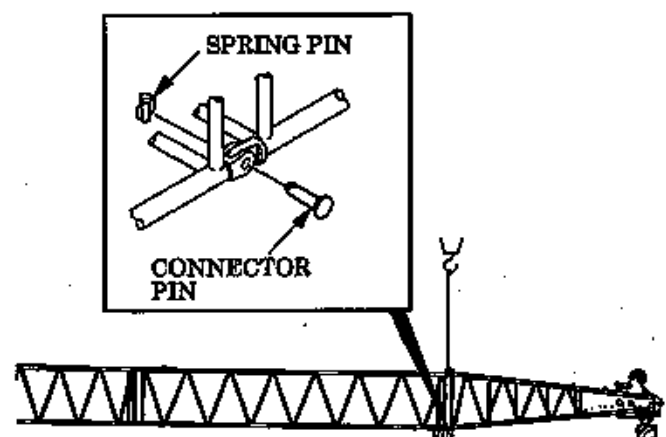
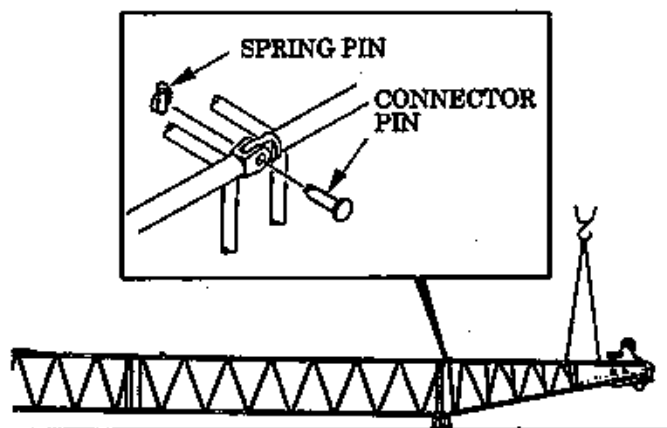


DANGER

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.

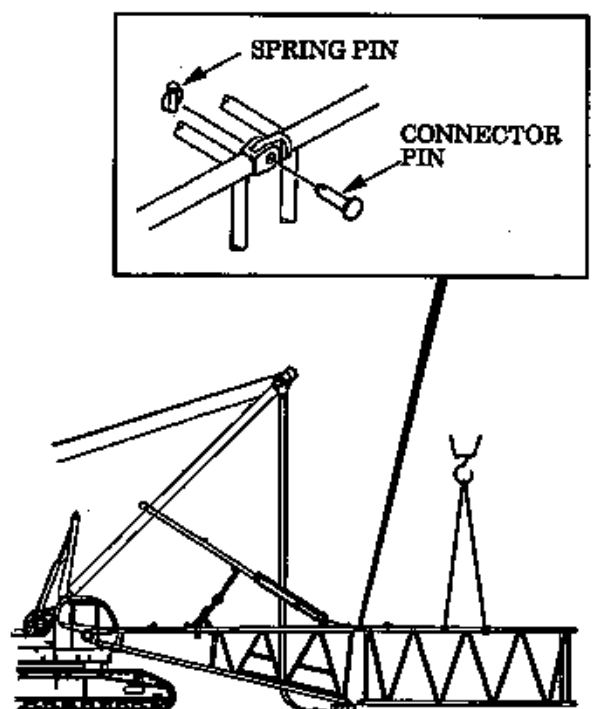
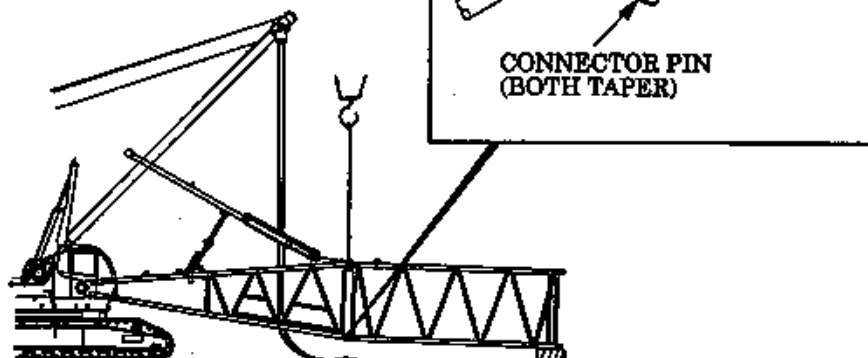
(1) Separating boom tip

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.



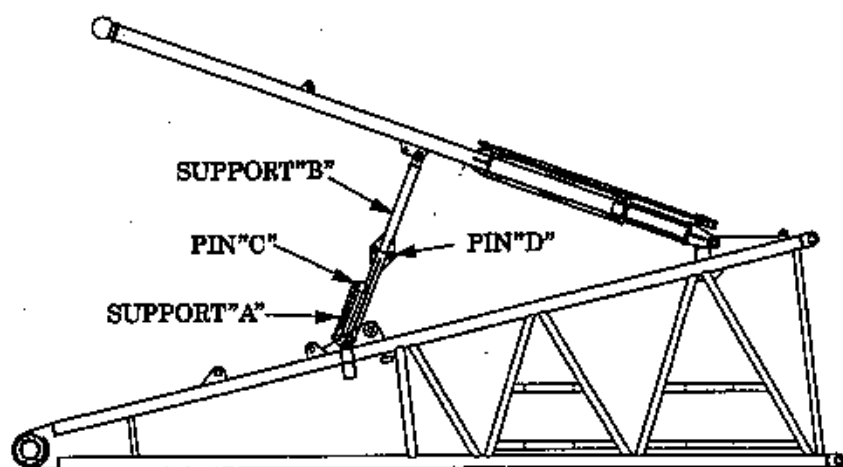
(2) Separating insert boom

1. Support the joint of the insert boom with the assisting crane.
2. Remove the lower side connector pin.
3. Remove the upper side connector pin to separate the insert boom.



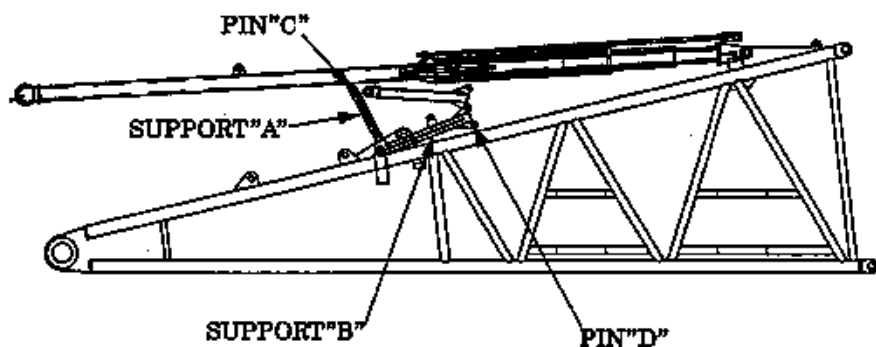
6.4.6 STORING BACKSTOPS

- (1) Remove the pin "C" fixing the support "A".



- (2) Support either backstop with the assisting crane, and remove the pin "D" fixing the support "B".

- (3) Lower the backstop, and fix the support "A" to the backstop with the pin "C".



- (4) Attach the support fixing pin "D" to the support "B".

- (5) Perform similar procedures on the other side to store the backstop.

6.4.7 REMOVING BASE BOOM

- (1) Ensure that all of the wirings between boom and the machine are disconnected. If any wiring remained connected, disconnect it.



DANGER

Do not stand under, inside, or on the boom structure when connecting insert boom. Failure to observe this precaution may result in serious injury or loss of life.

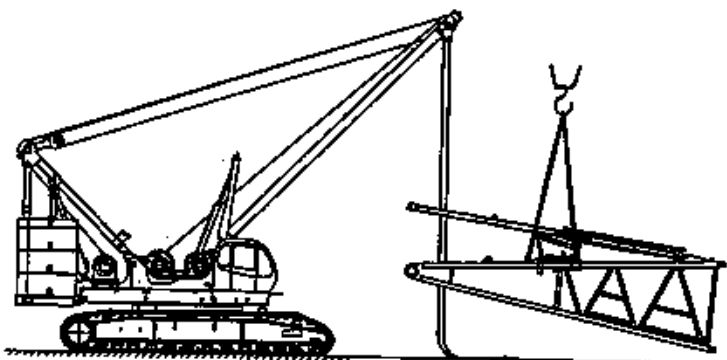


CAUTION

Securely attach water-proof caps to the connectors of disconnected wires.

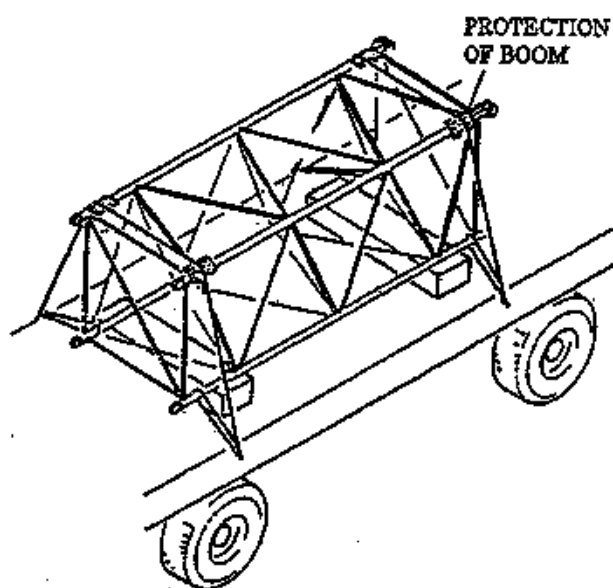
- (2) Support the foot side of the base boom with the assisting crane, and remove the cab side boom foot pin. Then, detach the left boom foot pin. (Refer to 6.1.2 INSTALLING THE BASE BOOM.)

- (3) Reverse the machine moderately, and lower the base boom onto the ground.

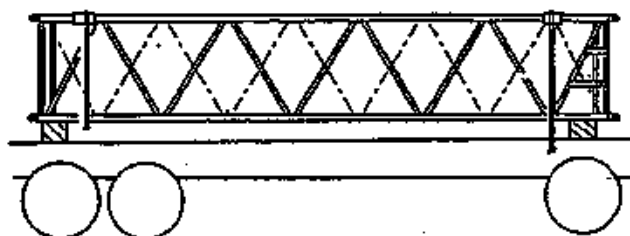


6.5 CAUTION WHEN TRANSPORTING BOOM

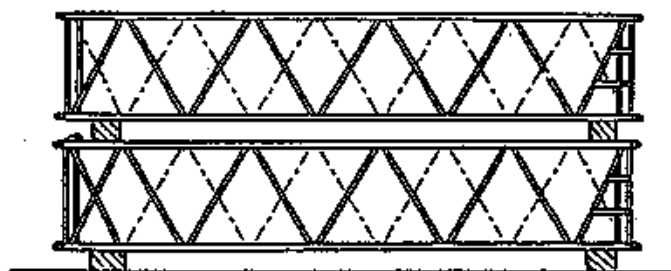
- (1) In order to prevent the boom from damage, do not hook the fixing ropes directly to the main chord members and lacing members. Be sure to use sling cloths.



- (2) Place blocking under the both ends of the boom.



- (3) When placing a boom upon another boom, place blocking just above the under blocking. Place the insert boom with lugs attached on the bottom. If it is placed on the top, the transporting height becomes high.



7. ASSEMBLY AND DISASSEMBLY OF CRANE ATTACHMENT WITH LUFFING JIB

This section explains about assembly, self-standing, lowering and disassembly 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.
 - Assembly of crane attachment described in section 6 is completed.
 - Jib hoist winch is installed to the boom base, and piping is completed.
- Install the jib hoist winch if the boom base is not equipped with it (Refer to page 7-9).

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.

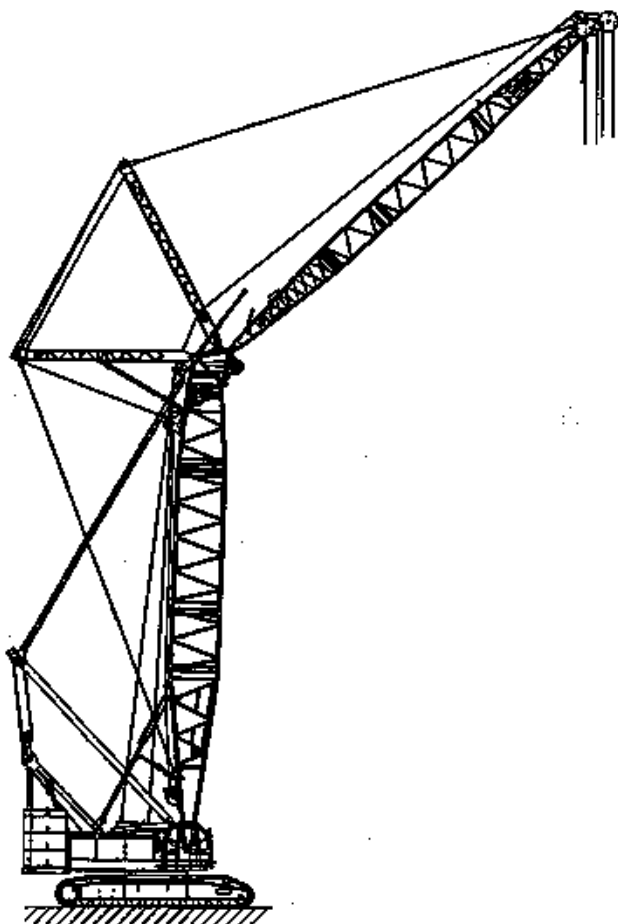
- 3) Secure the area required for installation of the auxiliary crane and the entering route for carriers transporting materials necessary for assembly.

(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.



DANGER

Do not stand or work under, inside, or on the tower boom or jib when installing or removing the connector pins at anytime.

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

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 loss of life.

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.

7.1 ASSEMBLY OF LUFFING ATTACHMENT

[Equipment needed]

- Complete assembly tools
- Auxiliary Crane
- Sling Wire Rope, Textile belt
- Wooden Blocks
- Cushion

7.1.1 ARRANGEMENT OF BOOM / 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 service shop to repair the damaged insert(s).



DANGER

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 loss of life.

Type of Boom		
Symbol	Boom Length	Specification
BB	25 ft (7.6 m)	Boom Base
10B	10 ft (3.0 m)	Insert Boom
20B	20 ft (6.1 m)	Insert Boom
40B	40 ft (12.2 m)	Insert Boom
11.7B	11.7 ft (3.6 m)	Insert Tapered Boom
BT	3.3 ft (1.0 m)	Boom Tip

Type of Jib		
Symbol	Boom Length	Specification
JB	19 ft (5.8 m)	Jib Base
10J	10 ft (3.0 m)	Insert Jib
20J	20 ft (6.1 m)	Insert Jib
40J	40 ft (12.2 m)	Insert Jib
JT	21 ft (6.4 m)	Jib Tip

BOOM AND JIB COMBINATIONS

		Jib Length (ft)										
		70	80	90	100	110	120	130	140	150	160	170
Boom Length (ft)	70	○	○	○	○	○	○	○	○	○	○	○
	80	○	○	○	○	○	○	○	○	○	○	○
	90	○	○	○	○	○	○	○	○	○	○	○
	100	○	○	○	○	○	○	○	○	○	○	○
	110	○	○	○	○	○	○	○	○	○	○	○
	120	○	○	○	○	○	○	○	○	○	○	○
	130	○	○	○	○	○	○	○	○	○	○	○
	140	○	○	○	○	○	○	○	○	○	○	○
	150	○	○	○	○	○	○	○	○	○	○	○
	160	○	○	○	○	○	○	○	○	○	○	○
	170	○	○	○	○	○	○	○	○	○	○	○
	180	○	○	○	○	○	○	○	○	○	○	○
	190	○	○	○	○	○	○	○	○	○	○	○
	200	×	×	×	○	○	○	○	○	○	○	○

○ : Combinations which is allowed.

× : Combinations which is not allowed.

2. Guy Line

Similarly to the case of boom/jib, prepare guy lines in accordance with the arrangement table.

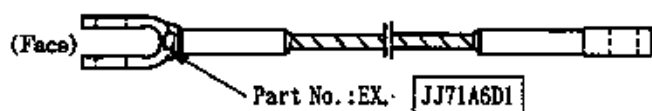
The diameters of all the guy lines are 34 mm (1.25 inch).

For identification of respective guy lines, check the part No. stamped on the connector.

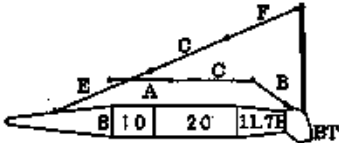
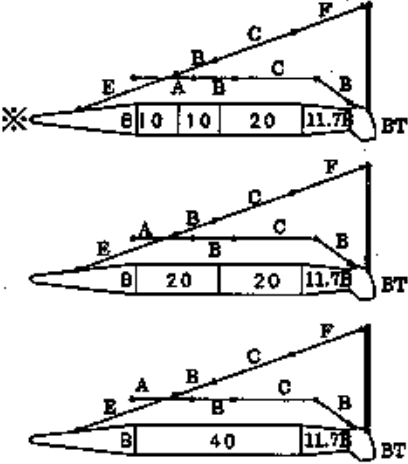
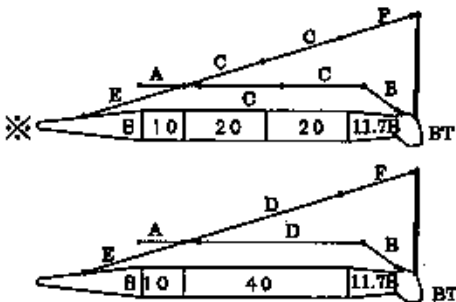
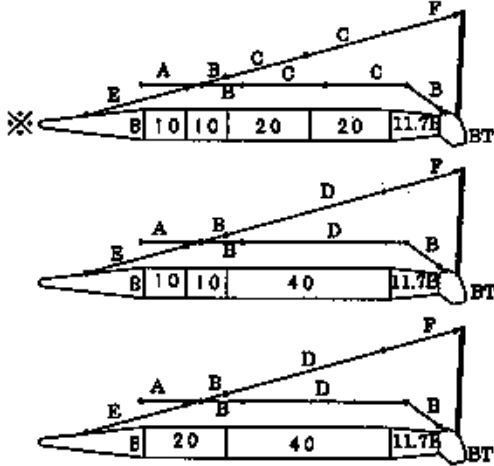
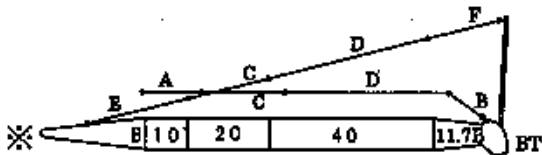


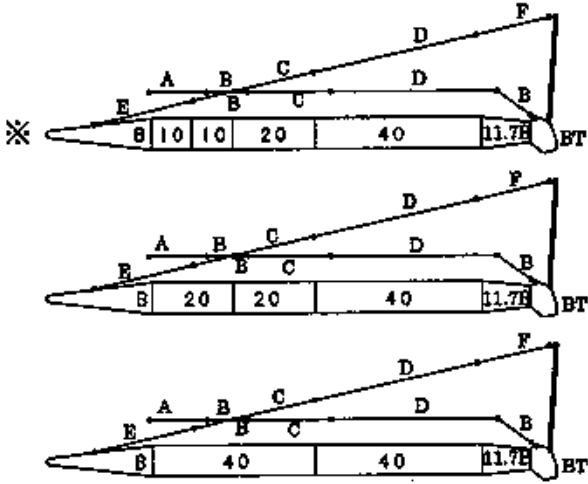
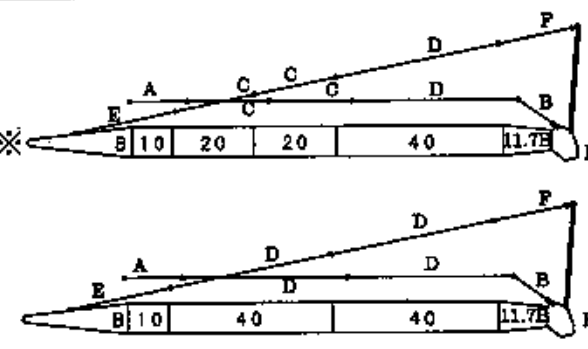
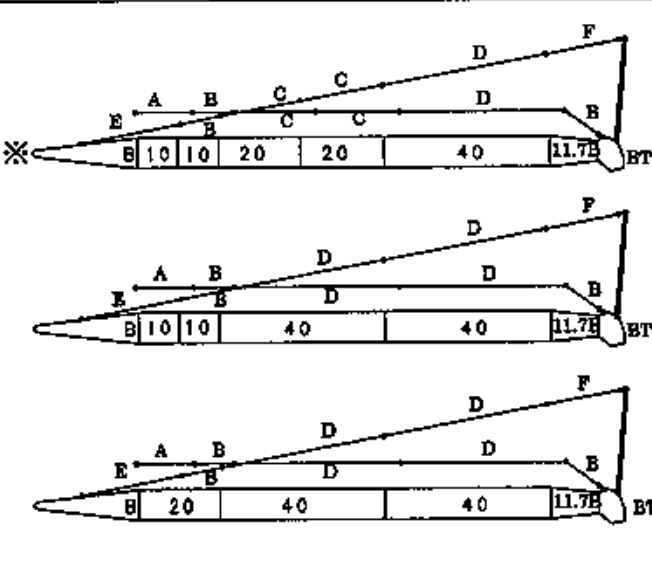
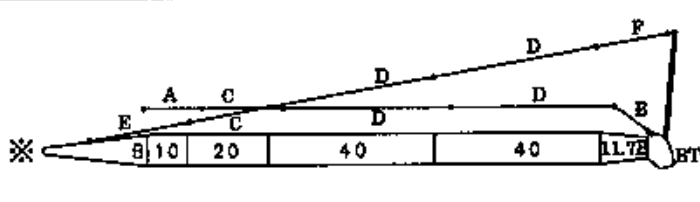
CAUTION

To prevent injuries to hands and legs, care should be taken while uncoiling twisted guy lines.

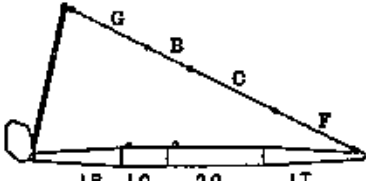
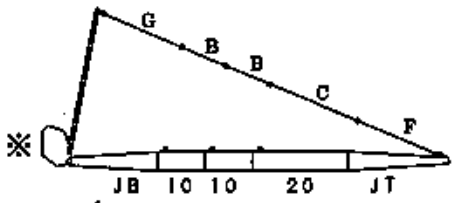
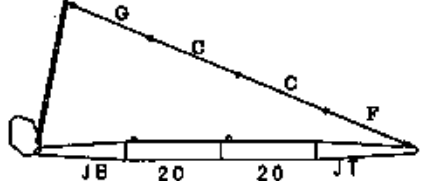
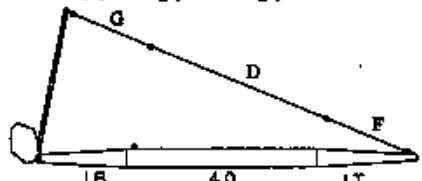
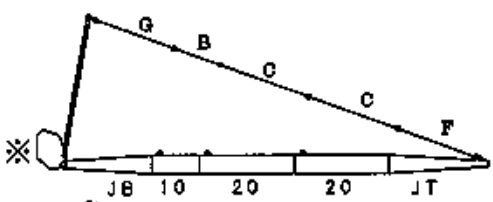
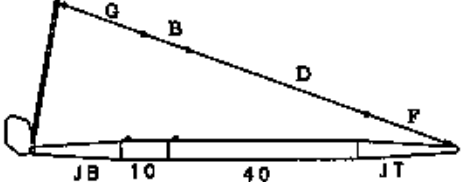
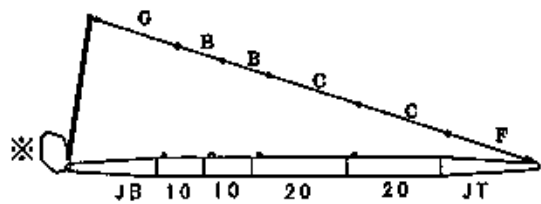
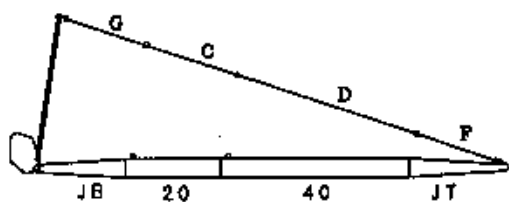
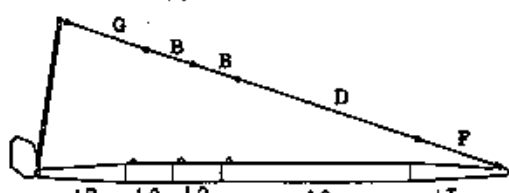


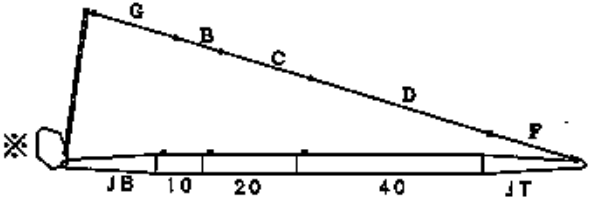
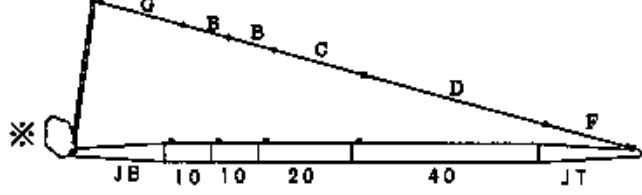
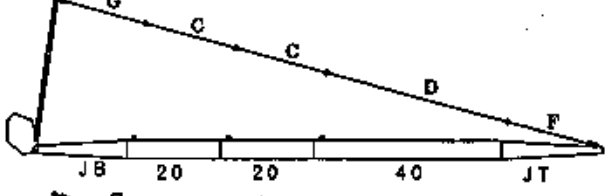
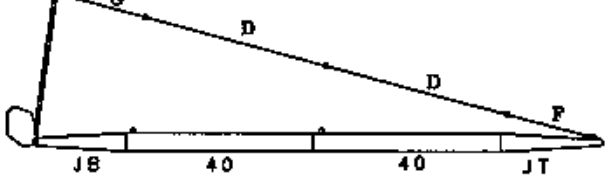
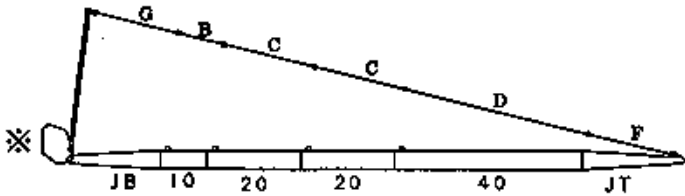
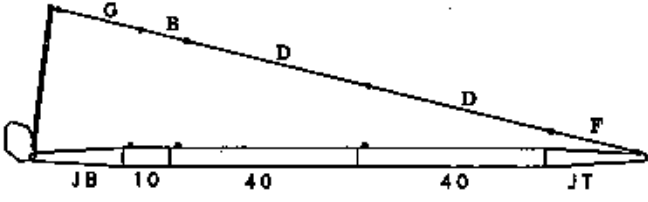
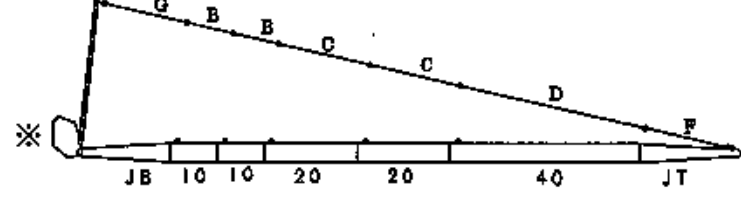
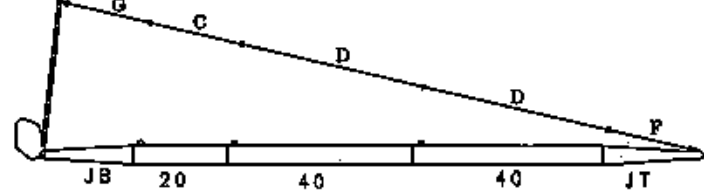
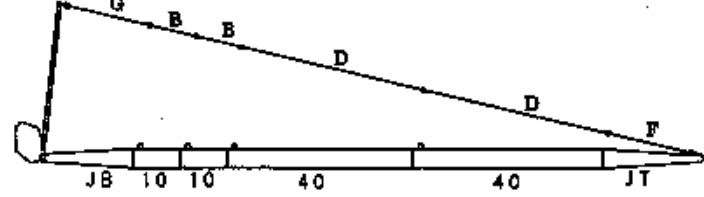
Type of Guy Line				
Symble	Dia.	Length	Part NO.	Connector Type
A	φ 34	14.4ft(4.4m)	JJ71A00007D8	
B		10ft(3.0m)	JJ71A00006D1	
C		20ft(6.1m)	JJ71A00006D2	
D		40ft(12.2m)	JJ71A00006D4	
E		25ft(7.6m)	JJ71A00007D5	
F		18ft(5.5m)	JJ71A00006D5	
G		18ft(5.5m)	JJ71A00007D4	

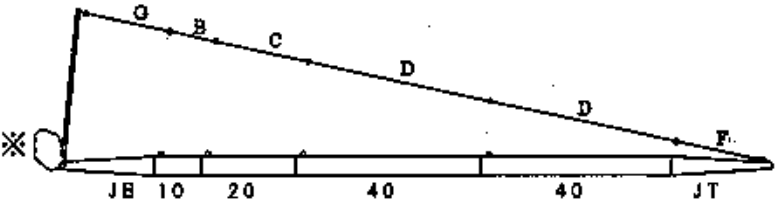
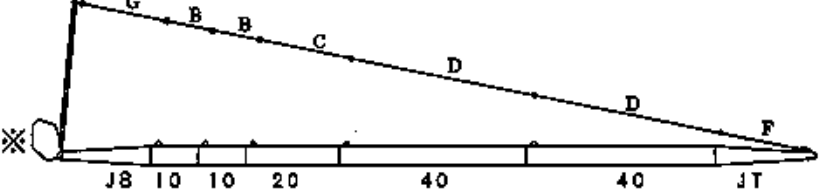
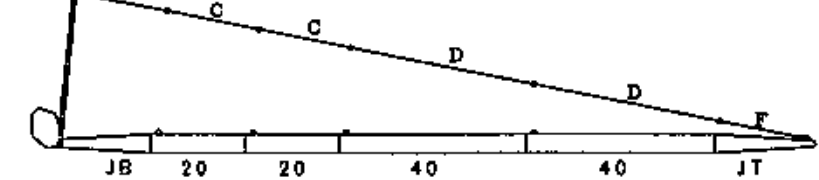
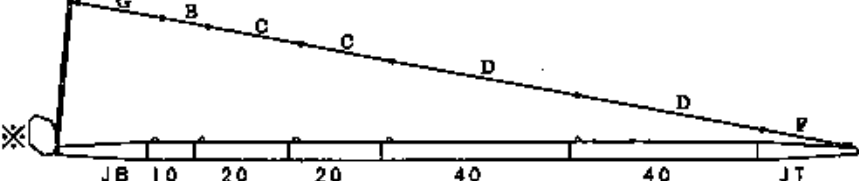
Boom Length ft(m)	Boom, Boom Guy Line And Strut Guy Line Arrangement Chart (1/3)
70 (21.3)	
80 (24.4)	
90 (27.4)	
100 (30.5)	
110 (33.5)	

Boom Length ft(m)	Boom, Boom Guy Line And Strut Guy Line Arrangement Chart (2/3)
120 (36.6)	 Diagram 1 (Top): Boom segments: 8, 10, 10, 20, 40, 11.75. Boom guy lines: A, B, C, D. Strut guy lines: E, F. Total length: 11.75 ft. BT Diagram 2 (Middle): Boom segments: 8, 20, 20, 40, 11.75. Boom guy lines: A, B, C, D. Strut guy lines: E, F. Total length: 11.75 ft. BT Diagram 3 (Bottom): Boom segments: 8, 40, 40, 11.75. Boom guy lines: A, B, C, D. Strut guy lines: E, F. Total length: 11.75 ft. BT
130 (39.6)	 Diagram 1 (Top): Boom segments: 8, 10, 20, 20, 40, 11.75. Boom guy lines: A, C, C, C, D. Strut guy lines: E, F. Total length: 11.75 ft. BT Diagram 2 (Bottom): Boom segments: 8, 10, 40, 40, 11.75. Boom guy lines: A, D, D, D. Strut guy lines: E, F. Total length: 11.75 ft. BT
140 (42.7)	 Diagram 1 (Top): Boom segments: 8, 10, 10, 20, 20, 40, 11.75. Boom guy lines: A, B, C, C, D. Strut guy lines: E, F. Total length: 11.75 ft. BT Diagram 2 (Middle): Boom segments: 8, 10, 10, 40, 40, 11.75. Boom guy lines: A, B, D, D, D. Strut guy lines: E, F. Total length: 11.75 ft. BT Diagram 3 (Bottom): Boom segments: 8, 20, 40, 40, 11.75. Boom guy lines: A, B, D, D, D. Strut guy lines: E, F. Total length: 11.75 ft. BT
150 (45.7)	 Diagram 1 (Top): Boom segments: 8, 10, 20, 40, 40, 11.75. Boom guy lines: A, C, D, D, D. Strut guy lines: E, F. Total length: 11.75 ft. BT

Boom Length ft(m)	Boom, Boom Guy Line And Strut Guy Line Arrangement Chart (3/3)
160 (48.8)	
170 (51.8)	
180 (54.9)	
190 (57.9)	
200 (61.0)	

Jib Length ft(m)	Jib And Jib Guy Line Arrangement Chart (1/3)
70 (21.3)	
80 (24.4)	  
90 (27.4)	 
100 (30.5)	  

Jib Length ft(m)	Jib And Jib Guy Line Arrangement Chart (2/3)
110 (33.5)	
120 (36.6)	  
130 (39.63)	 
140 (42.7)	  

Jib Length ft(m)	Jib And Jib Guy Line Arrangement Chart (3/3)
150 (45.7)	
160 (48.8)	
	
170 (51.8)	

※ mark shows the standard boom arrangement which makes the boom arrangement of less than the each boom length possible.

Before starting work, check the following points again.

- (1) Machine is placed on firm and level ground.
- (2) For the combination of the boom of 190 ft (57.9 m) and 200 ft (61.0 m) length, place steel blocking plates between the ends of the crawlers at the idler and the ground.
- (3) Counterweights are properly set.
- (4) Assembly of crane attachment is completed.

When assembling the luffing jib attachment, set the "ATTACHMENT SELECTOR SWITCH" to the "SETUP" side. (See page 2-9.)

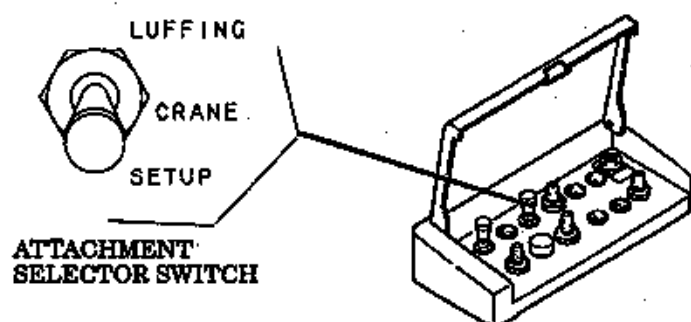
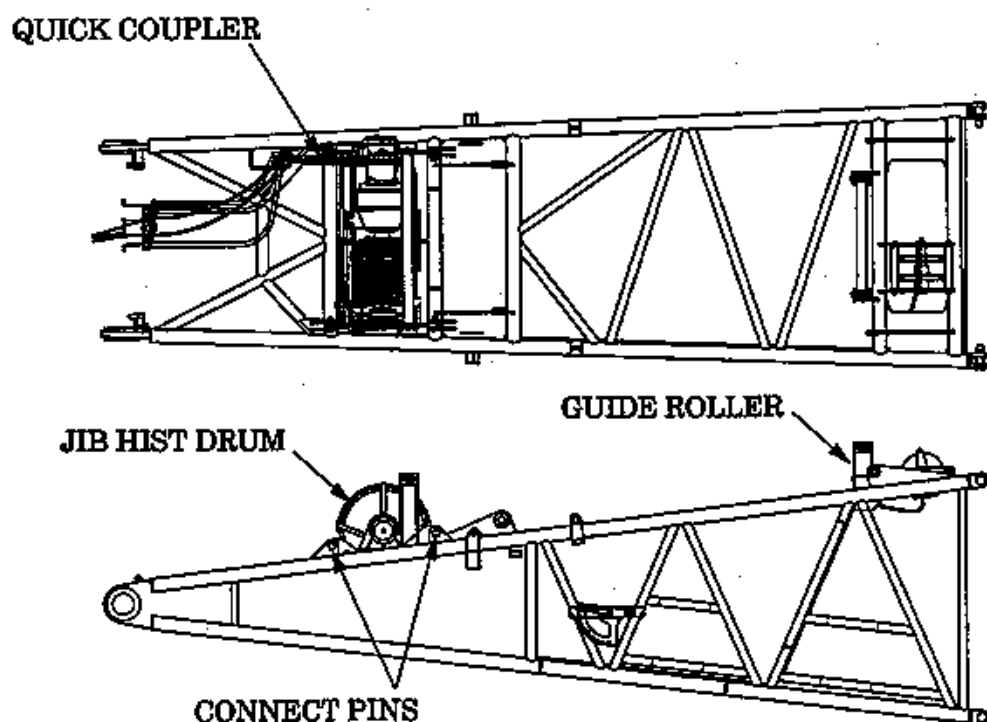
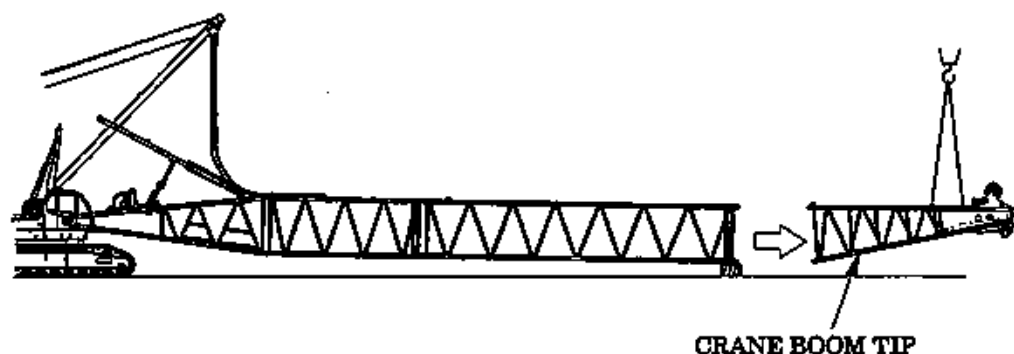


FIGURE OF JIB HOIST DRUM AND GUIDE SHEAVE INSTALLED



7.1.2 REMOVING CRANE BOOM TIP

Remove the crane boom tip and basic guy line, referring to chapter 5.



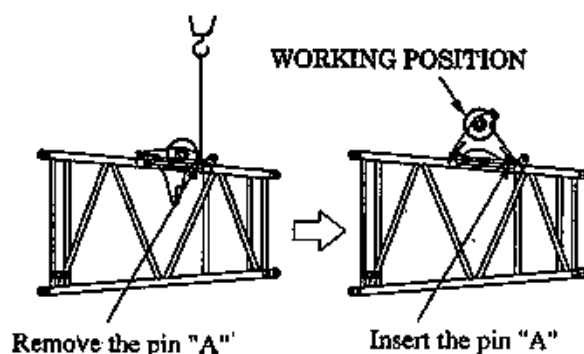
7.1.3 INSTALLING INSERT TAPER BOOM

Lift the insert taper boom with the auxiliary crane, and connect it to the insert boom.

Refer to "6.1.4 CONNECTING THE INSERT BOOM" for connecting procedures.

The taper boom idler sheave must be at the working position.

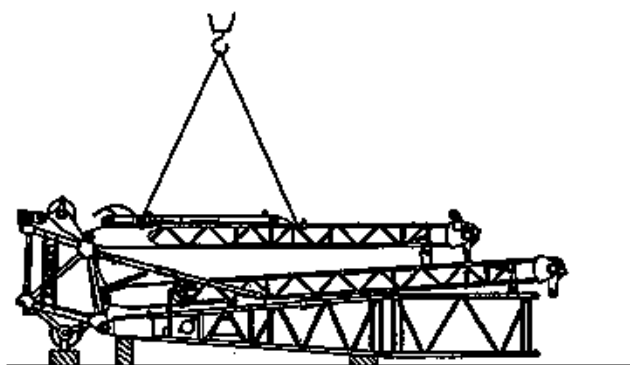
- (1) Support the idler sheave with the assisting crane, and remove the pin "A".
- (2) Lift the idler sheave, and insert the pin "A".



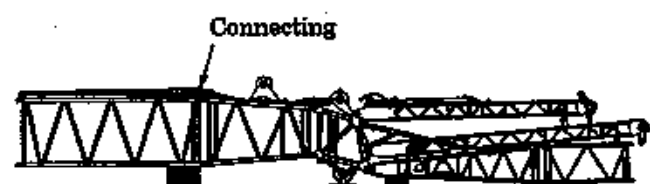
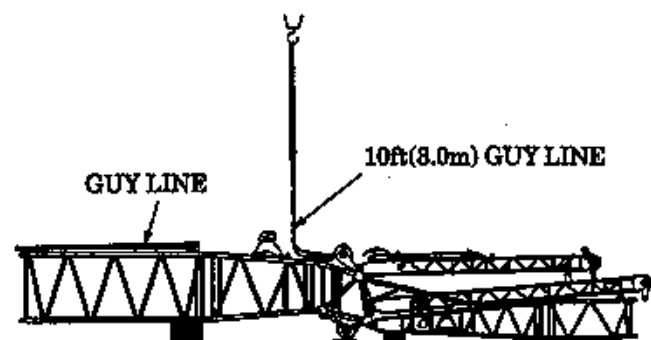
7.1.4 CONNECTING LUFFING BOOM TIP ASSEMBLY

The luffing boom tip assembly comprises the strut, jib base, and the insert jib. (travelling kit)

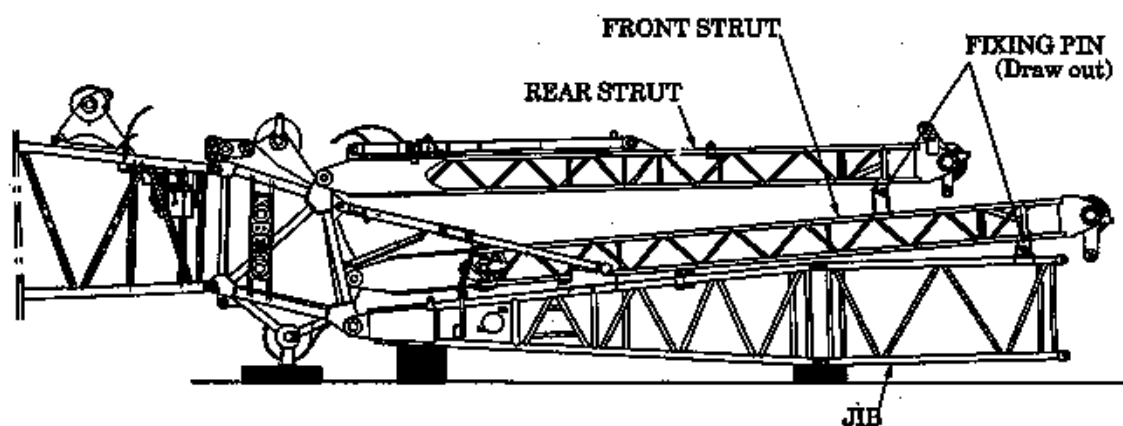
- (1) Lift the boom tip assembly with the auxiliary crane, and connect it to the insert taper boom.



- (2) Connect the 10 ft (3.0 m) basic guy line to the luffing boom tip and the guy line from the boom side together.



- (3) Remove the rear strut, front strut, and the fixing pin. Remove the fixing pin that connect the front and rear struts.



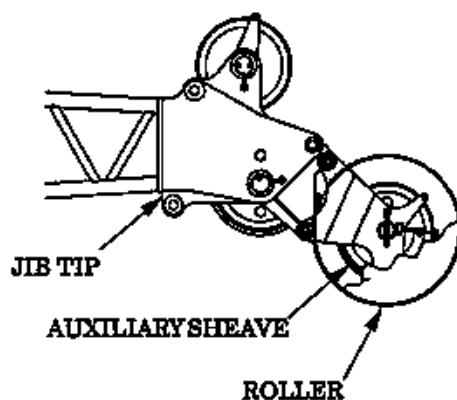
7.1.5 INSTALLING JIB ATTACHMENT

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 loss of life.



7.1.6 ASSEMBLY OF JIB

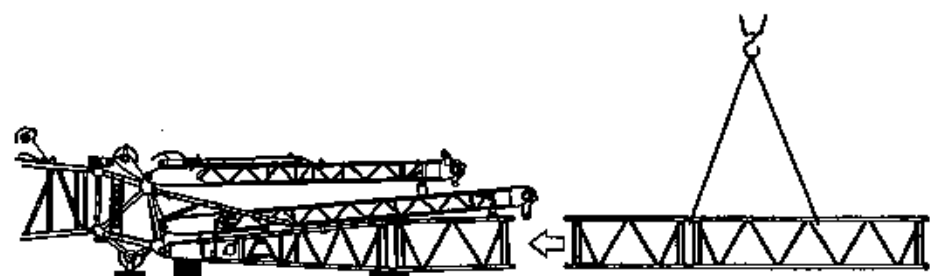
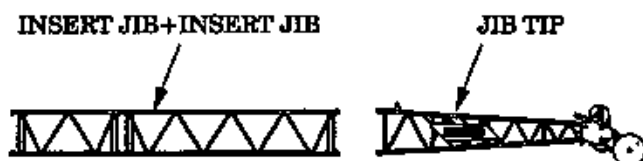
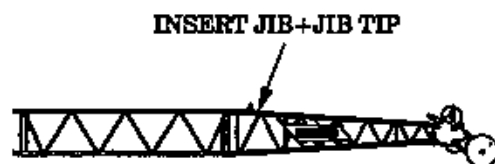
Referring to arrangement table of jib and jib guy lines, assemble required jib.

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.

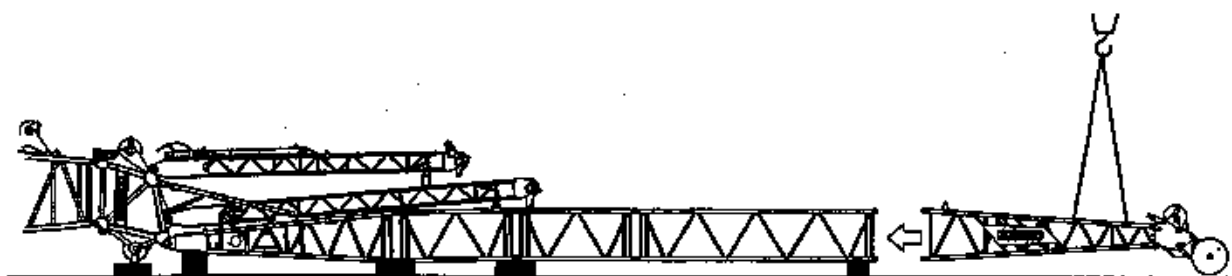
1. Connecting insert jib

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.



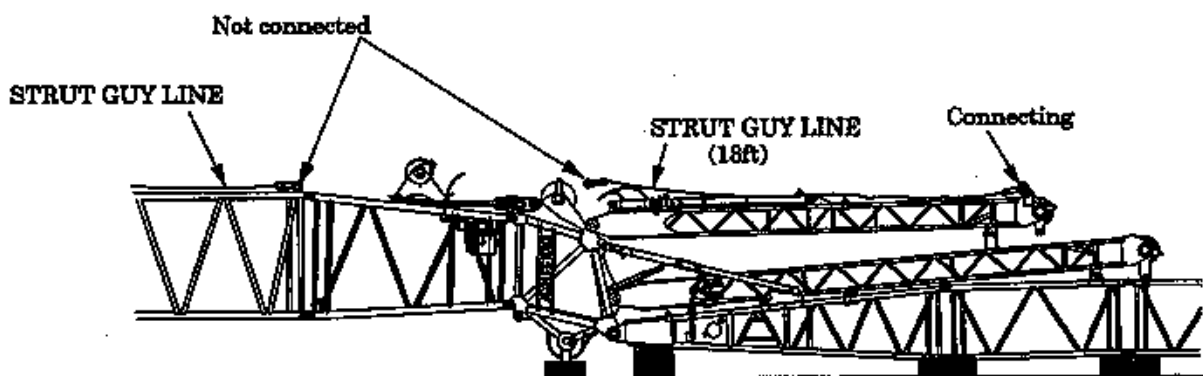
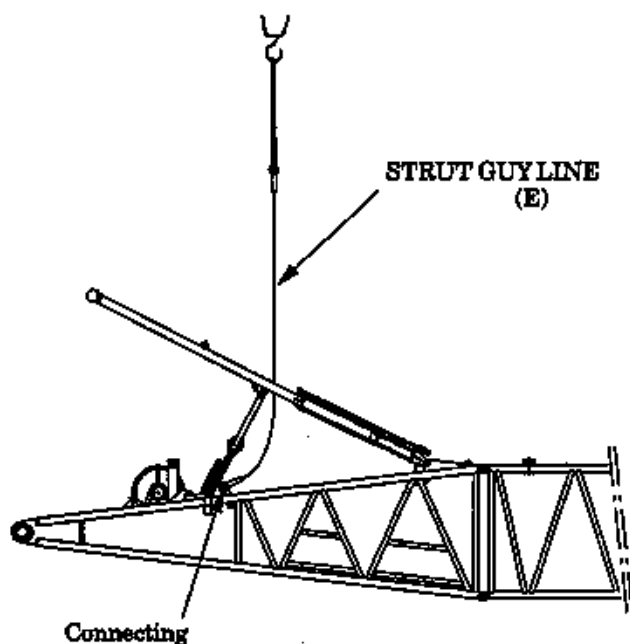
7.1.7 INSTALLING STRUT GUY LINE

1. Connecting strut guy line

- (1) Install a strut guy line from jib base on the boom side.
- (2) In accordance with arrangement table of guy line, prepare a strut guy line.
- (3) Connect the strut guy line from the jib base to the jip tip.
- (4) Connect the 18 ft (5.5 m) 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.

7.1.8 INSTALLING 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 loss of life.

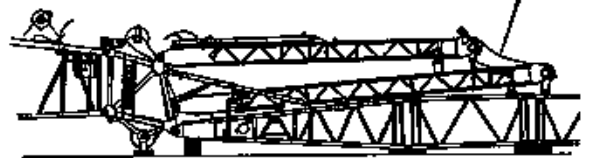
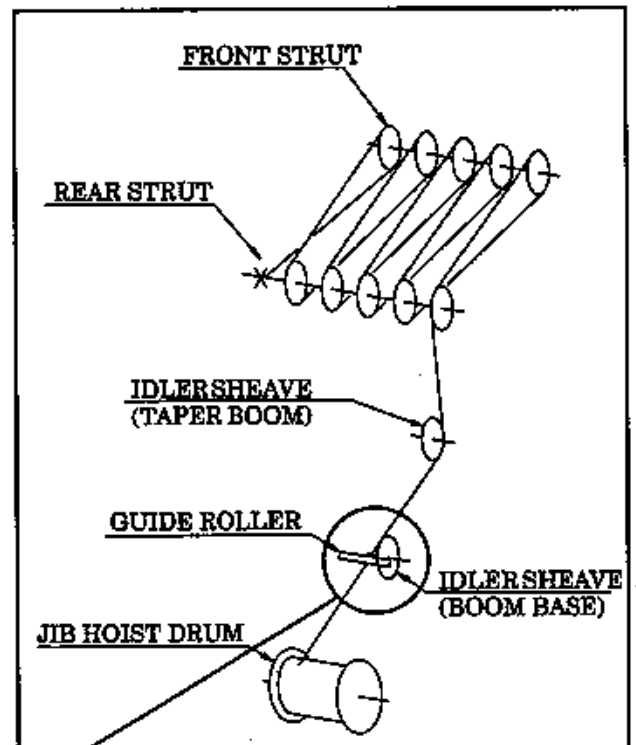
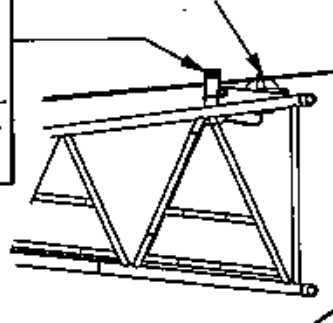
FRONT AND REAR
DRUM WIRE ROPE

JIB HOIST WIRE ROPE



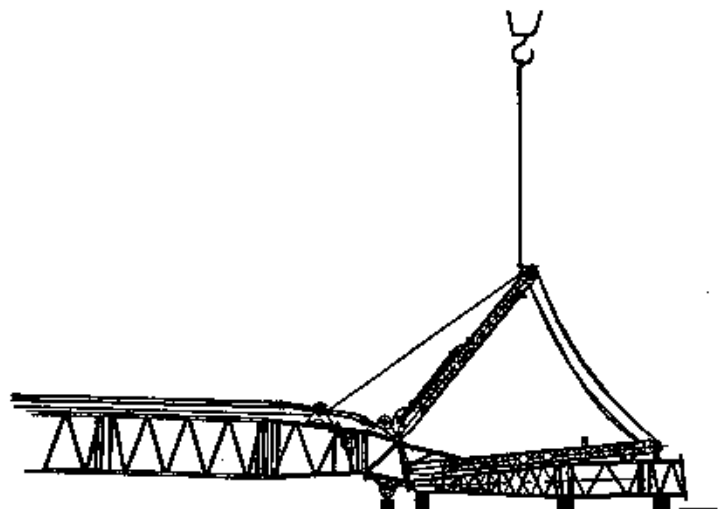
GUIDE ROLLER

IDLER SHEAVE

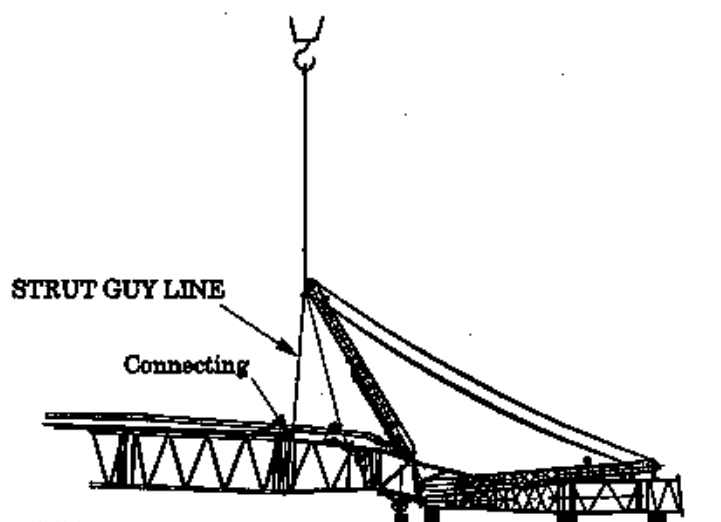


7.1.9 CONNECTING STRUT GUY LINE

- (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.



7.1.10 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.

Boom Length
70ft(21.3m)~90ft(27.4m)

Boom Length
100ft(30.5m)~140ft(42.7m)

Boom Length
150ft(45.7m)~200ft(61.0m)

Remove fixing pin

Connect with pin

Connect hose
(quick coupler)

Hydraulic oil reservoir

NOTE

Suitable boom length is stamped on the pin hole.



WARNING

If the length of strut backstop is set wrong, strut backstop, boom or rear strut may be damaged.

Failure to do so may result in serious injury or loss of life.

- (5) Connect both of the right and left hoses from the cylinders to the couplers on top of the insert taper boom.



CAUTION

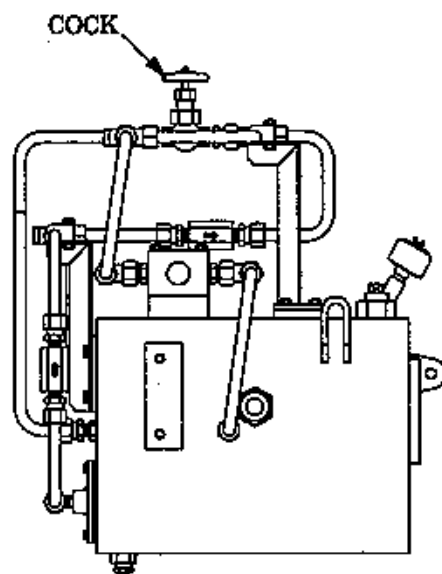
Be sure to check that the couplers are fully connected with the hoses.

- (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.

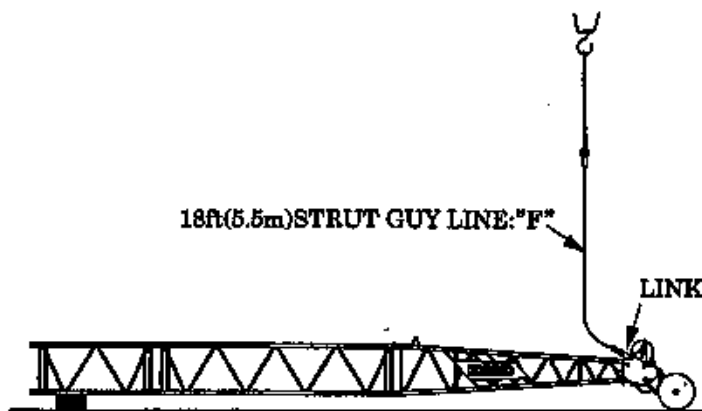


7.1.11 INSTALLING JIB GUY LINE

- (1) Connect the 18 ft (5.5 m) guy line to the guy line link on the jib tip.

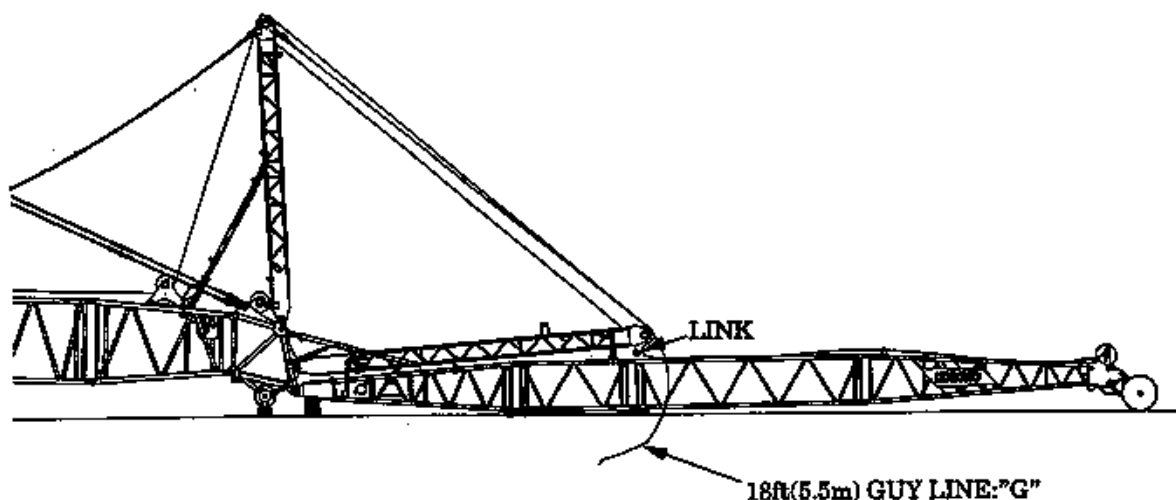
18ft(5.5m)STRUT GUY LINE:"F"

LINK

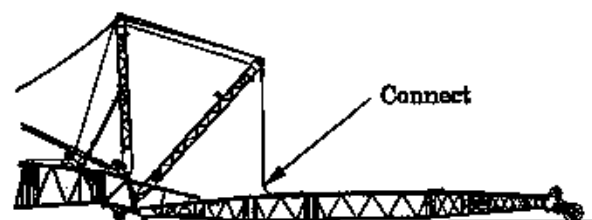
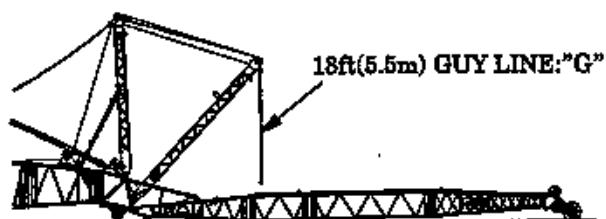


- (2) Bring the jib guy line toward the strut.

