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584E-OM0912-02

# OPERATION MANUAL

## CRAWLER CRANE

# LC1385M-8B

# LC1385M-8BF

**Serial No. 8009 and up**

**⚠ WARNING**

Unsafe use of this machine may cause serious injury or death. Operators must read this manual before operating this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel who will come into contact with it.

**NOTICE**

MAEDA has Operation Manual written in some other languages. If a foreign language manual is necessary, contact your local distributor for availability.

MAEDA

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# INTRODUCTION


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# 1. INTRODUCTION

Thank you for purchasing our Crawler Crane “LC1385M-8B”.
This manual is a guidebook for safe and effective use of this machine.
This manual describes the procedures for proper operation and maintenance of the machine.
Warnings and precautions defined in this manual shall be observed for safety.
Many of the accidents are caused by the operation, inspection, or maintenance that does not observe the basic precautions.
Be sure to read this manual and understand the procedures for machine operation, inspection, and maintenance thoroughly before performing operation of this machine.
Failure to observe the basic precautions defined in this manual may lead to hazardous accidents.

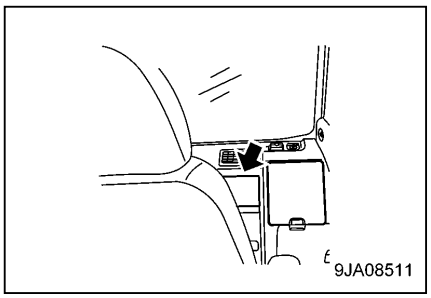
**⚠ WARNING**

**Failure to use this machine properly can lead to serious personal injury or death.**
**Operators and maintenance personnel must always read this manual prior to operation or maintenance of this machine.**
**Save this manual at a designated place for reference when necessary. All personnel who work on this machine are to carry out periodic reference.**

- **Only those who have thorough understanding of the fundamental procedures provided in this manual are qualified to perform machine operation.**
- **Keep this manual handy for reference when necessary.**
- **Should you lose or damage this manual, contact Maeda or our sales service agency immediately for ordering a new manual.**
- **This manual should always accompany this machine upon transfer of the machine to the next owner. However, when the machine is sold to a third party without any prior advice to us, we are not liable for any warranty.**
- **This manual has adopted data that was available at the time of the creation of the manual.**
  **The contents of this manual, including maintenance specifications, tightening torque, pressure, measuring method, adjustment value, and illustrations, are subject to change upon unremitting refinement of the machine, without notice.**
  **Machine maintenance may be susceptible to revisions. Always obtain the latest information from Maeda or our sales service agency before performing maintenance of this machine.**

**For safety instructions, see “2. For Safe Use of Machine” on page 1-3 and “Safety” on page 2-1.**

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# 2. FOR SAFE USE OF MACHINE

This manual classifies the risks into the following three categories to present the details of the safety labels in easy-to-understand manner.

**⚠ DANGER**

This denotes that there is an imminent hazard which will cause serious personal injury or death.
The method of hazard circumvention is stated.

**⚠ WARNING**

This denotes that there is a hazard which can cause serious personal injury or death.
The method of hazard circumvention is stated.

**⚠ CAUTION**

This denotes that there is a potential hazard which may cause minor or moderate personal injury or serious damage to this machine.
The method of hazard circumvention is stated.

This manual also provides the following to indicate what must be observed for the sake of the machine and what will be of help.

**CAUTION**

This denotes that failure to handle the machine properly may damage the machine or shorten its life.

**NOTES**

This denotes helpful information.

Not only procedures for operation, inspection, and maintenance of this machine described in this manual but also safety precautions should pertain to the case where this machine is only used for specified tasks. Every circumstance incidental to use of this machine is unforeseeable, and therefore, cautions given in this manual and on this machine do not necessarily cover every safety-related issue.
Necessary safety actions should be taken under your responsibility if operation, inspection, and maintenance in a situation that is not described in this manual are performed.
Even in the above case, never attempt the works and operations this manual prohibits you to do.



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# 3. MACHINE OVERVIEW

## 3.1 SPECIFIED OPERATIONS

This machine is to be used for operation listed below.

• Crane operation

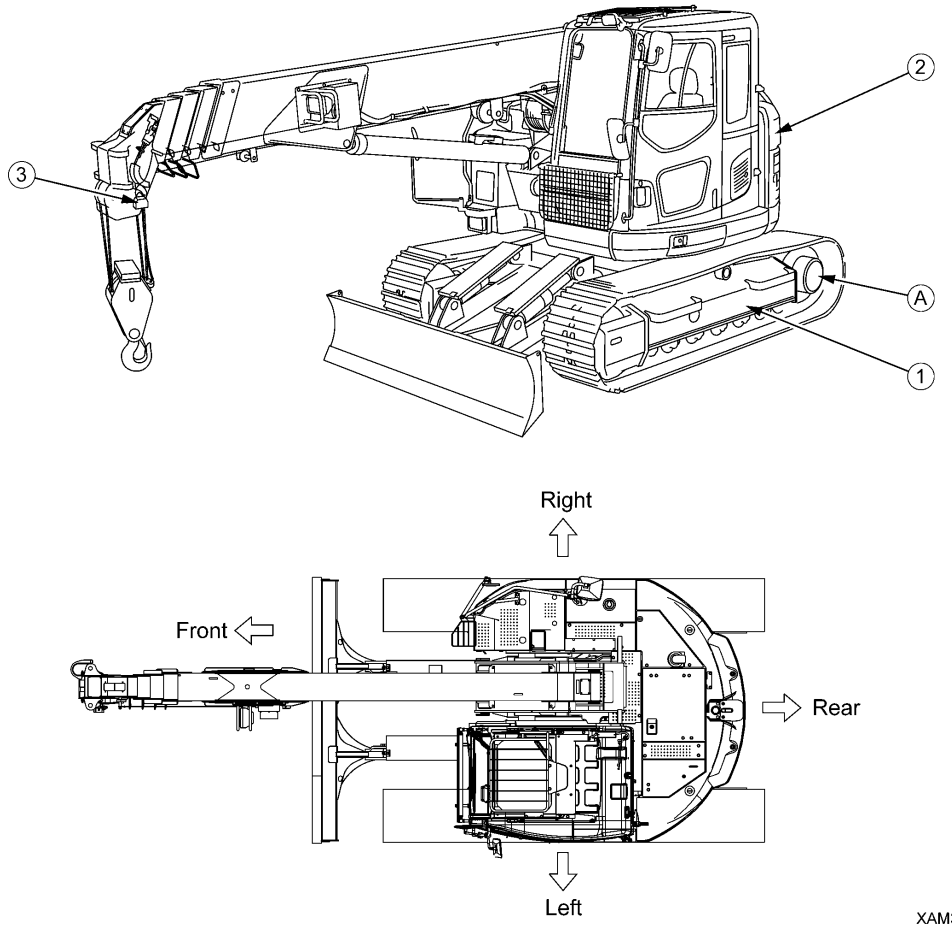
• Pick & Carry operation

This machine is a mobile crane which consists of a crawler type carrier and an upper structure of a boom equipped crane.

This self-propelled crane is capable of moving (traveling) in the worksite and lifting an object weighing within the rated total load.

## 3.2 MACHINE CONFIGURATION

**EXTERNAL VIEW**




(1) Undercarriage
(2) Upper structure
(3) Safety device

In this manual, the terms front, rear, left and right refer to the travel direction as viewed from the operator's seat when the operator's seat is facing the front and the sprocket (a) is at the rear of the machine.

Boom slewing motion is determined with the machine viewed from immediately above; slew clockwise denotes right-handed motion and slew counterclockwise denotes left-handed motion.



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This machine is composed of the units listed below.

**[1] UNDERCARRIAGE**

This is composed of a traveling gear and blade.

**[2] UPPER STRUCTURE (CRANE)**

This is composed of an engine, traveling operation unit, crane operation unit, telescoping system, derrick system, slewing system, hook block, and winch system.

**[3] SAFETY DEVICE**

This is composed of the following parts and devices: Over hoist detector/automatic stop device, three-winding stop alarm/automatic stop device, moment limiter (working envelope limited), slinging rope detachment protector, hydraulic safety valve, telescoping cylinder hydraulic automatic locking device, derricking cylinder hydraulic automatic locking device, alarm buzzer, machine tip-over alarm device, level, working status lamp, crane and traveling control lever lock.

## 3.3 MACHINE FUNCTIONS

**[1] UNDERCARRIAGE**

- The carrier equips crawlers which enables this machine to enter into rough or soft terrains.
- Two-traveling lever operation enables not only direction changes among forward, backward, and right/left but pivot turn and spin turn.

**[2] UPPER STRUCTURE (CRANE)**

- The upper structure allows continual 360 degree rotation.
- Thanks to extending/retracting, derricking up or down and/or swing operations of the boom, as well as wind/un-wind operation of the winch, you can move the hoisted load to the designated location, subject to the staying within the rated total road and working radius.



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# 4. QUALIFICATION FOR OPERATION

**⚠ WARNING**

- **A high incidence of occupational accidents in crane operation has been reported. Be aware that experienced engineers are also no exception.**
- **Warnings and precautions defined in this manual shall be observed for safety assurance during operation of the machine.**

## 4.1 QUALIFICATION FOR CRANE OPERATION

Only personnel that have obtained the required license or training stipulated by laws and regulations applicable to the place of use are qualified to operate this machine.
Contact the relevant government office or our sales service agency for further information.



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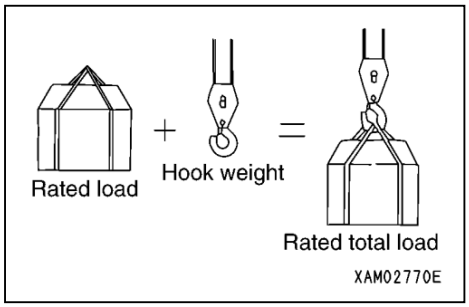
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# 5. TERMINOLOGY

## 5.1 DEFINITIONS OF TERMS

### [1] RATED TOTAL LOAD

This is the maximum load that can be applied according to a boom length and angle. The load includes the mass (weight) of hoisting accessories (hooks) and slinging ropes.

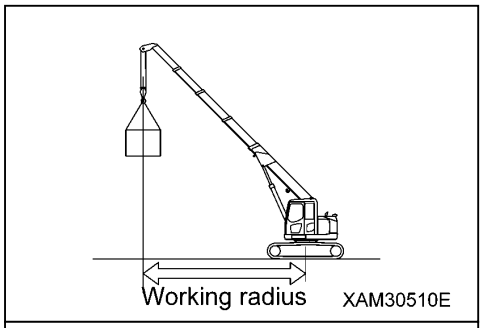



### [2] RATED LOAD

This is a load derived by subtracting the mass (weight) of hoisting accessories (hooks) and slinging ropes from the rated total load, which is a withstand load for hoisting.

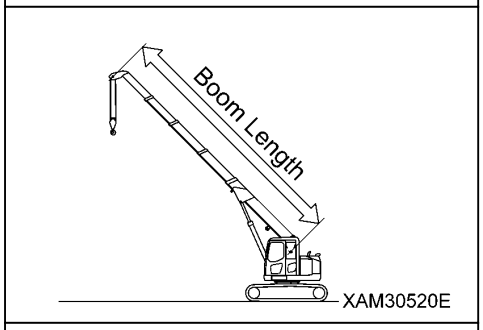
### [3] WORKING RADIUS

This is a horizontal distance between the axis of slewing and the hook center.



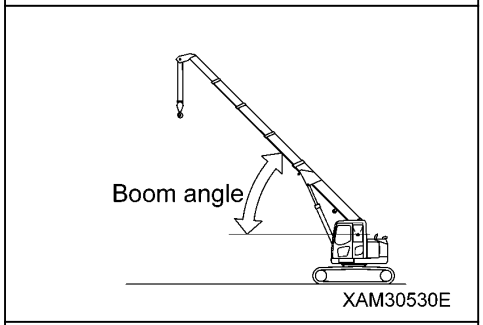

### [4] BOOM LENGTH

This is a distance between the boom primary pin and the sheave pin of the end boom.



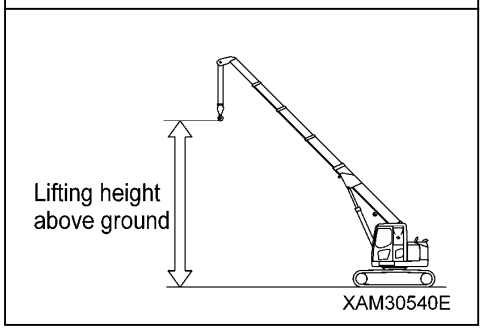

### [5] BOOM ANGLE

This is an angle which the boom forms with the horizon.




### [6] LIFTING HEIGHT ABOVE GROUND

This is a vertical distance between the hook bottom and the ground with the hook raised to the upper limit.





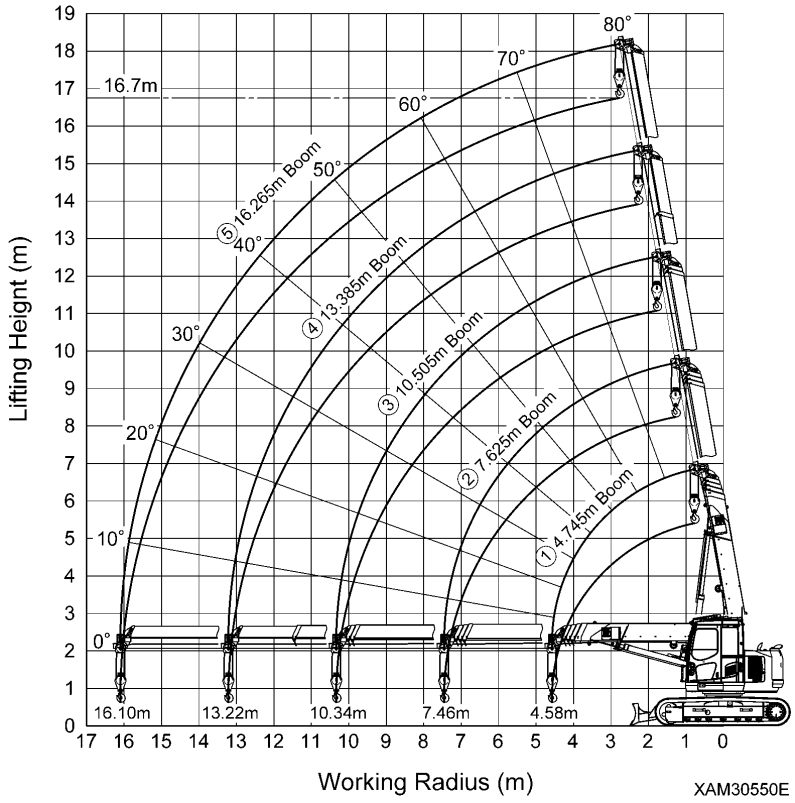

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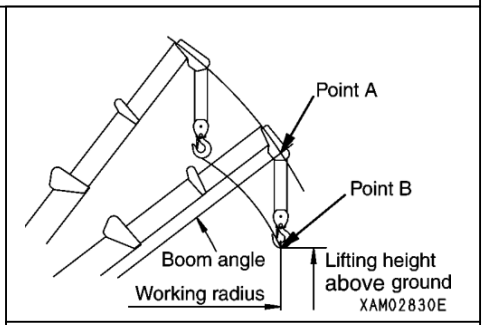
## 5.2 DIAGRAM OF WORKING RADIUS AND LIFTING HEIGHT

**⚠ WARNING**

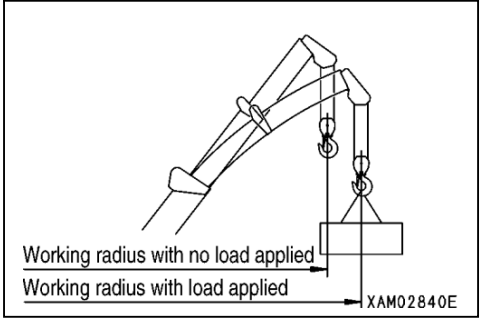
- **The diagram of working radius and lifting height shows the relationships the working radius of this machine, boom angle, and lifting height above the ground with no object hoisted. The diagram has been made allowing for no deflection in the boom.**
- **The boom (4) in the diagram of working radius and lifting height represents a state that half of the " ◣ mark" passes boom (3).**




1. Point A denotes a boom angle and point B denotes a lifting height above ground in the figure at right.
   The same working radius is applied to points A and B.




2. The "diagram of working radius and lifting height" shows the relationships the working radius, boom angle, and lifting height at no load, allowing for no deflection in the boom.
   A deflection occurs in the boom when an object is hoisted, which causes the working radius to increase slightly.
   The rated total load decreases with an increase in the working radius. Actual crane operation requires the planning of work, allowing for sufficient tolerance of more than that shown in the diagram.






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# 5.3 RATED TOTAL LOAD CHART

**⚠ CAUTION**

- **All the values provided in the rated total load chart are based on the assumption that the machine is placed on a level and firm surface.**
- **The values in the rated total load chart are determined based on the working radius allowing for deflection that is developed when load is applied to the boom.**
- **When extending boom (3) even if only slightly, crane operation should proceed to the extent of performance of "Boom (3)".**
- **When extending boom (4) even if only slightly, crane operation should proceed to the extent of performance of "Boom (4)".**
- **When half of the "◣ mark" passes boom (3), crane operation should proceed to the extent of performance of "Boom (5)".**
- **If the working radius exceeds that stated in the table even if only slightly, crane operation should proceed with respect to the rated total load corresponding to the working radius in the following table.**
- **The rated total load is a load including the mass of a hoisting accessory (hook: 90kg).**

## LC1385M-8B Total Rated Load Chart

Unit :kg

| Boom Length / Working Radius(m) | ① 4.745m boom | | ② 7.625m boom | | ③ 10.505m boom | | ④ 13.385m boom | | ⑤ 16.265m boom | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Stationary | Pick&Carry | Stationary | Pick&Carry | Stationary | Pick&Carry | Stationary | Pick&Carry | Stationary | Pick&Carry |
| 2. 00 | 6000 | 2000 | 6000 | 2000 | 3000 | 1500 | | | | |
| 2. 50 | 6000 | 2000 | 6000 | 2000 | 3000 | 1500 | 3000 | | | |
| 2. 60 | 6000 | 2000 | 6000 | 2000 | 3000 | 1500 | 3000 | | | |
| 3. 00 | 5250 | 2000 | 5260 | 2000 | 3000 | 1500 | 3000 | | 2600 | |
| 3. 20 | 4910 | 2000 | 4920 | 2000 | 3000 | 1500 | 3000 | | 2600 | |
| 3. 50 | 4450 | 2000 | 4460 | 2000 | 3000 | 1500 | 3000 | | 2600 | |
| 3. 85 | 4000 | 2000 | 4000 | 2000 | 3000 | 1500 | 3000 | | 2600 | |
| 4. 00 | 3830 | 1915 | 3820 | 1910 | 3000 | 1500 | 3000 | | 2600 | |
| 4. 50 | 3320 | 1660 | 3310 | 1655 | 3000 | 1500 | 3000 | | 2600 | |
| 4. 58 | 3250 | 1625 | 3240 | 1620 | 3000 | 1500 | 2940 | | 2600 | |
| 4. 60 | | | 3220 | 1610 | 3000 | 1500 | 2920 | | 2600 | |
| 5. 00 | | | 2880 | 1440 | 2710 | 1355 | 2640 | | 2600 | |
| 5. 50 | | | 2520 | 1260 | 2400 | 1200 | 2340 | | 2320 | |
| 6. 00 | | | 2210 | 1105 | 2140 | 1070 | 2100 | | 2080 | |
| 6. 50 | | | 1950 | 975 | 1920 | 960 | 1890 | | 1880 | |
| 7. 00 | | | 1720 | 860 | 1720 | 860 | 1710 | | 1710 | |
| 7. 46 | | | 1530 | 765 | 1570 | 785 | 1570 | | 1580 | |
| 7. 50 | | | | | 1550 | 775 | 1560 | | 1560 | |
| 8. 00 | | | | | 1400 | 700 | 1430 | | 1430 | |
| 8. 50 | | | | | 1270 | 635 | 1310 | | 1320 | |
| 9. 00 | | | | | 1150 | 575 | 1200 | | 1210 | |
| 10. 00 | | | | | 940 | 470 | 1020 | | 1040 | |
| 10. 34 | | | | | 880 | 440 | 970 | | 980 | |
| 11. 00 | | | | | | | 880 | | 890 | |
| 12. 00 | | | | | | | 750 | | 770 | |
| 13. 00 | | | | | | | 650 | | 670 | |
| 13. 22 | | | | | | | 630 | | 650 | |
| 14. 00 | | | | | | | | | 580 | |
| 15. 00 | | | | | | | | | 500 | |
| 16. 00 | | | | | | | | | 440 | |
| 16. 10 | | | | | | | | | 430 | |
| Boom Angle(°) | 0～64. 3 | | 0～74. 4 | | 0～78. 7 | | 0～79. 0 | – | 0～79. 2 | – |

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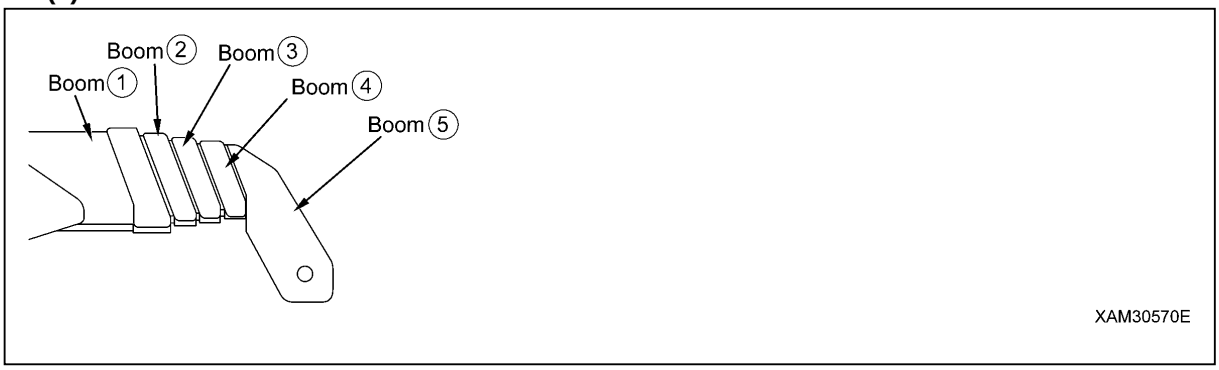
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The rated total load chart provides the maximum loads that the crane is capable of hoisting objects in parallel with the length of the boom. The loads are specified by working radius.

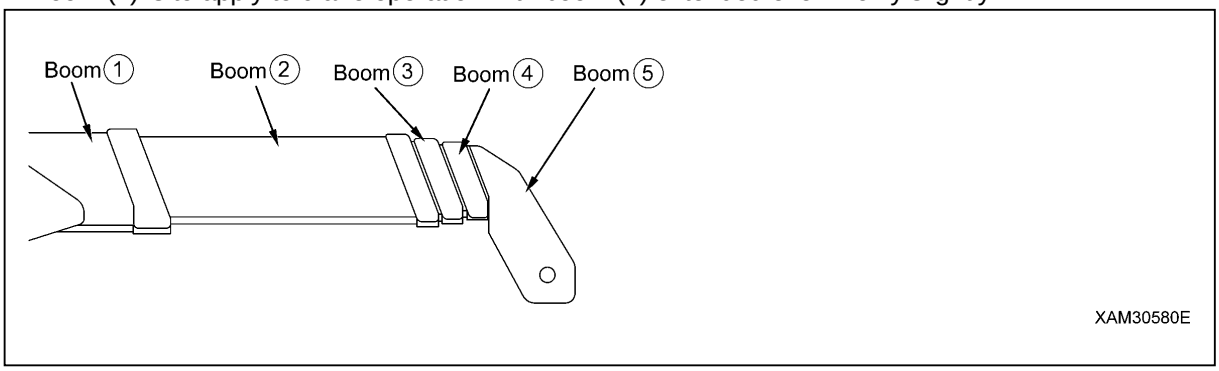
**[1] BOOM LENGTH**

The following figures illustrate the condition of the booms, “(1) 4.745m Boom”, “(2) 7.625m Boom”, “(3) 10.505m Boom”, “(4) 13.385m Boom”, and “(5) 16.265m Boom” in the preceding boxes in the rated total load chart.

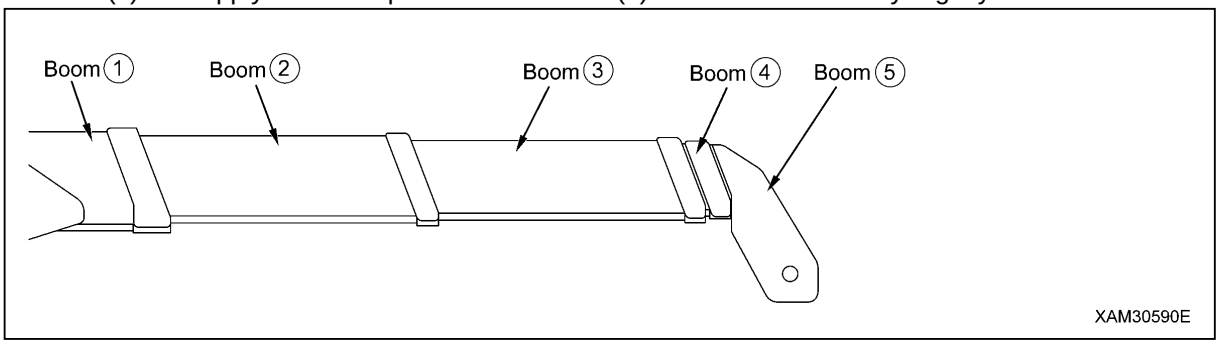
**1. “(1) 4.745m Boom”**: All the booms are retracted.




**2. “(2) 7.625m Boom”**: With booms (3), (4), and (5) retracted, boom (2) is fully extended.
Boom (2) is to apply to crane operation with boom (2) extended even if only slightly.



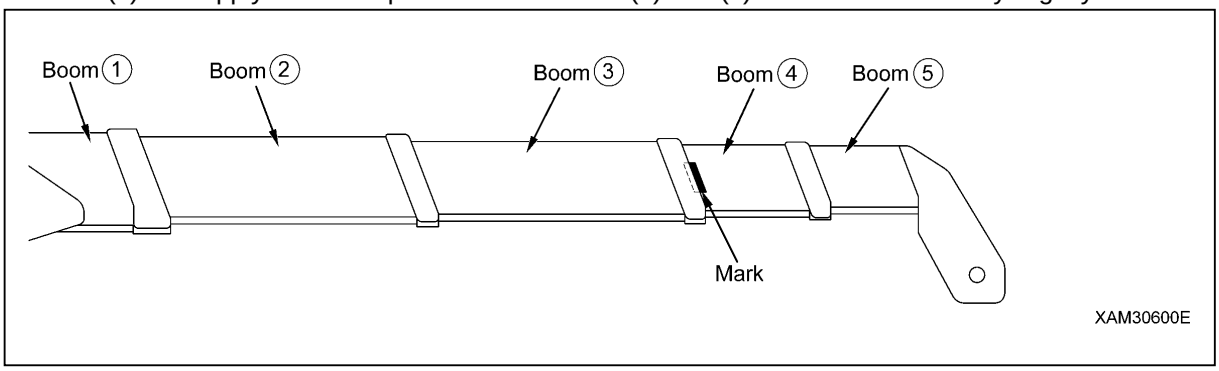

**3. “(3) 10.505m Boom”**: With booms (4) and (5) retracted, booms (2) and (3) are fully extended.
Boom (3) is to apply to crane operation with boom (3) extended even if only slightly.



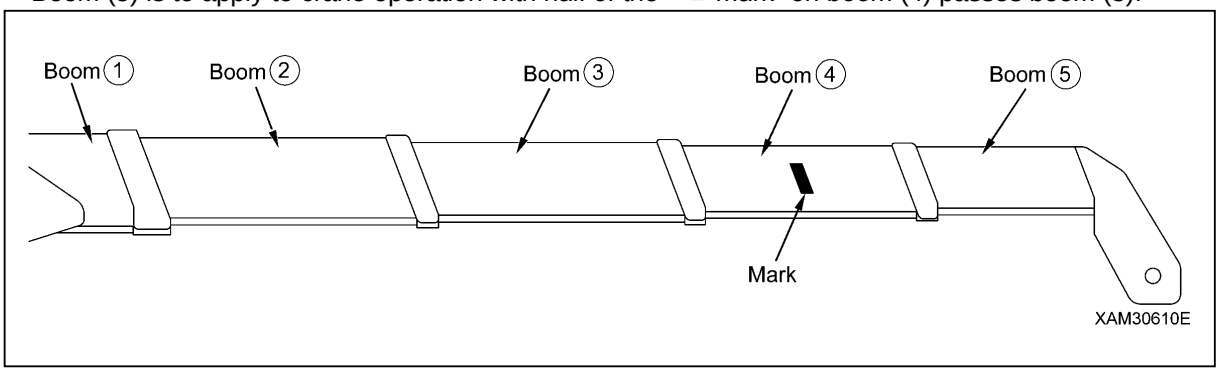



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**4. "(4) 13.385m Boom"**: With booms (2) and (3) fully extended, booms (4) and (5) are extended midway (half of the " ◥ mark" passes boom (3)).
Boom (4) is to apply to crane operation with booms (4) and (5) extended even if only slightly.




**5. "(5) 16.265m Boom"**: All the booms are fully extended.
Boom (5) is to apply to crane operation with half of the " ◥ mark" on boom (4) passes boom (3).






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# SAFETY


| | |
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| 1. BASIC PRECAUTIONS | 2- 2 |
| 2. DRIVING RELATED PRECAUTIONS | 2- 8 |
| 3. TRANSPORT PRECAUTIONS | 2-25 |
| 4. TOWING PRECAUTIONS | 2-26 |
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| 6. SAFETY LABEL LOCATIONS | 2-34 |


**⚠ WARNING**

**All the safety precautions defined in this manual should always be read and observed.**
**Failure to follow the safety precautions can cause serious personal injury or death.**



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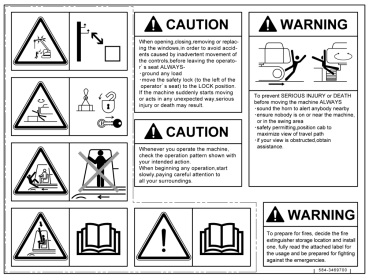
# 1. BASIC PRECAUTIONS

Failure to operate or maintain this machine properly can lead to serious personal injury or death. Be sure to read this manual and each safety label thoroughly before performing operation or maintenance of this machine and observe the safety precautions.

## 1.1 PRECAUTIONS FOR BEFORE STARTING OPERATION

### OBSERVE THE MANUAL AND SAFETY LABELS

- Read well and understand this manual as well as the safety labels labeled on various part of this Machine. Attempt to drive/operate without understanding fully may result in wrong operation that may cause personal or equipment accidents.
- Fully understand the proper use and inspection/maintenance procedures, and exercise safe works.
- Make sure this manual and the safety labels labeled on various part of this Machine are legible all the time.
  Whenever illegibility or loss occurs, order from us or our sales service agency and put the safety label back to the original location.




### DRIVING LICENSE

- Licenses or training certificates are necessary to drive this Machine.
  Always obtain a license or training certificate before driving.
  ★ See “Introduction 4. Qualification for Operation” for details
- The drivers are requested to receive education and training in the handling methods and other subjects from the applicable office, and obtain sufficient driving operation skills before work.

### COMMIT TO SAFE OPERATION

- Obey the instructions and signs given by the manager and work supervisor, and observe safety first during the work.
- Obey the crane work basics during work.
- Before starting driving or work, always carry out the inspections first.
- Do not work under bad weather for instance strong wind, thunder or mist.
- Do not drive under any condition when you are overtired, have drunk alcohol or after taking a somnific drug.
- Obey all of the workplace rules, safety regulations and operation method sequences during driving operations and inspection/maintenance.
- Pay attention to surrounding conditions and pedestrians all the time when driving or working.
  Whenever pedestrian approaches unwarily, abort working once, and take a measure such as issuing a warning.
- When driving, be mentally prepared for unexpected situations so that you can take the appropriate action immediately.
- Do not attempt any use outside of the capabilities and purposes described in this manual under any circumstance.
- Observe the designated rated total load and work range when driving.
- Do not attempt inattentive driving, harsh driving or awkward operation under any circumstance.
- Pull out the key when leaving operation seat.



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# 1.2 PREPARATIONS OF SAFETY OPERATION

## PROVIDE SAFETY DEVICES FOR SURE

- Check that all guards, covers, mirrors and rear view camera are attached properly. Repair immediately if damaged.
- Understand how to use the safety devices correctly and use properly.
- Do not detach any safety device under any circumstance. Keep control to achieve proper operation at all times.
- Improper use of safety devices can lead to serious bodily accidents.
- Do not rely solely on safety devices.

## PREPARE FOR ABNORMALITY

- Carry out secure inspections and services, and be careful to prevent accidents before they happen.
- Whenever you feel an abnormality of the Machine, abort working immediately, ensure safety and report to the manager.
- Assign in advance who takes which solution to prevent secondary accident.
- Do not drive the Machine when fuel or hydraulic oil is leaking from the Machine. Report to the manager any abnormality, and fully repair the fuel/hydraulic oil before use.
  The fuel for this Machine is diesel oil. Be especially careful of any fuel leak.
- Before leaving the Machine, lower the hoisted load to the ground, stop the engine and pull out the engine key.

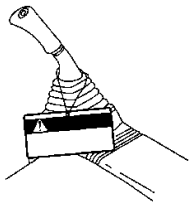


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## TEMPORARY STORAGE WHEN ABNORMALITY IS FOUND WITH MACHINE

In case the Machine is found with abnormality and is therefore stored temporarily waiting for service, apply following measures to notify all persons in the office that the use is prohibited due to failure.

- Indicate warning tags on the operation lever and other applicable parts.
  Write clearly the information such as abnormality contents, name and contact of the storage manager, and the term of storage.
- Make sure the machine cannot move when parking by putting blocks under the rubber tracks as pawls.
- Pull out the engine key and take it with you.



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## WEAR PROTECTIVE EQUIPMENT AND CLOTHES SUITABLE FOR WORK

- Always put on a helmet, safety shoes and safety belt.
- Select and make sure to put on necessary protective equipment suitable for the relevant working condition.
- Do not wear loose garments or accessory items that may catch an operation lever or protrusions and cause unexpected movement of the Machine.



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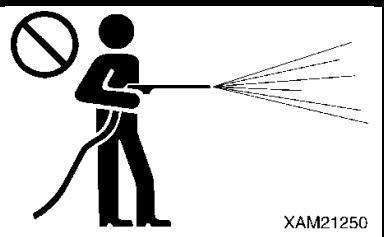
## USE OF MACHINE THAT WAS RENTED OR PREVIOUSLY USED BY SOMEONE ELSE

Check the following subjects in writing before using any Machine that was rented or previously used by someone else. In addition, check the inspection record table for the maintenance conditions such as the periodic inspections.

(1) Crane capacity
(2) Crane maintenance condition
(3) Behavior and disadvantage unique to the crane
(4) Other subjects that require attention when driving
  (a) operating condition of the brakes, clutches and others
  (b) Presence/absence and lighting condition. Check of lighting and rotating lamps
  (c) Operation condition of hook, winches, boom, outriggers and related

## KEEP MACHINE CLEAN

- If inspection and maintenance is carried out when the machine is still dirty with mud or oil, there is a hazard that you will slip and fall, or that dirt or mud will get into your eyes. Always keep the machine clean.
- If water gets into the electrical system, there is a hazard that it will cause malfunctions or miss-operation. Do not use water or steam to wash the electrical system (sensors, connectors).



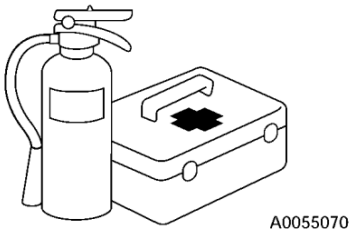

## KEEP OPERATOR'S COMPARTMENT CLEAN

- When entering operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do not stick suction pads to the window glass. Suction pads act as a lens and may cause fire.
- Never bring any dangerous objects such as flammable or explosive items into the operator's compartment.
- Do not use cellular telephones inside operator's compartment when driving or operating the machine.

## PROVISION OF FIRE EXTINGUISHER AND FIRST AID BOX

Always observe followings to prepare for injuries and fires.

- To prepare for fires, decide on the fire extinguisher storage location and install one, fully read the attached label for its uses and be prepared for fighting any emergencies.
- Decide the location to store the first aid box. In addition, inspect the first aid box periodically and replenish the contents as necessary.
- Decide the measures to take upon an injury or fire accident.
- Decide how to contact the emergency address (for instance the emergency physician, ambulance or fire department), and show the contact address at designated position so any person can make the contact.






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# 1.3 PRECAUTIONS FOR FIRE PREVENTION

## ACTION IF FIRE OCCURS

If a fire occurs, escape from the machine as follows.
- Turn starter switch OFF to stop engine.
- Use the handrails and steps to get off the machine.

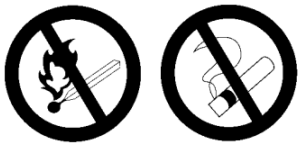
## FIRE PREVENTION AND EXPLOSION PREVENTION

- **FIRE CAUSED BY FUEL, OIL, OR ANTIFREEZE, AND WINDOW WASHER FLUID**

  Fuel, oil, antifreeze, and window washer fluid are particularly flammable and can be hazardous. To prevent fire, always observe the following:
  - Do not smoke or use any flame near fuel oil, antifreeze, or window washer fluid.
  - Stop the engine before refueling.
  - Do not leave the machine while adding fuel or oil.
  - Tighten all fuel and oil caps securely.
  - Do not spill fuel on overheated surfaces or on parts of the electrical system.
  - After adding fuel or oil, wipe up any spilled fuel or oil.
  - Put greasy rags and other flammable materials into a safe container to maintain safety at the work place.
  - When washing parts with oil, use a non-flammable oil. Diesel oil and gasoline may catch fire, so do not use them.
  - Do not weld or use a cutting torch to cut any pipes or tubes that contain flammable liquids.
  - Use well-ventilated areas for adding or storing oil and fuel.
  - Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.
  - When carrying out grinding or welding work on the chassis, move any flammable materials to a safe place before starting.



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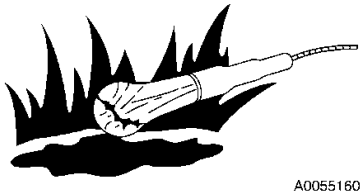
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- **FIRE CAUSED BY ACCUMULATION OF FLAMMABLE MATERIAL.**

  Remove any dry leaves, chips, pieces of paper, dust, or any other flammable materials accumulated or affixed around the engine, exhaust manifold, muffler, or battery, or inside the under-covers.
- **FIRE COMING FROM ELECTRIC WIRING**

  Short circuit in the electrical system can cause fire.
  - Always keep electric wiring connections clean and tightened.
  - Check the wiring every day for looseness or damage. Tighten any loose connectors or wiring clamps. Repair or replace any damaged wiring.
- **FIRE COMING FROM HYDRAULIC LINE**

  Check that all the hose and tube clamps, guards, and cushions are securely fixed in position. If they are loose, they may vibrate during operation and rub against other parts. This may lead to damage to the hoses, and cause high-pressure oil to spurt out, leading to fire damage or serious injury.
- **EXPLOSION CAUSED BY LIGHTING EQUIPMENT**
  - When checking fuel, oil, battery, electrolyte, window washer fluid, or coolant, always use lighting with anti-explosion specifications. If such lighting equipment is not used, there is danger of explosion that may cause serious injury.
  - When taking out the electrical power for the lighting from the machine itself, follow the instructions in this manual.



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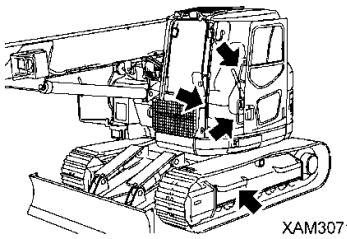
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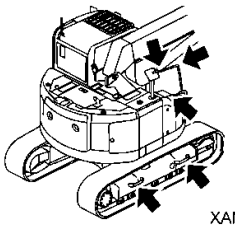
# 1.4 PRECAUTIONS WHEN GETTING ON OR OFF

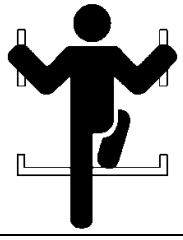
## USE HANDRAILS AND STEPS WHEN GETTING ON OR OFF

To prevent personal injury caused by slipping or falling off the machine, always do as follows.

- Use the handrails and steps marked by arrows in the diagram on the right when getting on or off the machine.
- To ensure safety, always face the machine and maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps (including the track shoe) to ensure that you support yourself.
- Before getting on or off the machine, check the handrails and steps (including the track shoe). If there is any oil, grease, or mud on the handrails and steps (including the track shoe), wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Do not grip the control levers, or lock lever when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.
- Do not get on or off the machine while holding tools in your hand.
- Never jump on or off the machine, Never jump on or off a moving machine.
- If the machine starts to move when there is no operator on the machine, do not jump on to the machine and try to stop it.

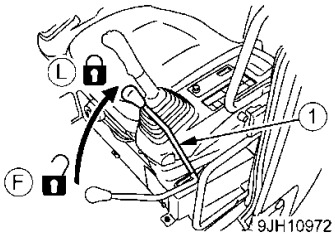

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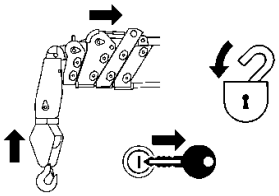

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## PRECAUTIONS WHEN LEAVING OR STANDING UP FROM OPERATOR'S SEAT

- Before standing up from operator's seat (such as when opening or closing the front window or roof window, or when removing or installing the bottom window, or when adjusting the operator's seat), always store the crane completely, set lock lever (1) securely to the LOCK position (L), then stop the engine. If you accidentally touch the control levers or pedals when they are not locked, there is a hazard that the machine may suddenly move and cause serious injury or property damage.
- When leaving the machine, always store the crane completely, set lock lever (1) securely to the LOCK position (L), then stop the engine. Use the key to lock all the equipment. Always remove the key, take it with you, and keep it in the specified place.

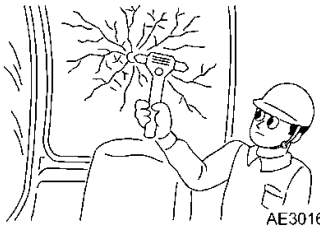


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## EMERGENCY EXIT OF THE OPERATOR'S CABIN

- In an emergency where the cabin door is blocked or does not open, use the emergency hammer and smash the windowpane so that you get out of the cabin through it.
- When you go through, remove fragments of the windowpane to prevent injury from them. In addition, take care of your footpath to avoid slipping on fragments of that.


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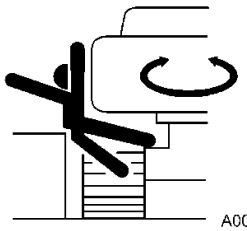
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## 1.5 OTHER PRECAUTIONS

### PRECAUTION NOT TO BE CAUGHT IN THE MACHINE

Around the upper structure and craning devices, movement of the derricking cylinder and/or winch make the opening space vary. When one becomes caught in such an opening, it may result serious personal injury or death.
Always keep persons away from such rotating or telescoping part.
Especially, avoid putting oneself or your body into locations as below:
- Clearance between boom and upper structure
- Clearance between boom and derricking cylinder
- Clearance between winch drum and wire rope
- Clearance between each sheaves and wire rope


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### DO NOT MODIFY

Do not modify the Machine without our written consent under any circumstance. Especially, welding work which can damage safety devices badly.
The modification raises a safety issue, so consult us or our sales service agency beforehand.
We cannot be held responsible for any bodily accident or failure caused by modification that was performed without consulting us.

### ATTACHMENT INSTALLATION

- When installing optional parts or attachments, there may be problems with safety or legal restrictions. Therefore contact our sales service agency for advice.
- Any injuries, accidents, or product failures resulting from the use of unauthorized attachments or parts will not be the responsibility of Maeda.
- When installing and using optional attachments, read the instruction manual for the attachment, and the general information related to attachments in this manual.

### CAB WINDOW GLASSES

- If a pane of the cab window is broken, stop the machine immediately and replace the broken pane with new one.
- The ceiling window is made of organic glass (polycarbonate), and as such it is apt to break easily when receiving damage on the surface, thereby deteriorating its protective characteristic. If there is a crack or damage caused by a fallen rock, or when any sign of them is noticed, replace it with new window.

### BEWARE OF EXHAUST GAS

When starting the engine or handling fuel/cleaning oil/paint indoors or at a location with bad ventilation condition, prevent gas-poisoning risk by improving the ventilation by opening the windows and exits.
If the ventilation is insufficient even after opening the windows and exits, set up a ventilation fan.


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# 2. DRIVING RELATED PRECAUTIONS

## 2.1 PRECAUTIONS FOR JOBSITE

### SAFETY AT JOBSITE

Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.

- When carrying out operations near combustible materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not operate where there is a hazard of landslides or falling rocks.
- Flatten the inclination of the working site as much as possible before starting work.
- When working over the roadway, enforce keep out by for instance placing guides or surrounding by barriers, and ensure the safety of the traffic vehicles and pedestrians.
- Enforce keep out to prevent people from entering the working site and apply measures to prevent people from approaching. Attempt to approach moving Machine may result in hard collision by contact or pinching, and may result in serious bodily accidents and deaths.
- When travelling or operating in shallow water or on soft ground, check the sharpness and condition of the bedrock, and the depth and speed of flow of the water before starting operations.
- Avoid traveling or operating your machine too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such area. If the ground collapses under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over. Remember that the soil after heavy rain or blasting or after earthquakes is weak in this area.
- When working on embankments or near excavated ditches, there is a hazard that weight and vibration of the machine will cause the soil to collapse. Before starting operations, take steps to ensure that the ground is safe and to prevent the machine from rolling over or falling.

### ENSURE GOOD VISIBILITY

This machine is equipped with mirrors to improve the visibility, but even with mirrors, there are places, which cannot be seen from the operator's seat, so always be careful when operating.

When operating or traveling in places with poor visibility, if it is impossible to confirm the condition of the job side or obstacle is in the area around the machine, there is danger that the machine may suffer damage or the operator may suffer serious personal injury.

When operating or traveling in places with poor visibility, always observe the following items strictly.

- If the visibility cannot be sufficiently assured, position a flagman if necessary. The operator should pay careful attention to the signs and follow the instruction of the flagman.
- The signals should be given only by one flagman
- When working in dark places, turn on the working lamps and front lamps of the machine, and if necessary, set up additional lighting in the area.
- Stop operations if there is poor visibility, such as in fog, snow, rain, or sand storms.
- Check the mirror on the machine before starting operations every day. Clean off any dirt and adjust the view to ensure good visibility.
- In area where it is impossible to confirm the area behind the machine and observation cameras have been set up, clean off any dirt from the lens and make sure that the camera gives a clear view of the rear. If a rear-view camera has been installed to show the area to the rear of the machine, clean off any dirt from the lens and make that the camera gives a clear view of the rear. If there is any problem with the camera and the rear view cannot be displayed, contact us or our sales service agency as soon as possible and ask for repairs to be carried out.

### SIGNALMAN'S SIGNAL AND SIGNS

- Set up signs to inform of road shoulders and soft ground. If the visibility is not good, position a signalman if necessary. Operators should pay careful attention to the signs and follow the instructions from the signalman.
- Only one signalman should give signals.
- Make sure that all workers understand the meaning of all signals and signs before starting work.



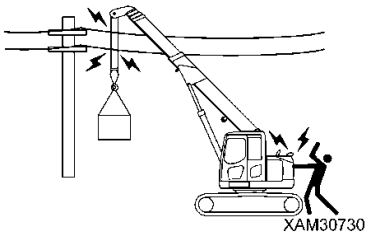
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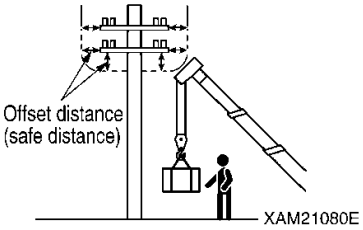
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## BEWARE OF ELECTRICAL CABLE ABOVE

- Do not let the Machine contact with electrical cables overhead.
  High voltage cables may inflict electrical shock by just approaching.
- Persons who sling are likely to suffer electrical shocks.
  Always observe followings to prevent accidents.
  - If the boom or the wire ropes may contact an electrical cable in the workplace, consult the electricity company and make sure that the measures (measures for instance placement of a guard personnel or application of wrap tubes and warning tags to the electrical cable) stipulated by the related regulations are taken before starting work.
  - Put on rubber soled shoes and rubber gloves, and be careful that the body parts unprotected by rubber or other insulation do not contact the wire rope or the Machine frame.
  - Place a guide and let him/her watch so that the boom, wire rope or Machine frame does not go near the electrical cable too much.
    Before doing so, decide the emergency signs and other necessities.
  - Ask the electricity company for the voltage in the electrical cables in the working site.
  - Ensure the offset distances (safe distance) shown in the following table between the boom/Machine frame and electrical cables.

| | Voltage of Electrical Cable | Minimum Safe Distance |
|---|---|---|
| Low voltage (Distribution line) | 100･200V | 2m |
| | 6,600V | 2m |
| Special (Transmission line) | 22,000V | 3m |
| | 66,000V | 4m |
| | 154,000V | 5m |
| | 187,000V | 6m |
| | 275,000V | 7m |
| | 500,000V | 11m |


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## MEASURES WHEN CHARGE ACCIDENT OCCURS

When an electrical charge accident occurred, do not panic and stay calm, apply the solution in the following sequence.

1. Report
   Immediately report to the electricity company or related management company, and receive instructions for the power transmission stop, emergency procedures and related.
2. Evacuation of related personnel from vicinity of Machine
   Let the related personnel including the workers from vicinity of the Machine to prevent secondary disasters.
   Personnel who suffered electrical shock by holding a sling rope, guide rope or other conductor when the Machine was charged should evacuate by his/her own effort.
   Do not try to help such person. Otherwise, secondary electrical shock accident can occur.
3. Emergency procedure
   Take the solution by following sequence in case of urgency where personnel received electrical shock because the Machine was charged.
   (1) If the Machine can be operated, immediately operate the Machine to move the Machine constructions away from the contact and out of the range of the cause of the charge. Be careful not to snip the distribution power cable.
   (2) Evacuate the Machine completely away from the cause of the charge, make sure the Machine is not charged, rescue the electrically shocked personnel and immediately carry to the hospital.
4. Measure after accident
   After accident, do not reuse as is. Such attempt may cause unexpected accidents and enhances failures. Ask us or our sales service agency for repair.

## CAUTIONS WHEN WORKING WITH CRANE IN LOCATION WITH HIGH OUTPUT MICROWAVE EMISSION

Working with crane near high output microwave emission equipment such as a radar or TV/radio broadcast antenna causes the crane construction to be exposed to the microwave and generates induced current, therefore is very dangerous. In addition, the mechatronics may become disturbed.
Establish grounding between the Machine frame and the ground when working in such location. In addition, slingers are requested to wear rubber boots and rubber gloves since risk of electrical shock by contacting parts such as the hook or wire exists.

## BEWARE OF ASBESTOS DUST

Inhalation air containing asbestos may result in lung cancer. This Machine does not use any asbestos, but asbestos may be contained in the wall, ceiling or other part of construction within the work area of this Machine. In addition, be careful of the followings when working with a material that may be using asbestos.

- Put on designated dust free mask and/or other equipment as necessary.
- Do not use compressed air for cleaning.
- Spray water when cleaning to prevent asbestos dusts from flying into air.
- Always work at windward location when driving the Machine at a site that may contain asbestos dusts.
- Enforce keep out to prevent people from entering the working site.
- Strictly observe the assigned rules related to the working site and environmental standard.



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# 2.2 PRECAUTIONS WHEN ENGINE STARTING

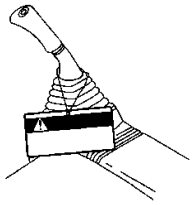
## PRECAUTIONS FOR WARNING TAG

If there is a warning tag hanging from working equipment control lever, do not start the engine or touch the levers.

**⚠ DANGER**

**Do NOT operate**

When this tag is not being used, keep it in the storage compartment. If there is no storage compartment, keep it in the operation manual case.



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## INSPECTION BEFORE STARTING ENGINE

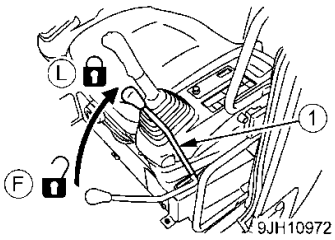
Check the instructions in "Operation 3.1 Check Before Operation" as well as followings, without starting the engine and before starting work every day:
Omitting these inspections may result in serious bodily accidents.

- Do not fail to perform the check before operation.
- Remove all dirt from the surface of the window glass to ensure a good view.
- Remove all dirt from the surface of the lens of the working lamps, and check that they light up correctly.
- Check/refill engine coolant, fuel and the engine oil pan, and check for air cleaner clogging or electrical circuit breakage.
- Adjust the operator's seat to a position where it is easy to carry out operations, and check that there is no damage or wear to the seat belt or mounting clamps.
  ★ See "Operation 3.1.2 [11] Adjusting Operator's Seat" for details.
- Adjust the mirrors so that the rear of the machine, and winch drum can be seen clearly from the operator's seat.
  ★ See "Operation 3.1.2 [12] Adjusting Mirrors" for details.
- Check the monitor of the rear view camera and adjust the angle of the camera so that the proper view is provided.
  ★ See "Operation 3.1.2 [14] Adjusting Angle of Rear View Camera" for details.
- Check pedals for piled up mad or alien substances which may disturb their movement, and remove those, if any, to secure correct functions.
- Check the operation of the instruments and gauges, and check that the control levers are all at the Neutral position.

Always repair if any result of the above is faulty.

## CHECKS BEFORE STARTING ENGINE

- Make sure no person or object is within the boom swing radius area before starting engine.
- Make sure no person is on or below the machine or around it, as well as no person or object is within the boom swing radius area, before starting engine.
- Do not allow anyone apart from the operator to ride on the machine.
- Start and operate the machine only while seated.
- Before starting engine, check that the control levers are all at the Neutral position.
- Before starting engine, check that lock lever (1) is in LOCK position (l).
- When starting the engine, sound the horn as a warning.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.




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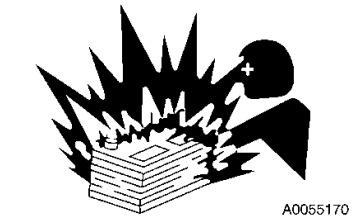


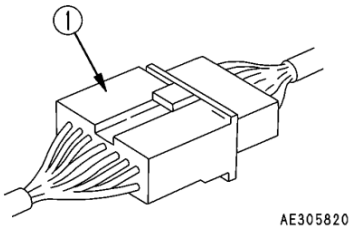
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## CAUTIONS UNDER COLD WEATHER

- Remove snow from and defreeze the swing gear, boom and winch related parts, and check the movements before work.
- Warm up enough. Attempting to operate the control levers and pedals without enough warm-up causes the Machine to react dull, and may result in unexpected accidents.
- If the battery fluid is frozen, do not charge battery or start the engine using other power source. Such an act may cause the battery to catch fire. Before charging or starting up using other power source, defreeze the battery fluid and check that failures such as battery fluid leak do not exist.
- After end of the work, wipe off and apply wraps if substances such as condensation, snow or mud are stuck to the wire harness, connector (1), switches, sensors or similar part.
  If the infiltrated condensation and/or similar substances freeze, the Machine may operate improperly upon the next use and cause unexpected accidents.


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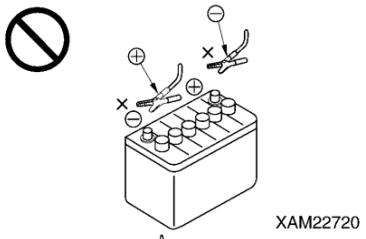


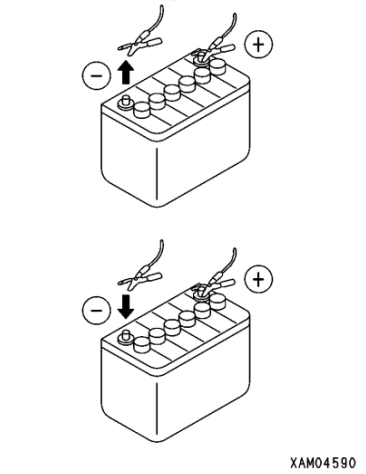
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## CAUTIONS WHEN STARTING UP USING BOOSTER CABLE

Wrong booster cable connection method may result in fire, so always observe the followings.

- When starting up the engine using a booster cable is attempted, always arrange 2 persons, one in the cabin and another with the battery.
- When starting using other Machine, be careful to prevent contact between the normal Machine and broken Machine.
- Keep the starter switch key of both the normal Machine and the broken Machine in OFF position when the booster cable is connected.
- Do not connect to wrong side [connecting (+) to (-), (-) to (+)] when connecting the booster cable.
- Start connecting from (+) terminal first, but start disconnecting from (-) terminal (ground) first.
- Connect the ground to the (-) terminal of the battery of the broken Machine when connecting the ground as the last procedure.
  ★See “Operation 9.4.4 Starting Engine with Booster Cable” for details.
- Avoid the contact between clips of the booster cable, and contact between a clip and the Machine when disconnecting the booster cable.


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# 2.3 PRECAUTIONS WHEN STARTING TO MOVE MACHINE

## CHECKS BEFORE OPERATION

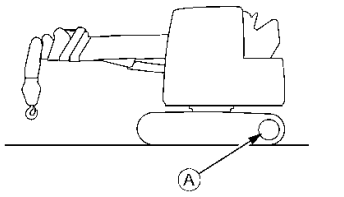
Omitting the inspections after starting the engine results in delay to notice the Machine abnormalities, and may result in bodily accidents and Machine damages.
Execute inspection in a wide location with no obstacle. In addition, be sure to prevent people from approaching nearby the Machine.

- Check that the movement of the machine matches the display on the control pattern card. If it does not match, replace it immediately with the correct control pattern card.
- Inspect the equipment operation conditions, Machine traveling conditions, winch winding up and down, boom derricking, and crane operation conditions such as extension, retraction and swinging.
- Inspect the sound, vibration, heat and odor of the Machine, and check for instrument errors, air leaks, oil leaks, fuel leaks, water leaks and other bad factors. Be extra careful with fuel leaks.
- Always repair broken part whenever an abnormality is found. Attempt to use without servicing may result in unexpected bodily accidents and/or Machine failures.

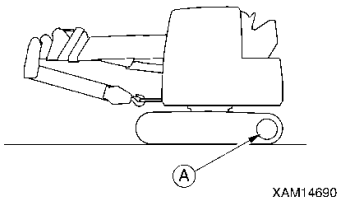
## CAUTIONS WHEN MOVING FORWARD/BACKWARD OR CHANGING DIRECTION

To prevent serious injuries and death accidents, always execute the followings before moving the Machine.

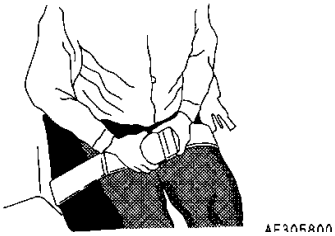
- Set the Machine to the traveling posture in the right diagram.
  ★ See “Operation 3.7 Machine Traveling Posture” for details.
  Do not travel when the hook block is not contained.
  - Before traveling, set the machine so that sprocket (A) is behind the operator’s seat. If sprocket (A) is in front of the operator’s cab, the machine will move in the opposite direction from the operation of the levers (front and rear travel is reversed, left and right steering is reversed). Be extremely careful when operating the machine in this situation.
  - Make the boom fully lowered and retracted.
  - Fix the hook block to the containment position.
    For a short distance travel, secure the hook block to the stowage position below the boom tip. For longer travel, secure it to the regular stowage wire rope in the front of the upper structure.
- Always lock the door and windows of the operator’s compartment in position (open or close). On jobsites where there is a hazard of flying objects or of objects entering the operator’s compartment, check that the door and windows are securely closed.
- In an environment where anyone is around the machine, the machine may smash or catch him/her, which results in death or serious injury.
  Before start traveling observe strictly as follows:
  - Always operate the machine only while seated.
  - Always fasten your seat belt.
  - Before traveling, check again that there is no one in the surrounding area, and that there are no obstacles.
  - Before traveling, sound the horn to warn people in the area.
  - After start traveling, check that the travel alarm correctly sounds.
  - If there is an area to the rear of the machine which cannot be seen, position a signal person. Take special care not to hit other machines or people when turning or swinging the machine.
    Though this machine is equipped with back mirrors and a rear view camera, always arrange a person to guide safety traveling.



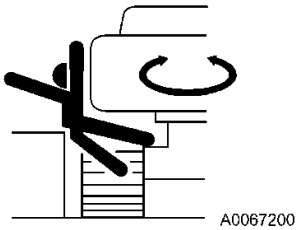
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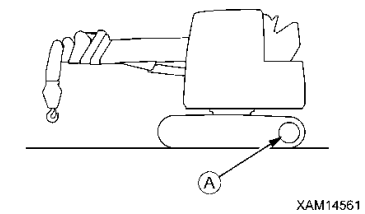
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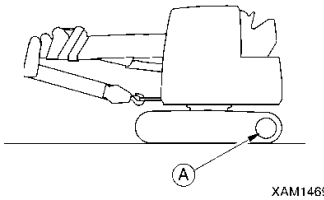
## CAUTIONS WHEN TRAVELING

Always observe followings to prevent serious injuries and death accidents when the Machine is traveling.

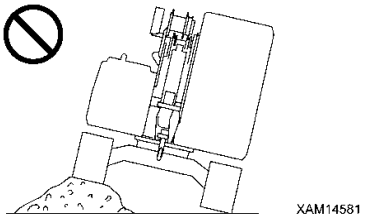
- Set the Machine to the traveling posture in the right diagram.
  ★ See “Operation 3.7 Machine Traveling Posture” for details.
- Do not attempt looking sideways or other dangerous act when driving.
- Do not over speed, start moving sudden, stop sudden, swing sudden or meander since such acts are dangerous.
- When traveling, always keep a safe distance from people, structures, or other machines to avoid coming into contact with them.
- When traveling on rough ground or steep slopes, If the machine is equipped with auto-deceleration, always turn the auto-deceleration switch OFF (cancel).
- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep at travel at low speed. Never travel over obstacle which makes the machine tilt strongly to one side.
- When traveling on rough ground, travel at low speed and do not operate the steering suddenly. There is a danger that the machine may turn over. The machine may lose its balance, or may damage the machine or structures in the area.
- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, operate slowly and be extremely careful not to let the crane hit anything.



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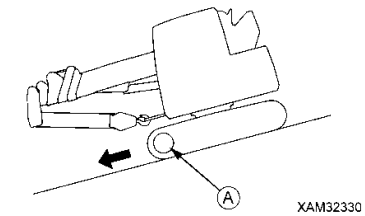
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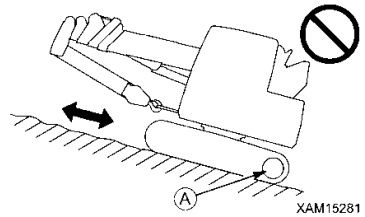
## BE CAREFUL WHEN TRAVELING OVER SLOPE

ALWAYS observe the following to prevent serious injuries and death accidents when traveling over a slope for unavoidable reason.

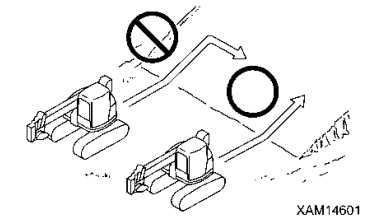
- For traveling on a slope, always keep the correct traveling posture with the hook block secured to the hook block stowage wire rope in the front of the upper structure. When the hook block is temporary stowed below the boom tip, it may become slack during traveling.
  ★ See “Operation 3.7 Machine Traveling Posture” for details.
- In a 10 degrees or more slope, use reverse traveling to climb it and forward travel for descend. Always direct the machine front to the downward of the slope. Where forward traveling to climb up and reverse traveling for descend are used, it makes the machine unstable and brings risks of overturning or drifting.
- Always travel straight up or down a slope. Traveling at an angle or across the slope is extermely dangeropus.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to change the position of the machine, then travel on to the slope again.
- When traveling downhill, lower engine speed, keep the travel lever close to the neutral position, and travel at low speed.
- Travel on grass, fallen leaves, or wet steel plates with low speed. Even with slight slopes there is a hazard that the machine may slip.
- If the engine stops when the machine is traveling on a slope, move the control levers immediately to the neutral position and start the engine again.



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## BE CAREFUL OF TIPPING ON UNSTABLE GROUND

Always observe followings to prevent serious injuries and death accidents when traveling over an unstable ground for unavoidable reason.

- Do not enter soft ground area. The Machine is difficult to evacuate from such area.
- The ground near cliff, roadside and deep gully is unstable, so avoid going near such ground as much as possible.
  The Machine may tip or fall when the ground loosens due to mass and/or vibration of the Machine. Be especially careful that the ground is likely loosened after rain, use of dynamite or earthquake.
- Avoid going near the earth fills or vicinity of dug gutter that are instable.
  Crumbles caused by mass and/or vibration of the Machine may cause the Machine to tilt.

## CAUTIONS WHEN SNOW COVERED OR FROZEN

Always observe the following to prevent serious injuries and death accidents when traveling over snow covered ground or frozen road for unavoidable reason.

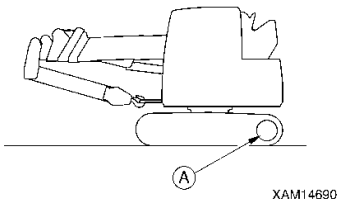
- The snow covered grounds and frozen roads cause slips even when the inclination is small, so decrease the speed when traveling and avoid starting suddenly, stopping suddenly and swinging suddenly. Uphill and downhill are especially likely to cause slips and thus dangerous.
- Ground of the frozen road becomes soft when the air temperature rises and causes the Machine travel and other operations to be unstable. Be very careful.
- Under cold weather, check that the load to be hoisted is not frozen or stuck to the ground or other substance. Attempting to hoist without knowing the load is frozen or stuck to the ground or other substance is dangerous.
- Do not directly contact metal surface with your body part such as a finger or hand under cold weather. Attempt to contact the metal surface of the Machine under harsh cold weather may cause the skin to stick to the metal surface.
- Remove snow and/or ice laid on the Machine that causes the safety nameplates to be hard to read. Be especially careful to securely remove those that are on the boom and thus may fall.

## CAUTIONS WHEN PARKING

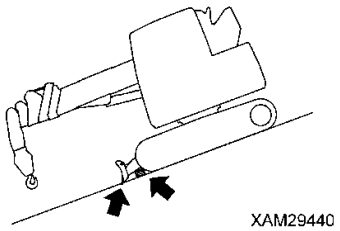
- Park the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Set the Machine to the traveling posture in the right diagram.
  - Make the boom fully lowered and retracted.
  - Fix the hook block to the containment position.

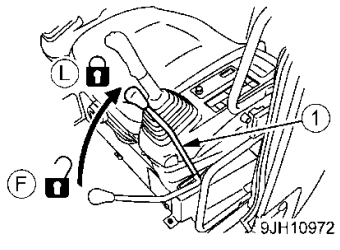
  For a short time parking, secure the hook block to the stowage position below the boom tip. For longer parking, secure it to the regular stowage wire rope in the front of the upper structure.
- Where it is un-avoidable to park the machine on a slope, observe strictly as follows:
  - Make the boom fully lowered and retracted.
  - Fix the hook block to the containment position.

  For a short time parking, secure the hook block to the stowage position below the boom tip. For longer parking, secure it to the regular stowage wire rope in the front of the upper structure.
  - Set the front of the machine (blade) on the downhill side. Then dig it into the ground.
  - Put blocks under the tracks to prevent the machine from moving.
- When you leave the machine, observe strictly as follows:
  - Set lock lever (1) to LOCK position (L), and then stop the engine.
  - Always close the operator's cab door, and use the key to lock all the equipment in order to prevent any unauthorized person from moving the machine. Always remove the key, take it with you, and leave it in the specified place.



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# 2.4 PRECAUTIONS WHEN WORKING WITH CRANE

## INSPECTION BEFORE STARTING WORK

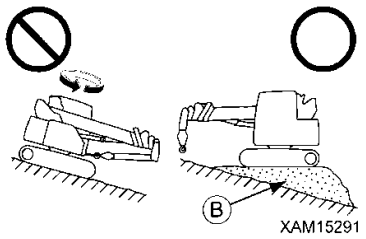
Check that the safety devices and crane operate properly.
- Operate each of the operation levers, pedals and switches under no load, and check that operations take place without abnormality.
  Repair immediately if any abnormality exists.
- Check that the safety devices such as the moment limiter, over hoist detector device and three-winding stop alarm device activate properly.

## PRECAUTIONS WHEN DECIDING THE CRANE OPERATION SITE

Always place the machine on the level and solid ground.
Crane operation is dangerous when the machine is placed in a site as below:
- Temporary asphalt pavements
- Thin concrete pavements
- Stone pavements
- Where the surface looks solid but the soil under it is soft, or the soil below pavement is washed by water to become hollow.
- Soft grounds which may collapse or are near a shoulder of a road or an excavated hole.
- Slopes

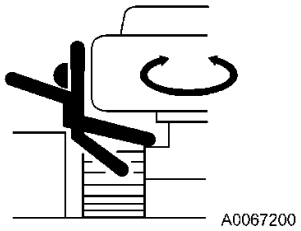
## PRECAUTIONS FOR CRANE OPERATION ON A SLOPE

Where a crane operation on a slope is un-avoidable, fill some soil (B) to prepare a level and solid groundwork, first, and then place the machine on it, so that overturning is prevented.
Unless this is done the crane is not placed level and attempting to hoist will mean that the moment limiter (over-load detector) will not work accurately, as well as un-foreseeable force to the machine which may overturn or damage it.




## FOLLOW INSTRUCTIONS AND SIGNS WHEN WORKING

- When working with the crane, appoint a work supervisor and mutual signs beforehand, and follow the work supervisor and signs during work.
- When working at a location where many parts are out of sight from the driver, be especially careful to follow the instructions and signs of the work supervisor and pay attention when driving.
- When working with the crane, the clearance between the boom and the upper structure and also the gaps between the movable parts of the derrick cylinder may catch body parts such as an arm or finger. The driver is requested to make sure no one is within the working radius of the crane before operating crane.




## CAUTIONS HIGH TEMPERATURE OIL WHEN WORKING WITH CRANE

When hydraulic oil temperature exceeds 80 degrees, high pressure hoses and seals can be damaged by heat, and it may cause burn by spouted oil.
If temperature of hydraulic oil becomes over 80 degrees, stop operation and wait until the oil cools down.
Continuous hook raising / lowering operation at high working lifting height and a long time accelerated operation are easier to raise oil temperature. Especially be careful for these operations.



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## CAUTIONS UNDER COLD WEATHER

- Remove snow from and defreeze the swing gear, boom and winch related parts, and check the movements before work.
- Check the operation of winch brake.
- Warm up enough. Attempting to operate the operation levers, pedals and switches without enough warm-up causes the Machine to react dull, and may result in unexpected accidents.
  ★ For details of warm up operation, see “Operation 3.4.1 Engine Warm Up”, “Operation 3.4.2 Hydraulic Equipment Warm Up”.
- Accumulation of snow within the working range of the crane can cause turnover of the unloaded load or the workers around may trip over. Remove snow sufficiently before starting crane operation.
- If the load to be hoisted is stuck to the ground because it is covered with snow or frozen, do not force to hoist the load. Thoroughly remove the snow or unfreeze before the crane operation.
- After end of the work, wipe off and apply wraps if substances such as condensation, snow or mud are stuck to the wire harness, connector (1), switches, sensors or similar part.
  If the infiltrated condensation and/or similar substance freeze, the Machine may operate improperly upon the next use and cause unexpected accidents.



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## PAY ATTENTION TO WEATHER INFORMATION

- In case of thunderstorm, risk of lightning exists, so abort working with crane, immediately lower the load and contain the boom.
- Exposing the hoisted load to wind causes the load to swing and causes the Machine to be unstable, thus is dangerous. Immediately lower the load and contain the boom when the wind is causing the load to swing.
- If the maximum instantaneous wind speed is 10 m/s or greater, abort working with crane, immediately lower the load and contain the boom.
- Even when the maximum instantaneous wind speed is below 10 m/s, the bigger the hoisted load, the higher the hoisted load position, and the longer the boom, the wind effect increases accordingly. Be very careful during work.
- When the boom is extended full or nearly full, take notice of that the winch wire ropes and electrical cable for signals are also effect by the wind. In addition, the wind speed may extremely increase when it blows through the high-rise buildings. Thus, be very careful when working near high-rise buildings.
- When a load such as a steel plate that has a large area exposed to wind is being hoisted, the wind arriving from front/rear/side of the boom may cause the Machine to trip or damage the boom. Be very careful when working.
- In a condition where wind blows to the front face of the boom, the higher the boom is raised, the more you may run a risk of overturning backward. Be very careful when working in such conditions.
- When an earthquake occurs, abort working and wait until the earthquake is over.

★The following table indicates approximate relation between the wind speed and wind effect. The wind speed mentioned in the weathercast is mean wind velocity (m/s) during 10 m at 10 m above the ground.

| Force | Wind Speed (m/s) | Effect On Land |
|---|---|---|
| 0 | Less than 0.3 | Smoke rises vertically. |
| 1 | 0.3 - below 1.6 | Wind motion visible in smoke. |
| 2 | 1.6 - below 3.4 | Wind felt on exposed skin. |
| 3 | 3.4 - below 5.5 | Leaves and smaller twigs in constant motion. |
| 4 | 5.5 - below 8.0 | Dust and loose paper raised. Small branches begin to move. |
| 5 | 8.0 - below 10.8 | Smaller trees sway. Some foam and spray. |
| 6 | 10.8 - below 13.9 | Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. |
| 7 | 13.9 - below 17.2 | Whole trees in motion. Effort needed to walk against the wind. |
| 8 | 17.2 - below 20.8 | Twigs broken from trees. Progress impeded. |
| 9 | 20.8 - below 24.5 | Light structure damage. Slates blown off. |
| 10 | 24.5 - below 28.5 | Trees uprooted. Considerable structural damage. |
| 11 | 28.5 - below 32.7 | Widespread structural damage. |



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## CAUTIONS WHEN WORKING WITH CRANE

- The stability of the crane is determined horizontally. Although the stability also increases diagonally, work exceeding the rated load causes the breakage of the boom or machine. The moment limiter (overload detector) must not be activated even in diagonal direction.
- Be sure to verify that the moment limiter emergency stop cancel switch is at OFF (auto) position before operating the crane. Do not attempt the crane operation when the moment limiter emergency stop cancel switch is at ON (cancel) position. The moment limiter emergency stop cancel switch is permitted to be at ON (cancel) position only during the inspection or maintenance works.
- Pay attention to indication and warning on the moment limiter while working.
- Attempt to work beyond the capacity of the Machine may cause serious accidents and failures caused by for instance tripping or fluctuation. Observe the rated total load chart when working with the crane.
- Be slow when operating the crane.
  Sudden lever or accelerator operations may cause risks such as swinging or falling of the load and collision with the surroundings. Be especially careful to be slow during the swing operations.
- Determine a work supervisor for crane operation and always follow the instructions of the supervisor.
  Follow the instructions of the supervisor for work methods and procedures.
  Determine how to give signs and follow these signs.
- A long load is instable when hoisted and thus, dangerous. Attach a rope to the both ends of the load to make the load stable.
- Do not let people approach the work radius or stand below the load, since risks such as fall of the load and contact with the load exist. Such attempt may result in serious bodily accidents. Also, during the work, consider the fact that the working radius increases when the load is hoisted and the boom is deflected thus.
- Work that goes beyond the machine performance will cause accidents and failures. Particularly, the crane operation must be performed based on the rated total load chart.
- Be careful to prevent the wire rope and/or hoisted load from contacting an obstacle such as a tree or steel when hoisting a load.
  If caught by an obstacle, do not forcibly wind up the hoist load, but untangle the caught part before winding up.
- Do not pull laterally, pull toward you or hoist diagonally. Such attempt may cause the crane to tip or suffer damage.
- Attempt to work with the crane when the view is bad due to location or weather is dangerous.
  Ensure brightness by posting a work lamp or other illumination facility in dark places.
  When the view is bad because of bad weather (rain, fog, and snow), abort working and wait until the weather recovers.
- Do not use for purpose, for instance raising a person using a crane, other than the true purpose.
- If the over-winding detector alarm buzzer is heard, immediately leave your hand from the winch lever.
  The hook block winding stops. Then, operate the winch lever to Down (push forward) to wind down the hook block. In addition, the hook block is wound up when the boom is extended, so be sure to allow extra clearance between the boom and the hook block during work.
- When the boom extends, the hook block is wound up.
  Operate the winch lever to Down (push forward) to wind down the hook block while you extend the boom.
- Whenever an overload occurs during work, lower the load by winding down the winch by setting the winch lever to Down (push forward).
  Do not raise or lower the boom acutely. Such attempt may cause serious accidents by tipping.
- The volume of the hydraulic oil in each of the cylinders changes depending on the temperature.
  By leaving idle with a load being hoisted, as the time passes by the oil temperature drops and the hydraulic oil volume decreases, and changes such as the boom derrick angle decrease and boom length decrease may occur.
  In that case, execute boom derricking operations and boom extension operations appropriately to correct.
- Do not leave the driving operation position when a load is hoisted.
  Lower the load and place lock lever to LOCK position before leaving the Machine.
- Keep the hook block wound up when not in use.
  Otherwise, person near the load may collide the hook block without load.
- Operator must not leave operation seat during operation.
- The work that hoists an attachment that generates some vibration such as VIBROs is forbidden. The vibration of the attachment may break the winch, etc.



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## CAUTIONS WHEN HANDLING MOMENT LIMITER

- Use/store the moment limiter under the following ranges of ambient temperature.
  ★Temperature of use: -10 to 50 degrees C  Storage temperature: -30 to 70 °C
- Avoid direct sunlight so that the temperature of the moment limiter body does not exceed the above range.
- Avoid locations with strong acid or alkaline atmosphere as much as possible. Otherwise, unexpected failures may occur.
- Do not apply impact to the moment limiter body for instance by colliding with an object.
  Such attempt may damage the case and may result in failures and improper operations.
- Do not push the panel sheet of the moment limiter body by a force more than necessary or push with sharp object such as a tip of a screwdriver. Such act may damage the panel sheet and may result in failures and improper operations.
- Do not remove the case cover or panel sheet from, or disassemble the moment limiter body. Such act may damage case and/or panel sheet and may result in failures and improper operations.

## CAUTIONS WHEN SETTING UP MOMENT LIMITER

- The moment limiter calculates the moments assuming the Machine is level.
  If you work with the crane when the Machine is not level, warnings and alarms are not issued even when the rated total load is near.  Always use the level to ensure that the machine is not at an angle.
- Before using the moment limiter, check that the boom angle display, boom length display and real load display are displayed correctly following the crane movements. Attempt to use without correct display results in failure to obtain correct measurement result and may result in serious bodily accidents caused by reasons such as a tipping over and/or breakage of the machine.
- Always make sure the fall mode setting of the moment limiter matches with the wire fall of the crane. Attempt to use unmatched wire falls may results in failure to obtain correct measurement and may result in serious accidents caused by reasons such as a breakage of wire rope.
- Do not carelessly change the setting when measuring with the moment limiter. Such attempt results in failure to obtain correct measurement result and may result in serious bodily accidents caused by reasons such as a tipping over and/or breakage of the machine.

## CAUTIONS WHEN SLINGING

- Check the following before hoisting a load.
  Attempt to hoist the load without checking may result in serious bodily accidents by a drop of the load or tipping of the crane.
  - Observe the values in the rated total load chart.
  - Hoist from the center of gravity of the load.
  - Check that the wire ropes of the hook block are perpendicular to the ground.
  - When the load leaves the ground, stop winding up the load once and check whether the load is stable.
- Before hoisting a load, always check whether the sling wire rope "retainer device" of the hook block is hanging securely If not the wire rope may leave the hook block and cause the load to fall and results in a serious accident.
- Larger sling rope angle when hoisting the load increases force to the sling rope even when the load weight is unchanged, thus may cause the sling rope to snap off. Be careful when slinging in order to prevent excessive force to the sling rope.
- Do not hoist more than 1 load at a time.
  This could cause the hoist bracket to hit and damage the other hoisted load, the loads may move and loose balance and cause tipping, or some other cause of a serious accident.
  Do not hoist more than one load even if the total is within the rated total load.
- Hoisting of lengthy load may cause the load to lose balance and is dangerous.
  In case of lengthy such load, hoist vertically by using a cramp, or achieve balance of the hoisted load by applying a rope to both ends of the load.

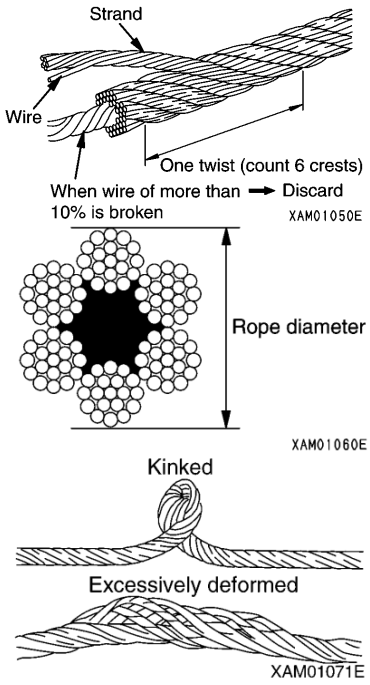


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## CAUTIONS WHEN HANDLING WIRE ROPE

- The wire rope wears down as the time passes, so inspect every time before work, and replace immediately if at or beyond the replacement standard.
  At the same time, inspect the sheave at the tip of the boom and the sheave of the hook block. Damaged sheaves accelerate the damage of the wire ropes.
- Use the wire ropes specified by us.
- Wire rope breakage causing protruding wires may injure your hands. Always put on leather gloves when handling the wire rope.
- Handling worn and damaged wire may cause injure by wire splinter.
- Do not use any wire rope of which any of the followings apply.
  - 10% or more of the wires (except the filler wires) in one twist of the wire rope are snapped off.
  - The wire rope diameter wear is beyond 7% of the nominal diameter.
  - Is kinked.
  - Is excessively deformed or corroded.
  - Affected by heat or sparks.







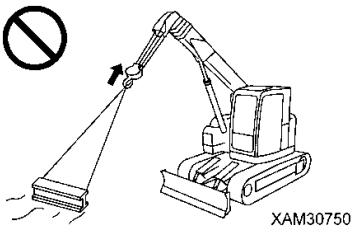


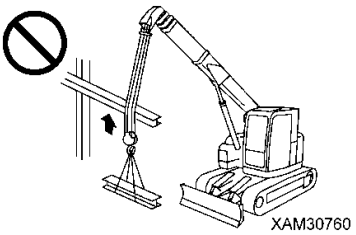
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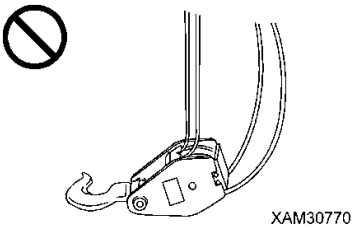
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## CAUTIONS WHEN OPERATING WINCH

- Select the hook appropriate for the load weight and right number of wire rope falls.
  ★ For details, see “Operation 5. Handling Wire Rope”.
- Do not let persons enter below the hoisted load.
- When hoisting a load, always stop once at the "takeoff" position where the hoisted load leaves the ground. Check subjects such as load stability and load force, then hoist up the load.
- Do not pull laterally, towards you or hoist diagonally. Such attempt may cause the crane to tip or suffer damage.
- Over-winding of the hook block may result in collision with the boom, snapping the wire ropes and causes the hook block and load to fall and cause serious accidents. Be fully careful to prevent over-winding the hook block.
- Be careful to prevent the wire rope and/or hoisted load from contacting an obstacle such as a tree or steel when hoisting a load. If caught by an obstacle, do not forcibly wind up the hoist load, but untangle the caught part before winding up.
- Do not use the winch drum wire rope in random condition. If random, not only the wire rope suffers damage and shortens the lifetime, but the wire rope may snap and causes serious accidents. Observe following precautions to avoid wire rope from becoming random.
  - Do not let the hook block hit the ground.
  - Before leaving the hook block lowered for a long time, for instance when working with underground, leave at least three loops of wire rope in the winch drum.
- Release the accelerator pedal to decrease the engine speed, and slowly return the right working control lever to decelerate from high-speed hoisting. Returning the right working control lever quickly at high speed will result in a rapid deceleration shock in the hook, popping the hook and leading to irregular winding.
- Hoisting/Lowering in high-speed mode should be used to hoist/lower the hook alone. Hoisting/Lowering the hung load in high-speed mode can break boom, frame or cause serious accidents in which the machine turns over.
- If the wire rope is twisted and causes the hook block to turn, fully eliminate the twist before work.
  ★See “Operation 4.2 What to do with Twisted Winch Wire Rope” for details.


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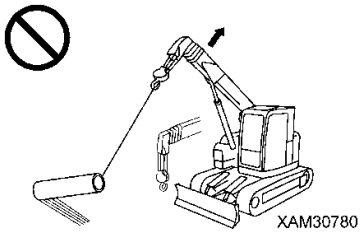


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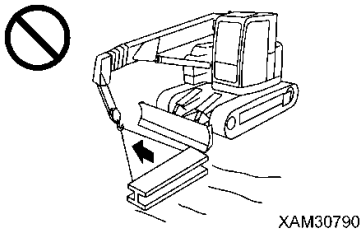
## CAUTIONS WHEN OPERATING BOOM

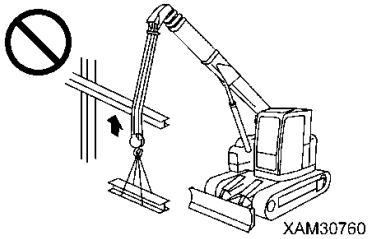
- Be as slow as possible when operating the boom operation lever. Especially avoid sudden lever operations when the load is hoisted, which may cause the load to swing and give large impact to the Machine, and thus may damage the crane or trip the Machine.
- When the boom is lowered, the working radius increases, and the rated total load that can be hoisted decreases. When working while raising/lowering the boom, pay extra attention so that the mass (weight) of the load at the time the boom is most lowered does not cause overloading.
- Attempts to pull the load laterally or pull to bring forth the load by raising/lowering and/or extracting/retracting operation of the boom are prohibited. Do not attempt under any circumstance.
- Be aware of the hook block windup condition and exercise caution when extending or retracting the boom.
- When the boom is extended, the working radius increases, and the rated total load that can be hoisted decreases. When working with extending/retracting the boom, pay extra attention so that the mass (weight) of the load at the time the boom is most lowered does not cause overloading.




## CAUTIONS DURING SWING OPERATION

- Check the safety in the vicinity and blow the horn before swinging.
- Be as slow as possible when operating the swing lever. Make sure to start smoothly, swing slow, and stop gently.
  Especially avoid sudden lever operations when the load is hoisted, which may cause the load to swing and cause the Machine to lose balance, and thus may damage the crane or tip the Machine.
- Attempts to pull to bring forth the load or let the load stand up by swinging operation are prohibited. Do not attempt under any circumstance.
- Be careful to prevent the wire rope and/or hoisted load from contacting an obstacle such as a tree or steel when hoisting a load or when swinging.
  If caught by an obstacle, do not forcibly wind up the hoist load, but untangle the caught part before winding up.




## COOPERATION HOISTING IS PROHIBITED AS THE RULE

Tandem hoisting, that is to use more than one crane to hoist a load, is prohibited.
Tandem hoisting work is a highly hazardous work that may cause for instance a tip of the Machine due to uneven center of gravity, fall of the hoisted load or boom damage.
If the need to work so exists for unavoidable reason, establish a work scheme by responsibility of the user, discuss fully, let the worker fully acknowledge the work method and procedures, then work carefully under the direct leadership of the work supervisor.
And, observe the following cautions as well.

- Use the cranes of same model.
- Choose the Machine model that can handle sufficiently larger load than the load to be hoisted.
- Make sure only one person gives signs.
- Limit the crane operations to single operations as the rule, and do not attempt any swing operation.
- Appoint one responsible slinger who is most experienced.



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## WORKING AT THE SITE WITH UNDERGROUND LIFTING

- Leave at least three loops of wire rope in the winch drum when winding down the wire rope in case of underground work or similar occasion. This Machine is equipped with three-winding stop alarm / automatic stop device as the safety device, but even then be very careful to prevent this safety device from activating.
- Make sure signs are communicated fully.
- Be especially careful with the crane operations.

## SAFETY RRECAUTIONS FOR PICK & CARRY OPERATION

Pick and carry operation is a very unstable and dangerous practice; it is prohibited, in genreal.
Where such an operation is un-avoidable, strictly observe followings. Failure to observe precautions may result in death or serious injury.

- Observe the precautions specified in the operation manual:
  ★Refer to "Operation 3.25.1 Safety Precautions for Pick and Carry Operation".
- Always keep the correct posture as specified in the operation manual:
  ★Refer to "Operation 3.25.2 Posture for Pick and Carry Operation".
- The hoisted load should be within a safe load range and kept in a height near the ground.
- Arrange a person to guide the machine traveling.
- Remove all the obstacles in the pick and carry path and keep out all the persons.
- Hoisting in the boom configuration exceeding the rated length is prohibited.
- The rated total load is applicable only to the optimum condition. Limit the load to a safety level based on the particular condition.
- To prevent the hoisted load from swinging in a pick and carry operation, keep the engine in low idling (low speed rotation) and set the travel speed selector switch to the "Low" position. Avoide operations such as sudden start and stop, or changing the travel speed to "High" position.
- During a pick and carry operation, never attempt shifting to the travel speed selector switch to the "High" position, swinging the upper structure and/or other crane operations.



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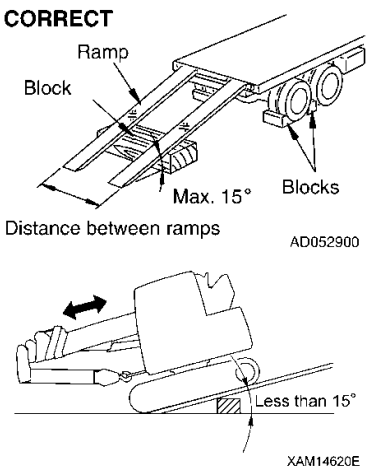
# 3. TRANSPORT PRECAUTIONS

## CAUTIONS DURING TRANSPORT

When transporting the machine on a trailer, do as follows.
- The weight, transportation height, and overall length of the machine differ accroding to the crane.
- When passing over bridges or structure on private land, check first that the structure is strong enough to support the weight of the machine.
- When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For details of the transportation procedure, see “Operation 6. Transportation”.

## CAUTIONS WHEN LOADING OR UNLOADING

When loading or unloading the machine, mistaken operation may bring the hazard of the machine tipping over or falling, so particular care is necessary. Always do as follows.
- Select a location that is level and has firm road surface when loading or unloading the Machine. In addition, keep enough distance from the roadside.
- Use the ramps under 15 degrees or smaller angle. In addition, decide the clearance between ramps to meet the center of the tracks.
- Use the ramps that have fully strong width, length and thickness, and that enable safe loading/unloading. Reinforce with blocks or other substances if the ramps deflect much.
- Remove the mud and other substances from the footing to prevent the Machine from skidding over the ramps. Remove the substances stuck the ramps such as grease, oil or ice, and keep clean.
  Be especially careful in the rainy days where slips easily occur.
- Always turn the auto-deceleration switch OFF (cancel).
  If the auto-deceleration switch is left ON, the machine may suddenly move.
- When loading or unloading the machine, always keep it in a traveling posture and fix the hook block by the stowage wire rope.
  ★ See “Operation 3.7 Machine Travel Posture” for details.
- When loading or unloading, set the engine rotation to low idling (low speed rotation) and operate slowly by low speed travels.
- Always move backward when loading the Machine. Moving forward may cause a trip.
- When on the ramps, do not operate any lever except for the travel lever.
- Never correct your steering on the ramps. If necessary, drive off the ramps, correct the direction, and then enter the ramps again.
- The center of gravity of the machine will change suddenly at the point between the ramps and the truck or trailer, and there is danger of the machine losing its balance. Travel slowly over this point.
- When loading or unloading to an embankment or platform, make sure that it has suitable width, strength, and grade.
- When the machine is required to turn its direction on the carrier, keep it in a traveling posture and operate slowly, as the base is unstable.
- Always lock the door after loading machine. If this is not done, the door may suddenly open during transportation.
- After loading the machine, apply the wood blocks so that the machine does not move, and securely fix with wire ropes or other means.
  ★ See “Operation 6.1 Loading/unloading” for details.
  ★ See “Operation 6.3 Cautions in Loading Machine” for details.






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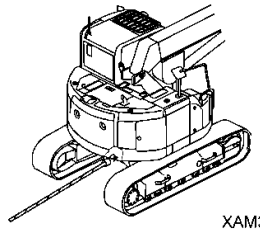
# 4. TOWING PRECAUTIONS

## SAFETY RULES FOR TOWING

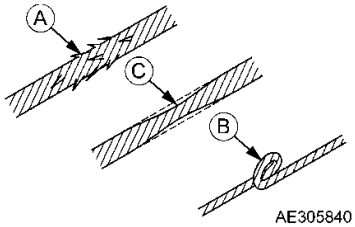
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

★For details of towing, see “Operation 9.3 Lightweight Towing Hook”.

- Always wear leather gloves when handling wire rope.
- During the towing operation, never stand between the towing objects and the machine being towed.
- Never tow a machine on a slope.
- Never use a wire rope which has cut strands (A), reduced diameter (C) or kinks (B). There is danger that the rope may break during the towing operation.



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# 5. MAINTENANCE PRECAUTIONS

## 5.1 PRECAUTIONS BEFORE MAINTENANCE

### FAILURE REPORT

Execution of a maintenance not described in our manual may cause unexpected failures.
Ask us or our sales service agency for repair.

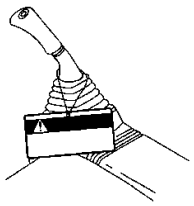
### PRECAUTIONS FOR WARNING TAG

- Always attach the “Do NOT operate” warning tag to the work equipment control lever in the operator’s cab to alert others that you are performing service or maintenance on the machine. Attach additional warning tags around the machine if necessary.
  ★Warning tag Part No. 09963- 03001
  Keep this warning tag in the tool box while it is not used. If there is no tool box, keep the tag in the operation manual pocket.
- If others start the engine, or touch or operate the work equipment control lever while you are performing service or maintenance, you could suffer serious injury or property damage.

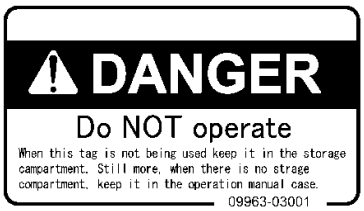
**⚠ DANGER**

**Do NOT operate**

When this tag is not being used, keep it in the storage compartment. When there is no storage compartment; keep it in the operation manual case.



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### KEEP WORK PLACE CLEAN AND TIDY

- Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean and tidy to enable you to carry out operation safety.
  If the work place is not kept clean and tidy, there is the danger that you will trip, slip, or fall over and injure yourself.
- When cleaning the ceiling window which is made of organic glass (polycarbonate), use tap water and avoid use of organic solvents for cleaning. An organic solvent like benzene, toluene or methanol can invite a chemical reaction like dissolution and decomposition on the window glass, deteriorating polycarbonate in use.

### SELECT A PLACE

- Stop the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landsides, or flooding if the land is low.

### PERSONNEL

Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area. If necessary, employ an observer.

### FOLLOW SUPERVISOR INSTRUCTION DURING TEAMWORK

Appoint a person who supervises the work and follow his/her instructions in case of Machine repair or installing/uninstalling a work device.
Unexpected accidents due to misunderstood communication between workers may occur during teamwork.

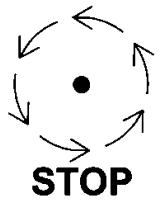


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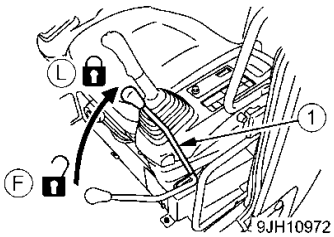
## STOP ENGINE BEFORE CARRYING OUT MAINTENANCE

- Stop the machine on firm, level ground. Store the crane, and then stop the engine.