- (3) Connect the 18 ft (5.5 m) guy line to the guy line link on the front strut.



- (4) Raise the strut until the guy lines can be connected.
- (5) Connect the guy line on the jib tip to the guy line on the front strut.



7.1.12 REEVING OF FRONT AND REAR DRUM WIRE ROPES

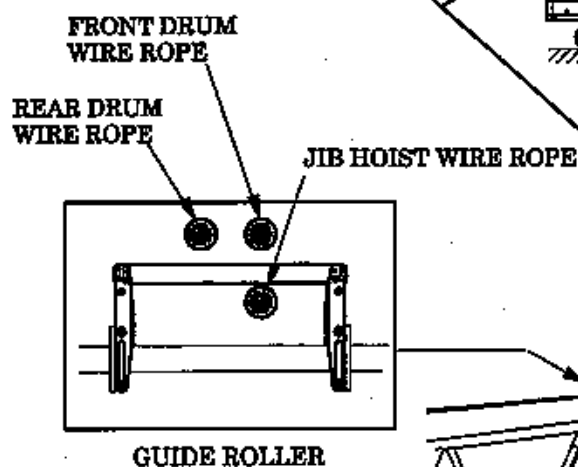
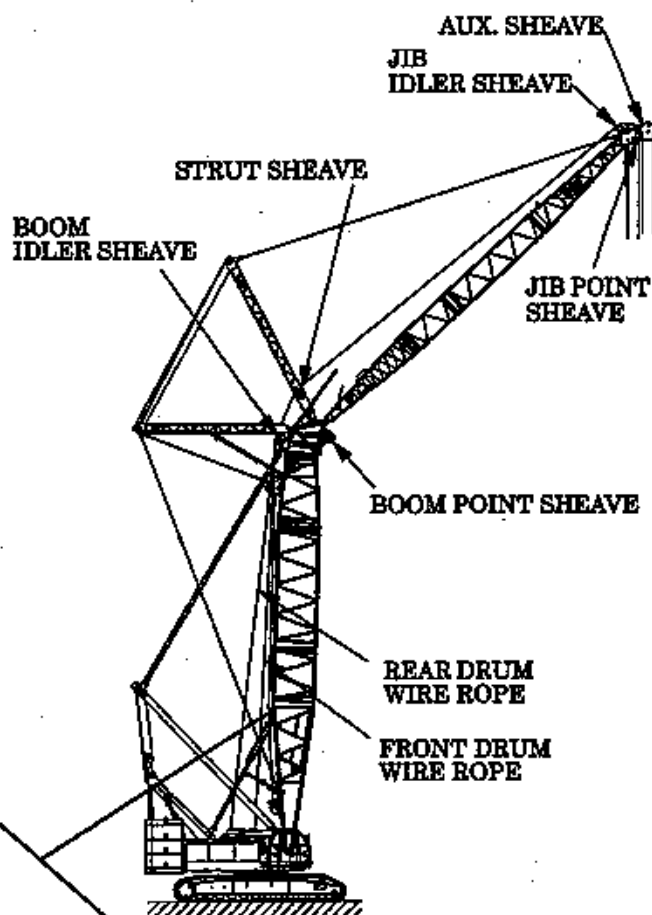


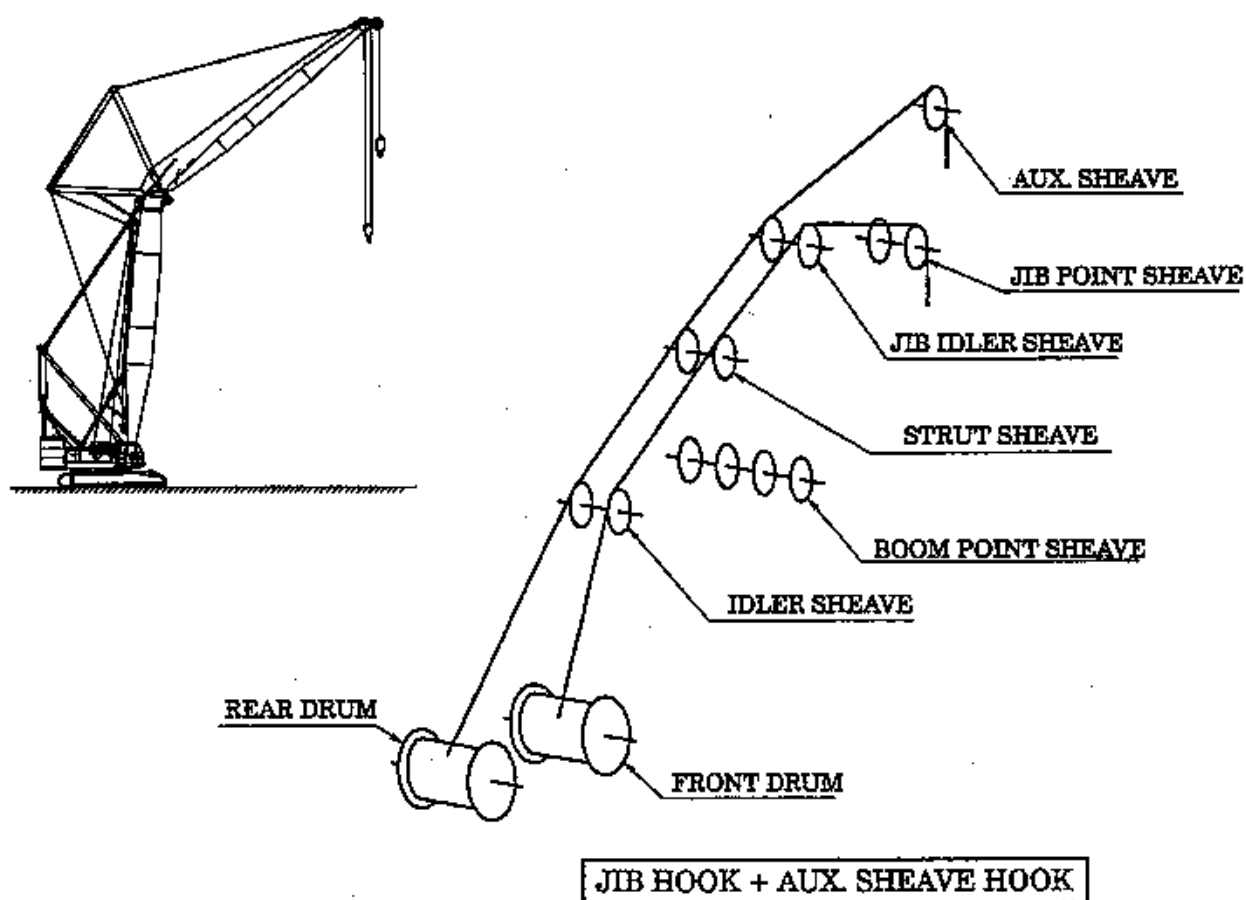
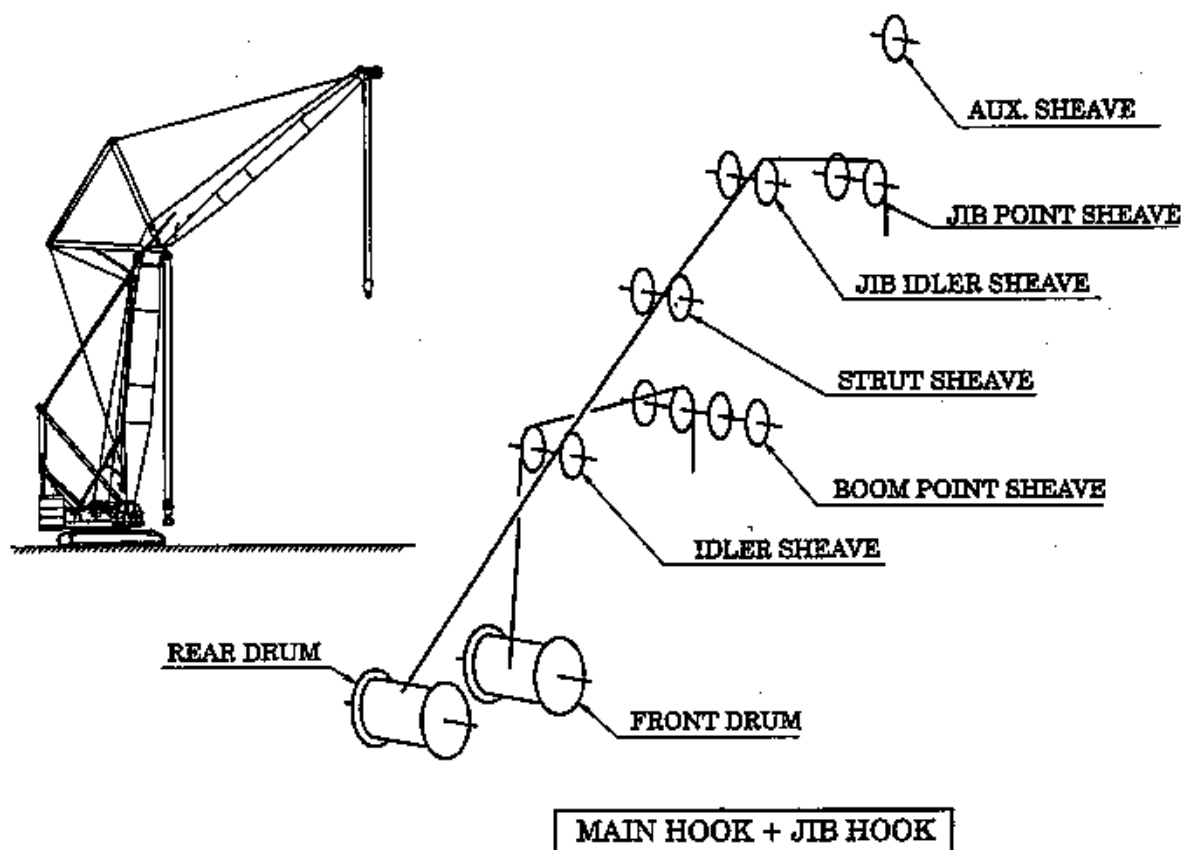
WARNING

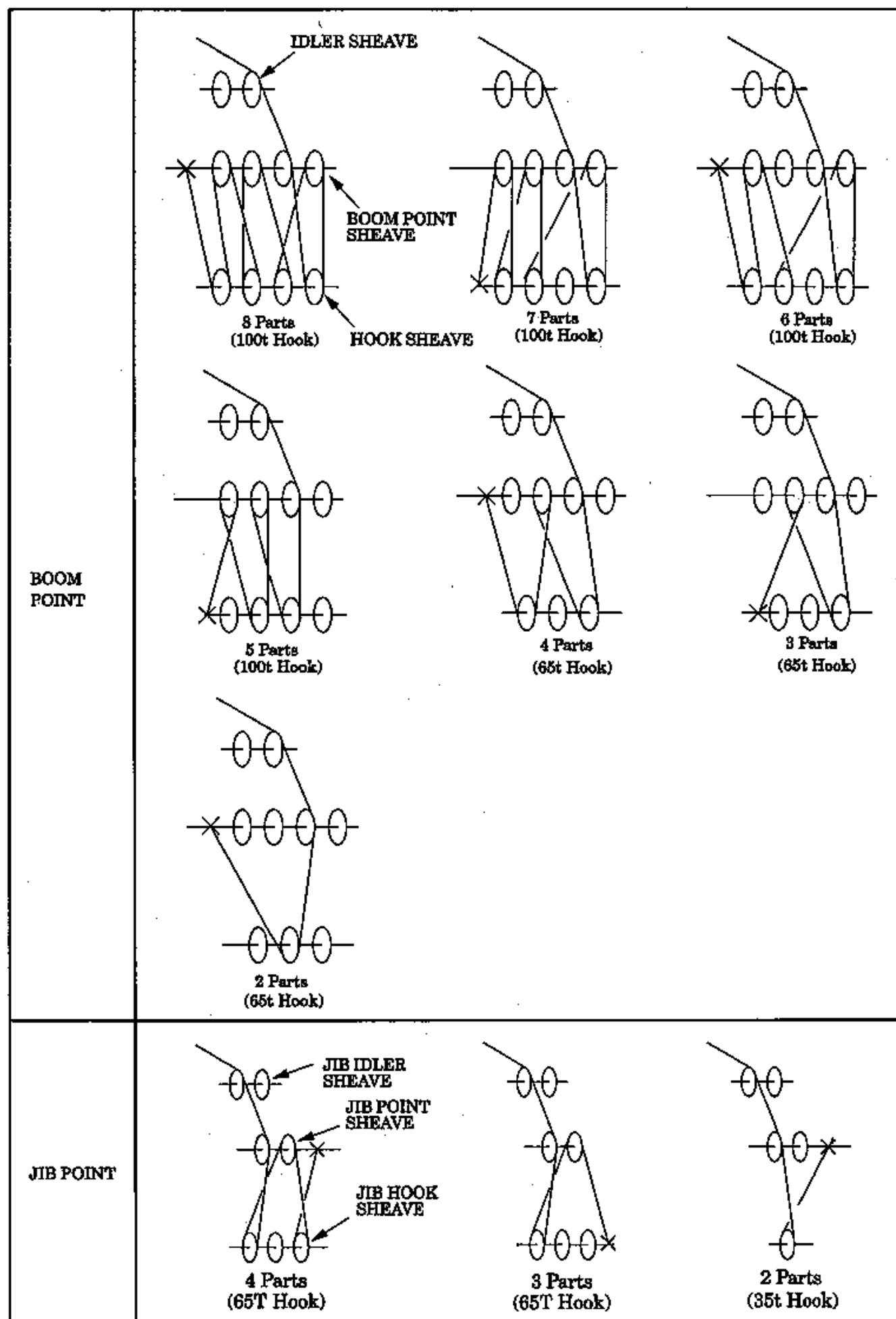
Do not touch the wire rope directly with bare hands. If wires protrude, you could be injured. Work gloves are recommended. Keep hands and clothing clear of the rotating drum and moving wire rope. Failure to observe this precaution may result in serious injury or loss of life.

- (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 main hook block or jib hook block, and the wire rope on the rear drum is used for the jib hook block or auxiliary sheave hook block.







7.1.13 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.

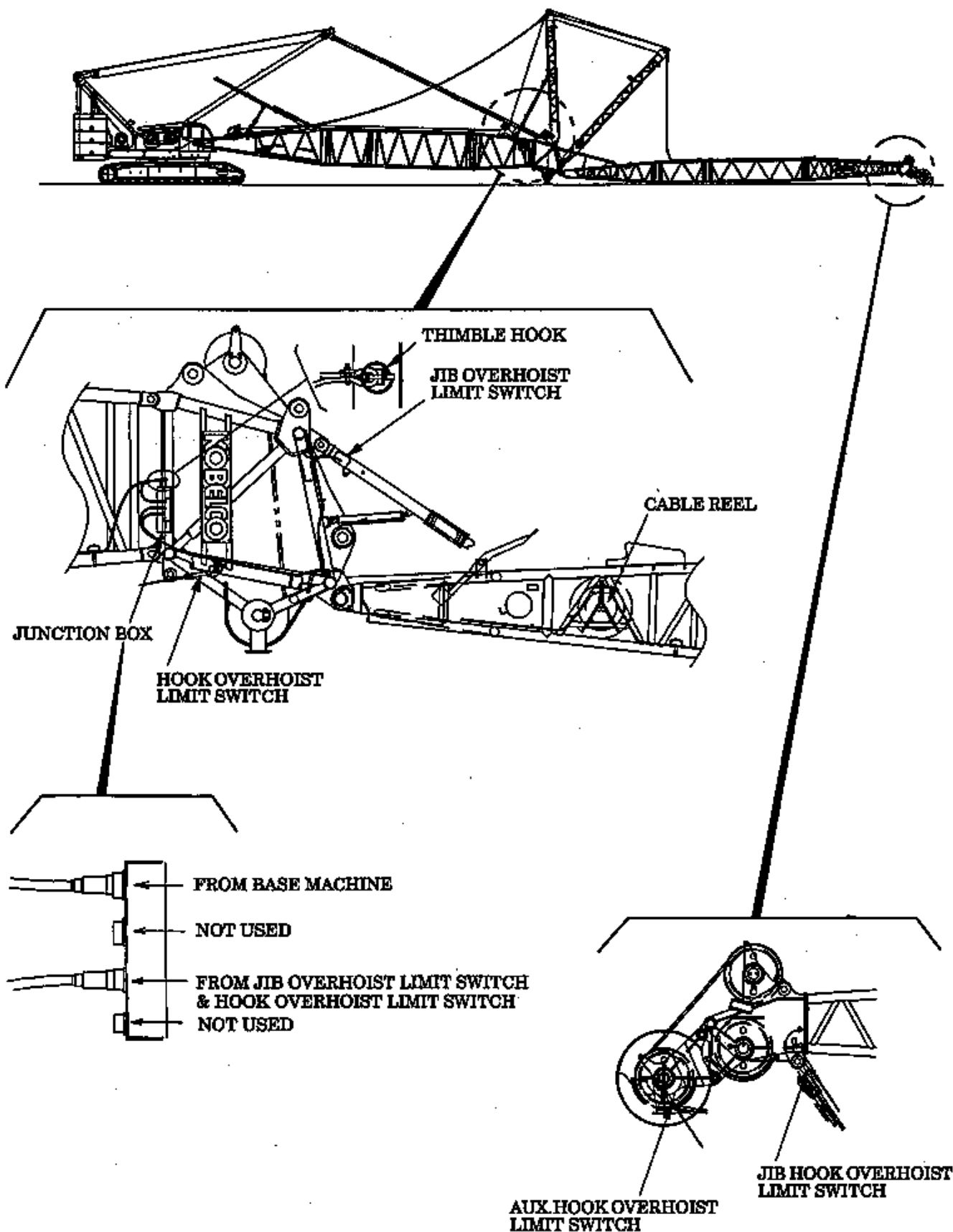


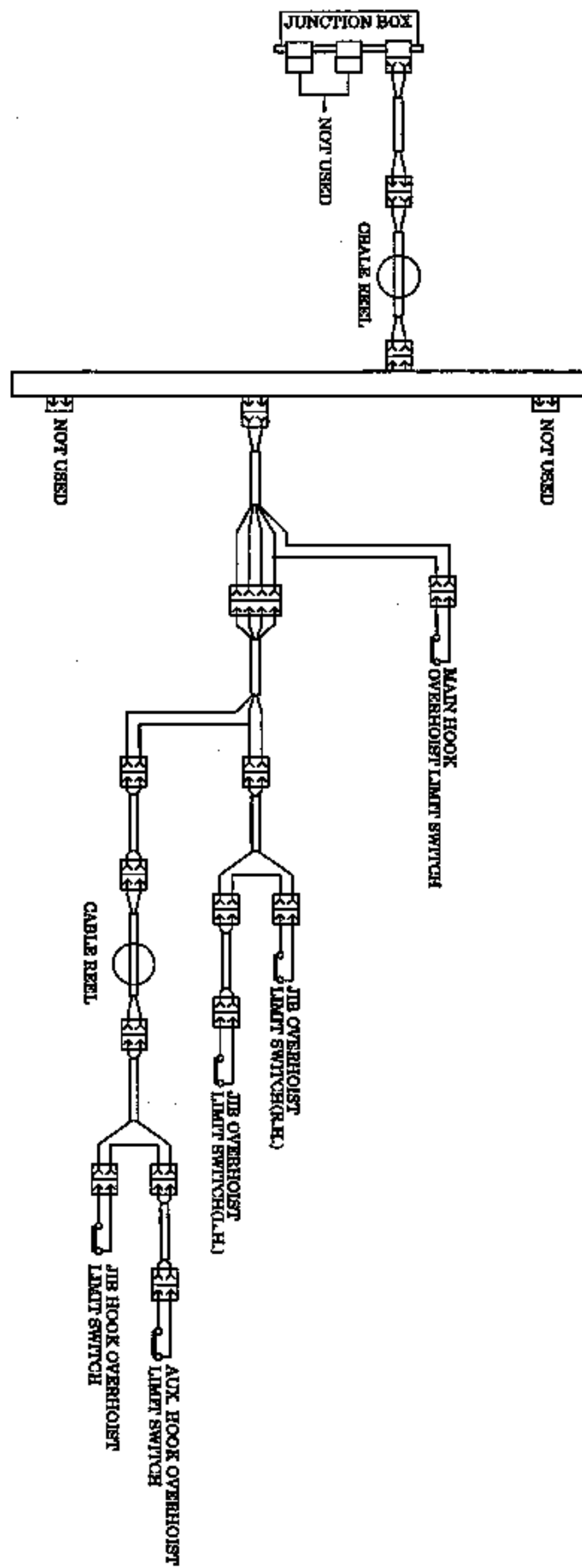
CAUTION

Make sure that all connections are fully connected and locked.

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

- (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.



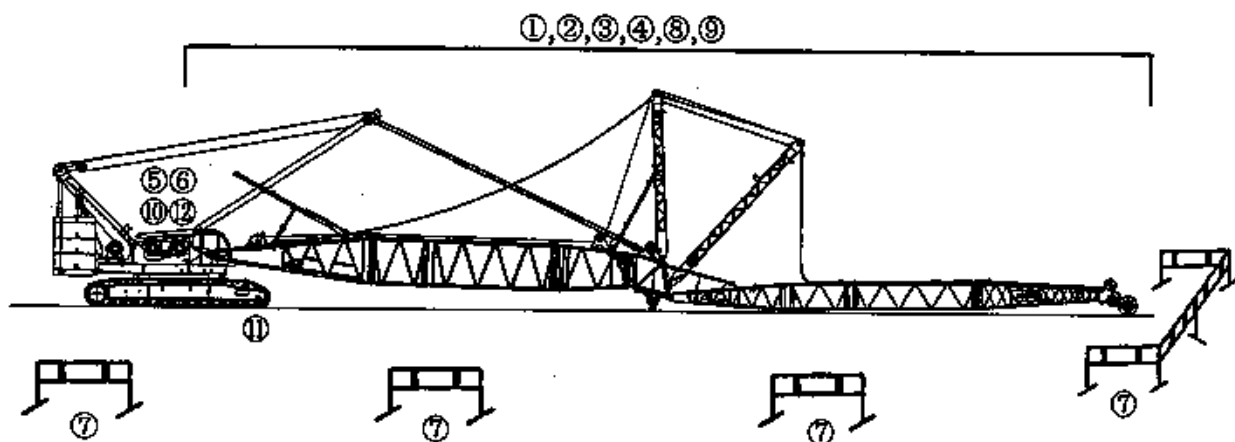


7.2 ERECTING THE LUFFING ATTACHMENT

7.2.1 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 Mast assist arms are in the fully lower position.
- ⑥ Power select switch for mast and gantry is in the OFF position.
- ⑦ The "off limit area" surrounding the attachment is secure from all unnecessary personnel.
- ⑧ The wiring for the boom, main and auxiliary hook overhoist limit switches are correctly installed.
- ⑨ The wiring for the limit switches of the boom, jib, and backstop must be fully completed.
- ⑩ All the hydraulic hoses are securely connected.
- ⑪ Steel blocking plates are inserted under the idlers for insert boom lift-off. This is required for boom lengths of 190 ft - 200 ft (57.9 m - 61.0 m).
- ⑫ The "ATTACHMENT SELECTOR SWITCH" is set to the "LUFFING" side.



7.2.2 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 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.



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.

Table 1 Boom angle to enable jib point lift off the ground

Boom Length ft (m)	Steel Blocking Plate	Jib Length ft (m)										
		70 (21.3)	80 (24.4)	90 (27.4)	100 (30.5)	110 (33.5)	120 (36.6)	130 (39.6)	140 (42.7)	150 (45.7)	160 (48.8)	170 (51.8)
70 (21.3)	—	25	25	25	30	30	30	40	40	40	45	45
80 (24.4)	—	25	25	25	30	30	30	40	40	40	45	45
90 (27.4)	—	20	20	25	30	30	30	40	40	40	45	45
100 (30.5)	—	20	20	25	30	30	30	40	40	40	45	45
110 (33.5)	—	20	20	25	30	30	30	40	40	40	45	45
120 (36.6)	—	20	20	25	30	30	30	40	40	40	45	45
130 (39.6)	—	20	20	25	30	30	30	40	40	40	45	45
140 (42.7)	—	20	20	25	30	30	30	40	40	40	45	45
150 (45.7)	—	20	20	25	30	30	30	40	40	40	45	45
160 (48.8)	—	20	20	25	30	30	30	40	40	40	45	45
170 (51.8)	—	20	20	25	30	30	30	40	40	40	45	45
180 (54.9)	Need	20	20	25	25	30	30	35	40	40	45	45
190 (57.9)	Need	20	20	25	25	30	30	35	40	40	45	45
200 (61.0)	Need	---			25	30	30	35	35	40	40	45

* For your reference, angles shown in the table above are not those at time of attachment being lowered.

- (5) After the boom angle reaches the angle shown in table 1, set the luffing jib control lever to the raising position, to remove any slack in the jib guy lines.
- (6) After removing the slack in jib guy lines, return the jib hoist lever to the neutral position.
- (7) Erect the boom until the boom angle to the minimum working angle.



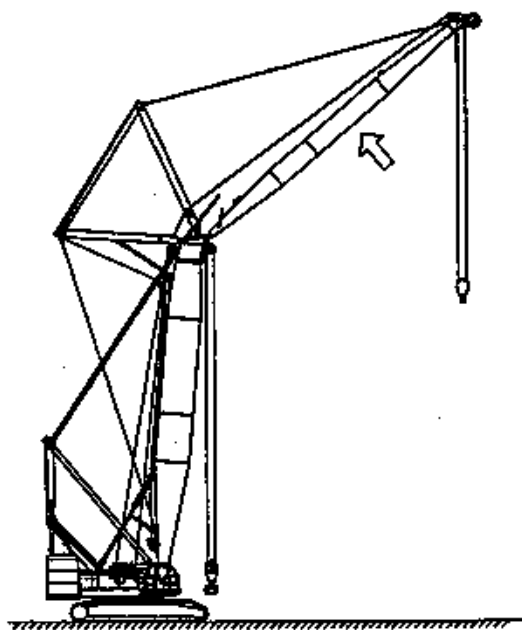
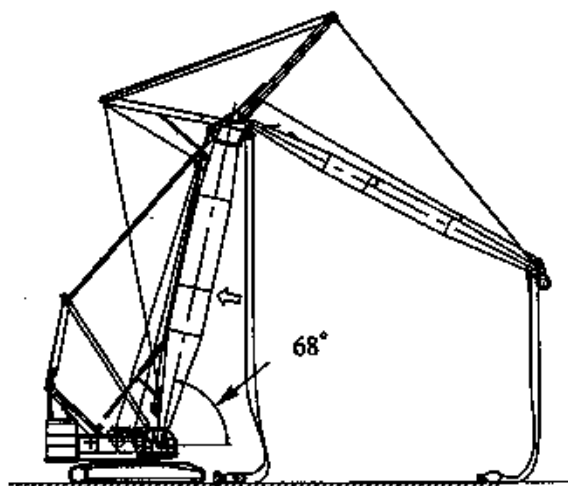
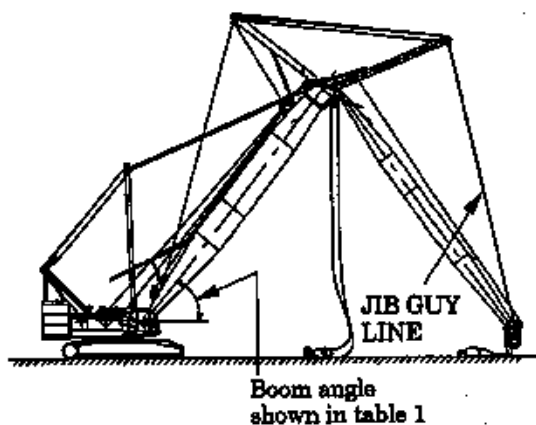
WARNING

Erecting the jib before the boom angle reaches the minimum working angle may cause overturning or damages to the crane.

- (8) 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.

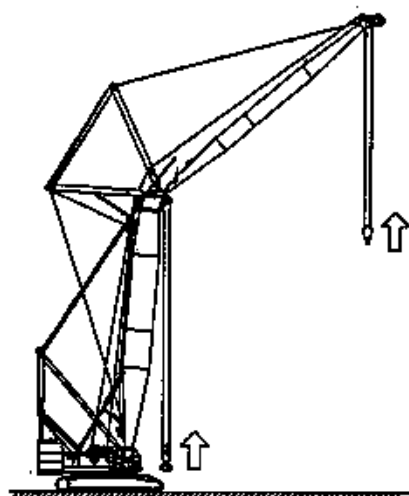
- (10) Hoist the hook off the ground.



7.2.3 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.



7.3 LOWERING THE ATTACHMENT

7.3.1 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 angle shown in table 2.
- (2) Return the boom hoist lever to the neutral position.

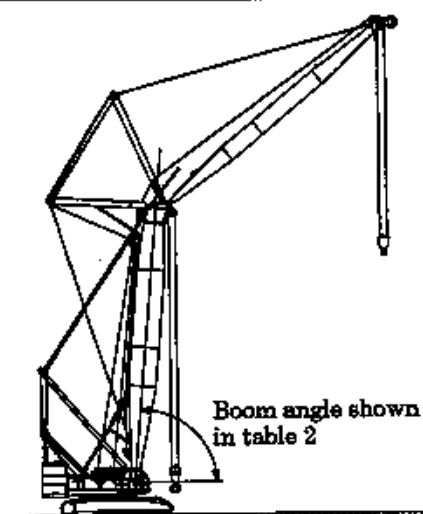


Table 2 Boom angle to start lowering the attachment

Boom Length ft (m)	Steel Blocking Plate	Jib Length ft (m)										
		70 (21.3)	80 (24.4)	90 (27.4)	100 (30.5)	110 (33.5)	120 (36.6)	130 (39.6)	140 (42.7)	150 (45.7)	160 (48.8)	170 (51.8)
70 (21.3)	—	68	68	68	68	68	68	68	68	68	68	68
80 (24.4)	—	68	68	68	68	68	68	68	68	68	68	68
90 (27.4)	—	68	68	68	68	68	68	68	68	68	68	68
100 (30.5)	—	68	68	68	68	68	68	68	68	68	68	68
110 (33.5)	—	68	68	68	68	68	68	68	68	68	68	68
120 (36.6)	—	68	68	68	68	68	68	68	68	68	68	68
130 (39.6)	—	68	68	68	68	68	68	68	68	68	68	68
140 (42.7)	—	68	68	68	68	68	68	68	68	68	68	68
150 (45.7)	—	68	68	68	68	68	68	68	68	68	68	68
160 (48.8)	—	68	68	68	68	68	68	68	68	68	68	68
170 (51.8)	—	68	68	68	68	68	68	78	78	78	78	78
180 (54.9)	Need	68	68	68	68	68	68	78	78	78	78	78
190 (57.9)	Need	68	68	68	68	68	68	78	78	78	78	78
200 (61.0)	Need	---			88	88	88	88	88	88	88	88

* For your reference, angles shown in the table above are not those at time of attachment being elected.

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) Lower the jib until the jib angle becomes 0 to -10 degree.



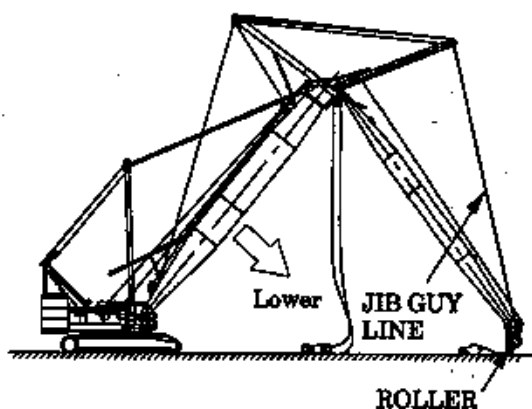
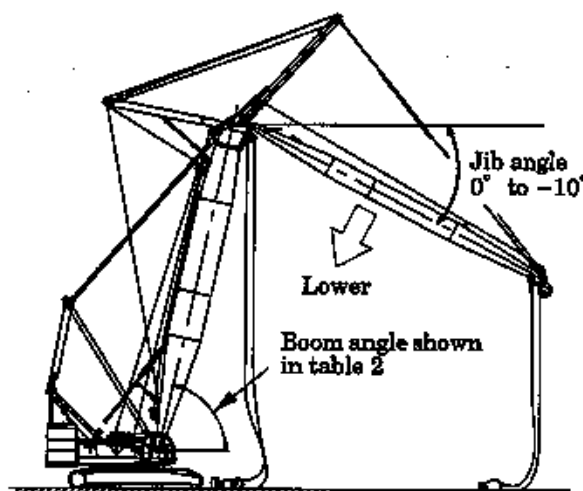
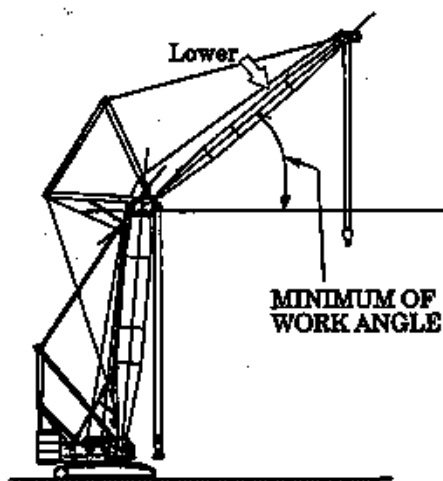
WARNING

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.

- (5) After jib angle reaches 0 to -10 degree, return the jib hoist control lever to the neutral position.

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.



- (4) 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

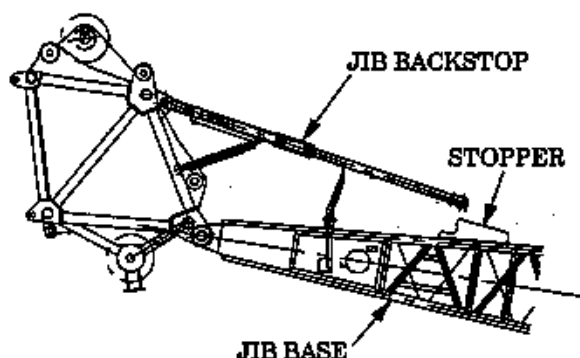
Take care not to erect the front strut excessively. Otherwise, it interferes with the rear strut, leading to damages on the struts.

6. 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.

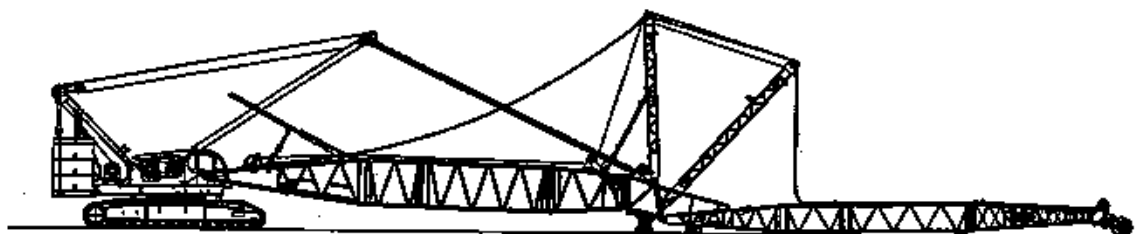


7. Continue lowering the boom and support the luffing boom tip on wooden block(s).



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

7.4 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 loss of life.



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 loss of life.



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.

7.4.1 DISCONNECTION OF 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.

7.4.2 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.



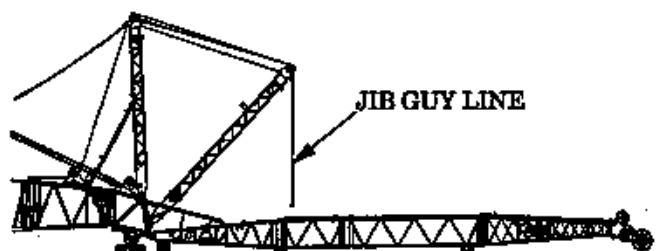
WARNING

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 loss of life.

7.4.3 DISASSEMBLY OF JIB

1. Removing Jib Guy Lines

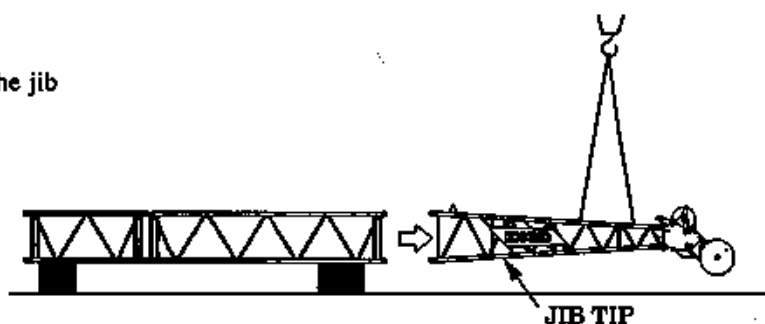
- (1) Separate the jib guy lines from the front strut connecting link.
- (2) Separate the jib guy lines on the top surface of jib and, lower them in order onto the ground with the auxiliary crane.



2. Removing Jib Tip

- (1) Use an assist crane to support the jib tip.

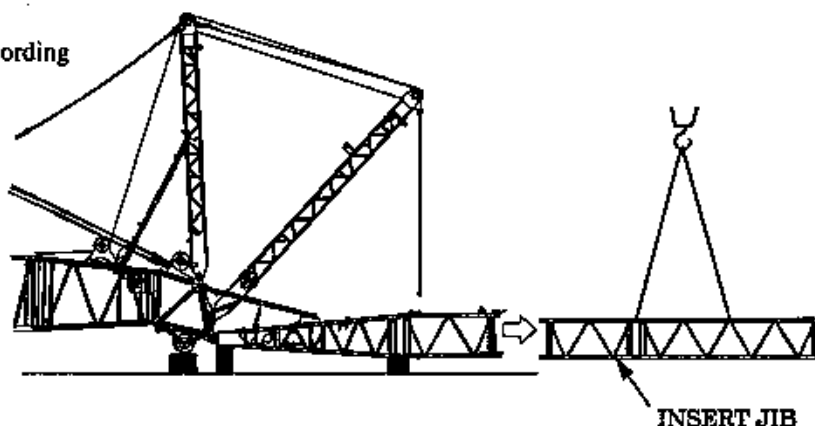
- (2) Remove the pins connecting the jib tip to the jib insert, and place it on a wooden block.



3. Removing Insert Jib

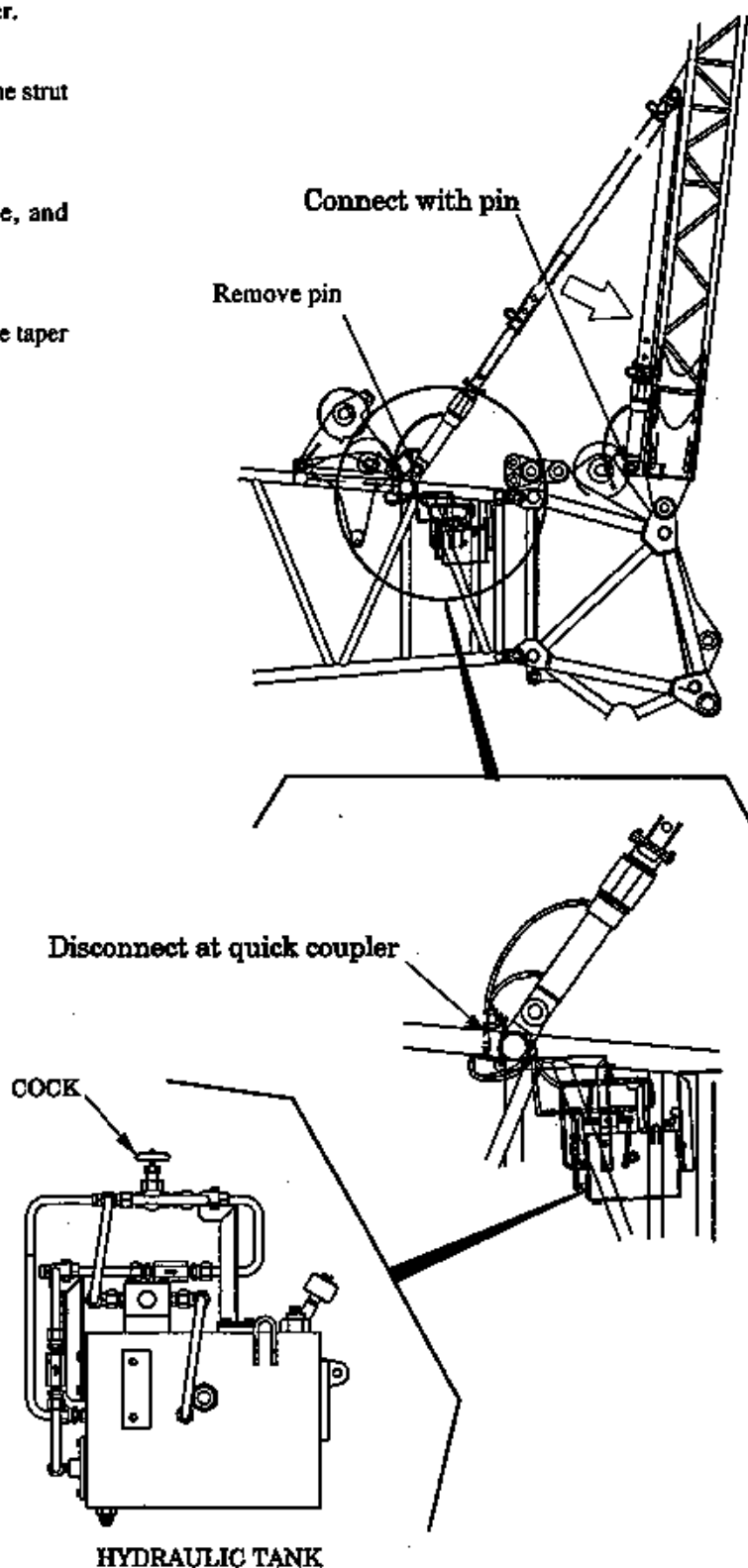
- (1) Use an assist crane to support the jib inserts.

- (2) Disassemble the remaining jib assembly according to the job site conditions.



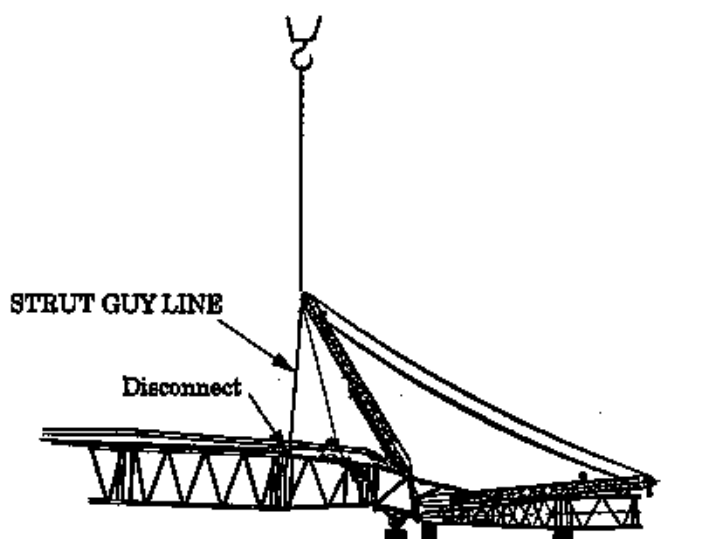
5. Storing Strut Backstop

- (1) Open the cock located on the upper side of the hydraulic tank to retract the backstop cylinder.
- (2) Disconnect the cylinder hoses connected to the strut backstop at the quick coupler.
- (3) Lift the rear strut with the auxiliary crane, and remove the positioning pin at the backstop.
- (4) Remove the pin connecting the backstop to the taper insert boom.
- (5) Fix the backstop to the strut with the pin.



6. Disconnecting Strut Guy Line

- (1) Lift the rear strut with the auxiliary crane, and tilt it rearward until the strut guy line can be disconnected.



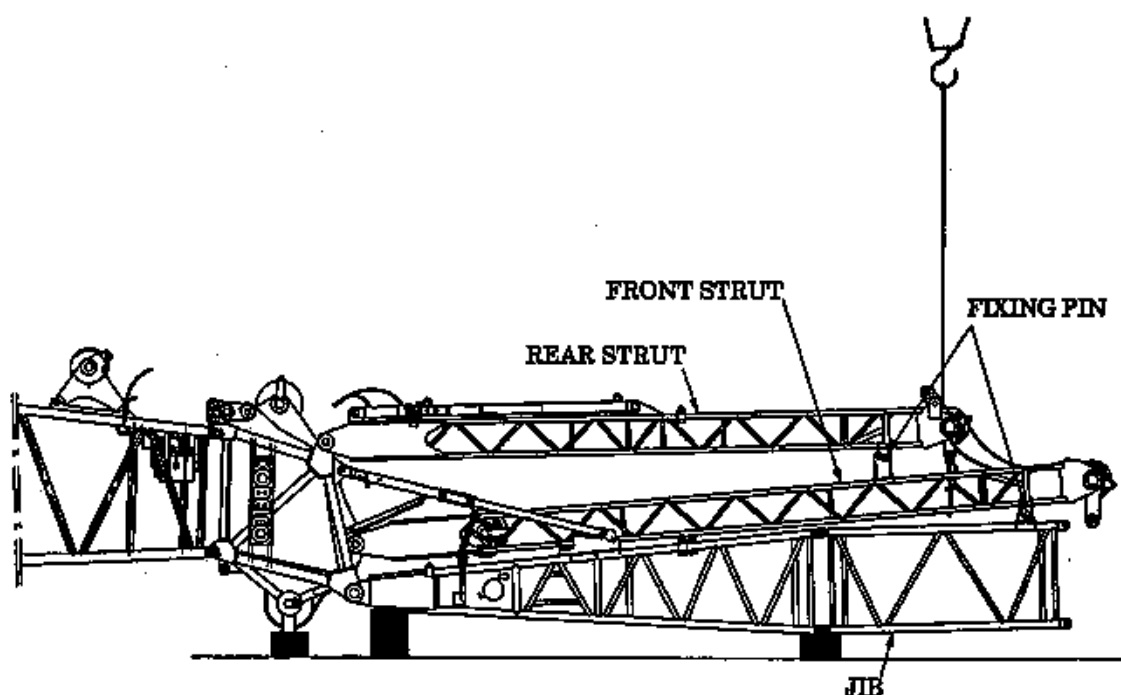
- (2) Disconnect the strut guy line.

7. Fixing Rear Strut

- (1) Tilt the rear strut onto the front strut, and fix it with the pin.

NOTE

When tilting the rear strut, slowly wind the jib raising wire rope to prevent any slack in the hoist line.

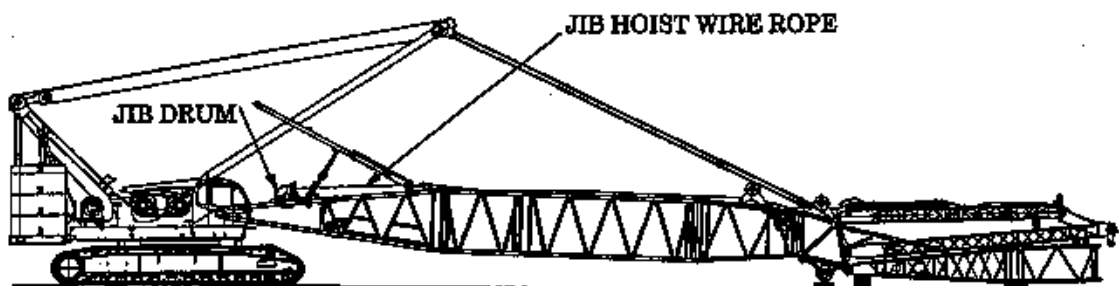


7.4.4 DISASSEMBLY OF LUFFING BOOM TIP ASSEMBLY

1. Wind Up Jib Hoist Wire Rope

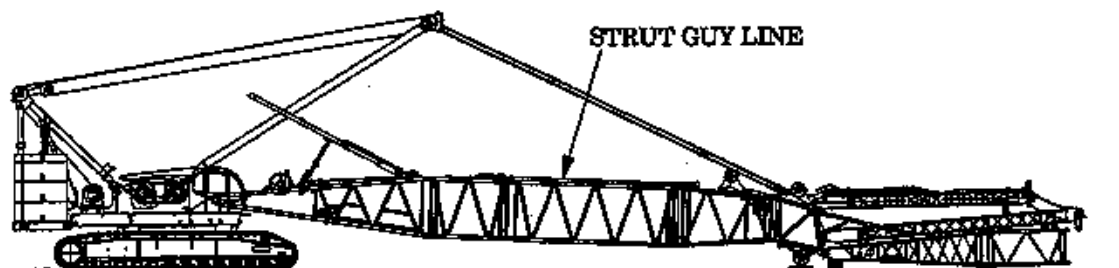
- (1) Remove the rope socket and clamps on the end of the wire rope.
- (2) Operate the jib drum control lever, and wind the wire rope up on the drum, taking care to prevent the wire rope from being caught in the sheave.

	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 loss of life.	



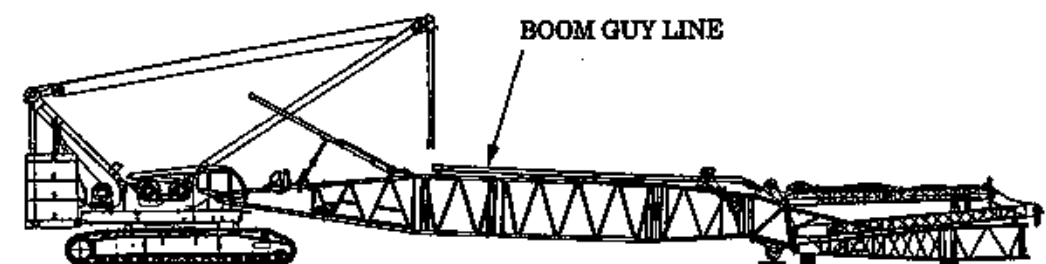
2. Removing Strut Guy Lines

- (1) Remove all the strut guy lines on the boom.



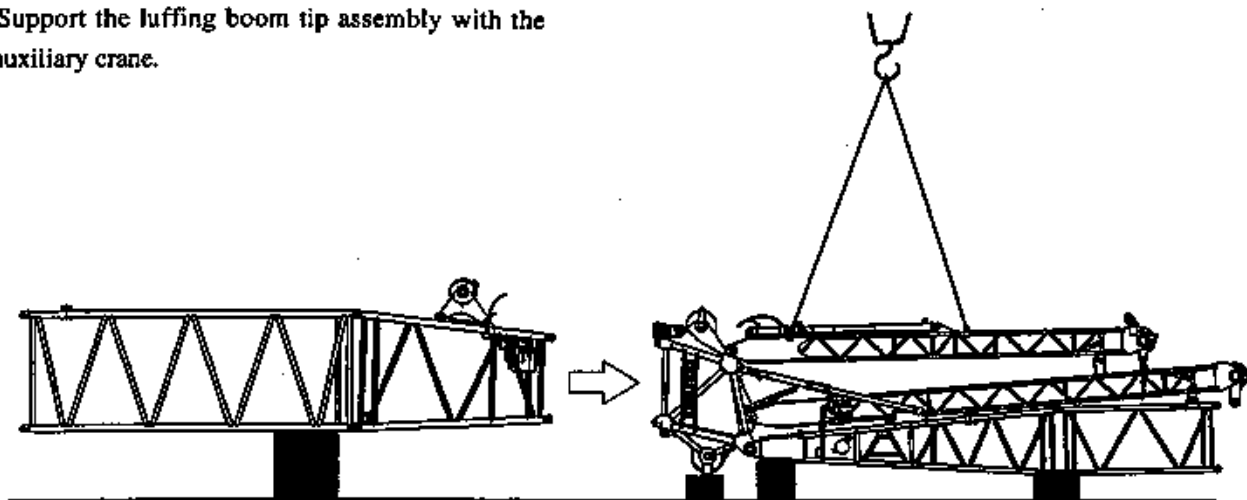
3. Removing Boom Guy Line

- (1) Remove the guy lines on the boom, do not remove the guy lines connect the boom to the mast.



4. 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 taper 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 loss of life.

7.4.5 DISASSEMBLING INSERT BOOM

Disassemble the insert boom, referring to chapter 6.

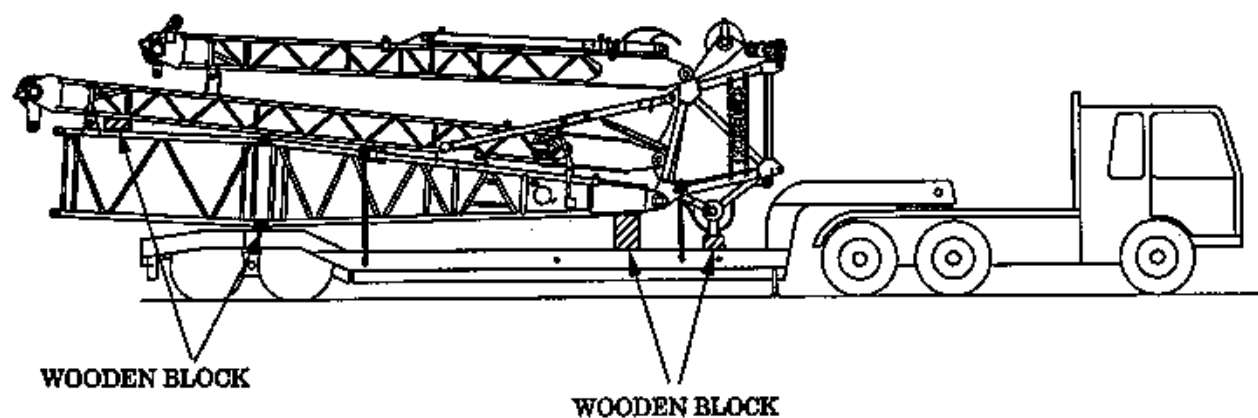
7.4.6 REMOVING BASE BOOM

Remove the base boom, referring to chapter 6.

Disconnect the luffing jib drum hoses at the quick couplers at the boom foot pin area.

7.5 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.



8. WIRE ROPE

8.1 HANDLING OF WIRE ROPE



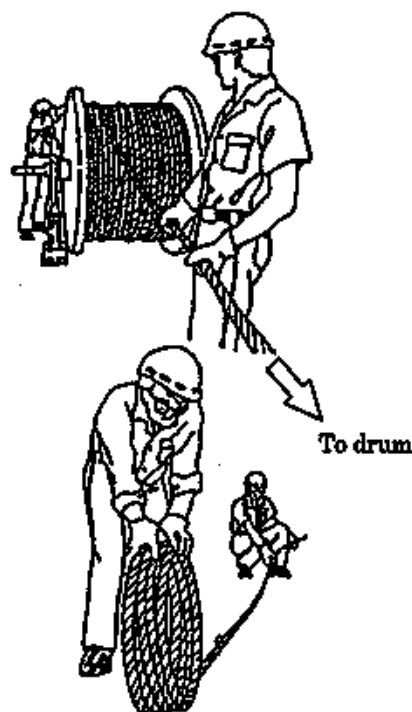
WARNING

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 loss of life.

8.1.1 UNREELING METHOD OF WIRE ROPE

When unreeling 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.



Unreeling method of wire rope

8.1.2 WINDING WIRE ROPE ONTO THE 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.

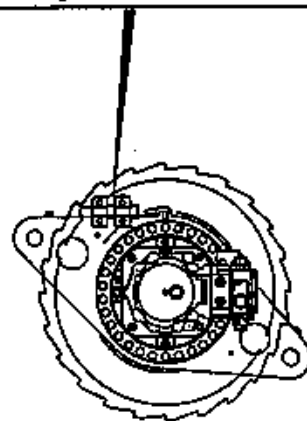
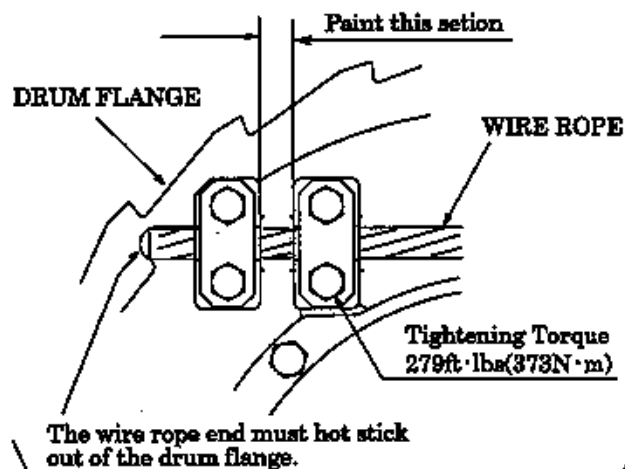
When unwinding the wire rope, remember that at least three lines of the wire rope must be on the drum.



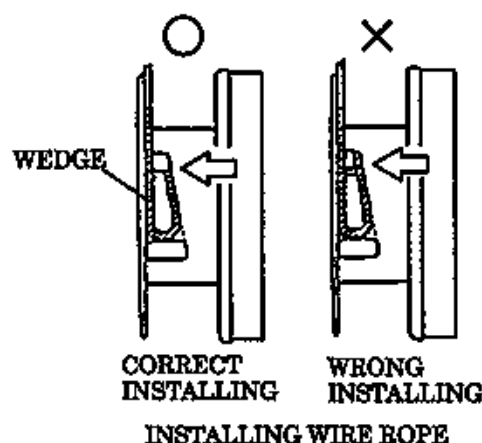
WARNING

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.

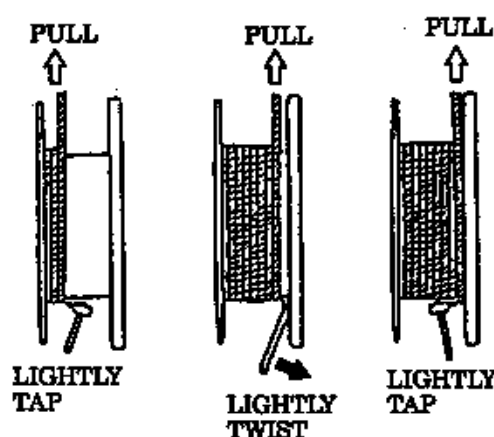


2. In case of the boom and luffing jib drum
Be careful not to allow the wire rope end to protrude from the cotter hole.
Pass the tensile end of the wire rope through the straight side of the rope socket.
Surely install the wedge.



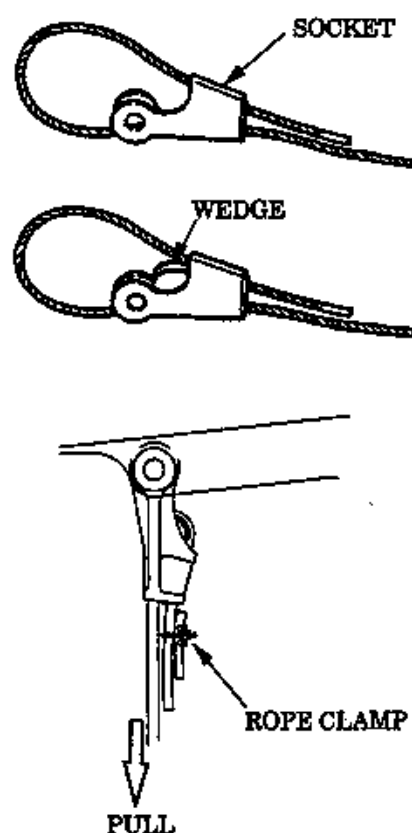
3. In case of the front and rear drum
Lightly tap the rope to line up, and slowly wind it onto the drum.
While pulling the rope, tightly wind the rope onto the drum.

 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 loss of life.



8.1.3 INSTALLING THE ROPE SOCKET

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 and rope loop tight enough to hold the wedge in position while handling.
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 not to mistake the direction.