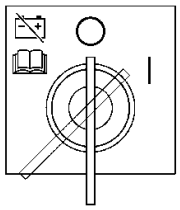



- Turn the starter switch to the ON position. Operate the work equipment control lever back and forth. Left and right at the full stroke 2 to 3 times to eliminate the remaining internal pressure in the hydraulic circuit, and then push up lock lever (1) to the LOCK position (L) and turn starter switch to the OFF position.
- Check that the battery relay is off and main power is not conducted.
  ★Wait for approx. one minute after turning off the engine starter switch key and press the horn switch. If the horn does not sound, it is not activated.
- Set the Disconnect Switch by the battery to "○" position to cut the power line, to prevent the engine from un-expected starting during maintenance.

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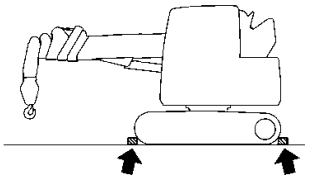



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- Put blocks under the track to prevent the machine from moving.



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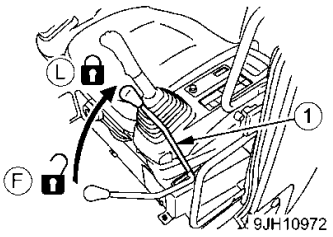
## TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

To prevent injury, do not carry out maintenance with the engine running. If maintenance must be carried out with the engine running, carry out the operation with at least two workers and do as follows.

- One worker must always sit in the operator's seat and be ready to stop the engine at any time. All works must maintain contact with the other workers.
- When carrying out operations near the fan, fan belt, winch drum, or other rotating parts, there is a hazard of being caught in the parts, so be careful not come close.
- Never drop or insert tools or other objects into the fan, or fan belt or winch drum, or other rotating parts. Parts may break or be sent flying.
- Do not touch any control levers or pedals. If any control levers or pedals must be operated, always give a signal to the other workers to warn them to move to a safe place.
- Release the pressure remaining in the hydraulic system and operate the lock lever (1) to "Lock" position (L).
  ★Refer to "Maintenance 12. Releasing the Internal Pressure from the Hydraulic System".
- Do not touch any control levers or pedals. If any control levers or pedals must be operated, always give a signal to the other workers to warn them to move to a safe place.



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## USE APPROPRIATE TOOLS

Use only tools suited to the task and be sure to use tools correctly. Using damaged, low quality, faulty, makeshift tools improper use of the tools could cause serious personal injury.



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## PRECAUTIONS FOR ELEVATED WORK

For elevated work, prepare an appropriate elevated work platform with steps.

## CAUTION WHEN WORKING UNDER THE MACHINE NAD CRANE

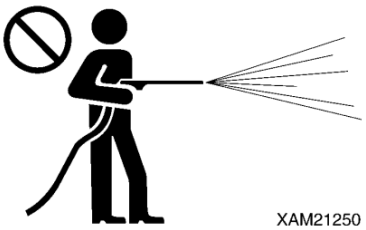
- Hoists or jacks used to lift the machine up must be capable to carry on the weight of the component and be in a good condition, as well. In addition, avoid using a hydraulic jack to lift up the damaged, bent or twisted part of the machine. Also, the wire rope for hoisting should be the one without any wire breakage, decreasing in the diameter and/or kink. Avoid using bent or damaged hooks.
- If it necessary to go under the crane or the machine to carry out service and maintenance, support the crane and machine securely with blocks and stands strong enough to support the weight of the crane and machine.
- Avoid using concrete blocks to support the machine. Concrete blocks easily crush even in small loads.



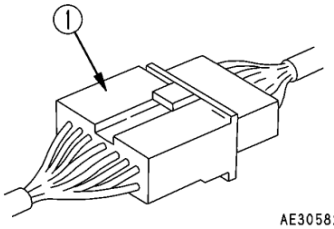
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## CLEAN BEFORE INSPECTION OR MAINTAIN

- Before starting an inspection or maintenance, clean the Machine and prevent rubbish from entering the Machine and make sure the safety will be ensured during maintenance.
- Attempt to inspect or maintain with the maintenance Machine still dirty not only lessens chance of locating faulty part, but may cause rubbish or mud entering your eye, or slipping and tripping resulting in injury.
- Always observe followings when washing the vehicle.
  - Use anti-slip shoes to prevent slips and trips caused by wet foothold.
  - Put on protective equipment when using a high pressure steam car wash. Avoid the accidents that the contact with high pressure water causes such as skin laceration or mud or other substances flying into eye.
  - Do not directly spray water onto electrical system (sensors, connector (1), receiving box and related). Entrance of water into the electrical system causes faulty operations and may trigger improper operations, thus is dangerous.



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# 5.2 PRECAUTIONS DURING MAINTENANCE

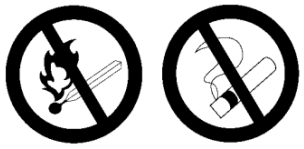
## CAUTIONS DURING WELDING REPAIR

Welding operation must always be carried out by a qualified welder and in a place equipped with proper equipment. There is a hazard of gas, fire, or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

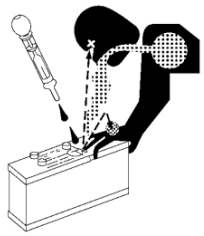
## BATTERY HANDLING CAUTIONS

To check or handle the battery, turn the starter switch to the OFF (cut) position and set the disconnect switch by the battery to "○" position to cut the power line, to prevent the engine from un-expected starting during maintenance.
The battery fluid includes diluted sulfuric acid, and generates hydrogen gas, and causes bodily accidents and fires if handled improperly, so always observe the followings.

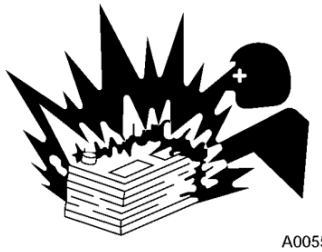
- Do not let a cigarette or any fire source approach the battery.
- Always put on protective glasses and rubber gloves before handling the battery.
- If the battery fluid contacted clothing or skin, immediately wash away by huge quantity of water.
- If the battery fluid entered an eye, wash immediately with water and see the doctor as soon as possible.
- If you have swallowed the battery fluid by mishap, immediately drink huge quantity of water, milk, raw egg or vegetable oil, and see the doctor as soon as possible.
- Wipe with a wet clean cloth when cleaning the battery upper surface or related part. Do not use organic solvent or detergent, for instance gasoline or paint thinner.
- Tighten the battery cap fully.
- If the battery fluid is frozen, do not charge battery or start the engine using other power source. Such act may cause the battery to catch fire.
- Before charging or starting up using other power source, defreeze the battery fluid and check that failures such as battery fluid leak do not exist.
- Always detach the battery from the Machine frame before charging the battery.



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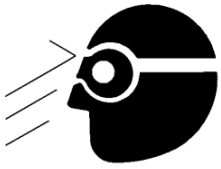
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## BEWARE OF CHIPS WHEN WORKING WITH HAMMER

Whilst working with a hammer, keep protective equipment such as protective glasses and a helmet on, and insert a copper bar or similar object between the hammer and the target when hitting.
Giving impact to a hard metal part such as a pin or a bearing may cause the broken chip to enter eye and inflict injury.



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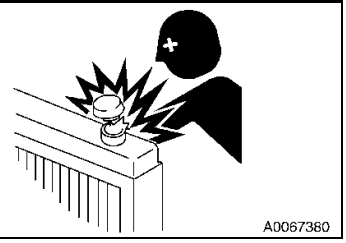


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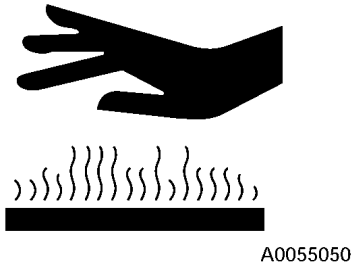
## CAUTIONS WHEN COOLANT TEMPERATURE IS HIGH

To prevent burns from hot water or steam spurting out when checking or draining the coolant, wait for the water to cool to a temperature where it is possible to touch the radiator cap by hand before starting the operation. Even when the coolant has cooled down, loosen the cap slowly to relieve the pressure inside the radiator before removing the cap.




## CAUTIONS WHEN OIL TEMPERATURE IS HIGH

To prevent burns from hot oil spurting out when checking or draining the oil, wait for the oil to cool to a temperature where it is possible to touch the cap or plug by hand before starting the operation. Even when the oil has cooled down, loosen the cap or plug slowly to relieve the internal pressure before removing the cap or plug.

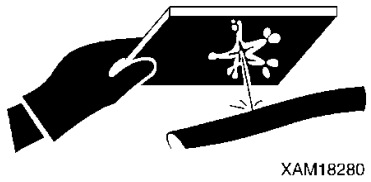



## CAUTIONS FOR HIGH PRESSURE OIL

The hydraulic system is always under internal pressure. When inspecting or replacing piping or hoses, always check that the pressure in the hydraulic circuit has been released. If the circuit is still under pressure, it will lead to serious injury, so always do as follows.

- Release the pressure in the hydraulic circuit. Do not carry out any inspection or replacement work when the hydraulic system is under pressure.
  ★Refer to "Maintenance 12. Releasing the Internal Pressure from the Hydraulic System".
- If there is any leakage from the piping or hoses, the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.
  When carry out inspection, wear safety glasses and leather gloves.
- There is a hazard that high-pressure oil leaking from small holes may penetrate your skin or cause blindness if it contacts your eyes directly. If you are hit by a jet of high-pressure oil and suffer injury to your skin or eyes, wash the place with clean water, and consult a doctor immediately for medical attention.




## CAUTIONS FOR HIGH PRESSURE FUEL

High pressure is generated inside the engine fuel piping when the engine is running. When carrying out inspection or maintenance of the fuel piping system, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before starting inspection or maintenance.



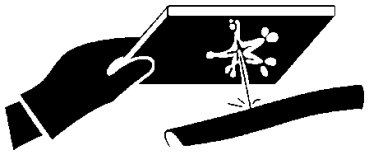
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## SAFETY HANDLING HIGH-PRESSURE HOSES

If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to serious injury. If any loose bolts are found, stop work and tighten to the specified torque. If any damaged hoses are found, stop operations immediately and contact us or our sales service agency.
Replace the hoses if any of the following problems are found.
- Damaged or leaking hydraulic fitting.
- Frayed or cut covering or exposed reinforcement wire layer.
- Covering swollen in places.
- Twisted or crushed movable portion.
- Foreign material embedded in covering.


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## PRECAUTION FOR HIGH VOLTAGE

When the engine is running or immediately after it has stopped, high voltage is generated at the injector terminal and inside the engine controller, so there is danger of electrocution. Never touch the injector terminal or the inside of the engine controller.
If it is necessary, please contact us or our sales service agency.

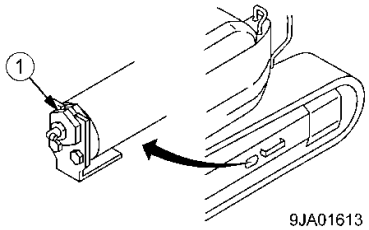

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## NOISE CAUTION

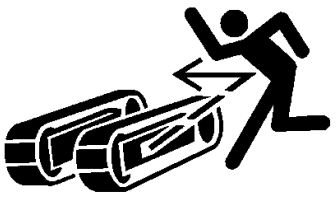
When carrying out maintenance of the engine and you are exposed to noise for long periods of time, wear ear covers or ear plugs while working.
If the noise from the machine is too loud, if may cause temporary or permanent hearing problems.

## SAFETY FIRST WHEN USING HIGH-PRESSURE GREASE TO ADJUST TRACK TENSION

- Grease is pumped into the track tension adjustment system under high pressure.
  If the specified procedure for maintenance is not followed when making adjustment, grease drain plug (1) may fly out and cause serious injury or property damage.
- When loosening grease drain plug (1) to loosen the track tension, never loosen it more than one turn. Loosen the grease drain plug slowly.
- Never put your face, hands, feet, or any other part of your body close to grease drain plug (1).



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## DO NOT DISASSEMBLE RECOIL SPRING

Never attempt to disassemble the recoil spring assembly. It contains a spring under high pressure which serves as a shock absorber for the idler. If it is disassemble by mistake, the spring will fly out and cause serious injury. When it becomes necessary to disassemble it, ask us or our agent.



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## CAUTION FOR ACCUMULATOR AND GAS SPRING HANDLING

The accumulator and gas springs are charged with high-pressure nitrogen gas. When handling the accumulator, careless procedure may cause an explosion which could lead to serious injury or property damage. For this reason, always observe the following precautions.

- Do not disassemble the accumulator.
- Do not bring it near a flame or fire.
- Do not make holes in it, weld it, or use a cutting torch.
- Do not hit or roll the accumulator, or subject it to any impact.
- When disposing of the accumulator, the gas must be released. Please contact us or our sales service agency to have this work performed.




## CAUTION FOR COMPRESSED AIR

- When carrying out cleaning with compressed air, there is a hazard of serious injury caused by flying particles.
- When using compressed air to clean elements or the radiator, always wear safety glasses, dust mask, gloves, and other protective equipment.

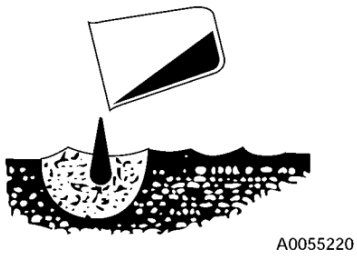
## CAUTION FOR AIR CONDITIONER MAINTENANCE

- If air conditioner refrigerant gets into your eyes, if may cause blindness; if it touches your skin, it may cause frostbite.
- Never touch refrigerant.

## CAUTIONS WHEN TREATING WASTE

Always observe the following to prevent environmental pollution of a district inhabited with humans or animals.

- Do not dispose the waste oil down a water system such as sewage or river.
- Observe the applicable legal regulations and rules when disposing harmful substance such as the machine, oil, fuel, solvent, filter or battery.




## PERIOODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- For using the machine safety for an extended period of time, replace safety-critical parts like hoses and seat belts periodically.
  ★For details, see “Inspection and Maintenance 4. Safety Critical Parts.
- The material of those components naturally changes over time, and repeated use causes deterioration, wear, and fatigue. As a result, there is a hazard that these components may fail and cause serious injury or death. It is difficult to judge the remaining life of these components from external inspection or the feeling when operating, so always replace them at the specified interval.
- Replace or repair safety-critical parts If any defect is found, even when they have not reached the time specified interval.

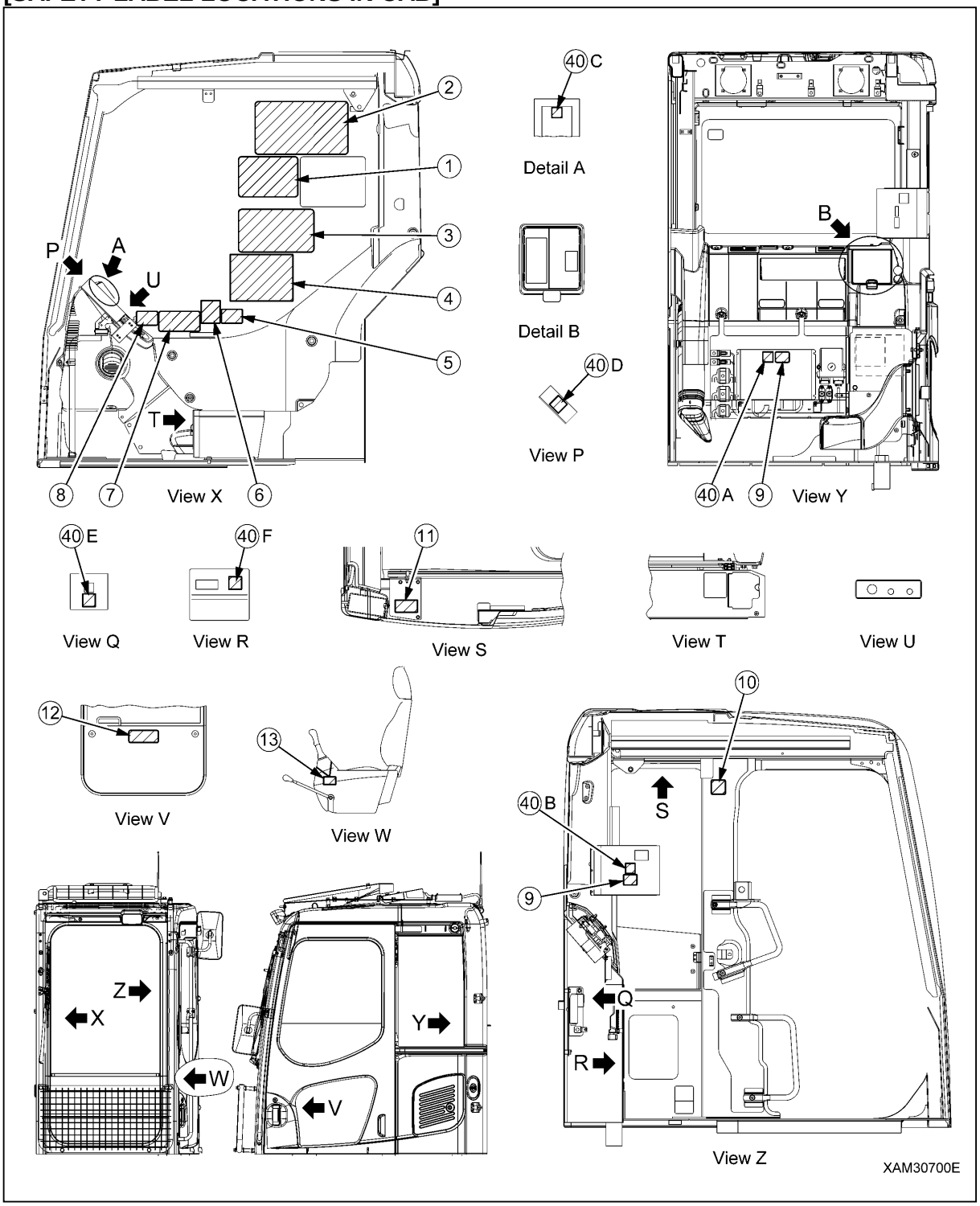


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# 6. SAFETY LABEL LOCATIONS

Keep these labels clean all the time. If lost, apply again or replace with new one.
Labels other than the following safety labels exist, treat them the same.

**[SAFETY LABEL LOCATIONS IN CAB]**

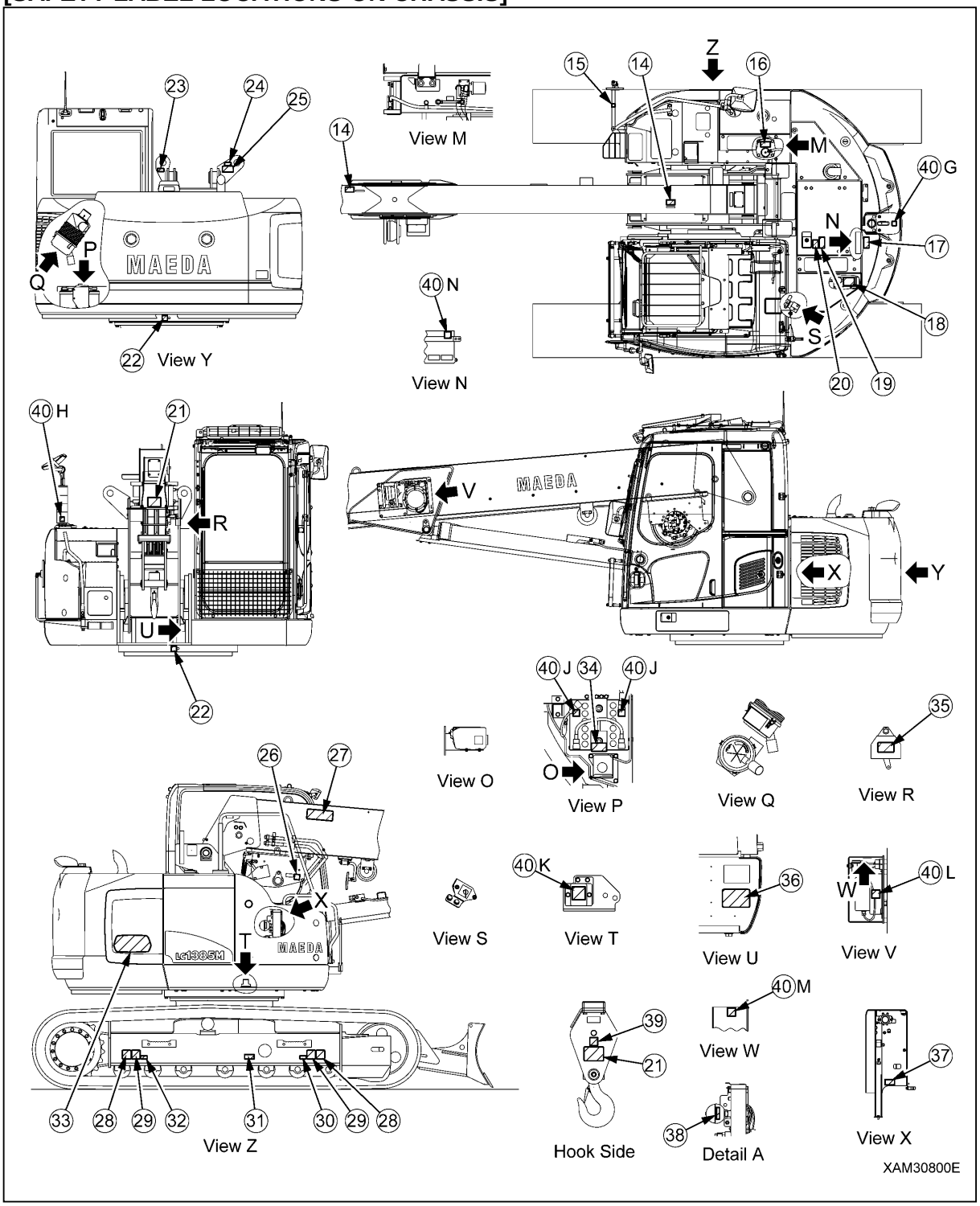





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## [SAFETY LABEL LOCATIONS ON CHASSIS]






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(1) For your safe operation (556-3367900)

# ⚠ FOR YOUR SAFE OPERATION

Be sure to operate your crane after reading Instruction Manual.

1. Be sure to observe local laws and ordinances for crane operation.
2. Before and after work,be sure to conduct daily inspection, lubrication and other required services.
3. Crane should be operated on level,hard groud.
4. Do not lift any load in excess of rated load.
5. Make sure that there is no person or obstacle around the machine during work.
6. Do not allow any person enter underneath the lifted load.
7. Whenever leaving your operator seat,be sure to ground the load and shut down the engine.
8. Never pull or drag any load horizontally.
9. Never operate your crane with safety system function disabled.

## CAUTION (Operation)

1. Definitely avoid composite operation of 3 or more actions. It is too dangerous.
2. Carry out swing operation smoothly, avoiding load to sway.
3. Hoisting loads that produce vibrations is in principle prohibited. Attachments that produce vibrations can cause damage to the winch or other components of the machinery.

## CAUTION (Work on slope)

1. Worlking on slope is prohibited.If inevitable,limit the load to 50% of rated load.Never work on slope that is in excess of 3%. Crane may tip over.
2. Swinging from higher to lower position on slope will be unstable with the load swaying out. Increase boom angle to reduce working radius and lower the swing speed.
3. Never perform travel suspension on slope.

## CAUTION (Traveling on slope)

1. When traveling on slope, travel backward on up-hill and forward on down-hill.
2. When traveling in reverse or in lateral position inevitably,be sure inclination is not in excess of 10 degrees.
3. Never perform swinging travel on slope as it may cause crane to tip over.

## CAUTION (Travel suspension)

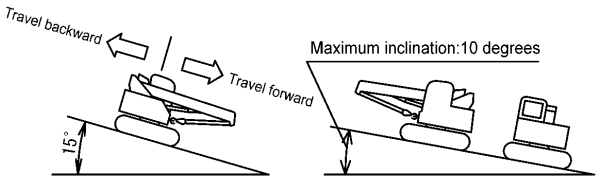
1. Travel suspension is in principle prohibited as it is extremely unstable and hazardous.If inevitable,perform your work in accordance with Rated Load for Travel Suspension.
2. Travel suspension is dangerous because load is likely to sway. Travel speed should be set at LO with engine running at low speed.
3. Avoid jerky start,stop and spin turn.
4. While in travel suspension, do not perform any crane function other than travel.
5. Swing travel on slope is dangerous as it may cause the crane to tip over.

## CAUTION (Hook stowage prior to traveling)

1. Alwais level the boom and stow the hook prior to travel.When stowing the hook,never use the emergency switch. Never attempt to travel with the hook stowed and the boom raised.

## CAUTION (Loading to and unloading from truck)

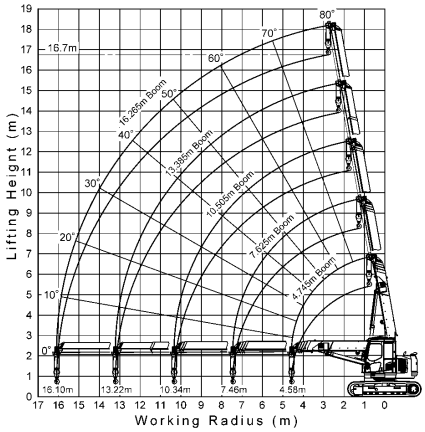
1. Travel backward for loading and forward for unloading.
2. Be sure to engage parking brake of truck and apply wheel blocks.
3. Ramp board angle should be less than 15 degrees.Engage the board securely to truck bed and eliminate any difference of height between each board.
4. Never perform any crane operation other than traveling on truck bed or ramp board as it may cause the crane to tip over.




556-3367900

(2) Working Range and Rated total load Chart (584-2198800)

## Working Range




## LC1385M-8B Total Rated Load Chart

Unit :kg

| Boom Length / Working Radius(m) | ① 4.745mboom | | ② 7.625mboom | | ③ 10.505mboom | | ④ 13.385mboom | | ⑤ 16.265mboom | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Stationary | Pick&Carry | Stationary | Pick&Carry | Stationary | Pick&Carry | Stationary | Pick&Carry | Stationary | Pick&Carry |
| 2.00 | 6000 | 2000 | 6000 | 2000 | 3000 | 1500 | | | | |
| 2.50 | 6000 | 2000 | 6000 | 2000 | 3000 | 1500 | 3000 | | | |
| 2.60 | 6000 | 2000 | 6000 | 2000 | 3000 | 1500 | 3000 | | | |
| 3.00 | 5250 | 2000 | 5260 | 2000 | 3000 | 1500 | 3000 | | 2600 | |
| 3.20 | 4910 | 2000 | 4920 | 2000 | 3000 | 1500 | 3000 | | 2600 | |
| 3.50 | 4450 | 2000 | 4460 | 2000 | 3000 | 1500 | 3000 | | 2600 | |
| 3.85 | 4000 | 2000 | 4000 | 2000 | 3000 | 1500 | 3000 | | 2600 | |
| 4.00 | 3830 | 1915 | 3820 | 1910 | 3000 | 1500 | 3000 | | 2600 | |
| 4.50 | 3320 | 1660 | 3310 | 1655 | 3000 | 1500 | 3000 | | 2600 | |
| 4.58 | 3250 | 1625 | 3240 | 1620 | 3000 | 1500 | 2940 | | 2600 | |
| 4.60 | | | 3220 | 1610 | 3000 | 1500 | 2920 | | 2600 | |
| 5.00 | | | 2880 | 1440 | 2710 | 1355 | 2640 | | 2600 | |
| 5.50 | | | 2520 | 1260 | 2400 | 1200 | 2340 | | 2320 | |
| 6.00 | | | 2210 | 1105 | 2140 | 1070 | 2100 | | 2080 | |
| 6.50 | | | 1950 | 975 | 1920 | 960 | 1890 | | 1880 | |
| 7.00 | | | 1720 | 860 | 1720 | 860 | 1710 | | 1710 | |
| 7.46 | | | 1530 | 765 | 1570 | 785 | 1570 | | 1580 | |
| 7.50 | | | | | 1550 | 775 | 1560 | | 1560 | |
| 8.00 | | | | | 1400 | 700 | 1430 | | 1430 | |
| 8.50 | | | | | 1270 | 635 | 1310 | | 1320 | |
| 9.00 | | | | | 1150 | 575 | 1200 | | 1210 | |
| 10.00 | | | | | 940 | 470 | 1020 | | 1040 | |
| 10.34 | | | | | 880 | 440 | 970 | | 980 | |
| 11.00 | | | | | | | 880 | | 890 | |
| 12.00 | | | | | | | 750 | | 770 | |
| 13.00 | | | | | | | 650 | | 670 | |
| 13.22 | | | | | | | 630 | | 650 | |
| 14.00 | | | | | | | | | 580 | |
| 15.00 | | | | | | | | | 500 | |
| 16.00 | | | | | | | | | 440 | |
| 16.10 | | | | | | | | | 430 | |
| Boom Angle(°) | 0～64.3 | | 0～74.4 | | 0～78.7 | | 0～79.0 | – | 0～79.2 | – |

## ⚠ GENERAL RULE TO OBSERVE

1 The working radius shown is based on the actual value including boom deflection. Always work in accordance with these values.

2 The Working Radius/Lifting Height Diagram is based on operations without a load and does not allow for boom deflection.

3 The rated load is the value not greater than 78% of the tipping load when the machine is placed on flevel, hard ground and forward stability is 1.15 or above.

4 Because it can be extremely unstable and dangerous, traveling with a load should be avoided wherever possible.Where it is unavoidable,always operate in accordance with Total Rated Capacity for Travel Suspension.

5 The Total Rated Capacity for traveling with a suspended load is calculated for travel on level hard ground only. Always lift the load statically and while traveling with a load,do not allow it to swing. Carry the load as close as possible to the ground and avoid jerky stopping,starting and turning.

6 Traveling with a load suspended using boom configurations (4) and (5) is prohibited in all circumstances.

7 When the boom length in use exceeds the boom lengths shown in the lifting charts,always operate in accordance with the capacities shown for the next higher boom length.

8 Values shown in the Rated Total Load Chart include the hook and any other lifting equipment. To determine the actual safe load deduct the weight of the hook block (90kg) and all other lifting equipment.

9 The load is limited by the number of falls of rope between the boom and the hook –

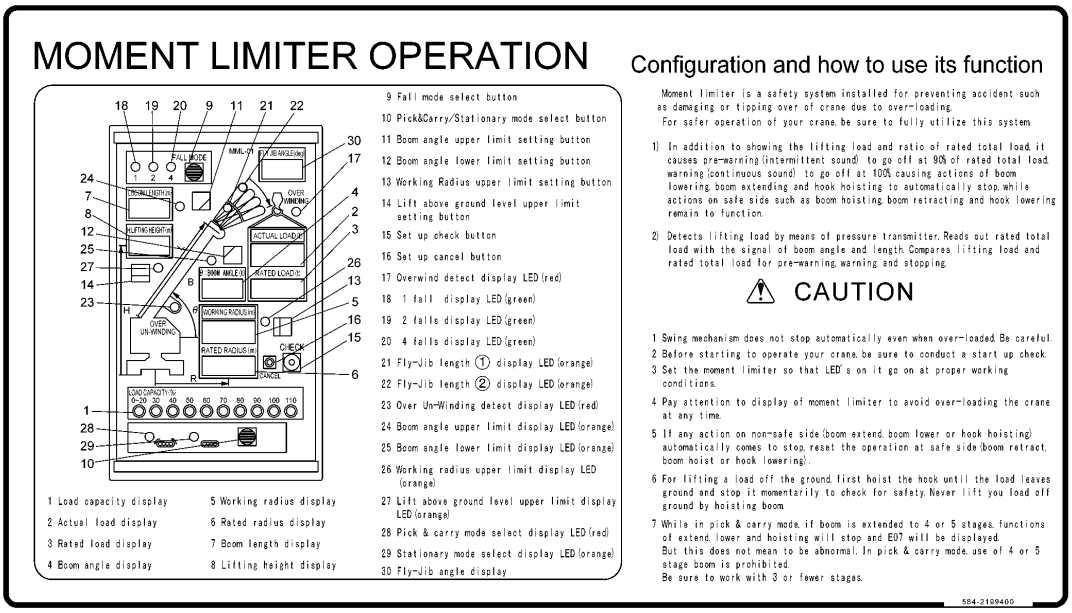
1 fall – 1500kg maximum
2 falls– 3000kg maximum
4 falls– 6000kg maximum

584-2198800

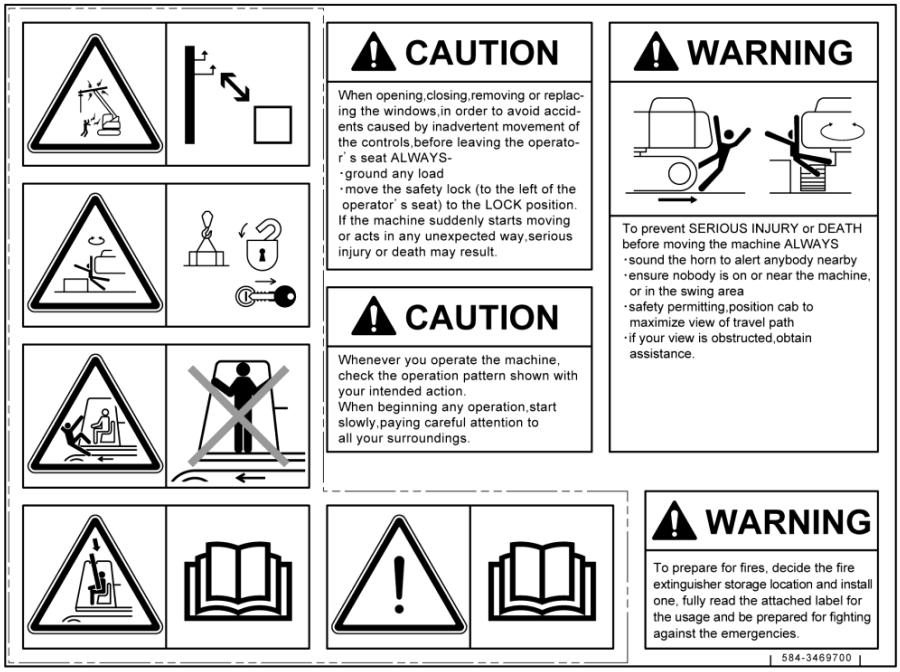


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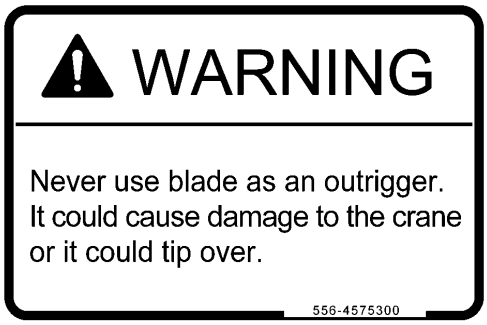
(3) Moment Limiter Operation (584-2199400)




(4) Warning for Operation, Inspection and Maintenance (584-3469700)




(5) Warning for blade operation (556-4575300)



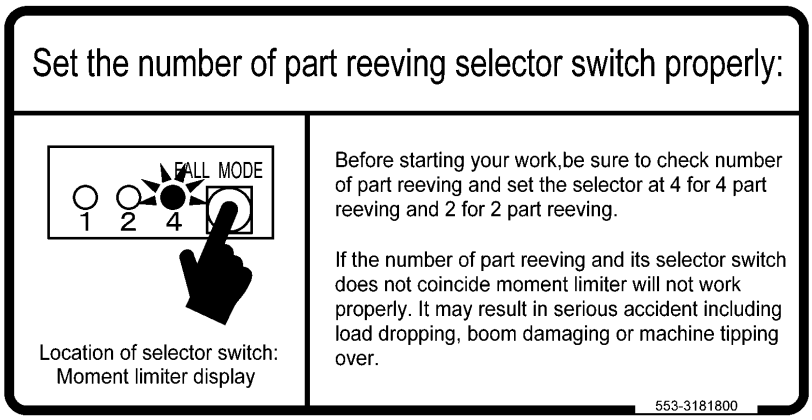



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(6) Warning for Swinging and backing up (584-4588100)




(7) Caution for Number of Parts Reeving Selector Switch (553-3181800)




(8) Caution for Emergency switch (553-4266400)




(9) Caution for Wash (300-4213900) (2 places)






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(10) Warning for Window (20U-98-21910)

**WARNING**

To prevent SEVERE INJURY or DEATH, follow instructions below:

- To avoid, contact with boom, DO NOT lean outside right side window.
- If right side window is broken or becomes dislodged, have it repaired immediately.

20U-98-21910

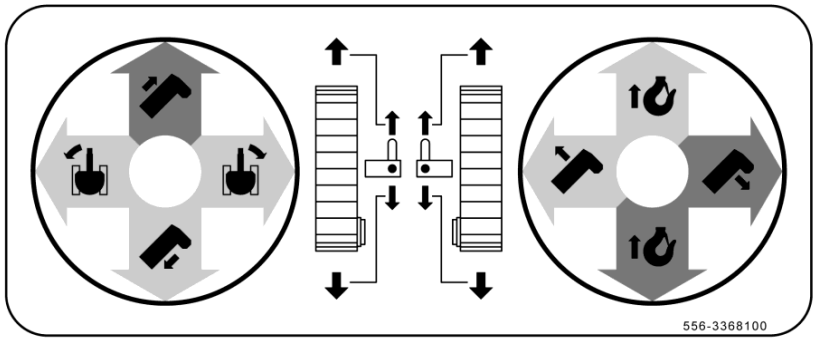
(11) Warning for Front window (09803-03000)

**WARNING**

When raising window, lock it in place with lock pins on both sides.
Falling window can cause injury.

09803-03000

(12) Control Pattern (556-3368100)




(13) Warning Tag (09963-03001)

**DANGER**

Do NOT operate

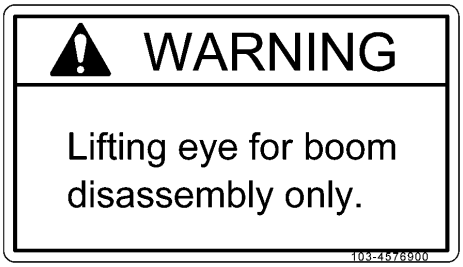
When this tag is not being used keep it in the storage compartment. Still more, when there is no storage compartment, keep it in the operation manual case.

09963-03001



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(14) Warning for Lifting Eye (103-4576900) (2 places)




(15) Do not Stand on here (584-4581700)




(16) Warning for Hydraulic Oil (09653-03001)




(17) Caution for fender (09805-03000)



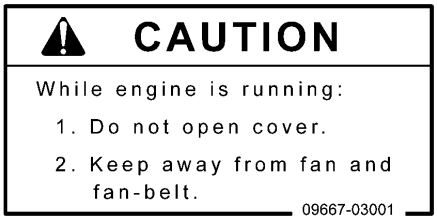

(18) Warning for Coolant (09668-03001)



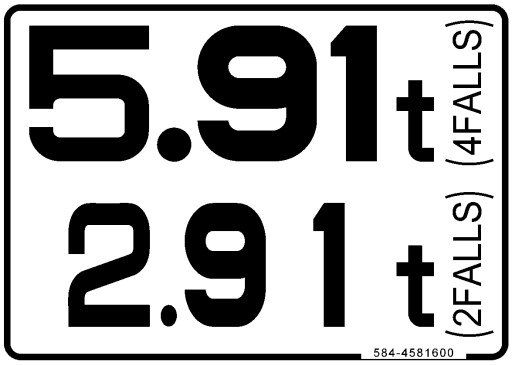

(19) Caution for Engine Hood (09805-13000)




(20) Caution for Rotating portion (09667-03001)




(21) Hoisting Load (584-4581600) (3 places)



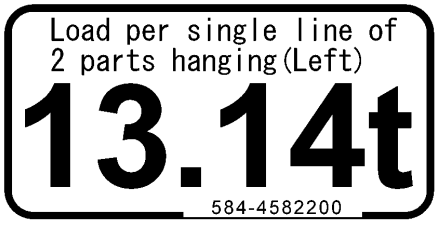



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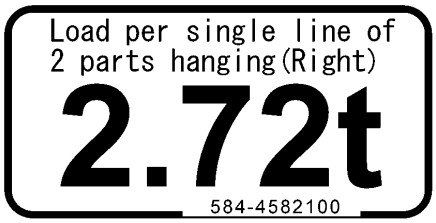
(22) Warning (583-4268000) (2 places)



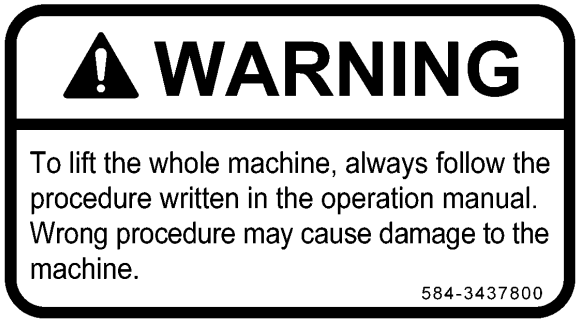

(23) Loads on 2-rope machine hoisting (left) (584-4582200)




(24) Loads on 2-rope machine hoisting (right) (584-4582100)



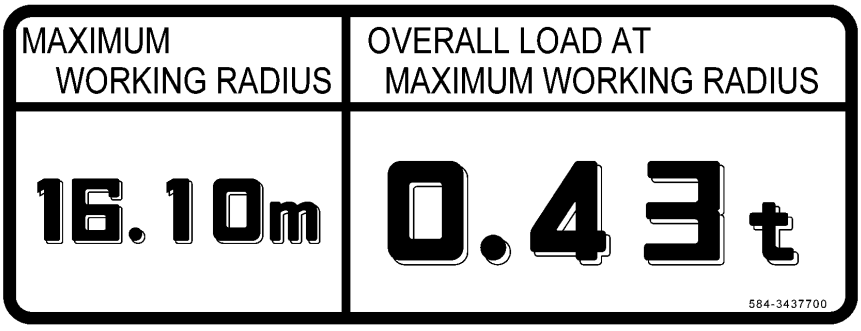

(25) Warning for Lifting position (584-3437800)



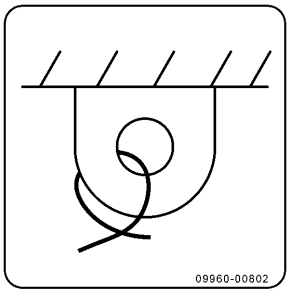

(26) Warning for winch (553-4267500)



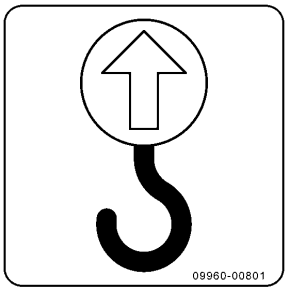

(27) Max. Working Radius and Overall Load at Max. Working Radius (584-3437700)




(28) Connecting Position (09960-00802) (4 places)




(29) Lifting Position (09960-00801) (4 places)

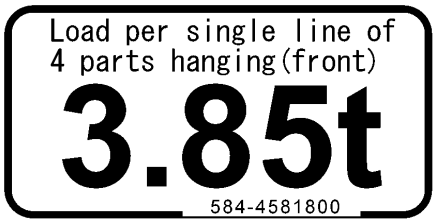





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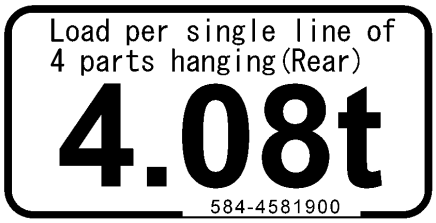
(30) Loads on 4-rope machine hoisting (front) (584-4581800) (2 places)




(31) Warning for track tension adjusting (584-4588200) (2 places)



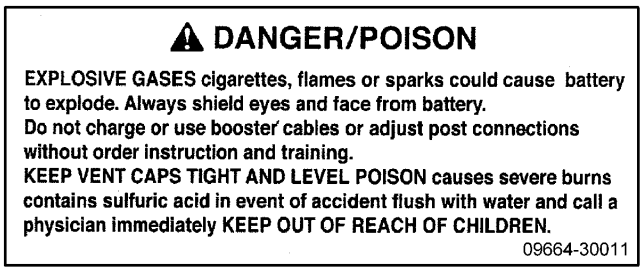

(32) Loads on 4-rope machine hoisting (rear) (584-4581900) (2 places)



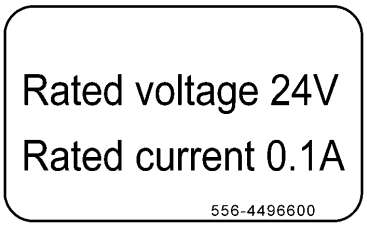

(33) Keep off Swing Area (09133-23000)




(34) Warning for Battery (09664-30011)




(35) Rated Voltage, Current (556-4496600)






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(36) Machine Weight (584-4582300)

LC1385M-8B
MACHINE WEIGHT

| Model | Weight |
|---|---|
| LC1385M-8B | 15640kg |
| LC1385M-8BF | 15850kg |

584-4582300

(37) Warning for battery cable (098808-03000)

**⚠ WARNING**

Improper use of booster cables and battery cables can cause an explosion resulting in serious injury or desth.

- Follow instructions in manial when using booster cables and battery cables.

09808-03000

(38) Warning for Accumulator (09659-53000)

**⚠ WARNING**

Explosion hazard
- Keep away from flame
- Do not weld or drill

09659-53000

(39) Warning for Hook Block (553-4267400)



553-4267400

(40) WEEE DERECTIVE LABEL (104-4549500) (14 places)

**⚠ WARNING**

This unit is not subject to the WEEE Directive.Therafore,this unit is permissible be used in the EU area as long as this unit mounted in a large industrial equipment released by us.

Indiscriminate disposal of this unit or use of this unit for different purpose may cause this unit to be subject to the WEEE Directive and consequently subject to the punishments stipulated by the EU regurations.

**[LOCATIONS OF WEEE DIRECTIVE LABELS]**

(A) Top of relay box
(B) Side of the moment limiter converter
(C) Back side of the monitor display
(D) Side of the moment limiter display
(E) Top of the air conditioner controller
(F) Top of the pump controller
(G) Top of monitor camera
(H) Top of the working status lamp
(J) Top of the battery (2 places)
(K) Top of the inclination sensor
(L) Top of the boom length detector
(M) Top of the boom angle detector
(N) Top of the engine controller



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# OPERATION


| | |
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| 2. EXPLANATION OF DEVICES | 3- 6 |
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| 6. HANDLING IN COLD WEATHER | 3-181 |
| 7. LONG-TERM STORAGE | 3-183 |
| 8. TROUBLES AND ACTIONS | 3-184 |

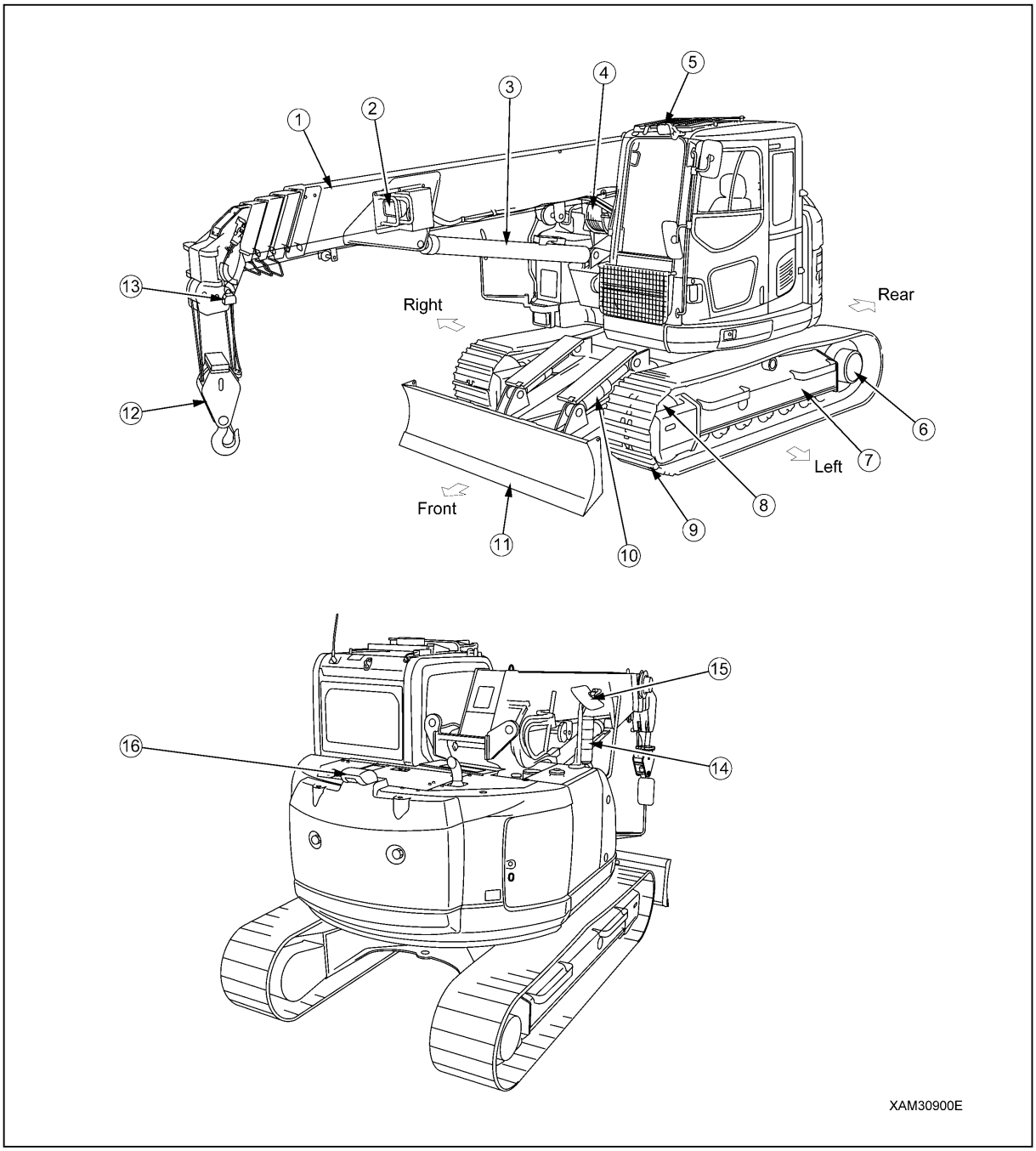



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# 1. MACHINE EACH SECTION

## 1.1 MACHINE EACH UNIT



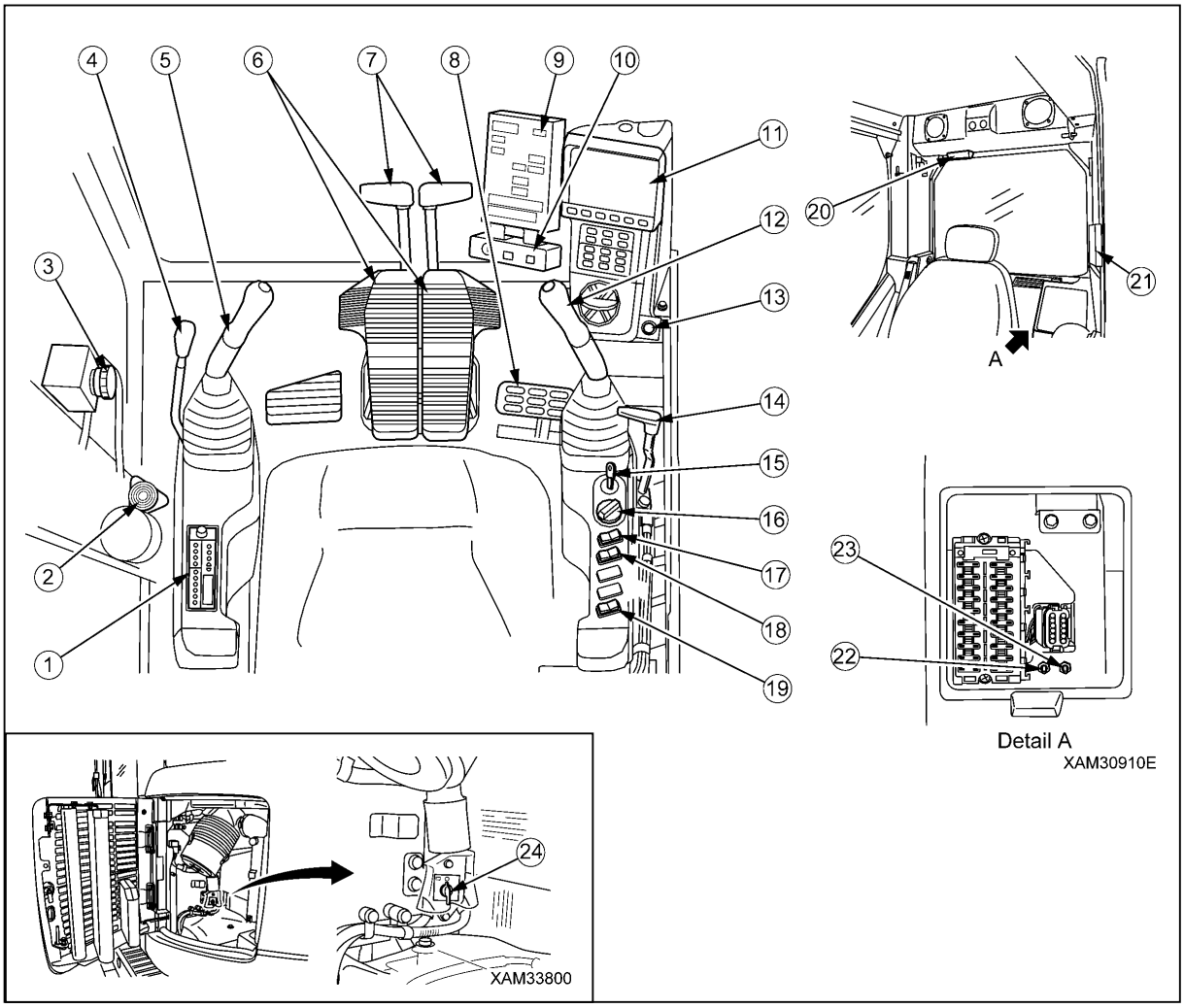

(1) Boom
(2) Working lamp
(3) Boom derricking cylinder
(4) Winch
(5) Head lamp
(6) Sprocket and traveling motor
(7) Track frame
(8) Idler
(9) Track
(10) Blade cylinder
(11) Blade
(12) Hook block
(13) Over hoist detector
(14) Working status lamp
(15) Rear view mirror
(16) Rear view camera



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## 1.2 OPERATOR'S COMPARTMENT EQUIPMENT

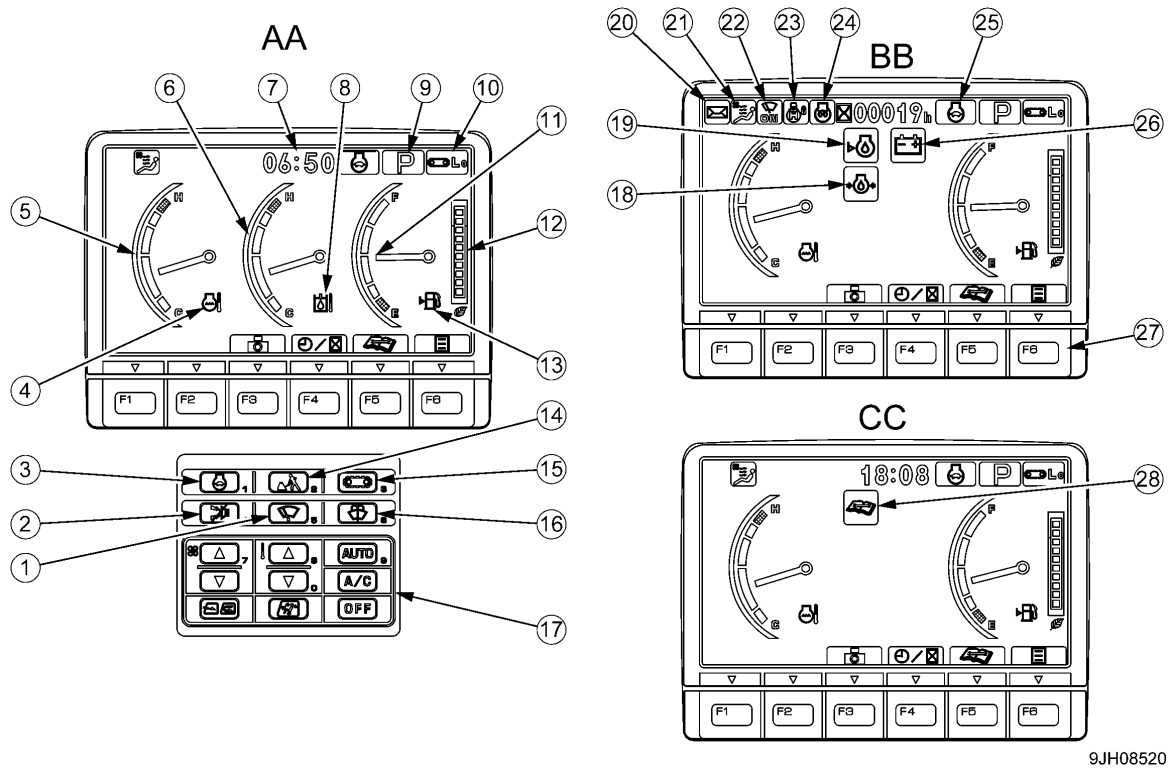



(1) Radio
(2) Level
(3) Engine emergency stop switch
(4) Lock lever
(5) Left work equipment control lever
(6) Travel pedals
(7) Travel levers
(8) Accelerator pedal
(9) Moment limiter display unit
(10) Moment limiter related switch box
(11) Machine monitor
(12) Right work equipment control lever
(13) Cigarette lighter
(14) Blade control lever
(15) Starter switch
(16) Fuel control dial
(17) Lamp switch
(18) Swing lock switch
(19) Sun roof wiper switch
(20) Room lamp switch
(21) Moment limiter transducer
(22) Emergency pump drive switch
(23) Swing parking brake release switch
(24) Battery disconnect switch



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## 1.2.1 MACHINE MONITOR



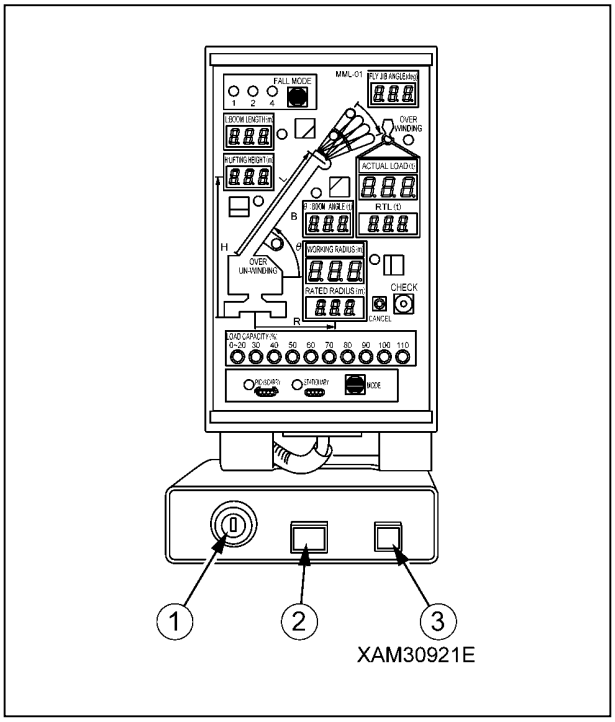

AA: Standard screen BB: All lamps lit up screen CC: Maintenance interval warning screen

(1) Wiper switch
(2) Buzzer cancel switch
(3) Auto-deceleration switch
(4) Engine coolant temperature monitor
(5) Engine coolant temperature gauge
(6) Hydraulic oil temperature gauge
(7) Service meter/Clock
(8) Hydraulic oil temperature monitor
(9) Working mode monitor
(10) Travel speed monitor
(11) Fuel gauge
(12) ECO gauge
(13)Fuel level monitor
(14) Working mode selector switch
(15) Travel speed selector switch
(16) Window washer switch
(17) Air conditioner control switches
(18) Engine oil pressure monitor
(19) Engine oil level monitor
(20) Message monitor
(21) Air conditioner monitor
(22) Wiper monitor
(23) Swing lock monitor
(24) Engine pre-heating monitor
(25) Auto-decelerator monitor
(26) Charge level monitor
(27) Function switch (F1 to F6)
(28) Maintenance interval monitor



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## 1.2.2 MOMENTOLIMITER RELATED SWITCH BOX




(1) Moment limiter emergency stop cancel switch
(2) Over-hoisting cancel switch
(3) Winch speed selector switch



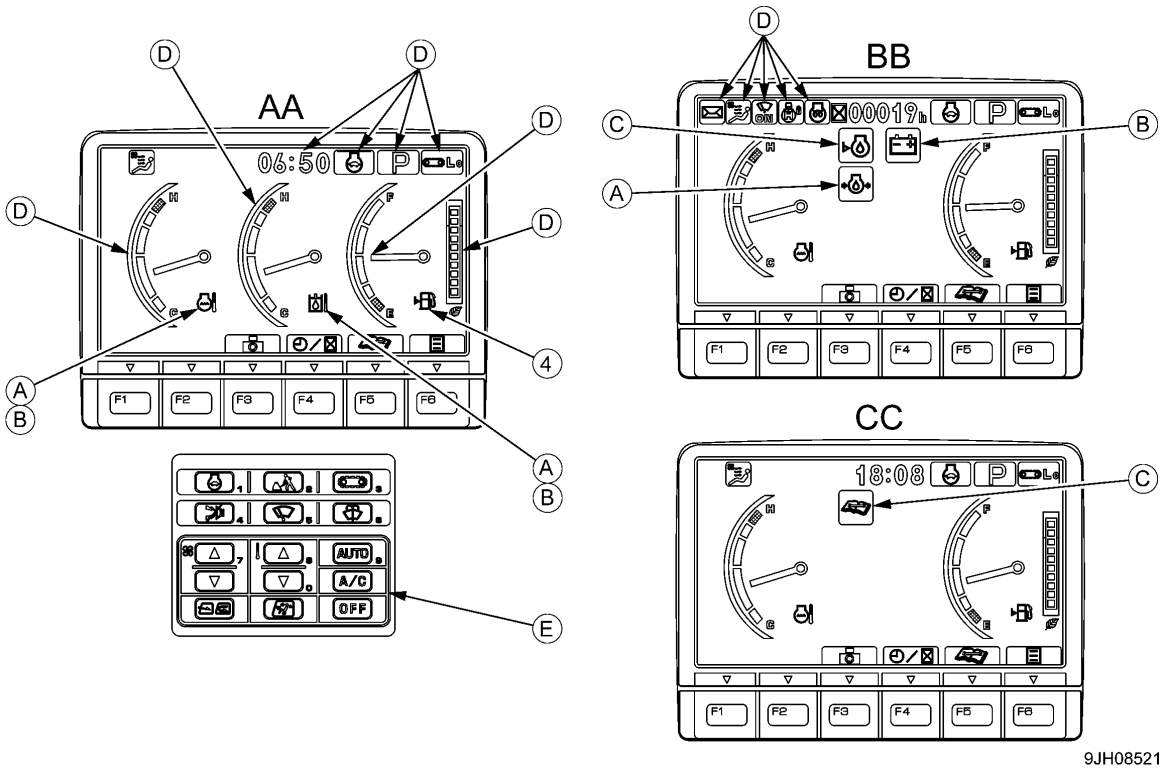
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# 2. EXPLANATION OF DEVICES

The following is an explanation of devices needed for operating the machine.
To perform suitable operations correctly and safety, it is important to completely understand methods of operating the equipment, and the meanings of the displays.

## 2.1 MACHINE MONITOR




AA: Standard screen
BB: All lamps lit up screen
CC: Maintenance interval warning screen

(A) Emergency monitors
(B) Caution monitors
(C) Basic check monitors
(D) Meter display portion, pilot display
(E) Monitor switches portion

| NOTES |
|---|
| One of the features of liquid crystal display panels is that there may be black spots (spots that do not light up) or white spots (spots that stay lit up) on the screen. If there are fewer than 10 black or while spots, this is not a failure or a defect. |

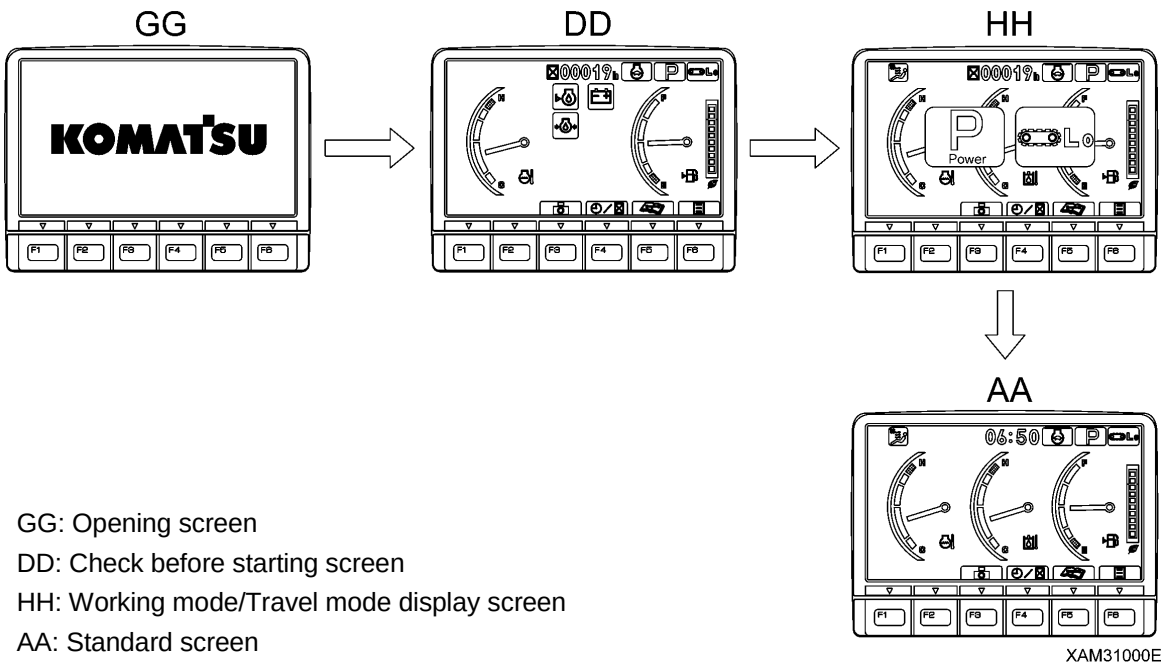


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## 2.1.1 BASIC OPERATION OF MACHINE MONITOR

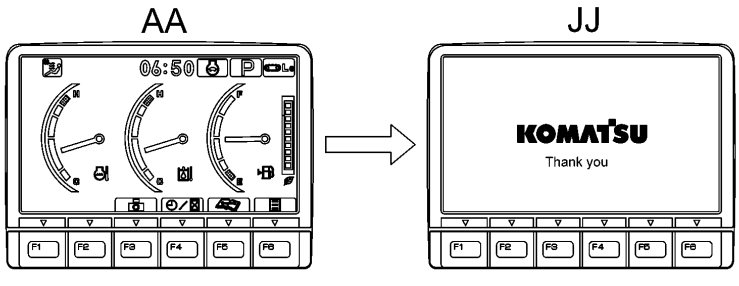
### [1] STARTING ENGINE WHEN SITUATION IS NORMAL




- When the starter switch is turned to the ON position, the Opening screen GG is displayed.
- After the Opening screen GG is displayed for 2 seconds, the screen changes to the Check before starting screen DD.
- After the Check before starting screen DD is displayed for 2 seconds, the screen changes to the Working mode/Travel mode display screen HH.
- After the Check before starting screen DD is displayed for 2 seconds, the screen changes to the Standard screen AA.

| NOTES |
|---|
| When the engine is started, the battery voltage may suddenly drop depending on the temperature and the battery condition. If this happens, the display on the machine monitor may momentarily go out, but this does not indicate any abnormality. |

### [2] STOPPING ENGINE WHEN SITUATION IS NORMAL



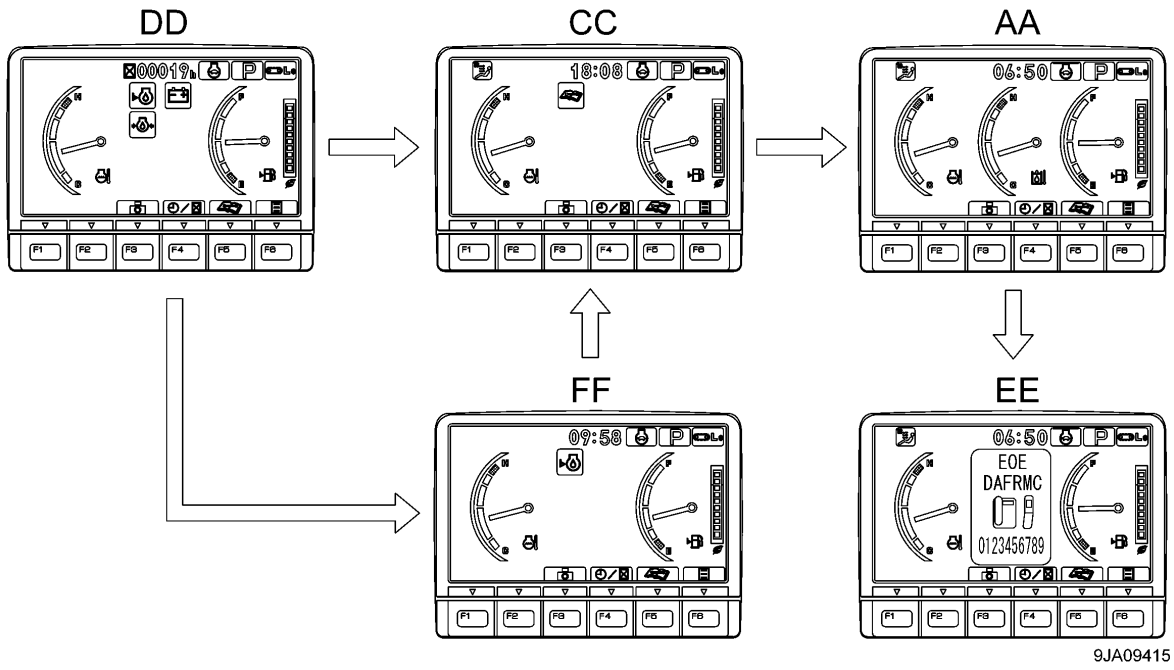

AA: Standard screen JJ: Ending screen

- When the starter switch is turned to the OFF position, the Ending screen JJ is displayed for 5 seconds, then on the display goes out.



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**[3] IF THERE IS ABNORMALITY WHEN STARTING ENGINE**




DD: Check before starting screen CC: Maintenance interval warning screen AA: Standard screen
EE: Error screen FF: Warning screen

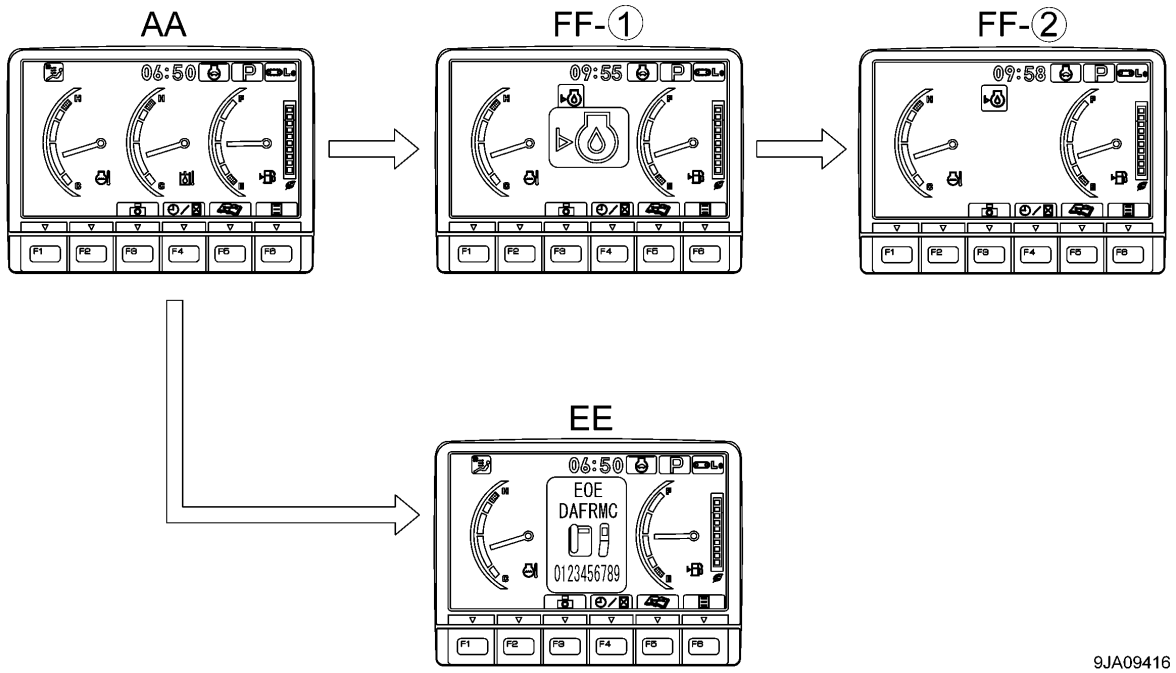
- If there is any abnormality when starting the engine, the Check before starting screen DD changes to the Maintenance interval warning screen CC, Warning screen FF, or Error screen EE.
- After displaying the Check before starting screen DD for 2 seconds, the screen changes to the Maintenance interval warning screen CC.
- After displaying the Maintenance interval warning screen CC for 30 seconds, the screen changes to the Standard screen AA.
- After displaying the Check before starting screen DD for 2 seconds, the screen changes to the Warning screen FF, or Error screen EE.



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## [4] IF ANY ABNORMALITY OCCURS DURING OPERATION




AA: Standard screen EE: Error screen FF-(1): Warning screen FF-(2): Warning screen

- If any abnormality OCCURS DURING OPERATION, the Standard screen AA changes to the Warning screen FF-(1) or the Error screen EE.
- After displaying the Warning screen FF-(1) for 2 seconds, the screen changes to the Warning screen FF-(2).

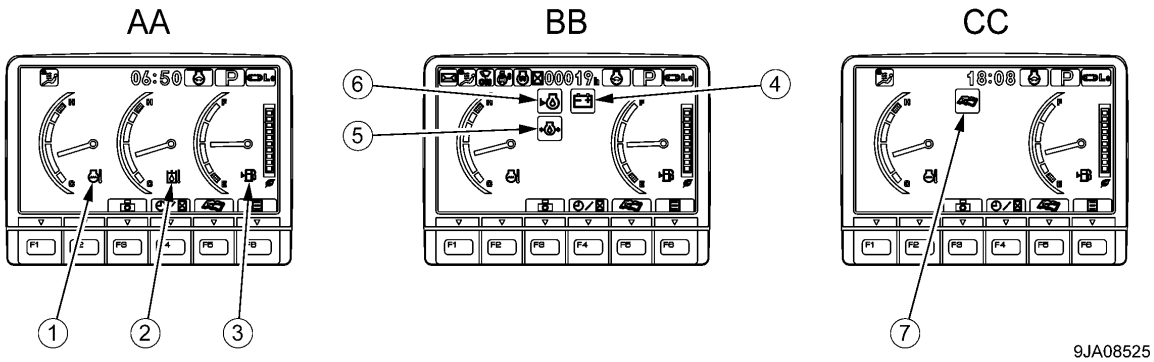


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## NOTES

The colours lighting up the monitors related to the emergency stop items, caution items, and basic check items are as follows.




AA: Standard screen BB: All lamps lit up screen CC: Maintenance interval warning screen

| | Type of monitor | Color when lit up | | |
|---|---|---|---|---|
| | | When normal | When abnormal | At low temperature |
| (1) | Engine coolant temperature monitor | Blue | Red | White |
| (2) | Hydraulic oil temperature monitor | Blue | Red | White |
| (3) | Fuel level monitor | Blue | Red | -- |
| (4) | Charge level monitor | OFF | Red | -- |
| (5) | Engine oil pressure monitor | OFF | Red | -- |
| (6) | Engine oil level monitor | OFF | Red | -- |
| (7) | Maintenance interval monitor | OFF | Red | -- |



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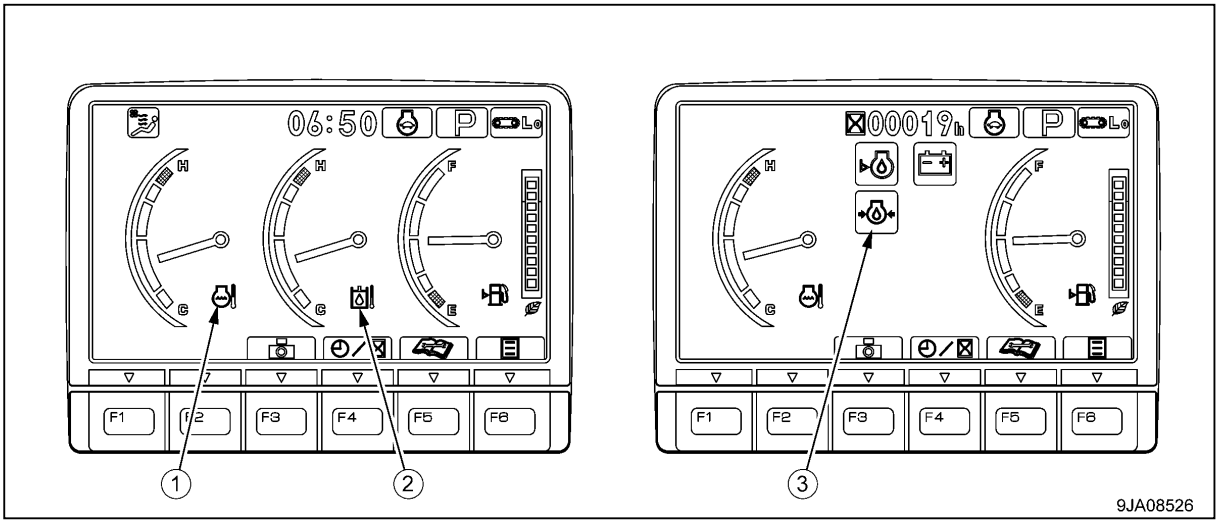
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## 2.1.2 EMERGENCY STOP ITEMS

**⚠ CAUTION**

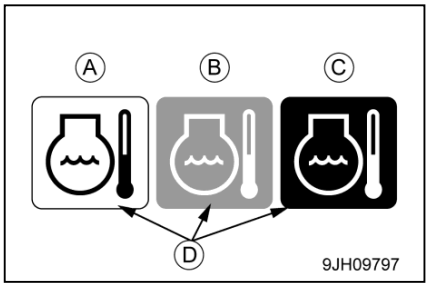
**If the monitor lights up red, Stop the engine immediately or run at low idle, check applicable location, then perform necessary actions.**

These items should be observed while the engine is running. If there is a problem, the monitor for the abnormal location lights up and buzzer sounds, perform action immediately.




(1) Engine coolant temperature monitor
(2) Hydraulic oil temperature monitor
(3) Engine oil pressure monitor

### [1] ENGINE COOLANT TEMPERATURE MONITOR




This monitor (1) warns operator that the engine coolant temperature has risen.
If the engine coolant temperature becomes abnormally high, the monitor shows abnormal display (C). The overheat prevention system is automatically actuated and the engine speed drops.
Stop operations and run the engine at low idling until monitor (1) change to normal display (B).

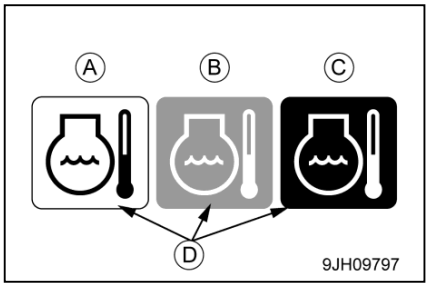
- Display (A) at low temperatures: Monitor background (D) is white
- Display (B) at correct temperatures: Monitor background (D) is blue
- Display (C) when condition is abnormal: Monitor background (D) is red



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### [2] HYDRAULIC OIL TEMPERATURE MONITOR



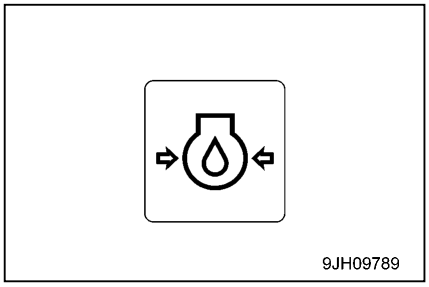

This monitor (2) warns operator that the hydraulic oil temperature has risen.

If the hydraulic oil temperature becomes abnormally high, the monitor shows abnormal display (C).

Stop operations and stop the engine or run it at low idling until monitor (2) change to normal display (B).

- Display (A) at low temperatures: Monitor background (D) is white
- Display (B) at correct temperatures: Monitor background (D) is blue
- Display (C) when condition is abnormal: Monitor background (D) is red

### [3] ENGINE OIL PRESSURE MONITOR




This monitor (3) warns operator that the engine lubrication oil pressure has dropped.

If the engine lubrication oil pressure goes below normal level, the monitor (3) lights up red.

Stop the engine immediately, check the lubrication system and level of oil in the engine oil pan.



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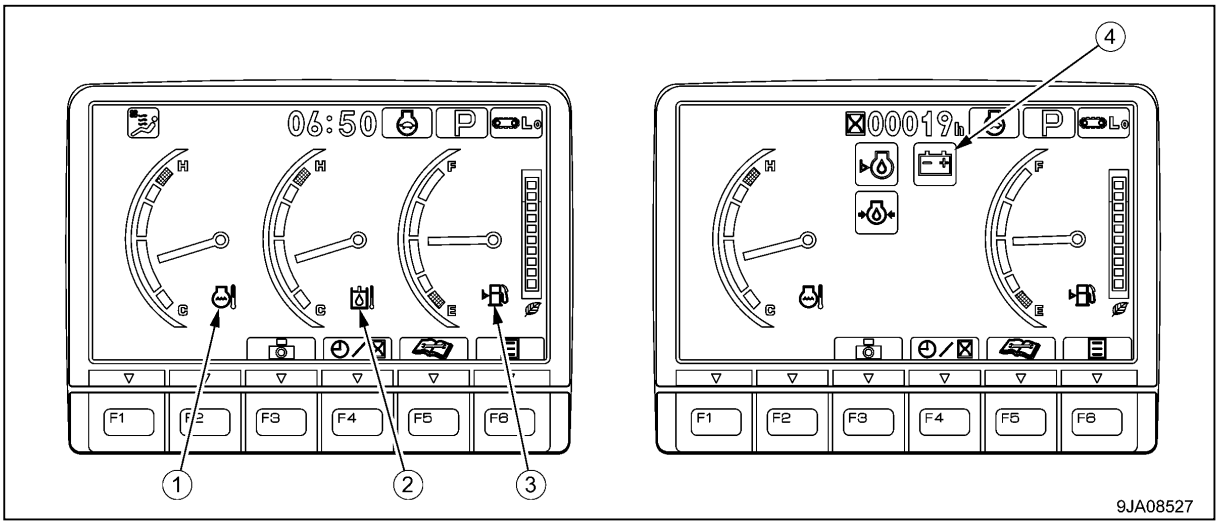
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## 2.1.3 CAUTION ITEMS

**⚠ CAUTION**

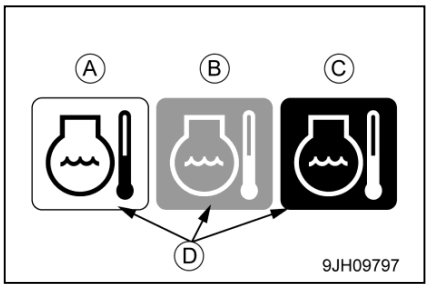
**If the warning monitor lights up red, Stop operations as soon as possible and perform inspection and maintenance of the applicable location. If the warning is ignored, it may lead to failure.**

These are items that should be observed while the engine is running. If any abnormality occurs, the screen displays the item that needs immediate action.
If there is an abnormality, the monitor for abnormal location lights up red.




(1) Engine coolant temperature monitor
(2) Hydraulic oil temperature monitor
(3) Fuel level monitor
(4) Charge level monitor

### [1] ENGINE COOLANT TEMPERATURE MONITOR




If this monitor (1) shows low-temperature display (A), carry out the warm-up operation.
★For details, see “Operation 3.4.1 Engine Warm Up”.
This monitor (1) will show normal display (B), so carry out the warm-up operation for engine.
This monitor (1) will show abnormal display (C), stop operations and run the engine at low idling until monitor (1) change to normal display (B).

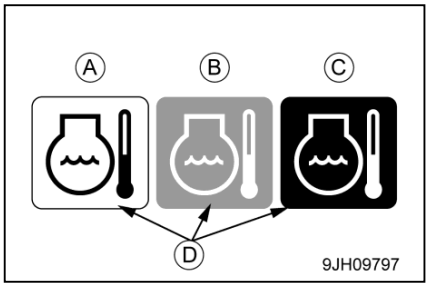
- Display (A) at low temperatures: Monitor background (D) is white
- Display (B) at correct temperatures: Monitor background (D) is blue
- Display (C) when condition is abnormal: Monitor background (D) is red



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### [2] HYDRAULIC OIL TEMPERATURE MONITOR



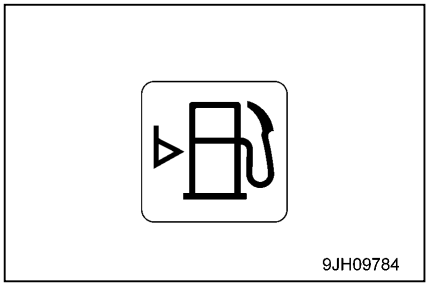

If this monitor (2) shows low-temperature display (A), carry out the warm-up operation.

★For details, see “Operation 3.4.2 Hydraulic Equipment Warm Up”.

This monitor (2) will show normal display (B), so carry out the warm-up operation for hydraulic equipment.

• Display (A) at low temperatures: Monitor background (D) is white
• Display (B) at correct temperatures: Monitor background (D) is blue
• Display (C) when condition is abnormal: Monitor background (D) is red

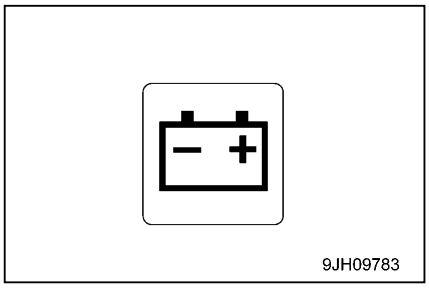
### [3] FUEL LEVEL MONITOR




This monitor (3) lights up to warn that the operator that the level in the fuel tank is low.

When the remaining fuel level reaches approx. 33 liters, the monitor lights up red, so add fuel as soon as possible.

### [4] CHARGE LEVEL MONITOR




This monitor (4) warns the operator that there is an abnormality in the charging system when the engine is running.

If the battery is not being charged properly while the engine is running, monitor (4) lights up red.

If monitor (4) lights up red, check the V-belt for looseness. If any abnormality is found, perform the necessary actions.

For details, see “Operation 9.5 Other Trouble”.



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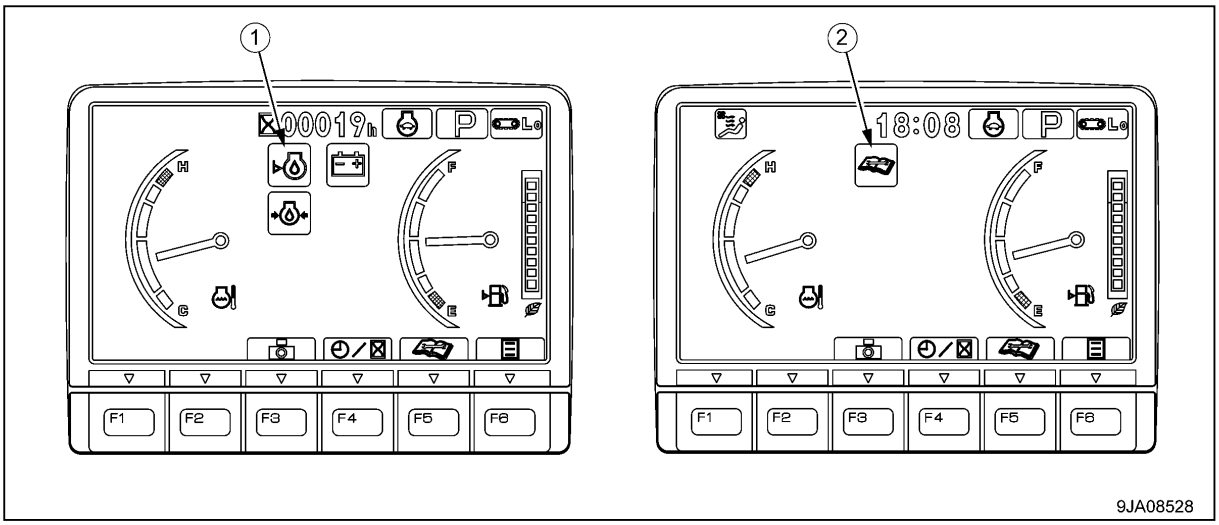
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## 2.1.4 BASIC CHECK ITEMS

**⚠ CAUTION**

**These monitor do not guarantee the condition of the machine.**
**Do not simply rely on the monitor when carrying out checks before starting (daily inspection).**
**Always get off the machine and check each item directly.**

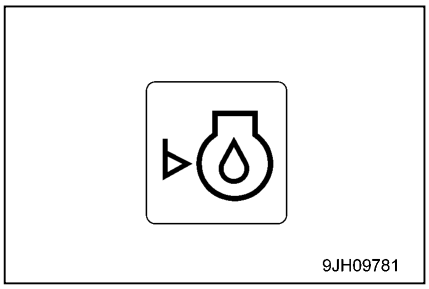
Displays basic items among the check before starting items that must be checked before starting the engine. If there is any abnormality, monitor for the location of abnormality will light up.




(1) Engine oil level monitor
(2) Maintenance interval monitor

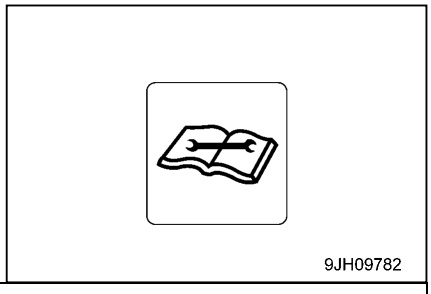
### [1] ENGINE OIL LEVEL MONITOR

This monitor (1) warns the operator that the oil level in the engine oil pan has dropped.
If oil level in the engine oil pan is low, the monitor lights up red, so check the oil level, and add oil.




### [2] MAITENANCE INTERVAL MONITOR

This monitor (2) lights up when the maintenance time gets close and remains lit after the maintenance time has already passed.
• Lit yellow: The maintenance interval is due within 30 hours.
• Lit red: The maintenance interval has already passed.
This monitor (2) Lights up when starter switch is turned to the ON position. It goes off after 30 seconds and display changes to the Standard screen.



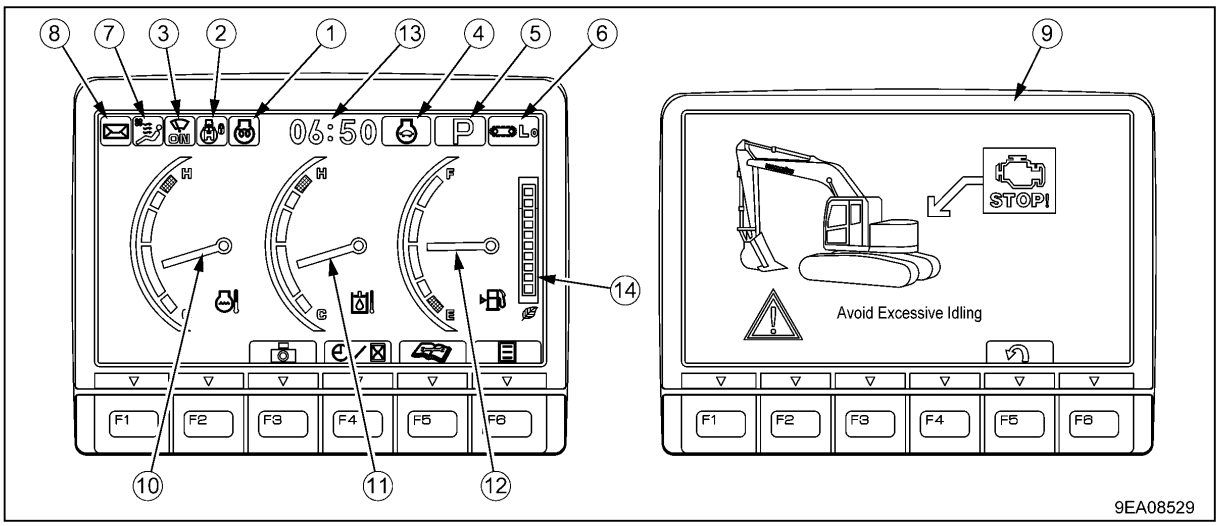

**NOTES**

- For details of the method of confirming the maintenance interval , see “Operation 2.1.7 [3] Maintenance Slector Switch”.
- If it is desired to change settings for the maintenance interval, have us or our sales service agent change the settings.



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## 2.1.5 METER DISPLAY PORTION




PILOT DISPLAY

(1) Engine pre-heating monitor
(2) Swing lock monitor
(3) Wiper monitor
(4) Auto-deceleration monitor
(5) Working mode monitor
(6) Travel speed monitor
(7) Air conditioner monitor
(8) Message monitor
(9) Idle stop guidance

GAUGE AND METER

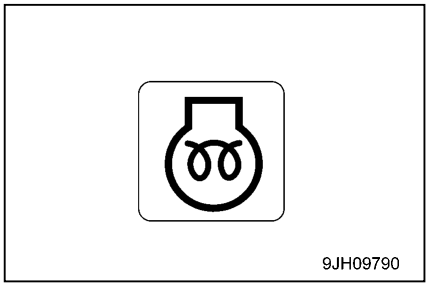
(10) Engine coolant temperature gauge
(11) Hydraulic oil temperature gauge
(12) Fuel level gauge
(13) Service meter/Clock
(14) ECO gauge

### [PILOT DISPLAY]

- The pilot display at the top of the screen consists of the pilot lamps to confirm the actuation of each function.
- When the starter switch is turned to the ON position, the pilot lamp lights up when the display items are functioning.

### [1] ENGINE PRE-HEATING MONITOR

This monitor (1) is displayed when preheating the engine before starting the engine in temperature below 0 degrees C.
In cold weather, when the starter switch is turned to the HEAT position, the preheating monitor lights up. After lighting up for approx. 30 seconds, it starts to flash to inform the operator that the preheating has been completed. After flashing for approx. 10 seconds, the monitor goes out.






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### [2] SWING LOCK MONITOR

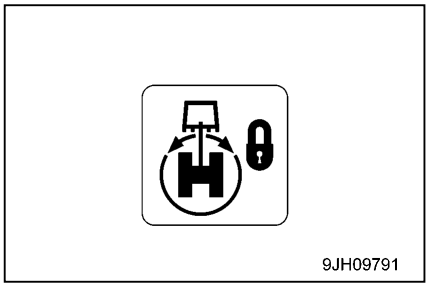
This monitor (2) informs the operator that the swing lock is being actuated.

Actuated: Lights up

When the swing lock switch is turned ON (Actuated), the monitor lights up.

When the swing parking brake release switch is set to the FREE position, the monitor flashes.

★For detail of positions of the swing parking brake release switch, see “Operation 1.2 Operator`s Compartment Equipment”.




**NOTES**

The swing motor is equipped with a disc brake that mechanically stops the rotation. When the swing lock monitor is lit up, the brake remains applied.

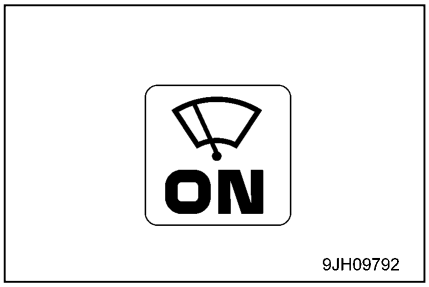
### [3] WIPER MONITOR

This monitor (3) indicates operating status of the wiper.

The monitor display when wiper switch is operated, as follows.

- Monitor ON lights up: Wiper moves continuously
- Monitor INT Lights up: Wiper moves intermittently
- Monitor OFF: Wiper stops.