8.1.4 SPECIFICATION OF WIRE ROPE

(1) Crane

Use	Specification	Diameter inch (mm)	Length ft (m)
Front Drum	IWRC 6×Fi (25) C/O Specified class	1" (25.4)	1575 (480)
Rear Drum	IWRC 6×Fi (25) C/O Specified class	1" (25.4)	1263 (385)
Boom Drum	IWRC 6×WS (31) O/O Specified class	7/8" (22)	1148 (350)
Luffing Jib Drum	IWRC 6×WS (31) O/O Specified class	7/8" (22)	870 (265)

8.1.5 WIRE ROPE LENGTH

(1) Main

Unit : ft (m)

Parts of Boom Liae Length	1	2	4	5	6	7	8	9	10	12	14	16	18
50 (15.2)	122 (37)	174 (53)	278 (85)	331 (101)	383 (117)	435 (132)	487 (148)	539 (164)	591 (180)	695 (212)	800 (244)	904 (276)	1008 (307)
60 (18.3)	142 (43)	204 (62)	328 (100)	390 (119)	452 (138)	514 (157)	576 (175)	638 (194)	700 (213)	824 (251)	948 (289)	1072 (327)	
70 (21.3)	162 (49)	234 (71)	377 (115)	449 (137)	521 (159)	593 (181)	664 (203)	736 (224)	808 (246)	952 (290)	1095 (334)		
80 (24.4)	182 (55)	263 (80)	427 (130)	508 (155)	590 (180)	672 (205)	753 (230)	835 (254)	917 (279)	1080 (329)	1243 (379)		
90 (27.4)	201 (61)	293 (89)	476 (145)	568 (173)	659 (201)	751 (229)	842 (257)	934 (285)	1025 (312)	1208 (368)			
100 (30.6)	221 (67)	323 (98)	525 (160)	627 (191)	728 (222)	829 (253)	931 (284)	1032 (315)	1134 (346)	1336 (407)			
110 (33.5)	241 (73)	352 (107)	575 (175)	686 (209)	797 (243)	908 (277)	1020 (311)	1131 (345)	1242 (379)	1464 (446)			
120 (36.6)	261 (80)	382 (116)	624 (190)	746 (227)	866 (264)	987 (301)	1108 (338)	1229 (376)	1351 (412)				
130 (39.6)	281 (86)	412 (125)	674 (205)	804 (245)	935 (285)	1066 (325)	1197 (365)	1328 (405)					
140 (42.7)	301 (92)	441 (135)	723 (220)	864 (263)	1004 (306)	1145 (349)	1286 (392)	1427 (435)					
150 (45.7)	321 (98)	471 (144)	772 (235)	923 (281)	1074 (327)	1224 (373)	1375 (419)						
160 (48.8)	340 (104)	501 (153)	822 (250)	982 (299)	1143 (348)	1303 (397)	1464 (446)						
170 (51.8)	360 (110)	531 (162)	871 (266)	1041 (317)	1212 (369)	1382 (421)	1552 (473)						
180 (54.9)	380 (116)	560 (171)	921 (281)	1101 (335)	1281 (390)	1461 (445)							
190 (57.9)	400 (122)	590 (180)	970 (296)	1160 (354)	1350 (411)	1540 (469)							
200 (61.0)	420 (128)	620 (189)	1019 (311)	1219 (372)	1419 (433)								
210 (64.0)	440 (134)	649 (196)	1069 (326)	1278 (390)	1488 (454)								
220 (67.1)	459 (140)	679 (207)	1118 (341)	1338 (408)	1557 (475)								
230 (70.1)	479 (146)	709 (216)	1167 (356)	1397 (426)									
240 (73.2)	499 (152)	738 (225)	1217 (371)	1456 (444)									
250 (76.2)	519 (158)	768 (234)	1266 (386)										
260 (79.2)	539 (164)	798 (243)	1316 (401)										
270 (82.3)	559 (170)	827 (252)	1365 (416)										
280 (85.3)	579 (176)	857 (261)	1414 (431)										
290 (88.4)	598 (182)	887 (270)	1464 (446)										
300 (91.4)	618 (188)	917 (279)	1513 (461)										

(2) Auxiliary

Unit: ft (m)

Jib Length	40 (12.2)		60 (18.3)		80 (24.4)	100 (30.5)
Parts of Line	1	2	1	2	1	1
Boom Length						
90 (27.4)	272 (83)	401 (122)	311 (95)	459 (140)	350 (107)	389 (118)
100 (30.5)	292 (89)	431 (131)	331 (101)	489 (149)	370 (113)	409 (125)
110 (33.5)	312 (95)	461 (140)	351 (107)	518 (158)	390 (119)	428 (131)
120 (36.6)	332 (101)	491 (150)	371 (113)	548 (167)	410 (125)	448 (137)
130 (39.6)	352 (107)	520 (159)	391 (119)	578 (176)	429 (131)	468 (143)
140 (42.7)	372 (113)	550 (168)	410 (125)	608 (185)	449 (137)	488 (149)
150 (45.7)	391 (119)	580 (177)	430 (131)	637 (194)	469 (143)	508 (155)
160 (48.8)	411 (125)	609 (186)	450 (137)	667 (203)	489 (149)	528 (161)
170 (51.8)	431 (131)	639 (195)	470 (143)	697 (212)	509 (155)	548 (167)
180 (54.9)	451 (137)	669 (204)	490 (149)	726 (221)	529 (161)	567 (173)
190 (57.9)	471 (144)	698 (213)	510 (155)	756 (230)	548 (167)	587 (179)
200 (61.0)	491 (150)	728 (222)	530 (161)	786 (239)	568 (173)	607 (185)
210 (64.0)	511 (156)	758 (231)	549 (167)	815 (249)	588 (179)	627 (191)
220 (67.1)	530 (162)	788 (240)	569 (173)	845 (258)	608 (185)	647 (197)
230 (70.1)	550 (168)	817 (249)	589 (180)	875 (267)	628 (191)	667 (203)
240 (73.2)	570 (174)	847 (258)	609 (186)	905 (276)	648 (197)	686 (209)
250 (76.2)	590 (180)	877 (267)	629 (192)	934 (285)	668 (203)	706 (215)

NOTE

Too long a rope may cause rough spooling on the drum.

(3) Luffing Jib

Unit : ft (m)

Jib Length		70 (21.34)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		316 (96)	467 (142)	618 (188)	768 (234)
80 (24.4)		336 (102)	497 (151)	658 (200)	818 (249)
90 (27.4)		356 (109)	527 (161)	698 (213)	868 (265)
100 (30.5)		376 (115)	557 (170)	738 (225)	918 (280)
110 (33.6)		396 (121)	587 (179)	778 (237)	968 (295)
120 (36.6)		416 (127)	617 (188)	817 (249)	1018 (310)
130 (39.6)		436 (133)	647 (197)	857 (261)	1068 (326)
140 (42.7)		456 (139)	677 (206)	897 (274)	1118 (341)
150 (45.7)		476 (145)	707 (215)	937 (286)	1168 (356)
160 (48.8)		496 (151)	737 (225)	977 (298)	1218 (371)
170 (51.8)		516 (157)	767 (234)	1017 (310)	1268 (387)
180 (54.9)		536 (163)	797 (243)	1057 (322)	1318 (402)
190 (57.9)		556 (169)	827 (252)	1097 (334)	1368 (417)
200 (61.0)					

Unit : ft (m)

Jib Length		80 (24.38)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		335 (102)	496 (151)	656 (200)	816 (249)
80 (24.4)		355 (108)	526 (160)	696 (212)	866 (264)
90 (27.4)		375 (114)	556 (169)	736 (224)	916 (279)
100 (30.5)		395 (121)	586 (179)	776 (237)	966 (295)
110 (33.6)		415 (127)	616 (188)	816 (249)	1016 (310)
120 (36.6)		435 (133)	646 (197)	856 (261)	1066 (325)
130 (39.6)		455 (139)	676 (206)	896 (273)	1116 (340)
140 (42.7)		475 (145)	706 (215)	936 (285)	1166 (355)
150 (45.7)		495 (151)	736 (224)	976 (297)	1216 (371)
160 (48.8)		515 (157)	766 (233)	1016 (310)	1266 (386)
170 (51.8)		535 (163)	796 (243)	1056 (322)	1316 (401)
180 (54.9)		555 (169)	826 (252)	1096 (334)	1366 (416)
190 (57.9)		575 (175)	856 (261)	1136 (346)	1416 (432)
200 (61.0)					

Jib Length		90 (27.43)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		355 (108)	525 (160)	695 (212)	865 (264)
80 (24.4)		375 (114)	555 (169)	735 (224)	914 (279)
90 (27.4)		395 (120)	585 (178)	775 (236)	964 (294)
100 (30.5)		415 (126)	615 (187)	815 (248)	1014 (309)
110 (33.6)		435 (133)	645 (196)	855 (260)	1064 (324)
120 (36.6)		455 (139)	675 (206)	895 (273)	1114 (340)
130 (39.6)		475 (145)	705 (215)	935 (285)	1164 (355)
140 (42.7)		495 (151)	735 (224)	974 (297)	1214 (370)
150 (45.7)		515 (157)	765 (233)	1014 (309)	1264 (386)
160 (48.8)		535 (163)	795 (242)	1054 (321)	1314 (401)
170 (51.8)		555 (169)	825 (251)	1094 (334)	1364 (416)
180 (54.9)		575 (175)	855 (260)	1134 (346)	1414 (431)
190 (57.9)		595 (181)	885 (270)	1174 (358)	1464 (446)
200 (61.0)					

Jib Length		100 (30.48)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		374 (114)	554 (169)	733 (223)	913 (278)
80 (24.4)		394 (120)	584 (178)	773 (236)	963 (293)
90 (27.4)		414 (126)	614 (187)	813 (248)	1013 (309)
100 (30.5)		434 (132)	644 (196)	853 (260)	1063 (324)
110 (33.6)		454 (138)	674 (205)	893 (272)	1113 (339)
120 (36.6)		474 (145)	704 (214)	933 (284)	1163 (354)
130 (39.6)		494 (151)	734 (224)	973 (297)	1213 (370)
140 (42.7)		514 (157)	764 (233)	1013 (309)	1263 (385)
150 (45.7)		534 (163)	794 (242)	1053 (321)	1313 (400)
160 (48.8)		554 (169)	824 (251)	1093 (333)	1363 (415)
170 (51.8)		574 (175)	854 (260)	1133 (345)	1413 (430)
180 (54.9)		594 (181)	884 (269)	1173 (358)	1463 (446)
190 (57.9)		614 (187)	914 (278)	1213 (370)	1513 (461)
200 (61.0)		634 (193)	944 (288)	1253 (382)	1563 (476)

Jib Length		110 (33.53)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		394 (120)	583 (178)	772 (236)	961 (293)
80 (24.4)		414 (126)	613 (187)	812 (247)	1011 (308)
90 (27.4)		434 (132)	643 (196)	852 (260)	1061 (323)
100 (30.5)		454 (138)	673 (205)	892 (272)	1111 (339)
110 (33.6)		474 (144)	703 (214)	932 (284)	1161 (354)
120 (36.6)		494 (150)	733 (223)	972 (296)	1211 (369)
130 (39.6)		514 (157)	763 (232)	1012 (308)	1261 (384)
140 (42.7)		534 (163)	793 (242)	1052 (321)	1311 (399)
150 (45.7)		554 (169)	823 (251)	1092 (333)	1361 (415)
160 (48.8)		574 (175)	853 (260)	1132 (345)	1411 (430)
170 (51.8)		594 (181)	883 (269)	1172 (357)	1461 (445)
180 (54.9)		614 (187)	913 (278)	1212 (369)	1511 (460)
190 (57.9)		634 (193)	943 (287)	1252 (381)	1561 (476)
200 (61.0)		654 (199)	973 (296)		

Jib Length		120 (36.58)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		413 (126)	612 (186)	810 (247)	1009 (308)
80 (24.4)		433 (132)	642 (196)	850 (259)	1059 (323)
90 (27.4)		453 (138)	672 (205)	890 (271)	1109 (338)
100 (30.5)		473 (144)	702 (214)	930 (284)	1159 (353)
110 (33.6)		493 (150)	732 (223)	970 (296)	1209 (368)
120 (36.6)		513 (156)	762 (232)	1010 (308)	1259 (384)
130 (39.6)		533 (163)	792 (241)	1050 (320)	1309 (399)
140 (42.7)		553 (169)	822 (250)	1090 (332)	1359 (414)
150 (45.7)		573 (175)	852 (260)	1130 (344)	1409 (429)
160 (48.8)		593 (181)	882 (269)	1170 (357)	1459 (445)
170 (51.8)		613 (187)	912 (278)	1210 (369)	1509 (460)
180 (54.9)		633 (193)	942 (287)	1250 (381)	1559 (475)
190 (57.9)		653 (199)	972 (296)		
200 (61.0)		673 (205)	1002 (305)		

Jib Length		130 (39.62)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		433 (132)	641 (195)	849 (259)	1057 (322)
80 (24.4)		453 (138)	671 (204)	889 (271)	1107 (337)
90 (27.4)		473 (144)	701 (214)	929 (283)	1157 (353)
100 (30.5)		493 (150)	731 (223)	969 (295)	1207 (368)
110 (33.5)		513 (156)	761 (232)	1009 (308)	1257 (383)
120 (36.6)		533 (162)	791 (241)	1049 (320)	1307 (398)
130 (39.6)		553 (168)	821 (250)	1089 (332)	1357 (414)
140 (42.7)		573 (175)	851 (259)	1129 (344)	1407 (429)
150 (45.7)		593 (181)	881 (268)	1169 (356)	1457 (444)
160 (48.8)		613 (187)	911 (278)	1209 (368)	1507 (459)
170 (51.8)		633 (193)	941 (287)	1249 (381)	1557 (475)
180 (54.9)		653 (199)	971 (296)		
190 (57.9)		673 (205)	1001 (305)		
200 (61.0)		693 (211)	1031 (314)		

Jib Length		140 (42.67)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		452 (138)	670 (204)	888 (271)	1105 (337)
80 (24.4)		472 (144)	700 (213)	928 (283)	1155 (352)
90 (27.4)		492 (150)	730 (222)	968 (295)	1205 (367)
100 (30.5)		512 (156)	760 (232)	1008 (307)	1255 (383)
110 (33.5)		532 (162)	790 (241)	1048 (319)	1305 (398)
120 (36.6)		552 (168)	820 (250)	1088 (331)	1355 (413)
130 (39.6)		572 (174)	850 (259)	1128 (344)	1405 (428)
140 (42.7)		592 (180)	880 (268)	1167 (356)	1455 (444)
150 (45.7)		612 (187)	910 (277)	1207 (368)	1505 (459)
160 (48.8)		632 (193)	940 (286)	1247 (380)	1555 (474)
170 (51.8)		652 (199)	970 (296)		
180 (54.9)		672 (205)	1000 (305)		
190 (57.9)		692 (211)	1030 (314)		
200 (61.0)		712 (217)	1060 (323)		

Jib Length		150 (45.72)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		472 (144)	699 (213)		
80 (24.4)		492 (150)	729 (222)		
90 (27.4)		512 (156)	759 (231)		
100 (30.5)		532 (162)	789 (240)		
110 (33.5)		552 (168)	819 (250)		
120 (36.6)		572 (174)	849 (259)		
130 (39.6)		592 (180)	879 (268)		
140 (42.7)		612 (186)	909 (277)		
150 (45.7)		632 (193)	939 (286)		
160 (48.8)		652 (199)	969 (296)		
170 (51.8)		672 (205)	999 (304)		
180 (54.9)		692 (211)	1029 (314)		
190 (57.9)		712 (217)	1059 (323)		
200 (61.0)		732 (223)	1089 (332)		

Jib Length		160 (48.77)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		491 (150)	728 (222)		
80 (24.4)		511 (156)	758 (231)		
90 (27.4)		531 (162)	788 (240)		
100 (30.5)		551 (168)	818 (249)		
110 (33.5)		571 (174)	848 (258)		
120 (36.6)		591 (180)	878 (268)		
130 (39.6)		611 (186)	908 (277)		
140 (42.7)		631 (192)	938 (286)		
150 (45.7)		651 (198)	968 (295)		
160 (48.8)		671 (205)	998 (304)		
170 (51.8)		691 (211)	1028 (313)		
180 (54.9)		711 (217)	1058 (322)		
190 (57.9)		731 (223)	1088 (332)		
200 (61.0)		751 (229)	1118 (341)		

Jib Length		170 (51.82)			
Boom Length	Parts of Line	1	2	3	4
70 (21.3)		511 (156)	757 (231)		
80 (24.4)		531 (162)	787 (240)		
90 (27.4)		551 (168)	817 (249)		
100 (30.5)		571 (174)	847 (258)		
110 (33.5)		591 (180)	877 (267)		
120 (36.6)		611 (186)	907 (276)		
130 (39.6)		631 (192)	937 (286)		
140 (42.7)		651 (198)	967 (295)		
150 (45.7)		671 (204)	997 (304)		
160 (48.8)		691 (211)	1027 (313)		
170 (51.8)		711 (217)	1057 (322)		
180 (54.9)		731 (223)	1087 (331)		
190 (57.9)		751 (229)	1117 (340)		
200 (61.0)		771 (235)	1147 (350)		

9. MAINTENANCE

In order to use this machine always safely in the best condition, preventive maintenance is required.



WARNING

When checking the machine, lower the boom down on 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 loss of life.

1. PRECAUTIONS WHEN PERFORMING CHECK AND MAINTENANCE

- Carry out check and maintenance with a suitable working clothes on.
- Be sure to set the machine on a firm and level ground, and post a notice board showing "Under Check and Inspection".
- Check and maintenance in a place of higher than two meters (6.6 feet) are elevation work. Be sure to use a working scaffold and safety band.
- When moving to perform check and maintenance, determine the fixed signals, and move the machine following the signals.
- When performing check and maintenance of hydraulic equipments, be careful to prevent dust and dirt from entering.

2. CHECK AND CHECK TABLE

- The following check table is based on the average operating condition. Consider the check schedule according to the working condition and weather condition.
- The check table covers all items, but if operators and maintenance personnel judge that additional items are necessary, add them to the check items.
- Whenever a question arises regarding check and maintenance, consult the local representative.



WARNING

Repair or adjust the machine immediately when necessity of repair or adjustment is observed during check and inspection.

3. MAINTENANCE

• Maintenance

When replacement of parts and readjustment are required by check, immediately replace or adjust.
If repair is necessary, consult the service shop designated by our company.

• Parts

Use the KOBELCO genuine parts for replacement parts and lubricant to be used in order to keep performance of the machine.

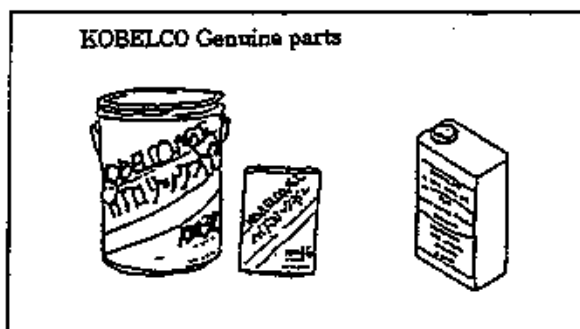
The parts of consumption such as elements, etc. must be replaced somewhat early in order to prevent deterioration of performance due to delay of replacement.

For doubtful point regarding check and maintenance, consult the service shop designated by our company.

4. PRECAUTIONS FOR CHECK AND MAINTENANCE

- Use genuine parts of our company.

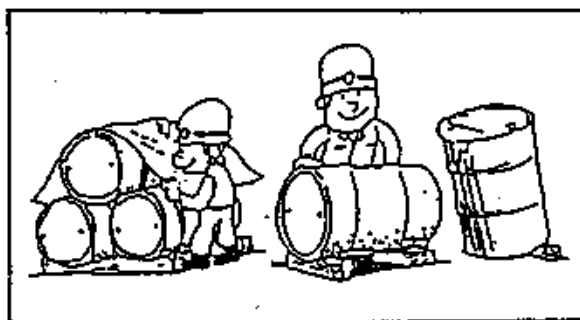
Be sure to use KOBELCO genuine parts for replacement parts and lubricant to be used.



- Use clean oil and grease.

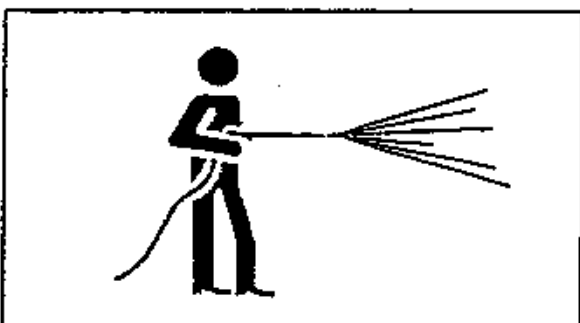
Keep the containers for oil and grease in a clean inside of a house to prevent dust and water from entering.

Be sure to use clean oil and grease which do not contain water.



- Clean carrier.

Cleanly wash the carrier to make finding of oil leak, crack, loosening and other wrong condition easy. Especially, clean grease fittings, breathers and oil level gauge parts (window for check of oil), and avoid entering of dust.

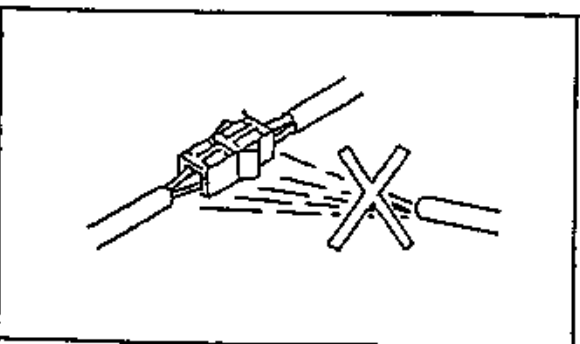


- Disposal of spilled oil

Leaving oil spilled when refilling or replacing fuel, hydraulic oil, various lubricants, or replacing the filter, may lead to a fire accident. Thoroughly wipe it away.

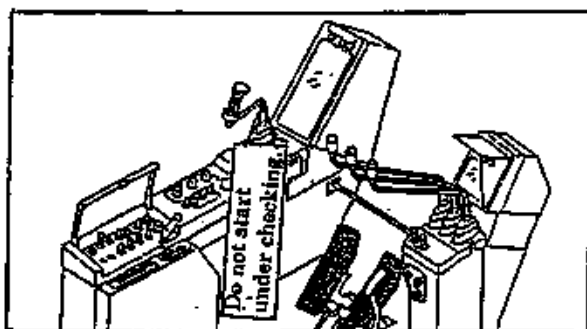
- Caution when washing the machines.

Do not pour steam directly to electric parts and connectors.



- Place a warning plate under checking.

When performing check and maintenance, be sure to indicate warning plate "Under checking. Do not Start." to the key switch.



- The lighting of fires prohibited!

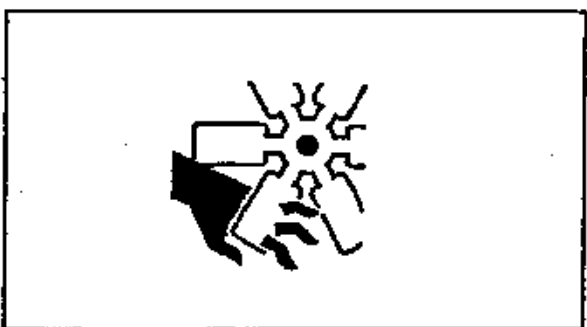
Wastes with oil adhered and combustibles should be stored in a safe place without fire.

Confirm the storage position and using method of fire extinguisher for emergency.



- Pay attention to rotating parts!

When checking fan belt tension or water pump, it may become entangled in moving machinery. Stop the engine, then work.



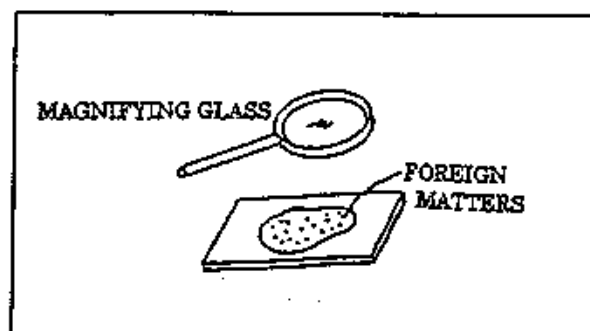
- Pay attention to temperature of water and oil.

Since draining oil, draining water and replacing filter just after the engine stops is dangerous, wait until the temperature lowers, then perform these works. However, when oil is cold, warm the oil properly [approximately 68°F to 122°F (20°C to 50°C)], on the contrary, then drain the oil.



- Check drained oil and old filter.

When replacing oil or when replacing a filter, check the old oil or old filter for much metallic powder and foreign matters.



- Be careful for entering of dust.

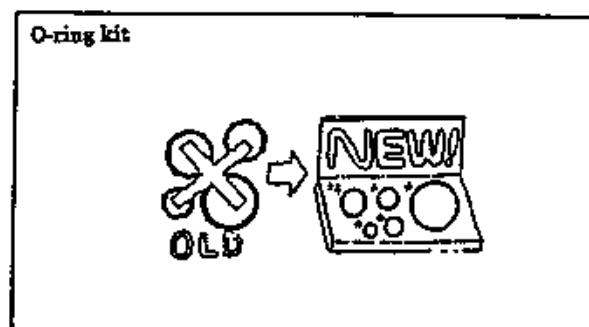
Put the blind plug and cap to the oil holes of the removed hydraulic hoses and hydraulic equipments to prevent foreign matters from entering.



- Clean mounting Surfaces.

When sealing sections of O-rings and gaskets were removed, clean the mounting surfaces, then replace with new ones.

When assembling, apply a thin coat of oil to the seals.



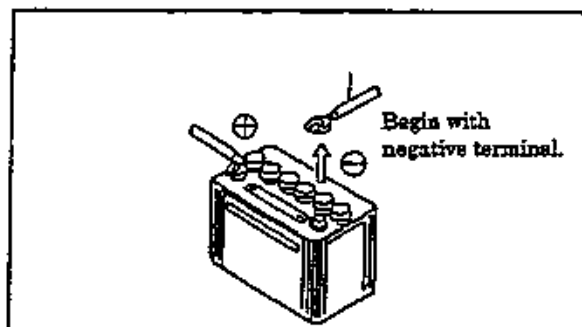
- Pay attention to Internal pressure.

When removing hydraulic system, air system, fuel system or pipings and connectors of cooling system and other related parts which have internal pressure, bleed internal pressure beforehand.



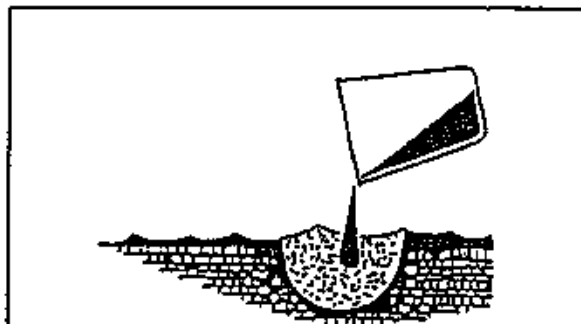
- **Precaution when welding.**

- Turn off power supply (turn the key switch off).
- Disconnect the cable of [-] side of the battery.
- Do not apply voltage more than 200 volts continuously.
- Provide earth (ground) within 1 meter from the welding section.
- Do not allow a seal and bearing to enter between the welding section and earth section.
- When welding near the load safety device and controller, remove them to prevent damage.



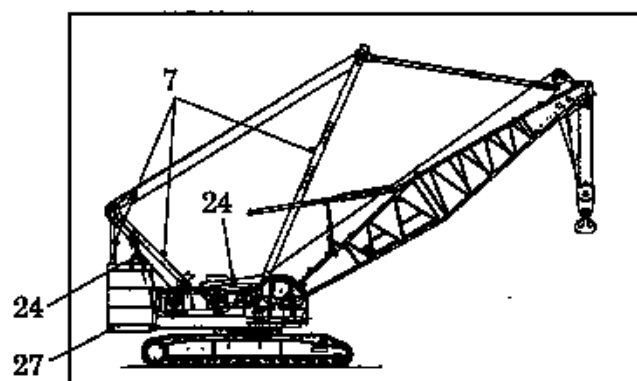
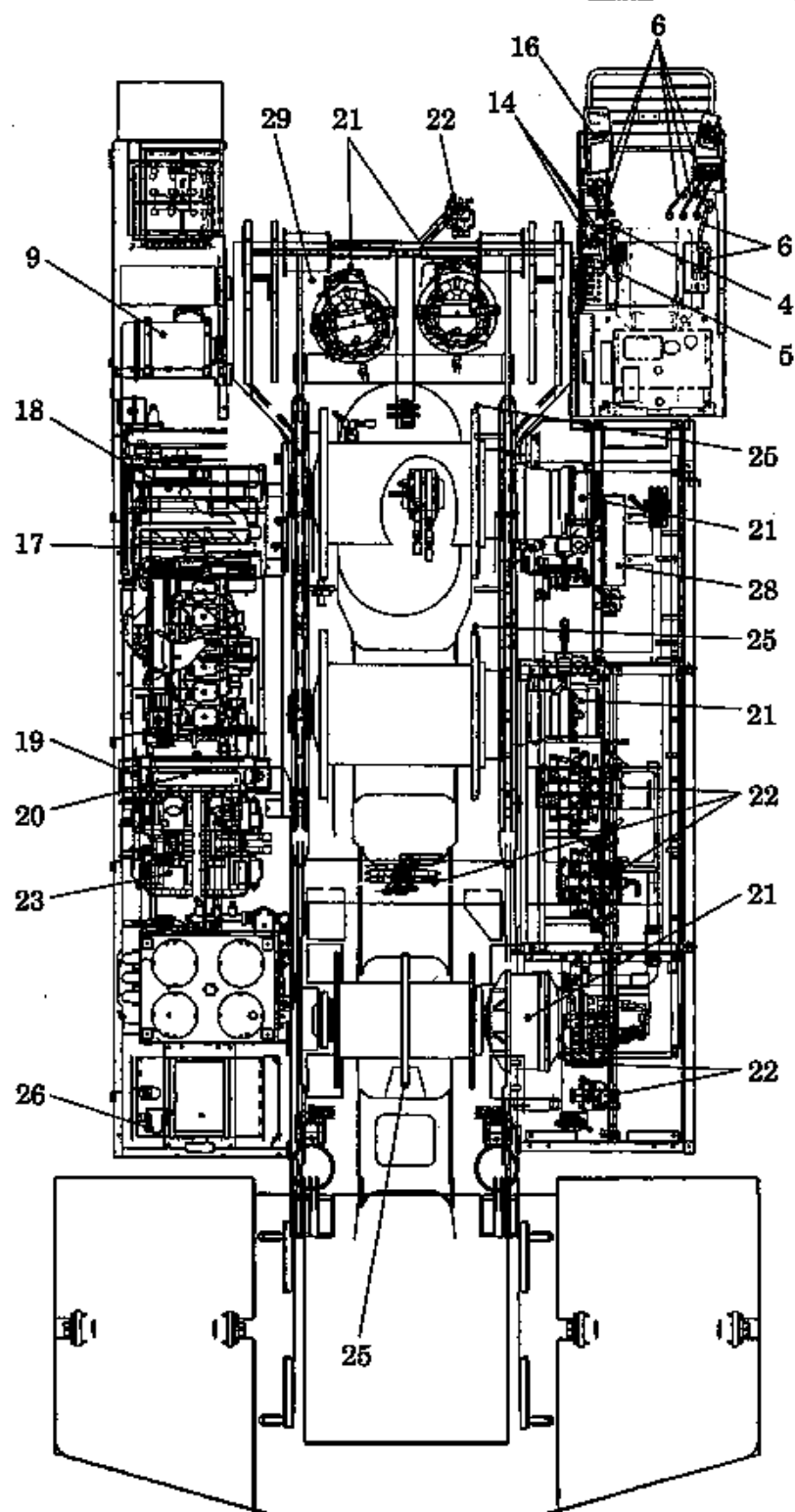
- **Treatment of discarded oil.**

Be sure to drain discarded oil into a container such as oil can, and treat it as industrial discharges.



9.1 CHECKS

9.1.1 CHECKS OF THE UPPER



Check Interval	Item No.	Identification	Check Item	Check Method	Reference page
Daily or every 5 hours	1	Fuel and hydraulic system hose	Damage	Visual check	9-8
	2	Engine	Starting, leak, unusual noise	Starting, check by hearing	9-8
	3	Hose, piping, connector	Oil leak	Visual check	9-8
	4	Swing brake	Effectiveness	Operation	9-8
	5	Swing lock	Performance	Operation	9-8
	6	Control lever	Play, deformation	Operation, visual check	9-9
	7	Gantry	Deformation, crack	Visual check	9-9
	8	Horn, head light, wiper	Performance	Operation, visual check	9-9
	9	Air cleaner	Clogging (indicator)	Visual check	9-9
	10	Pin, link, cotter pin	Damage, falling off	Visual check	9-10
	11	Bolt, nut	Looseness, falling off	Visual check	9-10
	12	Hook overhoist preventive device	Performance	Operation	9-10
	13	Boom overhoist preventive device	Performance	Operation	9-10
	14	Drum lock knob	Performance	Operation	9-10
	15	Window glass, step, handle, guard	Damage, crack, falling off	Visual check	9-10
	16	Swing neutral free indicator lamp	Filament is gone	Operation, visual check	9-11
Monthly or every 100 hours	17	Fan belt	Looseness, damage	Push with finger, visual check	9-12
	18	Radiator, oil cooler	Oil leak, damage	Visual check	9-12
	19	Engine mounting bolt, rubber mount	Looseness, damage	Visual check, test hammer	9-12
	20	Power divider	Oil leak, unusual noise	Visual check, check by hearing	9-13
	21	Hydraulic motor, reduction unit	Oil leak, unusual noise	Visual check, check by hearing	9-13
	22	Valve, etc.	Oil leak	Visual check	9-14
	23	Hydraulic pump	Oil leak, unusual noise	Visual check, check by hearing	9-14
	24	Gantry cylinder, mast cylinder	Oil leak, damage	Visual check	9-14
	25	Drum lock	Wear, damage	Visual check	9-14
	26	Fuel supply pump, hose	Performance, damage	Operation, visual check	9-14
	27	Swing alarm lamp	Alarm sound Filament is gone	Operation, visual check	9-15
Semi-annually or every 600 hours	28	Accumulator	Oil leak, damage	Visual check	9-15
	29	Frame	Damage, crack	Visual check	9-15

※ The item numbers in the above table correspond to the numbers in the following description.

※ The item numbers, 1, 2, 3, 8, 10, 11, 12, 13, and 15 are not indicated in the drawing.

CHECK OF UPPER DAILY OR EVERY 5 HOURS

1. FUEL SYSTEM HOSE

Check the fuel system hose for damage and for fuel leak.



CAUTION

Wipe up fuel, if fuel leak is observed.

2. ENGINE

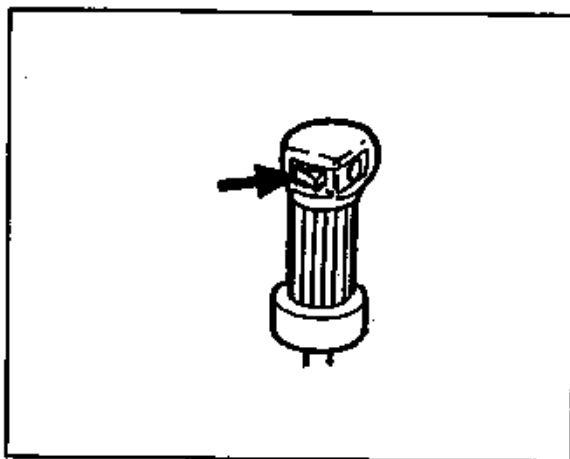
Start the engine, check for starting condition and for unusual noise.

3. HOSE, PIPING AND CONNECTOR, ETC.

Check the hose, piping and connector, etc. for oil leak and for damage.

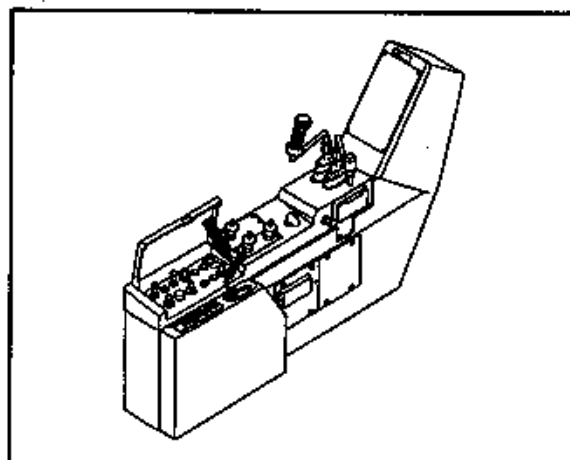
4. SWING BRAKE

Confirm that the swing brake is surely effective.
(With the swing brake switch placed in the ON position, operate the swing control lever to confirm that the swing brake is surely effective. When the swing brake is engaged, swinging is impossible.)



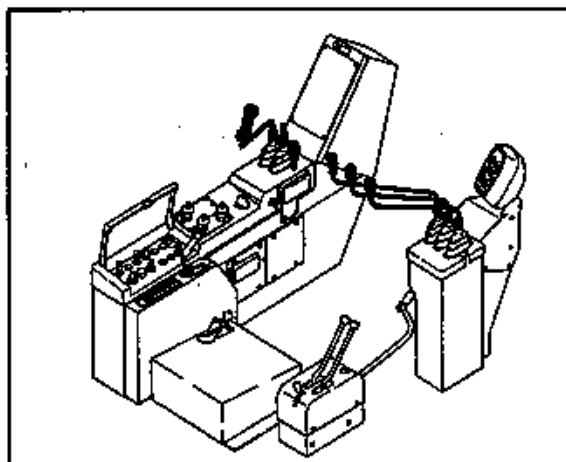
5. SWING LOCK

Confirm that the swing lock pin is inserted smoothly. Check the lock pin and rod for deformation.



6. CONTROL LEVER

Check the control lever and brake pedal for unusual play and for damage.



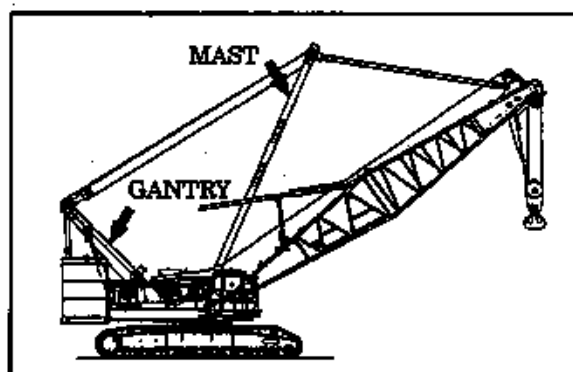
7. GANTRY, MAST

Check the gantry and mast for damage.



CAUTION

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



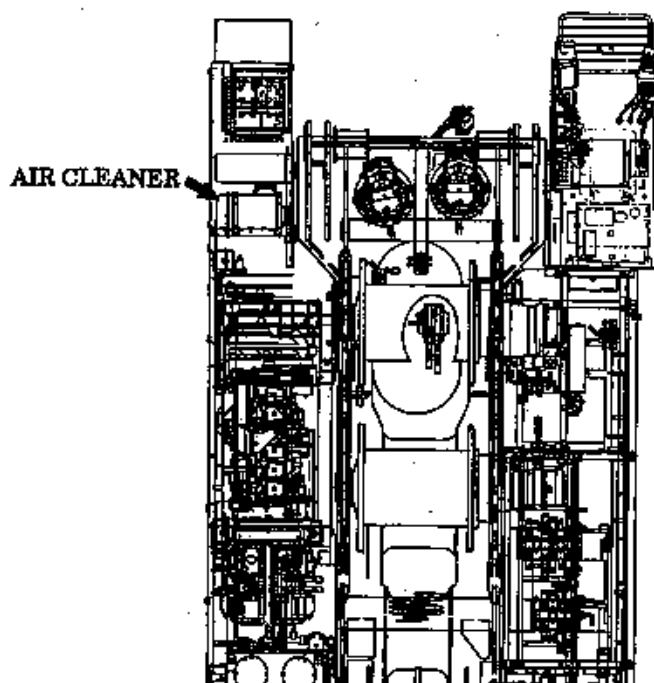
8. HORN, HEAD LIGHT AND WIPER

Confirm that the horn, head light and wiper operate normally by switch operate.

9. AIR CLEANER

Confirm, if the air cleaner is clogged, with the indicator.

When the air cleaner is clogged, the indicator changes to red color (Refer to page 9-59).



10. PIN, LINK AND COTTER PIN

Check the pin, link and cotter pin for damage and for falling off.

11. BOLT AND NUT

Check the bolt and nut for looseness and for falling off.

12. HOOK OVERHOIST PREVENTIVE DEVICE

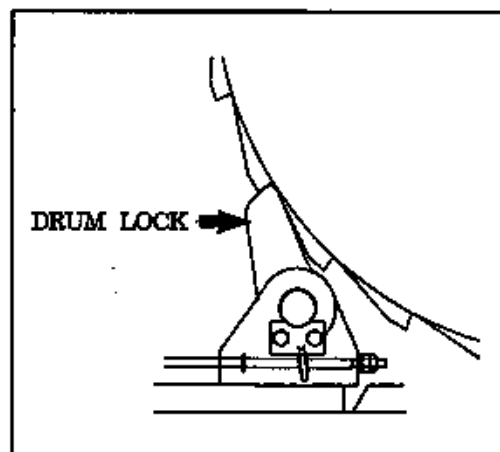
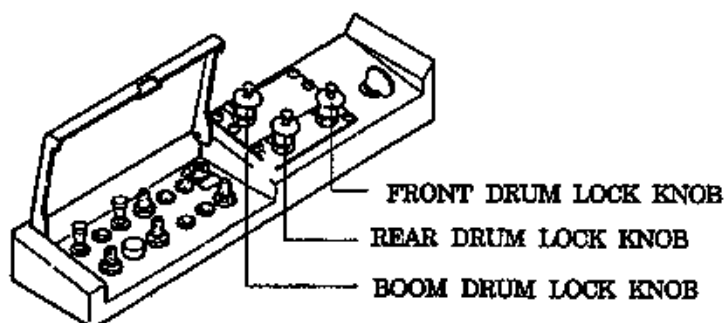
Confirm that the hook overhoist preventive device operates normally. (Refer to chapter 3)

13. BOOM OVERHOIST PREVENTIVE DEVICE

Confirm that the boom overhoist limit switch operates normally. (Refer to chapter 3)

14. DRUM LOCK

Confirm that the drum lock functions normally.



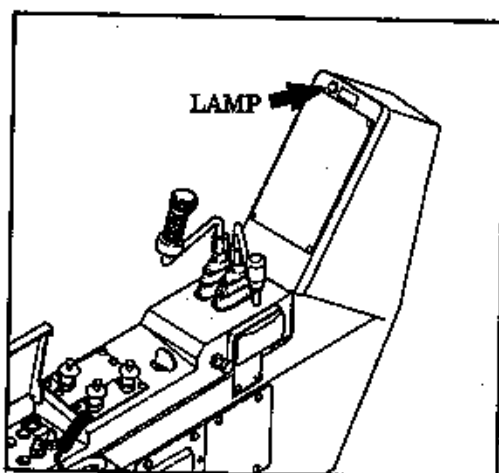
15. WINDOW GLASS, STEP, HANDLE AND GUARD

Always clean the window glass, step, handle and guard, etc.

Especially remove contamination by grease and oil.

16. SWING NEUTRAL FREE INDICATOR LAMP

Set the swing mode selector switch to the "Free" side, and ensure that the swing neutral free indicator lamp lights up.



CHECK OF UPPER MONTHLY OR EVERY 100 HOURS

17. FAN BELT

Check the fan belt for tension.

Firmly push a midway of the fan belt with a finger.

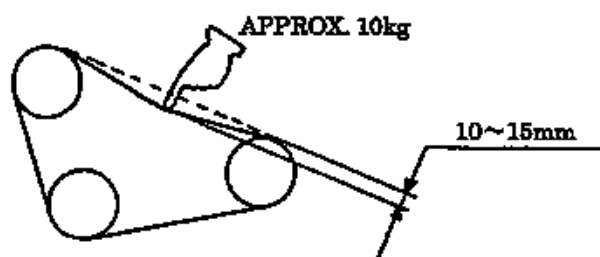
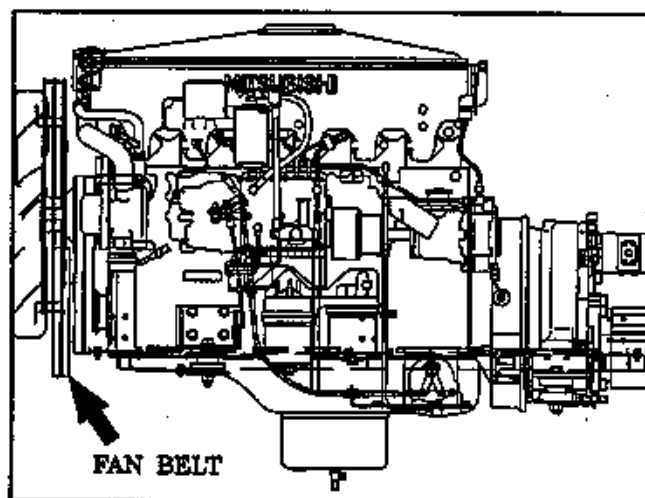
Deflection of 10 to 15 mm is normal.



WARNING

Shut of engine before inspection of fan belt.

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

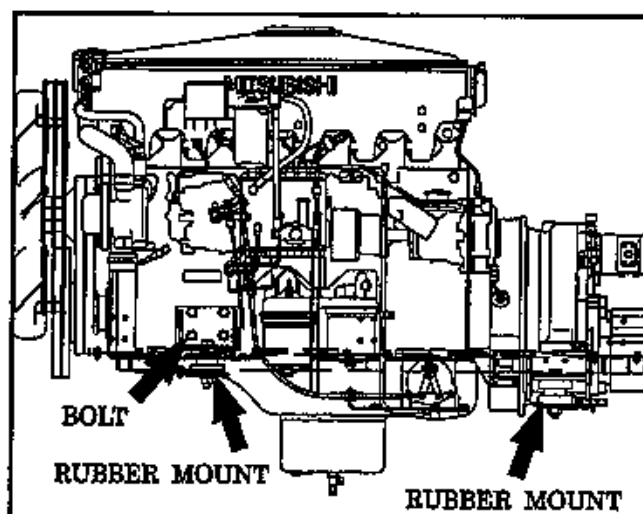


18. RADIATOR AND OIL COOLER

Clean the radiator core. And, check the radiator and oil cooler for abnormality and deformation.

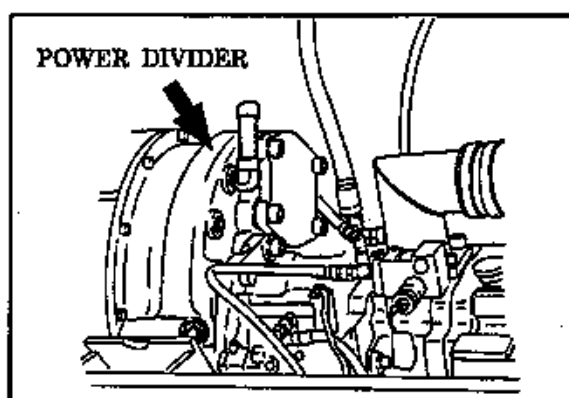
19. ENGINE MOUNTING BOLT AND RUBBER MOUNT

Check the engine mounting bolt for looseness, and the rubber mount for damage.



20. POWER DIVIDER

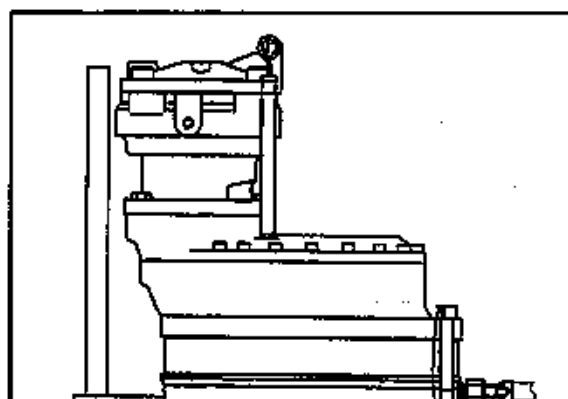
Check the power divider for oil leak and unusual noise.



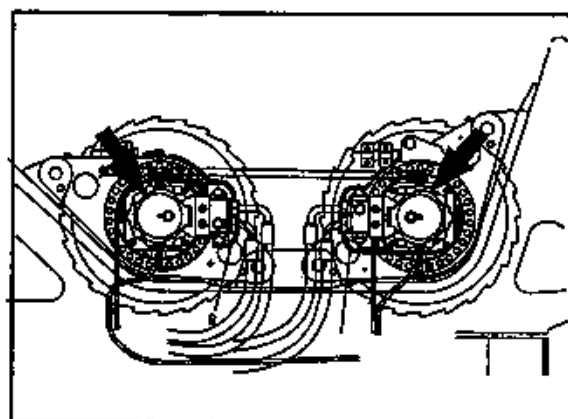
21. HYDRAULIC MOTOR AND REDUCTION UNIT

- Swing motor and reduction unit.
 - Front and rear drum motors and reduction units.
 - Boom hoist drum motor and reduction unit.
- Check these for oil leak and unusual noise.

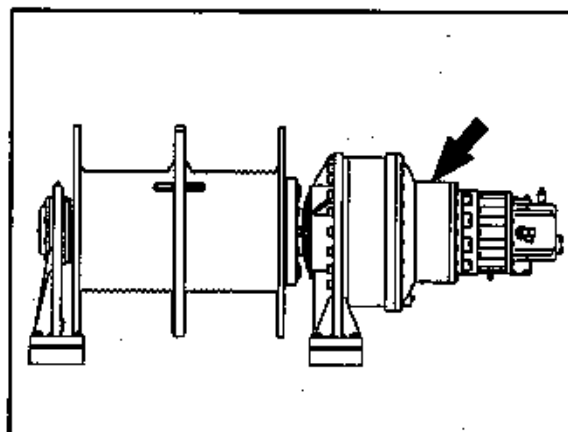
SWING MOTOR
and REDUCTION UNIT



FRONT and REAR DRUM MOTORS
and REDUCTION UNITS



BOOM HOIST DRUM MOTOR
and REDUCTION UNIT

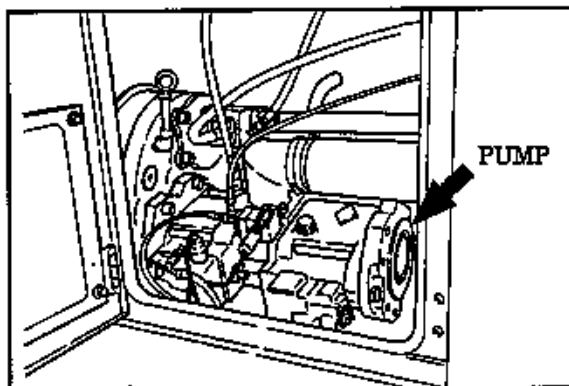


22. VALVE

Check each valve for oil leak.

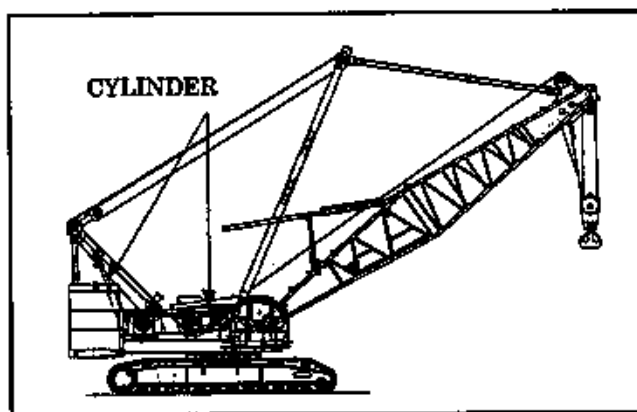
23. HYDRAULIC PUMP

Check the hydraulic pump for oil leak and for unusual noise.



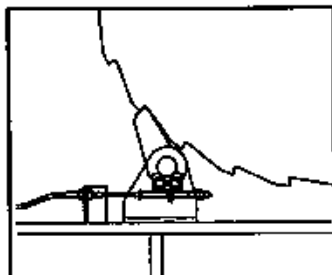
24. GANTRY CYLINDERS AND MAST CYLINDERS

Check the gantry and mast cylinder for oil leak and damage.

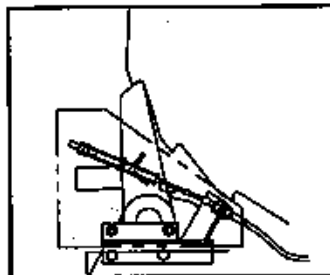


25. DRUM LOCK

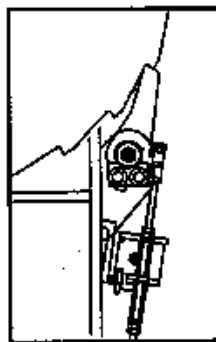
Check the drum lock and drum ratchet for wear and damage.



FRONT & REAR
DRUM LOCK



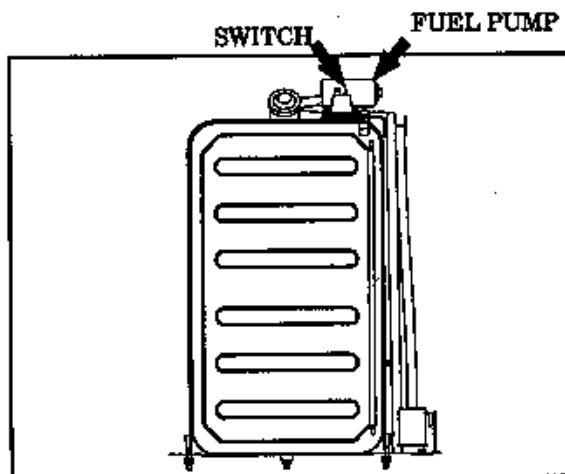
BOOM DRUM LOCK



LUFFING JIB
DRUM LOCK

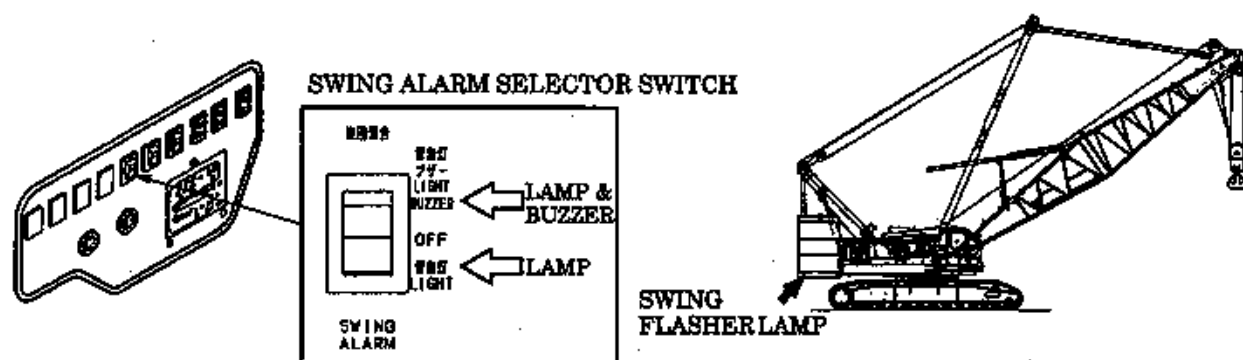
26. FUEL SUPPLY PUMP AND HOSE (OPTION)

Check the fuel supply pump for normal operation, and check the supply hose for damage.



27. SWING ALARM

Make sure that the swing alarm and swing flasher function properly with operating machine swing.



CHECK OF UPPER SEMI-ANNUALLY OR EVERY 600 HOURS

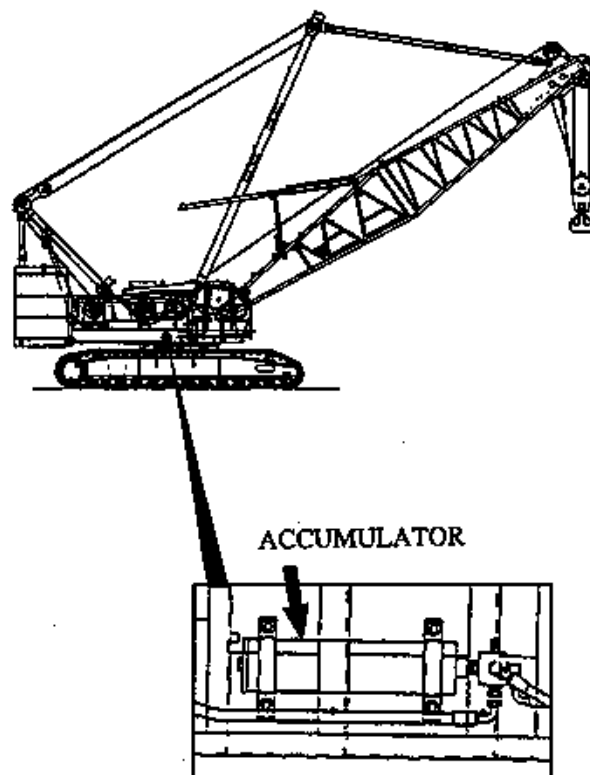
28. ACCUMULATOR

Check the accumulator for oil leak.

**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 installed on the machine.
6. Check the accumulator for gas pressure every two years.
7. Ask our authorized KOBELCO distributor to charge the gas.
8. Do not disassemble the accumulator.

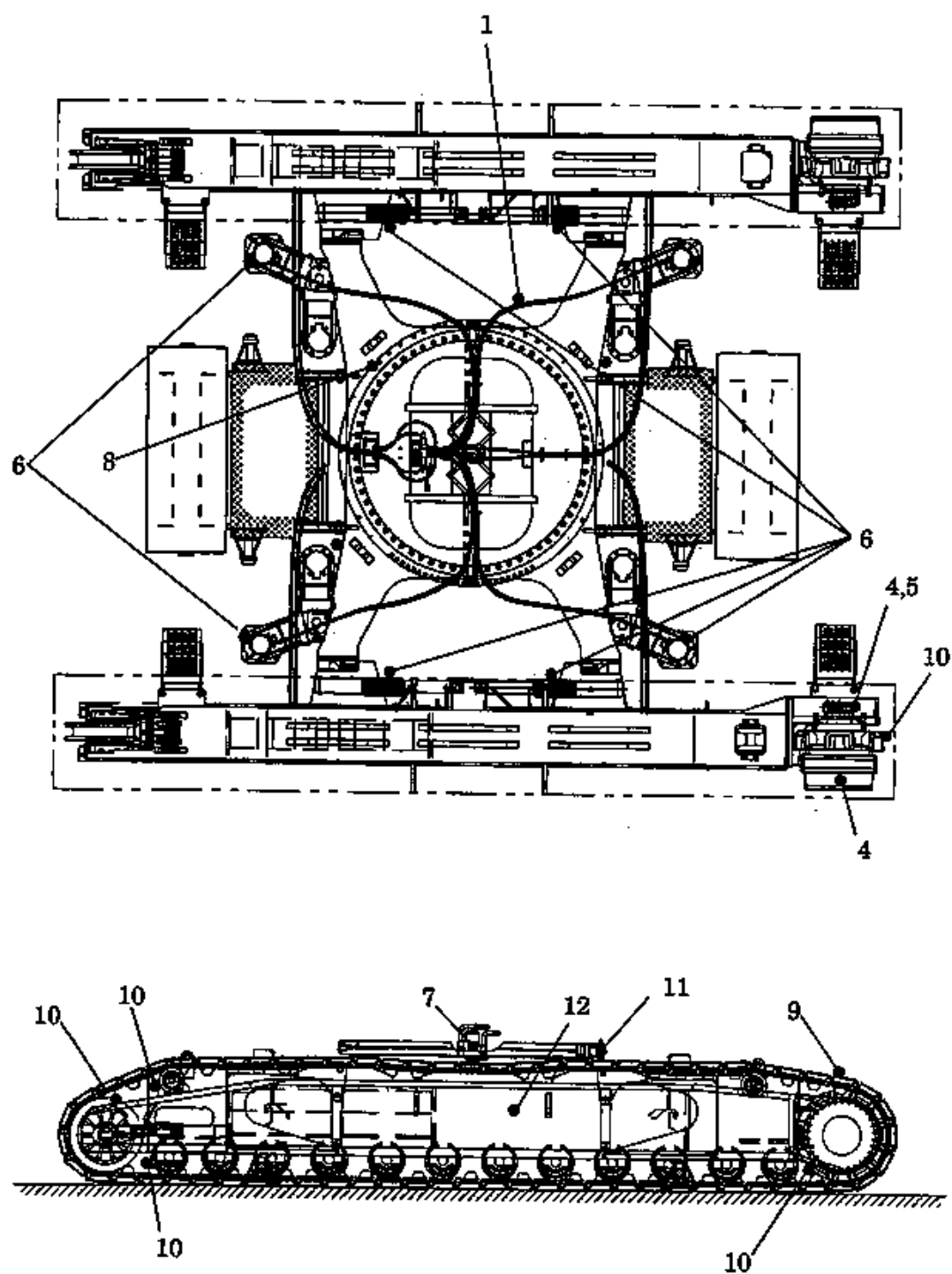
The accumulator is charged with Nitrogen gas under pressure of 3434 to 3728kPa (35 to 38 kg/cm²).



29. FRAME

Check the frame for crack and deformation.