★For detail of positions of the wiper switch, see “Operation 1.2 Operator`s Compartment Equipment”.



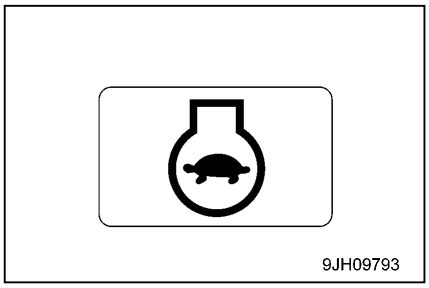

### [4] AUTO-DECELERATION MONITOR

This monitor (4) shows if the auto-deceleration is being actuated.

The monitor display when auto-deceleration switch is operated, as follows.

- Monitor ON: Auto-deceleration actuated
- Monitor OFF: Auto-deceleration canceled

★For detail of positions of the auto-deceleration switch, see “Operation 1.2 Operator`s Compartment Equipment”.



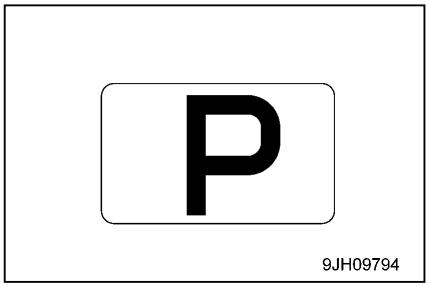

### [5] WORKING MODE MONITOR

This monitor (5) displays the setting of the working mode.

The monitor display is as follows according to the operation of the working mode switch.

- P mode: For heavy-load operations
- E mode: For operations with emphasis on fuel consumption
- L mode: For fine control operations
- B mode: Not available for this machine
- ATT mode: Not available for this machine

★For detail of positions of the working mode switch, see “Operation 1.2 Operator`s Compartment Equipment”.




**NOTES**

With this machine, avoid to set the working mode switch to B mode (Breaker operation) or ATT mode (Crusher operation) .



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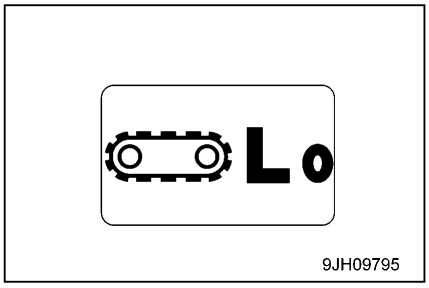
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### [6] TRAVEL SPEED MONITOR

This monitor (6) shows the setting for the travel speed.
The monitor display is as follows according to the operation of the travel speed selector switch.

- Monitor Lo: Low-speed travel
- Monitor Hi: High-speed travel

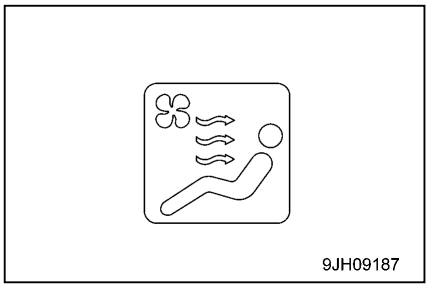
★For detail of positions of the travel speed selector switch, see "Operation 1.2 Operator`s Compartment Equipment".




### [7] AIR CONDITIONER MONITOR

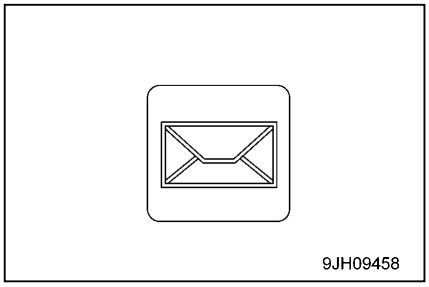
This monitor (7) displays the working status of the air conditioner.

- Monitor lit up: Air conditioner ON
- Monitor off: Air conditioner OFF



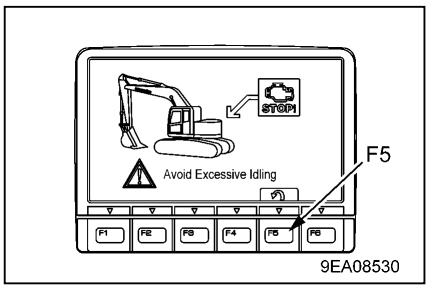

### [8]MESSAGE MONITOR

The message monitor is not available for this machine.
This monitor (8) remains lit throughout operation.




### [9] IDLE STOP GUIDANCE

If the levers are not operated for more than 5 minutes, and the engine is idling, the idling stop message is displayed on the monitor. When waiting for work or stopping work for short periods, stop the engine to reduce unnecessary fuel consumption.
The idling stop message screen returns to the standard screen if any lever is operated again or when function switch (F5) (Back) is pressed.






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**[GAUGE AND METER]**

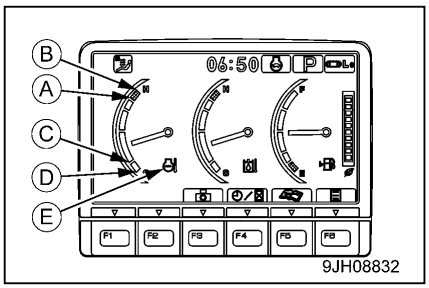
**[10] ENGINE COOLANT TEMPERATURE GAUGE**

This meter (10) shows the engine coolant temperature.

During normal operations, the indicator should be in the green range.

If the indicator goes beyond red range (A) during operations, the overheat prevention system is actuated.

- (A) - (B): Red range
- (A) - (C): Green range
- (C) - (D): White range



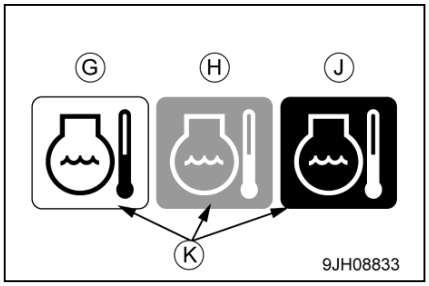

## NOTES

- The overheat prevention system is actuated as follows.
  - Red range (A) position: Engine coolant temperature monitor (E) shows abnormality display
  - Red range (B) position: Engine speed changes to low idling, engine coolant temperature monitor (E) shows abnormality display, alarm buzzer sounds at same time.

  The overheat prevention system continues to work until the indicator enters the green range.
- When the engine is started, if the indicator is at position (C), engine coolant temperature monitor E) shows the low-temperature display.

  If this happens, carry out the warm-up operation. For detail, see “Operation 3.4.1 Engine Warm-Up”.

- Display (G) at low temperatures: Monitor background (K) is white
- Display (H) at correct temperatures: Monitor background (K) is blue
- Display (J) when condition is abnormal: Monitor background (K) is red

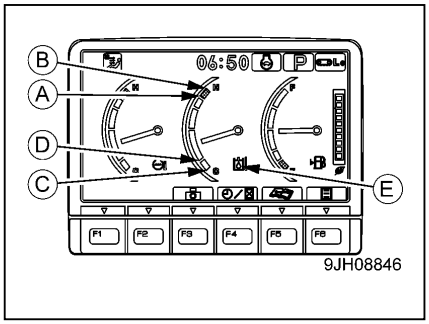





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### [11] HYDRAULIC OIL TEMPERATURE GAUGE




This meter (11) shows the hydraulic oil temperature.

During normal operations, the indicator should be in the green range.

If the indicator enters the red range (A) during operations, the hydraulic oil temperature is 102 degrees C or more. Run the engine at low idling or stop it and wait for the hydraulic oil temperature to go down.

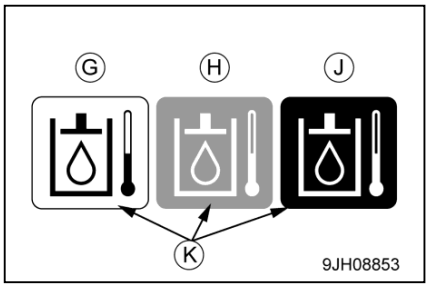
- (A) - (B): Red range
- (A) - (D): Green range
- (D) - (C): White range

## NOTES

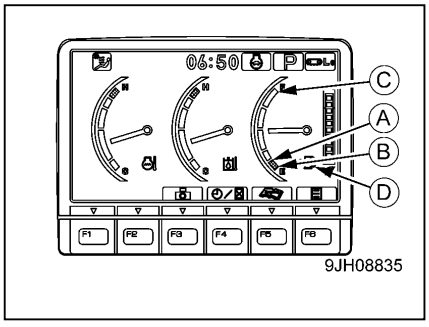
When the indicator reaches red range (A), the hydraulic oil temperature is as follows.
- Red range (A) position: 102 degrees C or more
- Red range (B) position: 105 degrees C or more

When the indicator is in red range (A) − (B), hydraulic oil temperature monitor (E) shows the abnormality display. When the engine is started, if the indicator is at position (C) and the hydraulic oil temperature is 20 degrees C, hydraulic oil temperature monitor (E) shows the low-temperature display. If this happens, carry out the warm-up operation. For detail, see “Operation 3.4.2 Hydraulic Equipment Warm-Up”.

- Display (G) at low temperatures: Monitor background (K) is white
- Display (H) at correct temperatures: Monitor background (K) is blue
- Display (J) when condition is abnormal: Monitor background (K) is red




### [12] FUEL GAUGE




This gauge (12) shows the amount of fuel remaining in the fuel tank.

During normal operations, the indicator should be in the green range.

If the indicator starts to enter red range (A) during operation, there is less than 52 liters of fuel remaining, so carry out inspection and add fuel.

- (A) - (B): Red range
- (A) - (C): Green range

## NOTES

- When the indicator reaches red range (B), there is less than 33 liters of fuel remaining.
- When the indicator is in red range (B), fuel level monitor (D) lights up red.
- The correct fuel level may not be displayed for a short time when the starter switch is turned ON, but this is not an abnormality.



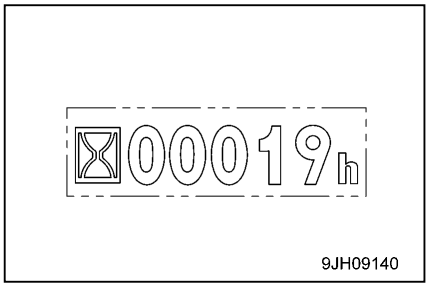
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### [13] SERVICE METER/CLOCK

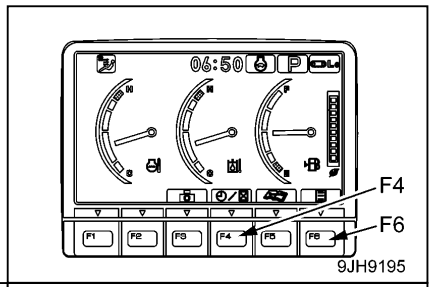
This meter (13) shows the total hours of operation of the machine or the present time.

When the engine is running, the service meter advances even if the machine is not moving. The service meter advances 1 for every hour that the machine is working, regardless of the engine speed.



9JH09140

- When the standard screen is being displayed, if function switch F4 is pressed, it is possible to switch between the clock display and the service meter display.
- Clock display (12-hour or 24-hour displays are available)
  To set or correct the time, press function switch F6 (user mode switch).



9JH9195



9JH09141

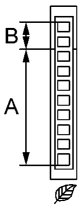


9JH09826

### [14] ECO GAUGE

This gauge (14) shows the working load status.

When the gauge is in green range (A), the work load is light to medium. When the gauge is in orange range (B), the load is heavy.



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**NOTES**

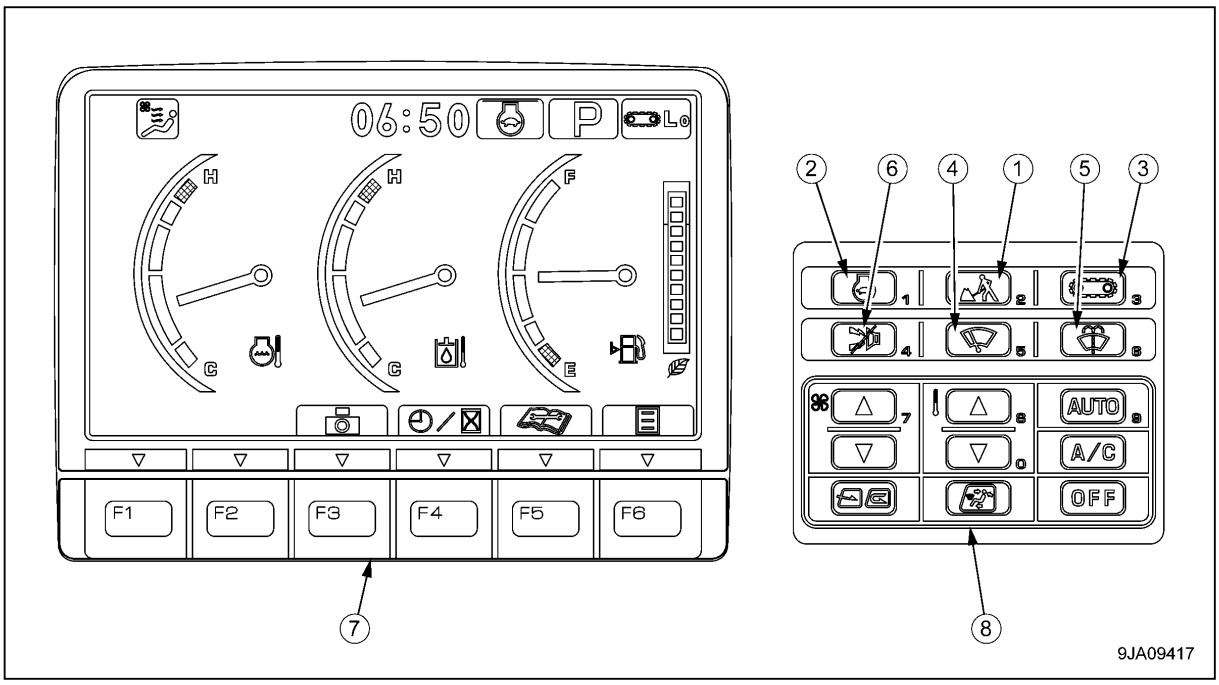
When the gauge enters the orange range (B), there is no abnormality on the machine, but to protect the environment, reduce the engine output to a point where there is no adverse effect on the operation. Generally, carry out energy-saving operations in the green range (A). Reducing the frequency of the travel also helps to save energy. Consider the best way of saving energy.



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## 2.1.6 MONITOR SWITCHES PORTION

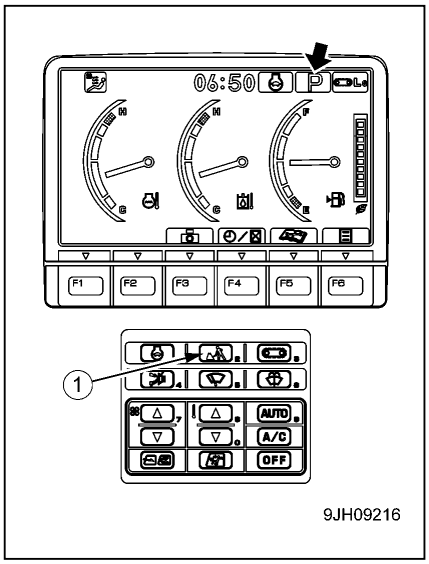



(1) Working mode selector switch
(2) Auto-deceleration switch
(3) Travel speed selector switch
(4) Wiper switch
(5) Window washer switch
(6) Buzzer cancel switch
(7) Function switch
(8) Air conditioner switch

### [1] WORK MODE SELECTOR SWITCH

Use this switch (1) to set the movement or power of the crane.
The operation becomes easier if the mode is selected to match the content of the operation.

- P mode: For heavy-load operations
- E mode: For operations with emphasis on fuel consumption
- L mode: For fine control operations
- B mode: Not available for this machine
- ATT mode: Not available for this machine




| NOTES |
|---|
| B mode (Breaker operation) and ATT mode (Crusher operation) of this work mode selector switch are not availble for this machine. |

- When the monitor first appears, it is automatically set to the mode in use when it was started the previous time.
- Press switch (1) to display the working mode selection screen. For each set mode, the pilot monitor at the top right of the monitor display shows P, E, L, B, ATT.

| NOTES |
|---|
| If you want to have automatic setting of the P, E or L mode when starting, please contact us or our sales service agency to change the setting. |

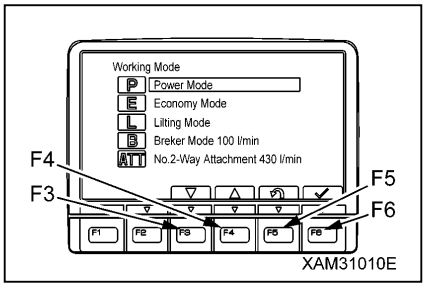


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**[PROCEDURE FOR OPERATION]**

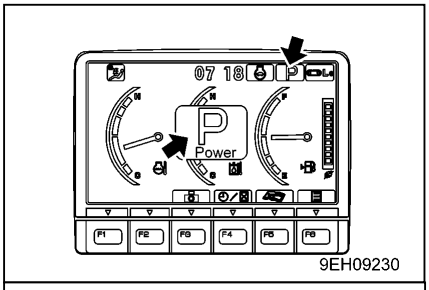
1. If working mode selector switch (1) is pressed, the working mode screen is displayed on the monitor.
2. Press function switches (F3) or (F4) at the bottom of the screen or working mode selector switch (1) to change the mode selection one at a time.




## NOTES

- If no switch is touched for more than 5 seconds, the selected work mode is automatically set as the working mode and the screen changes to Steps 3 and Steps 4.
- To return to the standard screen without changing the working mode, press function switch (F5).

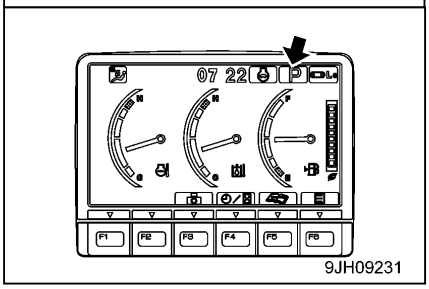
3. After selecting the desired mode, press function switch (F6) and the mode is displayed in the center of the monitor display.
   (Example: If power mode is selected: P)




4. After 2 seconds, the pilot monitor display at the top right of the screen is highlight in orange.

## NOTES

After 2 seconds, the screen return to the standard screen.
The monitor display highlighted in orange in steps 4 return to blue.






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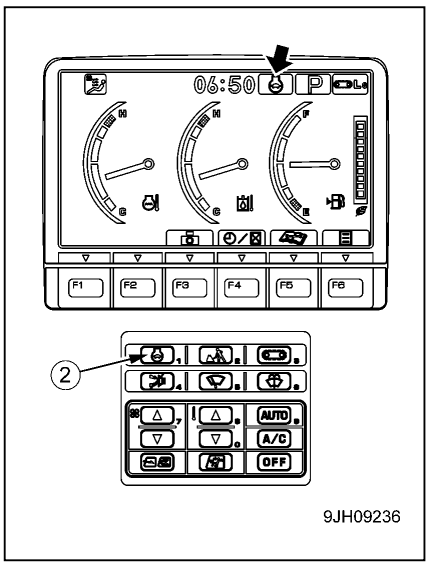
### [2] AUTO-DESELERATION SWITCH

If the control levers are neutral, this switch (2) automatically lowers the engine speed and returns on the function to reduce fuel consumption.

• Monitor ON: Auto-deceleration ON

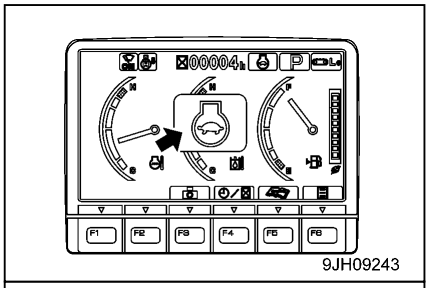
• Monitor OFF: Auto-deceleration OFF

Each time the switch is pressed, the auto-deceleration is switched between ON and OFF.



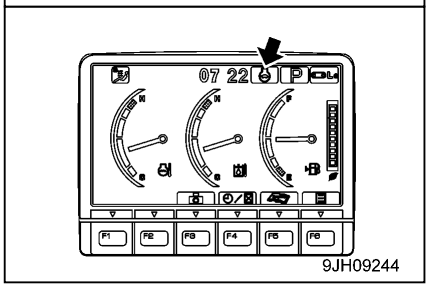

| NOTES |
|---|
| [AUTO-DESELERATION FUNCTION]<br>When the auto-deceleration function is ON, if the work equipment and travel levers are returned to the N position, the engine speed drop after 4 seconds from the operating speed to idling speed.<br>This makes it possible to reduce fuel consumption.<br>If any lever is operated when the machine is in this condition, engine speed will return to the previous operating speed to make it possible to perform operation. |

1. When auto-deceleration switch (2) is pressed and the auto-deceleration function is returned ON, the mode is displayed in the center of the monitor display, and after 2 seconds, the screen returns to the standard screen.




2. On the standard screen, the auto-deceleration monitor lights up.

| NOTES |
|---|
| When the auto-deceleration is OFF, it does not light up. |






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### [3] TRAVEL SPEED SELECTOR SWITCH

**⚠ WARNING**

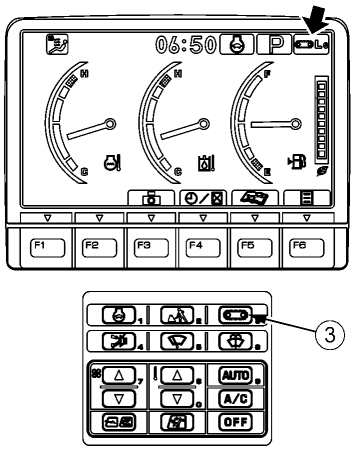
- **When loading or unloading the machine on a trailer, always travel at low speed (set to Lo). Never operate the travel speed selector switch when traveling.**
- **If the travel speed selector switch is operated when the machine is traveling, the machine may deviate to one side even when it is traveling in a straight line. Always stop the machine before changing the travel speed.**
- **The area at the rear of the machine is a blind spot. Always use the rear view camera to check the area at the rear of the machine before traveling in reverse.**

This switch (3) is used to set the travel speed to 2 stages.

Each time that the switch is pressed, the display changes Lo → Hi → Lo in turn.

- Monitor Lo: Low –speed travel
- Monitor Hi: Hi-speed travel

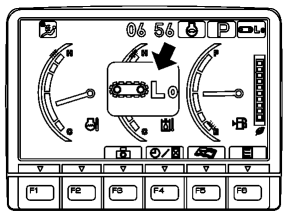
When the engine is started, the speed is automatically set to Lo.



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**NOTES**

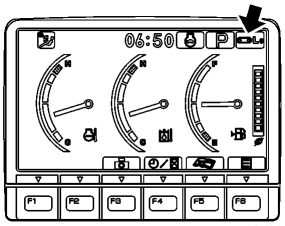
When traveling in high speed (Hi), if travel power is needed, such as when traveling on soft ground or on slopes, the speed automatically switches to low speed (Lo), so there is no need to operate the switch. The monitor display stays at Hi.



9JH09282

**NOTES**

- Each time travel speed selector switch (3) is switched, the mode is displyed on the monitor display, and after 2 seconds, the screen returns to the standard screen.
- If the moment limter displays the actual laod of 0.5 tons or more even once, traveling in high speed is not available despite the monitor display stays at "Hi". When traveling in high speed is required, always keep the actual load value within 0.2 tons.
- While the boom length in the moment limiter display is 5.2 meters or less and the boom angle is 5.0 degrees or less, travel speed selector switch can be turned to hi-speed travel, regardless of the actual load value.



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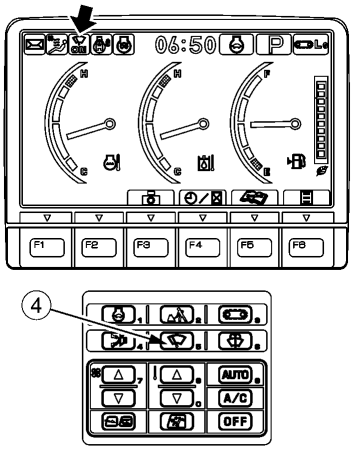
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### [4] WIPER SWITCH

This switch (4) actuates the front window wiper.

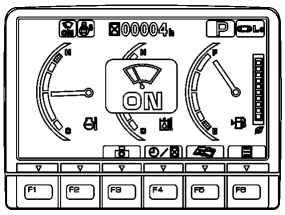
Each time the switch is pressed, it changes ON→INT→STOP (OFF).

- Monitor INT: Wiper operates intermittently
- Monitor ON: Wiper operates continuously
- Monitor OFF: Wiper stops

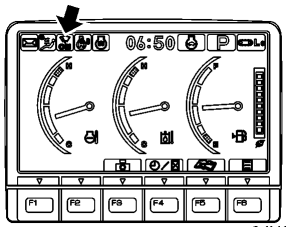



9JH09284

| NOTES |
| --- |
| Each time wiper switch (4) is pressed, the mode is displyed in the center of the monitor display, and after 2 seconds, the screen returns to the standard screen. |




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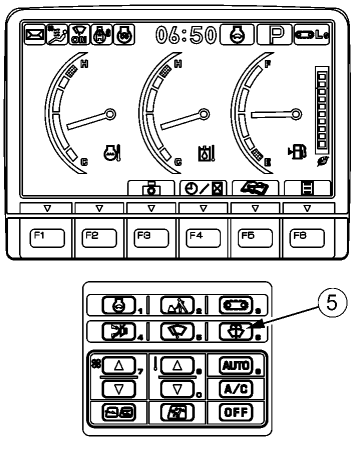



9JH09286

### [5] WINDOW WASHER SWITCH

If this switch (5) is kept continuously pressed; window washer fluid is sprayed out on the front glass. When the switch is released, the spray stops.

- If switch (5) is kept pressed when the wiper is stopped, the window washer fluid will spray, and at the same time, the wiper will be actuated continuously. When switch (5) is released, the wiper will continue to operate for 2 cycles, and then stop.
- If the wiper is moving intermittently and switch (5) is kept pressed continuously, window washer fluid will spray, and at the same time, the wiper will be actuated continuously. When switch (5) is released, the wiper will continue to operate for 2 cycles, and then return to intermittent operation.




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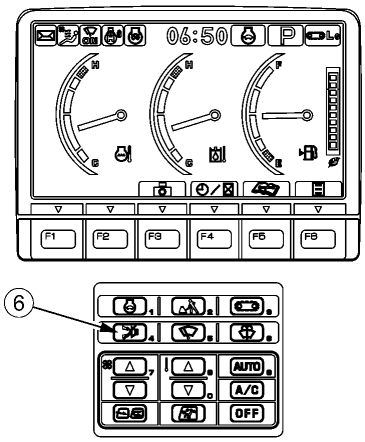


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### [6] BUZZER CANCEL SWITCH

This switch (6) is pressed, the warning buzzer for the abnormal warning item stops.




9JH09289

### [7] FUNCTION SWITCHES

Function switches (7) consist of 6 switches (F1 to F6). The function of each switch differs according to the content of each screen.

When the monitor display shows the standard screen, the functions are displayed as follows.

Switch (F3): Camera screen selector switch

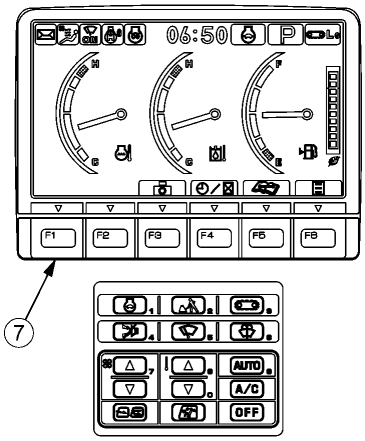
Switch (F4): Service meter/time display selector switch

Switch (F5): Maintenance mode switch

Switch (F6): User mode switch

Switch (F1) and (F2) are auxiliary switches for expanded functions.

| NOTES |
|---|
| For explanation of each switch, see “Operation 2.1.7 Handling Function Switches”. |

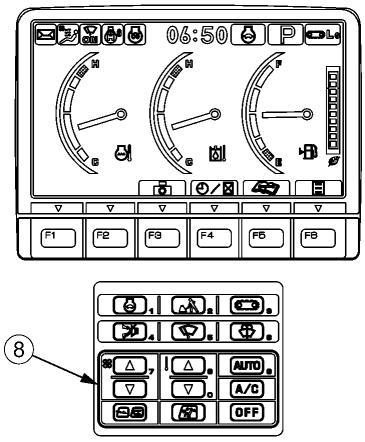



9JH09291

### [8] AIR CONDITIONER SWITCH

The air conditioner switches (8) consist of 9 switches.

| NOTES |
|---|
| For explanation of each switch, see “Operation 2.6 Air Conditioner Controls”. |




9JH09292

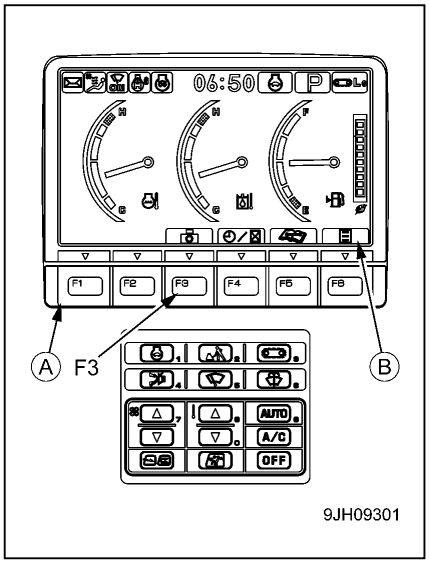


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## 2.1.7 HANDLING FUNCTION SWITCHES

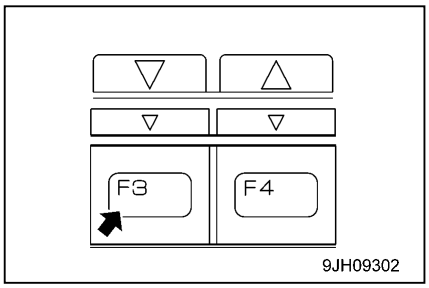
- The function switches (A) at the bottom of the monitor display consist of 6 switches (F1 – F6). The function of each switch differs according to the content of each screen.
- The function of switches (A) on each screen can be confirmed by guidance icons (B) displayed on top of each switch.
- If there is no display in guidance icon (B), even if switch (A) is pressed, it will not function.
- Even if guidance icon (B) is pressed, it will not function. Press switch (A) immediately below the guidance icon display to operate the function.




The operation of the function switches if the initial screen is the standard screen is as follows.

### [1] CAMERA SCREEN SELECTOR SWITCH

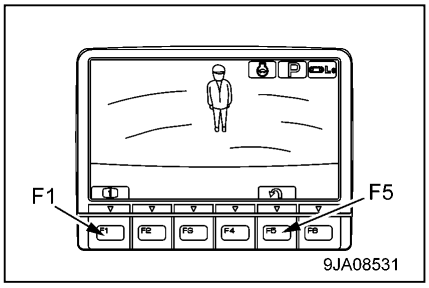
Press the switch (F3) to switch to the camera screen display.




### [OPERATING CAMERA SCREEN DISPLAY]

The following explanation is the method used to display the camera image on the monitor.

- On the standard screen, if switch (F3) is pressed, the image display screen is displayed.
- Press the switch (F5) to return to the standard screen.

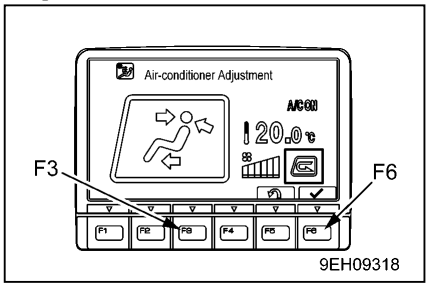



[OTHER MODE OPERATIONS WHEN DISPLAYING CAMERA IMAGE]

Even during the camera display, it is possible to operate other modes.

- The air conditioner can be operated.

  If the air conditioner switch is operated, the screen switches to the air conditioner control screen. If the screen switches to the air conditioner control screen, press function switch (F6) to return to the camera image display screen. In addition, if no operation is carried out for 5 seconds after the screen switches to the air conditioner control screen, the screen automatically returns to the camera image display screen.



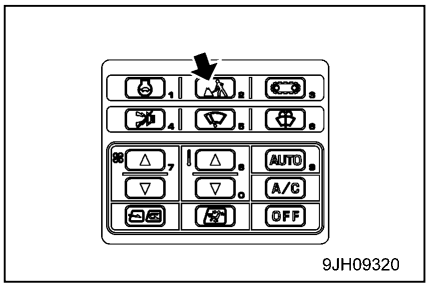

| NOTES |
| --- |
| For details of the operation of the air conditioner, see “Operation 2.6 Air Conditioner Controls”. |



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• It is possible to change the working mode by pressing the working mode selector switch.
When the working mode is changed, the screen returns automatically to the camera image display screen. When this happens, the pilot monitor display at the top centre of the monitor screen is highlighted in yellow for 2 seconds, then returns to blue.

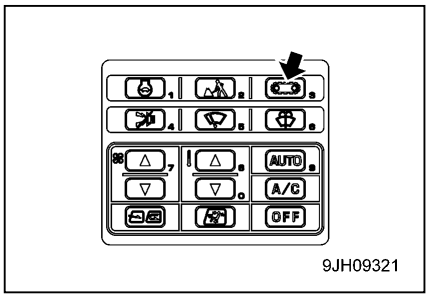


9JH09320

**NOTES**

For details of the method of using the working mode selector switch, see “Operation 2.1.6 Monitor switch portion [1] Working Mode Selector Switch”.

• It is possible to change the travel speed by pressing the travel speed selector switch.
When the travel speed is changed, the pilot monitor display at the top right of the monitor screen is highlighted in yellow for 2 seconds, then returns to blue.

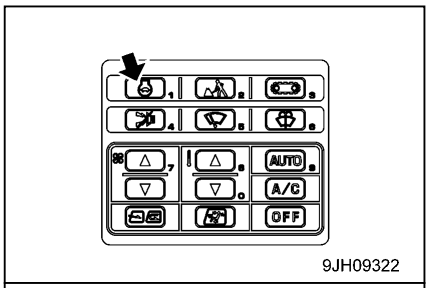


9JH09321

**NOTES**

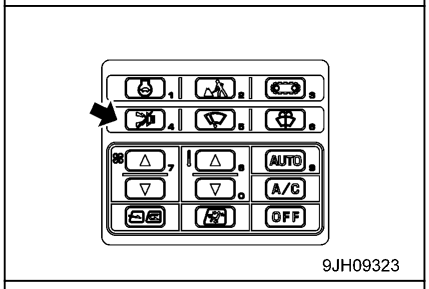
For details of the method of using the working mode selector switch, see “Operation 2.1.6 Monitor switch portion [3] Travel Speed Selector Switch”

• Press the auto-deceleration switch to return the auto-deceleration function ON/OFF.
Even if the auto-deceleration switch is pressed, the camera image display screen does not switch to another screen or return to the standard screen display.



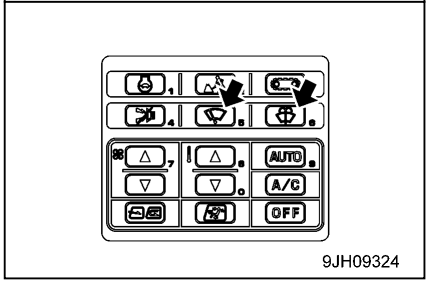
9JH09322

• It is possible to press the buzzer cancel switch to stop the alarm buzzer for the warning item where there is an abnormality.
Even if the buzzer cancel switch is pressed, the camera image display screen does not switch to another screen or return to the standard screen display.



9JH09323

• Press the wiper switch and washer switch to operate the wiper and washer.
Even if the wiper switch or washer switch is pressed, the camera image display screen does not switch to another screen or return to the standard screen display.



9JH09324

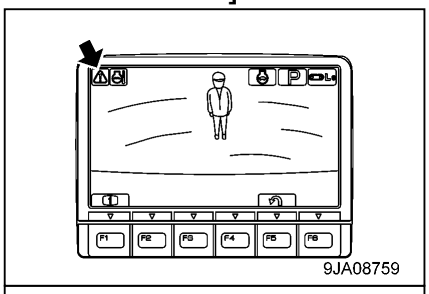


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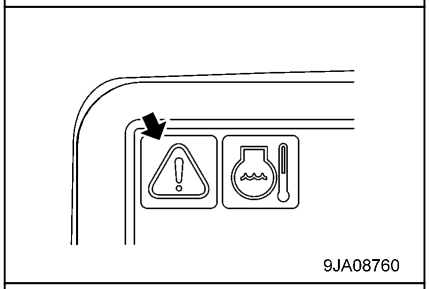
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**[ACTION WHEN WARNING IS GENERATED WHEN DISPLAYING CAMERA IMAGE]**

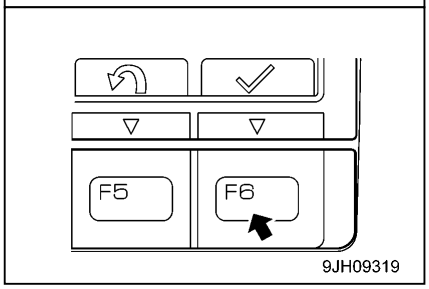
- If an error or alarm occurs while the camera image is being displayed, the error monitor or alarm monitor is displayed at the top left of the screen and flashes.



9JA08759

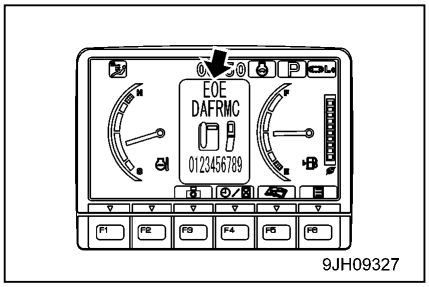

9JA08760

- If the error monitor or alarm monitor is displayed, press switch (F6), return to the standard screen, and check the content of the error or alarm display.
  When the error monitor is flashing, if no lever is operated for more than 10 seconds, the screen automatically returns to the standard screen.
  When the screen returns to the standard screen, the error monitor at the top left of the screen goes out and the error or alarm is displayed in the center of the screen.



9JH09319

- If an error monitor is displayed, move the machine, set it in a safety posture, and then have inspection carried out immediately.



9JH09327

## NOTES

For details of the content of the warning display, see “Operation 2.1.4 basic Check Monitors”, “Operation 2.1.3 Caution Monitors”, “Operation 2.1.2 Emergency Stop Monitors”, and “Operation 10. Troubles and Actions”.

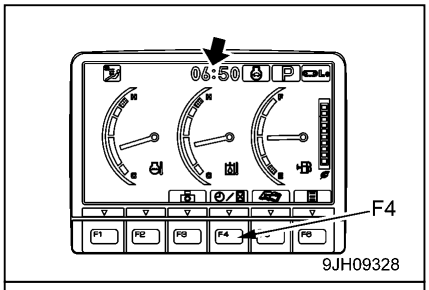


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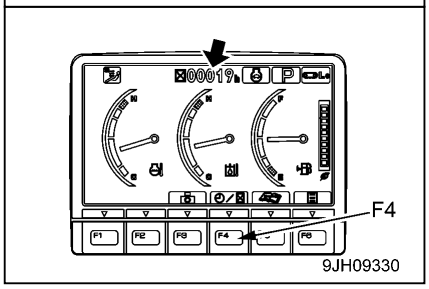
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### [2] SERVICE METER/CLOCK DISPLAY SELECTOR SWITCH

• On the standard screen, it is possible to press the function switch (F4) to switch the service meter and clock display at the top of the monitor display.

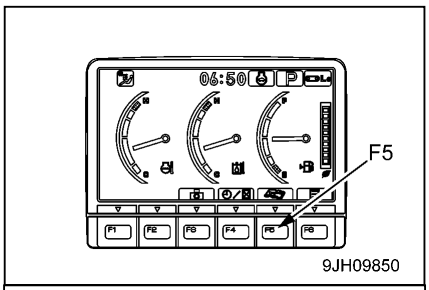



• When the time is being displayed, press the function switch (F4) to switch to the service meter display.



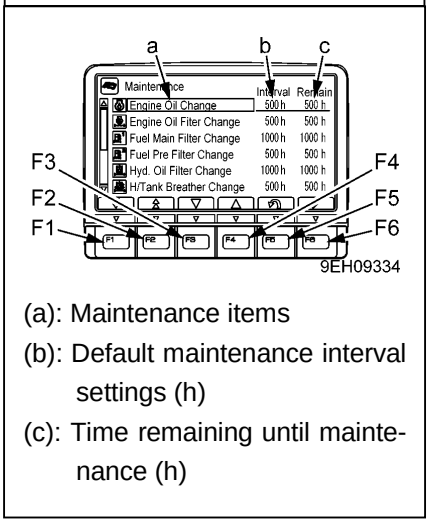

### [3] MAINTENANCE MODE SELECTOR SWITCH

When function switch (F5) is pressed on the standard screen, the monitor display screen switches to the maintenance mode screen.




The items on the maintenance display are as follows.

| Maintenance items | Default maintenance interval settings (h) |
|---|---|
| Engine oil change | 500 |
| Engine oil filter change | 500 |
| Fuel main filter change | 1000 |
| Fuel pre-filter change | 500 |
| Hydraulic oil filter change | 1000 |
| Hydraulic tank breather change | 500 |
| Damper case service | 1000 |
| Final drive case oil change | 1000 |
| Swing machinery case oil change | 1000 |
| Hydraulic oil change | 5000 |




(a): Maintenance items
(b): Default maintenance interval settings (h)
(c): Time remaining until maintenance (h)



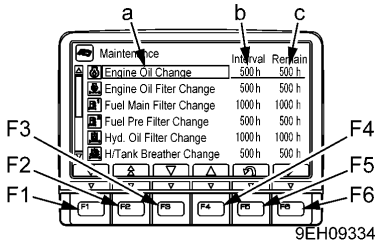
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**[OPERATIONS ON MAINTENANCE LIST SCREEN]**

On the maintenance list screen, it is possible to carry out the following operations with function switches (F1 to F6).

- Switch (F1): Displays next page. After the last page, it displays the first page.
- Switch (F2): Displays previous page. After the first page, it displays the last page.
- Switch (F3): Moves to next item (1 line down). After the last line, it moves to the first line on the next page.
- Switch (F4): Moves to previous item (1 line up). After the first line, it moves to the last line on the previous page.
- Switch (F5): Returns to standard screen.
- Switch (F6): If this switch is kept pressed, the screen changes to the screen for resetting the remaining time for the selected item (item highlighted in yellow).




(a): Maintenance items
(b): Default maintenance interval settings (h)
(c): Time remaining until maintenance (h)

**NOTES**

When resetting the remaining time, keep switch (F6) pressed for at least 1.5 seconds. If switch (F6) isnot kept pressed for at least 1.5 seconds, the switch operating sound can be heaard, but the screen does not switch to the screen for resetting the remaining time.

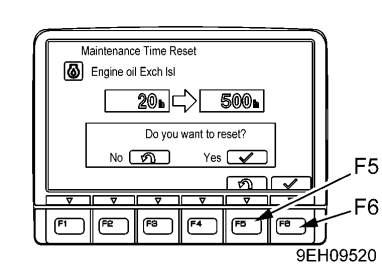
- If no switch is operated for 30 seconds on the maintenance list screen, the screen automatically returns to the standard screen.
- On the maintenance list screen, if the time remaining until maintenance for any item is less than 30 hours, the remaining time display is highlighted in yellow. If the time remaining until maintenance becomes 0 hours, the remaining time display is highlighted in red.
- If you want to change the setting for the maintenance interval, please consult us or our sales service agency.

**[OPERATIONS ON MAINTENANCE INTERVAL RESET SCREEN]**

On the maintenance list screen, if switch (F6) is kept pressed for at 1.5 seconds, the screen changes to the maintenance time reset screen.

Reset the remaining time on this screen.

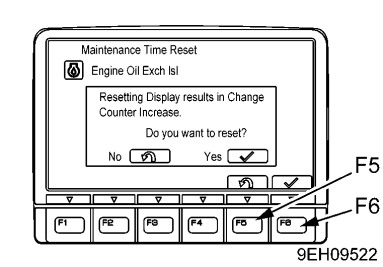
1. Press switch (F6) when the reset screen is in the condition shown in the diagram on the right. The screen switches to the reconfirmation screen.




**NOTES**

- It is desired to cancel the reset, press switch (F5). The screen returns to the maintenance list screen.
- On the reset screen, if no switch is operated for more than 30 seconds, the screen automatically switches to the maintenance list screen.

2. The reconfirmation screen shown on the right is displayed.
3. If switch (F6) is pressed again. The remaining time is reset and the screen switches to the maintenance list screen.




**NOTES**

- If it is desired to cancel the reset, press switch (F5). The screen returns to the maintenance list screen.
- On the reconfirmation screen, if no switch is operated for more than 30 seconds, the screen automatically switches to the maintenance list screen.

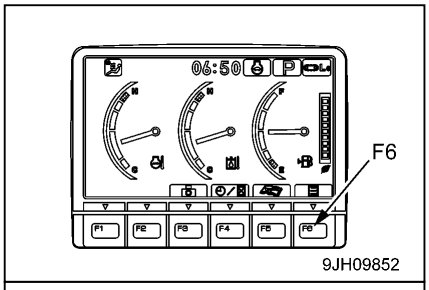


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### [4] USER MODE SELECTOR SWITCH

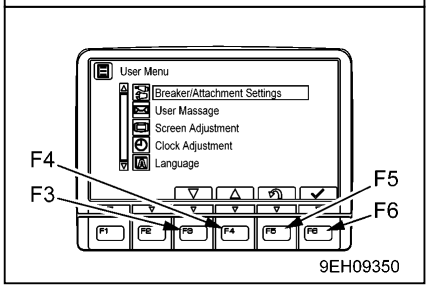
When the switch (F6) pressed, the monitor display screen switches to the setting mode screen for the machine.



9JH09852

On the user menu screen, it is possible to carry out the following operations with function switches (F3 to F6).

- Switch (F3): Moves to next item (1 line down). When on the last line, it moves to the first line on the next page.
- Switch (F4): Moves to previous item (1 line up). When on the first line, it moves to the last line on the previous page.
- Switch (F5): Returns to standard screen.
- Switch (F6): Switches to setting screen for selected item.

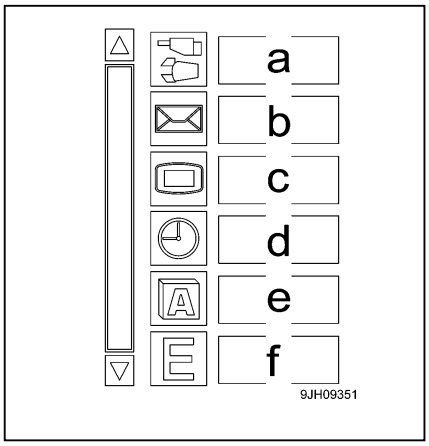


9EH09350

**NOTES**

If no switch is operated for 30 seconds on the user menu screen, the screen automatically returns to the previous screen.

- The following item can be set.
  (a): Not available for this machine
  (b): Not available for this machine
  (c): Screen adjustment
  (d): Clock adjustment
  (e): Language selection
  (f): Economy mode adjusting
  The operation for setting (a) to (f) as follows.



9JH09351



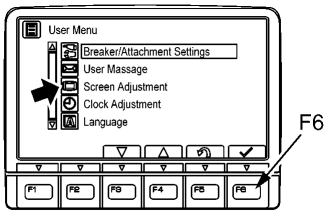
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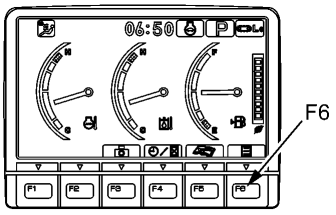
**(c) Adjusting screen**

Use this screen adjustment menu to adjust the brightness, contrast, and back light of the screen.

1. On the standard screen, presses switch (F6).

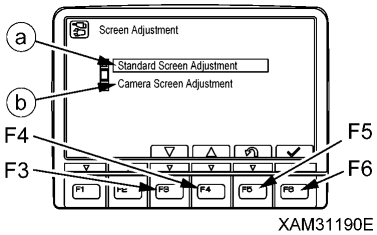



2. Select screen adjustment on the user menu screen, then press switch (F6). The screen switches to the selection menu screen for screen adjustment.




| NOTES |
|---|
| It is possible to adjust the brightness, contrast, and back light of the camera image display screen on this menu. |

3. Select item to be adjusted (a) or (b) from the selection menu screen for screen adjustment, then press switch (F6).
   The screen switches to the setting screen for the selected item.
   On the mode selection screen shown on the right, it is possible to carry out the following operations with switches (F3 to F6).
   - Switch (F3): Moves to next item (1 line down).
   - Switch (F4): Moves to previous item (1 line up).
   - Switch (F5): Returns to user menu screen.
   - Switch (F6): Switches to setting screen for selected item.