9.1.2 CHECK OF LOWER



Check Interval	Item No.	Identification	Check Item	Check Method	Reference page
Daily or every 5 hours	1	Hose, piping, connector	Oil leak, damage	Visual check	9-18
	2	Pin, link, cotter pin	Damage, falling off	Visual check	9-18
	3	Bolt, nut	Looseness, falling off	Visual check	9-18
Monthly or every 100 hours	4	Hydraulic motor, reduction unit	Oil leak, unusual noise	Visual check	9-19
	5	Valve, etc.	Oil leak	Visual check	9-19
	6	Translifter and crawler fixing pin cylinder (4 places)	Oil leak, damage	Visual check	9-19
	7	Swivel joint	Oil leak	Visual check	9-19
	8	Slewing ring bearing	Unusual noise	Check by hearing	9-20
	9	Crawler shoe	Extension, damage, wear	Visual check	9-20
Quarterly or every 250 hours	10	Drive sprocket, crawler idler, upper and lower rollers	Oil leak, damage	Visual check	9-21
	11	Slewing ring bearing mounting bolt	Looseness, falling off	Visual check	9-21
Semi-annually or every 600 hours	12	Frame	Damage, crack	Visual check	9-22

※ 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.

CHECK OF LOWER DAILY OR EVERY 5 HOURS

1. HOSE, PIPING AND CONNECTOR

Check the hose, piping and connector, etc. for oil leak and damage.

2. PIN, LINK AND COTTER PIN

Check the pin, link and cotter pin for damage, and for falling off.

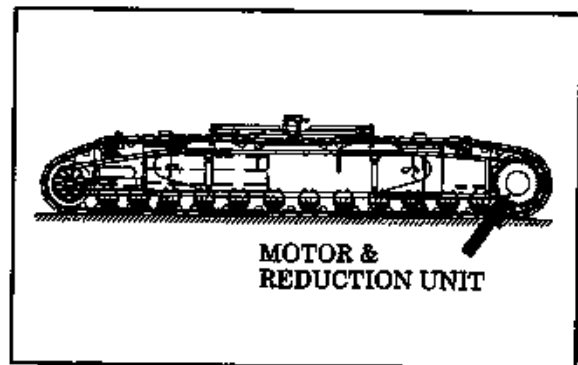
3. BOLT AND NUT

Check the bolt and nut for looseness and for falling off.

CHECK OF LOWER MONTHLY OR EVERY 100 HOURS

4. HYDRAULIC MOTOR AND REDUCTION UNIT

Check the propel motor and reduction unit for oil leak and unusual noise.

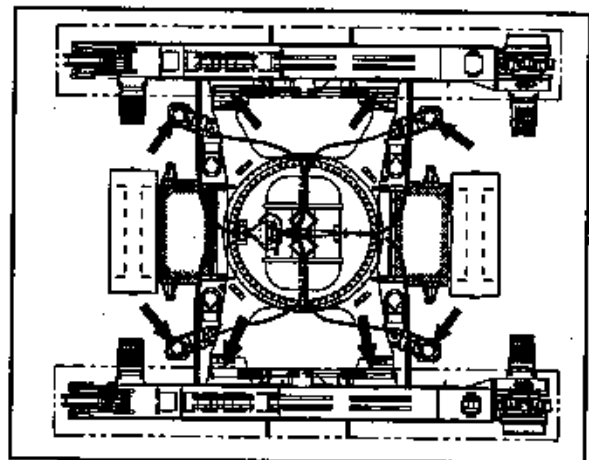


5. VALVE

Check the valve, etc. for oil leak.

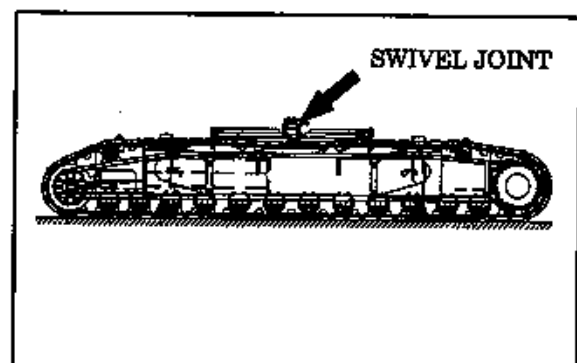
6. TRANSLIFTER AND CRAWLER FIXING PIN CYLINDER

Check the crawler extend/retract cylinder for oil leak and damage.



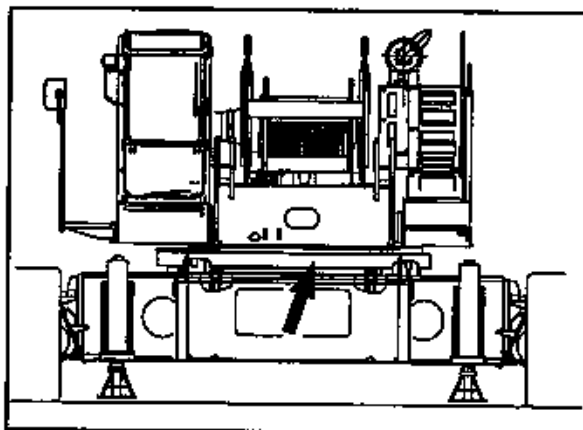
7. SWIVEL JOINT

Check the swivel joint for oil leak.



8. SLEWING RING BEARING

Check the slewing ring bearing for unusual noise.

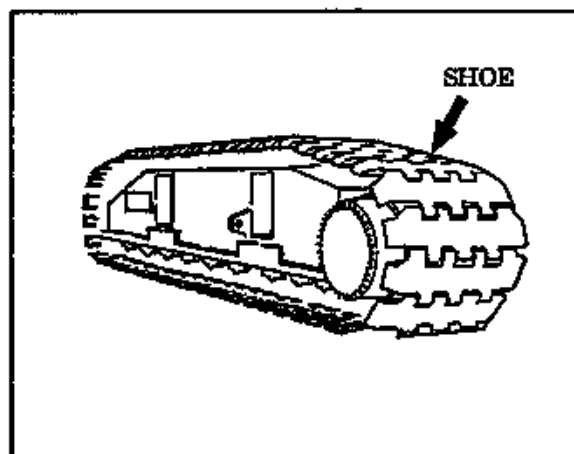


9. CRAWLER SHOE

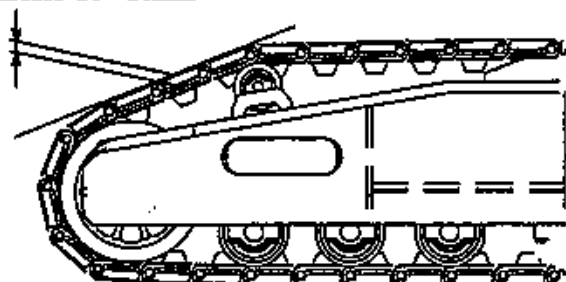
Check the crawler shoes for looseness and for damage and wear.

If the crawler shoes are too tight, the shoes wear quickly and a connection part of 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 propelling.

The slackening of 10 to 20 mm is normal condition after propelling the machine forward about the crawler length so that the slackening of the crawler shoes appear on the upper side of the crawler.



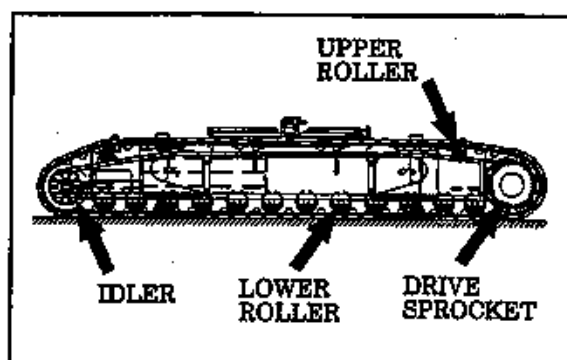
SLACK 10~20mm



CHECK OF LOWER QUARTERLY OR EVERY 250 HOURS

10. DRIVE SPROCKET, CRAWLER IDLER AND UPPER/LOWER ROLLER

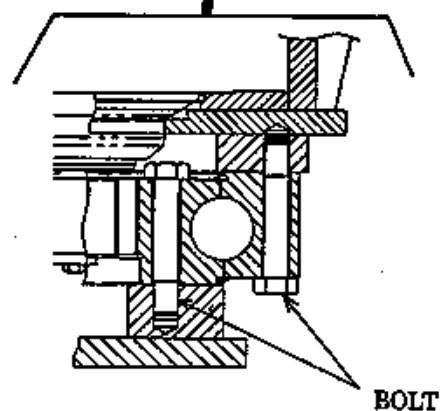
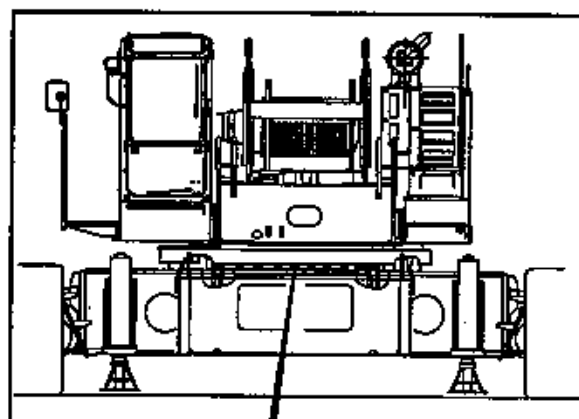
Check the drive sprocket, crawler idler and upper/lower rollers for oil leak and damage.



11. SLEWING RING BEARING MOUNTING BOLT

Check the slewing ring bearing mounting bolt for looseness and falling off.

If the bolt is loose, remove and check the bolt. If the bolt is damaged, replace it with new one. If the removed bolt is not damaged, clean and coat it with Loctite #242 or equivalent, then securely tighten it. Tightening torque : [2060 ft-lbs (2.8 KN·m)]

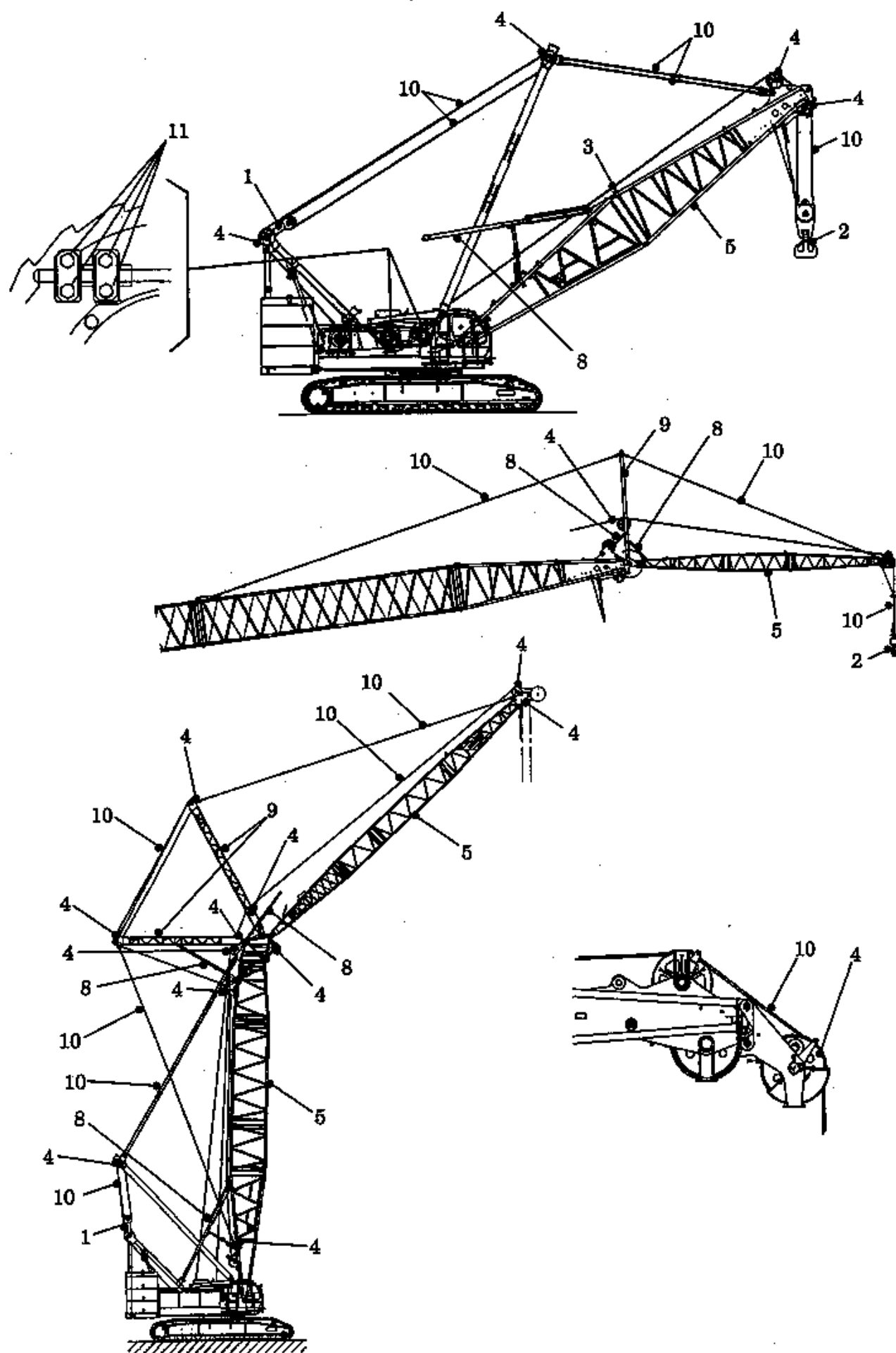


CHECK OF LOWER SEMI-ANNUALLY OR EVERY 600 HOURS

12. FRAME

Check the carbody and crawler frame for crack and damage.

9.1.3 CHECK OF ATTACHMENT



Check Interval	Item No.	Identification	Check Item	Check Method	Reference page
Daily or every 5 hours	1	Lower spreader	Deformation, crack	Visual check	9-25
	2	Hook, wire lock	Damage, looseness	Visual check	9-25
	3	Cable roller	Damage, deformation, wear	Visual check	9-25
	4	Sheave	Damage, deformation, wear	Visual check	9-25
	5	Boom, jib	Damage, deformation	Visual check	9-26
	6	Pin, link, cotter pin	Damage, falling off	Visual check	9-26
	7	Bolt, nut	Looseness, falling off	Visual check	9-26
	8	Backstop	Damage, deformation	Visual check	9-27
	9	Strut	Damage, deformation	Visual check	9-27
	10	Wire rope, guy line	Damage, deformation, wear	Visual check	9-27
	11	Hoist wire rope clamp bolt	Looseness, falling off	Visual check	9-27

※ 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.

CHECK OF ATTACHMENT DAILY OR EVERY 5 HOURS

1. UPPER SPREADER AND LOWER SPREADER

Check the sheave and frame of the upper and lower spreaders for damage.



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 loss of life.



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 loss of life.

2. HOOK AND WIRE LOCK

Check the sheave, bearing and hook latch of the hook block for damage, and check the bolt and nut for falling off. (See page 9-29-1 and 9-29-2.)

3. CABLE ROLLER

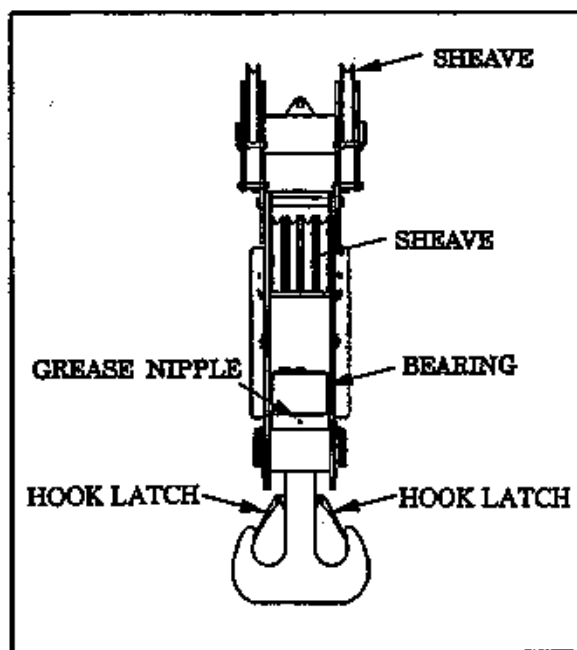
- Cable roller for insert boom
- Cable roller for upper boom

Check these parts for damage, deformation and wear.

4. SHEAVE

- Boom point sheave
- Idler sheave
- Auxiliary sheave
- Jib point sheave
- Strut sheave

Check these sheaves for damage, deformation and wear.



5. BOOM AND JIB

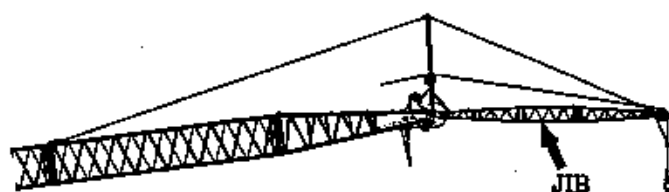
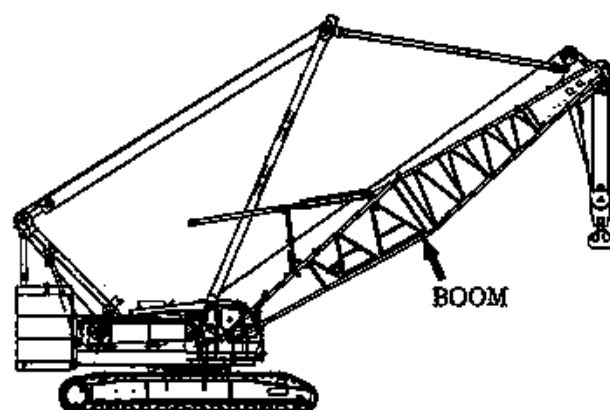
Check the boom and jib for damage and deformation. Do not use the damaged and/or deformed boom and jib.

Be sure to replace the damaged boom and jib with new ones, or repair.



CAUTION

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

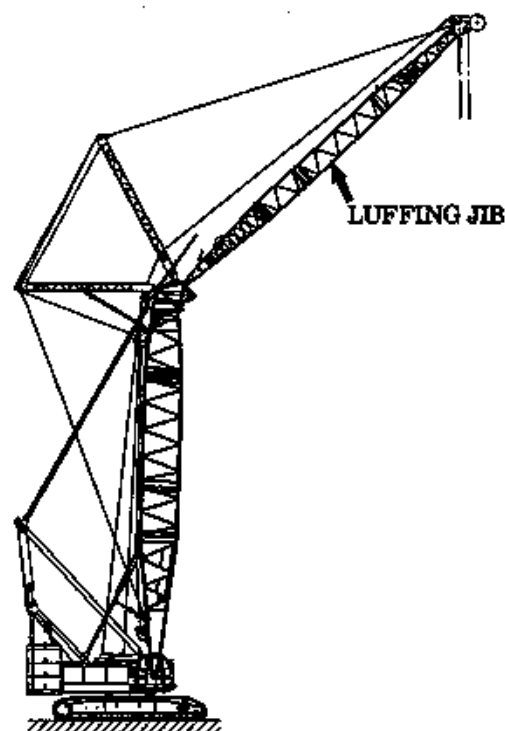


6. PIN, LINK AND COTTER PIN

Check the pin, link and cotter pin for damage and falling off.

7. BOLT AND NUT

Check the bolt and nut for looseness and for falling off.



8. BACKSTOP

- Boom backstop
- Jib backstop

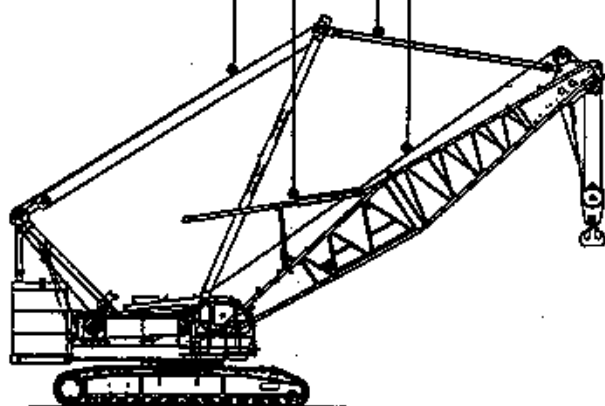
Check these backstops for damage and deformation.



CAUTION

Special procedures required for repair. Consult your local authorized KOBELCO distributor for instruction.

BOOM BACKSTOP
BOOM HOIST WIRE ROPE
BOOM GUY LINE
MAIN HOIST WIRE ROPE



9. STRUT

Check the jib strut for damaged and deformation.



CAUTION

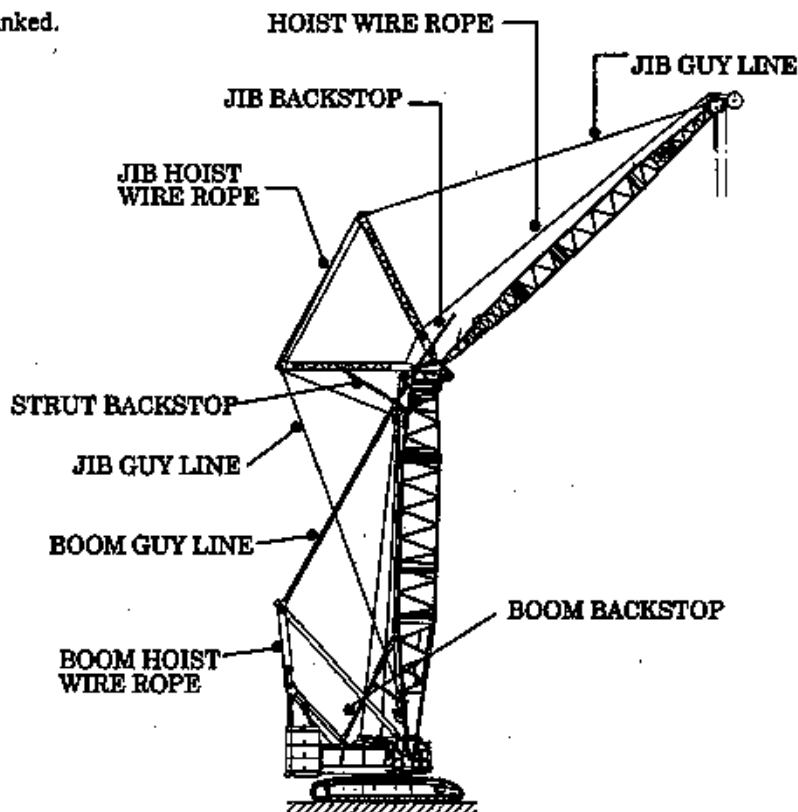
Special procedures required for repair. Consult your local authorized KOBELCO distributor for instruction.

STRUT BACKSTOP
JIB BACKSTOP
JIB GUY LINE
AUX HOIST WIRE ROPE
JIB GUY LINE



10. WIRE ROPE AND GUY LINE

Check the wire rope and guy line for damage and deformation. Do not use the wire rope and guy line of which wires are broken or which are kinked. See the following page.



REPLACEMENT STANDARDS FOR WIRE ROPE

(1) CHECK AND REPLACEMENT STANDARDS OF WIRE ROPE

If the wire rope is broken during operation, it might cause a serious accident. Therefore, check the rope periodically. Never use those wire ropes that are subject to wire-cut, abrasion, corrosion and other defects. Such wire rope as given in Items 1 to 4 below must be immediately replaced with a new rope. And wire rope subject to damage mentioned in Items 5 onwards should be replaced with new one as soon as possible according to the degree of damage.

Kind of Wire rope
• HOIST WIRE ROPE • GUY LINE • TAGLINE ROPE (OPTIONAL) • REEVING WINCH ROPE (OPTIONAL) • BOOM, JIB HOIST WIRE ROPE

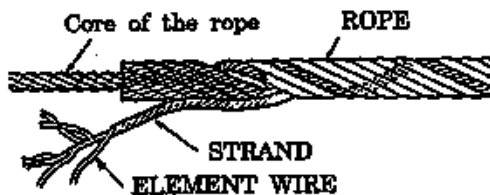
- 1) 10% or more steel wires are broken excepting filler wires in one lay of wires. Inspection of internal breakage of wires is difficult. To check breakage of wires in the valley section of wire ropes, bend the rope sharply. Broken element wires, if any, will be exposed.

If breakage of wires in the valley section is found, it is considered that internal breakage of wires may also have developed, and that in other words, fatigue of the whole rope may have developed. Replace the rope at once.

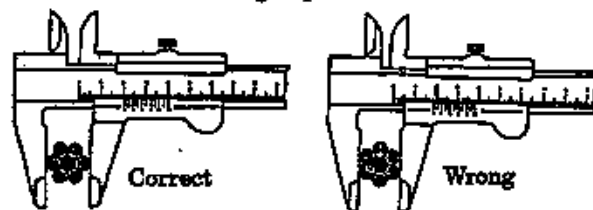


Bend rope sharply to expose breakage

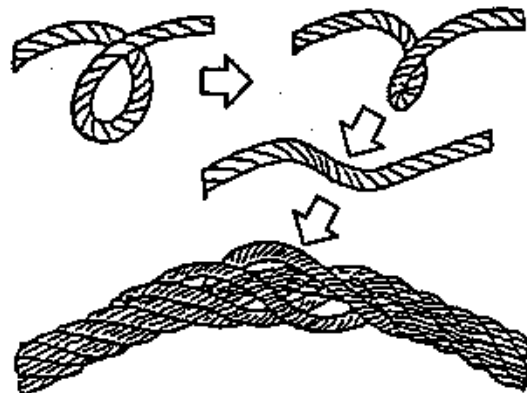
- 2) Wire rope of more than 7 % reduction of diameter from the nominal diameter, caused by abrasion.



Method of measuring rope diameter



- 3) Kink is observed in the wire rope.



- 4) Excessive deformation or corrosion is observed on the wire rope.
- 5) Excessive elongation is observed due to overloading or derailment from sheaves.
- 6) A short circuit has been formed electrically.
- 7) Those wire ropes that are subject to fire or spark by electric current or by gas welding as well as subject to high temperature.

(2) REPLACEMENT STANDARD FOR GUYLINE

Since damage and corrosion are caused by fatigue from the inside in the boom guy line, replacement time cannot be judged from the appearance.

If the guy line is broken by progressing of internal damage and/or corrosion, there is possibility to cause a serious accident. Be sure to replace the guy line periodically.

Replacement time according to the content of work is shown in the table.

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

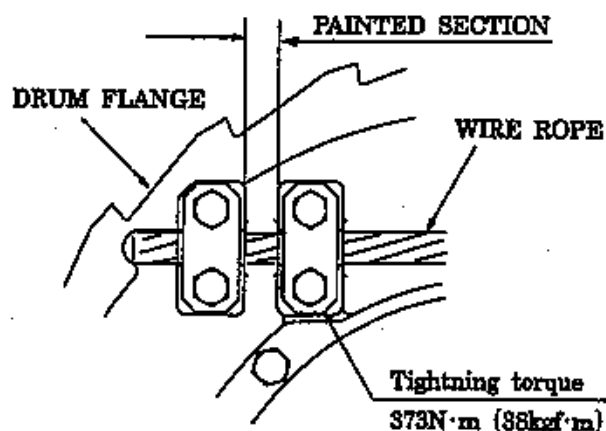
(3) REPLACEMENT STANDARD OF WEIGHT SUSPENDING ROPE FOR OVERWIND LIMIT SWITCH AND HOOK FIXING ROPE

If the vinyl cover of the wire rope is broken or the rope itself has conditions as mentioned in step 1, replace the rope at once.



11. HOIST WIRE ROPE CLAMP BOLT

Ensure that the bolts fixing the hoist wire rope to the drum flange are securely tightened, and the painted section of the wire rope is correctly positioned.



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.

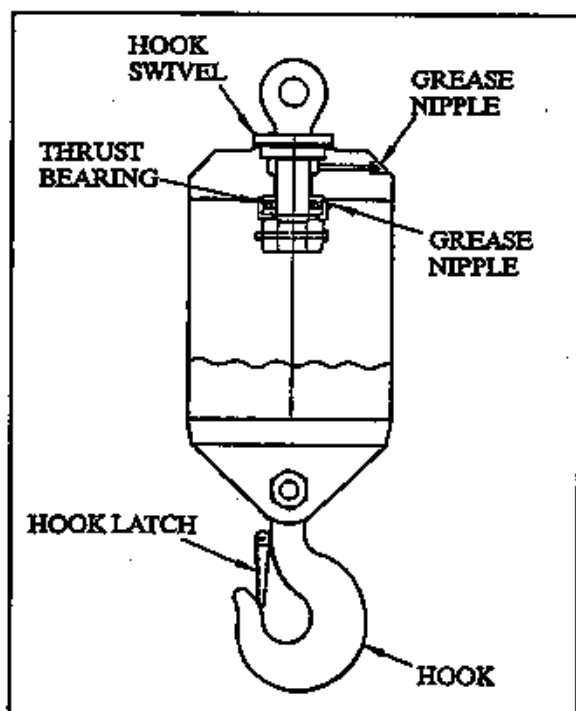
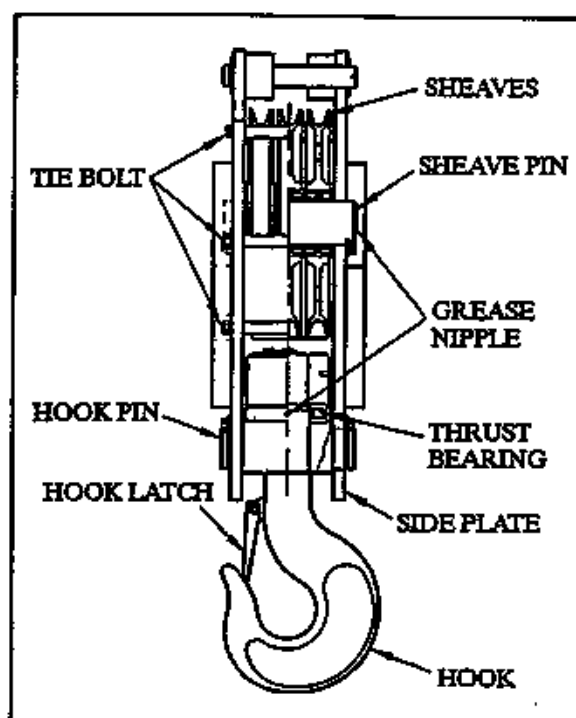
Daily inspection and maintenance will include the following points.

- (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 9-37)".
- (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) 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)

CHECK FOR WEAR
AND DEFORMATION

CHECK THAT
HOOK IS NOT
TWISTED

CHECK FOR
"OPENING UP"

CHECK FOR
CRACKS AND
TWISTING

CHECK FOR WEAR
AND CRACKS

"HOOK"

CHECK FOR WEAR
AND DEFORMATION

CHECK FOR WEAR
AND STRAIGHTNESS

CHECK THAT PIN IS
ALWAYS SEATED

CHECK FOR
"OPENING UP"

"SHACKLE"

9.2 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 [gal. (ltr.)]
Upper	Engine	Engine oil SAE #30	MO	7.6: Oil pan = 6.6, Filter = 1.0 (29: Oil pan = 25, Filter = 4)
	Radiator	Water (soft water)	—	11.4 (43)
	Fuel tank	Light oil JIS #2		105.6 (400)
	Hydraulic oil tank (Main)	Hydraulic oil #46	HO	143.9 (545)
	Hydraulic oil tank (Luffing jib)	Hydraulic oil #46	HO	4.0 (15)
	Power divider	Gear oil #90	GO	0.87 (3.3)
	Front/rear drum reduction unit	Gear oil #90	GO	5.8/each (22/each)
	Boom hoist drum reduction unit	Gear oil #90	GO	4.4 (16.5)
	Luffing jib hoist drum reduction unit	Gear oil #90	GO	2.0 (7.5)
	Swing reduction unit	Gear oil #90	GO	2.5 (9.4)
Lower	Propel reduction unit	Gear oil #90	GO	15.8/each (60/each)
	Idler wheel	Gear oil #140	GO	0.15/each (0.55/each)
	Lower roller	Gear oil #140	GO	0.07/each (0.25/each)
	Upper roller	Gear oil #140	GO	0.03/each (0.13/each)

Note 1: The radiator is supplied with coolant combined with Long Life Coolant (antifreeze) of 30% to 50% concentration by volume.

Note 2: When using the machine in extreme cold and extreme heat places, see page 9-63 and 9-64.

KOBELCO Genuine Lubricant Chart

Kind	Symbol	Specification	Part Number
Hydraulic oil	HO	KW46 (for general use)	20 ltr. can→2421R157D5 200 ltr. 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
Engine oil	M	#30	20 ltr. can→2421Z353D1 200 ltr. can→2421Z353D2
		#10W	20 ltr. can→2421Z354D1 200 ltr. can→2521Z354D2
Antifreeze	—	Long life coolant	18 ltr. can→KSPLLC95-18 20 ltr. can→KSPLLC95-20
		Permanent	18 ltr. can→KSPPT95-18 20 ltr. can→KSPPT95-20

LUBRICATION CHART

Lubricant	Symbol	Recommended Lubricant (Initial Factory Fill)			
Hydraulic Oil	HO	Hydraulic oil with anti-wear, anti-oxidant and anti-harmful foaming			
		131°F to 41°F (55°C to 5°C)	104°F to 41°F (40°C to 5°C)	86°F to -13°F (30°C to -25°C)	59°F to -22°F (15°C to -30°C)
		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 MoS ₂ grease			
Engine Oil	MO	Above 104°F (40°C)	104°F to 41°F (40°C to -5°C)	50°F to -22°F (10°C to -30°C)	
		SAE40	SAE30	SAE10W-30	

RECOMMENDED HYDRAULIC OIL

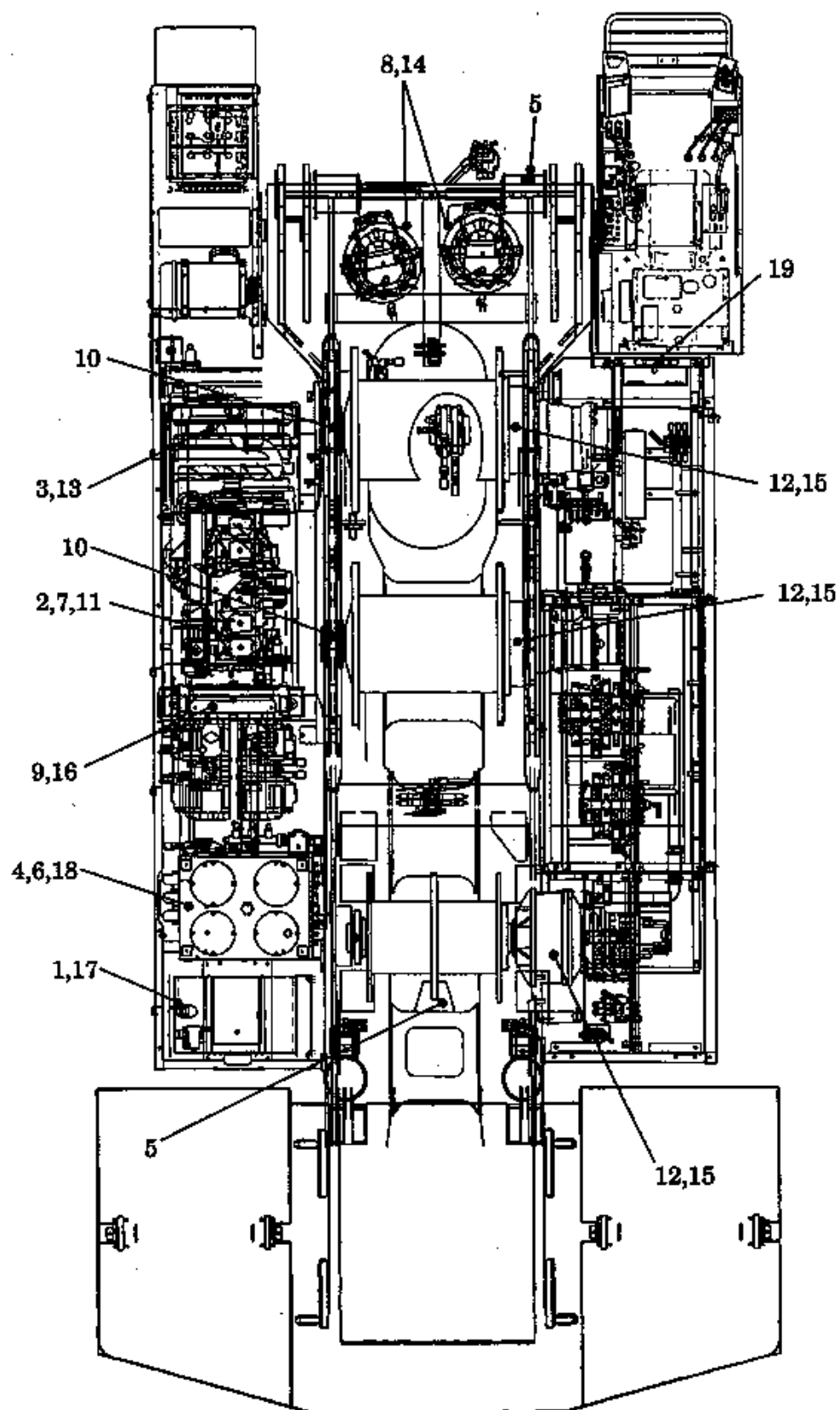
	VG22 KW32S	VG32 KW32	VG46 KW46	VG68 KW68
ESSO	—	NUTO H32	NUTO H46	NUTO H68
MOBIL	DTE 13	DTE 24	DTE 25	DTE 26
CALTEX	—	RANDO HD32	RANDO HD46	RANDO HD68
SHELL	—	TELLUS 32	TELLUS 46	TELLUS 68
GULF	—	HARMONY 32AW	HARMONY 46AW	HARMONY 68AW



CAUTION

- Do not mix different brands of oil. The same brand of oil should be used.
- Do not mix the original factory supplied oil with recommended hydraulic oil.

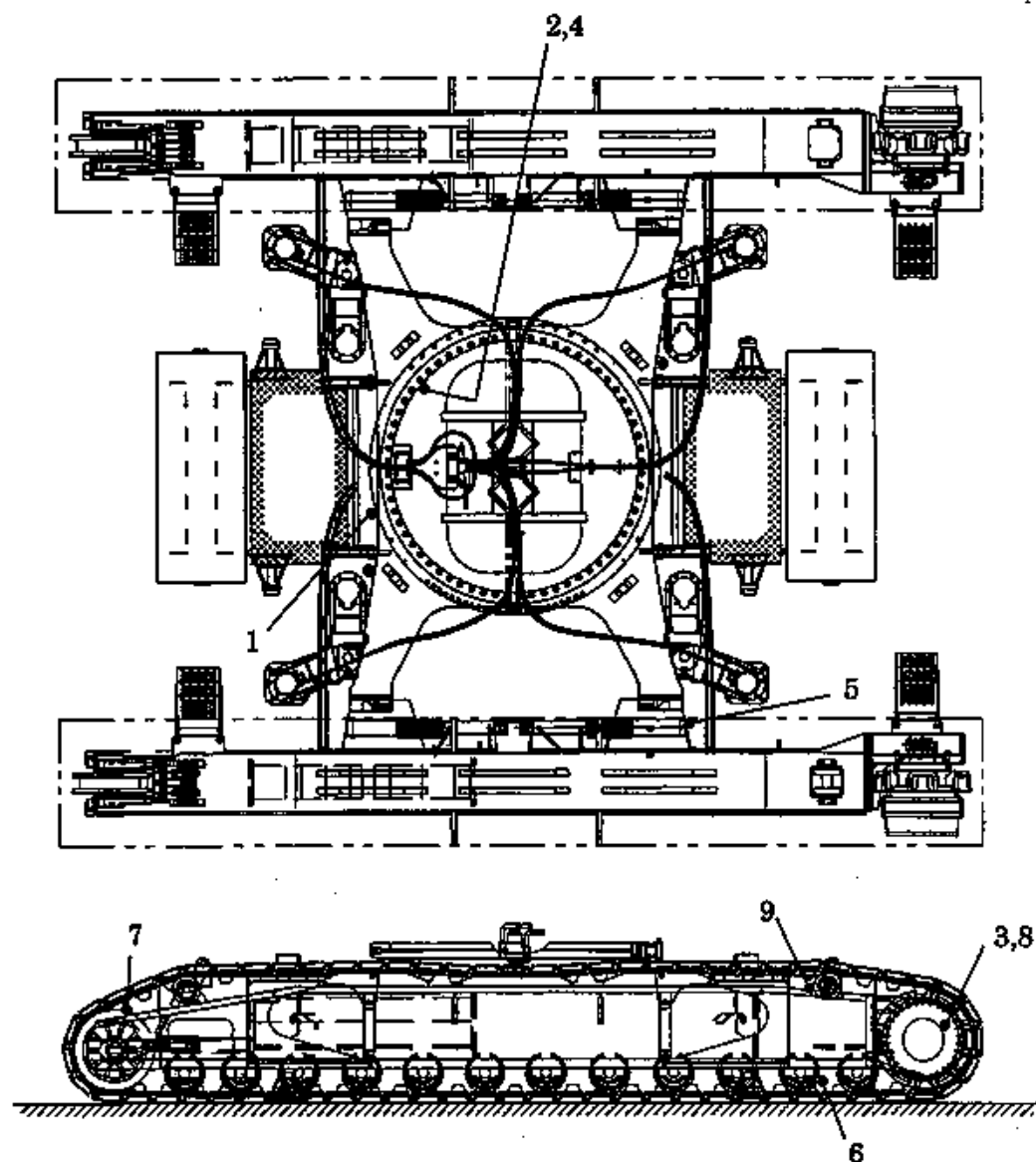
9.2.1 UPPER LUBRICATION (INCL. WATER SUPPLY)



Upper Lubrication Table

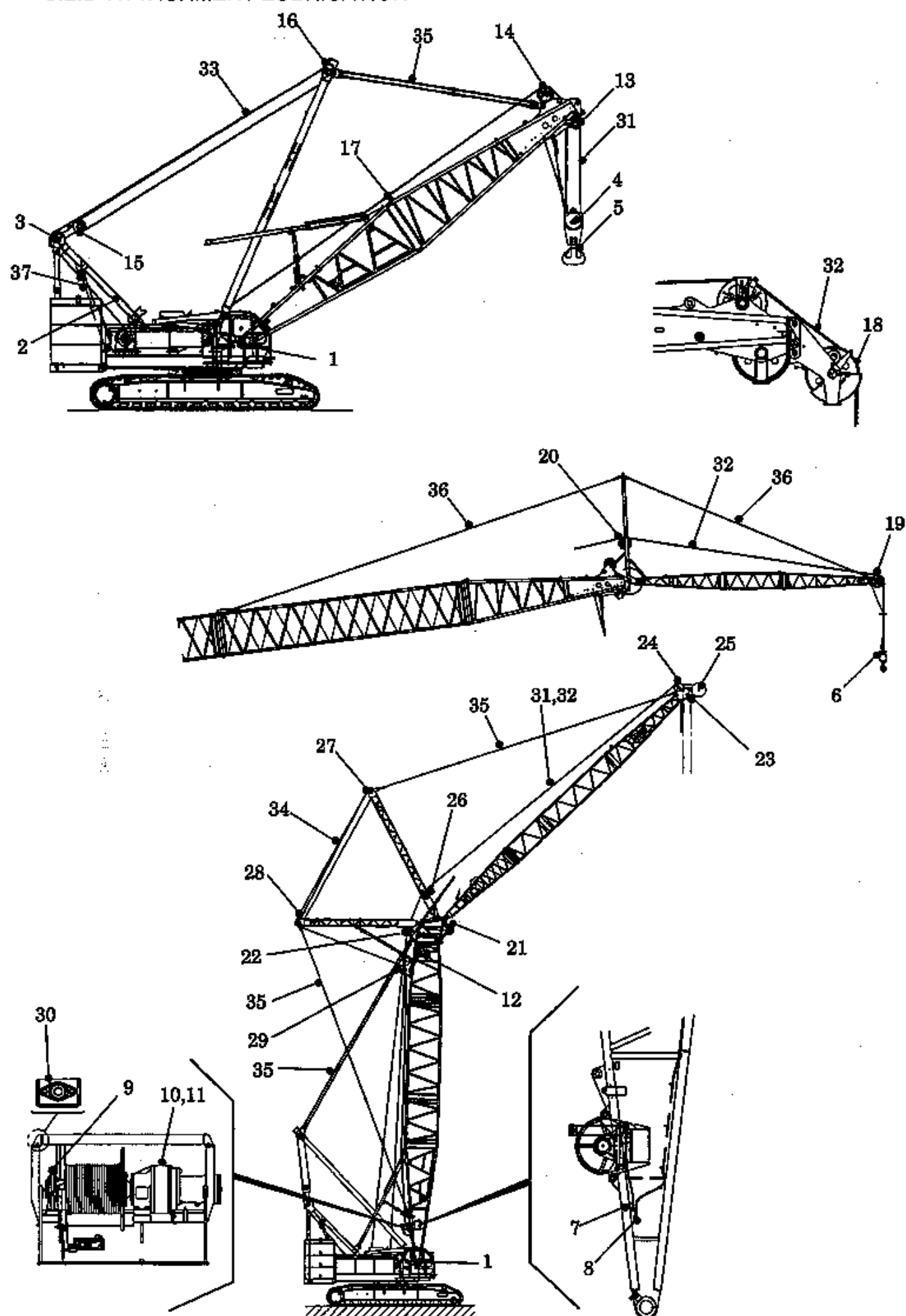
Check and Lubrication Interval	Item No.	Check and Lubrication Place	Required Service	Kind of Lubricant	Reference Page
Daily or every 5 hours	1	Fuel tank	Supply fuel	Light oil	9-46
	2	Engine	Check oil level	MO	9-45
	3	Radiator	Check coolant level	Soft water	9-46
	4	Hydraulic oil tank	Check oil level	HO	9-49
Weekly or every 25 hours	5	Drum lock (Front, rear, boom drums)	Grease	EPG	9-38 9-39
	6	Hydraulic oil tank	Drain		9-49
First time only (50 hours)	7	Engine	Replace oil	MO	9-45
Monthly or every 100 hours	8	Swing reduction unit	Check oil level	GO	9-51
	9	Power divider	Check oil level	GO	9-54
Quarterly or every 250 hours	10	Drumshaft bearing	Grease	EPG	9-40
	11	Engine	Replace oil	MO	9-45
	12	Winch reduction unit (Front, rear, boom)	Check oil level	GO	9-52
Annually or every 1000 hours	13	Radiator	Replace coolant		9-47
	14	Swing reduction unit	Replace oil	GO	9-51
	15	Winch reduction unit (Front, rear, boom)	Replace oil	GO	9-52
	16	Power divider	Replace oil	GO	9-54
	17	Fuel tank	Drain		9-46
Every 2 years or 2000 hours	18	Hydraulic oil tank	Replace oil	HO	9-49
	19	Washer tank	Supply liquid	Washer liquid	

9.2.2 LOWER LUBRICATION



Check and Lubrication Interval	Item No.	Check and Lubrication Place	Required Service	Kind of Lubricant	Reference Page
Weekly or every 25 hours	1	Slewing ring bearing	Grease	EPG	9-40
	2	Slewing ring gear (When operating clamshell or lifting magnet)	Grease	GL	9-40
Quarterly or every 250 hours	3	Propel reduction unit	Check oil level	GO	9-54
	4	Slewing ring gear	Grease	GL	9-40
	5	Crawler fixing pin (4 point)	Grease	EPG	
Annually or every 1000 hours	6	Lower roller	Change oil	GO	9-55
	7	Idler wheel	Change oil	GO	9-55
	8	Propel reduction unit	Change oil	GO	9-54
	9	Upper roller	Change oil	GO	9-55

9.2.3 ATTACHMENT LUBRICATION



Lubrication Interval	Item No.	Lubrication Place	Required Service	Kind of Lubricant	Reference Page
Daily or every 5 hours	1	Boom foot pin	Grease	EPG	9-38
	2	Gantry link	Grease	EPG	9-38
	3	Gantry slide sheave	Grease	EPG	9-38
Weekly or every 25 hours	4	Hook sheave	Grease	EPG	9-39
	5	Hook bearing	Grease	EPG	9-39
	6	Ball hook bearing	Grease	EPG	9-39
	7	Luffing jib drum lock	Grease	EPG	9-39
	8	Guide sheave (For luffing jib hoist rope)	Grease	EPG	9-41
Quarterly or every 250 hours	9	Luffing jib drum shaft bearing	Grease	EPG	9-42
	10	Winch reduction unit (Luffing jib drum)	Check oil level	GO	9-53
Annually or every 1000 hours	11	Winch reduction unit (Luffing jib drum)	Change oil	GO	9-53
Every 2 years or 2000 hours	12	Hydraulic oil tank	Change oil	HO	9-50
See Note 1.	13	Boom point sheave	Grease	EPG	9-42
	14	Idler sheave	Grease	EPG	9-42
	15	Lower spreader sheave	Grease	EPG	9-42
	16	Mast point sheave	Grease	EPG	
	17	Cable roller	Grease	EPG	9-44
	18	Auxiliary sheave	Grease	EPG	9-43
	19	Jib point sheave (Fixing jib)	Grease	EPG	
	20	Strut sheave (Fixing jib)	Grease	EPG	9-43
	21	Luffing boom point sheave	Grease	EPG	9-44
	22	Luffing boom idler sheave	Grease	EPG	9-44
	23	Jib point sheave (Luffing jib)	Grease	EPG	
	24	Jib idler sheave (Luffing jib)	Grease	EPG	
	25	Auxiliary sheave (Luffing jib)	Grease	EPG	9-43
	26	Strut point sheave (Luffing jib)	Grease	EPG	9-43
	27	Strut point sheave (Luffing jib)	Grease	EPG	9-43
	28	Strut point sheave (Luffing jib)	Grease	EPG	9-43
	29	Guide sheave (For luffing jib hoist rope)	Grease	EPG	9-44
	30	Guide roller (For luffing jib hoist rope)	Grease	EPG	9-41
See Note 2.	31	Main hoist wire rope	Lubricate	WO	
	32	Auxiliary hoist wire rope	Lubricate	WO	
	33	Boom hoist wire rope	Lubricate	WO	
	34	Luffing jib hoist wire rope	Lubricate	WO	
	35	Boom guy line	Lubricate	WO	
	36	Jib guy line	Lubricate	WO	
See Note 3.	37	Counterweight handling link	Lubricate	EPG	9-44

Note 1 : Item No. 13 to 30 are grease sealing type bearing. Lubricate or replace according to the operating conditions.

Note 2 : Lubricate wire ropes, according to the operating conditions.

To lubricate wire ropes, use a brush or spray.

Note 3: Lubricate item No. 37 when using the link.

9.2.4 GREASE

	Greasing Place	Kind of Lubricant	Greasing Time (Hourmeter:Hrs)			
			5	25	250	Remark
1	Boom foot pin	EPG	○			
2	Gantry link	EPG	○			
3	Gantry slide sheave	EPG	○			
4	Drum lock (front, rear, jib and boom drums)	EPG		○		
5	Hook sheave	EPG		○		
6	Hook bearing	EPG		○		
7	Ball hook bearing	EPG		○		
8	Drumshaft bearing	EPG			○	
9	Slewing ring bearing	EPG		○		
10	Slewing ring gear	GL		※○	○	
11	Guide sheave (For luffing jib hoist rope)	EPG		○		
12	Crawler fixing pin cylinder (4 places)	EPG			○	
13	Guide roller (For luffing jib hoist rope)	EPG				(1)
14	Luffing jib drum shaft bearing	EPG			○	
15	Boom point sheave	EPG				(1)
16	Idler sheave	EPG				(1)
17	Lower spreader sheave	EPG				(1)
18	Auxiliary sheave (Crane + Luffing)	EPG				(1)
19	Strut sheave (Fixing jib)	EPG				(1)
20	Strut sheave (Luffing jib)	EPG				(1)
21	Strut point sheave (Luffing jib)	EPG				(1)
22	Luffing boom point sheave	EPG				(1)
23	Luffing boom idler sheave	EPG				(1)
24	Guide sheave (For luffing jib hoist rope)	EPG				(1)
25	Cable roller (Upp. boom, Insert boom)	EPG				(1)
26	Counterweight handling link	EPG				(2)

Before greasing, clean the grease fitting. Wipe off the extra grease which is crowded out.

※ mark shows the time for clamshell and lifting magnet operation.

(1) These sheaves or rollers are grease sealing type bearing. Lubricate or replace according to the operating conditions.

(2) Grease before lifting up and down the counterweight with handling link.



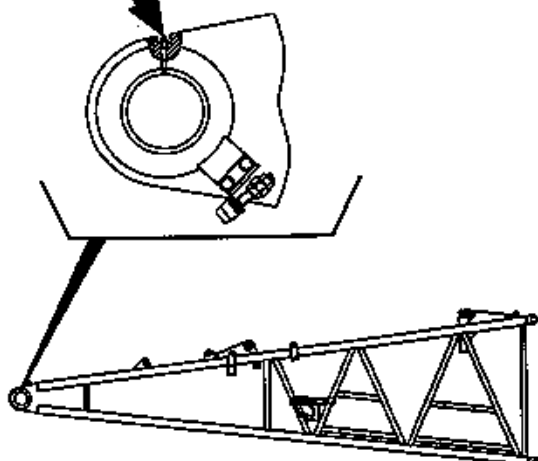
WARNING

Shut off engine before lubrication.
Failure to observe this precaution may result in serious injury or loss of life.

1. BOOM FOOT PIN

Grease from the grease fittings on the foot pin (left and right) .

FITTING



2. GANTRY LINK

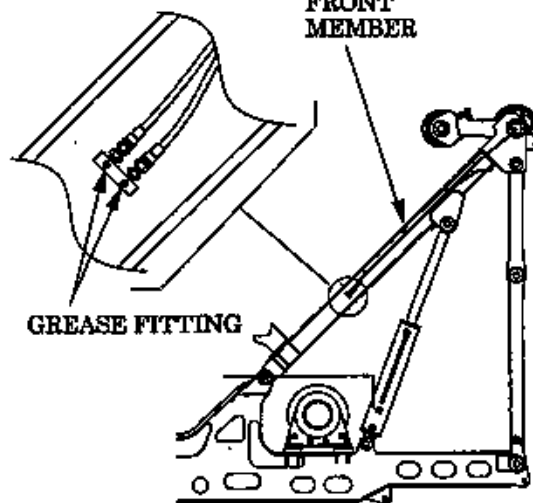
Grease from the grease fittings provided on the front member.



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 loss of life.

FRONT MEMBER



3. GANTRY SLIDE SHEAVE

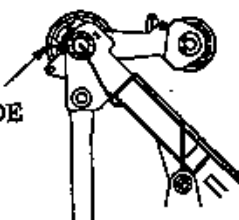
Grease from the grease fittings provided on the sheave.



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 loss of life.

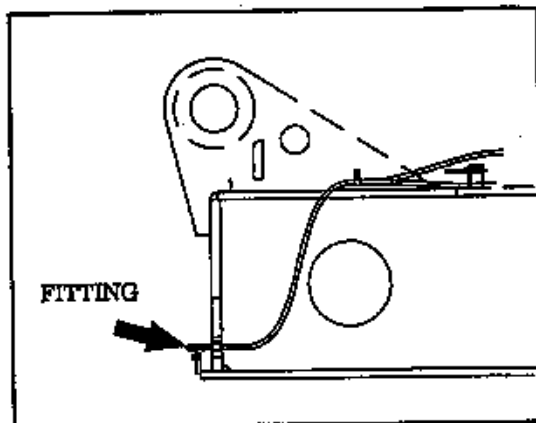
GANTRY SLIDE SHEAVE



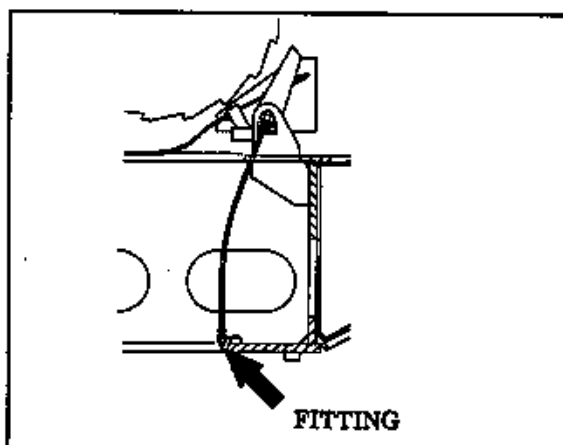
4. DRUM LOCK

To grease the front and rear drum locks, grease from the grease fittings provided in the front of the revolving frame (two places).

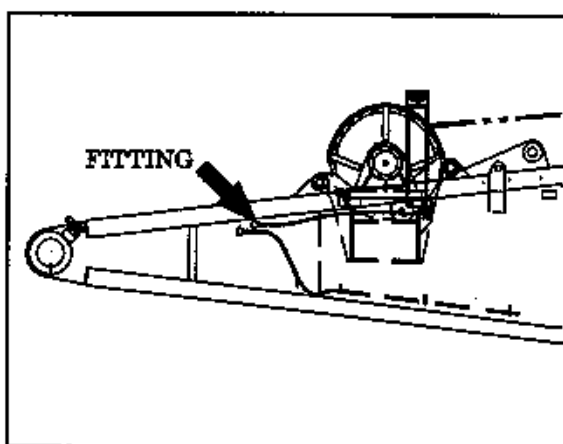
FITTING



To grease the boom hoist drum lock, grease from the grease fitting provided on the revolving frame.



To grease the luffing jib drum lock, grease from the grease fitting provided in the lower of the boom base.

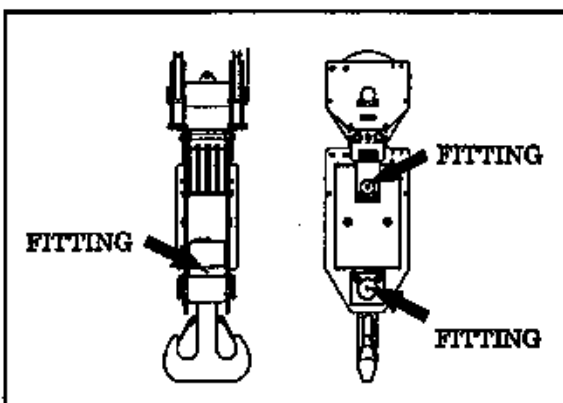


5. HOOK SHEAVE

Grease from the grease fitting on the sheave pin.

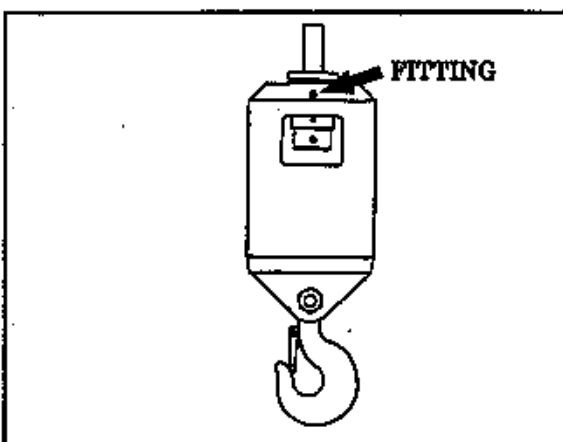
6. HOOK BEARING

Grease from the grease fitting on the bearing cap.



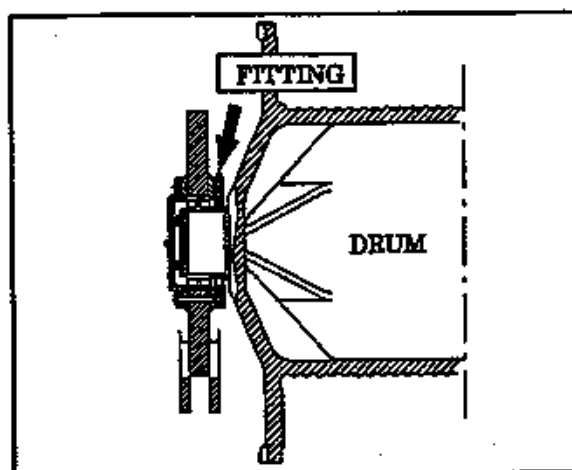
7. BALL HOOK BEARING

Grease from the grease fitting provided on the bearing cap.



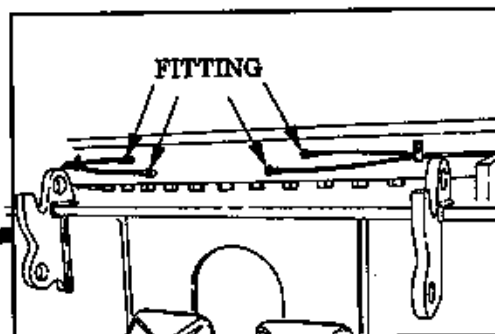
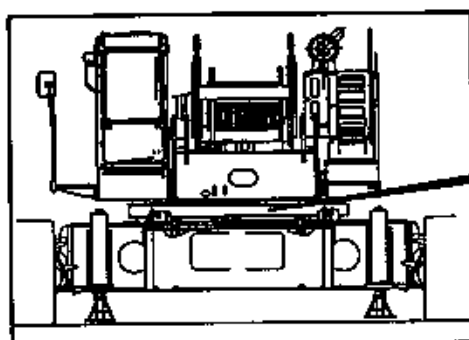
8. DRUMSHAFT BEARING

Grease from the grease fittings provided on the side stand and drumshaft bearing retainer.



9. SLEWING RING BEARING

Grease from the grease fittings provided on the slewing ring bearing.



10. SLEWING RING GEAR

Remove the under cover, and grease from under the machine so that the whole large gear is lubricated.

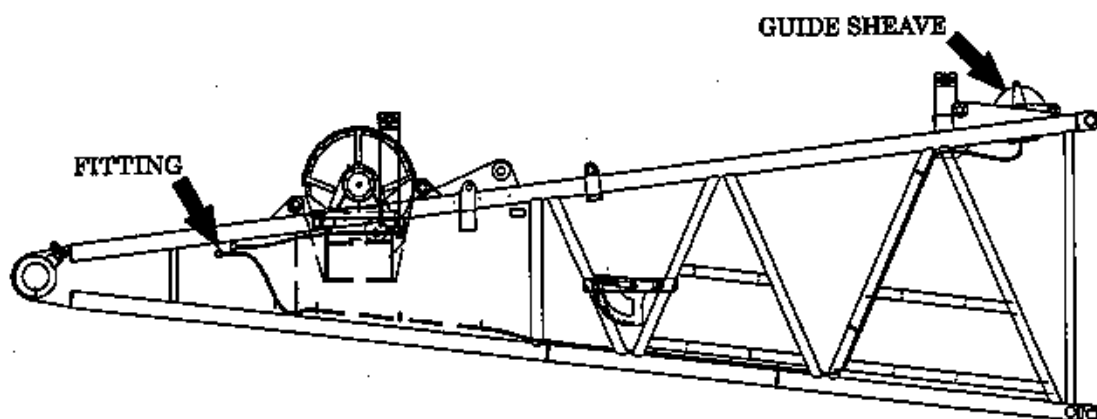


WARNING

To avoid injury, do not apply grease to slewing ring gear directly by hand.

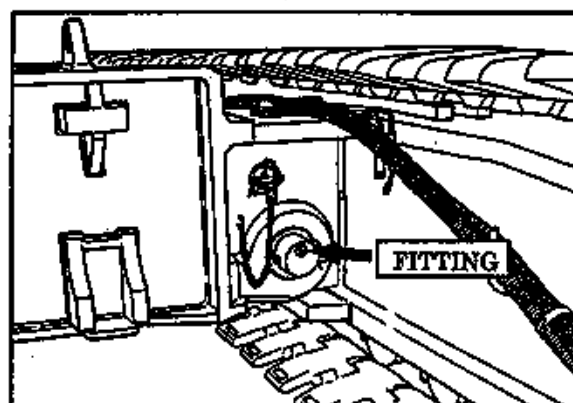
11. GUIDE SHEAVE (FOR LUFFING JIB HOIST ROPE)

Grease from the grease fitting inside of the boom base.



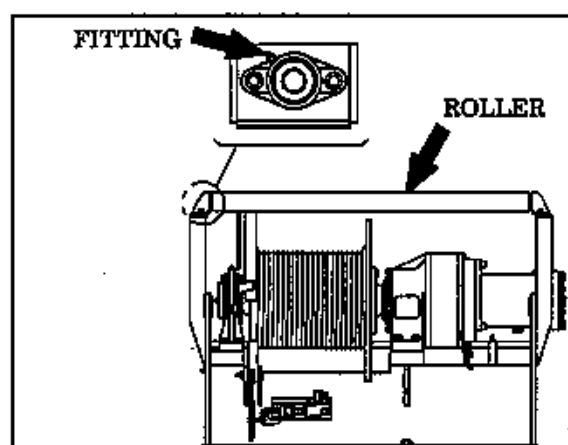
12. CRAWLER FRAME CONNECTING PIN (4 POS.)

Grease from the grease fittings on the pins.



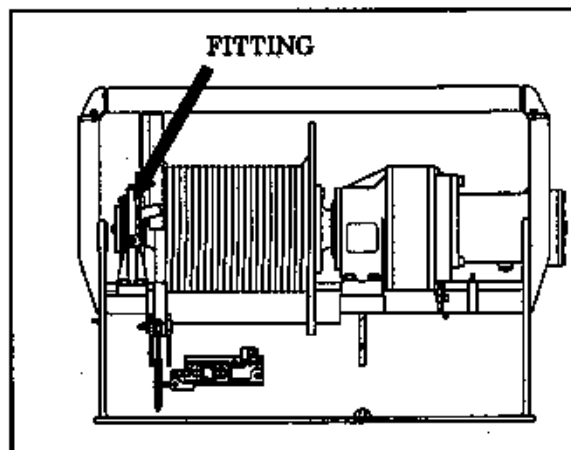
13. GUIDE ROLLER (FOR LUFFING JIB HOIST ROPE)

Grease from the grease fittings provided on the pillow block of the guide roller.



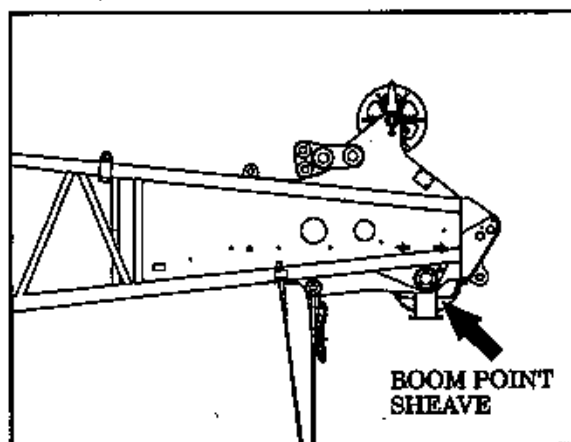
14. LUFFING JIB DRUM SHAFT BEARING

Grease from the grease fitting provided on the side stand and drumshaft bearing retainer.



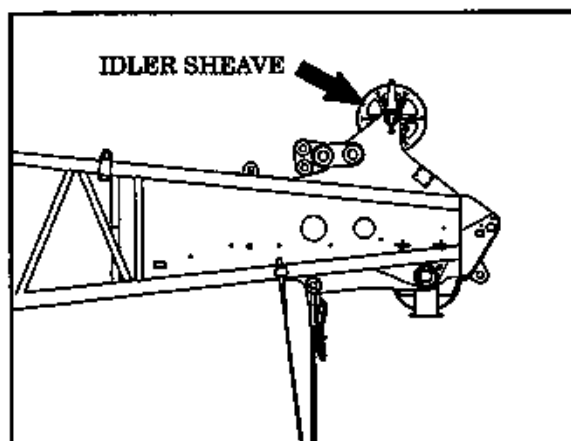
15. BOOM POINT SHEAVE

Grease from the grease fitting provided on each boom point sheave.



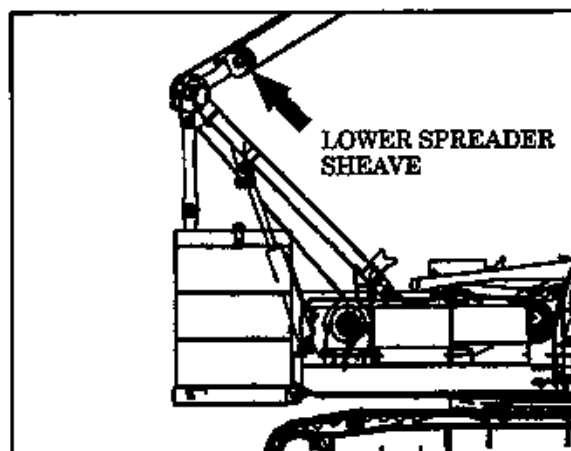
16. IDLER SHEAVE

Grease from the grease fitting provided on each idler sheave.



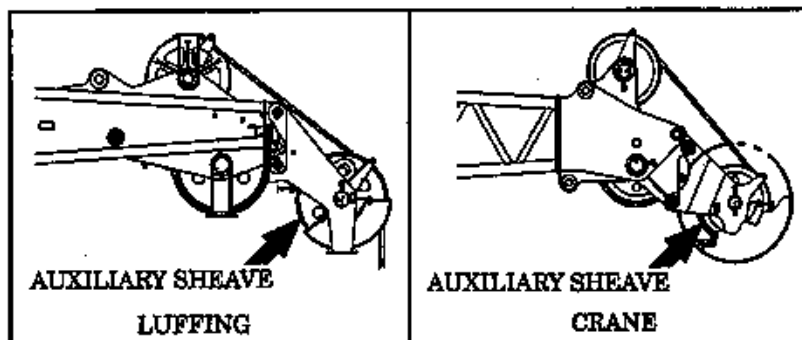
17. LOWER SPREADER SHEAVE

Grease from the grease fitting provided on each lower spreader sheave.



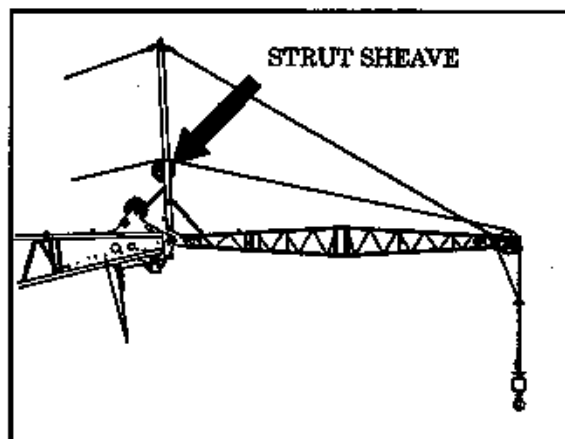
18. AUXILIARY SHEAVE

Grease from the grease fitting provided on the auxiliary sheave.



19. STRUT SHEAVE (FIXING JIB)

Grease from the grease fitting provided on the strut sheave.

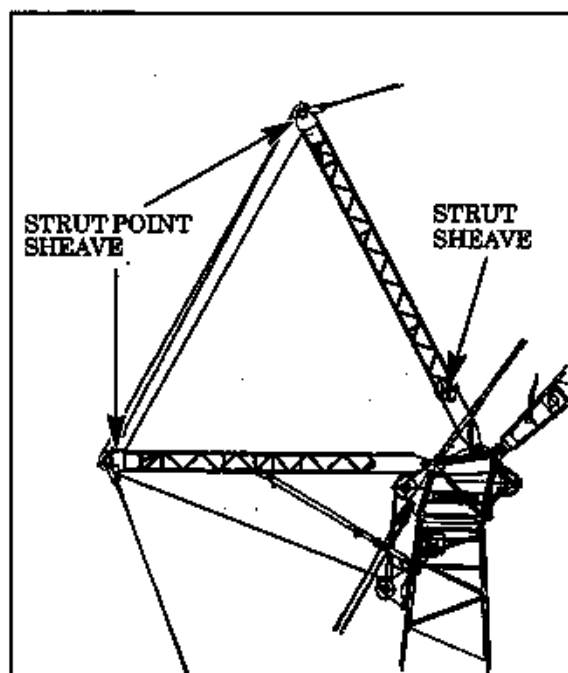


20. STRUT SHEAVE (LUFFING JIB)

Grease from the grease fitting provided on each strut sheave.

21. STRUT POINT SHEAVE (LUFFING JIB)

Grease from the grease fitting provided on each strut point sheave.



22. LUFFING BOOM POINT SHEAVE

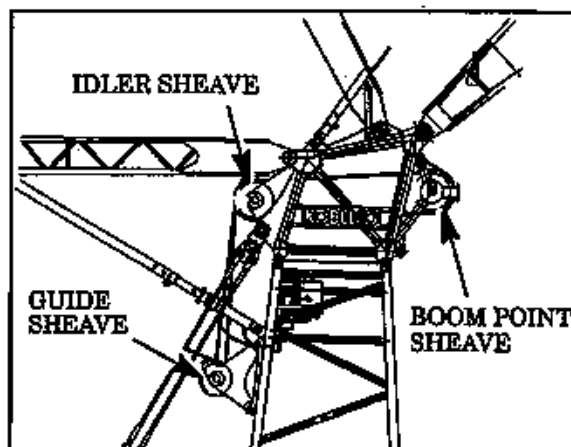
Grease from the grease fitting provided on each luffing boom point sheave.

23. LUFFING BOOM IDLER SHEAVE

Grease from the grease fitting provided on each luffing boom idler sheave.

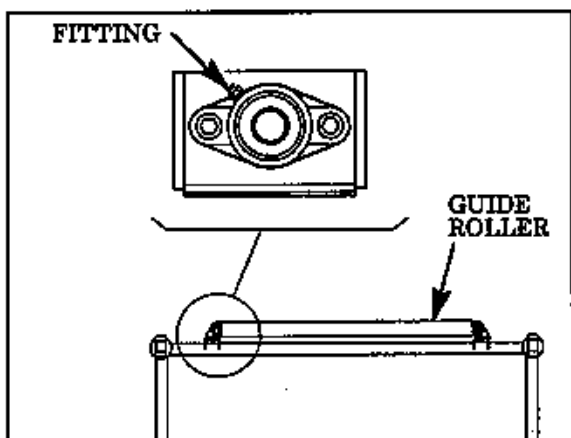
24. GUIDE SHEAVE (FOR LUFFING JIB HOIST ROPE)

Grease from the grease fitting provided on each guide sheave.



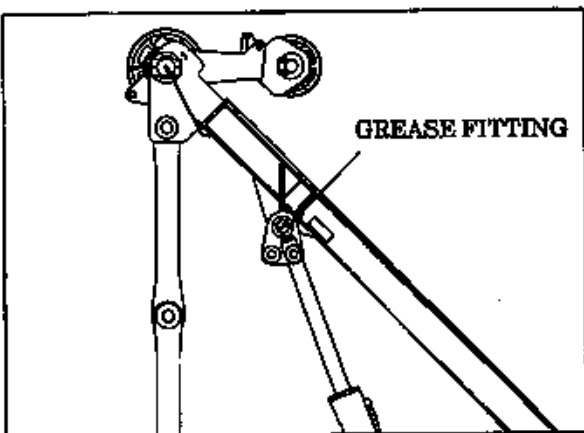
25. CABLE ROLLER

Grease from the grease fittings provided on the pillow block of the guide roller.



26. COUNTERWEIGHT HANDLING LINK

Grease from the grease fittings provided on the pin before lifting up and down the counterweight.



9.2.5 ENGINE OIL

Item No.	Checking Item	Check and Change Interval (hourmeter:hour)					Remarks
		5	100	250	500	1000	
1	Oil level check of engine oil	○					
	Change of engine oil			○			7.6 gal. (29 ltr.)

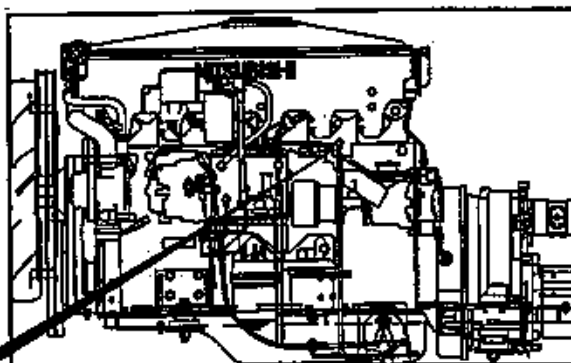
1. OIL LEVEL CHECK AND REPLACEMENT OF THE ENGINE

(1) OIL LEVEL CHECK

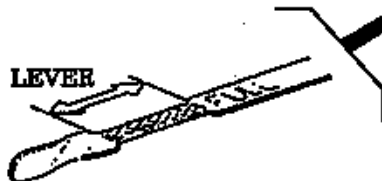
Be sure to perform oil level check of engine oil before starting operation.

After wiping clean the level gauge once, insert it again and check the level.

If the oil level is between the meshes of the net, it is normal.



PROPER OIL LEVEL



NOTE

Crane must be standing on level ground when oil level is checked or reading may be inaccurate.

(2) OIL CHANGE



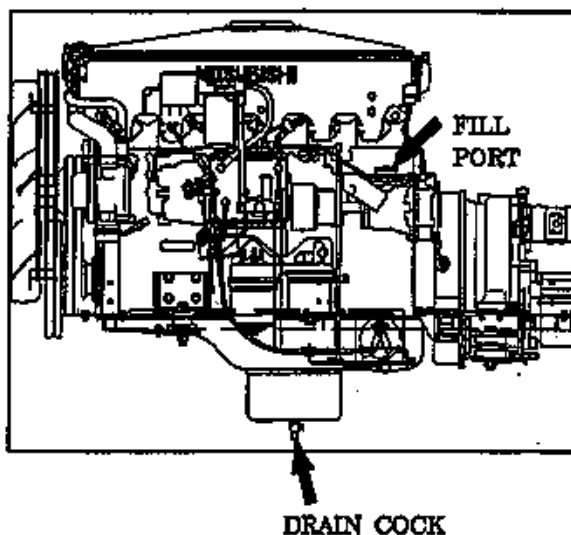
WARNING

While the engine oil is hot, absolutely do not open the drain cock to avoid burns caused by hot oil.

Fallure to observe this precaution may result in serious injury or loss of life.

- 1) Prepare a container of approx. 7.9 gal. (30 liters) capacity.
- 2) Loosen the drain plug, and allow the oil to drain into the prepared container.
- 3) Tighten the drain plug.
- 4) After confirming that metal particles does not exist, refill fresh oil through the fill port.

When replacing the engine oil, replace the oil filter together at the same time.



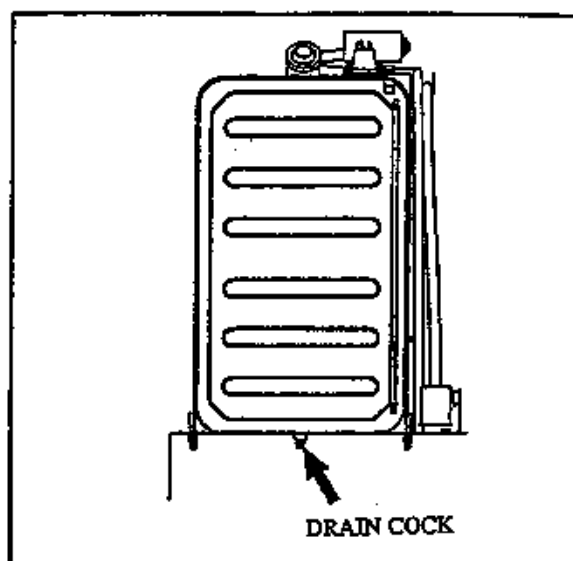
9.2.6 FUEL

Item No.	Checking Item	Check and Change Interval (hourmeter:Hr)						Remarks
		5	25	250	500	1000	2000	
1	Drain of fuel tank					○		
2	Adding fuel	※						105.6 gal. (400 ltr.)

※As required

1. DRAIN OF 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

- Do not bring any spark or flame close to the fuel.
- Never smoke cigarettes while refueling. This could ignite the fuel and cause property damage, injury to personnel, or loss of life.

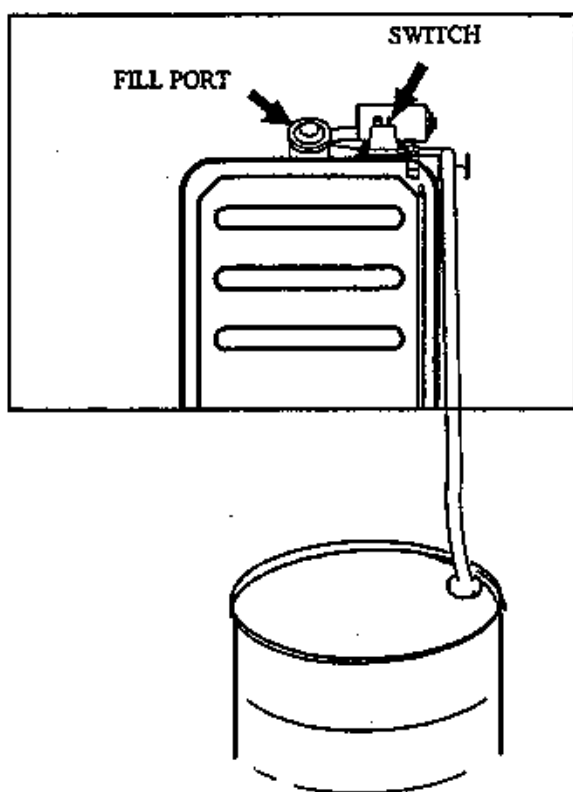


CAUTION

Never run the fuel pump empty.

The fuel pump is optional.

Refuel from the fill port if the fuel pump is not provided.



9.2.7 COOLANT

Item No.	Checking Item	Check and Change Interval (hourmeter:Hr)						Remarks
		5	25	250	500	1000	2000	
1	Check of coolant level	○						
2	Change of coolant					○		11.4 gal. (43 ltr.)

※Changing interval of coolant is for the case that Long Life coolant is combined. In other case, replace coolant semi-annually.

1. CHECK OF COOLANT LEVEL



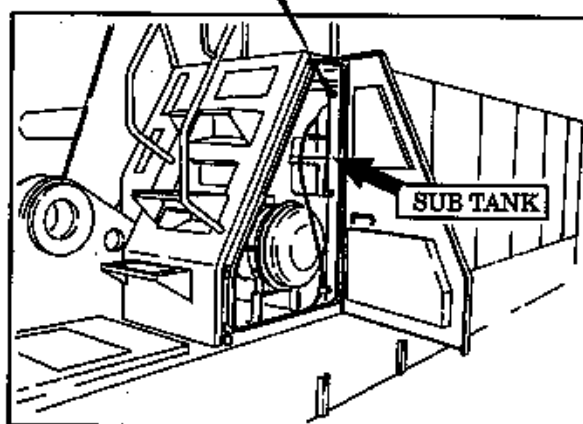
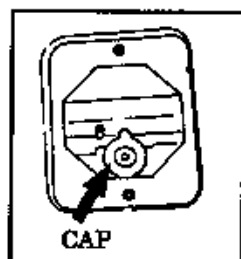
WARNING

Do not remove the radiator cap when the engine is hot. Use a heavy cloth or gloves to protect yourself while loosening the cap slowly. 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 loss of life.

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 and also fill the sub-tank up to the FULL mark position with soft water (running water) by removing the cap.



2. CHANGE OF COOLANT



WARNING

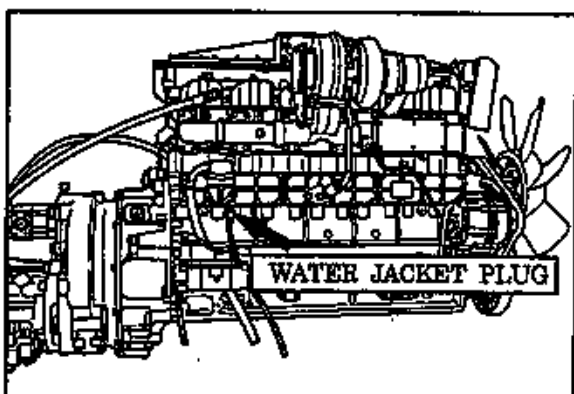
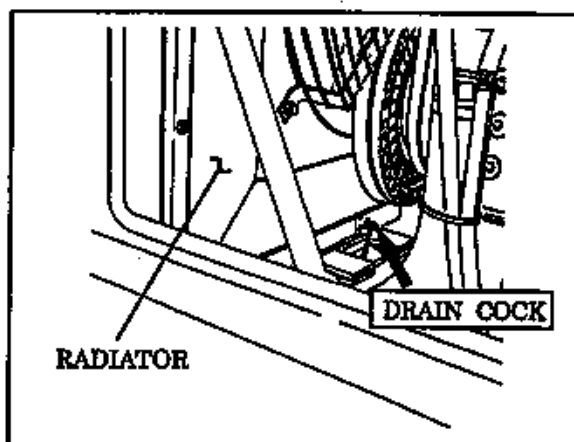
Do not drain the coolant when it is hot. The hot water may spout out which could result in personal injury. After the water has cooled, drain the water.

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

- (1) Loosen the drain cock in the bottom of the radiator and the plug of the water jacket, drain the coolant.
- (2) Combine soft water (city water) and Long life coolant, and fill the radiator upto the foot of the water supply port.

In order to prevent air from entering, slowly pour water. After water pouring, confirm that the water level does not lower, 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 water.



9.2.8 HYDRAULIC OIL

Item No.	Check Item		Check and Change Interval (hourmeter:Hr)						Remarks
			5	25	250	500	1000	2000	
1	Check of hydraulic oil level	Main	○						
2	Drain of hydraulic oil tank					○			
3	Change of hydraulic oil							○	137 gal. (520 ltr.)
4	Check of hydraulic oil level	Luffing jib		○					
5	Change of hydraulic oil							○	4 gal. (15 ltr.)

1. CHECK OF HYDRAULIC OIL LEVEL

If the hydraulic oil level is in the range indicated on level with the following conditions and the engine running, the oil level is normal.

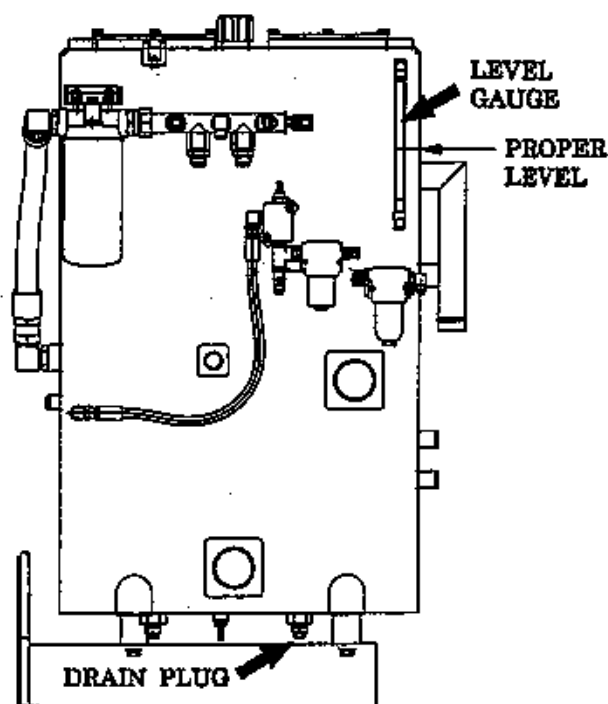
[Oil temperature : 68°F (20°C)]

Gantry cylinder Extended

Mast cylinder Retracted

Crawler frame connection

pin cylinder Extended



2. DRAIN OF HYDRAULIC OIL TANK

Before starting operation, loosen the drain plug to drain water and sediment from the tank.

3. CHANGE OF HYDRAULIC OIL



WARNING

Do not drain the oil when it is hot. The hot oil may spout out which could result in personal injury. After the oil has cooled, drain the oil. Failure to observe this precaution may result in serious injury or loss of life.



CAUTION

Extra care must be taken to insure that all the 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 remarkably contaminated or deteriorated, replace the oil regardless of operating hours.

- (1) Prepare a container of approx. 145 gal. (545 ltr.).
 - (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, then extend the crawler extend/retract cylinders. Check the oil level again.
- When changing hydraulic oil, change the filter also of the same time.

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 : 68°F (20°C)]

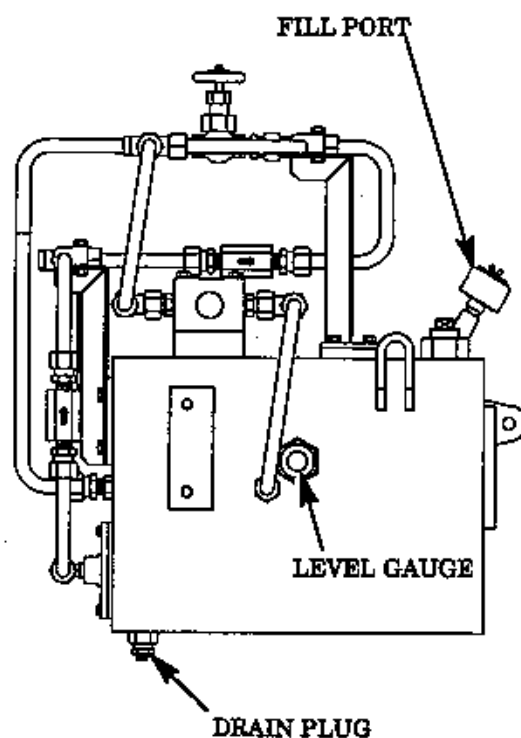
Strut cylinder Retract

Lower the boom on to the ground.

5. CHANGE OF HYDRAULIC OIL

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. 4 gal. (15 ltr.).
- (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.



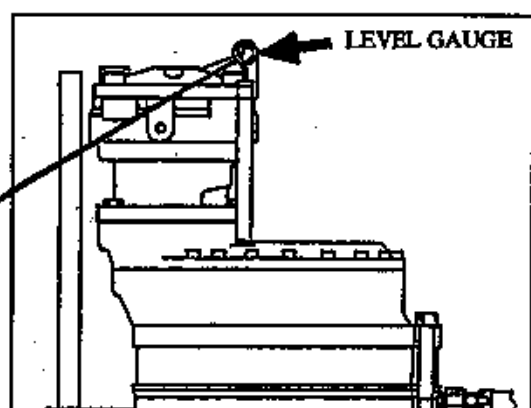
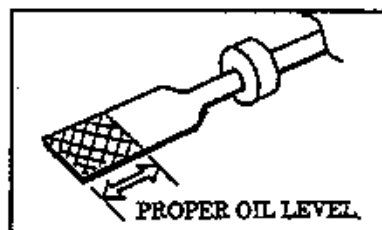
9.2.9 GEAR OIL

Item No.	Check Item	Check Interval (hourmeter:Hr)						Remarks
		5	100	250	500	1000	2000	
1	Oil level check of swing reduction unit		○					
	Oil change of swing reduction unit					○		2.5 gal. (9.4 ltr.)
2	Oil level check of front and rear drum reduction unit			○				
	Oil change of front and rear drum reduction unit					○		5.8 gal. (22 ltr.)/each
3	Oil level check of boom hoist drum reduction unit			○				
	Oil change of boom hoist drum reduction unit					○		4.4 gal. (16.5 ltr.)
4	Oil level check of luffing jib drum			○				
	Oil change of luffing jib drum					○		2.0 gal. (7.5 ltr.)
5	Oil level check of power divider		○					
	Oil change of power divider					○		0.87 gal. (3.3 ltr.)
6	Oil level check of propel reduction unit			○				
	Oil change of propel reduction unit					○		15.8 gal. (60 ltr.)/each
7	Oil change of lower roller					○		0.07 gal. (0.25 ltr.)/each
8	Oil change of upper roller					○		0.03 gal. (0.13 ltr.)/each
9	Oil change of idler wheel					○		0.15 gal. (0.55 ltr.)/each

1. OIL LEVEL CHECK AND OIL CHANGE OF SWING REDUCTION UNIT

(1) OIL LEVEL CHECK

If the oil level is in the net meshes of the level gauge, it is normal.



DRAIN COCK

(2) OIL CHANGE



WARNING

Do not drain the oil when it is hot. The hot oil may spout out which could result in personal injury. After the oil has cooled, drain the oil. Failure to observe this precaution may result in serious injury or loss of life.

With the level gauge drawn out, remove the drain cock, drain the oil into a prepared container.

2. OIL LEVEL CHECK AND OIL CHANGE OF FRONT, REAR AND THIRD DRUM REDUCTION UNITS

(1) OIL LEVEL CHECK

If the oil level in the front and rear drum reduction unit is upto the red color mark of the level gauge, it is normal.

(2) OIL CHANGE

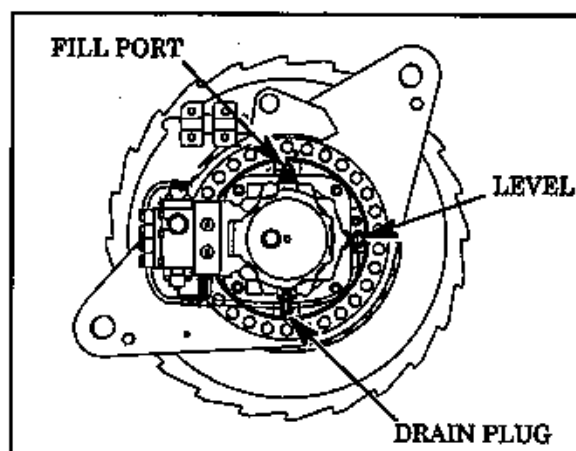


WARNING

Do not drain the oil when it is hot. The hot oil may spout out which could result in personal injury. After the oil has cooled, drain the oil. Failure to observe this precaution may result in serious injury or loss of life.

Prepare a container of approx. 5.9 gal. (22 ltr.) capacity. 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. OIL LEVEL CHECK AND OIL CHANGE OF BOOM HOIST DRUM REDUCTION UNIT

(1) OIL LEVEL CHECK

If the oil level is located of the level plug, it is normal.

(2) OIL CHANGE

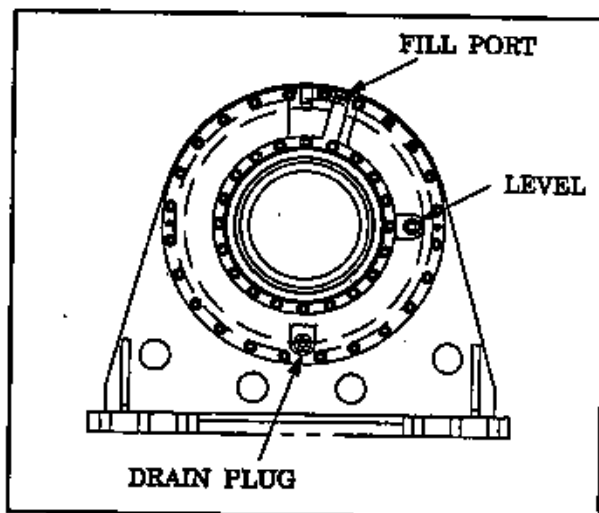


WARNING

Do not drain the oil when it is hot. The hot oil may spout out which could result in personal injury. After the oil has cooled, drain the oil. Failure to observe this precaution may result in serious injury or loss of life.

Prepare a container of approx. 2.6 gal. (10 ltr.) of capacity.

With the level plug removed, removed 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. OIL LEVEL CHECK AND OIL CHANGE OF LUFFING JIB DRUM REDUCTION UNIT

(1) OIL LEVEL CHECK

If the oil level is located of the level plug, it is normal.

(2) OIL CHANGE



WARNING

Do not drain the oil when it is hot. The hot oil may spout out which could result in personal injury. After the oil has cooled, drain the oil. Failure to observe this precaution may result in serious injury or loss of life.

Prepare a container of approx. 2.0 gal. (7.5 ltr.) of capacity.

With the level plug removed, removed 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.

5. OIL LEVEL CHECK AND OIL CHANGE OF POWER DIVIDER

(1) OIL LEVEL CHECK

If the oil level is up to the red color mark of the level gauge, it is normal.

(2) OIL CHANGE



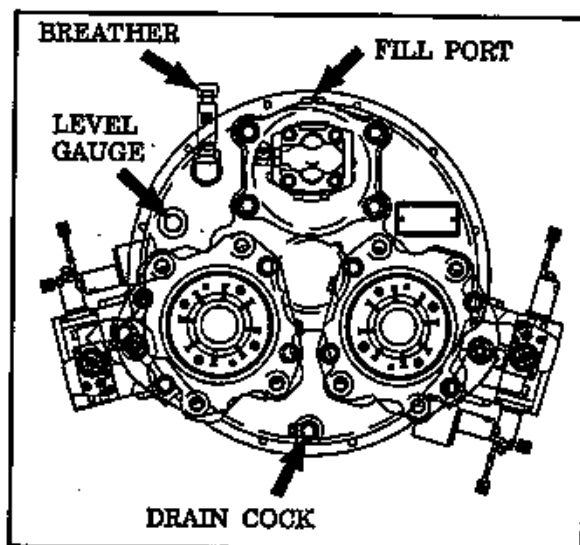
WARNING

Do not drain the oil when it is hot. The hot oil may spout out which could result in personal injury. After the oil has cooled, drain the oil. Failure to observe this precaution may result in serious injury or loss of life.

Prepare a container of approx. 1.3 gal. (5 ltr.) of capacity.

With the cap of the oil supply port removed, 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. OIL LEVEL CHECK AND OIL CHANGE OF PROPEL REDUCTION UNIT

(1) OIL LEVEL CHECK

With the drain plug positioned at the right bottom, remove the level plug. If the oil level is up to the bottom of the level plug opening, it is normal.

(2) OIL CHANGE



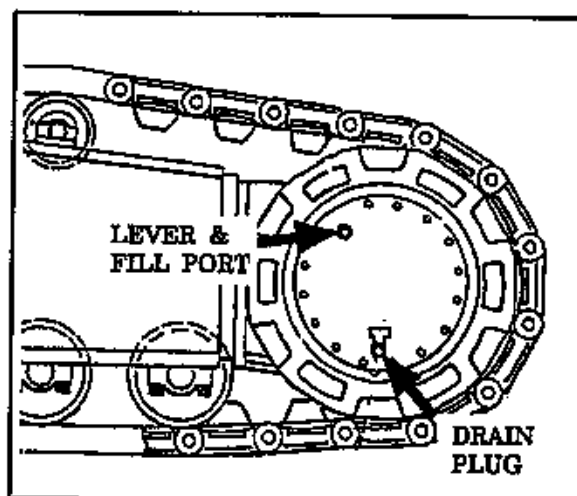
WARNING

Do not drain the oil when it is hot. The hot oil may spout out which could result in personal injury. After the oil has cooled, drain the oil. Failure to observe this precaution may result in serious injury or loss of life.

Prepare a container of approx. 10.6 gal. (40 ltr.) of capacity.

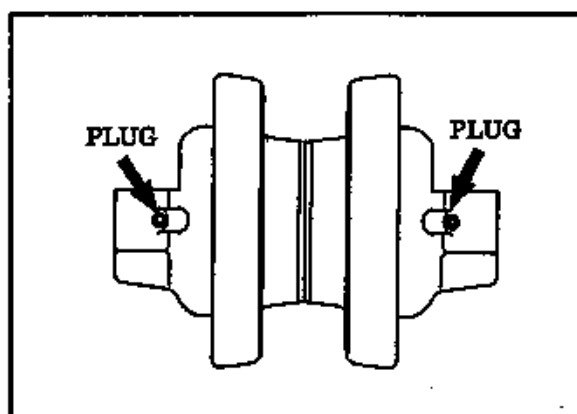
With the level plug removed, remove the drain plug to drain the oil into the container.

Reinstall the drain plug, pour the specified oil through the fill/level port until the oil reaches the specified level.



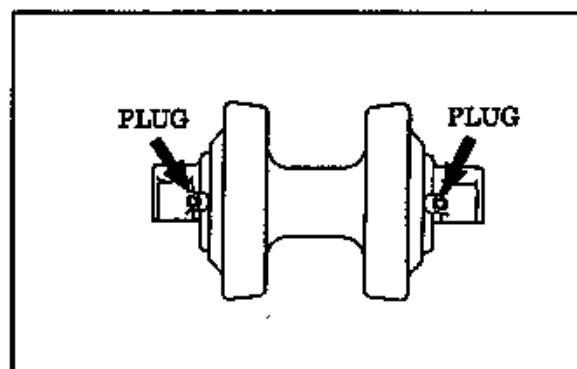
7. OIL CHANGE OF LOWER ROLLER

Remove the both end plugs to drain the oil. Supply the specified oil of specified amount. To change oil, consult the local KOBELCO distributor.



8. OIL CHANGE OF UPPER ROLLER

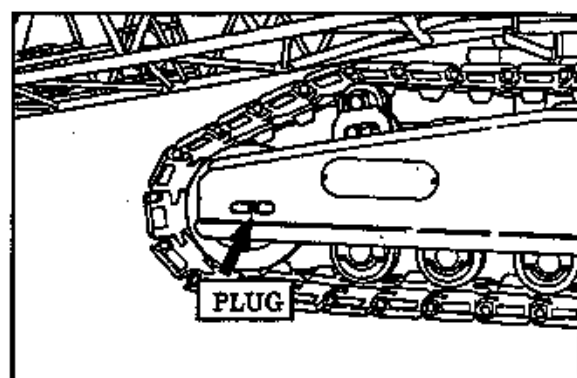
Remove the both end plugs to drain the oil. Supply the specified oil of specified amount. To change oil, consult the local KOBELCO distributor.



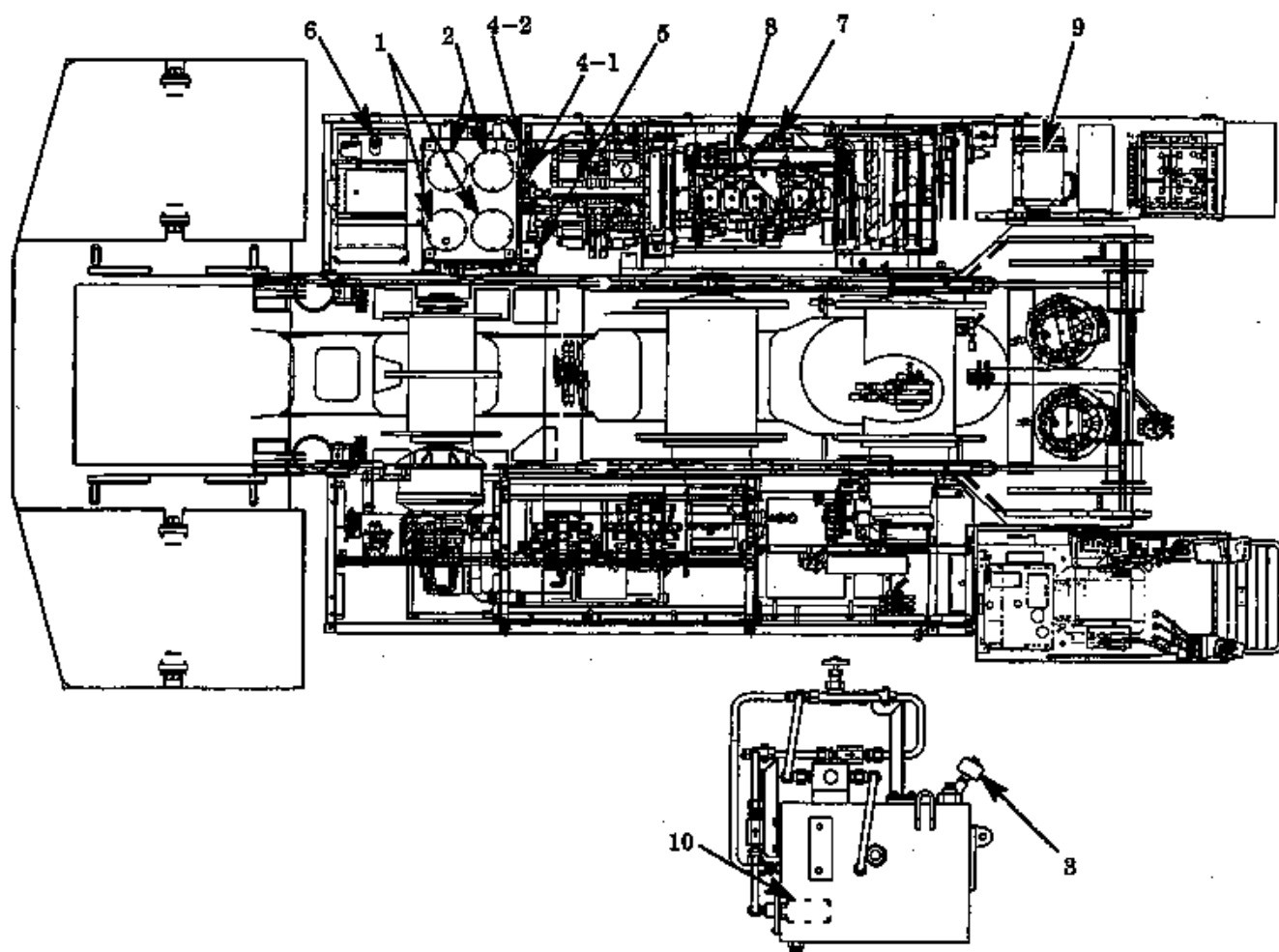
9. OIL CHANGE OF IDLER WHEEL

Remove the plug of the sliding block to drain the oil.

Supply the specified oil of specified amount. To change oil, consult the local KOBELCO distributor.



9.3 CLEANING/WASHING/CHANGE OF FILTER ELEMENT AND STRAINER



Item No.	Service Item		Cleaning/Washing/Changing Interval (hourmeter:Hr)						PART No.	Quantity
			5	100	250	500	1000	2000		
1	Hydraulic oil tank	Change of return filter			○				2446R275 (element) ZD11G22000 (O-ring)	1
2		Change of suction filter						○	GB50V00004S001 (element) ZD11G22000 (O-ring)	2
3		Washing of oil fill port strainer						○		2
4-1	Washing or change of line filter						○		2446R183S2 (filter) 45Z91D84 (O-ring)	2
4-2	Washing or change of line filter		○		○				2446U346S3 (filter) 2446U346S5 (O-ring)	1
5	Change of drain filter (cartridge)		○		○				2446U254S3	1
6	Washing of fuel tank fill port strainer				○					1
7	Change of fuel filter					○			JD02-00001 to JD02-00017 MED56670 From JD02-00018 ME150631	1
8	Change of engine oil element				○				JD02-00001 to JD02-00017 MED64356 From JD02-00018 ME121789	1
9	Cleaning and change of air element						Change ○		GB11P00001S002	1
10	Hydraulic oil tank (For luffing jib)							○	2446Z143	1

1. CHANGE OF HYDRAULIC OIL TANK RETURN FILTER



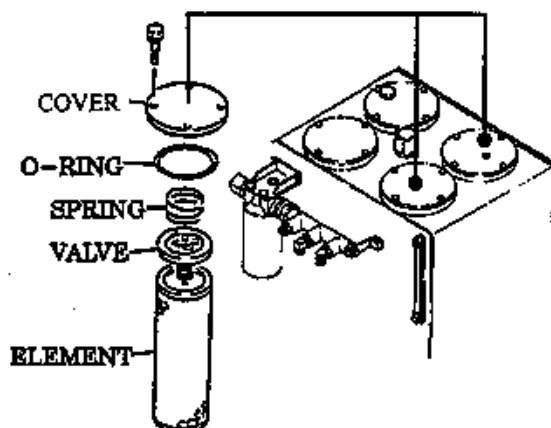
WARNING

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 loss of life.

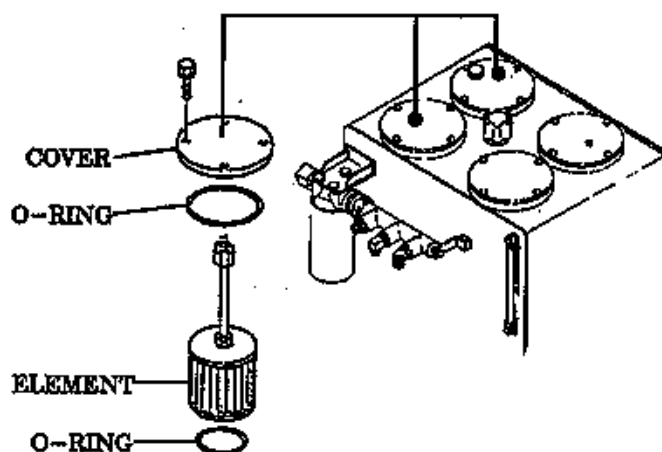
Removing the filter cover, replace the element and O-ring with new ones.



2. CHANGE OF HYDRAULIC OIL SUCTION FILTER

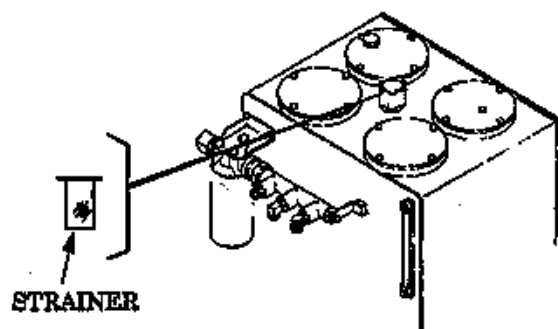
Removing the filter cover, replace the element and O-ring.

Perform this change when changing the hydraulic oil.



3. WASHING OF FILL PORT STRAINER

Removing the air breather cap, take out the fill port strainer, and sufficiently wash it with washing liquid.



4. WASHING OF LINE FILTER

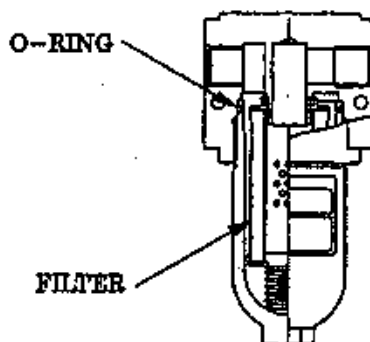


WARNING

After stopping engine, wait for five minutes to release pressure.

Removing the case, take out the filter, and sufficiently wash it.

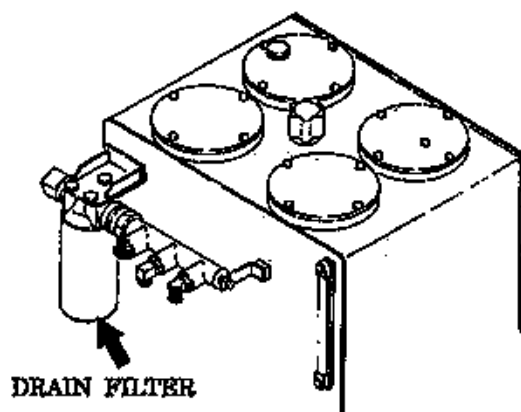
Replace the O-ring with a new one.



5. CHANGE OF DRAIN FILTER (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.



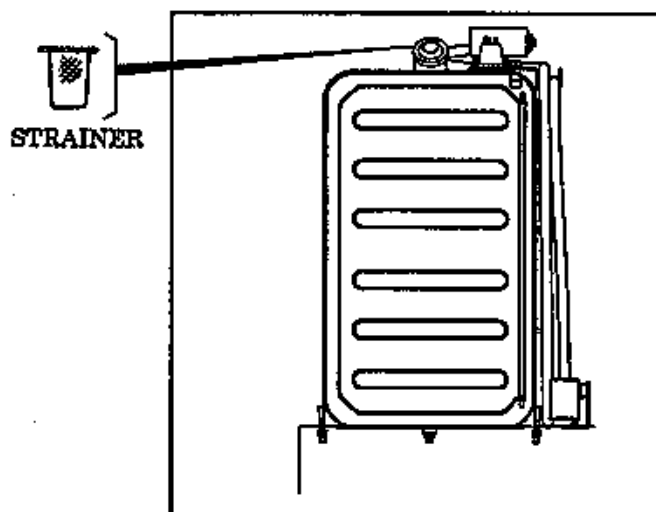
6. WASHING OF FUEL TANK FILL PORT STRAINER

Removing the cap, take out the strainer and sufficiently wash it with washing liquid.



WARNING

Do not bring any spark or flame close to the fuel.



7. CHANGE OF FUEL FILTER

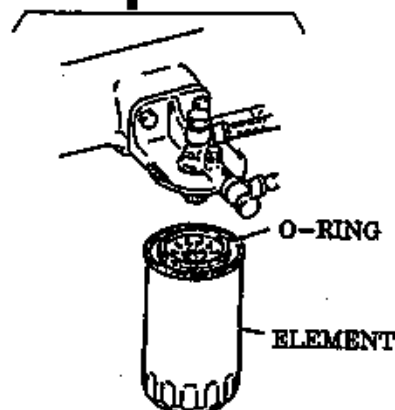
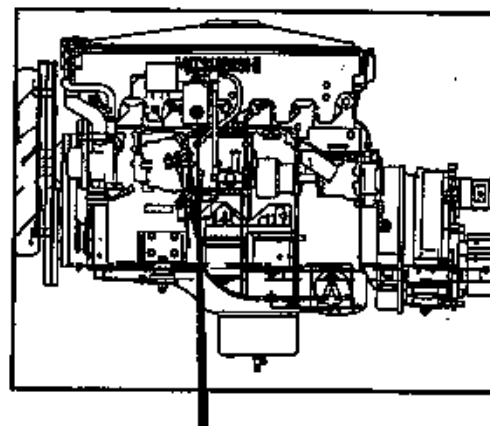
Place a suitable container to receive fuel under the filter, being careful not to allow fuel to spill, and remove the case. Then replace the filter and O-ring with new ones.

After replacing the filter, be sure to bleed air, and wipe off spilt fuel.



WARNING

- Do not bring any spark of flame close to the fuel.
- Never smoke cigarettes while changing fuel filter, this could ignite the fuel and cause property damage, injury to personnel or loss of life.



8. CHANGE OF ENGINE OIL ELEMENT

- (1) Place a suitable container to receive oil under the filter, and loosen the drain plug on the bottom side of the filter case to drain the oil in the case.
- (2) Remove the filter case, and replace the element with a new one.



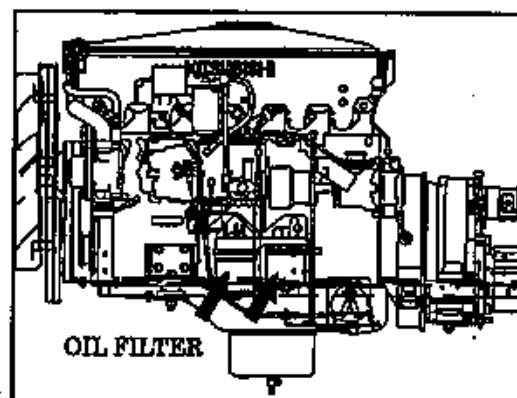
WARNING

Do not change engine oil element when oil is hot. Hot oil may spout out.

After the oil has cooled, change the filter.

The hot oil may cause severe burns.

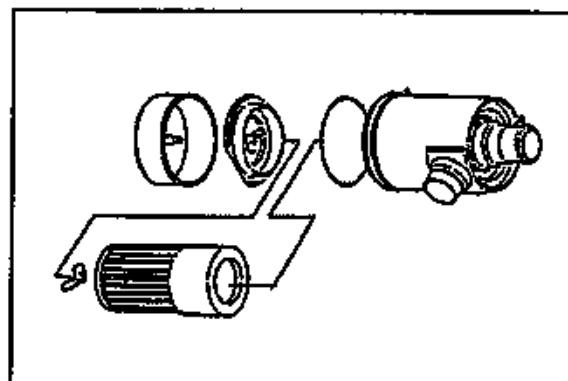
Failure to observe this precaution may result in serious injury or loss of life.



9. CLEANING AND CHANGE OF AIR ELEMENT

Remove the air element, and blow air from the inside to remove dust.

If it is remarkably dirty and the element is deformed, replace the element with a new one early.



10. CHANGE OF HYDRAULIC OIL SUCTION FILTER (FOR LUFFING JIB)

(1) Prepare a vessel of approx. 4 gal. (15 ltr.) capacity.
Remove the drain plug, and drain hydraulic oil.

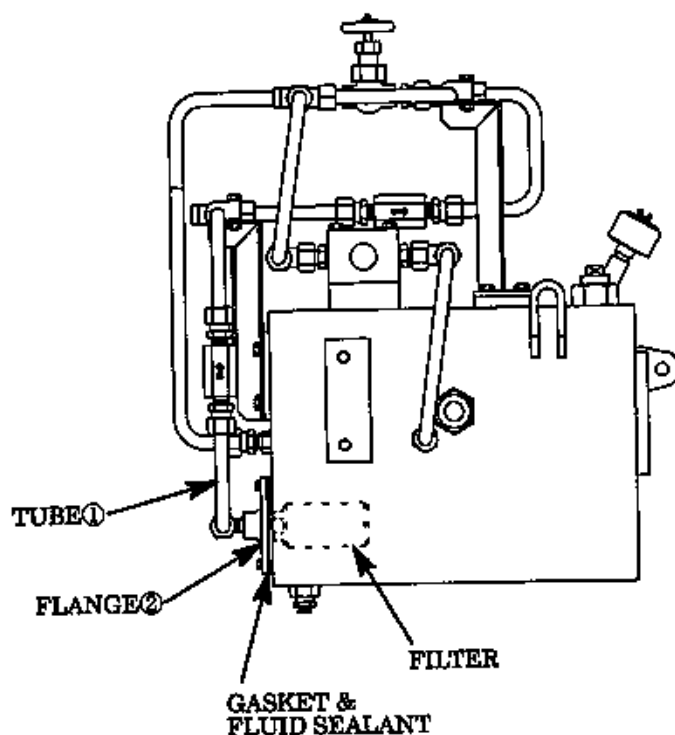
(2) Remove the tube (1).

(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.



9.4 CHECK OF BATTERY

Item No.	Check Item	Check Interval (hourmeter:Hr)						Remarks
		5	100	250	500	1000	2000	
1	Check of battery electrolyte level.		○					
2	Check of charge condition.							As required

1. CHECK OF BATTERY ELECTROLYTE LEVEL

If the battery electrolyte level is upto 10mm above the plates, it is normal.

If insufficient, add distilled water.



WARNING

- Do not bring a flame or spark close to the batteries.
- Never smoke cigarettes while checking electrolyte level. This could cause the battery electrolyte to ignite, and could cause property damage, injury to personnel or loss of life.



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 eyes when working with electrolyte.

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



WARNING

- Wear eye glasses to protect eyes when working with electrolyte.
- Do not short across the battery terminals.

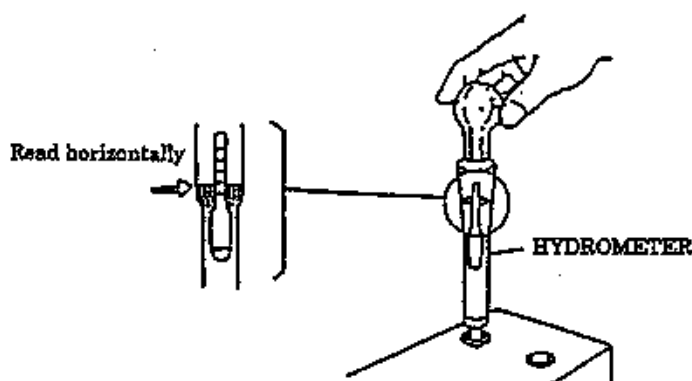
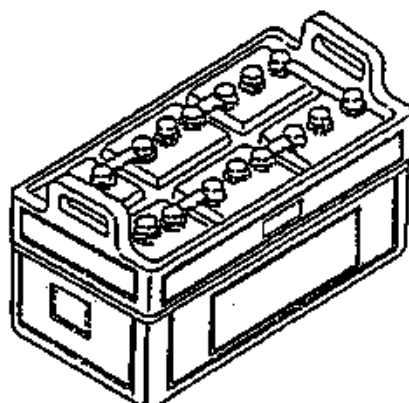
Failure to observe this precaution may result in serious injury or loss of life.

2. CHECK OF 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 68°F (20°C) 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 cool and dark place.



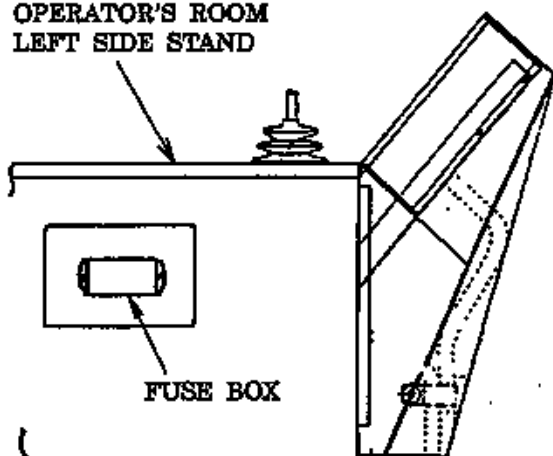
CAUTION

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.

If the battery cannot be removed and stored, then disconnect the terminals to avoid draining the battery.

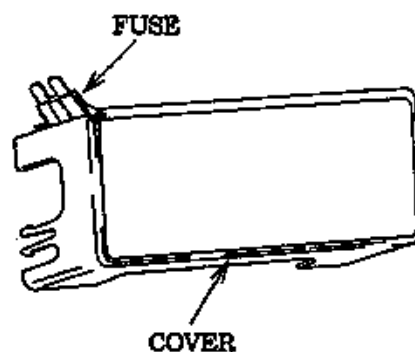
9.5 ARRANGEMENT AND USE OF FUSE

OPERATOR'S ROOM
LEFT SIDE STAND



REMOVAL OF FUSE

Fit the fuse to the corner of the fuse box cover, and pull it out.