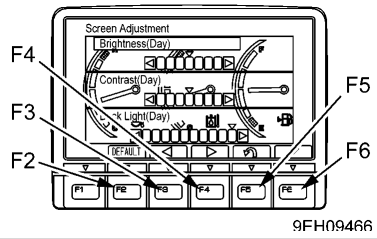


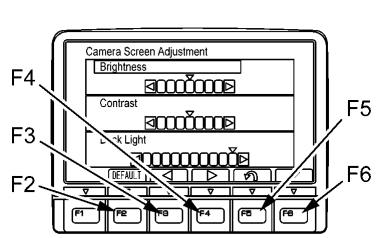

(a): Standard screen adjustment
(b): Camera screen adjustment

4. Use switches (F2 to F6) to adjust the brightness, contrast, and back light of the selected screen.
   (1) Adjusting standard screen
   - If the light switch is at night mode ON, and the standard screen is adjusted, it is possible to adjust the brightness of the monitor screen (night mode).
   - If the switch is at day mode ON or OFF, and the standard screen is adjusted, it is possible to adjust the brightness of the monitor screen (day mode).

   (2) Adjusting camera screen
   - The background when adjusting the camera image is the image for the No. 1 camera.
   - When displaying the camera screen, the screen may become dark if the image is on snow. In such cases, we recommend adjustment of the screen.

   On the screen for items (1) or (2), it is possible to carry out the following operations with switches (F2 to F6).
   - Switch (F2): Resets all adjusted values to default value.
   - Switch (F3): Indicator of selected item moves 1 segment to left.
   - Switch (F4): Indicator of selected item moves 1 segment to right.
   - Switch (F5): Returns to user menu screen.
   - Switch (F6): Accepts change and switches to next item setting.



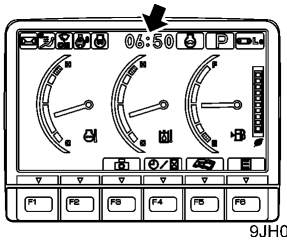



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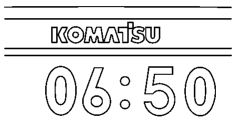
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**(d) Clock Adjustment**

On this clock adjustment menu, it is possible to change the setting of the clock displayed on the pilot monitor of the standard screen.

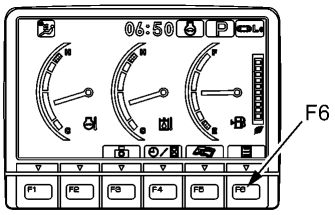


9JH09469



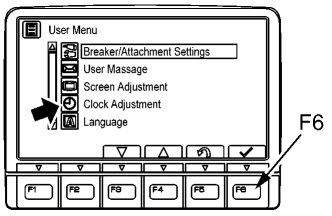
9JH09470

1. On the standard screen, presses switch (F6).



9JH09852

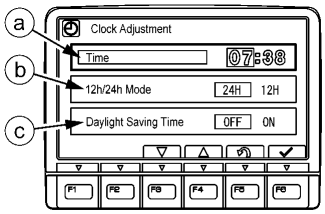
2. Select “Clock Adjustment” on the user menu screen, then presses the switch (f6). The screen switches to the time adjustment selection menu screen.



9EH09471

The following 3 items can be changed.

- (a): Clock setting
- (b): 12/24 hour display mode
- (c): Daylight saving time



9EH09472

3. On the clock adjustment selection screen, it is possible to carry out the following operations with switches (F3 to F6).

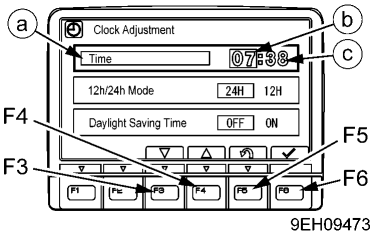
**[Time]**

Adjust the hour setting.

(1) If “Time” (a) is not highlighted in yellow, press switch (F6) to highlight “Time” (a) in yellow. When this is done, hour display (b) changes to orange.

(2) Adjust hour display (b) with the switches as following. If it is not necessary to change the hour setting, presses switch (F6).

- Switch (F3): Time advances 1 hour.
- Switch (F4): Time goes back 1 hour.
- Switch (F5): Cancels change and returns to user menu screen.
- Switch (F6): Accepts change and goes to setting for minutes.



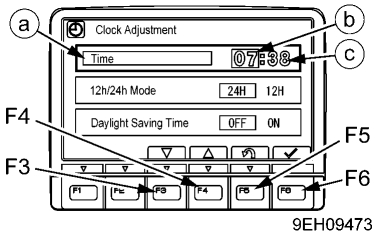
9EH09473

(a): Time (b): Hour (c): Minute



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(3) When minute display (c) is highlighted in orange, operate the switches as follows to adjust minute display (c).
(4) If it is not necessary to change the minute setting, press switch (F6). If the time has been changed, always press switch (F6).
- Switch (F3): Time advances 1 minute.
- Switch (F4): Time goes back 1 minute.
- Switch (F5): Cancels change and returns to user menu screen.
- Switch (F6): Accepts change and goes to setting for 12/24 hour display mode minutes.

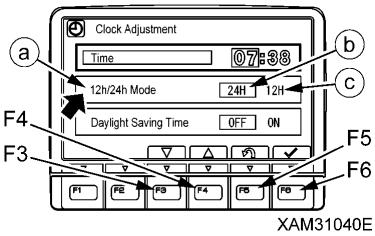



(a): Time (b): Hour (c): Minute

**[12/24h Mode]**

Choose either a 12-hour display (am/pm) or a 24-our display.
(1) If “12h/24h Mode” (a) is not highlighted in yellow, press switch (F6) to highlight “12h/24h Mode” (a) in yellow.
(2) Change the “12h/24h Mode” with the switches as follows.
The selected display mode (b) or (c) is highlighted in green.
- Switch (F3): Moves 1 item to left.
- Switch (F4): Moves 1 item to right.
- Switch (F5): Cancels change and returns to user menu screen.
- Switch (F6): Accepts change and goes to setting for “Daylight Saving Time” minutes.

If the setting has been changed, always press switch (F6).

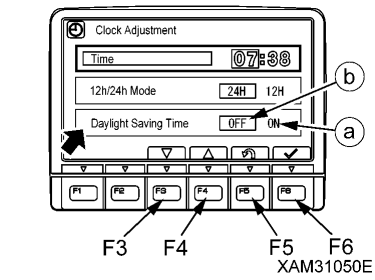



(a) 12h/24h Mode
(b): 24-hour display
(c): 12-hour display (am/pm)

**[Daylight Saving Time (Summer time)]**

(1) If “Daylight Saving Time” is turned ON (a), the clock display becomes 1 hour earlier. If “Daylight Saving Time” is turned OFF (b), the clock display returns to the set time.
The selected display mode is highlighted in green.
(2) Change the “Daylight Saving Time” with the switches as follows.
- Switch (F3): Moves 1 item to left.
- Switch (F4): Moves 1 item to right.
- Switch (F5): Cancels change and returns to user menu screen.
- Switch (F6): Accepts change and goes to setting for “Time”

If the setting has been changed, always press switch (F6).




(a): ON (b): OFF

## NOTES

Daylight saving time or summer time means moving the clock forward 1 hour to take advantage of the fact that the sun rises early in summer. This system is used in many countries during the summer.



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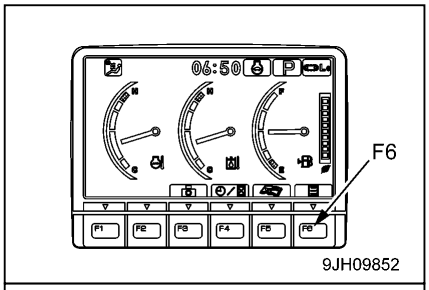
**(e) Language selection**

On this language selection menu, it is possible to select the language used on the monitor display.

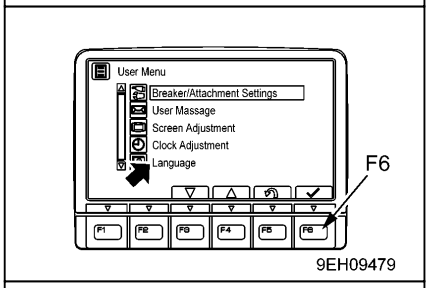
The languages that can be selected are as follows.

• Japanese, English, Chinese, French, Spanish, Portuguese, Italian, German, Russian, Turkish, Indonesian, Thai.

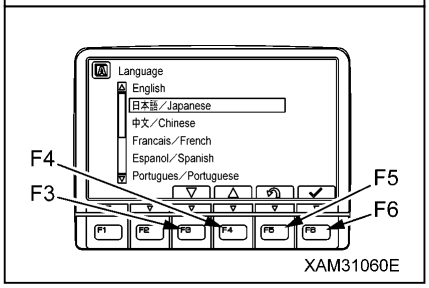
1. On the standard screen, press switch (F6).




2. Select “Language” on the user menu screen, then press switch (F6).
   The screen switches to the language selection menu screen.




3. Select the language to use for the display, then press switch (F6). The screen display changes to the selected language.
   • Switch (F3): Moves to item below.
   • Switch (F4): Moves to item above.
   • Switch (F5): Cancels change and returns to user menu screen.
   • Switch (F6): Accepts change and returns to user menu screen.





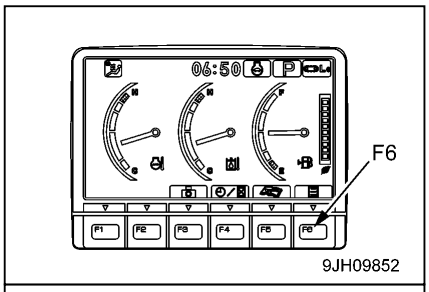

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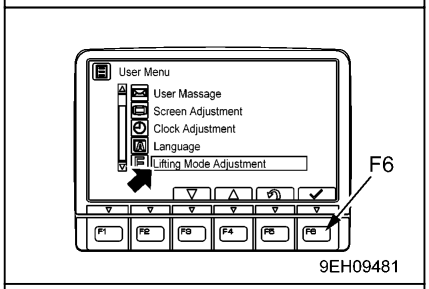
### (f) Adjusting Economy Mode

With this economy mode, the engine output can be adjusted to improve the fuel consumption in economy mode.

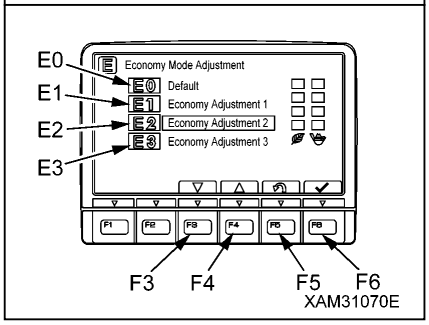
1. On the standard screen, press switch (F6).




2. Select “Economy Mode Adjustment” on the user menu screen, then press switch (F6).
   The screen switches to the “Economy Mode Adjustment” selection menu screen.




3. Select the desired economy mode from the “Economy Mode Adjustment” selection menu.
   The levels that can be set are as follows.
   - (E0): Default
   - (E1): Economy Adjustment 1
   - (E2): Economy Adjustment 2
   - (E3): Economy Adjustment 3




**NOTES**

- The higher the selection is made from (E0) to (E3), the better the fuel consumption becomes, but the production is reduced accordingly.
- When the machine is shipped, it is set to (E0).

On the “Economy Mode Adjustment” menu screen, it is possible to carry out the following operations with switches (F3 to F6).

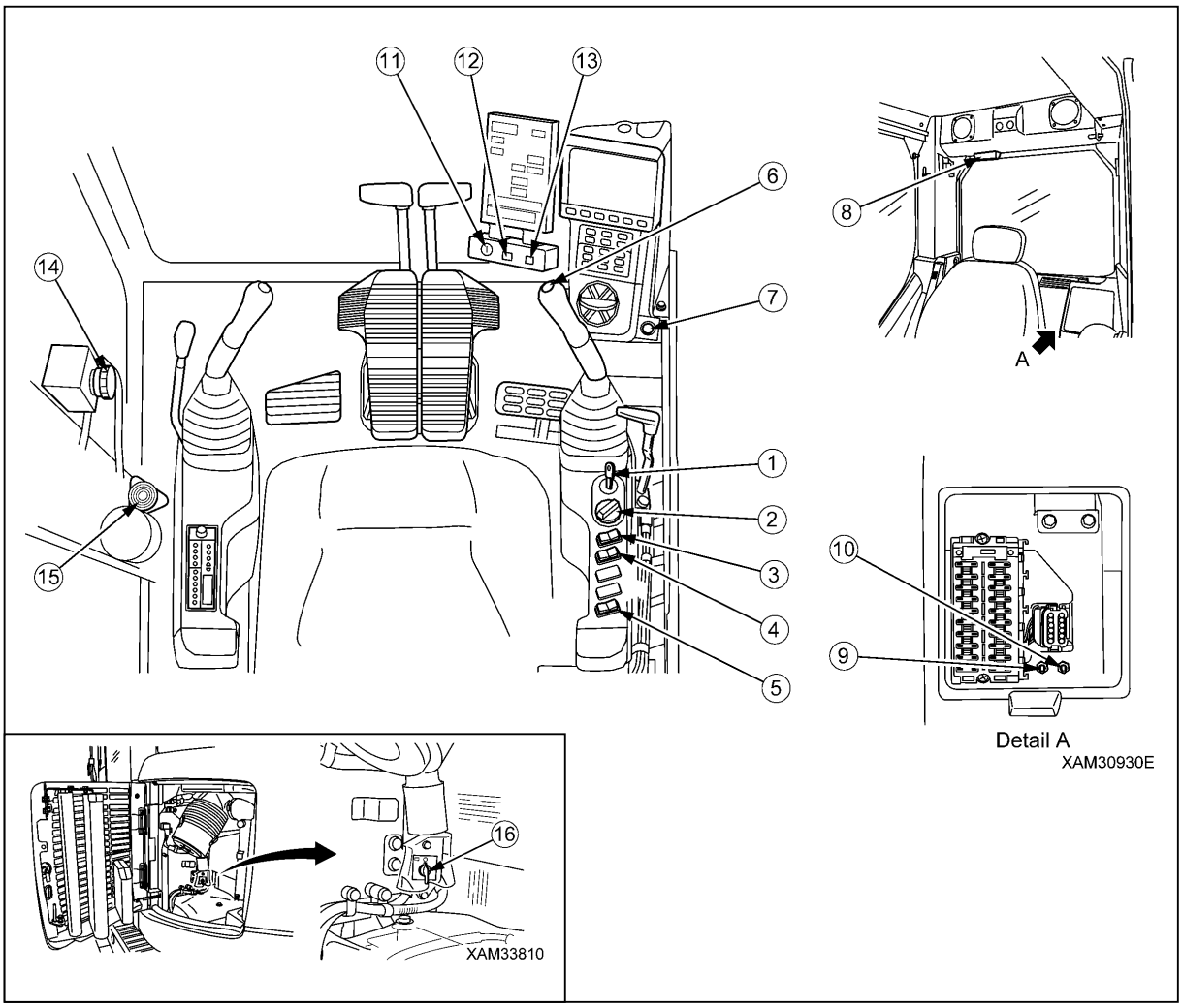
- Switch (F3): Moves to item below.
- Switch (F4): Moves to item above.
- Switch (F5): Cancels change and returns to user menu screen.
- Switch (F6): Accepts change and returns to user menu screen.



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## 2.2 SWITCHES




(1) Starter switch
(2) Fuel control dial
(3) Lamp switch
(4) Swing lock switch
(5) Sun roof wiper switch
(6) Horn switch
(7) Cigarette lighter
(8) Room lamp switch
(9) Emergency pump drive switch
(10) Swing parking brake release switch
(11) Moment limiter emergency stop cancel switch
(12) Over-hoisting cancel switch
(13) Winch speed selector switch
(14) Engine emergency switch
(15) Level
(16) Battery disconnect switch



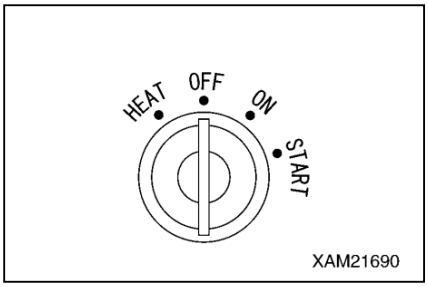
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### [1] STARTER SWITCH

**⚠ CAUTION**

**Always turn the starter switch to the OFF position after completing the work.**

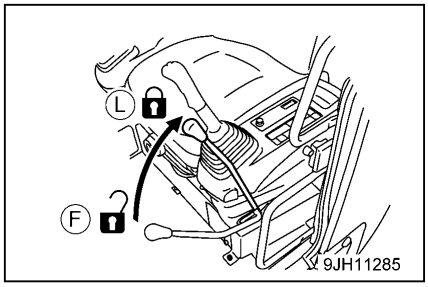



Starting switch (1) is used to start or stop the engine.

- OFF position:
  The starter key can be inserted or withdrawn. Switches for the electrical system (except room lamp), are all turned off and the engine is stopped.
- ON position:
  Electrical current flows through the charging and lamp circuit. Keep starter key in the ON position while the engine is running.
- START position:
  This is the engine-start position. Keep the key at this position during cranking. Immediately after starting the engine, release the key. It will automatically return to the ON position.
- HEAT position:
  Set to this position when starting engine in cold weather.
  When the starter key is returned to HEAT position, the preheating monitor lights up. Keep the key in this position until the preheating monitor flashes. When the preheating monitor flashes, release the key immediately. When the key is released, it will return automatically to OFF position so turn it immediately to START position and start the engine.

**NOTES**

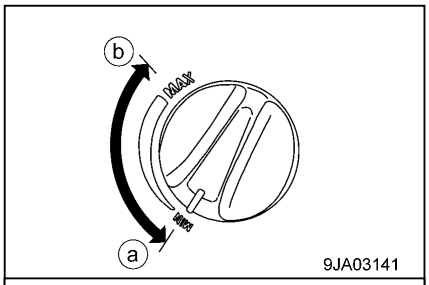
The engine does not start, if the lock lever is not in the LOCK position (L). Make sure first that the lock lever is in the LOCK position (L), and then turn the engine starter switch.




### [2] FUEL CONTROL DIAL

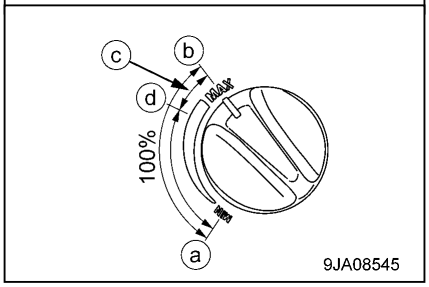
Use this dial (2) to control the engine rotating speed and output.

- (a) Low idling (MIN): Turn dial fully to left
- (b) Full speed (MAX): Turn dial fully to right




**NOTES**

On this machine, the engine is electronically controlled to give the optimum matching with the main pump. There is an area without any feeling on the dial, but this is not an abnormality.
Range (c): No feeling (engine speed constant)
P mode: 22%
E mode: 30%
Position (d): High idling





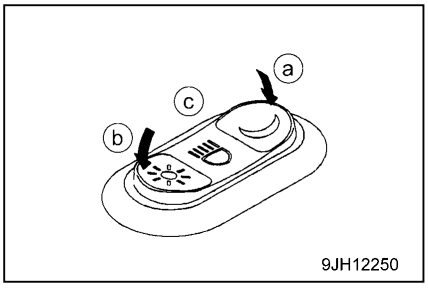

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### [3] LAMP SWITCH

This switch (3) is used to light up the working lamp and monitor lighting.

- (a) Night position: Lamps light up and monitor illumination is set to night mode.
- (b) Day position: Lamps light up and monitor illumination is set to day mode.
- (c) OFF position: Lamps go out. (The monitor illumination is set to day mode.)



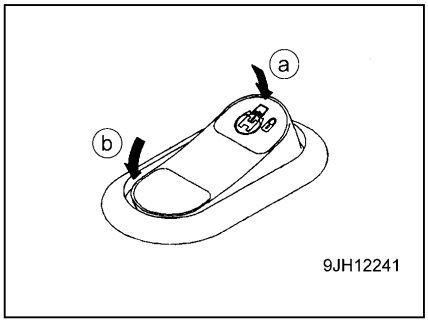

### [4] SWING LOCK SWITCH

**⚠ WARNING**

- **When not using the swing operation, e.g. when traveling, put the swing lock switch to the OFF position.**
- **On slopes, even when the swing lock switch is at the ON position, the weight of the boom may cause the upper structure to swing if the swing control lever is operated in the downhill direction.**

This switch (4) is used to lock the upper structure so that cannot swing.

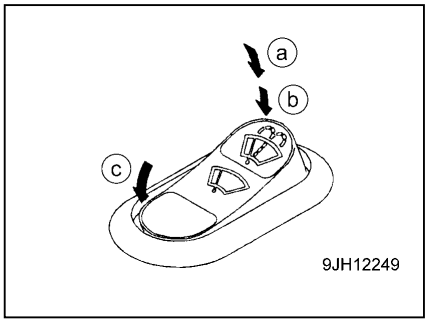
- (a) ON position (actuated): The swing lock is always applied, and the upper structure will not swing even if the swing is operated. In this condition, the swing lock lamp lights up.
- (b) OFF position (canceled): The swing lock is released, when operating the swing control lever, allowing the upper structure to swing.




### [5] SUN ROOF WIPER SWITCH

This switch (5) is used to actuate the wiper and window washer of the sun roof.

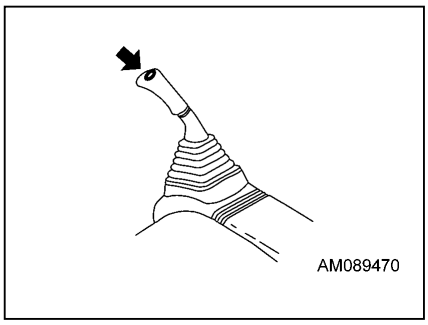
- (a) Wiper position: Wiper moves continuously.
- (b) Washer position: this switch is kept continuously pressed, window washer fluid is sprayed out, and at the same time, the wiper will be actuated continuously. When the switch is released, the switch returns to the wiper position (a), the spray stops, and then the wiper will continue to operate.
- (c) Stop position: Wiper stops.




### [6] HORN SWITCH

Use this switch (6) to sound the horn.

Press the switch on the right work control lever to sound the horn.






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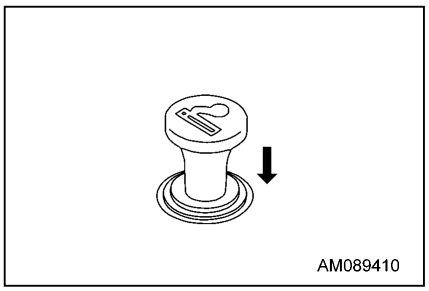
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### [7] CIGARETTE LIGHTER

**CAUTION**

**This cigarette lighter is for 24V. Do not use it as the power source for 12V equipment.**

This cigarette lighter (3) is used when lighting cigarettes.
When the cigarette lighter is pushed in, it will return to it's original position after several seconds, so pull it out to use it.
If the cigarette lighter is removed, the socket can be used as an 85W (24V x 3.5A) power source.

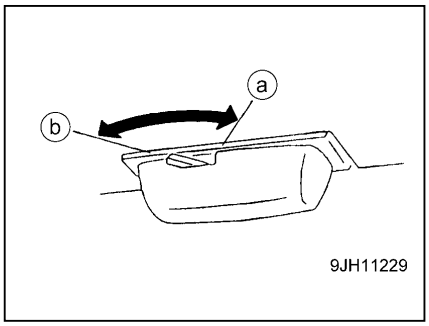



### [8] ROOM LAMP SWITCH

**CAUTION**

**It is possible to turn ON the interior cab room lamp even when starter switch is in the OFF position, do not forget to turn it OFF. The room lamp lights up even when starter switch is at the OFF position.**

Use this switch (8) to light up the room lamp.
• (a) ON position: Lamp lights up
• (b): OFF position: Lamp goes out.




### [9] EMERGENCY PUMP DRIVE SWITCH

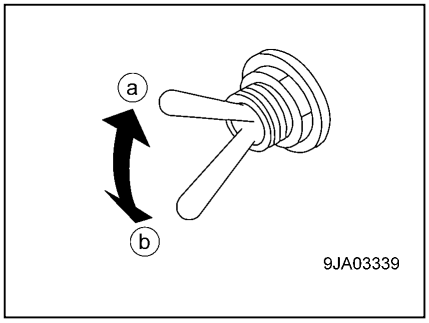
**CAUTION**

- **This switch is provided to enable you to carry out operation temporarily, when any problem occurs on the pump control system. Do not use it except in emergency. Furthermore, remove the cause of the problem immediately.**
- **If the switch is depressed and moved to the EMERGENCY position by mistake, therby engaging the machine in the work, while the machine is in normal condition, an "E02" mark is shown in the display. If "E02" is displayed during the work, check that the switch is in the NORMAL position.**

This switch (9) is used to make it possible to carry out operations temporarily if any problem should occur in the pump control system (when the display shows "E02").
• (a) EMERGENCY position: When abnormal (move switch up)
• (b) NORMAL position: When normal (move switch down)

**NOTES**

If the display shows "E02", move the switch up to make it possible to carry out work.






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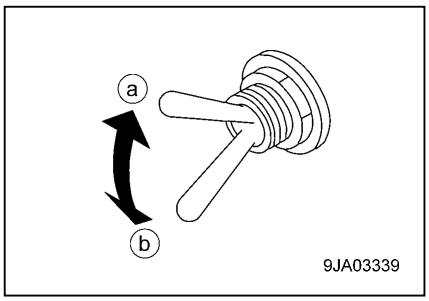
### [10] SWING PARKING BRAKE RELEASE SWITCH

**CAUTION**

**This switch makes it possible to perform swing operations for a short time, even when there is a problem in the swing parking brake electric system. Do not use this switch except in emergencies. Repair the problem as soon as possible.**

This switch (10) is used to make it possible to carry out operation temporarily if any problem should occur in the swing parking brake system (when the display shows “E03”).

- (a) FREE position: When abnormal (move switch up)
- (b) NORMAL position: When normal (move switch down)




**NOTES**

- If the display shows “E03”, move the switch up to the FREE position, to make it possible to carry out work.
- When pushing this switch up to the FREE position, the swing lock monitor being to flash.



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## [11] MOMENT LIMITER EMERGENCY STOP CANCEL SWITCH

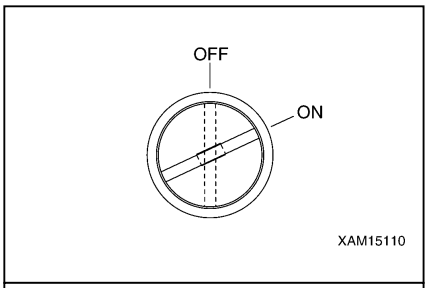
**⚠ DANGER**

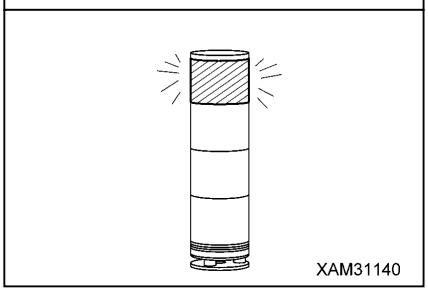
**The moment limiter emergency stop cancel switch will temporarily disable the moment limiter function. While this switch is turned to ON position (i.e. released), calculation of the rated total load is stopped, thus the machine is in a very risky condition. When lifting operation is continued in this condition, it may result in dropping of the hoisted load or damage to the boom, and cause serious accidents such as overturning of the machine resulting in death or serious injury.**
**Use of this switch must be limited to the specific inspection and maintenance purpose, where each sensor to detect the crane condition is checked. Otherwise, keep the key of the switch extracted, for ordinary operations. When turning ON (cancel) the emergency stop cancel switch, always shift the crane speed to low.**
**In particular, operations as below must be strictly avoided:**

- **To hoist a load, never raise the hook while this switch is set ON (released). The moment limiter is disabled to detect a condition where the hoisted load exceeds the rated load, which causes the wire rope breakage and the hoisted load to drop, damage to the boom, or overturning of the machine.**
- **After the moment limiter detects a condition that the actual load exceeds the rated load during the crane operation and interrupts it, winding up, boom lowering and/or boom extending operation by turning this switch to ON (released) position must be strictly avoided. It may result in boom damage or the machine overturning.**
- **For hook stowage, always use the Over-hoisting cancel switch, only. If this moment limiter emergency stop cancel switch is used for hook hoisting, the winch will not automatically stop in an over-winding condition which may allow the hook to swing into the boom tip or cause the wire rope to snap.**

Use this switch (11) only for the limited purpose of inspection and maintenance of the boom length detector and angle detector, and the pressure sensor.

- ON (Clear): Insert the key into the switch. Turn the key clockwise and retain the key at that position. The activation stop function is cleared while the key is maintained at the ON position. When the key is released, it will return automatically to OFF position.
- OFF (Auto): Insert the key into the switch and turn the key counterclockwise. This activates stop functions.
  The key can be removed or inserted at this position.




**NOTES**

When turning this switch to the ON position, the red lamp of the working status lamp will light up.



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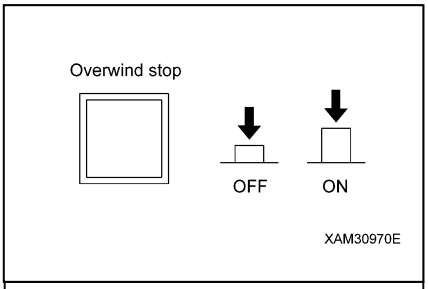
### [12] OVER-HOISTING CANCEL SWITCH

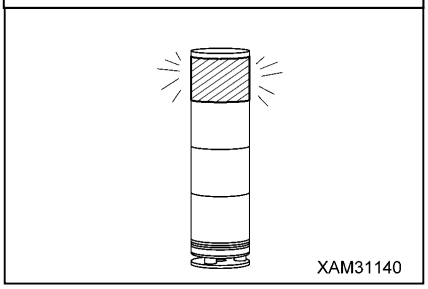
**⚠ WARNING**

- **The Over-hoisting cancel switch cancels the auto-stop function of the over hoist detector. Operate the winch lever carefully when stowing the hook block. Pay sufficient attention not to let the hook block collide with the boom.**
- **Use this switch only when stowing the hook block.**

The purpose of the switch (12) is to stow the hook block into it's stowage position in the boom top.
The pilot lamp inside the switch button lights when it is pushed to the RELEASE position and is off when positioned AUTO.

- Release: Keep the button pushed and operate the control lever to raise the HOOK . The hook block will be winched for stowage to the boom top.
- Auto: Release the finger from the button. It returns to the previous position and the auto-stop function of overwind detector will be enabled.




**NOTES**

- When turning this switch to the RELEASE position, the red lamp of the working status lamp will light up.
- When the hook block is hoisted and this switch is pushed, the winch speed is slower, however it is not a winch failure.

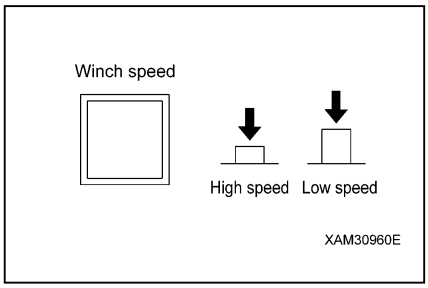
### [13] WINCH SPEED SELECTOR SWITCH

**⚠ WARNING**

- **High speed winch hoisting and lowering are allowed only in a condition that no load is hoisted. When any load is hoisted or lowered in high speed, it may cause an accident to the machine , overturning or damaging it, or the hoisted load may drop which results in a serious injury or death to personnel.**
- **Where the load of the hoisting is "0.5 tons" or more, the high speed operation is not available even when the winch speed selector switch is pushed to the "High speed" position (with it's pilot lamp ON).**
  **While the load of the hoisting is "0.2 tons" or less, the high speed hoisting/lowering are enabled, however such practice may cause an accident to the machine overturning or damaging it, or the hoisted load may drop which results in a serious injury or death to personnel. It is advisable to avoid such a practice.**

The purpose of the switch (13) is to use it for changing the winch speed for hoisting and lowering. During such hoisting and lowering operation, the pilot lamp inside the switch button lights when it is pushed to the "High speed" position and is off when positioned to "Low speed".

- High speed: Push the switch button, then hoisting/lowering speed is accelerated.
- Low speed: Push the switch button, again. Then hoisting/lowering speed resumes to normal.




**NOTES**

During the FALL MODE in the moment limiter, when set to "1 FALL", the high speed winching is not available, even when this selector switch is positioned "High speed" (, the lamp of the switch keeps OFF). The winch is fixed to "Low speed".



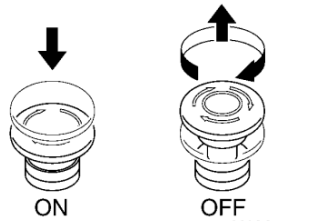
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### [14] ENGINE EMERGENCY STOP SWITCH

Use this switch (14) in case of an error in the machine to stop the engine for emergency.

- ON position: Press the switch. The engine stops.
- OFF position: Turn the switch clockwise (direction of the arrow in the right figure) or pull up knob of this switch. The switch returns to the original position.



XAM21450

**NOTES**

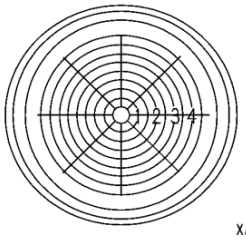
- When restarting the engine after emergency stop, be sure to turn this switch to the OFF position before starting the engine.
- When this switch is pressed to ON position, the machine monitor display will be OFF while the moment limiter screen keeps displaying.

### [15] LEVEL

**⚠ WARNING**

**A crane operation on a slope condition could cause the machine to overturn.**
**Prior to starting the operation, monitor the level and try to find a location which enables a level condition. Where an operation on a slope is un-avoidable, use supporting timber or build up ground with soil, so that the machine is level.**

This device indicates how much the machine body is tilted.
The bubble position shows how much the machine is tilted in which direction.
Use this device to verify that the machine is leveled when stopping the machine on working area.


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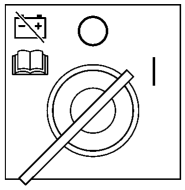
### [16] BATTERY DISCONNECT SWITCH

**CAUTION**

**During normal operations, always leave this switch positioned in " | " (ON). Use of this switch is only to temporally prevent unexpected starting of electrical devices during inspection/ maintenance work.**

The purpose of the switch (16) is to use to isolate the battery power to prevent electrical devices from unexpected starting, during inspection/maintenance work.

- O (OFF): The battery power is isolated and current is not supplied to all the electrical circuits.
- | (ON) : Battery connection is resumed.

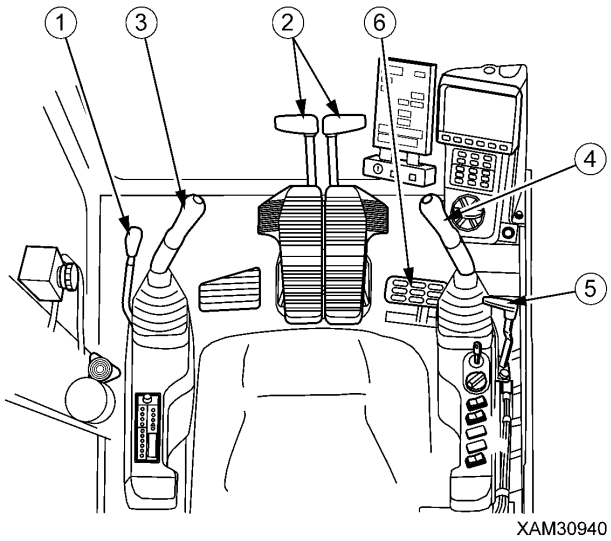

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## 2.3 CONTROL LEVERS AND PEDALS




(1) Lock lever
(2) Travel levers
(With pedal and auto-deceleration system)
(3) Left work equipment control lever
(With auto-deceleration system)
(4) Right work equipment control lever
(With auto-deceleration system)
(5) Blade control lever
(6) Accelerator pedal

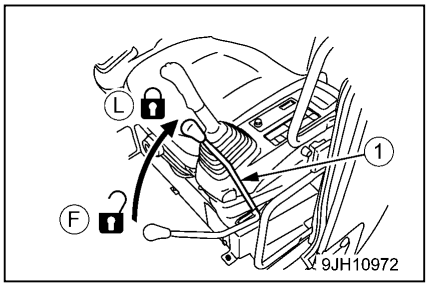
### [1] LOCK LEVER

**⚠ WARNING**

- **When leaving the operator's compartment, set the lock lever securely to the LOCK position. If the lock lever is not at the LOCK position and the control levers or control pedals are touched by mistake, it may lead to serious personal injury.**
- **Check that the conditon of the lever is as shown in the diagram.**
- **When pulling the lock lever up or down, be careful not to touch the work equipment control lever.**

The lever (1) is a device to lock the crane, swing, and travel control levers.

- (L) LOCK position: Even when levers are operated, machine does not move.
- (F) FREE position: Machine moves according to operation of levers.




**NOTES**

This lock lever is a hydraulic lock type. Accordingly, when it is in the lock position (L), the control levers move but the machine does not move.



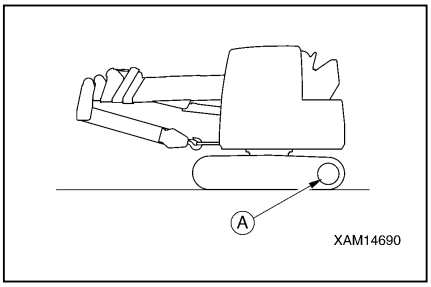
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## [2] TRAVEL LEVERS

**⚠ WARNING**

- **Do not rest your foot on the pedal. If you carry out operations with your foot on the pedal, the machine may suddenly start if pressure is applied by mistake to the pedal, and this may lead to serious personal injury. Be extremely careful when using the pedal for travel and steering operations, and do not put your foot on the pedal when it is not necessary.**
- **When the track frame is facing the rear, the direction of operation of the steering lever is the opposite to the direction of movement of the machine (forward/reverse, left/right).**
  **When operating the travel lever, always check if the track frame is facing the front or the rear. (When the sprocket (A) is at the rear, the track frame is facing the front.)**

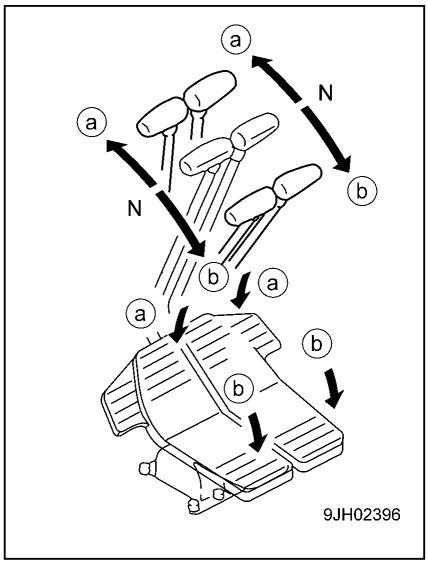



The lever (2) is used to change the direction of travel between forward and reverse. See picture to the right for pedal operation.

- (a) FORWARD: The lever is pushed forward.
  (The pedal is angled forward)
- (b) REVERSE: The lever is pulled back.
  (The pedal is angled back)
- (N) NEUTRAL: The machine stops.

**NOTES**

If the lever is shifted to the FORWARD or REVERSE positon from the Neutral position, the alarm sounds to warn that the machine is starting to move.





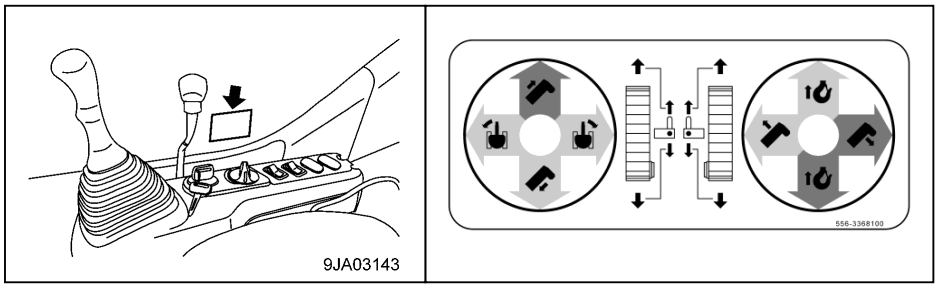

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### [3] WORK EQUIPMENT CONTROL LEVER

**⚠ WARNING**

- **The control pattern of this machine is as indicated in the CONTROL PATTERN label, as below. When any user desires to change to any other pattern, please contact us, or our sales and service agency.**
- **In such event that the control pattern is changed, the CONTROL PATTERN label must also be replaced.**




(1) LEFT WORK EQUIPMENT CONTROL LEVER

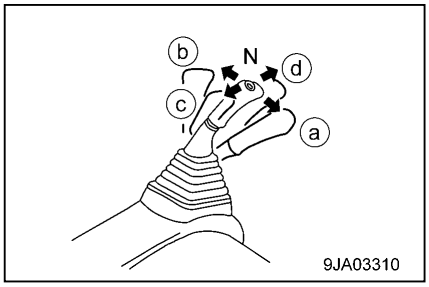
The lever (3) is used to operate the upper structure and boom.

Swing operation

- (a): Swing to right
- (b): Swing to left

Boom telescoping operation

- (c): Boom retracting
- (d): Boom extending
- N (Neutral): The upper structure and boom are held in that position when they come to a stop and do not move.




(2) RIGHT WORK EQUIPMENT CONTROL LEVER

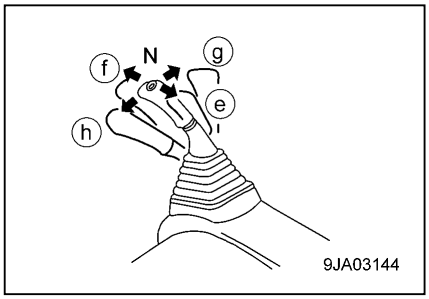
The lever (4) is used to operate the winch and boom.

Winch operation

- (e): Hook raising
- (f): Hook lowering

Boom derricking operation

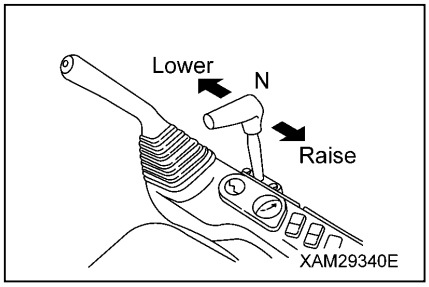
- (g): Boom lowering
- (h): Boom raising
- N (Neutral): The hook and boom are held in that position when they come to a stop and do not move.




### [4] BLADE CONTROL LEVER

The lever (5) is used to operate to the blade.

- RAISE: Blade raising
- NEUTRAL: The blade are held in that position when they come To a stop and do not move.
- LOWER: Blade lowering






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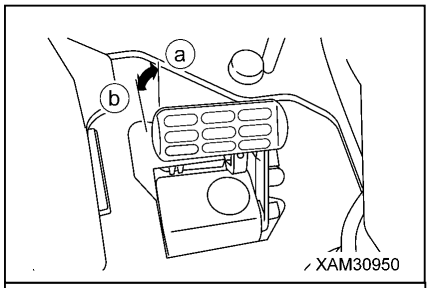
## [5] ACCELERATOR PEDAL

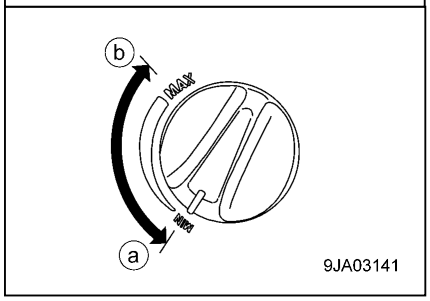
**⚠ WARNING**

**The accelerator pedal should only be used to control the crane operation while the machine is stationed.**
**During traveling operation, use of this pedal is strictly prohibited; otherwise it may cause an accident due to an operation error which may lead to serious personal injury.**
**During traveling operation, always adjust the engine speed only by turning the fuel control dial.**

This pedal (6) is used to adjust the engine speed or power during the crane operation.

- (a) Low idling: Release your foot from the pedal.
- (b) Full throttle: Press the pedal fully.




**NOTES**

The engine speed is set by the fuel control dial and the value is given a priority; thus the speed will not be slower than the value even when your foot is released from the pedal.
For the accelerator pedal control, use the fuel control dial to set the minimum engine speed required, in advance.

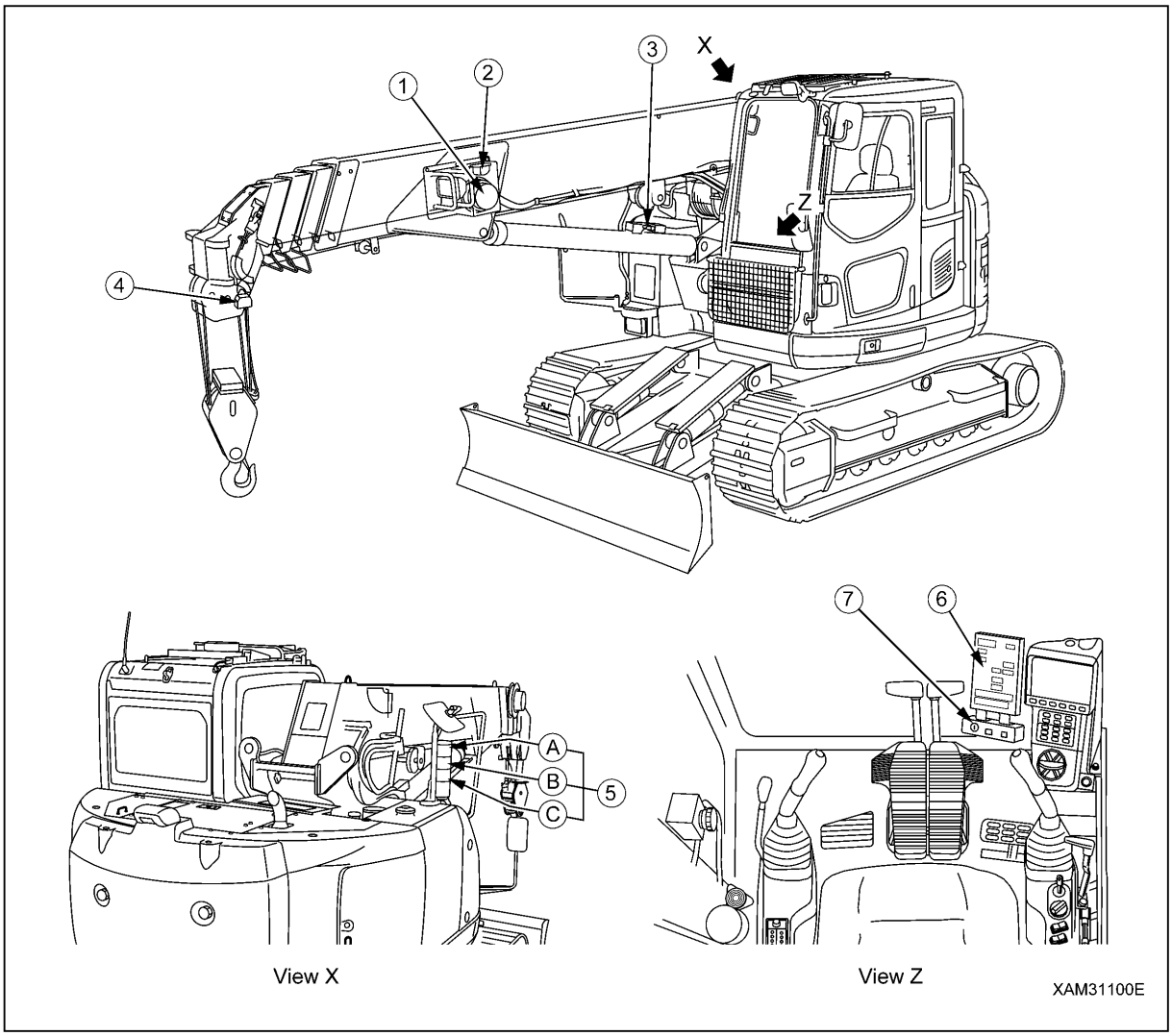


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# 2.4 MOMENT LIMITER (OVERLOAD DETECTOR)

## 2.4.1 MOMENT LIMITER CONFIGURATION




(1) Boom length gauge (Boom left side)
(2) Boom angle gauge (Boom left side)
(3) Pressure sensor (Derrick cylinder) (2 places)
(4) Over hoist detector (Boon tip side)
(5) Working status lamp
  (A) Red lamp (Warning lamp for load factor of 100% or more)
  (B) Yellow lamp (Pre-warning lamp for load factor of 90 to 100%)
  (C) Green lamp (Working lamp for load factor of less than 90%)
(6) Moment limiter display unit (inside cab)
(7) Moment limiter emergency stop cancel switch (Inside cab)



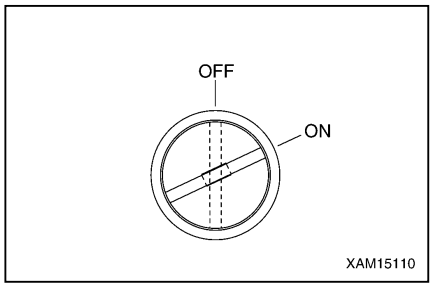
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## 2.4.2 FUNCTION OF MOMENT LIMITER

**⚠ DANGER**

- **Do not remove, disassemble, or repair detectors. Do not move the detectors to another location from original position.**
- **Should an object hit a detector or you find any damage on a detector, be sure to verify the actuation status of the auto stop. If you find any abnormality with the actuation of the auto stop, do not fail to fix it.**
- **The machine will not stop automatically even if the crane is overloaded during the slewing operation. Do not slew the crane when being overloaded.**
- **When the boom approaches the stop position during the operation, be sure to change the operation speed of the boom to low speed.**
  **With high-speed boom operation, the boom may overrun the specified stop position, causing serious accidents such as overturning of the machine resulting in death or serious injury.**
- **The moment limiter emergency stop cancel switch will temporarily disable the moment limiter function. While this switch is turned to ON position (i.e. released), calculation of the rated total load is stopped, thus the machine is in a very risky condition. When lifting operation is continued in this condition, it may result in dropping of the hoisted load or damage to the boom, and cause serious accidents such as overturning of the machine resulting in death or serious injury. Use of this switch must be limited to the specific inspection and maintenance purpose, where each sensor to detect the crane condition is checked.**
  **Otherwise, keep the key of the switch extracted, for ordinary operations. When turning ON (cancel) the emergency stop cancel switch, always shift the crane speed to low.**




The moment limiter is a device installed to prevent the hoisted load from falling, the boom from breaking, or the machine from overturning due to overloading.