Classification of Fuse Use				
Fuse No.	Capacity	Kind	Line No.	Use
F1	20A	Automotive Blade	1 — 11	Main power supply, headlight
F2	5A		1 — 12	Back-up
F3	5A		54 — 13	Engine start
F4	5A		2 — 14	Camera (Optional)
F5	10A		2 — 15	Translifter, Gantry
F6	10A		2 — 16	Solenoid valve
F7	5A		3 — 17	Load safety device control power supply
F8	5A		3 — 18	Load safety device output power supply
F9	20A		2 — 19	Wiper
F10	20A		2 — 20	Air conditioner
F11	10A		52 — 21	Radio, One-way
F12	20A		2 — 22	Total controller
F13	5A		2	Spare
F14	10A		2 — 24	Swing flasher
F15	10A		2 — 25	Cigaret lighter, fuel pump
F16	10A		2 — 26	Monitor
F17	20A		2 — 27	Bypass circuit
F18	20A		2	Spare
F19	10A		2	Spare
F20	10A		2	Spare

Fuse part No. : 5A=24100R215S4 10A=24100R215S3 20A=24100R215S2

9.6 OPERATION UNDER UNUSUAL CONDITIONS

(1) OPERATION IN COLD REGION

Item	Treatment	Caution																											
Engine Oil	Use engine oil suitable to the atmospheric temperature. (See the engine manual.) Class CD in API service classification. <table><tr><td>Atmospheric temperature when engine starting.</td><td>104°F to 50°F (40°C to 10°C)</td><td>50°F to -22°F (10°C to -30°C)</td></tr><tr><td>Viscosity of oil</td><td>SAE 30</td><td>SAE10W-30</td></tr></table>	Atmospheric temperature when engine starting.	104°F to 50°F (40°C to 10°C)	50°F to -22°F (10°C to -30°C)	Viscosity of oil	SAE 30	SAE10W-30	When replenishing or adding oil, do not mix different brand and quality oil, but use the same brand and quality oil.																					
Atmospheric temperature when engine starting.	104°F to 50°F (40°C to 10°C)	50°F to -22°F (10°C to -30°C)																											
Viscosity of oil	SAE 30	SAE10W-30																											
Fuel	Use fuel suitable to the atmospheric temperature. <table><tr><td>Atmospheric temperature</td><td>Kind</td></tr><tr><td>Higher than 23°F (-5°C)</td><td>JIS #2 light oil</td></tr><tr><td>23°F to 5°F (-5°C to -15°C)</td><td>JIS #3 light oil</td></tr><tr><td>Lower than 5°F (-15°C)</td><td>JIS Special #3 light oil</td></tr></table> Before starting work, drain water, and after the work is finished, fill the tank as full as possible.	Atmospheric temperature	Kind	Higher than 23°F (-5°C)	JIS #2 light oil	23°F to 5°F (-5°C to -15°C)	JIS #3 light oil	Lower than 5°F (-15°C)	JIS Special #3 light oil																				
Atmospheric temperature	Kind																												
Higher than 23°F (-5°C)	JIS #2 light oil																												
23°F to 5°F (-5°C to -15°C)	JIS #3 light oil																												
Lower than 5°F (-15°C)	JIS Special #3 light oil																												
Coolant	Combine antifreeze (Long Life Coolant) according to the atmospheric temperature. [Capacity of coolant: 11.4 gal. (43 ltr.)] <table><tr><td>Atmospheric temperature</td><td>Volume of cooling water</td><td>Volume of antifreeze</td></tr><tr><td>24.8°F (-4°C)</td><td>10.3 gal. (39 ltr.)</td><td>1.1 gal. (4 ltr.) (10%)</td></tr><tr><td>19.4°F (-7°C)</td><td>9.8 gal. (37 ltr.)</td><td>1.6 gal. (6 ltr.) (15%)</td></tr><tr><td>8.6°F (-13°C)</td><td>8.4 gal. (32 ltr.)</td><td>3.0 gal. (11 ltr.) (25%)</td></tr><tr><td>1.4°F (-17°C)</td><td>7.9 gal. (30 ltr.)</td><td>3.5 gal. (13 ltr.) (30%)</td></tr><tr><td>-5.8°F (-21°C)</td><td>7.4 gal. (28 ltr.)</td><td>4.0 gal. (15 ltr.) (35%)</td></tr><tr><td>-13°F (-25°C)</td><td>6.9 gal. (26 ltr.)</td><td>4.5 gal. (17 ltr.) (40%)</td></tr><tr><td>-23.8°F (-31°C)</td><td>6.3 gal. (24 ltr.)</td><td>5.1 gal. (19 ltr.) (45%)</td></tr><tr><td>-40°F (-40°C)</td><td>5.8 gal. (22 ltr.)</td><td>5.6 gal. (21 ltr.) (50%)</td></tr></table>	Atmospheric temperature	Volume of cooling water	Volume of antifreeze	24.8°F (-4°C)	10.3 gal. (39 ltr.)	1.1 gal. (4 ltr.) (10%)	19.4°F (-7°C)	9.8 gal. (37 ltr.)	1.6 gal. (6 ltr.) (15%)	8.6°F (-13°C)	8.4 gal. (32 ltr.)	3.0 gal. (11 ltr.) (25%)	1.4°F (-17°C)	7.9 gal. (30 ltr.)	3.5 gal. (13 ltr.) (30%)	-5.8°F (-21°C)	7.4 gal. (28 ltr.)	4.0 gal. (15 ltr.) (35%)	-13°F (-25°C)	6.9 gal. (26 ltr.)	4.5 gal. (17 ltr.) (40%)	-23.8°F (-31°C)	6.3 gal. (24 ltr.)	5.1 gal. (19 ltr.) (45%)	-40°F (-40°C)	5.8 gal. (22 ltr.)	5.6 gal. (21 ltr.) (50%)	Sometimes, combination rate may be different depending upon brands.
Atmospheric temperature	Volume of cooling water	Volume of antifreeze																											
24.8°F (-4°C)	10.3 gal. (39 ltr.)	1.1 gal. (4 ltr.) (10%)																											
19.4°F (-7°C)	9.8 gal. (37 ltr.)	1.6 gal. (6 ltr.) (15%)																											
8.6°F (-13°C)	8.4 gal. (32 ltr.)	3.0 gal. (11 ltr.) (25%)																											
1.4°F (-17°C)	7.9 gal. (30 ltr.)	3.5 gal. (13 ltr.) (30%)																											
-5.8°F (-21°C)	7.4 gal. (28 ltr.)	4.0 gal. (15 ltr.) (35%)																											
-13°F (-25°C)	6.9 gal. (26 ltr.)	4.5 gal. (17 ltr.) (40%)																											
-23.8°F (-31°C)	6.3 gal. (24 ltr.)	5.1 gal. (19 ltr.) (45%)																											
-40°F (-40°C)	5.8 gal. (22 ltr.)	5.6 gal. (21 ltr.) (50%)																											
Battery	Sufficiently charge the battery. (Maintain the specific gravity more than 1.22.) The electro-lyte in a fully charged battery will resist freezing at lower temperature better than a battery that in not fully charged.	After distilled water has been added, start and run the engine to mix with the electrolyte.																											

(2) EXTREME HEAT

Item	Treatment	Caution						
Engine Oil	Use engine oil suitable to atmospheric temperature. (See the engine manual.) Class CD in API service classification. <table border="1"><tr><td>Atmospheric temperature when starting engine</td><td>Higher than 104°F (40°C)</td><td>104°F to 50°F (40°C to 10°C)</td></tr><tr><td>Viscosity of oil</td><td>SAE40</td><td>SAE30</td></tr></table>	Atmospheric temperature when starting engine	Higher than 104°F (40°C)	104°F to 50°F (40°C to 10°C)	Viscosity of oil	SAE40	SAE30	Don not mix a different brand and quality of oil, but use the same brand and quality oil.
Atmospheric temperature when starting engine	Higher than 104°F (40°C)	104°F to 50°F (40°C to 10°C)						
Viscosity of oil	SAE40	SAE30						
Coolant	- 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 0.39 inch (10mm) above the plates.							

(3) 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.	

9.7 MACHINE STORAGE

(1) SHORT TERM STORAGE (Period of 30 Days or Less)

- Clean the entire machine, sufficiently dry it, then carefully lubricate.
- Cover the machine to prevent dust.

(2) LONG TERM STORAGE (Longer than One month and less than 1 Year)

- Clean the entire machine, sufficiently dry it, then carefully lubricate.
- Sufficiently grease the slewing ring gear.
- Replace the reduction unit gear oil and hydraulic oil with fresh oil.
- Replace all filters and so on with new ones.
- Remove the batteries and store them in a cold and dark place.
- Apply thin coat of oil to places which are apt to rust.
- Completely drain coolant, and post a sign "No Water".
- Cover the entire machine to prevent dust.

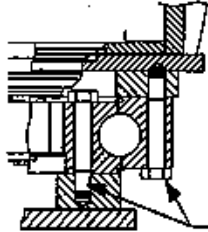
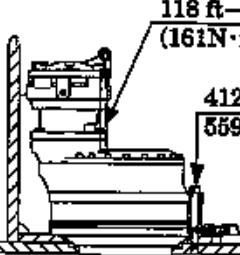
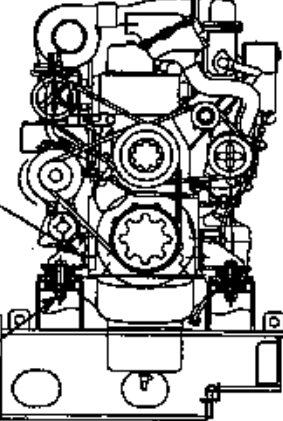
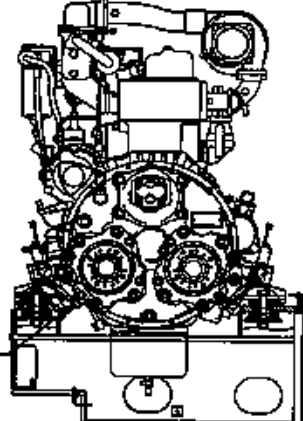
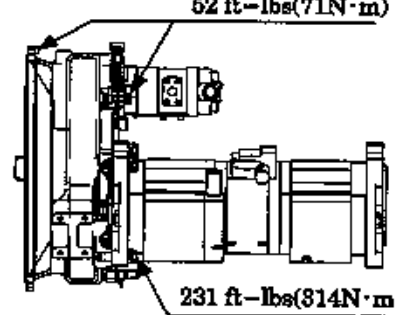
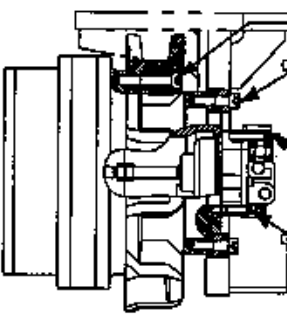
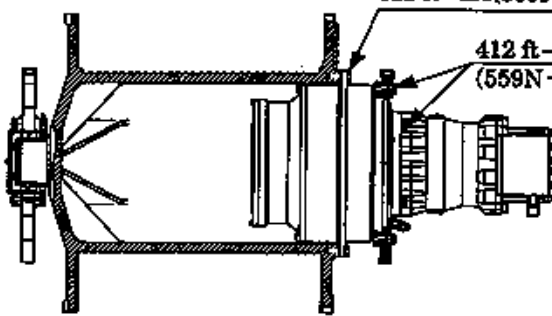
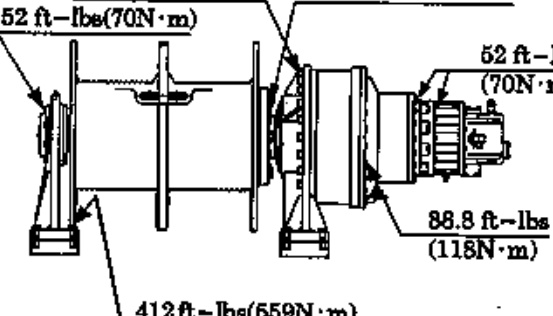
9.8 TIGHTENING TORQUE VALUES

(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 ft-lbs (N-m)		Tightening Torque ft-lbs (N-m)	
	Dry	Lubricated	Dry	Lubricated
M6	3.8±0.4 (5.1±0.5)	3.2±0.3 (4.3±0.4)	8.2±0.8 (11.1±1.1)	6.9±0.7 (9.3±0.9)
M8	9.0±0.9 (12.3±1.2)	7.7±0.8 (10.4±1.0)	20.2±2.0 (27.4±2.7)	16.6±1.7 (22.5±2.3)
M10	18.1±1.8 (24.5±2.5)	15.2±1.5 (20.6±2.1)	39.0±3.9 (52.9±5.3)	33.2±3.3 (45.1±4.5)
M12	30.3±3.0 (41.2±4.1)	26.7±2.7 (36.3±3.6)	66.4±6.6 (90.2±9.0)	56.3±5.6 (76.4±7.6)
M14	48.4±4.8 (65.7±6.6)	41.2±4.1 (55.9±5.6)	105±10.5 (143±14)	88.8±8.9 (121±12)
M16	73.6±7.4 (100±10)	62.1±6.2 (84.3±8.4)	159±16 (216±22)	134±13 (181±18)
M18	101±10 (137±14)	85.9±8.6 (117±12)	224±22 (304±30)	188±19 (255±26)
M20	142±14 (193±19)	119±12 (162±16)	310±31 (421±42)	260±26 (353±35)
M22	188±19 (255±26)	159±16 (216±22)	412±41 (559±56)	347±35 (470±47)
M24	245±25 (333±33)	195±20 (265±27)	527±53 (715±72)	425±43 (578±58)
M27	354±35 (480±48)	289±29 (392±39)	773±77 (1048±105)	643±64 (853±85)
M30	484±48 (657±66)	404±40 (549±55)	1047±105 (1421±142)	881±88 (1195±120)
M33	650±65 (882±88)	542±54 (735±74)	1408±141 (1911±190)	1184±118 (1607±161)
M36	838±84 (1137±114)	700±70 (951±95)	1805±180 (2450±245)	1509±151 (2048±205)

Nominal	Metric Fine Screw Thread			
	4T		7T	
	Tightening Torque ft-lbs (N-m)		Tightening Torque ft-lbs (N-m)	
	Dry	Lubricated	Dry	Lubricated
M8	9.5±0.9 (12.9±1.3)	8.0±0.8 (10.9±1.1)	20.9±2.1 (28.4±2.8)	17.3±1.7 (23.5±2.4)
M10	18.8±1.9 (25.5±2.6)	15.9±1.6 (21.6±2.2)	40.4±4.0 (54.9±5.5)	34.7±3.5 (47.0±4.7)
M12	33.2±3.3 (45.1±4.5)	28.2±2.8 (38.2±3.8)	71.5±7.2 (97.0±9.7)	59.9±6.0 (81.3±8.1)
M16	77.3±7.7 (105±11)	65.0±6.5 (88.2±8.8)	166±17 (225±23)	141±14 (191±19)
M20	152±15 (206±21)	129±13 (174±17)	332±33 (451±45)	274±27 (372±37)
M24	260±26 (353±35)	217±22 (294±29)	563±56 (764±76)	469±47 (637±64)
M30	520±52 (706±71)	433±43 (588±59)	1141±114 (1548±155)	946±95 (1284±128)
M36	866±87 (1176±118)	722±72 (980±98)	1892±189 (2568±257)	1574±157 (2136±214)

- (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
 2060 ft-lbs (2.8kN·m)	 118 ft-lbs (161N·m) 412 ft-lbs (559N·m)
ENGINE	
 141 ft-lbs (191N·m) 412 ft-lbs (559N·m)	 88.8 ft-lbs (121N·m)
PUMP	PROPEL REDUCTION UNIT
 52 ft-lbs (71N·m) 231 ft-lbs (314N·m)	 412 ft-lbs (559N·m) 412 ft-lbs (559N·m) 318 ft-lbs (431N·m) 318 ft-lbs (431N·m)
FRONT & REAR DRUM ASSEMBLY	BOOM DRUM ASSEMBLY
 412 ft-lbs (559N·m) 412 ft-lbs (559N·m)	 412 ft-lbs (559N·m) 52 ft-lbs (70N·m) 698 ft-lbs (940N·m) 52 ft-lbs (70N·m) 88.8 ft-lbs (118N·m) 412 ft-lbs (559N·m)

Apply Loctite #242 or equivalence to the bolts and nuts.
For maintenance, contact our KOBELCO service shop.

9.9 SECURITY PARTS TO BE REPLACED PERIODICALLY

Abnormality of parts related to brakes and clutches has possibility to cause unexpected serious accidents. Therefore, "Security Parts to be Replaced periodically" are set for these critical parts as shown in the following table, and interval of replacement is standardized. Be sure to replace the security parts shown in the table every (within) 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. 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

9.10 ADJUSTMENT

9.10.1 ADJUSTMENT OF FRONT AND REAR DRUM LOCKS

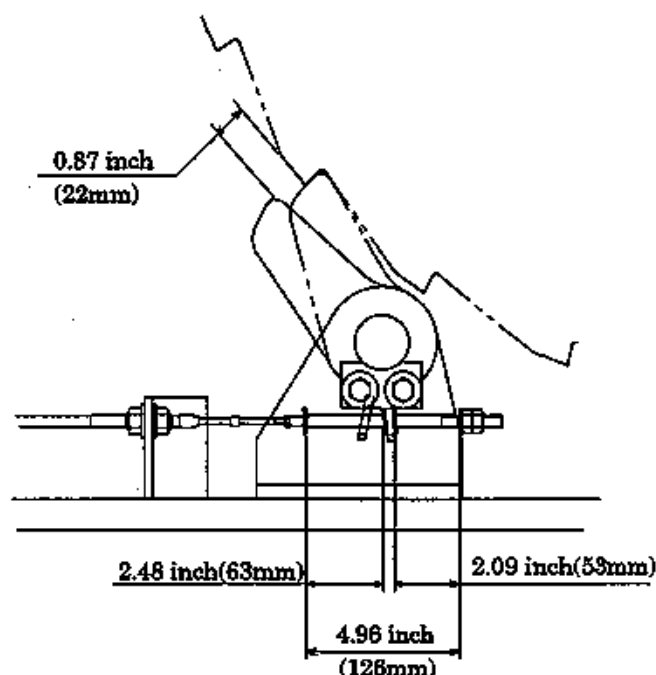


WARNING

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 loss of life.

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 in the bottom.
2. With the **RELEASE** position, adjust the respective dimension as shown in the figure.
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 0.87 inch (22 mm).
Operate the knob to the **LOCK** position and to the **RELEASE** position and confirm that the pawl moves smoothly.



9.10.2 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 loss of life.

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 in the bottom.

2. With the RELEASE position, adjust the respective dimension as shown in the figure.

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 1.93 inch (49 mm).

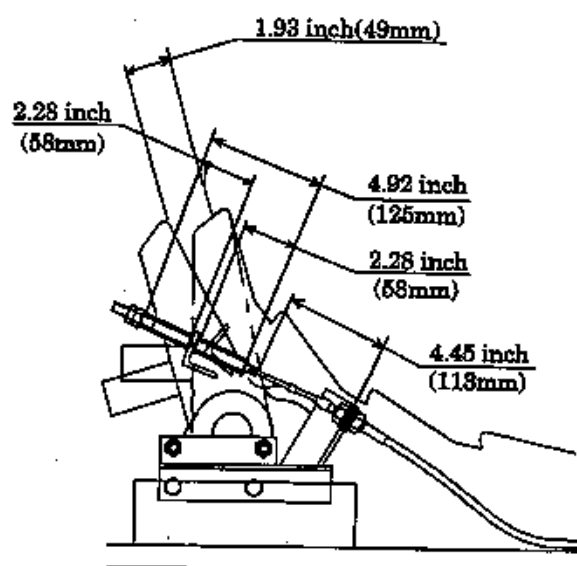
Operate the knob to the LOCK position and to the RELEASE position and confirm that the pawl moves smoothly.



WARNING

Keep hands and clothing clear of the rotating drum.

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



9.10.3 ADJUSTMENT OF LUFFING JIB DRUM LOCK



WARNING

Do not adjust the drum lock until the jib has been lowered to the ground.

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

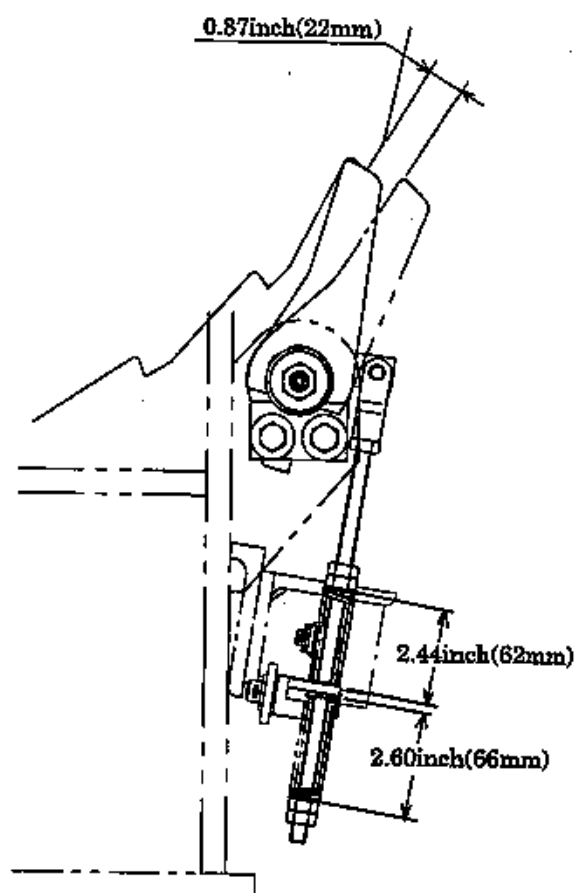
1. Shift the drum lock switch in the LOCK position and check to see that the pawl is engaged in the bottom of the drum ratchet.

If the pawl is not engaged in the bottom of the ratchet, adjust the spring length to allow the pawl to be engaged in the bottom.

2. With the LOCK position, adjust the respective dimension as shown in the figure.

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 0.87 inch (22 mm).

Operate the knob to the LOCK position and to the RELEASE position and confirm that the pawl moves smoothly.



9.10.4 ADJUSTMENT OF CRAWLER SHOES

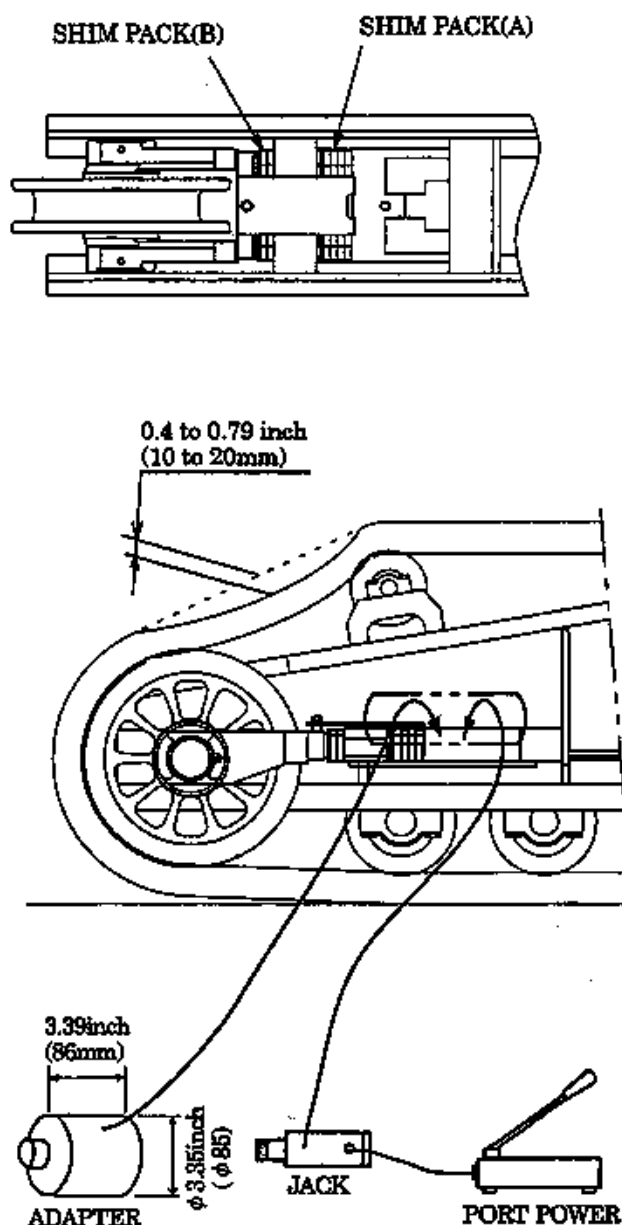
If the crawler shoes are too tight, the shoes wear quickly and a connection between two shoes could break. On the other hand, if the shoes are too loose, the shoes may ride off the drive sprocket and idler wheel during the travel operation. To prevent these occurrence from happening, it is required to adjust shoe tension.

To adjust shoe tension, proceed as follows:

1. Move the machine forward about the crawler length so that the slackening of the crawler shoes appear on the upper side of the crawler.
2. Remove all the shims from shim pack (A).
3. Set the hydraulic jack in the position between the bracket and block of the side frame. Operate the jack to push the idler wheel, and remove the slackening of 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.



9.11 CONSUMABLE PARTS LIST

(1) OIL/GREASE

For the recommended oil and grease, refer to the "KOBELCO Genuine Lubricant Chart" in the page 9-30, and be sure to use KOBELCO genuine 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 in the page 9-56.

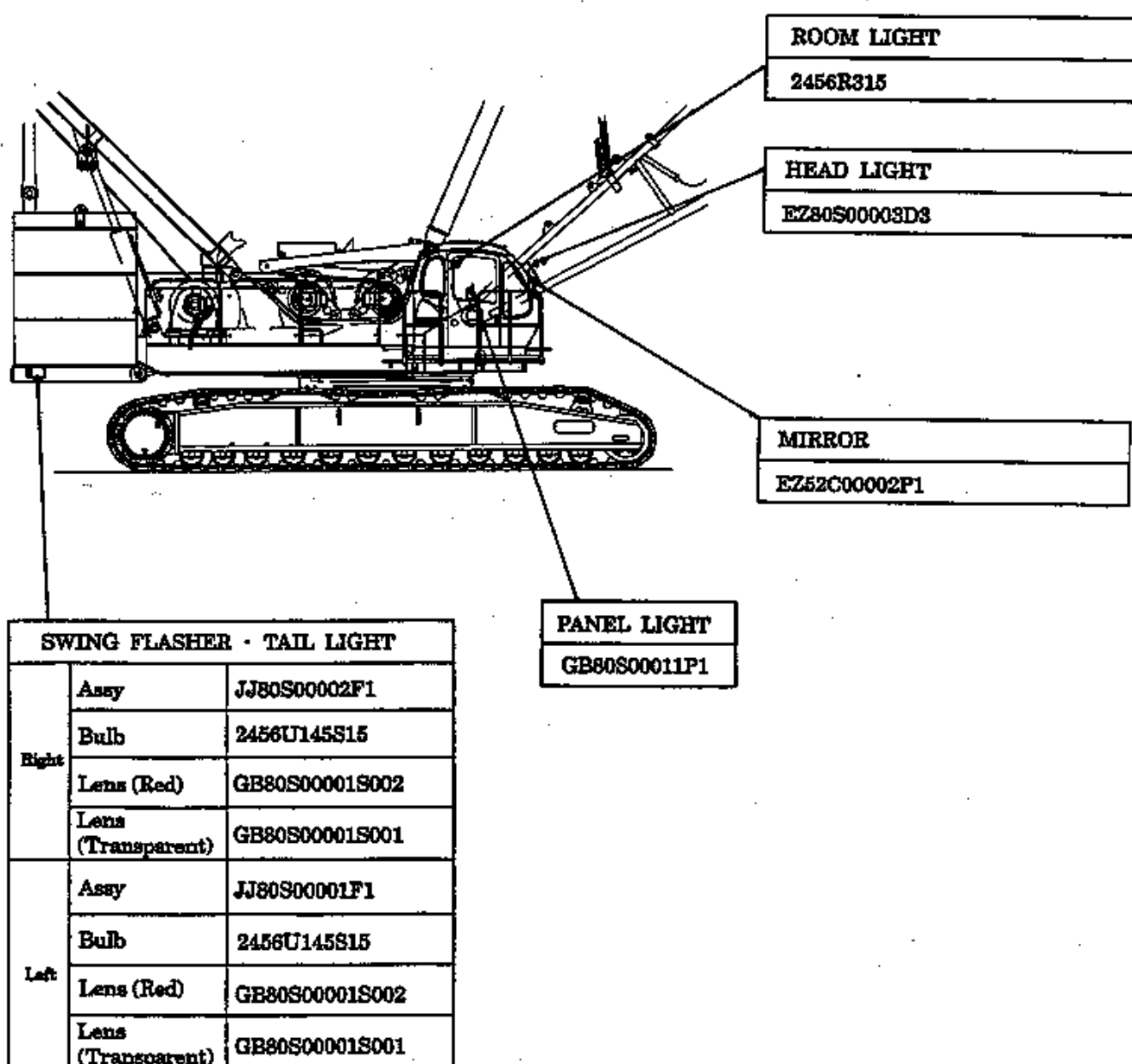
(3) FUSE

For the recommended fuse, refer to the chart in the page 9-62.

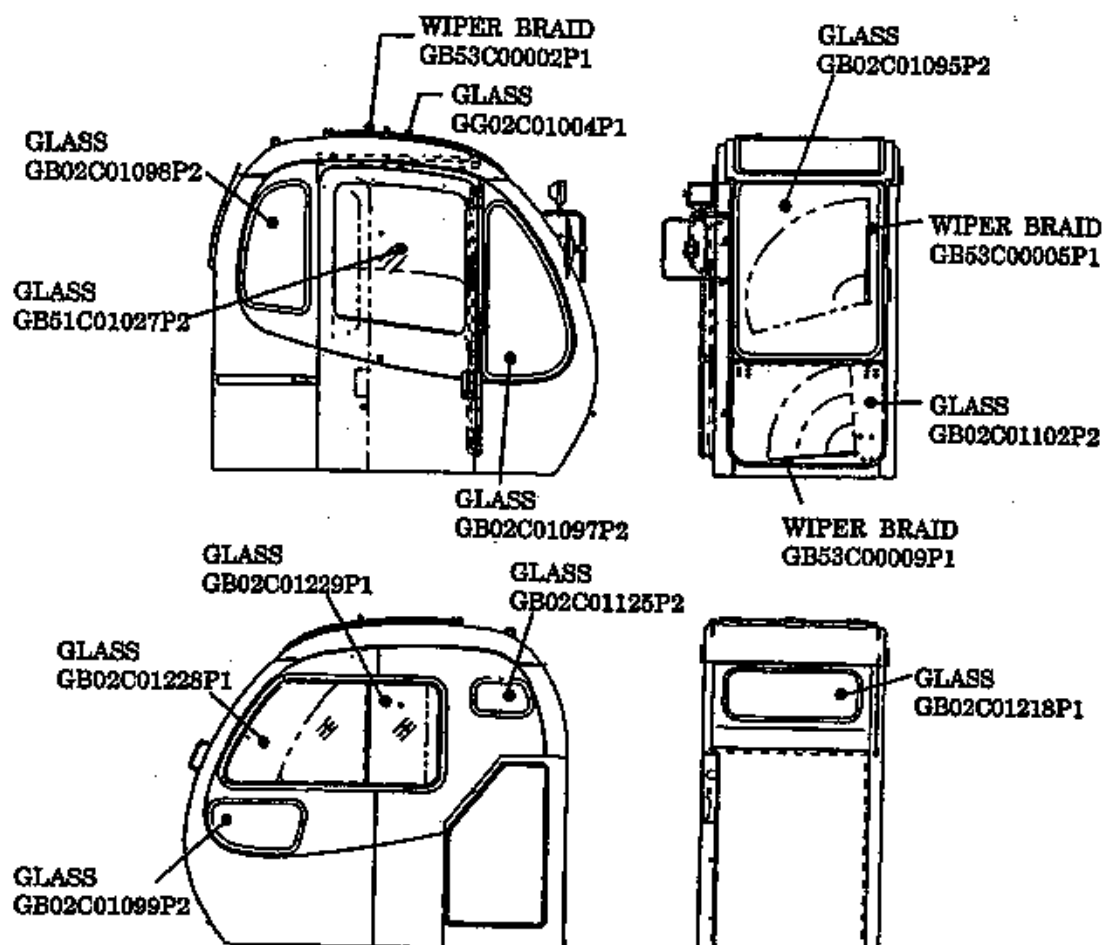
(4) WIRE ROPE

For the recommended wire rope, refer to the section of the "SPECIFICATION OF WIRE ROPE" in the Chapter 7.

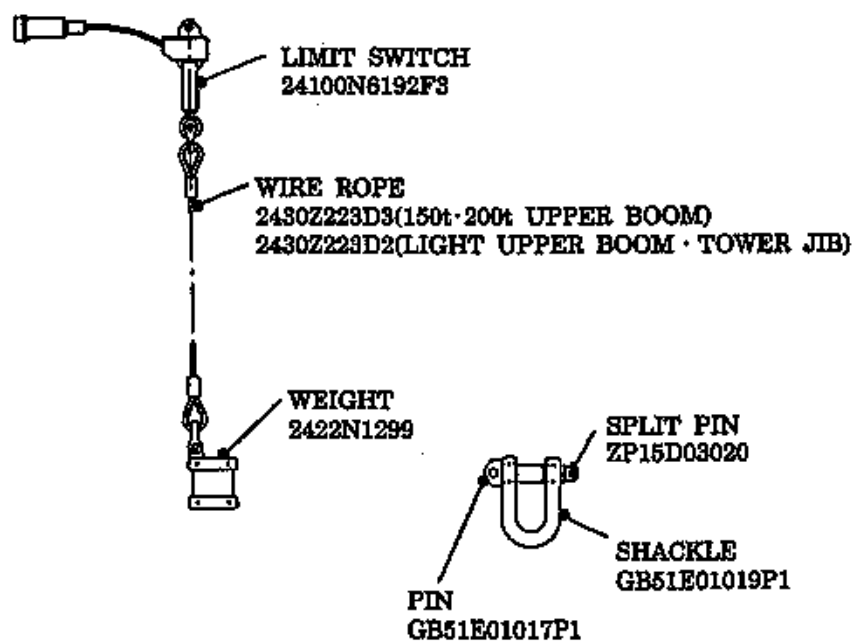
(5) LIGHT AND MIRROR



(6) GLASS · WIPER



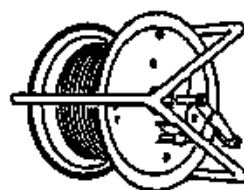
(7) HOOK OVER HOIST LIMIT SWITCH



(8) CABLE REEL FOR LOAD SAFETY DEVICE

Cable reel

Crane	24100R439F1
Jib	24100R437F1



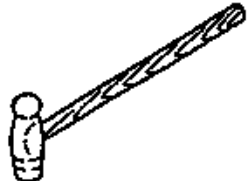
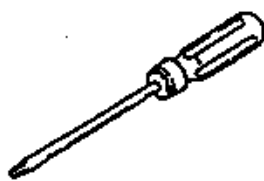
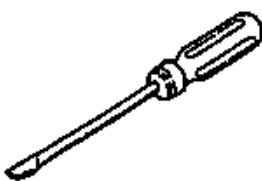
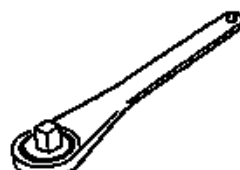
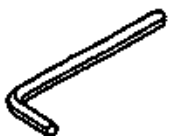
(9) KEY

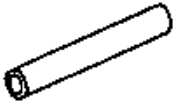
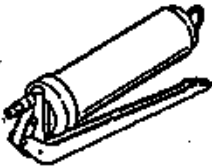
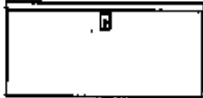
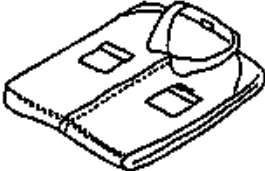
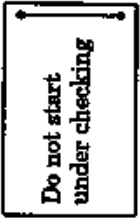
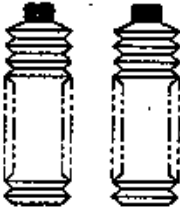
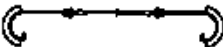
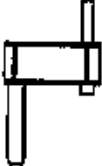


ENGINE
DOOR
GUARD

EZ51S00016S002 (K250)

(10) TOOL

SHACKLE  2420Z604D11 2420Z605D7	PLIERS  2421R393	MONKEY WRENCH  ZT12D25000(28mm)	VINYLE HOSE  2420Z718D200
HUMMER  2421R397	HUMMER  21Z72D4	⊕DRIVER  GB01T01008D2	⊖DRIVER  2421R995D2 (5.5mm)
ADAPTER (When adjustment of shoe)  2421T146	JACK (When adjustment of shoe)  2421Z166F3	RATCHET HANDLE  2420R527 (□12·7) ZT31B19500 (□19)	EXTENSION BAR  2420Z623D4 (□12·7) ZT31D19400 (□19)
HEXAGON WRENCH  ZT22A08000 (8mm) ZT22A10000 (10mm) ZT22A12000 (12mm) ZT22A14000 (14mm) ZT22A17000 (17mm) ZT22A19000 (19mm) ZT22A22000 (22mm)	WRENCH  ZT12B10013 (10×13) ZT12B13017 (13×17) ZT12B17019 (17×19) ZT12B19022 (19×22) ZT12B22024 (22×24) ZT12B27030 (27×30) ZT12B32036 (32×36) ZT12B36041 (36×41) 2421R111D3 (1/2" × 9/16") 2421R111D5 (9/16" × 5/8") 2421R111D11 (5/16" × 11/8")	WRENCH  ZT12A55000(55mm)	SOCKET  3421Z7D3 (1 1/8") 2408R587D9 (13mm) 2408R587D1 (17mm) 2408R587D2 (19mm) 2408R587D3 (22mm) 2408R587D4 (24mm) ZT32A30000 (30mm) ZT32A55000 (55mm) ZT32A36000 (36mm) ZT32A50000 (50mm) ZT32A46000 (46mm) ZT32A82000 (32mm)

PIPE (For wrench)  2420T3100	LINK (When lifting of machine)  JJ01T01004P1	OILER  2421Z238	FILTER WRENCH  2421R170
HOSE (For grease pump)  44Z186	GREASE PUMP  2421R107	TOOL BOX  27U3	WORKING CLOTHES  EZ01T01018P1
 YN20T01180P1	GREASE  2421R114D11	GEAR OIL  21Z16D5	GREASE NIPPLE (A)  (B)  (A) ZG91S02000 (PT1/8) (B) ZG91S04000 (PT1/4)
KEY  21Z1	RADDER  2421Z291	SUPPORT (When lifting of crawler)  JJ01T01012P1	BRACKET (When R.H. guard)  JJ01T01003P1

10. REFERENCE MATERIALS

10.1 SPECIFICATION

10.1.1 PERFORMANCE

Type	Crawler mounted, fully revolving	
Max. lifting capacity (with 50 ft boom)	500,000 lbs × 14 ft (226.6 t × 4.3 m)	
Max. boom length	300 ft (91.4 m)	
Max. boom & jib length	250 ft boom + 100 ft jib (76.2 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. 458,600 lbs (208 ton)	
Average ground pressure	Approx. 13.7 psi (95 kPa)	
Greadability ($\tan \theta$)	30%	
Engine	JD02-00001 to JD02-00017	Mitsubishi 6D24-TCEC Diesel engine 235 kw/2000 min ⁻¹ (315hp/2000 rpm)
	From JD02-00018	Mitsubishi 6D24-TLA2F 235 kw/2000 min ⁻¹ (315hp/2000 rpm)
Main lifting / lowering rope speed	360 to 10 ft/min. (110 to 3 m/min)	
Auxiliary lifting / lowering rope speed	360 to 10 ft/min. (110 to 3 m/min)	
Boom raising rope speed	170 to 6.6 ft/min. (52 to 2 m/min)	
Boom lowering rope speed	170 to 6.6 ft/min. (52 to 2 m/min)	
Swing speed	2.1 min ⁻¹ (2.1 rpm)	
Propel speed	0.69 to 0.44 miles (1.1/0.7 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.

10.1.2 PERFORMANCE OF LUFFING JIB

Max. lifting capacity	114,600 lbs. × 45 ft (52.0 t × 13.7 m)
Max. boom length + Jib length	200 ft boom + 170 ft jib (61.0 m boom + 51.8 m jib)
Working weight	Approx. 485,000 lbs. (220 t) [Including upper and lower machine, counterweights, 70 ft boom + 70 ft jib (21.3 m boom + 21.3 m jib), hook block]
Average ground pressure	Approx. 14.5 psi (100 kPa) [Including upper and lower machine, counterweights, 70 ft boom + 70 ft jib (21.3 m boom + 21.3 m jib), hook block]
Jib raising/lowering rope speed	135 to 6.6 ft/min. (41 to 2 m/min.)

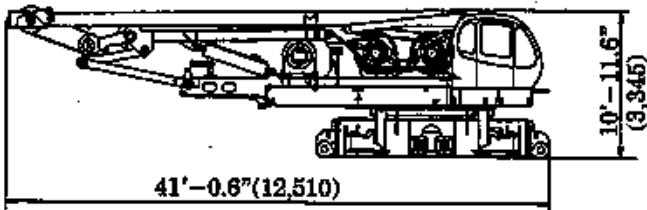
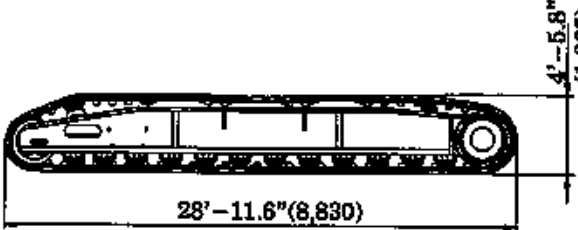
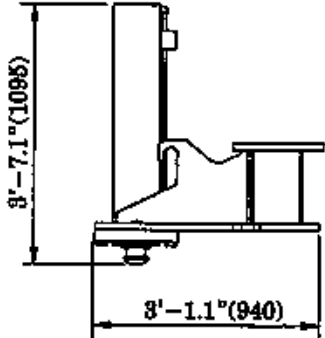
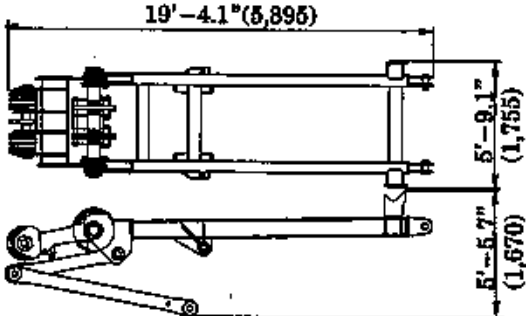
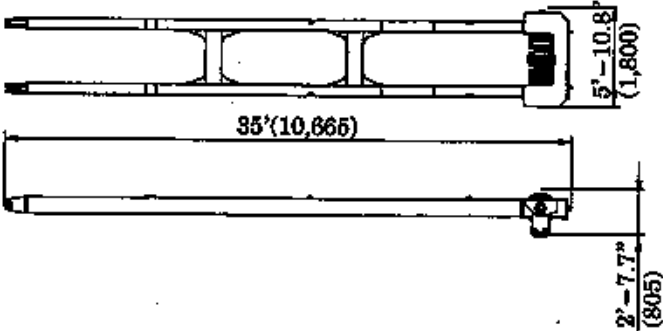
10.1.3 OUTSIDE DIMENSIONS

Height above ground of cab	12'-4 13/32" (3770 mm)
Width of upper machine with operator's cab	12' (3658 mm)
Radius of rear end (with counterweight)	19'-8 3/16" (6000 mm)
Counterweight ground clearance	4'-9 3/32" (1450 mm)
Center of rotation to boom foot pin	4'-7 3/32" (1400 mm)
Height above ground of boom foot pin	8'-3 5/16" (2523 mm)
Height to top of gantry (working position)	22'-1 11/16" (6750 mm)
Overall length of crawlers	28'-11 19/32" (8830 mm)
Distance between centers of tumblers	25'-4 1/2" (7735 mm)
Overall width of crawlers	23'-8 5/16" (7220 mm)
Width of crawler shoe	48" (1220 mm)
Ground clearance of carbody	1'-4 13/16" (430 mm)

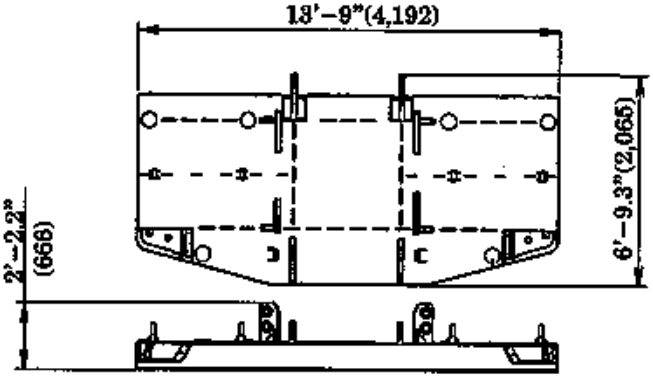
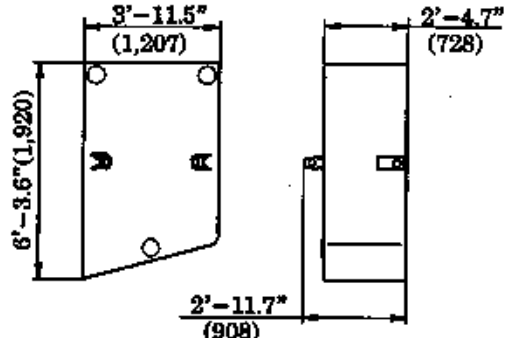
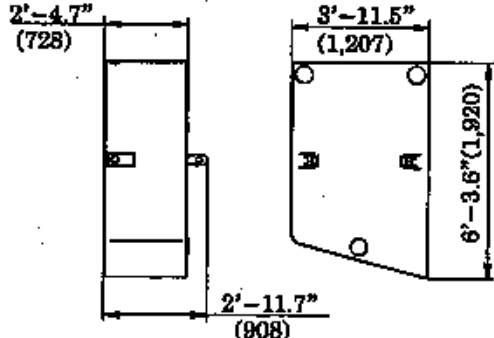
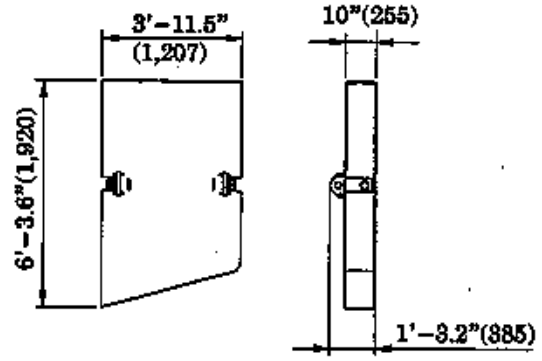
10.2 DIMENSIONS AND WEIGHT OF EACH PARTS

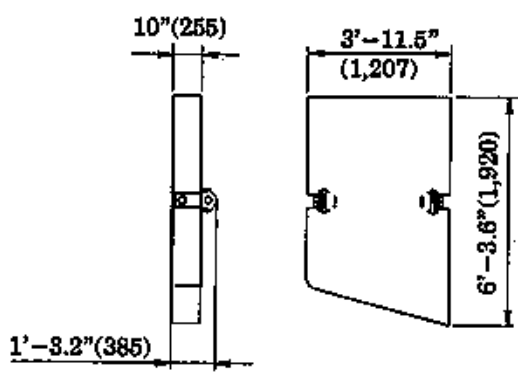
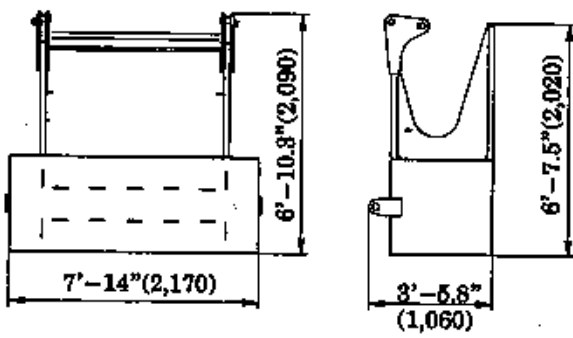
For your reference, the chart below shows the dimensions and weight of each parts.

10.2.1 BASE MACHINE

Name	Dimension ft-in(mm)	Weight lbs(kg)
Base machine		99,005 (44,900)
Crawler		51,817 (23,500)
Translifter		860 (390)
Gantry		6,440 (2,920)
Mast		6,550 (2,970)

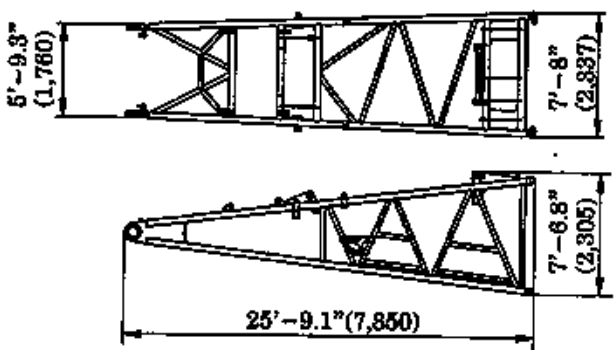
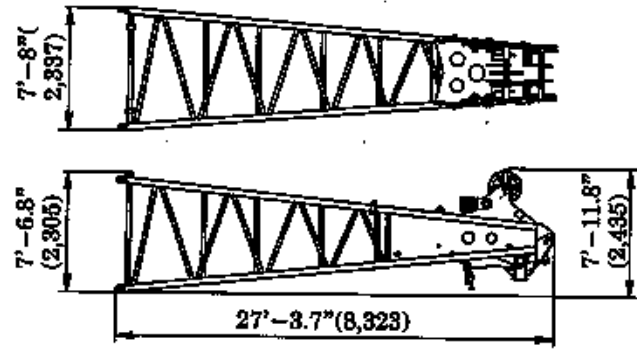
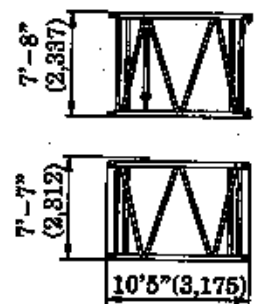
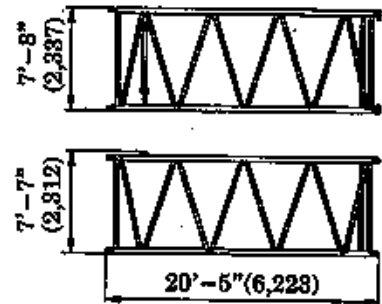
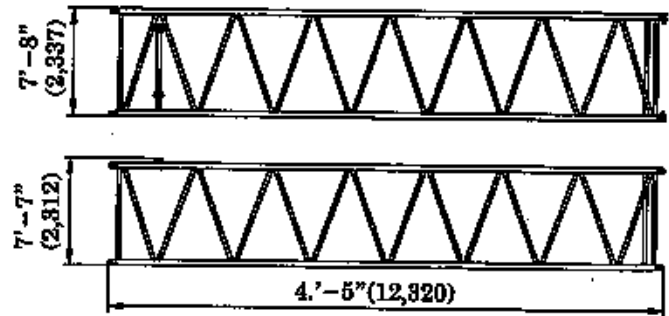
10.2.2 COUNTERWEIGHT

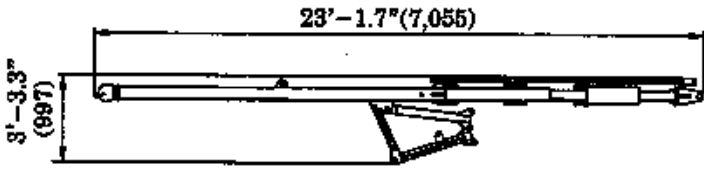
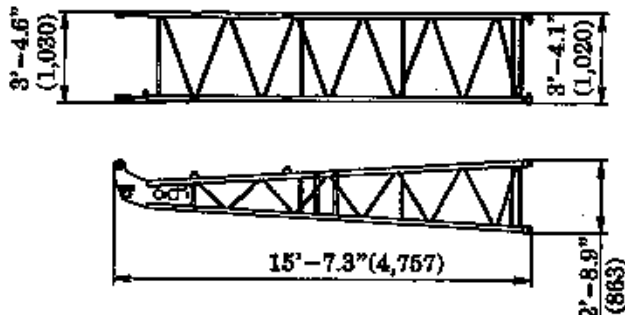
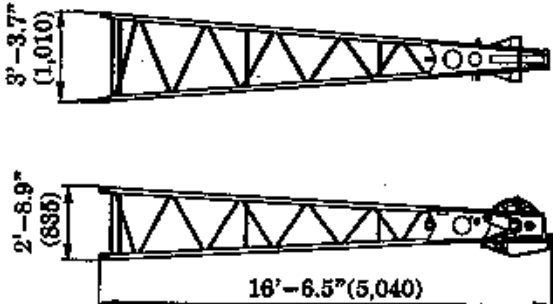
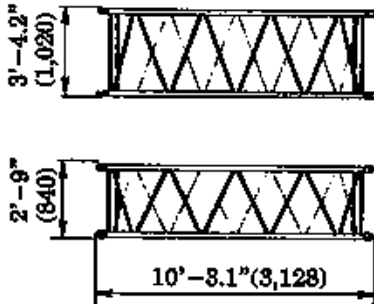
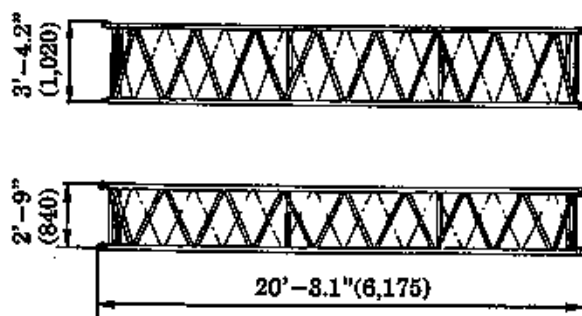
Name	Dimension ft-in(mm)	Weight lbs(kg)
Counterweight (A)		27,585 (12,510)
Counterweight (B)		22,050/1Piece (10,000/1Piece)
Counterweight (C)		22,050/1Piece (10,000/1Piece)
Counterweight (D)		8,270 (3,750)

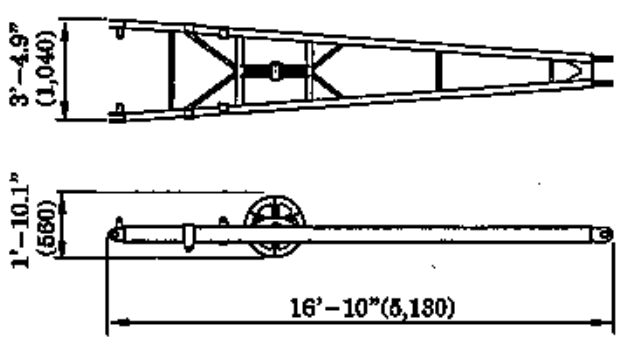
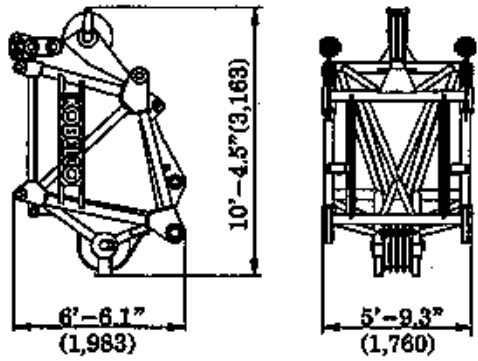
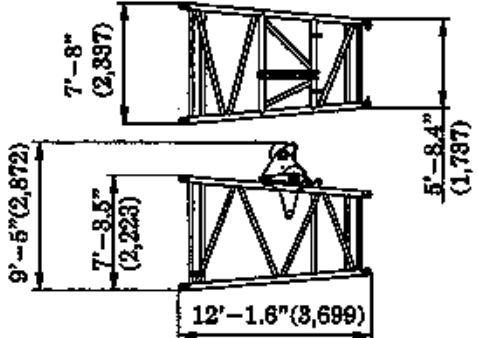
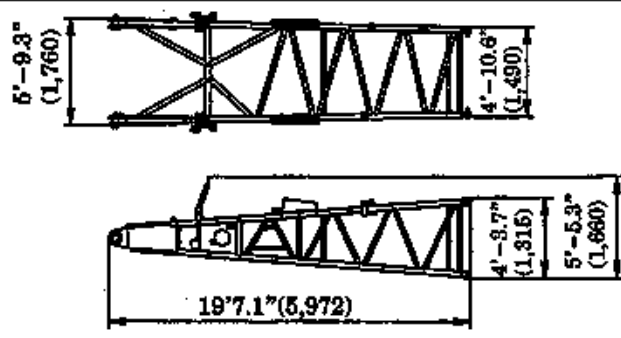
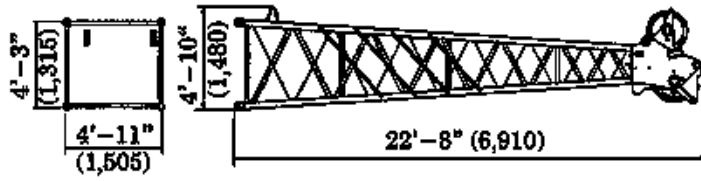
Name	Dimension ft-in(mm)	Weight lbs(kg)
Counterweight (E)		8,270 (3,750)
Carbody weight		22,050/1Piece (10,000/1Piece)

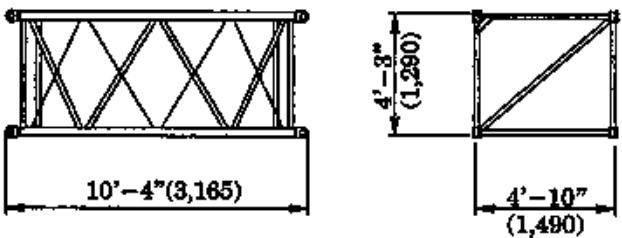
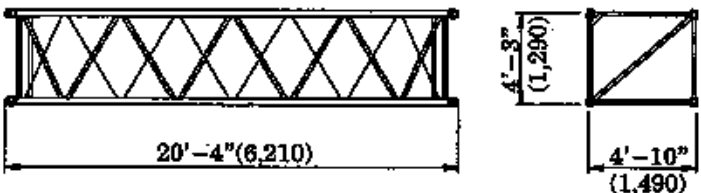
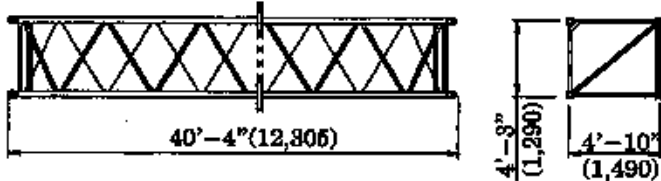
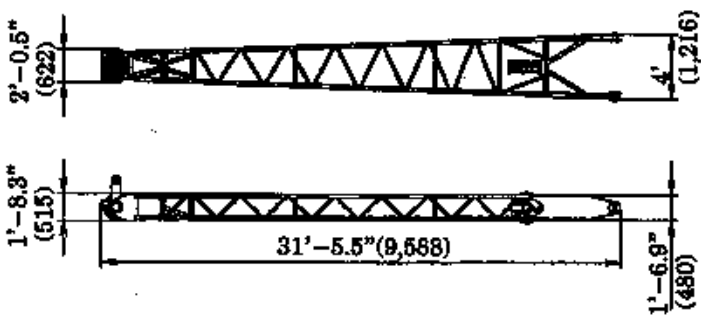
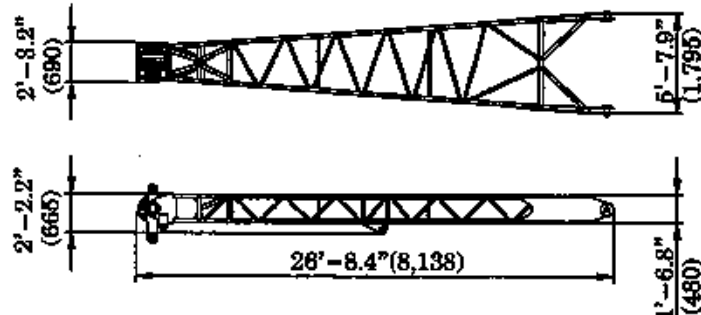
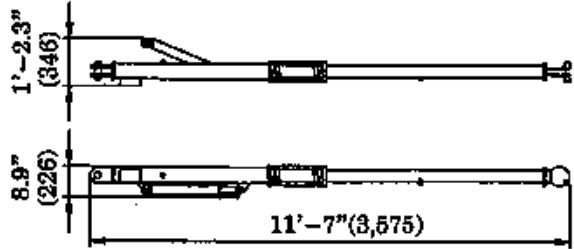
10.2.3 ATTACHMENT

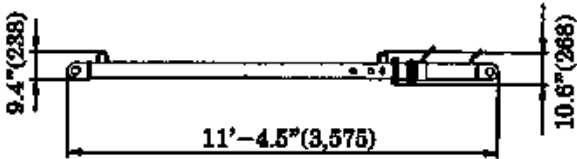
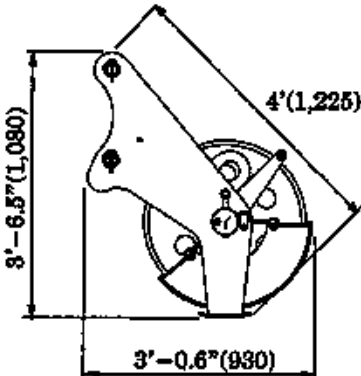
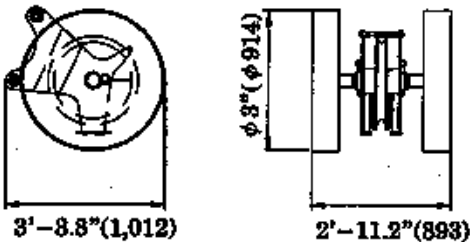
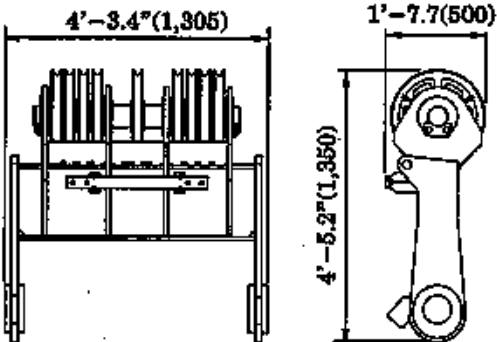
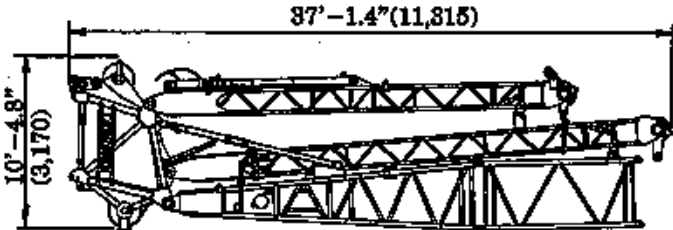
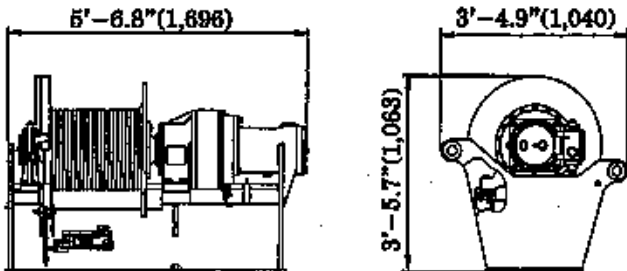
The weight of the guy lines is not included into the attachments' weight.

Name	Dimension ft-in(mm)	Weight lbsa(kg)
Boom Base		7,166 (3,250)
Boom Tip		6,818 (3,090)
10ft(3.0m) Insert Boom		1,632 (740)
20ft(6.1m) Insert Boom		2,743 (1,240)
40ft(9.1m) Insert Boom		4,763 (2,160)

Name	Dimension ft-in(mm)	Weight lbs(kg)
Boom Backstop		1,500 (680)
Jib Base(For Crane)		463 (210)
Jib Tip(For Crane)		697 (315)
10ft(3.0m) Insert Jib		243 (110)
20ft(6.1m) Insert Jib		420 (190)

Name	Dimension ft-in(mm)	Weight lbs(kg)
Jib Strut		682 (300)
Luffing Boom Tip		4,167 (1,890)
Luffing Taper Insert Boom		2,271 (1,030)
Luffing Jib Base		2,514 (1,140)
Luffing Jib Tip		2,580 (1,170)

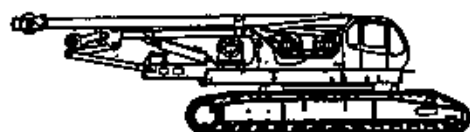
Name	Dimension ft-in(mm)	Weight lbs(kg)
10ft(3.0m) Insert Jib		684 (310)
20ft(6.1m) Insert Jib		1,147 (540)
40ft(12.2m) Insert Jib		2,117 (960)
Front Strut(Luffing Jib)		2,558 (1,160)
Rear Strut(Luffing Jib)		2,492 (1,130)
Luffing Jib Backstop		243 (180)

Name	Dimension ft-in(mm)	Weight lbs(kg)
Strut Backstop (Luffing Jib)		397 (180)
Aux. Sheave		610 (276)
Aux. Sheave (For Luffing Jib)		838 (380)
Lower Spreader		1,545 (700)
Luffing Boom Tip Assembly		13,230 (6,000)
Luffing Jib Drum		3,241 (1,470)

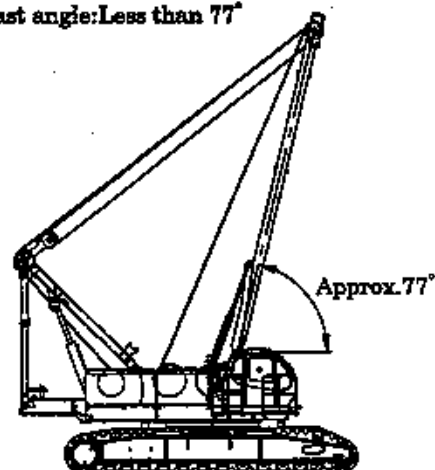
10.3 STABILITY IN SWINGING AND TRAVELING

Attachment (Mast)	Counter weight(t)	Carbody weight(t)	All-round swing		Propelling	
			With crawler	When juck up without crawler	Forwarding	Backwarding
Mast angle:180° (Backward storage)	None	None	○	×	○	○
Mast angle:Less than 77°	None	None	○	○	○	○
Mast angle:180° (Backward storage)	None	20t	○	○	○	○
Mast angle:Less than 77°	None	20t	○	○	○	○
Mast angle:180° (Backward storage)	80t	None	×	×	×	○
Mast angle:Less than 77°	80t	None	×	×	×	○
Mast angle:180° (Backward storage)	80t	20t	×	×	×	○
Mast angle:Less than 77°	80t	20t	×	×	×	○

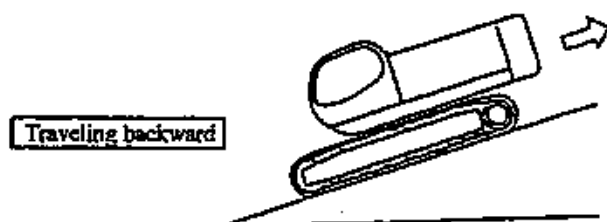
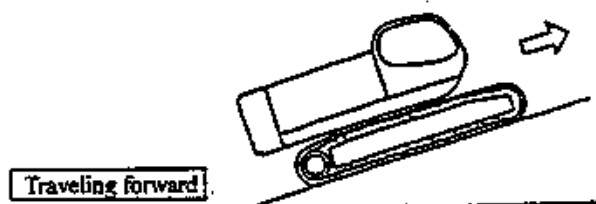
Mast angle:180°
(Backward storage)



Mast angle:Less than 77°

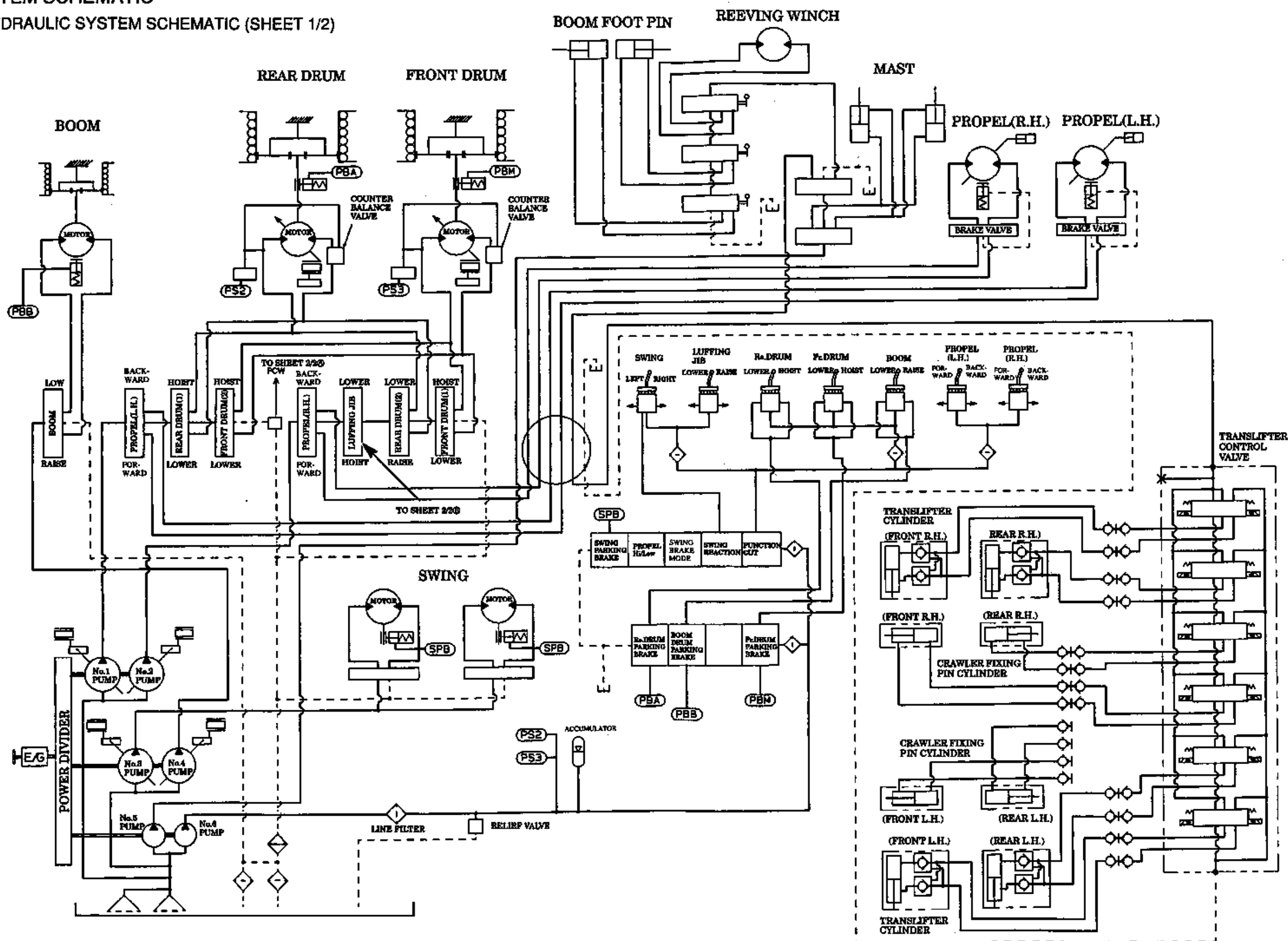


- (1) The table on the previous page above shows the values for operation on a firm ground. On a weak ground, operate with care after curing the ground.
- (2) As a principle, swinging on a trailer is prohibited.
- (3) Maximum slope angle is 16.7° (30%).
- (4) Traveling forward means the case, where the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

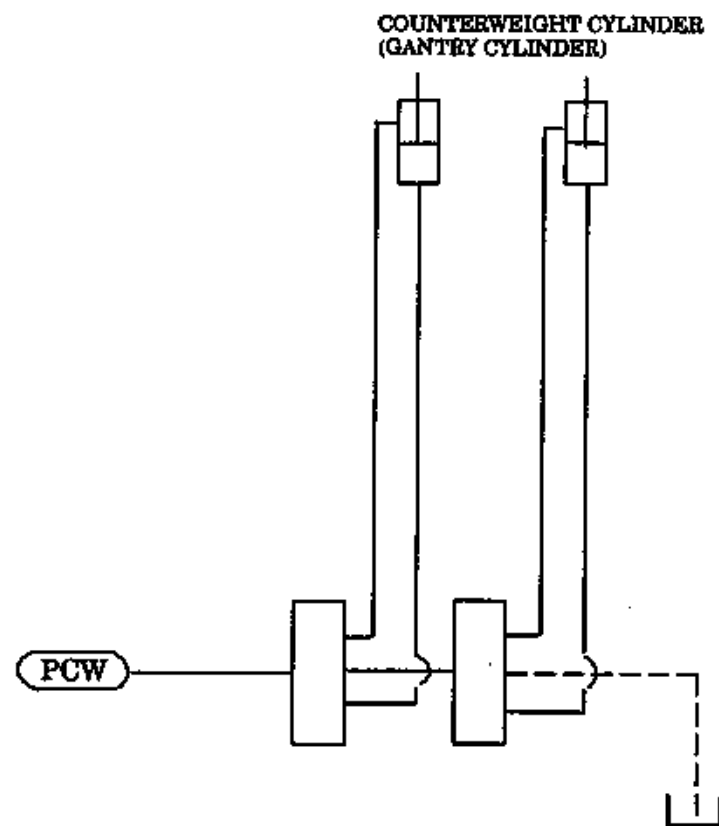


10.4 SYSTEM SCHEMATIC

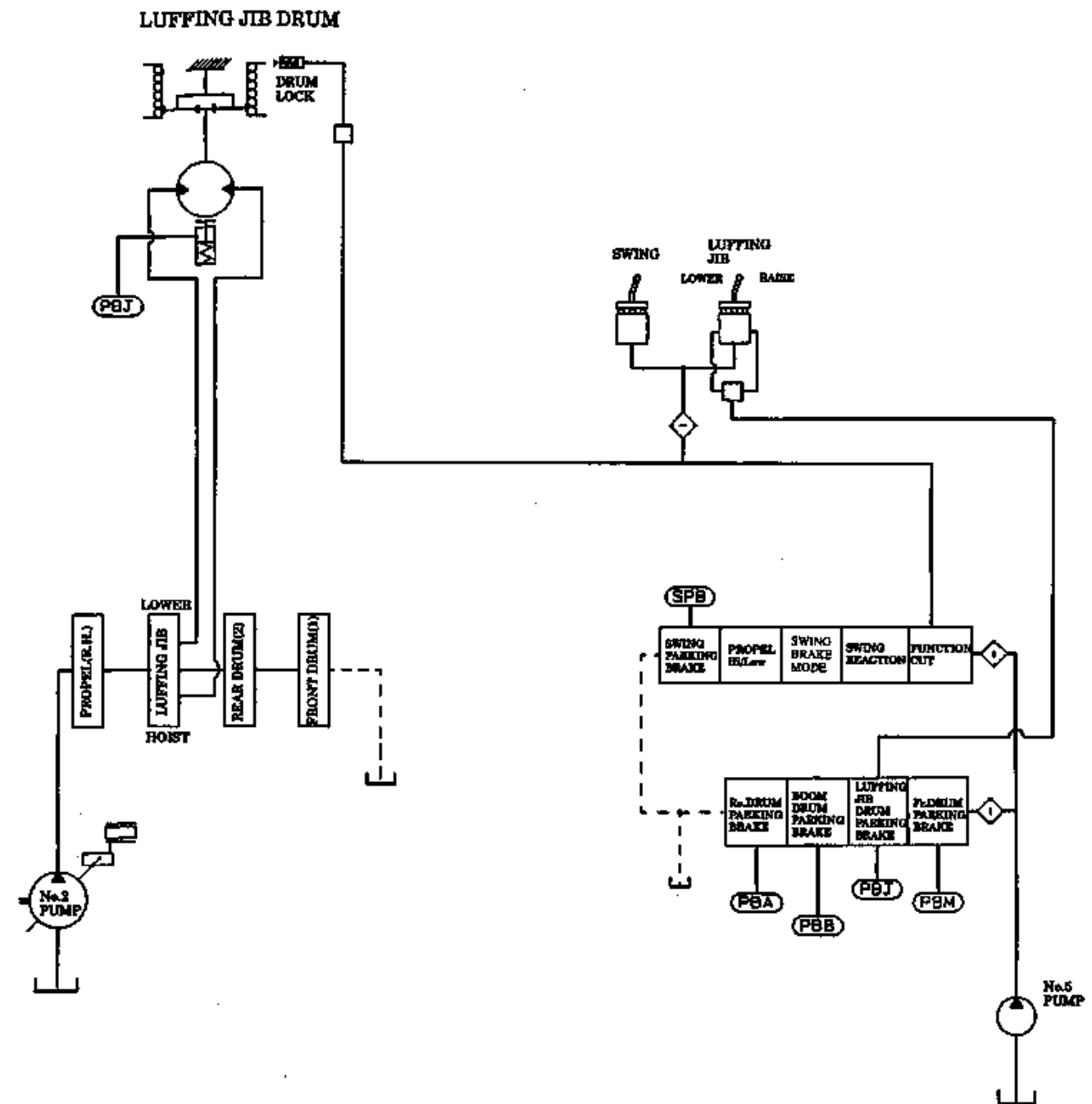
10.4.1 HYDRAULIC SYSTEM SCHEMATIC (SHEET 1/2)



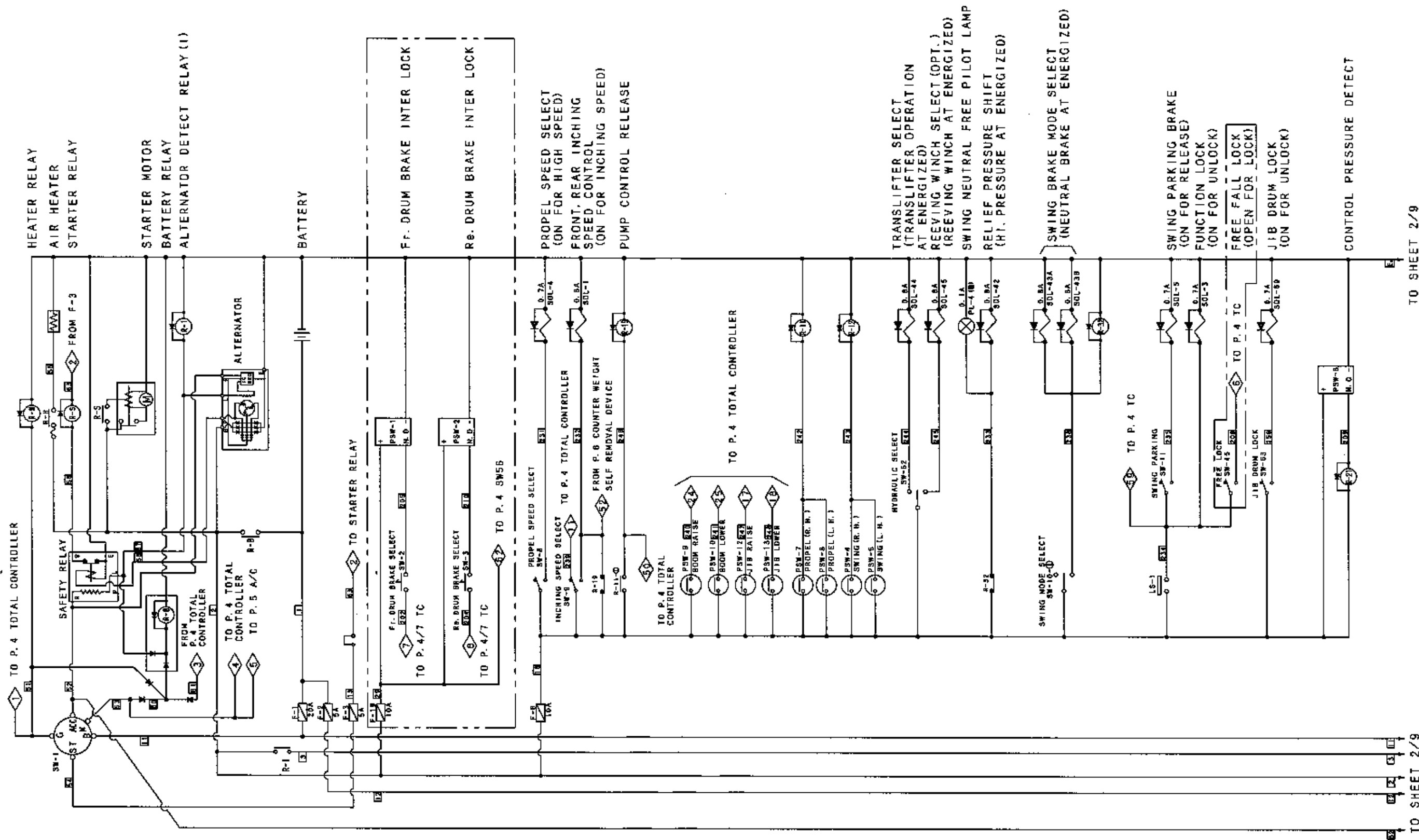
Ⓐ COUNTERWEIGHT REMOVAL DEVICE & GANTRY CONTROL



Ⓑ LUFFING JIB



10.4.2 ELECTRICAL WIRING SCHEMATIC



KEY SWITCH

	B	G	ACC	H	ST
HEAT	○	○	○	○	○
OFF	○	○	○	○	○
ACC	○	○	○	○	○
ON	○	○	○	○	○
START	○	○	○	○	○

NOTE:

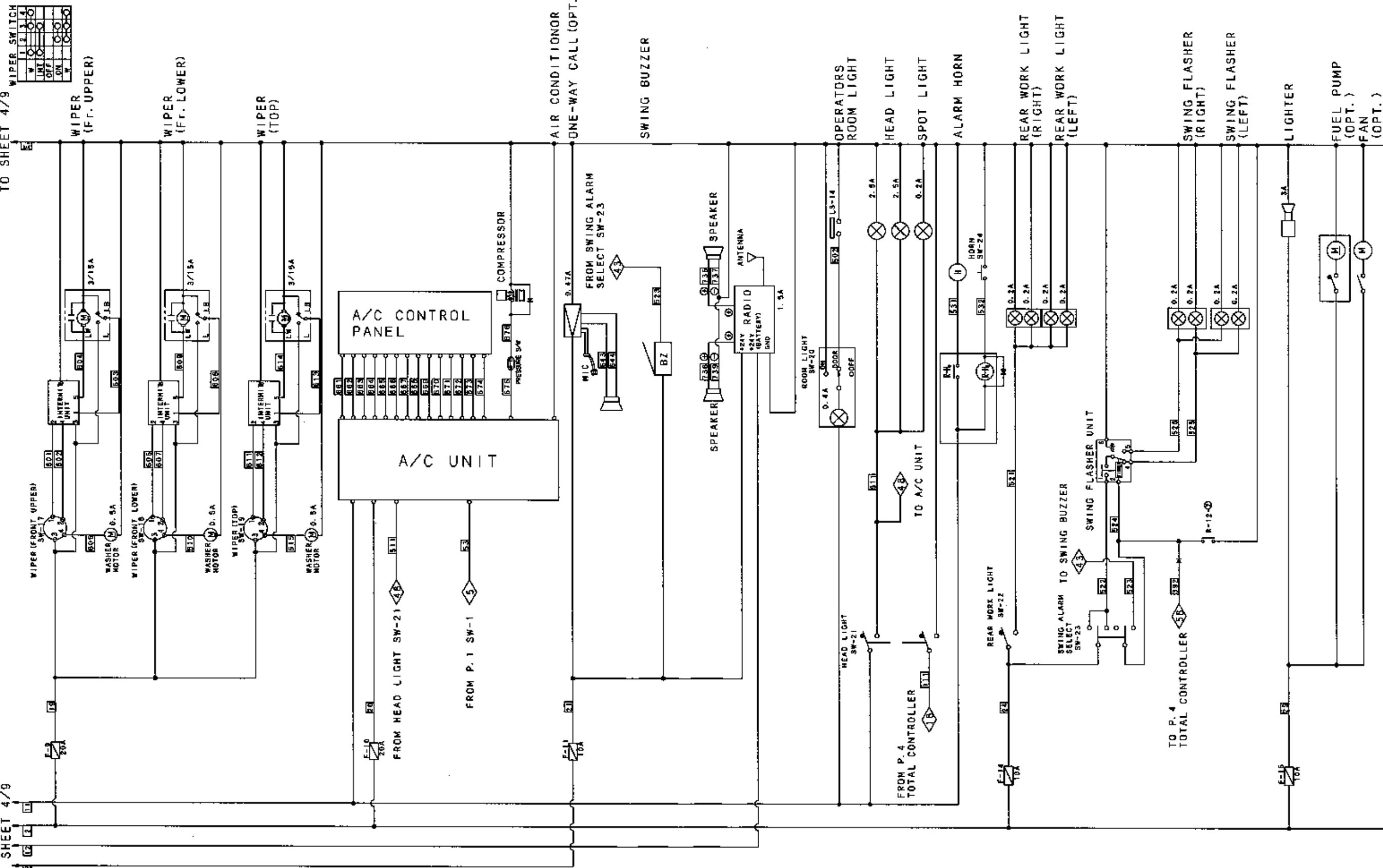
1. This drawing is the circuit for CK2500 with FREE FALL WINCH on Fr. and Re.
2. Areas encircled with long dashed double-short dashed line have been changed from standard with non-free-fall winch.

JJ03Z00016P1

SHEET 1/9

TO SHEET 4/9

TO SHEET 4/9

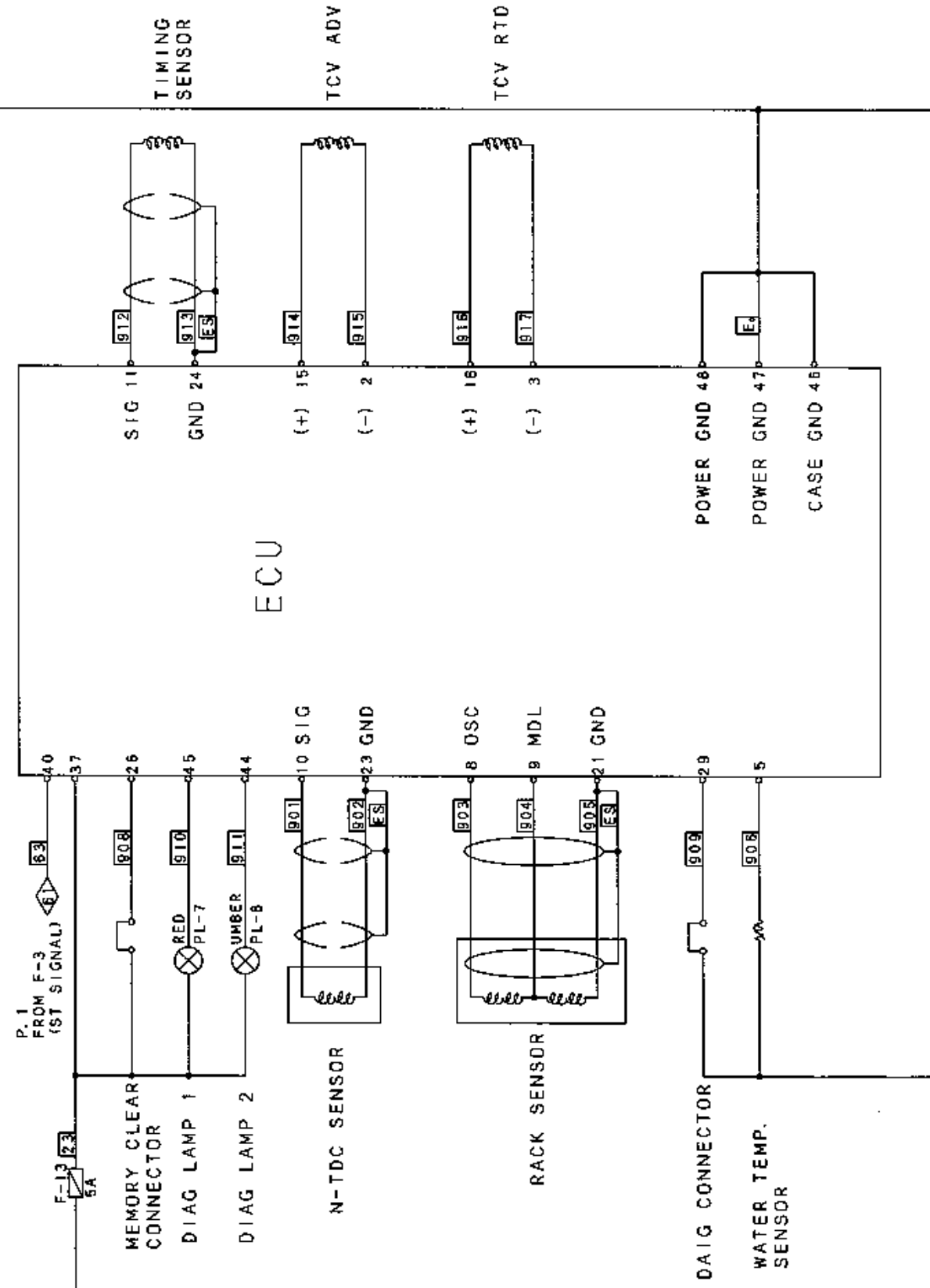


TO SHEET 6/9

TO SHEET 6/9

TO SHEET 6/9

TO SHEET 6/8



SWITCH			
SW-NO.	LINE NO.	USE	PART NO.
SW-1	11-51 52 53 54	ENG. KEY SWITCH	EZ50S00016P1
SW-2	202-205	FR. DRUM BRAKE SELECT	GG50E00006F1
SW-3	204-210	RE. DRUM BRAKE SELECT	GG50E00006F1
SW-8	116-231	PROPEL SPEED SELECT	2479Z2872
SW-9	116-232	INCHING SPEED SELECT	10050W01032F1
SW-10	116-238 22-380 302	SWING BRAKE MODE	GM50S00002P1
SW-11	234-235	SWING PARKING	10020E0001F2
SW-12A	257-251 252	GANTRY CONTROL	JJ50E00008F1
SW-12B	257-253 254	GANTRY CONTROL	JJ50E00008F1
SW-13	110-E	OVER ROAD RELEASE	GB50S00040P1
SW-17	119-601 602 605	WIPER (FR. UPPER)	EZ50S00015P1
SW-18	119-608 607 610	WIPER (FR. LOWER)	EZ50S00015P1
SW-19	119-611 612 615	WIPER (TOP)	EZ50S00015P1
SW-20	11-E 502	OPERATORS ROOM LIGHT	2456R315
SW-21	11-511 111-E	HEAD LIGHT	GB50S00007D1
SW-22	24-521	REAR WORK LIGHT	GB50S00007D1
SW-23	24-522 523-524	SWING ALARM SELECT	GB50S00008D1
SW-24	532-E	HORN	10020E0001F2
SW-27	311-313 312 E-314 315 317-319 318 E-320 321	BOOM REMOTE CONTROL REDUNDANCY	2479Z349
SW-28	356-324 323 E-325 328 327-328 328 E-330 331	FR. DRUM REMOTE CONTROL REDUNDANCY	2479Z349
SW-29	356-357 359 E-309 368 395-398 393 E-398 397	RE. DRUM REMOTE CONTROL REDUNDANCY	2479Z349
SW-33	E-413	FREE SPEED ACCELERATION LOCK	2479Z1813
SW-34	E-414	RE. DRUM LOCK SELECT	2479Z1813

SWITCH			
SW-NO.	LINE NO.	USE	PART NO.
SW-42	540-416	FR. DRUM FREE ACCELERATION	GG50E00008F1
SW-43	540-417	RE. DRUM FREE ACCELERATION	GG50E00008F1
SW-45	234-209	FREE LOCK	GG50S00005P1
SW-49	17-140	LOAD SAFETY REWIND RESET	2479Z580
SW-52	16-244 245	HYDRAULIC SELECT	7921657
SW-55	E-405 408	WINCH SELECT	JJ50S00004D1
SW-56	E-405 408	WINCH SELECT	JJ50S00005P1
SW-56	29-540		FY50E00007F1
SW-57	491-493 492 E-494 495 496-498 497 E-499 500	JIB DRUM REMOTE CONTROL REDUNDANCY	2479Z349
SW-61	17-172 152	ATT. SELECT	GM50S00002P1
SW-62	257-238 237	MAST CONTROL	JJ50E00008F1
SW-63	18-256	JIB DRUM LOCK	FY50S00007F1

LIMIT SWITCH			
LS-NO.	TYPE	LINE NO.	USE
LS-1	N.O.	18-234	FUNCTION LOCK
LS-2	N.C.	102-E	HOOK OVER HOIST (MAIN HOIST)
LS-3	N.C.	109-E	HOOK OVER HOIST (AUX. HOIST)
LS-7	N.C.	108-E	CRANE BOOM OVER HOIST
LS-8	N.C.	109-E	JIB OVER HOIST (LUFFING JIB)
LS-9A	N.C.	151-E	LUFFING BOOM OVER HOIST
LS-9B	N.C.	18-185	BOOM OVER HOIST
	N.O.	18-587	BOOM OVER HOIST
LS-13	N.O.	22-338	STEPPING MOTOR (STARTING POINT)
LS-14	N.O.	502-E	OPERATORS ROOM LIGHT
LS-15	N.O.	461-E	E/G OIL FILTER
LS-16	N.O.	462-E	AIR CLEANER (GG11P0001F1)
LS-17	N.O.	463-E	WATER TEMP.
LS-18	N.C.	464-E	WATER LEVEL (2427U1416F1)
LS-19	N.O.	467-E	HYD. OIL TEMP. (2478U285)
LS-20	N.O.	469-E	BRAKE COOLING OIL TEMP. (FR.)
LS-21	N.O.	470-E	BRAKE COOLING OIL TEMP. (RB.)
LS-22	N.O.	471-E	COOLING LINE FILTER CLOGGED (GG50V00001F1)
LS-24	N.C.	115-E	JIB OVER HOIST (CRANE JIB)
LS-25	N.C.	115-E	BOOM ANGLE DETECT
LS-32	N.C.	22-431	FR. DRUM OVER PAY OUT PREVENTIVE
LS-33	N.C.	22-432	RE. DRUM OVER PAY OUT PREVENTIVE
LS-34	N.C.	102-E	HOOL OVER HOIST (JIB HOIST)
LS-35	N.C.	109-E	HOOL OVER HOIST (JIB)
LS-36	N.C.	113-E	HOOL OVER HOIST (JIB HOIST)
LS-37	N.O.	18-18A	SPEAKER POSITION DETECT
LS-38	N.C.	18-18A	MAST ANGLE DETECT

RELAY				
R NO.	COIL LINE NO.	TERMINAL LINE NO.	TYPE	USE
R-B	57-E 60	1-2	N.O.	ELECTRIC POWER SOURCE
R-H	51-E	2-55	N.O.	AIR HEATER
R-H	11-532	11-531	N.O.	HORN
R-S	56-63	2-64	N.O.	STARTER
R-SF	58-E	56-E	N.C.	SAFETY
R-I	57-E	2-3	N.D.	GENERATION OF ELECTRICITY SENSOR
R-11	242-E	18-246	N.O.	PUMP CONTROL
R-12	243-E	524-E	N.O.	SWING ALARM
R-16	141-E	310-311	N.O.	BOOM RAISE STOP
R-17	142-E	316-317	N.O.	BOOM LOWER STOP
R-18	152-E	108-E 151-E 154-141 155-142	N.O. N.C. N.C. N.C.	ATT. SELECT ATT. SELECT ATT. SELECT ATT. SELECT
R-19	248-E	18-232	N.C.	PUMP CONTROL
R-21	18-209	468-E	N.C.	CONTROL PRESSURE DETECT
R-23	137-E	322-358	N.O.	HOIST STOP (MAIN/AUX.)
R-32	238-E	18-233	N.C.	PRESS. RELIEF SHIFT
R-36	18-108	155-135 166-144 120-E	N.O. N.O. N.C.	BOOM OVER HOIST BOOM OVER HOIST BOOM OVER HOIST
R-37	18-109	135-136 167-168 120-E	N.O. N.O. N.C.	LUFFING JIB OVER HOIST LUFFING JIB OVER HOIST LUFFING JIB OVER HOIST
R-38	18-151	138-137 144-154 120-E	N.O. N.O. N.C.	LUFFING BOOM OVER HOIST LUFFING BOOM OVER HOIST LUFFING BOOM OVER HOIST
R-40	588-589	588-587	N.O.	BOOM DRUM LOCK ALARM
R-41	18-102	165-185A 120-E	N.D. N.C.	HOOK OVER HOIST (MAIN) HOOK OVER HOIST (MAIN)
R-42	18-105	165A-155 120-E	N.O. N.C.	HOOK OVER HOIST (JIB) HOOK OVER HOIST (JIB)
R-43	188-E	490-491	N.O.	JIB RAISE STOP
R-44	155-E	501-498	N.O.	JIB LOWER STOP
R-45	172-173	110-E 108-E 18-185	N.O. N.O. N.O.	SETUP SETUP SETUP
R-46	18A-E	167-167A	N.O.	BOOM RAISE STOP
R-47	18A-E	253-251A	N.O.	R.H. CYLINDER EXT. STOP
R-48	18A-E	253-253A	N.O.	L.H. CYLINDER EXT. STOP
R-49	244A-E	15-15A	N.C.	CVT SELF REMOVAL POWER OFF

FUSE			
F-NO.	RATED	LINE NO.	USE
F-1	20A	1-11	ELECTRIC POWER SOURCE
F-2	5A	1-12	BACK-UP
F-3	5A	54-13	E/G START
F-4	5A	2-14	CAMERA (OPT.)
F-5	10A	2-15	TRANSFLITER
F-6	10A	2-16	EACH SOLENOID
F-7	5A	3-17	LMT POWER SOURCE
F-8	5A	3-18	STOP CIRCUIT
F-9	20A	2-19	WIPER
F-10	20A	2-20	AIR CONDITIONER
F-11	10A	52-21	RADIO (OPT.)
F-12	20A	2-22	TOTAL CONTROLLER
F-13	5A	2-	SPEAR
F-14	10A	2-24	SWING FLASHER
F-15	10A	2-25	FUEL PUMP LIGHTER
F-16	10A	2-26	GAGE CLUSTER
F-17	20A	2-27	REDUNDANCY CIRCUIT
F-18	20A	2-	SPEAR
F-19	10A	2-29	FREE FALL INTERLOCK
F-20	10A	2-	SPEAR

PILOT LAMP			
PL-NO.	LINE NO.	USE	PART NO.
PL-1	423-E	FR. DRUM FREE FALL	GB80S00010P1
PL-2	424-E	RE. DRUM FREE FALL	GB80S00010P1
PL-4	233-E	SWING FREE	GB80S00007F2
PL-7	23-910	E/G CONTROL	JJ80S00006D2
PL-8	23-911	E/G CONTROL	JJ80S00006D1

SOLENOID VALVE			
SOL NO.	LINE NO.	USE	PART NO.
SOL-1	232-E ₁	INCHING SPEED CONTROL	GB35V00002F2
SOL-3	234-E ₁	FUNCTION LOCK	GB35V00002F1
SOL-4	231-E ₁	PROPEL SPEED SELECT	GB35V00002F1
SOL-5	235-E ₁	SWING PARKING	GB35V00002F1
SOL-6	473-E ₁	BOOM INCHING	GB35V00002F2
SOL-9	185-E ₁	BOOM HOIST STOP	GB35V00002F2
SOL-10	185-E ₁	MAIN HOIST STOP	GB35V00002F2
SOL-11	185-E ₁	AUX. HOIST STOP	GB35V00002F2
SOL-12	429-E ₁	Fr. DRUM MOTOR CONTROL SELECT	GB35V00002F2
SOL-13	434-E ₁	R. DRUM MOTOR CONTROL SELECT	GB35V00002F2
SOL-15	445-E ₁	Fr. DRUM MOTOR BOOST	GB35V00002F2
SOL-16	446-E ₁	R. DRUM MOTOR BOOST	GB35V00002F2
SOL-19	438-E ₁	Fr. DRUM MOTOR ESM	GG20V00001F1
SOL-20	441-E ₁	R. DRUM MOTOR ESM	GG20V00001F1
SOL-22	437-E ₁	Fr. DRUM MOTOR CLM	GG20V00001F1
SOL-23	440-E ₁	R. DRUM MOTOR CLM	GG20V00001F1
SOL-26	236-E ₁	MAST RAISE	JJ20V00003F1
SOL-27	237-E ₁	MAST LOWER	JJ20V00003F1
SOL-40	449-E ₁	Fr. DRUM TURN DETECT GRIP	GB50M01093F1
SOL-41	451-E ₁	R. DRUM TURN DETECT GRIP	GB50M01093F1
SOL-42	233-E ₁	PRESS. RELIEF SHIFT	GB35V00002F1
SOL-43A	238-E ₁	SWING BRAKE MODE	GB35V00002F2
SOL-43B	238-E ₁	SWING BRAKE MODE	GB35V00002F2
SOL-44	244-E ₁	HYDRAULIC SELECT	JJ20V00003F1
SOL-45	245-E ₁	HYDRAULIC SELECT	JJ20V00003F1
SOL-47	452-E ₁	Fr. DRUM FREE ACCELERATION	GG20V00008F1
SOL-48	453-E ₁	R. DRUM FREE ACCELERATION	GG20V00008F1
SOL-50	404-407	MAIN PUMP POWER CONTROL	GB34V00002F2
SOL-51	332-333	SWING REACTION	GB34V00001F1
SOL-52	313-314	BOOM RAISE PRESSURE REDUCE	GB34V00001F4
SOL-53	319-320	BOOM LOWER PRESSURE REDUCE	GB34V00001F4
SOL-54	324-325	Fr. DRUM HOIST PRESSURE REDUCE	GB34V00001F4
SOL-55	329-330	Fr. DRUM LOWER PRESSURE REDUCE	GB34V00001F4
SOL-56	367-309	R. DRUM HOIST PRESSURE REDUCE	GB34V00001F4
SOL-57	396-399	R. DRUM LOWER PRESSURE REDUCE	GB34V00001F4
SOL-58	493-494	JIB LOWER PRESSURE REDUCE	GB34V00001F4
SOL-59	498-499	JIB LOWER PRESSURE REDUCE	GB34V00001F4
SOL-62	426-427	TAGLINE	GB22V00007F1
SOL-65	251-E ₁	R. H CYLINDER EXT.	JJ35V00004F1
SOL-66	252-E ₁	R. H CYLINDER RET.	JJ35V00004F1
SOL-67	253-E ₁	L. H CYLINDER EXT.	JJ35V00004F1
SOL-68	254-E ₁	L. H CYLINDER RET.	JJ35V00004F1
SOL-69	256-E ₁	JIB DRUM LOCK	GB35V00002F1
SOL-70	430-433	BOOM PUMP POWER REDUCE	GB34V00001F4
SOL-71	258-E ₁	COUNTER WEIGHT REMOVAL SELECT	JJ35V00003F1
SOL-72	401-403	SWING CONSTANT SPEED	GB34V00001F4
SOL-80	800-E ₁	VERTICAL EXT. (Fr. R. H)	JJ20V00004F1
SOL-81	801-E ₁	VERTICAL EXT. (R. R. H)	JJ20V00004F1

SOLENOID VALVE			
SOL NO.	LINE NO.	USE	PART NO.
SOL-82	802-E ₁	CRAWLER FIXING PIN (R. EXT.)	JJ20V00004F1
SOL-83	803-E ₁	CRAWLER FIXING PIN (F. EXT.)	JJ20V00004F1
SOL-84	804-E ₁	VERTICAL EXT. (R. L. H)	JJ20V00004F1
SOL-85	805-E ₁	VERTICAL EXT. (F. L. H)	JJ20V00004F1
SOL-86	806-E ₁	VERTICAL RET. (F. R. H)	JJ20V00004F1
SOL-87	807-E ₁	VERTICAL RET. (R. R. H)	JJ20V00004F1
SOL-88	808-E ₁	CRAWLER FIXING PIN (R. RET.)	JJ20V00004F1
SOL-89	809-E ₁	CRAWLER FIXING PIN (F. RET.)	JJ20V00004F1
SOL-90	810-E ₁	VERTICAL RET. (R. L. H)	JJ20V00004F1
SOL-91	811-E ₁	VERTICAL RET. (F. L. H)	JJ20V00004F1

PRESSURE SWITCH				
PL-NO.	LINE NO.	USE	TYPE	PART NO.
PSW-1	29-E ₁ 205	Fr. FOOT BRAKE DETECT	N. O.	GG50S00038P1
PSW-2	29-E ₁ 210	Re. FOOT BRAKE DETECT	N. O.	GG50S00038P1
PSW-4	16-240	BOOM RAISE DETECT	N. O.	GG50S00007F1
PSW-5	16-241	BOOM LOWER DETECT	N. O.	GG50S00007F1
PSW-6	16-E ₁ 209	CONTROL PRESS. DETECT	N. O.	GG50S00043P1
PSW-7	16-242	PROPEL (RIGHT) DETECT	N. O.	GG50S00007F1
PSW-8	16-242	PROPEL (LEFT) DETECT	N. O.	GG50S00007F1
PSW-9	16-243	SWING (RIGHT) DETECT	N. O.	GG50S00007F1
PSW-10	16-243	SWING (LEFT) DETECT	N. O.	GG50S00007F1
PSW-11	381-E ₁	E/G OIL PRESSURE	N. C.	-
PSW-12	16-247	JIB RAISE DETECT	N. O.	GG50S00007F1
PSW-13	16-248	JIB LOWER DETECT	N. O.	GG50S00007F1

PRESSURE TRANSMITTER			
PT-NO.	LINE NO.	USE	P-NO.
PT-1	351-350 349	SWING	LC52S00002P2
PT-3	382-384 383	Fr. DRUM HOIST	LC52S00001P3
PT-4	385-384 386	Fr. DRUM LOWER	LC52S00001P3
PT-5	387-389 388	R. DRUM HOIST	LC52S00001P3
PT-6	390-389 391	R. DRUM LOWER	LC52S00001P3
PT-9	454-456 455	Fr. CLUTCH	GG52S00004P1
PT-10	457-456 458	Re. CLUTCH	GG52S00004P1

11. OPERATION OF COUNTERWEIGHT SELF REMOVAL SYSTEM

The counterweight self removal system is the auxiliary device for assembly and disassembly used when removing or installing the counterweights.

Prior to work, check the items shown below.

1. LOCATION

- (1) The space is enough to install the counterweights, and the ground is firm and level.
- (2) The route for entry of vehicles which carry members required for assembly is secured.

2. CHECK OF WORK PROCEDURES AND SAFETY

Prior to assembly, persons related to the work are required to have a meeting to check the work procedures, safety, and their roles and charge of the work.

3. START-UP CHECK

Perform start-up check of the machine.



DANGER

- To prevent accidents of being caught in the counterweight and hit by the dropping counterweight, clear away from around the counterweight temporarily stood on the ground unless otherwise removing the fixing pin. Also, clear away from the area above or under the lifted counterweight and the area between the counterweight and the machine.
- Use a safety belt to prevent falls during working at high places.
- Do not attempt to lift anything with the mast other than those items specified in the operators manual. Failure to observe these precautions may result in serious injury or loss of life.



WARNING

To prevent any injury, DO NOT put your fingers or hands into pin holes when inserting or removing pins.

11.1 INSTALLATION OF COUNTERWEIGHTS

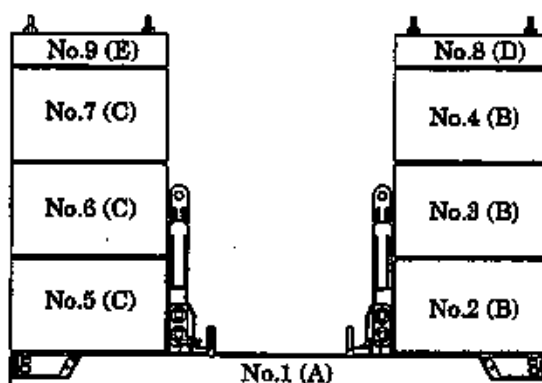
● Installation procedures

1. Assemble the nine counterweights on the ground with the mast in advance.
2. Lift the counterweight assembly in the place using the gantry cylinders.
Attach the counterweight to the upper revolving frame.



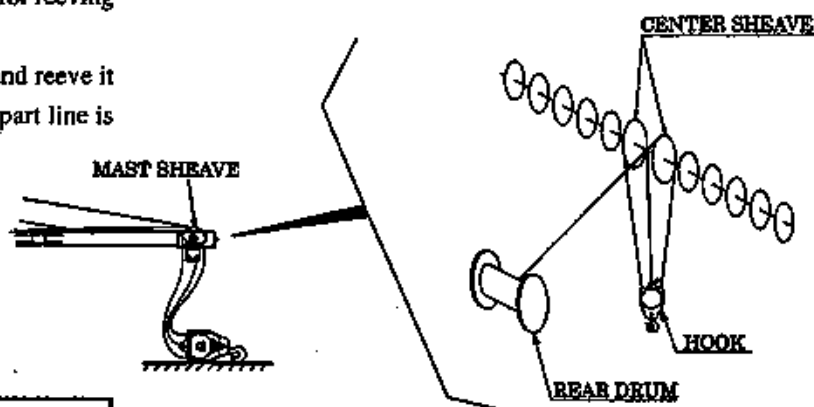
CAUTION

- Be sure to keep the mast arm raised during operation.
- Be sure to install the carbody weight.



11.1.1 ASSEMBLY OF THE COUNTERWEIGHTS

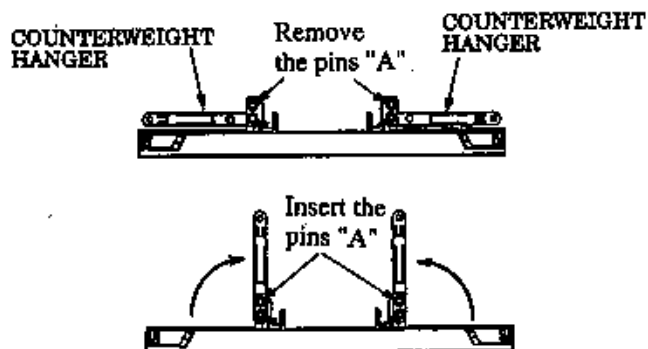
1. Reeving of hoist wire rope
 - (1) Lower the mast to the height appropriate for reeving the hook block.
 - (2) Unwind the wire rope on the rear drum and reeve it through the mast and hook block. (A 3 part line is used for this operation)



WARNING

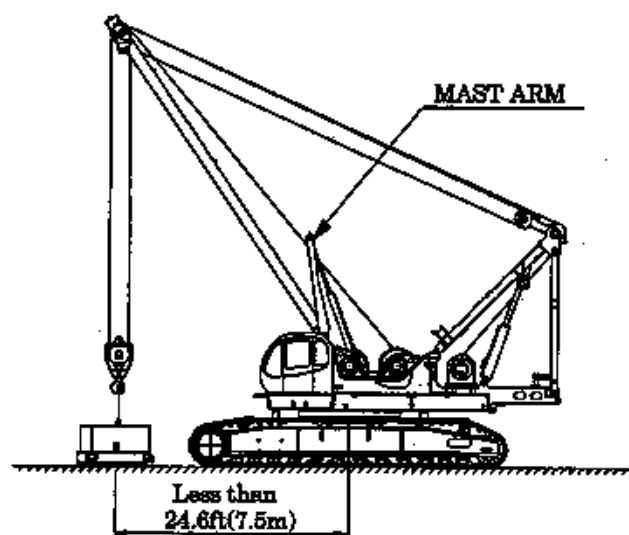
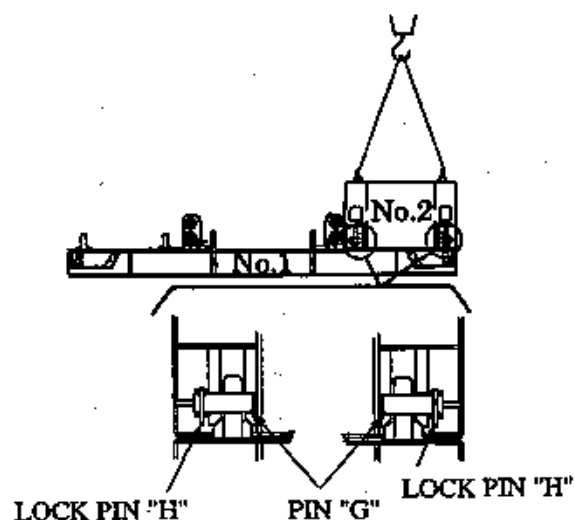
Do not touch a wire rope directly with bare hands. If wire protrude, you could be injured. Working gloves are recommended. Keep hands and clothing clear of the rotating drum and running wire rope. Failure to observe this precaution may result in serious injury or loss of life.

2. Set up the counterweight hangers.
 - (1) Remove the pins "A", and stand the counterweight hangers.
 - (2) Insert the pins "A", and fix the counterweight hangers.



3. Installation of No.2 weight.

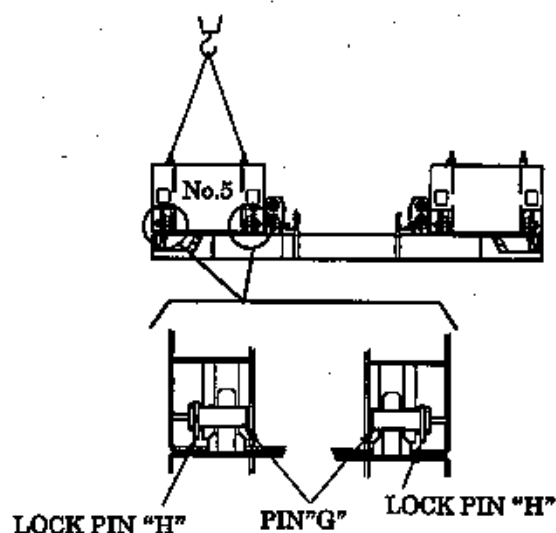
- (1) Lift No.2 weight.
- (2) Place No.2 weight on No.1 weight using the mast assembly aligning the No.2 weight with the bracket on the No.1 weight.
- (3) Insert the pin "G", and fix it with the lock pin "H".



4. Installation of No.5 weight.

- (1) Lift No.5 weight.
- (2) Place No.5 weight on No.1 weight using the mast assembly aligning the No.5 weight with the bracket on the No.1 weight.
- (3) Insert the pin "G", and fix it with the lock pin "H".

	WARNING
Do not lift more than two weights at a time. Lifting brackets may break. Failure to observe this precaution may result in serious injury or loss of life.	



5. Installation of No.3, 6/No.4, 7/No.8, 9 weights

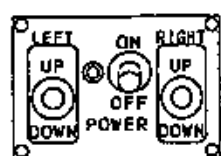
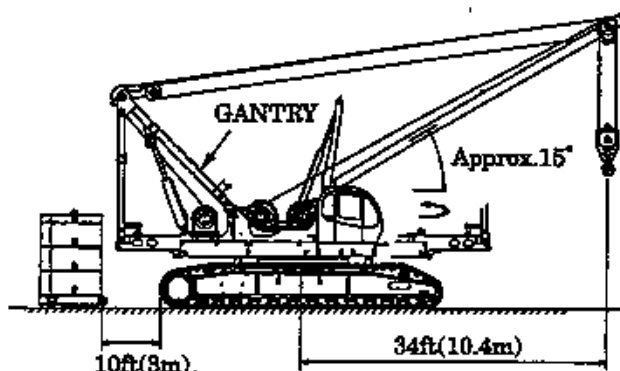
Install the remaining counterweights by following procedures similar to the above.

Install the remaining weights to the No.2 and No.5 counterweight evenly.

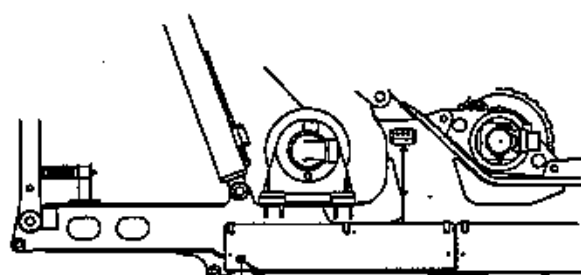
11.1.2 INSTALLATION OF COUNTERWEIGHTS TO MACHINE

1. Installation of counterweight lifting guy cables

- (1) Walk the machine forward until the distance between the counterweights and the crawler track assy is approx. 10 ft. (3.0 m).
- (2) Rotate the upper structure 180° so that the gantry is located by the counterweights.
- (3) When the gantry is lowered, the mast is always raised. Be sure to adjust the mast angle to 15° or less.
- (4) Connect the remote control cable to the receptacle located on the rear of the right side deck.



REMOTE CONTROL BOX



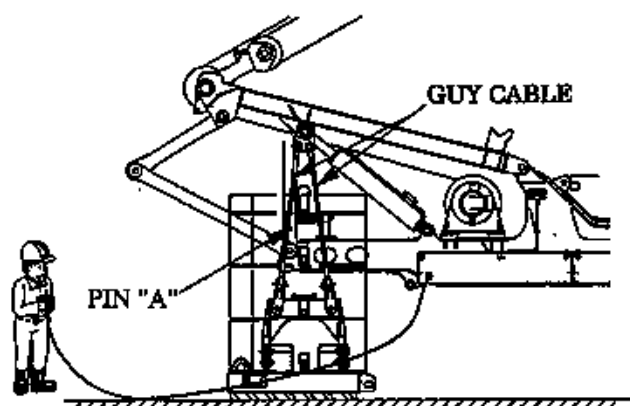
RECEPTACLE

- (5) Support the gantry with the cylinder, and remove the tension member fixing pin "A".
- (6) Operate the remote control box to lower the gantry and install the counterweight lifting guy cables to the link assemblies.



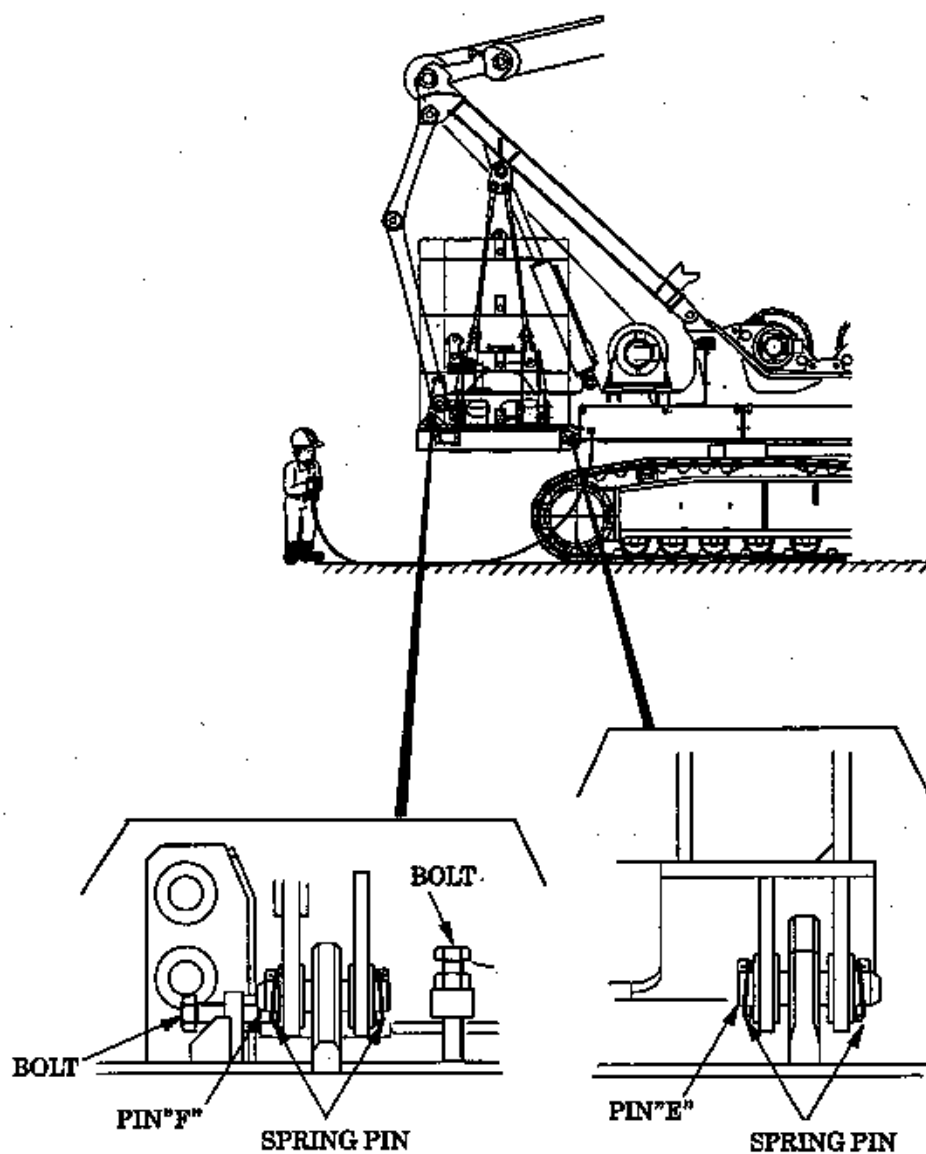
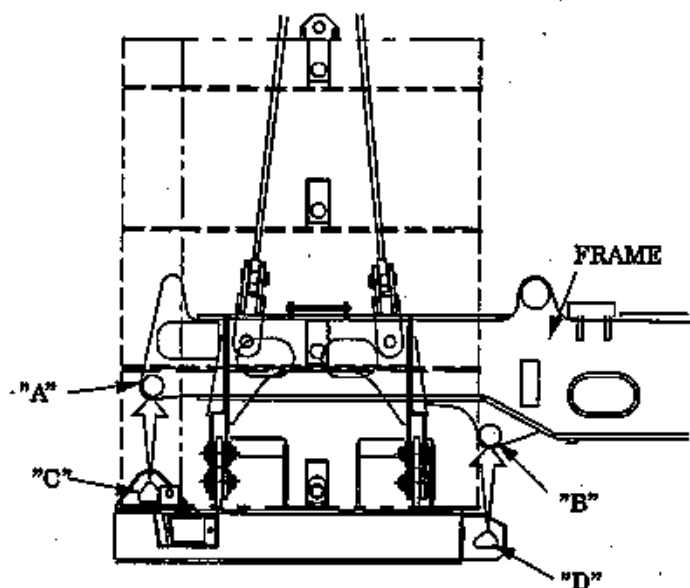
CAUTION

When lowering the gantry, take care so that the mast does not interfere with the mast arm. Otherwise, the mast or mast arm may be damaged.