Always check the operation of the moment limiter before crane operation to verify no abnormality.

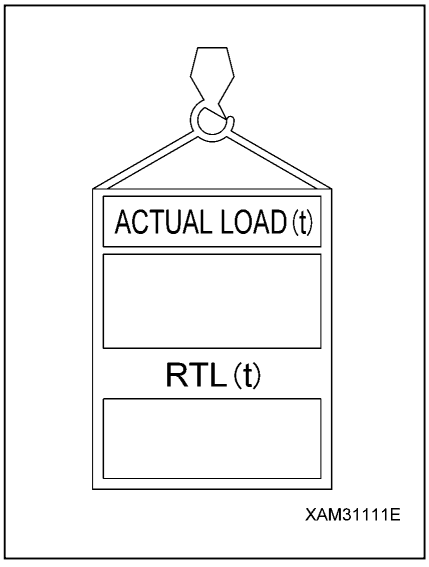
### [1] MECHANISM OF MOMENT LIMITER

The moment limiter calculates current "rated total load" by knowing the current boom posture by the boom angle gauge and the boom length gauge, and by knowing the number of wire falls (entered by the driver).

Then by actually hoisting a load, the "read load" (hoist load) is sent from the pressure sensor of the derrick cylinder to the moment limiter.

The moment limiter comparatively calculates between the "rated total load" computed out of the current posture and the "real load" (hoisted load), and issues an alarm if the result indicates the rated total load/real load=90 to 100%.

If the calculation result indicates the rated total load/real load=above 100%, an alarm is issued and the causes the boom operation to automatically stop.




And the accuracy of the overload stop meets the accuracy calculated as below, when the boom is slowly lowered:

$$\text{Accuracy of the overload stop} = \frac{A - B}{B} \times 100 < +10\%$$

Where: A: Total weight of the hoisted load, hook block and sling instruments

B: Rated total load at the working radius (measured radius) of the overload error.



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### [2] DISPLAY OF THE MOMENT LIMITER ERROR MESSAGES

The moment limiter performs self-diagnosis on the moment limiter display unit when an error is issued by the boom angle gauge, boom length gauge, pressure sensor, or when a circuit is opened or a connector is disconnected.

The result is displayed on the “Rated total load Display” of the moment limiter display unit by an error code to notify the operator of the error.

Immediately stop the use of the crane when an error code is displayed.

See “Operation 2.4.10 Moment Limiter Error Causes and Actions to be Taken”.

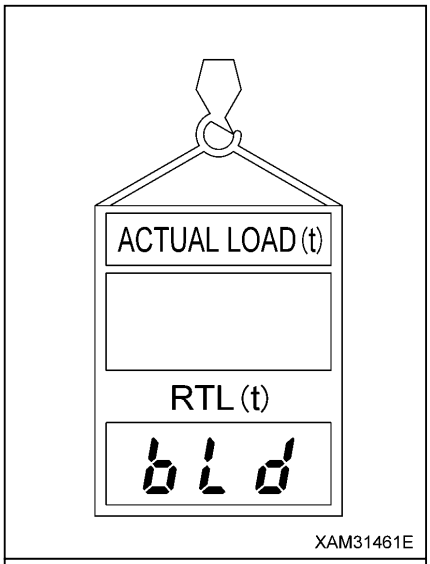
### [3] LIMITATION OF OPERATION DUE TO THE BLADE POSITION

Indications and warning are issued against a load hoisting operation in a condition where the Blade is lowered and a load is imposed. At the same time, crane functions below are interrupted:

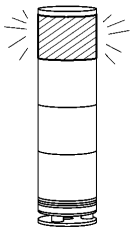
- Indications and warnings:
  - Rated total load display in the Moment limiter will blink and indicate “bld”.
  - Buzzer sounds intermittently.
  - The red lamp of the working status lamp lights up.
- Functions to be interrupted:
  - Winch hoisting
  - Winch lowering
  - Boom derricking
  - Boom telescoping

When a load is imposed on the Blade and in addition to that a load is hoisted, the above conditions continue.

Either clearing the Blade from the ground or to lower the hoisted load to the ground will release these indications and warnings, and then the crane resumes these functions.



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## 2.4.3 MOMENT LIMITER OPERATIONS

The moment limiter is a device for unexpected events. Operations relying on the device may rather incur danger.

Pay sufficient attention during the operation not to cause auto-stop of the crane.

### [1] PROHIBITED ACTIONS AFTER AUTO STOP

**⚠ DANGER**

**The following crane operations are prohibited after the crane has stopped automatically due to overloading. These operations may cause overturning of the machine or breakage of the boom and are very dangerous.**

**• Boom lowering operation • Boom extending operation • hook raising operation**

**• Crane slewing operation**

### [2] RECOVERY OPERATION AFTER AUTO STOP

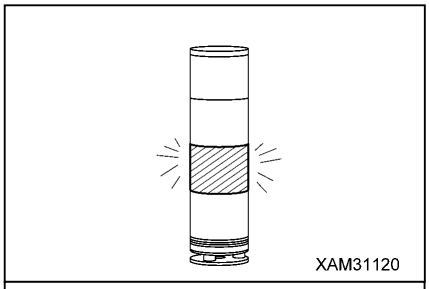
**⚠ DANGER**

**Be sure to switch the engine speed to low speed and perform crane operation carefully if the moment limiter load factor is 90 % or higher.**

**Performing crane operation at high engine speed will swing the hoisted load and is very dangerous, causing overloading and it may break the boom.**

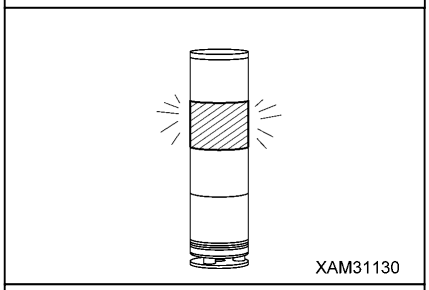
**1. With load factor of "less than 90 %"**

When the hoisting load is less than 90 % of the rated total load, the working status lamp lights in green, indicating normal operation status.


XAM31120

**2. With load factor of "90 to less than 100 %"**

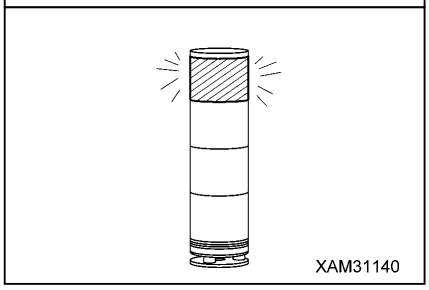
When the hoisting load reaches 90 % of the rated total load (pre-warning), the working status lamp changes from green to yellow and the alarm sounds intermittently, notifying the operator and those around that the hoisting load is close to the rated total load.


XAM31130

**3. With load factor of "100 % or higher"**

When the hoisting load reaches 100 % of the rated total load by continuing the crane operation after exceeding 90 % of the rated total load (pre-warning), the working status lamp changes from yellow to red and the alarm now sounds continuously. The following crane operations will stop automatically.

- Hook raising operation • Boom extending operation
- Boom lowering operation


XAM31140

The audible message of "Peep, overloading" will be issued. Furthermore, the LED of "100 %" on the moment limiter load factor display lights up.



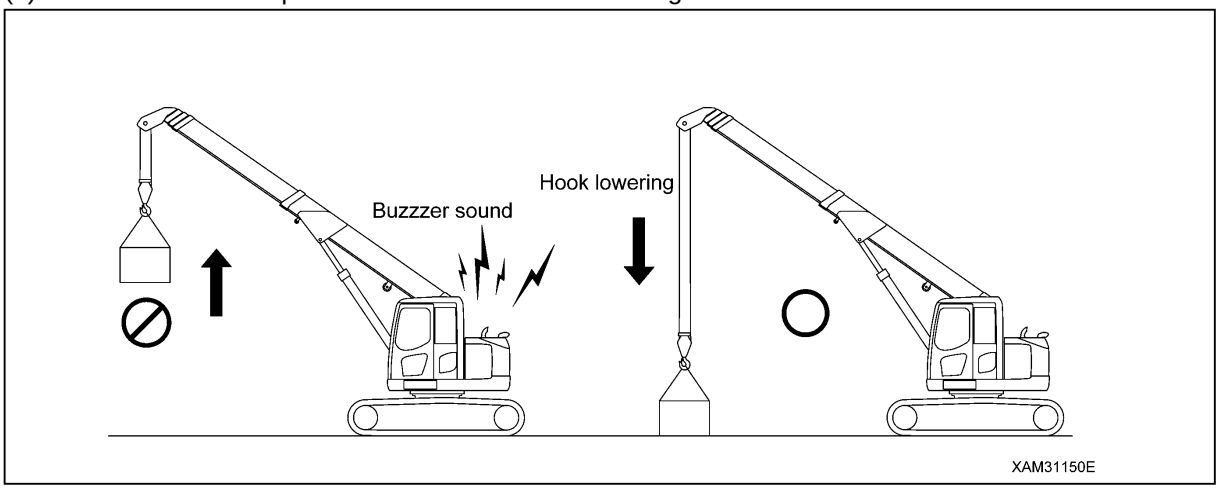
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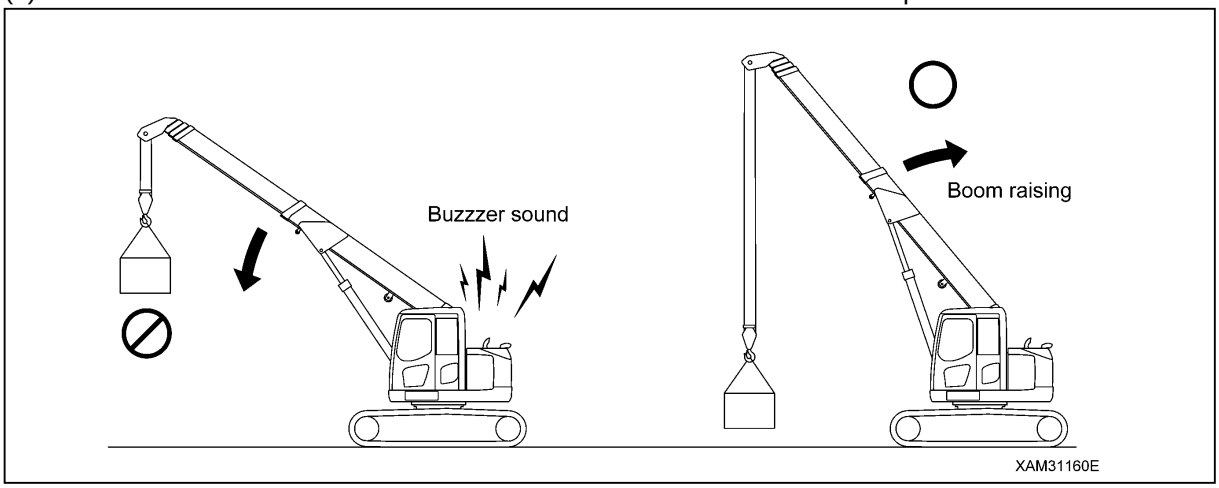
**4. Recovery Operation from Auto Stop**

The recovery operation from overloading should be the reverse operation of the crane operation that caused the auto stop. Perform one of the followings.

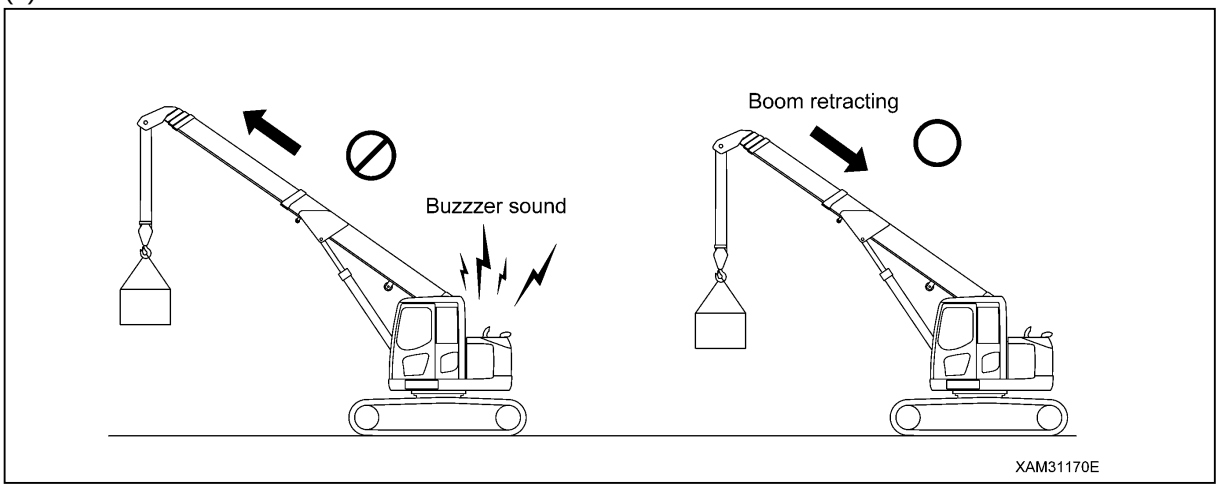
(1) Lower the hook and put down the hoisted load on the ground.




(2) Raise the boom. Lower the hook so that the hoisted load will be as low as possible.




(3) Retract the boom.

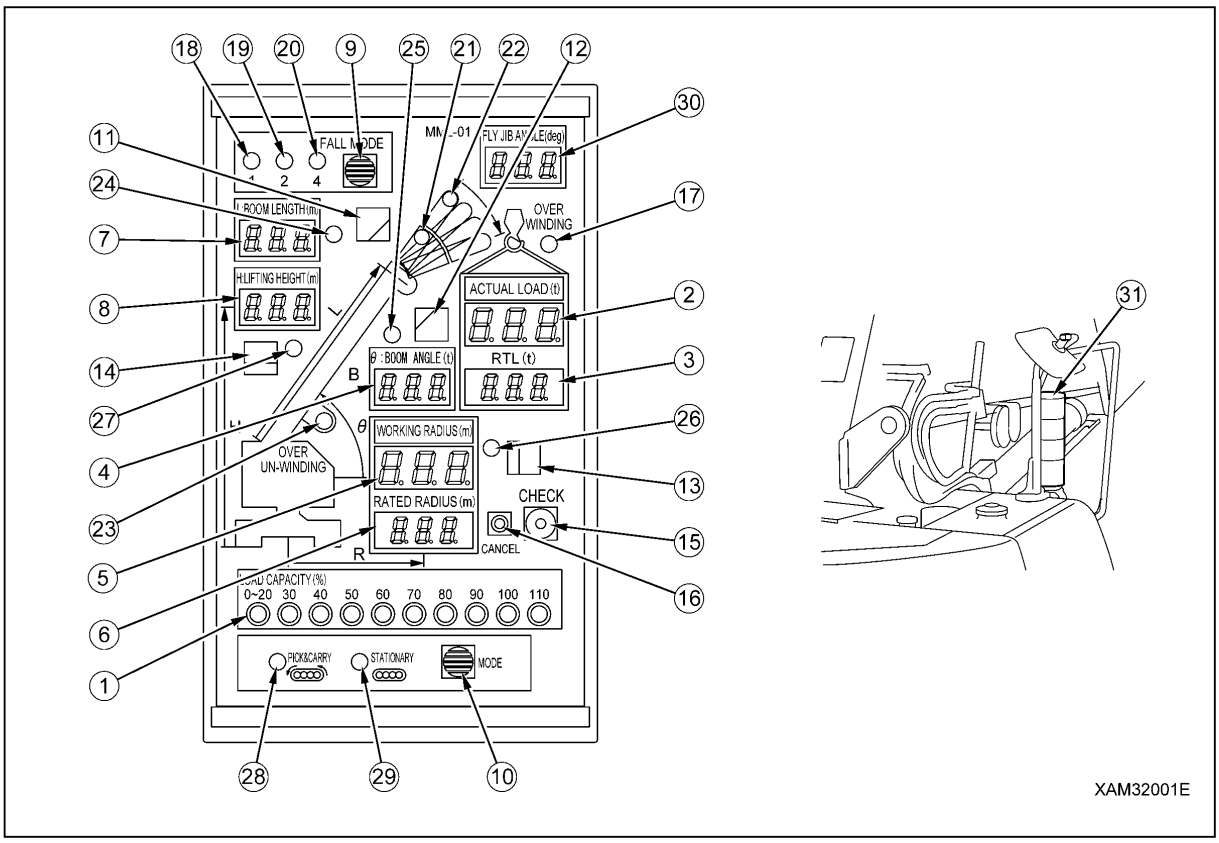





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## 2.4.4 NAMES OF MOMENT LIMITER DISPLAY UNIT




(1) Load capacity display
(2) Actual load display
(3) Rated total load display
(4) Boom angle display
(5) Working radius display
(6) Rated radius display
(7) Boom length display
(8) Lifting height display
(9) Fall mode selector switch
(10) Pick & Carry/ Stationary mode select switch
(11) Boom angle upper limit switch
(12) Boom angle lower limit switch
(13) Working radius upper limit switch
(14) Lifting height upper limit switch
(15) Check switch
(16) Cancel switch
(17) Overwind detection LED (Red)
(18) 1 fall LED (Green)
(19) 2 falls LED (Green)
(20) 4 falls LED (green)
(21) Fly-jib length (1) LED (Orange)
(22) Fly-jib length (2) LED (Orange)
(23) Over un-winding detection LED (Red)
(24) Boom angle upper limit LED (Orange)
(25) Boom angle Lower limit LED (Orange)
(26) Working radius upper limit LED (Orange)
(27) Lifting height upper limit LED (Orange)
(28) Pick & carry mode selection LED (Red)
(29) Stationary mode selection LED (Orange)
(30) Fly-jib angle display
(31) Working status lamp



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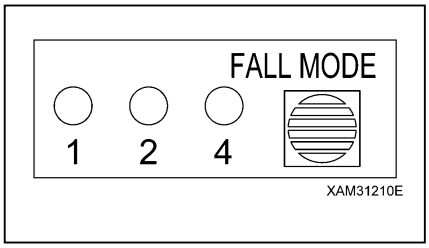
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## [1] DESCRIPTIONS OF SWITCHES ON MOMENT LIMITER DISPLAY UNIT

### 1. WIRE ROPE FALL MODE SELECTOR SWITCH AND WIRE ROPE FALL DISPLAY LED (GREEN)

**⚠ DANGER**

**When entering the number of wire rope falls, verify the actual number of wire rope falls and make sure to set up correctly. Failure to set the correct wire rope fall (s) may result breakage of the winch wire ropes and cause a serious accident.**



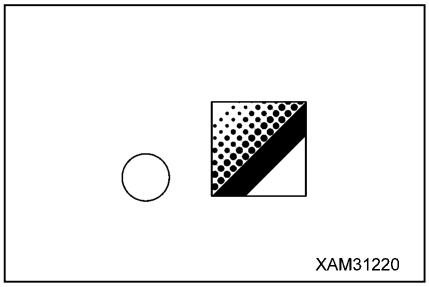

Use this switch to change the number of wire falls.

- Keep pressing the switch for 1 second or more.
  The setting changes from “4-falls” to “1-fall”.
  At the same time, the wire fall display LED changes from “4-falls” to “1-fall”, indicating that the setting has changed.
- After that, keep pressing the switch for 3 seconds or more, then the setting changes from "1-fall" to "2-falls", and "2-falls" to "4-falls" in every 1 second.

**NOTES**

When changing the setting right after doing so, release your hand from the switch, and then press the switch again.

### 2. BOOM ANGLE UPPER LIMIT SWITCH AND LED (GREEN)




Use this switch to set or cancel the boom angle upper limit.

**[SETUP]**

With no upper limit value being set, set the boom to the angle you would like, and press the switch for 3 seconds or more.

The boom angle at this point is set as the upper limit.

At the same time, the LED flashes indicating that the upper limit value was set.

**NOTES**

- Be sure to verify that the boom automatically stops at the set angle before performing the actual operation. If the boom does not stop automatically, re-set the boom angle using the procedure above.
- Whilst the boom is within the pre-warning zone or at the upper limit, the warning buzzer sounds intermittently, only when the boom derricking operation is attempted.
- The limit value being set is retained in the memory even when the starter switch is turned to "OFF" (cut).

When the boom reaches the pre-warning zone or stops at the upper limit with the boom angle upper limit set, the boom angle upper limit LED flashes.

**[CANCEL]**

With the upper limit value being set (LED ON), press the switch for 3 seconds or more.

The current upper limit value setting will be cleared. At the same time, the LED goes off indicating that the upper limit value setting is cleared.

**NOTES**

The setting and canceling will not repeat even if you keep the switch pressed for more than 3 seconds or more. Let your hand go off the switch and press the switch again.

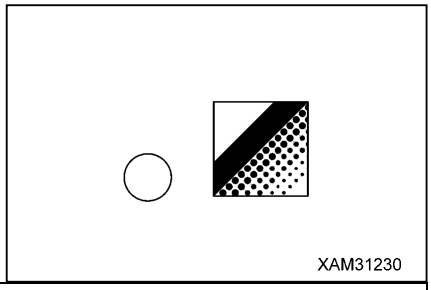


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### 3. BOOM ANGLE LOWER LIMIT SWITCH AND LED (GREEN)

Use this switch to set or cancel the boom angle lower limit.




**[SETUP]**

With no lower limit value being set, set the boom to the angle you would like, and press the switch for 3 seconds or more.

The boom angle at this point is set as the lower limit.

At the same time, the LED flashes indicating that the lower limit value was set.

**NOTES**

- Be sure to verify that the boom automatically stops at the set angle before performing the actual operation. If the boom does not stop automatically, re-set the boom angle using the procedure above.
- Whilst the boom is within the pre-warning zone or at the lower limit, the warning buzzer sounds intermittently, only when the boom lowering operation is attempted.
- The limit value being set is retained in the memory even when the starter switch is turned to "OFF" (cut).

When the boom reaches the pre-warning zone or stops at the lower limit with the boom angle lower limit set, the boom angle lower limit LED flashes.

**[CANCEL]**

With the lower limit value being set (LED ON), press the switch for 3 seconds or more.

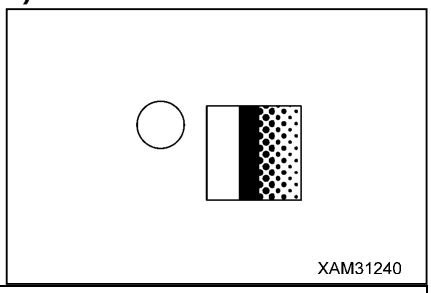
The current lower limit value setting will be cleared. At the same time, the LED goes off indicating that the lower limit value setting is cleared.

**NOTES**

The setting and canceling will not repeat even if you keep the switch pressed for more than 3 seconds or more. Let your hand go off the switch and press the switch again.

### 4. WORKING RADIUS UPPER LIMIT SWITCH AND LED (ORANGE)

Use this switch to set or cancel the working radius upper limit.




**[SETUP]**

With no upper limit value being set, set the boom to the working radius you would like, and press the switch for 3 seconds or more.

The working radius at this point is set as the upper limit.

At the same time, the LED flashes indicating that the upper limit value was set.

**NOTES**

- Be sure to verify that the boom automatically stops at the set working radius before performing the actual operation. If the boom does not stop automatically, re-set the working radius using the procedure above.
- Whilst the boom is within the pre-warning zone or at the lower limit, the warning buzzer sounds intermittently, only when the boom lowering operation is attempted.
- The limit value being set is retained in the memory even when the starter switch is turned to "OFF" (cut).

When the boom reaches the pre-warning zone or stops at the upper limit with the working radius upper limit set, the working radius upper limit LED flashes.

**[CANCEL]**

With the upper limit value being set (LED ON), press the switch for 3 seconds or more.

The current upper limit value setting will be cleared. At the same time, the LED goes off indicating that the upper limit value setting is cleared.

**NOTES**

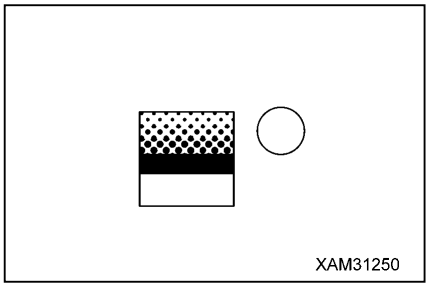
The setting and canceling will not repeat even if you keep the switch pressed for more than 3 seconds or more. Let your hand go off the switch and press the switch again.



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**5. LIFTING HEIGHT UPPER LIMIT SWITCH AND LED (GREEN)**




Use this switch to set or cancel the lifting height upper limit.

While the lifting height is restricted by detecting the height of the tip of the boom, the lifting height on the display panel shows the lifting height when the hook was raised to the over hoist detection status.

**[SETUP]**

With no upper limit value being set, set the boom to the lifting height you would like, and press the switch for 3 seconds or more.

The lifting height at this point is set as the upper limit.

At the same time, the LED flashes indicating that the upper limit value was set.

| NOTES |
|---|
| • Be sure to verify that the boom automatically stops at the set lifting height before performing the actual operation. If the boom does not stop automatically, re-set the lifting height using the procedure above.<br>• Whilst the boom is within the pre-warning zone or at the lower limit, the warning buzzer sounds intermittently, only when the boom lowering operation is attempted.<br>• The limit value being set is retained in the memory even when the starter switch is turned to "OFF" (cut). |

When the boom reaches the pre-warning zone or stops at the upper limit with the lifting height upper limit set, the lifting height upper limit LED flashes.

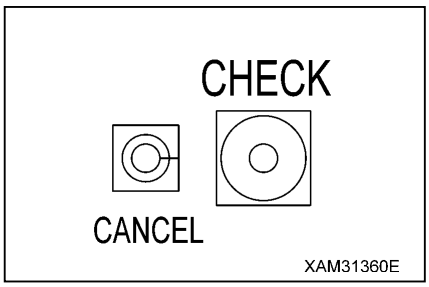
**[CANCEL]**

With the upper limit value being set (LED ON), press the switch for 3 seconds.

The current upper limit value setting will be cleared. At the same time, the LED goes off indicating that the upper limit value setting is cleared.

| NOTES |
|---|
| The setting and canceling will not repeat even if you keep the switch pressed for more than 3 seconds or more. Let your hand go off the switch and press the switch again. |

**6. CANCEL SWITCH**




Use this switch to cancel the all setting sets in the section 2 to 5 above.

• Press this switch and “CHECK” switch at the same time for 5 seconds or more.

All values set in the section 2 to 5 above will be canceled.



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**7. CHECK SWITCH**

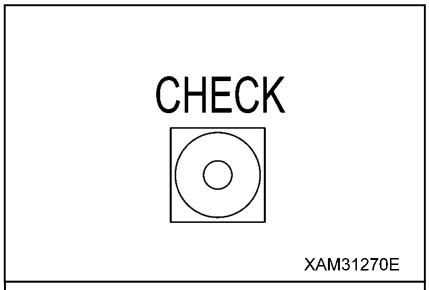
Use this switch to verify the values set in the section 2 to 5 above. Keep pressing the switch for 3 seconds or more; then each value being set will flash for 5 seconds in the respective display section.

(1) “Boom angle upper limit value” is displayed at the boom length display section.

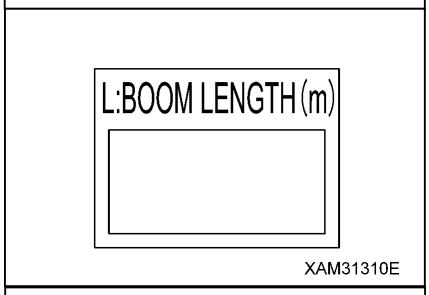
(2) “Boom angle lower limit value” is displayed at the boom angle display section.

(3) “Working radius upper limit value” is displayed at the working radius display section.

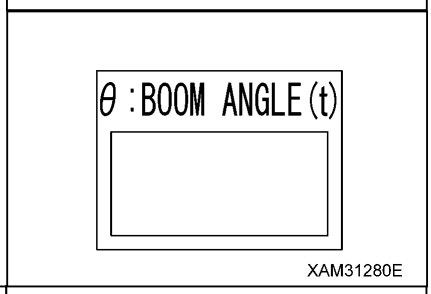
(4) “Lifting height upper limit value” is displayed at the lifting height display section.



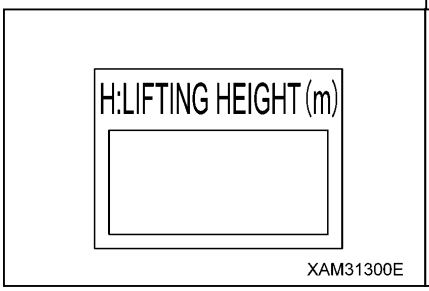
XAM31270E



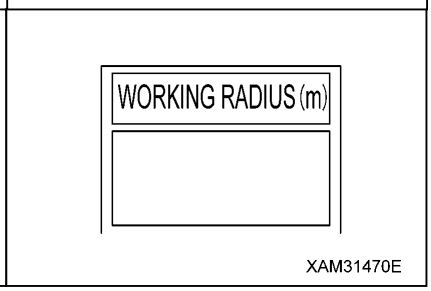
XAM31310E



XAM31280E



XAM31300E



XAM31470E

**NOTES**

- When a set value is displayed, the LED for it’s setting switch section flashes at the same time.
- After 5 seconds of flashing the set value, displays will return to the original indication.
- "0.0" is shown in a display for which a specific value is not given.
- Displays other than those being set will not change.

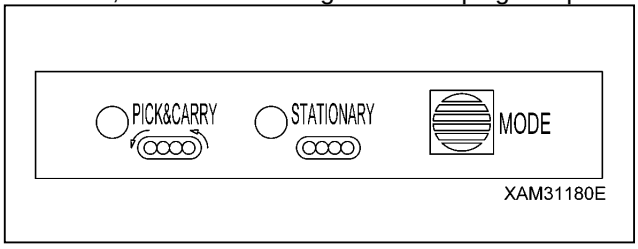
**8. PICK & CARRY/STAITIONARY MODE SELECT SWITCH AND PICK & CARRY LED (RED), STAITIONARY LED (ORANGE)**

**⚠ DANGER**

**Pick and carry operation is a very unstable and dangerous practice; it is prohibited, in genreal. Where such an operation is un-avoidable, refer to "Operation 3.25 Pick & Carry Operation" and strictly observe rated total laod for pick and carry operation, correct practices and traveling posture.**
**Such safety precautions for pick and carry must be strictly adhered, otherwise an accident with serious injury may result.**

This switch is used to switch to traveling mode from stationary mode for pick and carry operation.

- Keep pressing the switch for 3 seconds or more. The setting of the rated load changes to "Pick and Carry Mode" and "PICK & CARRY" LED lights. At the same time, red of the working status lamp lights up.
- Keep pressing the switch again for 3 seconds or more. The setting of the rated load changes to "Stationary Mode" and "STATIONARY" LED lights.



XAM31180E



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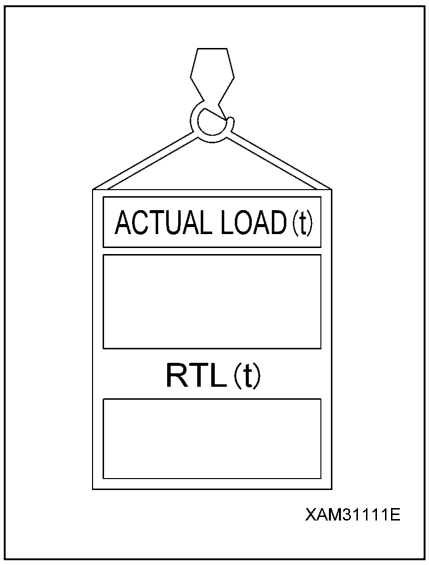
## [2] DESCRIPTIONS OF MOMENT LIMITER DISPLAY UNIT

For LEDs not described in this section, see “Operation 2.4.4 Names of moment limiter display unit”.

### 1. ACTUAL LOAD DISPLAY SECTION

This section constantly displays the actual load of the hoisted load during the crane operation.

The actual load indicates the total weight of the hoisted load and lifting accessories increasing the hook weight. If “0.0” to “0.1” is displayed when nothing is being hoisted, the system is normal. If the value displayed is out of this range, contact us or our sales service agency.



XAM31111E

**NOTES**

- Due to the mechanism of the load detector, the actual load value changes in the display during boom derricking operation. When the boom is raised, the actual load value moves to higher, however this does not mean a device failure.
- Even when the hoisting operation is in a pause, the swinging load makes changes in the actual load value display.

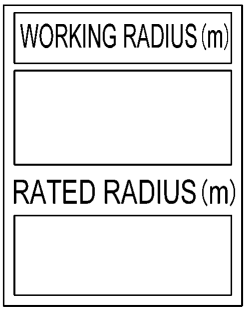
### 2. RATED LOAD DISPLAY SECTION

The rated total load (i.e. hook block + sling instruments + hoisted load) applicable to the current configuration is computed based on the condition including number of wire falls or working radius, and is displayed.

### 3. WORKING RADIUS DISPLAY SECTION

This section constantly displays the current working radius during the crane operation.

Current working radius is the distance between the center of the crane rotation and axis of the hook. Effect of bending of the boom is not computed.



XAM31290E

### 4. RATED RADIUS DISPLAY SECTION

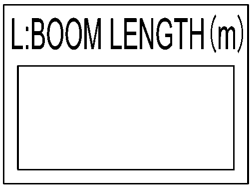
This section constantly displays the rated working radius during the crane operation.

Rated working radius is the maximum working radius computed based on the boom length and actual load.

### 5. BOOM LENGTH DISPLAY SECTION

This section constantly displays the current boom length during the crane operation.

The boom length is the distance from the boom foot pin to the sheave pin at the end of the boom.



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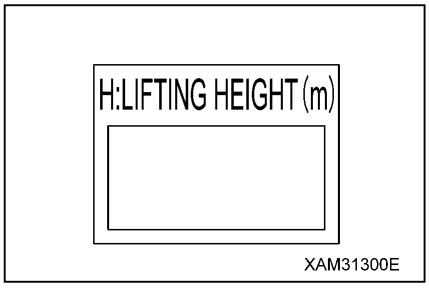


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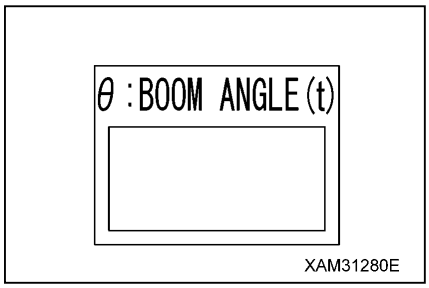
### 6. LIFTING HEIGHT DISPLAY SECTION

This section constantly displays the current lifting height during the crane operation.
The lifting height is the vertical distance from the ground to the bottom of the hook.



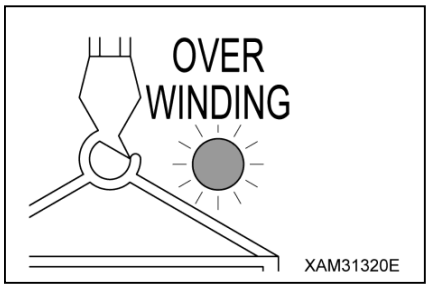

### 7. BOOM ANGLE DISPLAY SECTION

This section constantly displays the current boom angle during the crane operation.
The boom angle is the angle the boom and the horizontal line form.



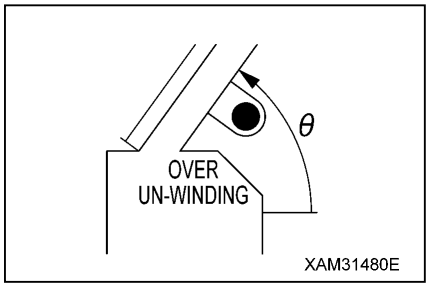

### 8. OVER WINDING LED (RED)

When the hook reaches over winding condition during the crane operation, the over winding LED flashes for warning and hook winding and/or boom extending is automatically interrupted.
This LED also flashes when the hook is stowed during the hook stowing operation. This is normal.




### 9. OVER UN-WINDING LED (RED)

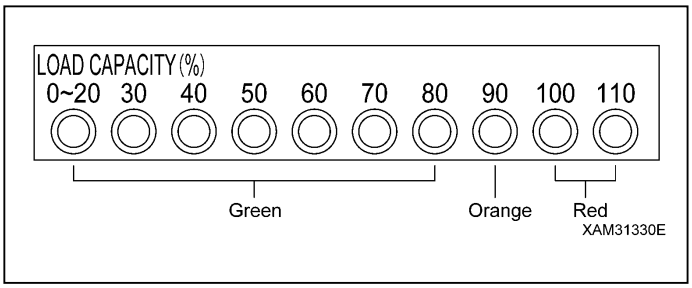
When the hook reaches over un-winding condition during the crane operation, the over un-winding LED flashes for warning and hook un-winding is automatically interrupted.




### 10. LOAD FACTOR DISPLAY

This display indicates the status of the moment limiter load factor by it's illumination.

- According to the change in the load capacity, particular "LEDs" are turned on or off to show the present load factor.
- All the "LEDs" are on when the load factor is 100% or more.




## NOTES

Where the load factor is near 50%, all the "LEDs" marked with "50" or below will be on.
All the "LEDs" marked over 50 will be off.



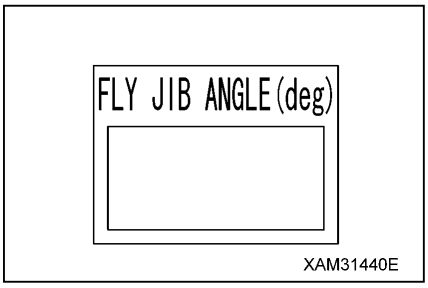
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### 11. FLY-JIB ANGLE DISPLAY

This section constantly displays the current fly-jib angle during the crane operation with the fly-jib configuration.

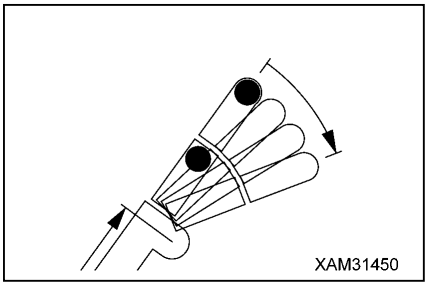
The fly-jib angle is the angle that the fly-jib and the main boom form.




| NOTES |
| --- |
| Refer to the "FLY-JIB" for details of the fly-jib installation and it's angle setting. |

### 12. FLY-JIB LENGTH (1) LED (ORANGE), FLY-JIB LENGTH (2) LED (ORANGE)

When the fly-jib is installed, the Fly-jib length (1) LED automatically lights. Then the fly-jib length (2) LED lights, if the No. 2 fly-jib is extended.




| NOTES |
| --- |
| Refer to the "FLY-JIB" for details of the fly-jib installation and it's length setting. |

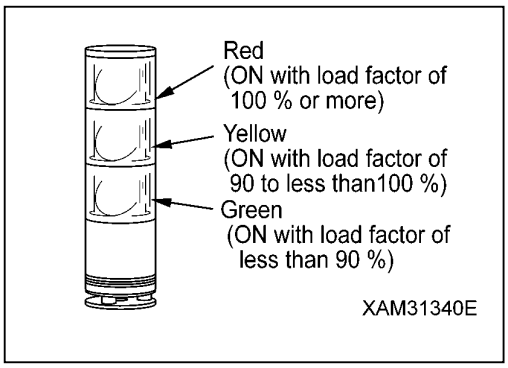


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## 2.4.5 MOMENT LIMITER FUNCTIONS

### [1] OVERLOAD WARNING




**1. SAFETY ZONE** (“Actual load” is less than 90 % of the “rated total load”)
- Green of the working status lamp lights up.
- The LEDs lights up in green if the load factor is less than 80 %.

**2. PRE-WARNING** (“Actual load” is 90 to less than 100 % of the “rated total load”)
- Yellow of the working status lamp lights up.
- The LEDs lights up in orange and green if the load factor are 90 to less than 100 %.
- The alarm bleeps intermittently.

**3. LIMIT WARNING** (“Actual load” is 100 % or higher than the “rated total load”)
- Red of the working status lamp lights up.
- The alarm bleeps continuously.
- The hazardous operation of the boom stops automatically.
- “Load factor 110 % or more” LED (orange) lights up.
- “Load factor 110 % or more” LED (red) lights up when the load factor is 110% or more.

**4. CLEARING LIMIT WARNING AUTO STOP**

If the system stops automatically, promptly perform the recovery operation caused by overloading.
See “Operation 2.4.3 [2] Recovery Operation After Auto Stop” for recovery operations.

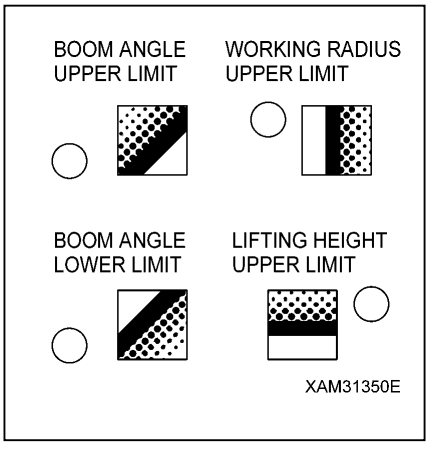
### [2] WORKING ENVELOPE RESTRICTION WARNING

When the working envelope gets close to the set restriction value, a warning is issued to notify the operator and people around of the situation.
The last status of the set value for the working envelope restriction is memorized even if the starter switch is turned to the OFF position.

**NOTES**

- See “Operation 2.4.4 [1] Descriptions of Switches on Moment Limiter Display Unit” for how to set the value for working envelope restriction.
- The warning buzzer sounds only when the working envelope gets close to the set restriction value.

When the working envelope has been set, the restriction will be as follows.




**1. SAFETY ZONE**
- The appropriate working envelope restriction LED (green) lights up.
- Green of the working status lamp lights up.

**2. PRE-WARNING**
- The appropriate working envelope restriction LED (green) lights up.
- The alarm bleeps intermittently.
- Green of the working status lamp lights up.

**3. LIMIT WARNING**
- The appropriate working envelope restriction LED (green) lights up.
- Yellow of the working status lamp lights up.
- The alarm bleeps continuously.
- The hazardous operation of the boom stops automatically.



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### [3] OVER HOIST DETECTOR

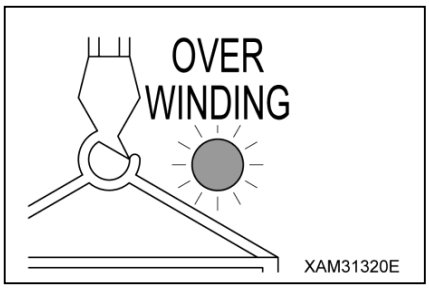
**CAUTION**

**Pay attention to the distance between the hook and boom when raising the hook.**
**Extending the boom also raises the hook.**
**Always check the hook height when extending the boom.**

When you overwind the hook when raising the hook or extending the boom,

- The “Over-winding” LED (red) flashes.
- Where the hook raising or boom extending operation is attempt, the warning beep sounds intermittently.
- The hook raising and boom extending operation stop automatically.

In case of auto stop, immediately perform the recovery operation.
Perform hook lowering and boom retracting operations as recovery operations.

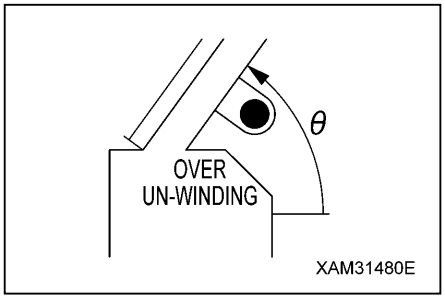



### [4] THREE-WINDING STOP DEVICE

When you over un-wind the hook which causing the wire rope on the winch drum to be in-sufficient.

- The “Over un-winding” LED (red) flashes.
- Where the hook lowering operation is attempted, the warning beep sounds intermittently.
- The hook lowering operation stops automatically.

In case of auto stop, immediately perform the recovery operation.
Perform hook raising for operations as recovery operations.

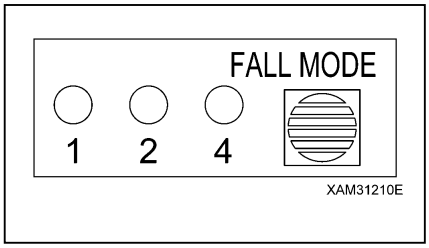



### [5] NUMBER OF WIRES SELECTOR SWITCH

**⚠ WARNING**

- **Stop the crane operation when changing the number of wires rope falls by using the fall mode selector switch.**
  **Changing the number of wires during the crane operation can cause unexpected accidents.**
- **Perform the crane operation always after matching the number of wires displayed on the moment limiter and the actual number of wires. Mistaking the number of wires could cause serious accidents.**

The wire rope has the safe load per rope determined.
Determine the number of wires according to the maximum load to be hoisted. The actual number of wires falls used and the number of wires displayed on the moment limiter must match. With this machine, the hook for four/two wire ropes is referred to as the standard specification. The last status of the set number of wires is memorized even if the starter switch is turned to the OFF position.




### [6] BOOM LOWER LIMIT DETECTION

Where the boom length is 5.3 meters or more, boom lowering operation is automatically stopped to prevent the boom angle being lower than horizontal.



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## 2.4.6 MOMENT LIMITER STARTING STATUS

The moment limiter checks it's function for approx. 3 seconds when the starter switch is turned to the ON position.

Meanwhile,

• All the working status lamps light up.

• All the LEDs light up.

Then, if the moment limiter and the sensors are normal upon the completion of the functional check of the moment limiter, the red and yellow of the working status lamp goes off and green of the working status lamp lights up indicating that the machine is ready for use.