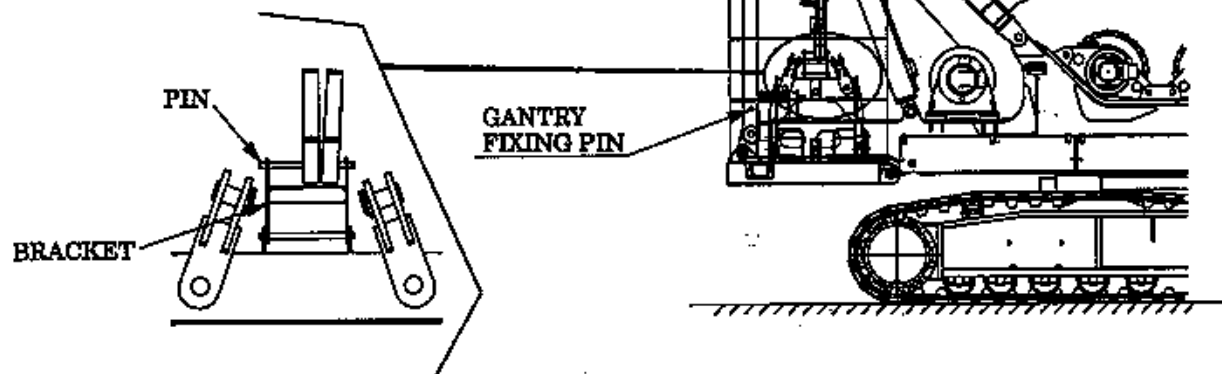


=2. Installation of counterweights to swing frame

- (1) Operate the remote control to lift the counterweights.**
- (2) Align the pin holes "A" and "B" on the swing frame with the pin holes "C" and "D" on the No.1 weight, and insert the pin "E" and "F" into the respective holes.**
- (3) Tighten the bolts to avoid unnecessary movement of the counterweights.**



- (4) Remove the counterweight lifting guy cables from the brackets, and raise the gantry to the working position.
- (5) Insert the gantry fixing pins, and fix the counterweight lifting guy cables to the brackets with the pins.
- (6) Disconnect and store the remote control cable.



11.2 REMOVAL OF COUNTERWEIGHTS



CAUTION

- Be sure to keep the mast arm raised during operation.
- Be sure to install the carbody weight.

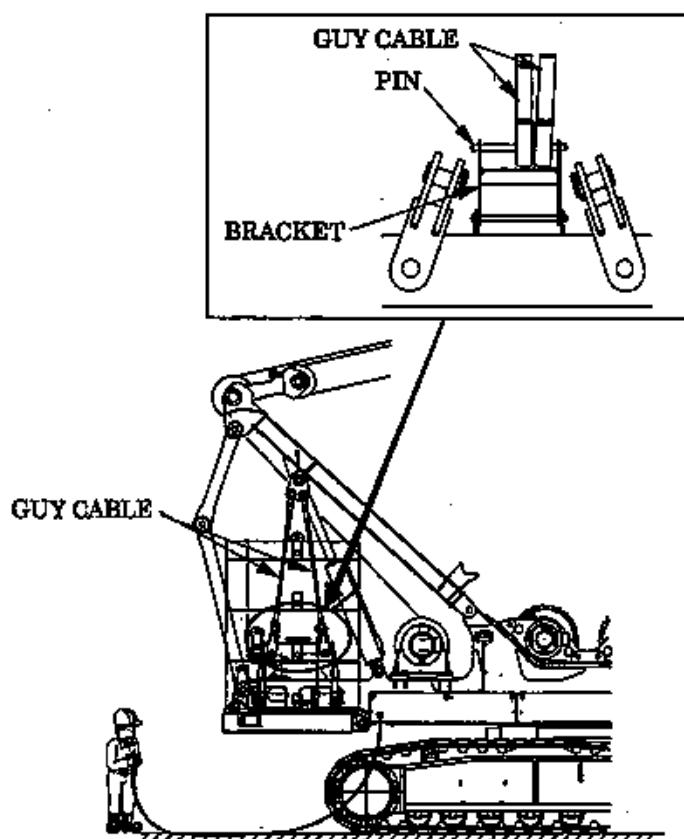
11.2.1 INSTALLATION OF COUNTERWEIGHT LIFTING GUY CABLE

- (1) Connect the remote control cable to the receptacle on the rear of the swing frame.
- (2) Remove the guy cables from the bracket.
- (3) Start the engine, and remove the gantry fixing pin with the gantry supported.
- (4) When the gantry is lowered, the mast is always raised. Be sure to adjust the mast angle to 15° or less.
- (5) Lower the gantry, and set the guy cable to the counterweight hangers.



CAUTION

When lowering the gantry, take care so that the mast does not interfere with the mast arm. Otherwise, the mast or mast arm may be damaged.



11.2.2 REMOVAL OF COUNTER-WEIGHTS

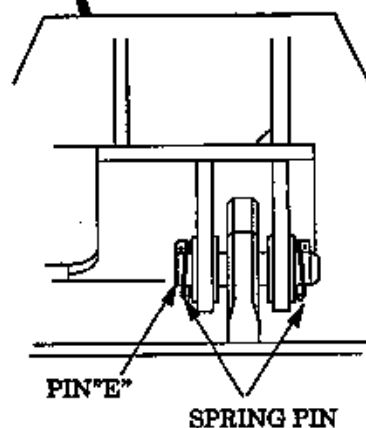
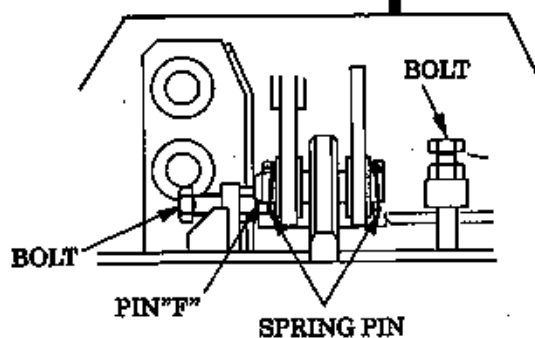
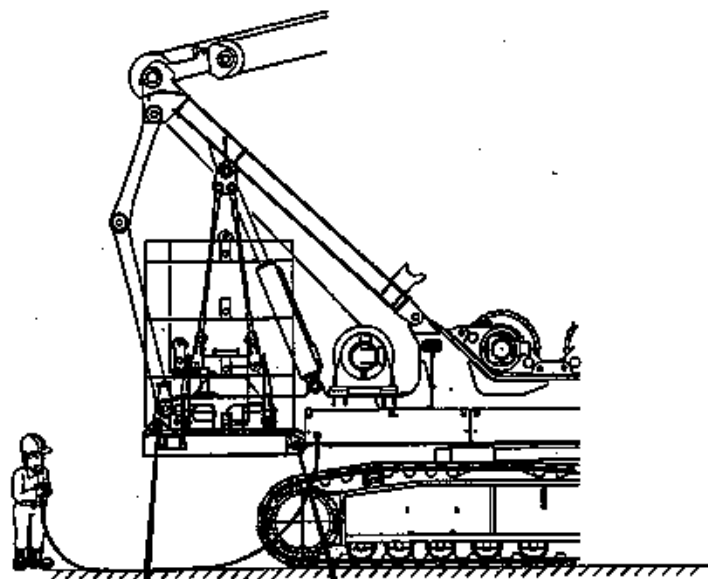
1. Lowering of counterweights

- (1) Securely support the counterweights with the gantry, and loosen the counterweight clamping bolts.
- (2) Remove the spring pins and pins "E" and "F" connecting the swing frame to the counterweights.
- (3) Operate the remote control to lower the counterweights onto the ground.



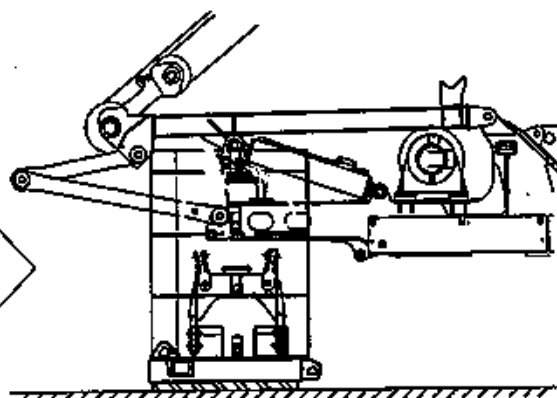
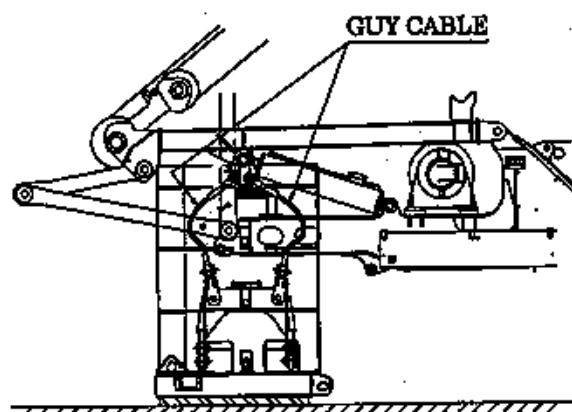
DANGER

Do not stand under lifted counterweight or between counterweight and the basic machine to avoid accident of drop or being caught. Failure to observe this precaution may result in serious injury or loss of life.



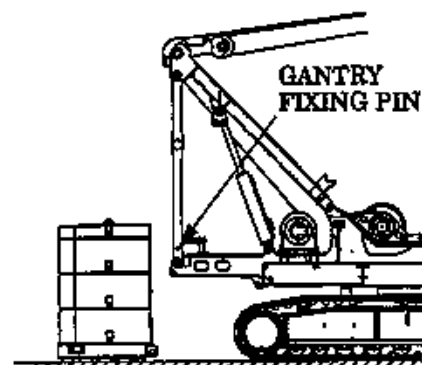
2. Removal of counterweight lifting guy cable

- (1) Further lower the gantry, and remove the counterweight lifting guy cable.



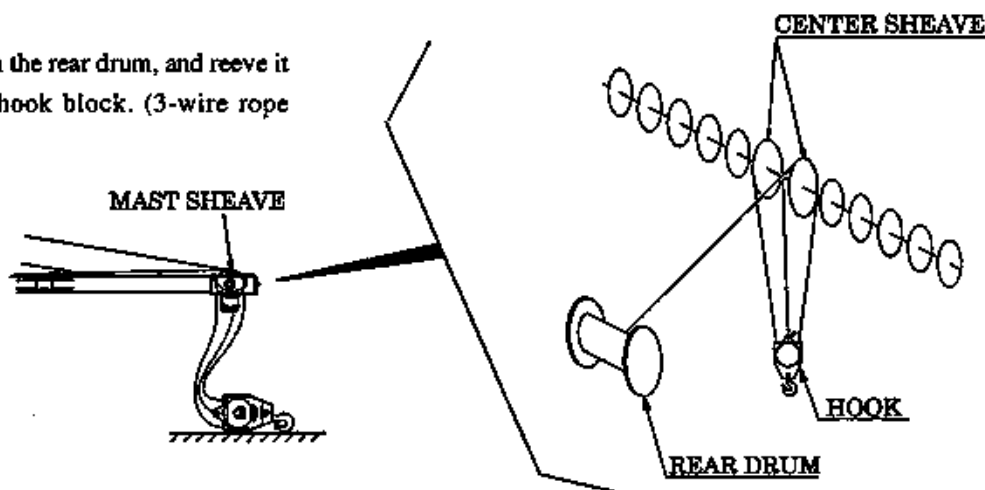
3. Reeving of hoist wire rope

- (1) Raise the gantry up to the working position, and insert the gantry fixing pin.
Disconnect and store the remote control cable.



- (2) Lower the mast to the height appropriate for reeving.

- (3) Unwind the wire rope on the rear drum, and reeve it through the mast and hook block. (3-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 loss of life.

11.2.3 DISASSEMBLING OF COUNTERWEIGHTS

1. Removal of No.9 weight

(1) Lift the No.9 counterweight with the auxiliary crane, and remove the lock pin "H" and pin "G".

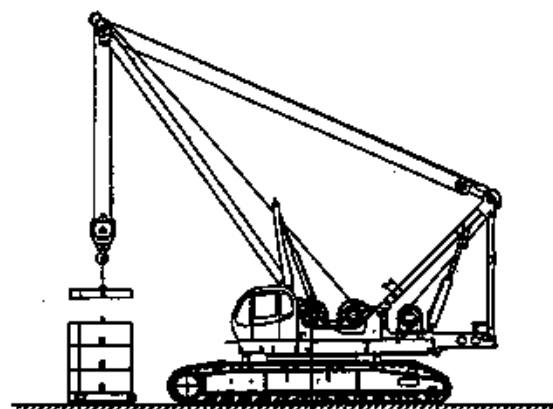
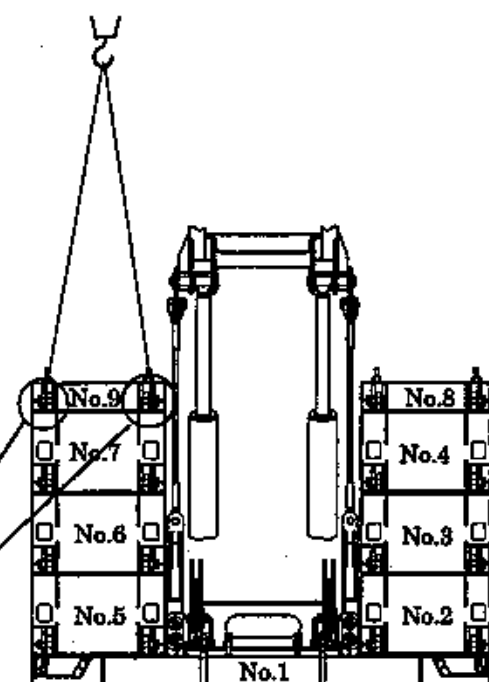
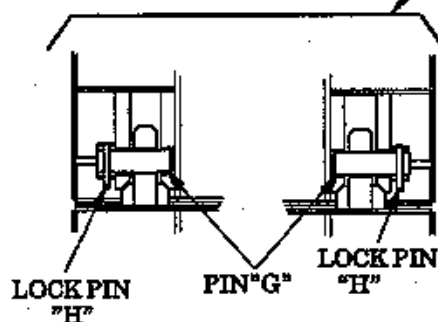
(2) Lower the lifted No.9 weight onto the ground.

2. Removal of No.8 to 2 weights

Similarly remove the No.8 to 2 weights.

**WARNING**

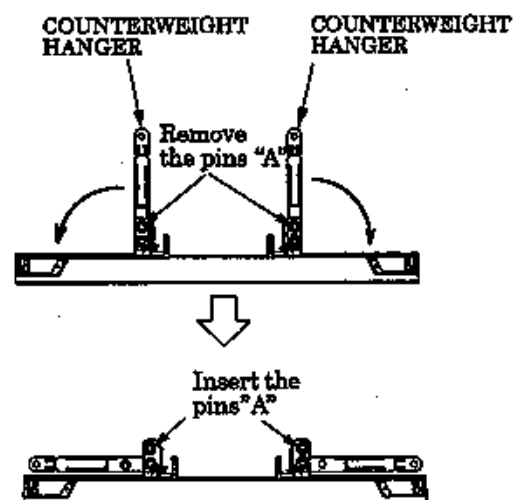
Do not lift more than two weights at a time.
Lifting brackets may break.
Failure to observe this precaution may result in serious injury or loss of life.



3. Restore the counterweight hangers.

(1) Remove the pins "A", and stand the counterweight hangers.

(2) Insert the pins "A", and fix the counterweight hangers.



12. OPERATION OF CRAWLER AND CARBODY WEIGHT SELF REMOVAL DEVICE

The crawler self removal device is the auxiliary device for assembly and disassembly used when removing or installing the right and left crawlers, loading or unloading parts into or from the trailer. These procedures are based on using four beam trailers only. It comprises the components shown below.

- Hook block (which enables reeving of three parts of lines)

Also tools shown below should be prepared:

- Slings (2 pieces: length 26 ft (8 m)
diameter 1 1/8 inch (28 mm))
- Shackles (4 pieces)
- Protective material (4 pieces)

Prior to work, check the items shown below.

1. LOCATION

- (1) The space is enough to install the crawlers, and the ground is firm and level.
- (2) The route for entry of vehicles which carry members required for assembly is secured.

2. CHECK OF WORK PROCEDURES AND SAFETY

Prior to assembly, persons related to the work are required to have a meeting to check the work procedures, safety, and their roles and charge of the work.

3. START-UP CHECK

Perform start-up check of the machine.



DANGER

- To prevent accidents of being caught in the crawler and hit by the dropping crawler, clear away from around the crawler temporarily stood on the ground unless otherwise removing the fixing pin. Also, clear away from the area above or under the lifted crawler and the area between the crawler and the machine.
 - Use a safety belt to prevent falling during working at high places.
- Failure to observe these precautions may result in serious injury or loss of life.



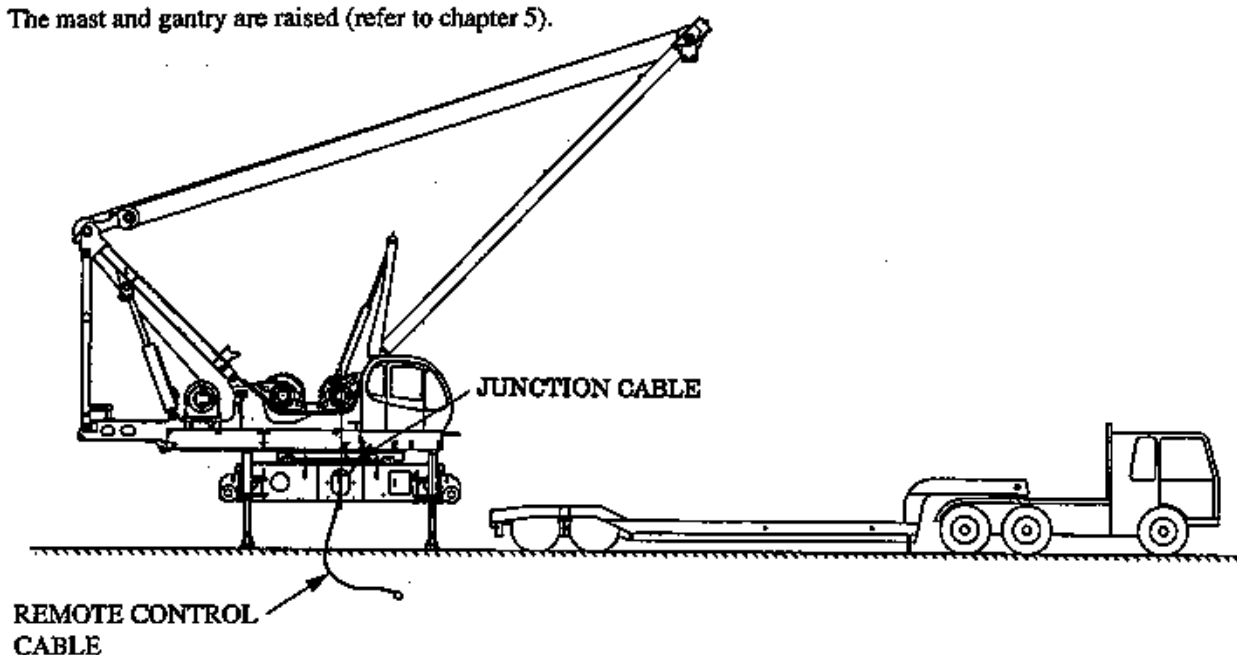
WARNING

To prevent any injury, DO NOT put your fingers or hands into pin holes when inserting or removing pins.

12.1 INSTALLATION OF THE CRAWLERS AND CARBODY WEIGHTS

12.1.1 MACHINE POSTURE BEFORE INSTALLATION

- The machine is lowered onto the ground with the transifter from the trailer.
- The remote control junction cable is connected (refer to chapter 4).
- The mast and gantry are raised (refer to chapter 5).



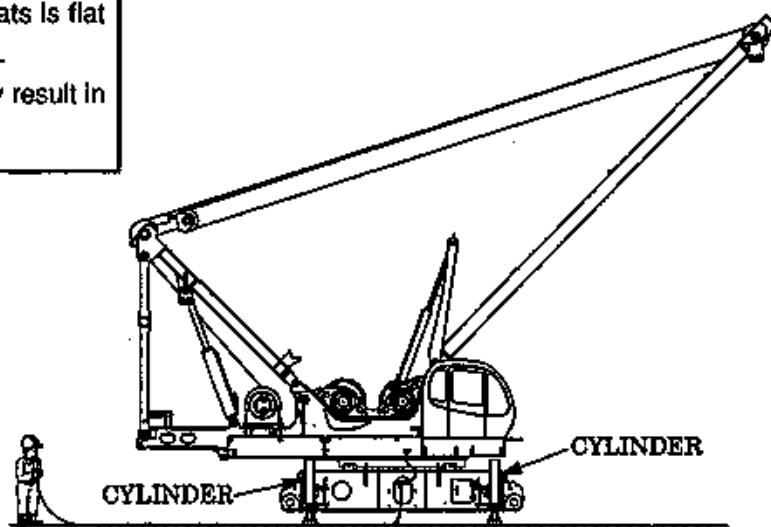
12.1.2 REEVING OF HOIST WIRE ROPE

- (1) Operate the transifter to lower the machine to the height near the ground (the cylinders are fully retracted).



WARNING

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.

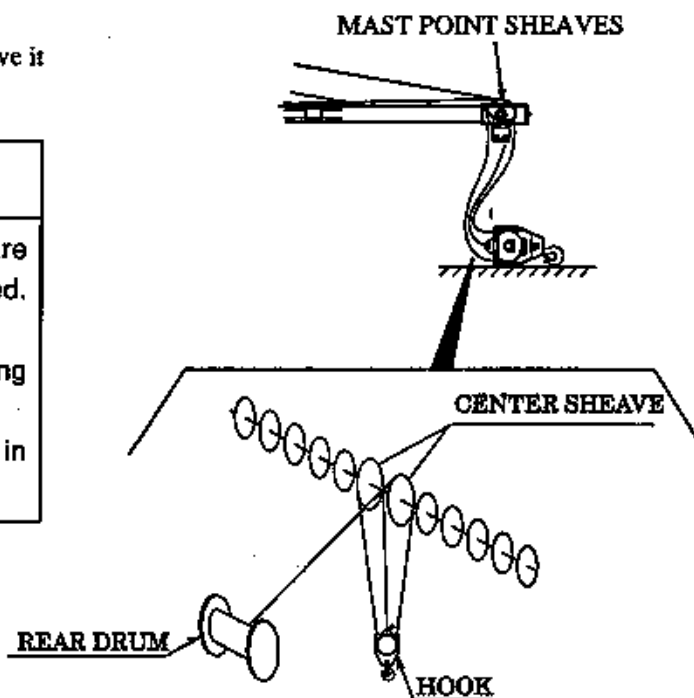


- (2) Lower the mast to the height appropriate for reeving of the hoist wire rope.
- (3) Unwind the wire rope on the rear drum, and reeve it through the mast sheave and hook block.



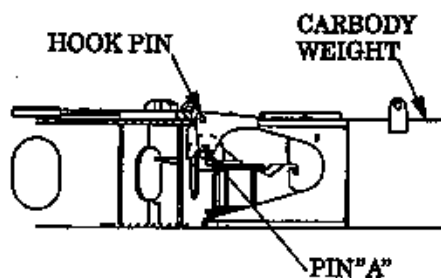
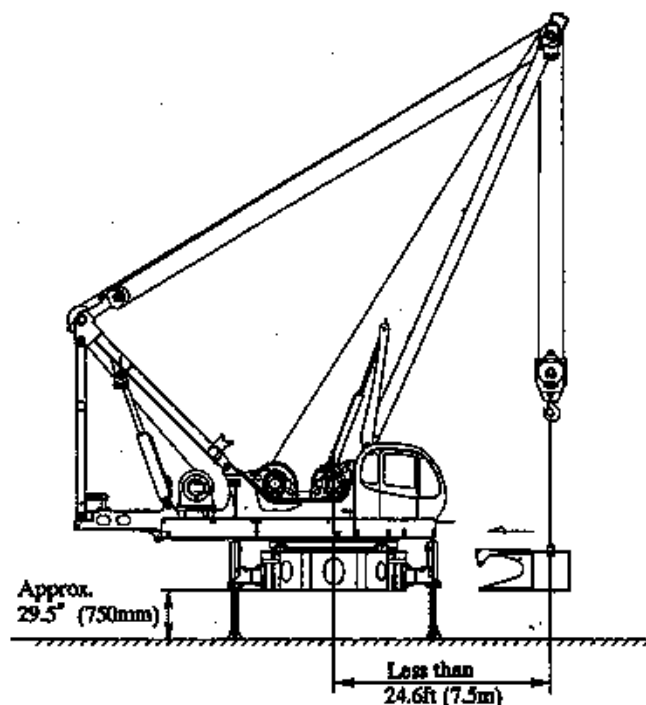
WARNING

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 loss of life.



12.1.3 INSTALLATION OF CARBODY WEIGHTS

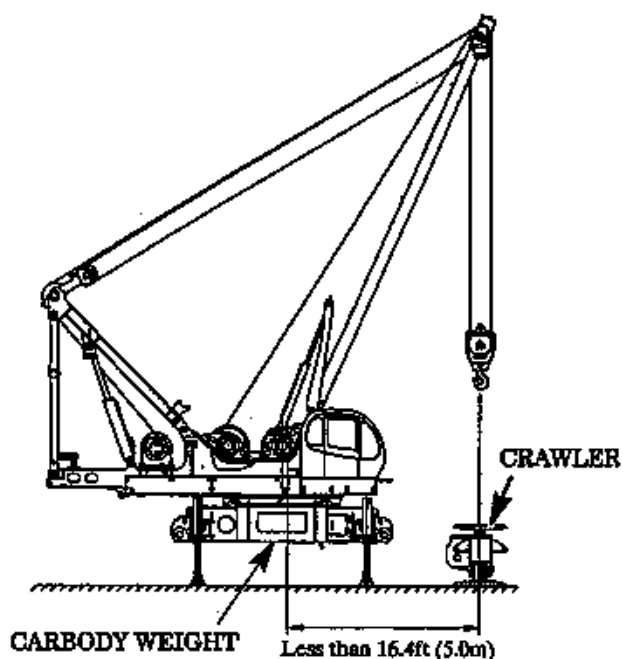
- (1) Operate the transifter to raise the machine by approx. 29.5 inch (750 mm).
- (2) Swing the upper structure 90° to orient it toward the carbody weight.
- (3) Lift the carbody weight, and install it to the machine. [Weight : 2250 lbs (10 t)]
- (4) Similarly install the other carbody weight to the machine.



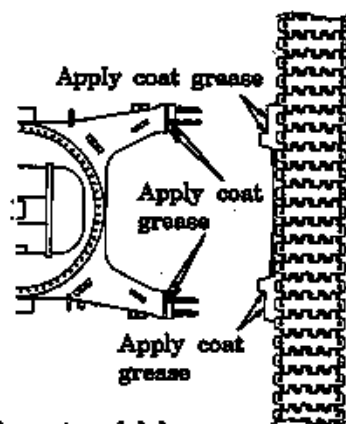
12.1.4 INSTALLATION OF THE CRAWLERS

- (1) Swing the upper structure 90° to orient it toward the crawler to be installed.

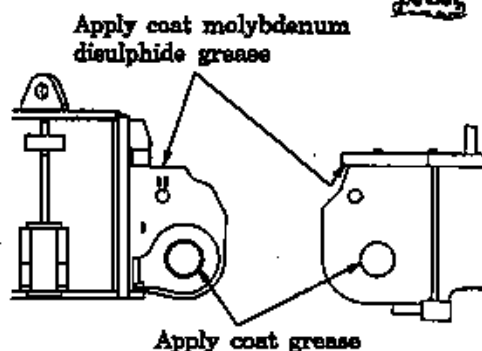
[Weight : 51,817 lbs (23.5 t)]



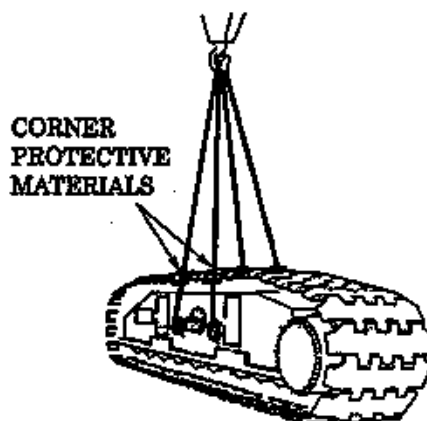
- (2) Apply grease to the engaging sections on the upper surfaces of the connecting sections of the lower structure with the crawler frames, and the connecting pin holes.



- (3) Ensure that the crawler connecting pins located on the crawler frame side are not protruded. Then, remove the fixing pins (2 pos. on one side).

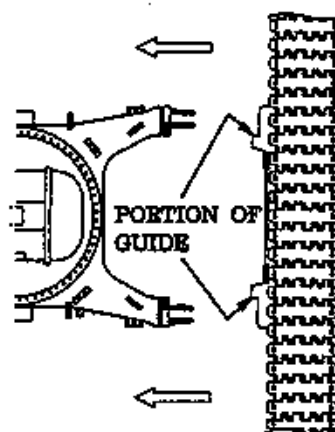


- (4) Lift one of crawlers [about 52920 lbs (24 ton)] .
When lifting the crawler, use corner protective materials so that wire does not bite into shoes.

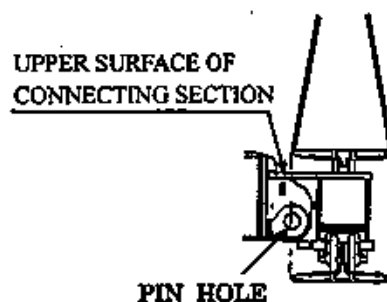


- (5) Slowly move the crawler toward the mounting side of the lower structure.

 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 loss of life.



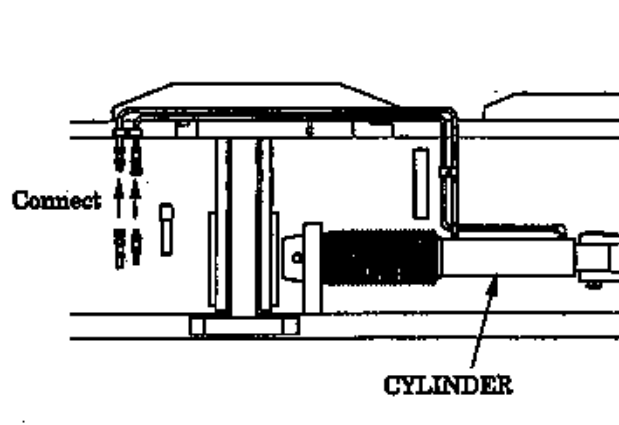
- (6) Fit the crawler frame along with the guide section of the lower structure to engage the upper surface of the connecting section.



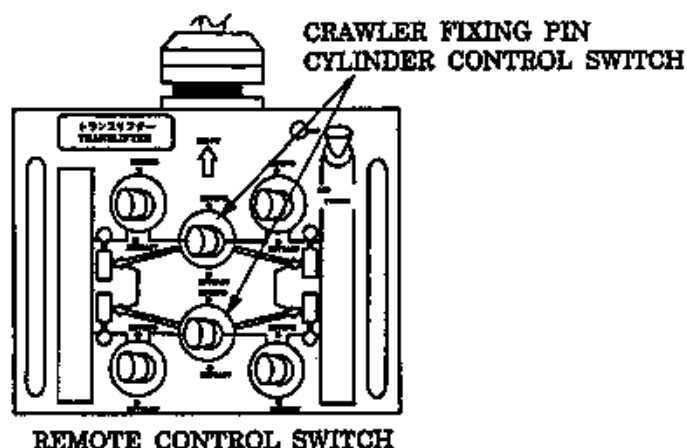
- (7) While lowering the crawler frame slowly, align the pin holes on the car body and the crawler frame. If the shoe comes in contact with the ground, and the pin holes cannot be aligned correctly, lift the machine with the translifter cylinder until the shoe does not come in contact with the ground.

 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 loss of life.

- (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.

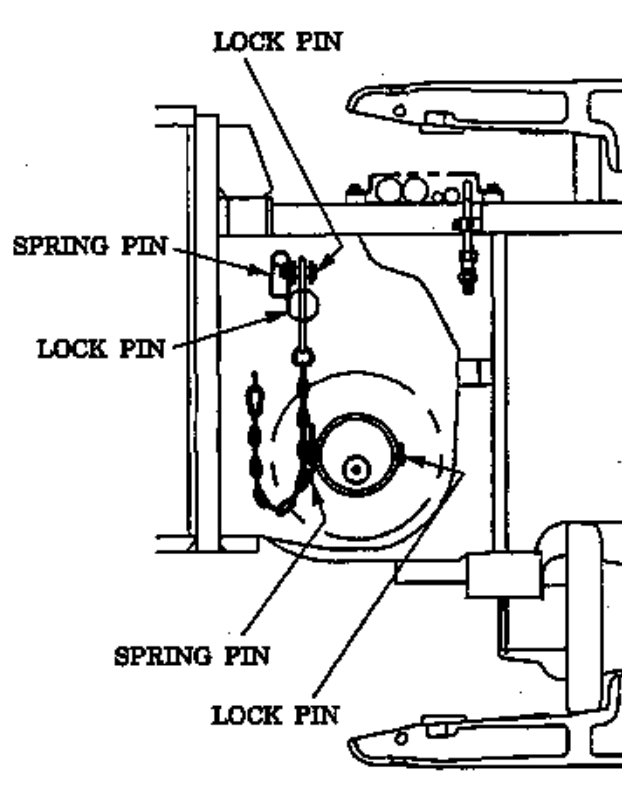


- (10) After fully inserting the two crawler connecting pins, stop the engine. Then, insert the fixing pin while supporting the crawler. Attach the lock pin to the inserted fixing pin, and lock it with the spring pin.

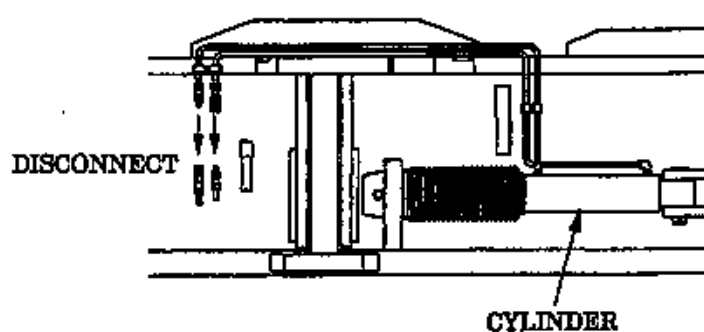
 WARNING
Be sure to attach the lock pin and the spring pin to avoid any accident due to the coming-off the fixing pin.

- (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 connecting pin removal/installation cylinder hose.



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

- (14) Restart engine and install the other crawler in the same way as above.

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.



DANGER

Do not swing the machine abruptly with only one crawler installed. Failure to observe this precaution may result in serious injury or loss of life.

- (15) After installing the both crawlers, retract the translifter cylinder until the crawlers come in contact with the ground completely.

- (16) Remove the floats and store them in the storing position.



CAUTION

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

- (17) 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

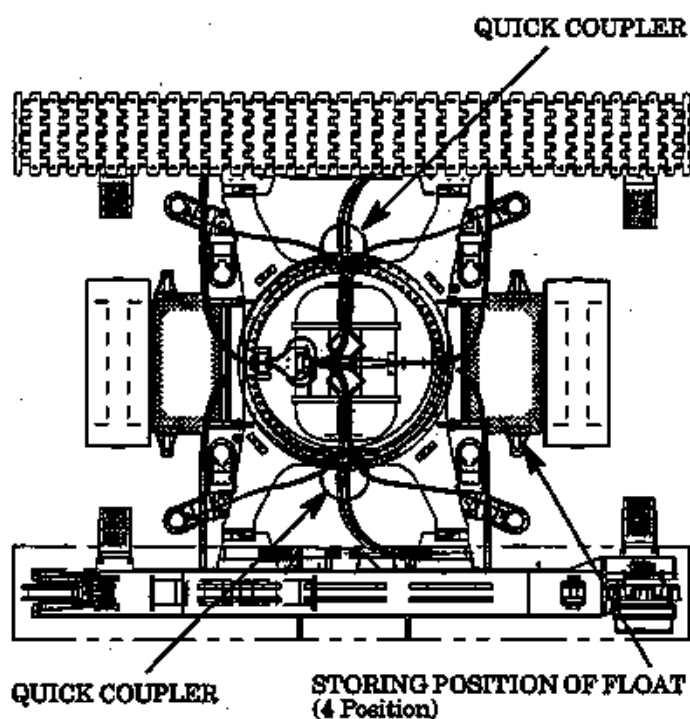
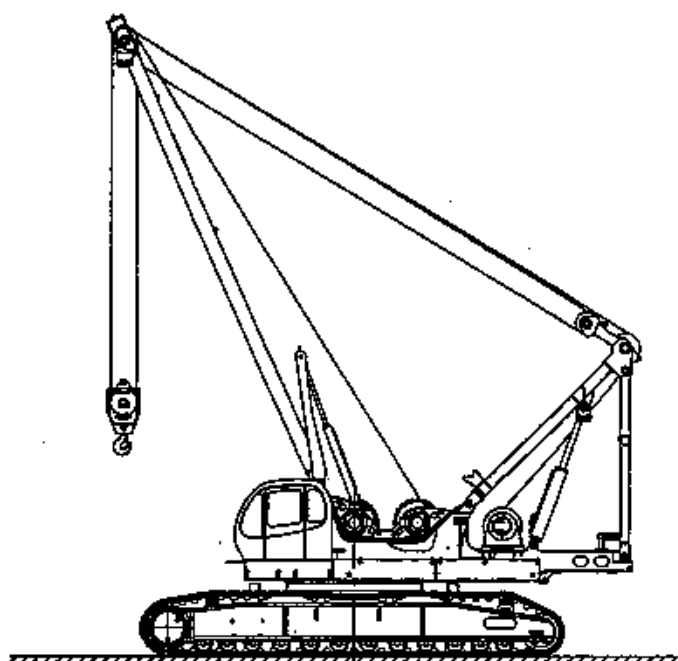
Do not swing when connecting or disconnecting hydraulic hose of crawler to avoid accident of being caught.

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



CAUTION

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



12.2 REMOVAL OF THE CRAWLERS AND CARBODY WEIGHT

12.2.1 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.

- (3) 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 loss of life.



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.

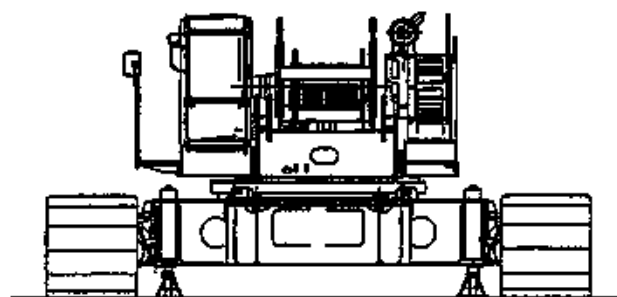
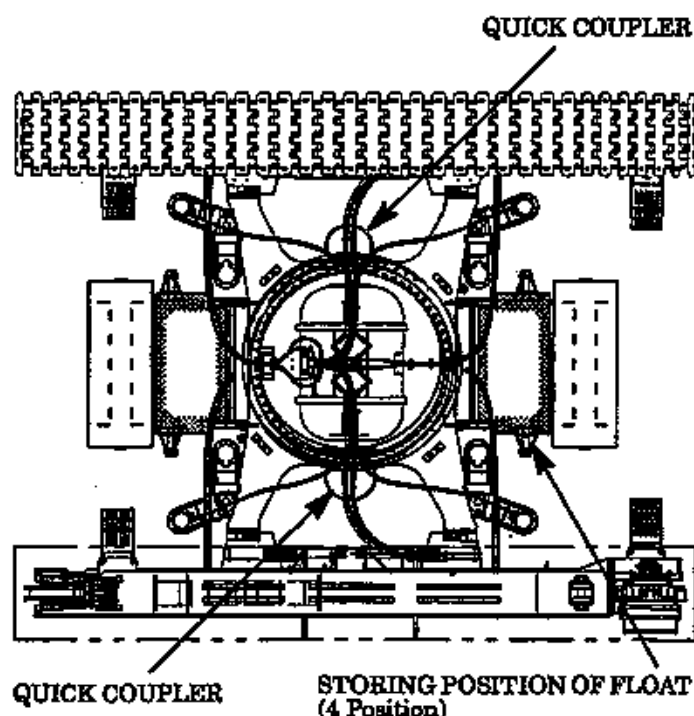
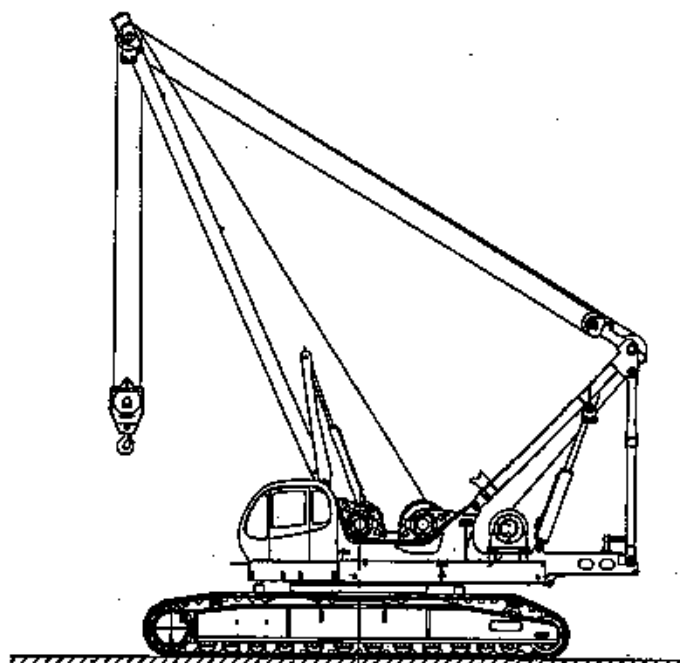
Do not hit with steel hammer.

- (4) Set the transifter to the work position and set them and install the floats.

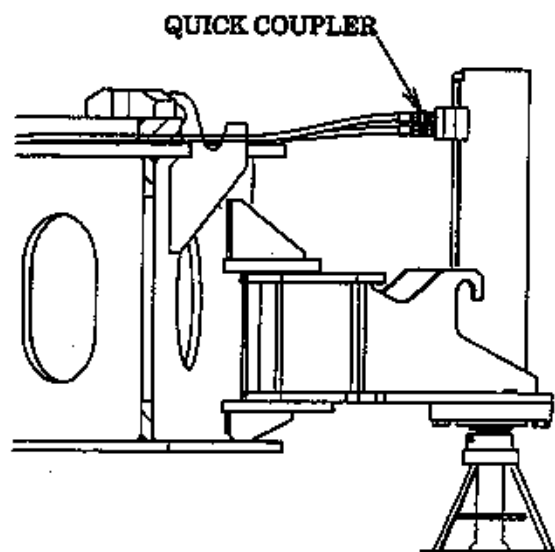


CAUTION

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



- (5) Connect the hydraulic hoses to the transliifter cylinders with quick couplers.
Confirm that the hydraulic hoses are securely connected to the vertical cylinders by pulling them.

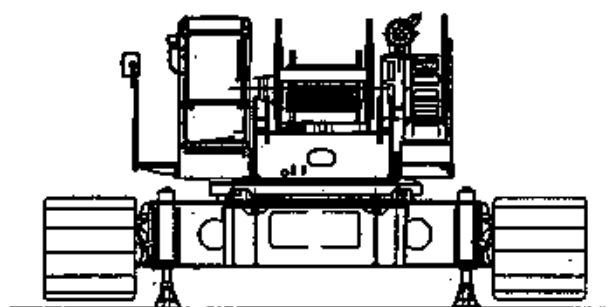


- (6) Start the engine and set the speed to low (about 1000 rpm).

By operating the transliifter, 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.

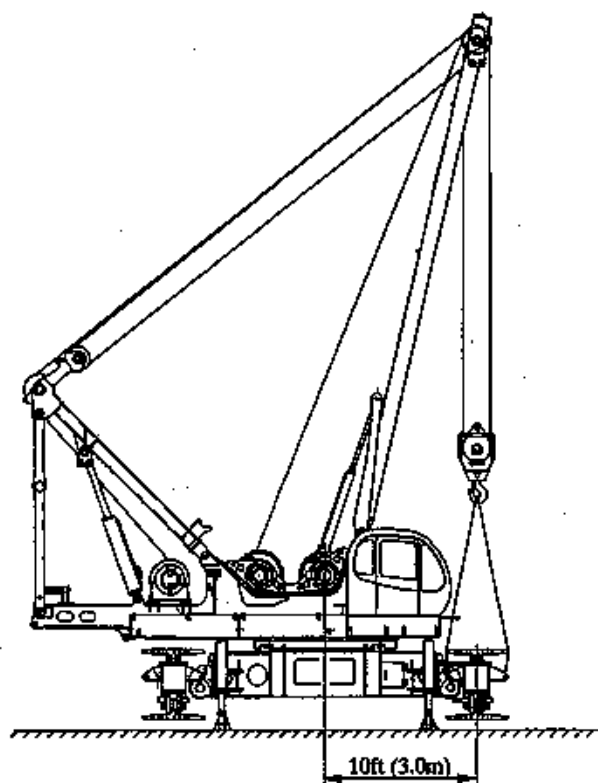


- (7) Swing the upper structure 90° to orient it toward the crawler.

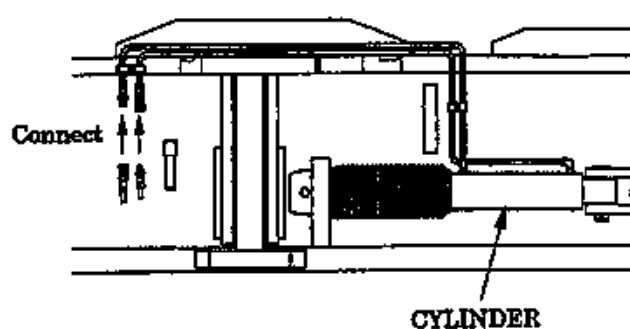
- (8) Hold one of crawlers.

When lifting the crawler, use corner protective materials so that wire does not bite into shoes.

[Weight: 51,817 lbs (23.5 t)]



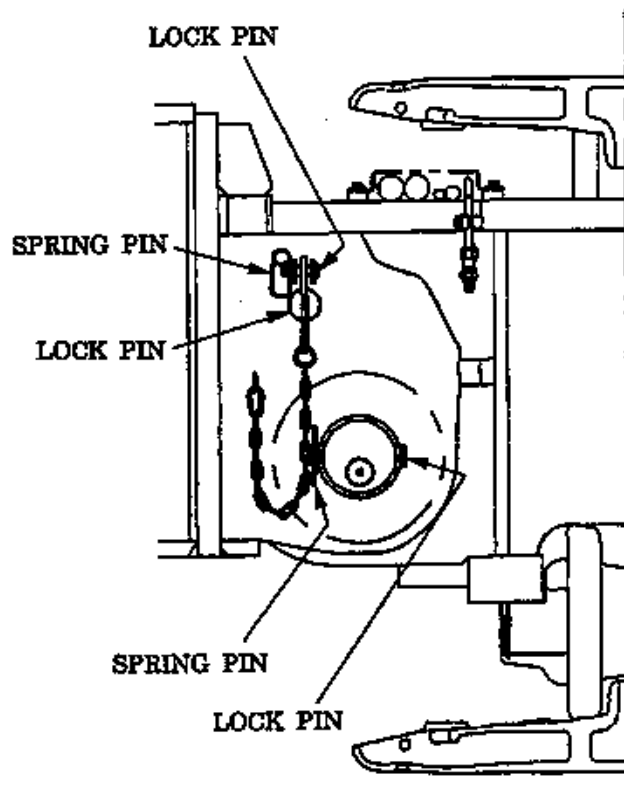
- (9) Connect the connecting pin removal/installation cylinder hose.



- (10) Remove the lock pin for the connecting pin.

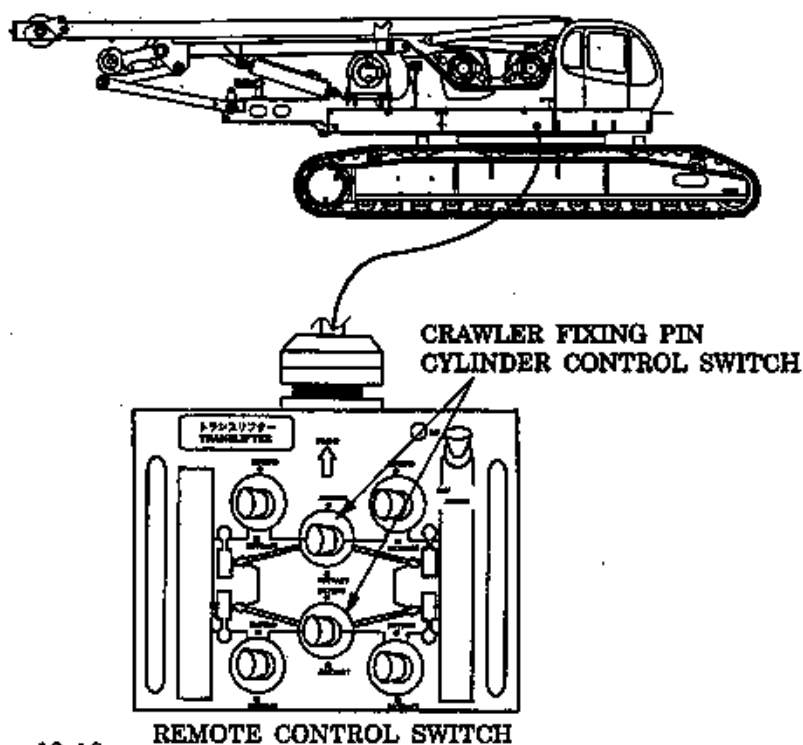
- (11) Remove the fixing pins (2 pos.).

If they are hardly removed, align the pin holes.

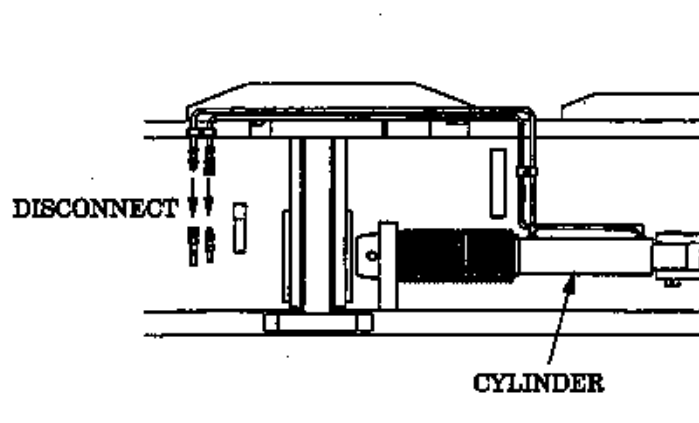


- (12) Connect remote control switch.

- (13) Operate the remote control switch, and completely remove the two crawler connecting pins.

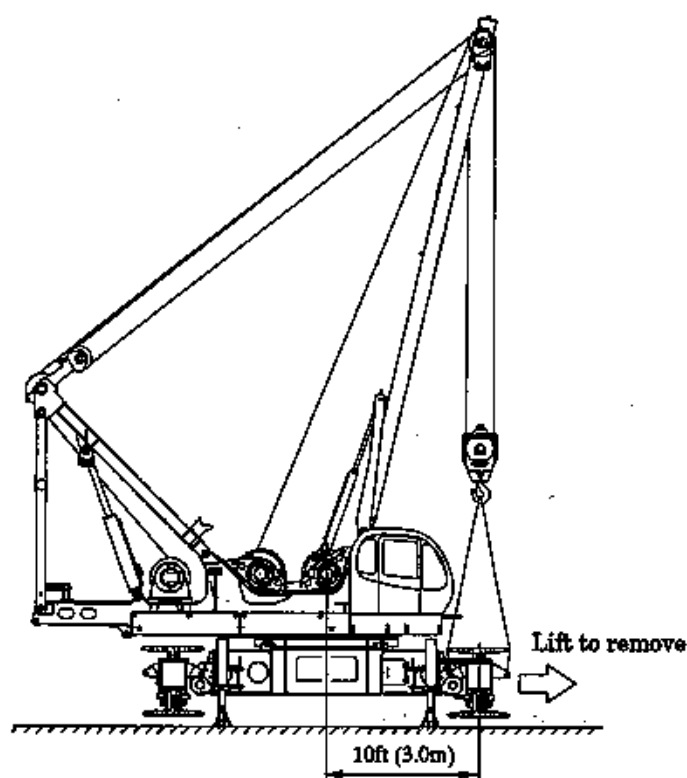


- (14) Ensure that the connecting pins are completely removed, and stop the engine.
- (15) Remove the connecting pin removal/installation cylinder hose.



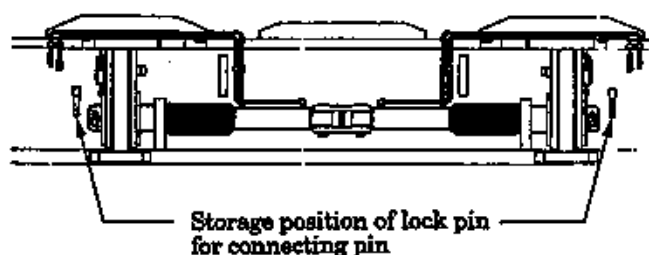
- (16) Restart engine and lift the crawler to move it away from the machine, and lay it onto the trailer or the ground.

	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 loss of life.	

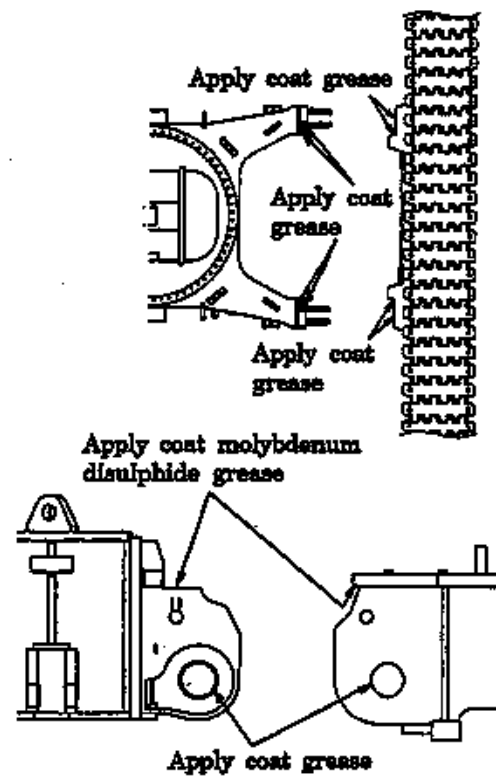


- (17) Apply grease to the fixing pins, and insert them into the pin holes on the car body side. Then, lock them with the lock pins.
- Store the lock pins for the connecting pins at the specified position on the crawler frame side, and lock them with the spring pins.

	CAUTION
After storing the lock pins, be sure to lock them to avoid them from missing.	



- (18) 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.



- (19) 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 loss of life.

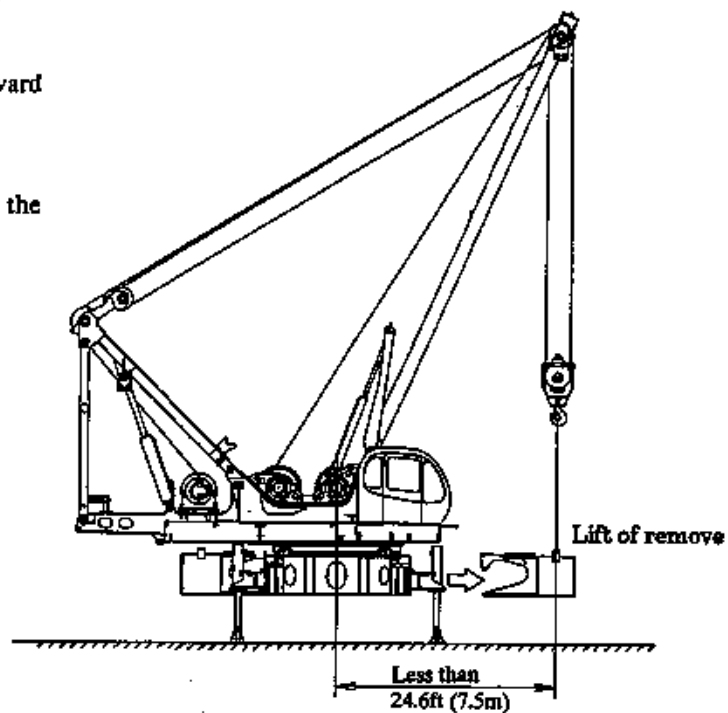
12.2.2 REMOVAL OF THE CARBODY WEIGHTS

(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 : 22,050 lbs (10 t)]

(3) Similarly remove the other carbody weight.



YOUR WARRANTY RIGHT AND OBLIGATIONS

The California Air Resources Board and Mitsubishi Motors Corporation (hereinafter referred to as ARB and MMC) is pleased to explain the emission control system warranty on your 1996 and later heavy-duty off-road engines. In California, new heavy-duty off-road engines must be designed, built and equipped to meet the State's stringent anti-smog standards. MMC must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, MMC will repair your heavy-duty off-road engine at no cost to you including diagnosis, parts and labor.

MANUFACTURER'S WARRANTY COVERAGE:

- The 1996 and later heavy-duty off-road engines are warranted for a period of five years or 3,000 hours of operation, whichever occurs first. In the absence of a device to measure hours of use, the engine shall be warranted for a period of five years. If any emission-related part on your engine is defective, the part will be repaired or replaced by MMC.

OWNER'S WARRANTY RESPONSIBILITIES:

- As the heavy-duty off-road engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. MMC recommends that you retain all receipts covering maintenance on your heavy-duty off-road engine, but MMC cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

- As the heavy-duty off-road engine owner, you should however be aware that MMC may deny you warranty coverage if your heavy-duty off-road engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.
- Your engine is designed to operate on commercially available diesel fuel only.
- You are responsible for initiating the warranty process. The ARB suggests that you present your heavy-duty off-road engine to a MMC dealer as soon as a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible, not to exceed 30 days.

If you have any questions regarding your warranty rights and responsibilities, you should contact at the office as shown below.

Mitsubishi Engine North America, Inc.
1250 Greenbriar Drive, Suite E Addison,
Illinois 60101-1065 U.S.A.

Tel.No.: 708-268-0750

Fax.No.: 708-268-9293

or

California Air Resource Board
9528 Telstar Avenue, El Monte,
CA 91731

Tel.No.: 818-575-6800

Fax.No.: 818-575-6685