**CAUTION**

**If the red of the working status lamp does not go off after completing the functional check of the moment limiter, be sure to contact us or our sales service agency.**

## 2.4.7 MOMENT LIMITER WORKING ENVELOPE SETTING

**⚠ WARNING**

- **The boom may go beyond the set value when operated at high speed even if the working envelope was restricted by the moment limiter. Be sure to set the working envelope with safe distance from obstacles. Operate the crane at low speed.**
- **Be sure to verify that the boom stops at the set position after setting the boom working envelope.**

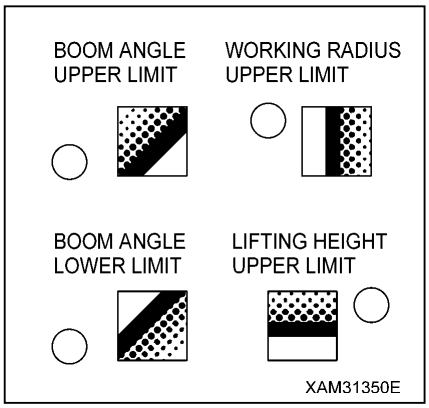
If the boom working envelope is limited due to working space issue, you can set the boom working envelope to the desired value.

### [1] SETTING WORKING ENVELOPE

Operate the boom to the limit of the working envelope you would like to restrict, and press the appropriate SETUP/CANCEL switch for 3 seconds or more.

You can set that limit value.

At the same time, the LED above the appropriate switch lights up.



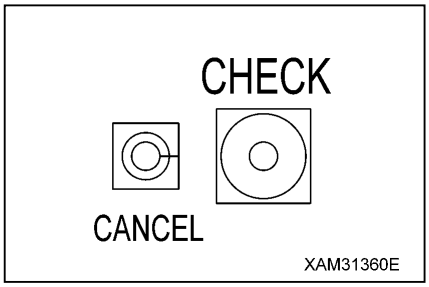

**NOTES**

The last status of the set value has been held in memory even if the starter switch is turned to the "OFF" position.

### [2] CANCELING WORKING ENVELOPE SETTING

• Press and hold the CANCEL switch and CHECK switch at the same time for 5 seconds or more.
All the set working envelope restrictions are canceled.
At the same time, the LED above all the working envelope limit switches goes off to complete the cancellation of the settings.

• Press the SETUP/CANCEL switch of the item which restriction you would like to cancel for 3 seconds or more.
The set value of only the selected item can be canceled.
At the same time, the LED above the switch goes off to complete the cancellation of the setting.




**NOTES**

See "Operation 2.4.4 [1] Descriptions of Switches on Moment Limiter Display Unit" for how to set limit on the working envelope.



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## 2.4.8 PICK & CARRY/STAITIONARY MODE SELECT

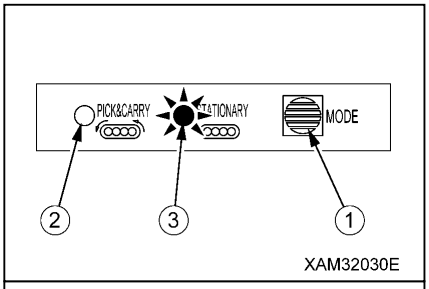
**⚠ DANGER**

**Pick and carry operation is a very dangerous practice and prohibited, in genreal.**
**Where such an operation is unavoidable, refer to "Operation 3.25 Pick & Carry Operation" and strictly observe rated total laod for pick and carry operation, correct practices and traveling posture.**
**Such safety precaution for pick and carry must be strictly adhered, otherwise an accident with serious injury may result.**

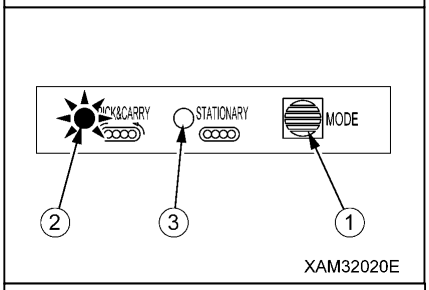
Use this Pick and Carry/Stationary Mode Select Switch for the condition of operations.

1. When a pick and carry operation is not required, press this mode switch (1) and keep pressing for 3 seconds or more.
   The operation mode is set to "Stationary Mode" and "STATIONARY" LED (3) lights.

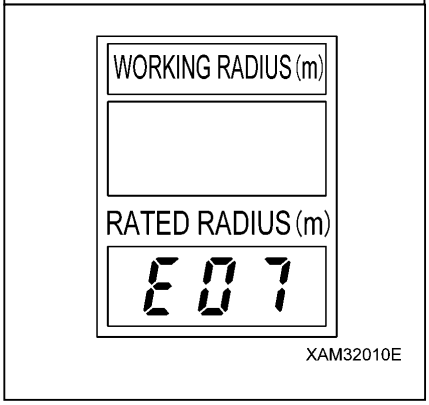
2. When a pick and carry operation is required, press this mode switch (1) and keep pressing for 3 seconds or more.
   The operation mode is set to "Pick and Carry Mode" and "PICK&CARRY" LED (2) lights.



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### NOTES

- Whilst the boom length is "10.6 meters" or longer and where Pick & Carry/ Stationary mode select switch is set to Pick & Carry mode or the travel levers are actuated, the buzzer sounds and the rated radius display is turned to an error code "E07".
  To select Pick & Carry mode, the boom length must be "10.5 meters" (i.e. 3 sections of the boom) or less.
- When the travel levers are actuated to right or left, Pick & Carry mode is automatically activated, over which, however, the Pick & Carry/ Stationary mode select switch setting takes precedence.



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## 2.4.9 MOMENT LIMITER EMERGENCY STOP CANCEL SWITCH

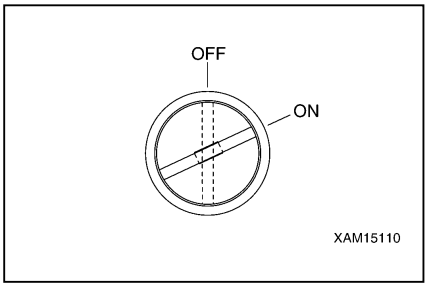
**⚠ DANGER**

**The moment limiter emergency stop cancel switch will temporarily disable the moment limiter function. While this switch is turned to ON position (i.e. released), calculation of the rated total load is stopped, thus the machine is in a very risky condition. When lifting operation is continued in this condition, it may result in dropping of the hoisted load or damage to the boom, and cause serious accidents such as overturning of the machine resulting in death or serious injury. Use of this switch must be limited to the specific inspection and maintenance purpose, where each sensor to detect the crane condition is checked. Otherwise, keep the key of the switch extracted, for ordinary operations. When turning ON (cancel) the emergency stop cancel switch, always shift the crane speed to low.**

**In particular, operations as below must be strictly avoided:**

- **To hoist a load, never raise the hook while this switch is set ON (released). The moment limiter is disabled to detect a condition where the hoisted load exceeds the rated load, which can cause the wire rope to break and the hoisted load to drop or boom damage, or overturning of the machine.**
- **After the moment limiter detects a condition that the actual load exceeds the rated load during the crane operation and interrupts it, winding up, boom lowering and/or boom extending operation by turning this switch to ON (released) position must be strictly avoided. It may result in boom damage or the machine overturning.**
- **For hook stowage, always use the Over-hoisting cancel switch, only. If this moment limiter emergency stop cancel switch is used for hook hoisting, the winch will not automatically stop in an over-winding condition which may allow the hook to strike the boom tip or cause the wire rope to break.**

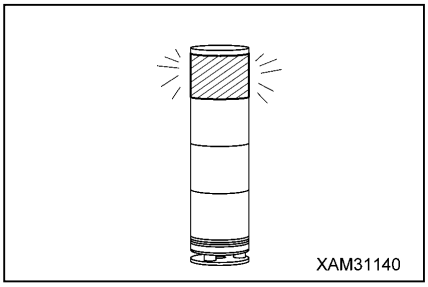
Use this switch (11) only for the limited purpose of inspection and maintenance of the boom length detector and angle detector, and the pressure sensor.




- ON (Clear): Insert the key into the switch. Turn the key clockwise and retain the key at that position. The activation stop function is cleared while the key is maintained at the ON position. When the key is released, it will return automatically to OFF position.
- OFF (Auto): Insert the key into the switch and turn the key counterclockwise. The activation stop functions. The key can be removed or inserted at this position.

**NOTES**

When turning this switch to the ON (Clear) position, the red lamp of the working status lamp will light up.



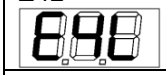
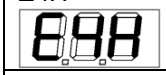
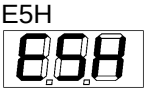
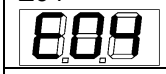
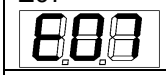



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## 2.4.10 MOMENT LIMITER ERROR CAUSES AND ACTIONS TO BE TAKEN

The moment limiter displays an error code at the “rated total load” display section on the display panel to notify the error.

If an error code shown in the table below was displayed, contact us or our sales service agency.

| Error Code | Error Details | Actions to Be Taken |
|---|---|---|
| E1L  | The input to pressure sensor 1 is lower than the specified value. | Check the installation of the pressure sensor 1. |
| E1H  | The input to pressure sensor 1 is higher than the specified value. | |
| E2L  | The input to pressure sensor 2 is lower than the specified value. | Check the installation of the pressure sensor 2. |
| E2H  | The input to pressure sensor 2 is higher than the specified value. | |
| E3L  | The input to angle detector is lower than the specified value. | Check the installation of the angle detector. |
| E3H  | The input to angle detector is higher than the specified value. | |
| E4L  | The input to length detector is lower than the specified value. | Check the installation of the length detector. |
| E4H  | The input to length detector is higher than the specified value. | |
| E5L  | The input to pressure sensor 5 is lower than the specified value. | Check the installation of the pressure sensor 5. |
| E5H  | The input to pressure sensor 5 is higher than the specified value. | |
| E04  | Calibration memory error | Turn the starter switch to OFF, once, then to ON, again. Where an error comes again, replace the computing unit. |
| E05  | A/D Converter is not working. Pressure, angle and length data are not available to read. | |
| E07  | Pick and Carry mode is selected in a disallowed area. | Cancel Pick and Carry mode, or retract the boom so that it turns into allowed area. |
| E08  | When the fly-jib is installed while the "3. Fly-jib YES/NO switch" inside the moment limiter reducer door is set to OFF. | Contact us or our sales service agency. |



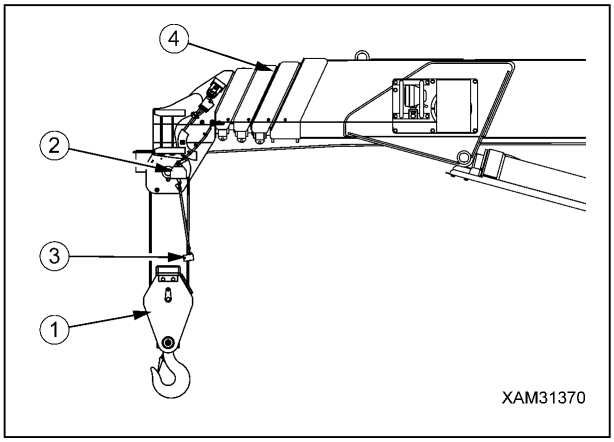
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## 2.5 OVER HOIST DETECTOR

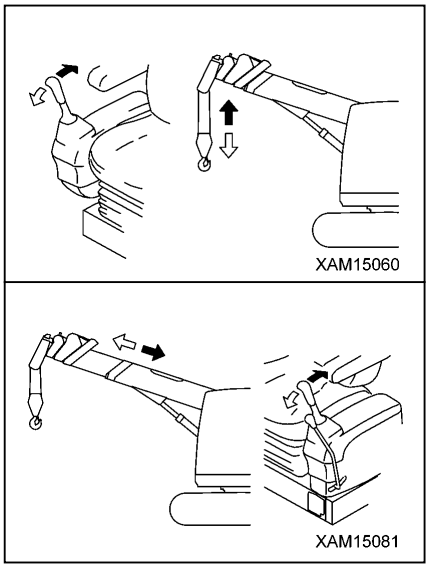
**CAUTION**

**Pay attention to the distance between the hook block and the boom when raising the hook block. The hook block also raises when the boom is extended.**
**Always check the height of the hook block when performing the boom extending operation.**




(1) Hook block
(2) Over hoist detector
(3) Weight
(4) Boom

The over hoist detector is a device which automatically stops the hook block (1) raising up or the boom (4) extending and inhibit further operations, in a condition where the hook block (1) is raised up or the boom (4) is extended until the hook block (1) comes close to the Boom (4) tip and lifts the weight (3) up. In such a condition, the buzzer intermittently sounds only when hook raising or boom extending operation is attempted, to warn of over-raising.
When this warning buzzer sounds, immediately operate the Right work equipment control lever to HOOK LOWERING (push forward) or Left work equipment control lever to BOOM RETRACTING (pull backward), so that the hook block (1) is lowered down.



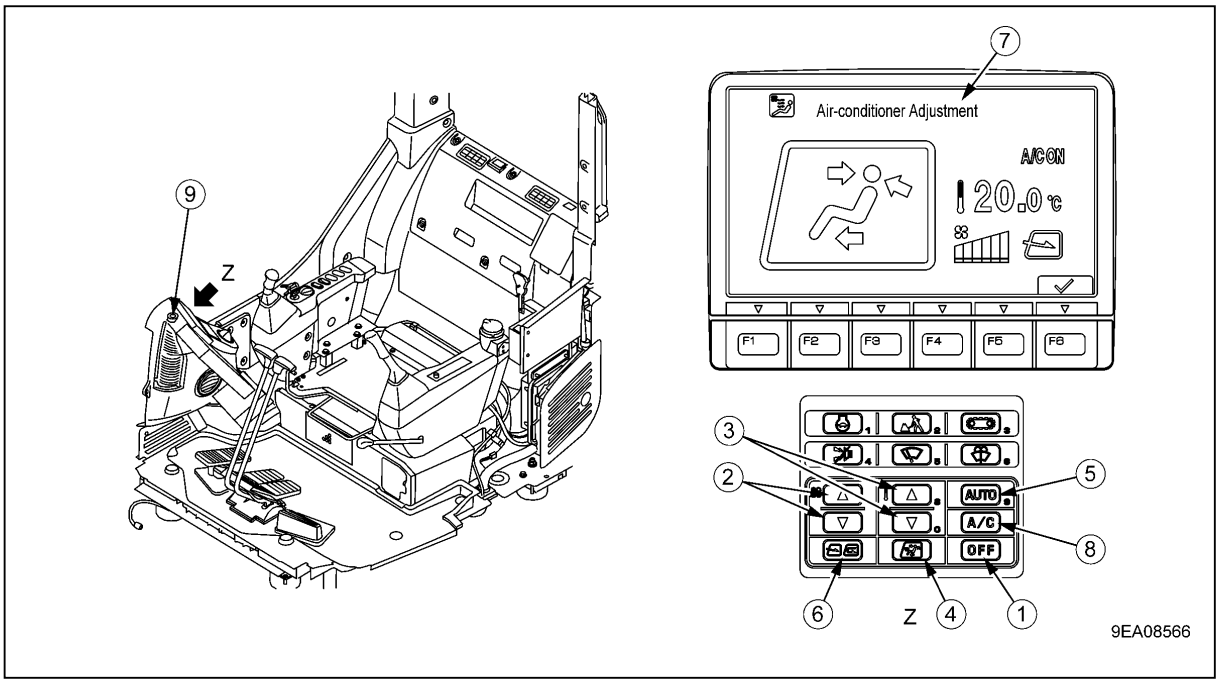



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# 2.6 AIR CONDITIONER CONTROLS

## 2.6.1 AIR CONDITIONER CONTROL PANEL

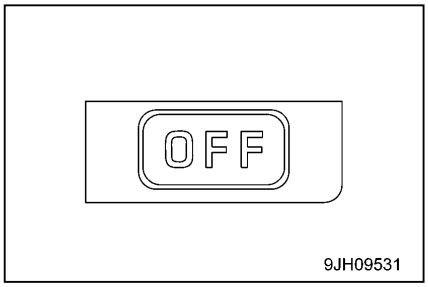



(1) OFF switch
(2) Fan switch
(3) Temperature control switch
(4) Vent selector switch
(5) Auto switch
(6) FRESH/RECIRC selector switch
(7) Display monitor
(8) Air conditioner switch
(9) Sunlight sensor

### [1] OFF SWITCH

This switch (1) is used to stop the fan and air conditioner.

| NOTES |
| --- |
| Even if this switch (1) is pressed, the monitor screen does not switch to the air conditioner adjustment screen. |

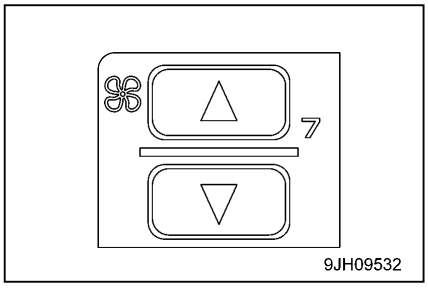





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### [2] FAN SWITCH




This switch (2) is used to adjust the air flow.

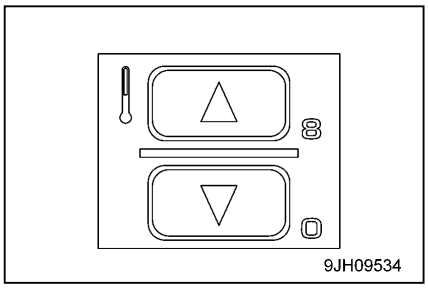
The air flow can be adjusted to 6 levels.

- Press the △ switch to increase the air flow, press the ▽ switch to decrease the air flow.
- During auto operation, the air flow is automatically adjusted.

[Monitor display and air flow]

| Liquid crystal display | Air flow |
|---|---|
| | Air flow “low” |
| | Air flow “medium 1” |
| | Air flow “medium 2” |
| | Air flow “medium 3” |
| | Air flow “medium 4” |
| | Air flow “high” |

### [3] TEMPERATURE CONTROL SWITCH




This switch (3) is used to control temperature inside the cab. The temperature can be set between 18 degrees C and 32 degrees C.

- Press the △ switch to raise the set temperature, press the ▽ switch to lower the set temperature.
- The temperature is generally set at 25 degrees C.
- The temperature can be set in stages of 0.5 degrees C.

[Monitor display and function]

| Monitor display | Set temperature |
|---|---|
| 18.0 degrees C | Max. cooling |
| 18.5 to 31.5 degrees C | Adjusts temperature inside cab to set temperature |
| 32.0 degrees C | Max. heating |

| NOTES |
|---|
| If the mode is set to auto mode and the temperature setting is set to 18.0 degrees C or 32 degrees C, the air flow from the fan is always set to HIGH and does not change even when the set temperature is reached. |



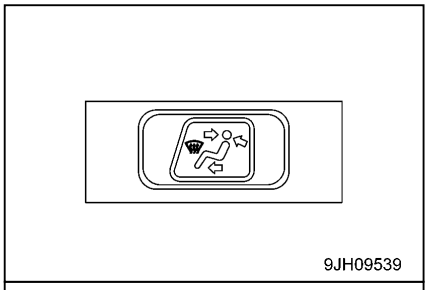
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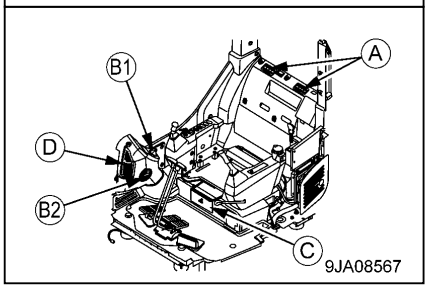
### [4] VENT SELECTOR SWITCH

This switch (4) is used to select the vents.

- When switch (4) is pressed, the display on monitor display (7) switches and air blows out from the vents displayed.
- During automatic operation, the vents are automatically selected.




- (A): Rear vents (2 places)
- (B1): Face vent (1 place)
- (B2): Foot vent (1 place)
- (C): Foot (1 place)
- (D): Front window glass vents (2 places)



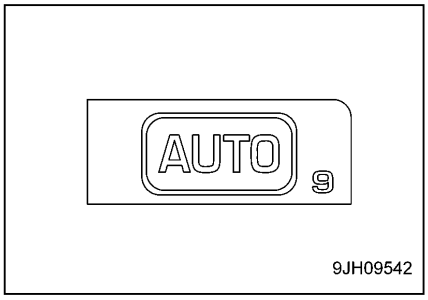

| Liquid crystal display | Vent mode | Vent | | | | Remarks |
|---|---|---|---|---|---|---|
| | | (A) | (B) | (C) | (D) | |
|  | Front and rear vents | ○ | ○ | | | -- |
|  | Front, rear and foot vents | ○ | ○ | ○ | | -- |
|  | Foot vent | | | ○ | | -- |
|  | Foot vents and defroster vent | ○ | | ○ | ○ | Cannot be selected for automatic operation |
|  | Defroster vent | ○ | | | ○ | Cannot be selected for automatic operation |

Note: Air blows from vents marked ○.

### [5] AUTO SWITCH

This switch (5), the air flow, vents, and air source (FRESH/RECIRC) air automatically selected according to the set temperature.

- Press switch (5), then use temperature control switch (3) to set the temperature, and run the air conditioner under automatic control.
- When switching from automatic operation to manual operation, it is possible to use the switches to select the vents and air source (FRESH/RECIRC).




| NOTES |
|---|
| When Auto Mode is selected, if the set temperature is set to 18 degrees C or 32 degrees C, the air flow is always set to High, but this is not a problem. |



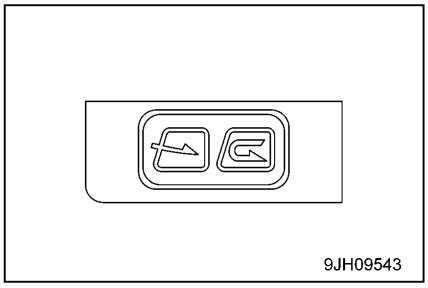
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### [6] FRESH/RECIRC SELECTOR SWITCH

This switch (6) is used to switch the air source between recirculation of the air inside the cab and intake of fresh air from the outside.

• During automatic operation, the selection of inside air (RECIRC) and outside air (FRESH) is performed automatically.

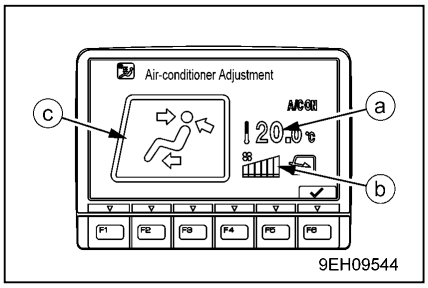



| | |
|---|---|
| RECIRC | Outside air shut off and only air inside the cab is circulated.<br>Use this setting to perform rapid cooling of the cab or when outside air is dirty. |
| FRESH | Outside air is taken into the cab.<br>Use this setting to take in fresh air when performing demisting. |

### [7] DISPLAY MONITOR

Monitor (7) displays the status of temperature setting (a), air flow (b), and vents (c).

• When OFF switch (1) is pressed, the display of temperature setting (a) and air flow (b) goes out, and operation stops.

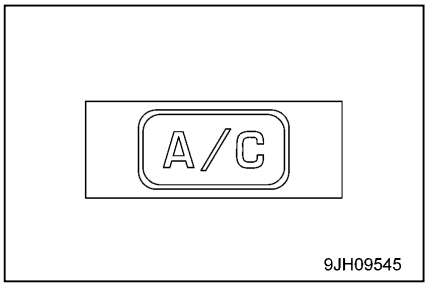



### [8] AIR CONDITIONER SWITCH

This switch (8) is used to turn the air conditioner (cooling, dehumidifying, and heater) ON or OFF.

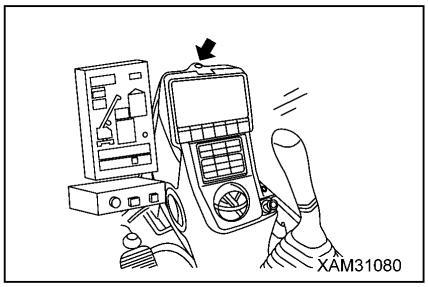
• Press air conditioner switch (8) when the fan is operating (when display (b) is shown on the display monitor). The air conditioner is switched ON and starts to work. Press the switch again to stop the air conditioner.

• Air conditioner cannot be operated while the fan is off.




### [9] SUNLIGHT SENSOR

This sensor (9) automatically adjusts the flow of air from the vents to match the strength of the sun's rays. In addition, it automatically detects changes in the temperature inside the cab caused by changes in the strength of the sun's rays beforehand and automatically adjusts the temperature.






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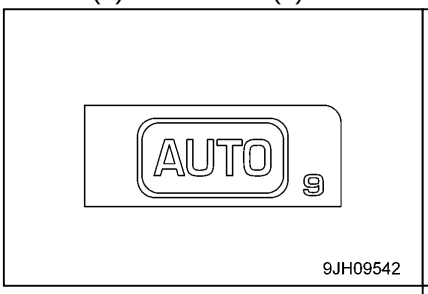
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## 2.6.2 AIR CONDITIONER OPERATION METHOD

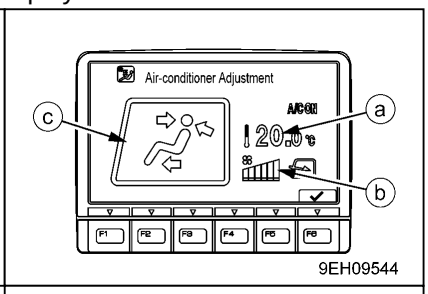
The air conditioner can be operated automatically or manually. Select the method of operation as desired.

### [1] AUTOMATIC OPERATION

1. Turn auto switch (5) ON.
   The monitors for the set temperature (a) and air flow (b) are also displayed.

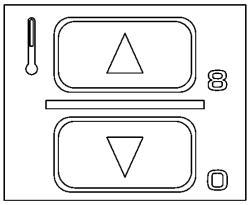


9JH09542



9EH09544

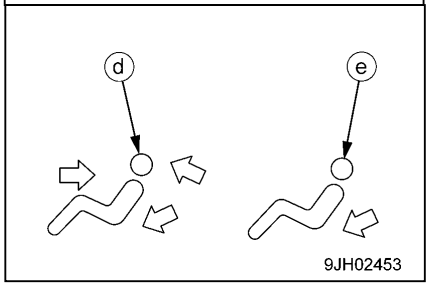
2. Use temperature control switch (3) to set to the desired temperature. The air flow, combination of vents, and selection of fresh or recirculated air is automatically selected according to the set temperature, and the air conditioner is operated automatically to provide the set temperature.



9JH09534

**NOTES**

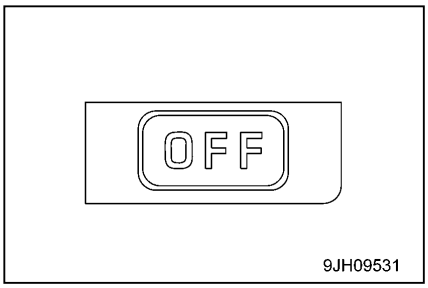
When vent display monitor (c) display (d) or (e), and engine coolant temperature is low, the air flow is automatically limited to prevent cold air from blowing out.



9JH02453

### [2] STOPPING AUTOMATIC OPERATION

Press OFF switch (1). Operation stops.



9JH09531

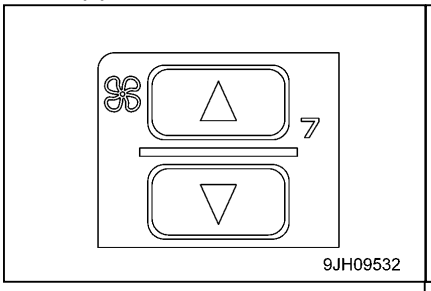


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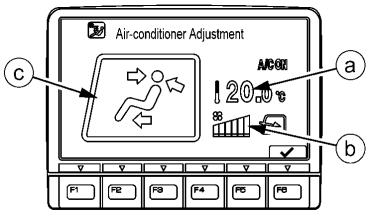
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**[3] MANUAL OPERATION**

1. Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and airflow (b) are displayed on monitor (7)



9JH09532



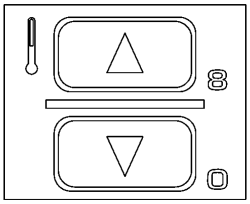
9EH09544

2. Turn air conditioner switch (8) ON.



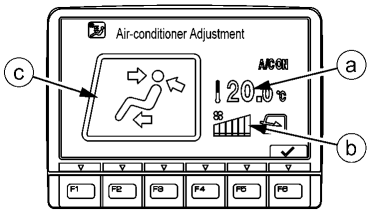
9JH09545

3. Press temperature control switch (3) and adjusts temperature inside the cab.



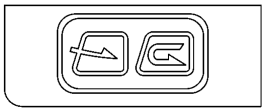
9JH09534

4. Press vent selector switch (4) and selects the desired vents. When this done, the display for vent (c) of the display monitor changes according to the selection.



9EH09544

5. Press FRESH/RECIRC selector switch (6) and select recirculation of the air inside the cab (RECIRC) or intake of fresh air from outside (FRESH).


9JH09543

**[4] STOPPING MANUAL OPERATION**

Presses OFF switch (1). Operation stops.



9JH09531



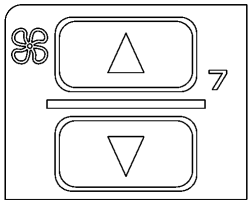
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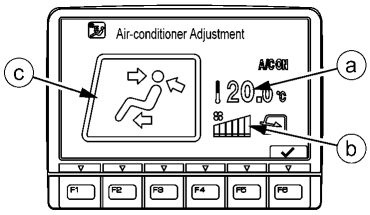
### [5] OPERATION WITH COLD AIR TO FACE AND WARM AIR TO FEET

To operate with cold air blowing to the face and warm air blowing to the feet, set as follows.

1. Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and air flow (b) are displayed on monitor (7).

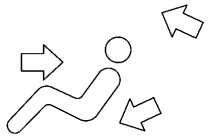


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2. Press vent selector switch (4) and set the vent display on the display monitor to the display shown in the diagram on the right.

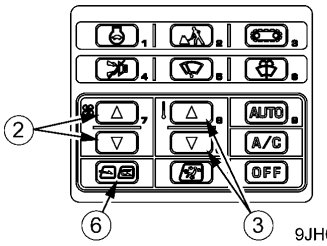

9JH05723

3. Turn air conditioner switch (8) ON.



9JH09545

4. Adjust fan switch (2), temperature control switch (3), and FRESH/RECIRC selector switch (6) to the desired positions.



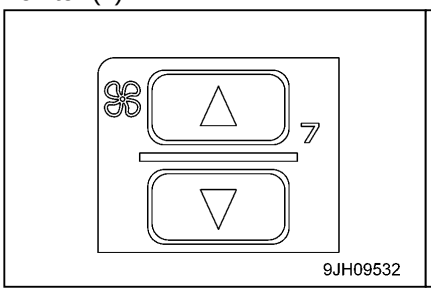
9JH09548



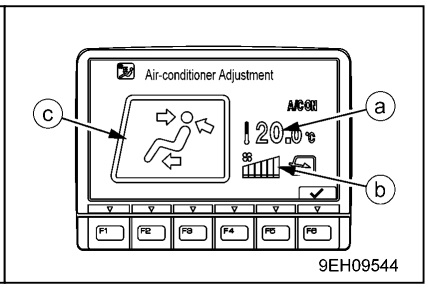
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## [6] DEFROSTER OPERATION

1. Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and airflow (b) are displayed on monitor (7).

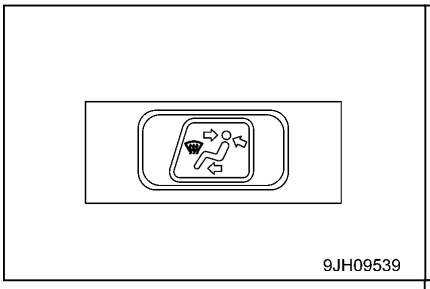


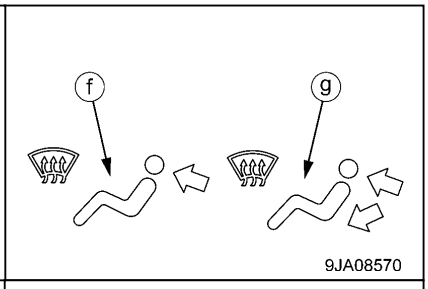
9JH09532



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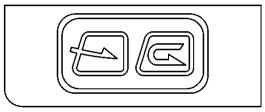
2. Press vent selector switch (4) and set vent display on the display monitor to (f) or (g) as shown in diagram on the below.


9JH09539

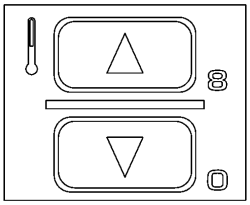


9JA08570

3. Press FRESH/RECIRC selector switch (6) and set it to take in fresh air.

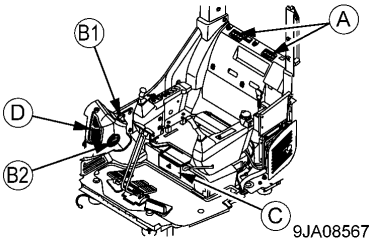

9JH09543

4. Press temperature control switch (3) and set temperature on the display (7) monitor to maximum heating.



9JH09534

5. Adjust vents (A), (B1), and (B2) so that the air blows onto the window glass.
   (Vents (C) and (D) are fixed and cannot be adjusted.)



9JA08567

| NOTES |
| --- |
| When operating in the rainy season or when it is desired to remove the mist from the window glass or to dehumidify the air, turn air conditioner switch (8) ON. |



9JH09545



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### 2.6.3 USE AIR CONDITIONER WITH CARE

**CAUTION**

- **When running the air conditioner, always start with the engine running at low speed. Never start the air conditioner when the engine is running at high speed. It will cause failure of the air conditioner.**
- **If water gets into the control panel or sunlight sensor, it may lead to unexpected failure, be careful not to let water get on these parts. In addition, never bring any flame near these parts.**
- **For the auto function of the air conditioner to work properly, always keep the sunlight sensor clean and do not leave anything around the sunlight sensor that may interfere with it's sensor function.**

**[Ventilation]**

- When running the air conditioner for a long time, turn the level to the FRESH position once an hour to carry out ventilation and cooling.
- If you smoke when the air conditioner is ON, the smoke may start to hurt your eyes, so open the window and turn the lever to FRESH for a while to remove the smoke while continuing the cooling.

**[Temperature Control]**

When the cooler is ON, set the temperature so that it feels slightly cooling with entering the cab (5 or 6 degrees C) lower than the outside temperature. This temperature difference is considered to be the most suitable for your health, so always be careful to set the temperature properly.

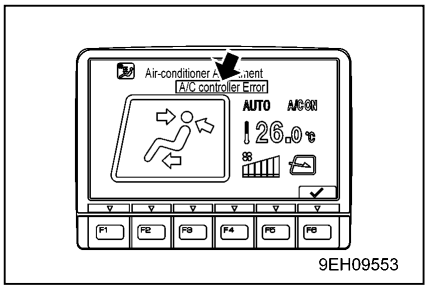
### 2.6.4 INSPECTION AND MAINTENANCE OF AIR CONDITIONER

- When carry out inspection and maintenance on machine equipped with an air conditioner, carry out the inspection and maintenance according to the chart.
  - For details, see "Inspection and Maintenance 9.2 [8] Check and Maintenance Air Conditioner".
  - For details, see "Inspection and Maintenance 9.5 [5] Check and Adjust Air Conditioner Compressor Belt Tension".
  - For details, see "Inspection and Maintenance 9.5 [7] Clean Air Conditioner FRESH/RECIRC Filters".

- When the air conditioner is not being used every day, to prevent loss of the film of oil at various parts, run the engine at low speed from time and carry out cooling or dehumidifying heating for several minutes.

- If the temperature inside the cab is low, the air conditioner may not work. In this case, circulate fresh air to warm the inside of the cab. When the air conditioner switch is turned ON, the air conditioner will work.

- If any abnormality is detected in any equipment or sensor used on the air condition, "A/C Controller Error" is displayed on the air conditioner monitor screen. If "A/C Controller Error" is displayed, please ask us or our sales service agency to carry out inspection and repair.



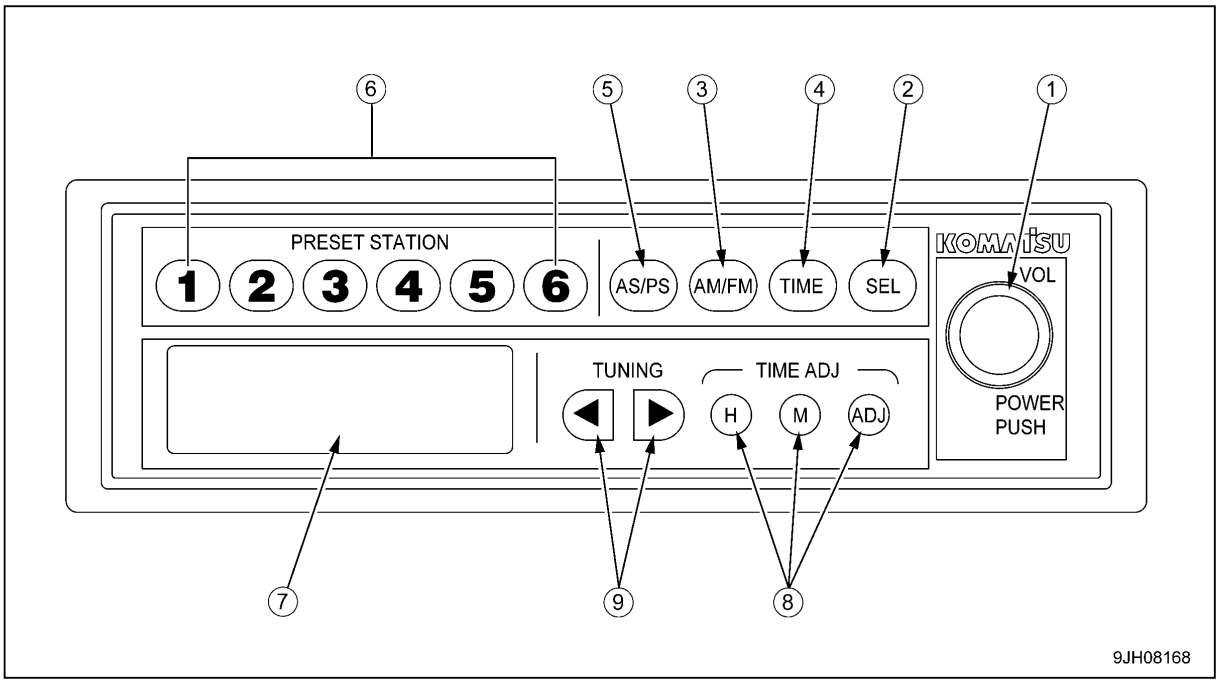



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# 2.7 RADIO

## 2.7.1 CONTROL PANEL




(1) Power switch, Volume control knob, balance control knob
(2) SEL button
(3) FM/AM selection button
(4) Display selection button
(5) AS/PS button
(6) Preset station buttons (1.2.3.4.5.6)
(7) Display
(8) Time reset button
(9) Tuning button

### [1] POWER SWITCH, VOLUME CONTROL KNOB, BALANCE CONTROL KNOB

Press the knob (1) to turn the power for the radio ON. The frequency is displayed on display (7). Press again to turn the power OFF.
Turn the knob (1) clockwise to increase the volume; press counterclockwise to reduce the volume.
The range for the volume is VOL 0 to VOL 40.

### [2] SEL BUTTON

Each time this button (2) is pressed, the mode changes as follows: VOL (volume) → BAS (bass) → TRE (treble) → BAL (balance). The mode is display (7).
For details of each mode, see “2.7.2 Method of Operating Mode”.

### [3] FM/AM SELECTION BUTTON (AM/FM)

Press this button (3) to select the desired band.
Each time the button (3) is pressed, the band changes FM → AM → FM…



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**[4] DISPLAY SELECTION BUTTON (TIME)**

On this machine, priority is given to the frequency display. When the frequency is being displayed, press button (4) and the display will show the preset time for 5 seconds. After 5 seconds pass, the display returns automatically to the frequency display. If any button other than TIME ADJ (H, M, ADJ) is pressed within 5 seconds, the display returns to the frequency display.

For details of the method of adjusting the time, see “2.7.2 Method of Operating Mode [4] Setting Correct Time”.

**[5] AS/PS BUTTON**

This button (5) actuates the auto store and preset scan function.

• Auto Store

If this button is kept pressed for at least 2 seconds during radio reception, it will automatically search for 6 available AM and FM stations each, starting with the lowest frequency and going up to the highest frequency. These frequencies can then be saved in the preset memory.

• Preset Scan

If this button is pressed within 2 seconds, it is possible to select one of the already preset stations. Wait for 6 seconds after pressing the button and then press the button again to select the next preset station. If it is impossible to receive the preset frequency, the selection advances after 1 second to the next preset station.

**[6] PRESET STATION BUTTONS (1, 2, 3, 4, 5, 6)**

If this button has been used to decide which stations to preset, it is possible to select the desired station at a touch. It is possible to preset 6 stations each for both AM and FM.

For details of the method of presetting the stations, see “2.7.2 Method of Operating Mode [1] Method Setting with Preset Button”.

| NOTES |
| --- |
| The preset button (6) can be used to save the frequency manually. To save the frequency automatically,use the Auto store button (5). |

**[7] DISPLAY**

This display (7) shows the reception band, frequency, press No., and time.

**[8] TIME RESET BUTTON**

Use this button (8) when adjusting the time.

For details of the method of adjusting the time, see “2.7.2 Method of Operating Mode [4] Setting Correct Time”.

H: hour M: Minute ADJ: Sets to 00 minutes

**[9] TUNING BUTTON (TUNING)**

This button (9) is used to change the frequency.

For details of the method of tuning, see “2.7.2 Method of Operating Mode [2] Method of Tuning”.

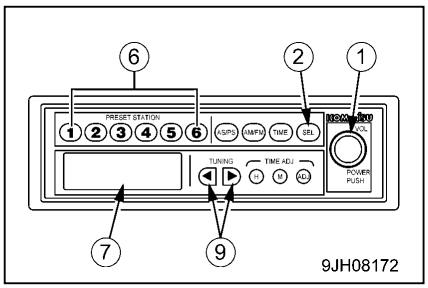


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## 2.7.2 CONTROL OF RADIO

### [1] METHOD OF SETTING WITH PRESS BUTTON




1. Press power switch (1) and display the frequency on display (7).

2. Use tuning button (9) to set to the desired frequency. There are two methods for tuning: auto tuning and manual tuning.

3. With the display (7) showing the desired frequency, keep the desired Preset button No. pressed for at least 1.5 seconds. The reception sound will disappear, but when the presetting operation (saving to memory) is completed, the sound will appear again and the Preset No. and frequency will be shown on the display to show that the presetting operation has been completed.

4. After completing the presetting, press Preset button (6) and release it within approx. 1.5 seconds. This will make it possible to receive the channel preset to that button. One channels each for AM and FM can be preset to each Preset button.

| NOTES |
|---|
| It is also possible to save to the Preset button (6) by using the auto store button (5). |

### [2] METHOD OF TUNING

1. Press power switch (1) and display the frequency on display (7).

2. Use tuning button (9) to set to the desired frequency. There are two methods for tuning: auto tuning and manual tuning.
   - Manual tuning

     Press tuning button (9) until the frequency is displayed on display (7).

     ◀ Button: Frequency moves down

     ▶ Button: Frequency moves up

     When the frequency reaches the top or bottom frequency, it automatically continues as follows: Top → Bottom, or Bottom → Top.
   - Auto tuning

     Press tuning button (9) for at least 3 seconds. When a station is picked up, the tuning automatically stops. To search for the next station, press the tuning button again for at least 3 seconds.

     ◀ Button: Frequency moves down

     ▶ Button: Frequency moves up

     If this button is pressed during auto tuning, the auto tuning will be cancelled and the setting will return to the frequency in use before the button was pressed.



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### [3] METHOD OF OPERATING MODE

• (BAS) Bass adjusting

When button (2) is pressed, BAS is displayed on display (7). If knob (1) is turned clockwise within 5 seconds, the bass sound is emphasized. If the knob is turned counterclockwise, the bass sound is reduced.

• (TRE) Treble adjustment

When button (2) is pressed, TRE is displayed on display (7). If knob (1) is turned clockwise within 5 seconds, the treble sound is emphasized. If the knob is turned counterclockwise, the treble sound is reduced.

• (BAL) Balance adjustment

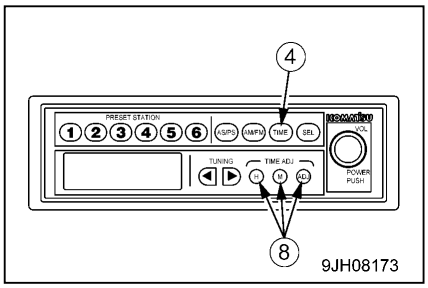
When button (2) is pressed, BAL is displayed on display (7). If knob (1) is turned clockwise within 5 seconds, the sound from the right speaker is increased. If the knob is turned counterclockwise, the sound from left speaker is increased. When it is set to BAL 0, the sound from the left and right speakers is balanced.

**NOTES**

With each mode, the display is returned automatically to it's orignal setting after 5 seconds.

### [4] SETTING CORRECT TIME

1. Press display selector button (4) and display the time on display (7).




**NOTES**

After 5 seconds, the display (7) will return to the frequency display and the time cannot be corrected. If this happens, press display selector button (4) again.

2. Press time adjustment button (8) to select Hour or Minute.

Use the H, M, and ADJ buttons to set to the correct time.

- H button: Adjusts the hour (each time the button is pressed, the time advances by one hour)
  If the H button is kept pressed, the time will advance continuously until the button is released.
- M button: Adjusts the minute (each time the button is pressed, the time advances by one minute)
  If the M button is kept pressed, the time will advance continuously until the button is released.
- ADJ button: When the ADJ button is pressed, the time is reset as follows.
  - When display is 00 to 05 minutes, time is returned to 00 min. 00 sec. (No change in hour)
  - When display is 55 to 59 minutes, time is returned to 00 min. 00 sec. (Hour advances)
  - When display is 06 to 54 minutes, time cannot be reset. (Time stays same)

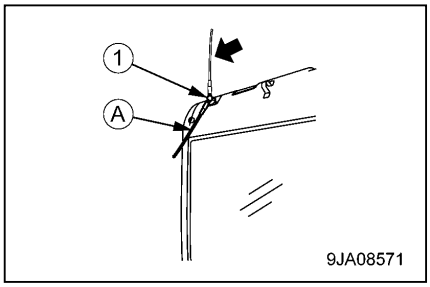
Example: 10:05 → 10:00  10:59 → 11:00  10:26 → 10:26

### [ANTENNA]

Before transporting the machine or putting it inside a building, stored the antenna to prevent any interference.

Stow the antenna as flows.

1. Loosen antenna mounting bolt (1) and store the antenna at position (A).
2. After storing the antenna, tighten bolt (1).






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### 2.7.3 USE RADIO WITH CARE

- To ensure safety, always keep the sound to a level where it is possible to hear outside sounds during operation.
- Take care for a risk that hearing impairment may appear after lengthy hearing the radio in a high volume.
- If water gets into the speaker case or radio, if may lead to an unexpected failure, so be careful not to get water on the equipment.
- Do not wipe the scales or buttons with solvent such as benzene or thinner. Wipe with a dry soft cloth. If the dirt cannot be removed easily, soak the cloth with alcohol.
- When the battery is disconnected or replaced, setting for the preset buttons and clock are cleared, so all settings must be reprogrammed.



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## 2.8 FUSE

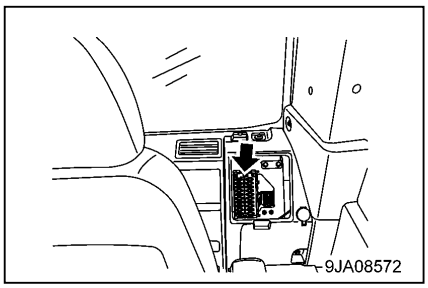
**⚠ CAUTION**

**Be sure to turn the starter switch to the OFF position when checking or replacing a fuse.**

**CAUTION**

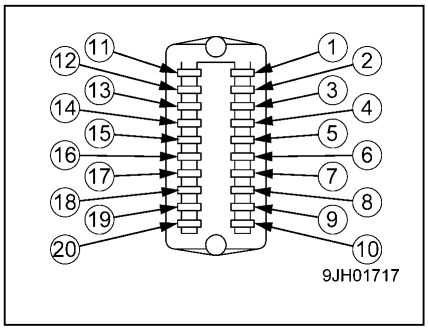
**Fuses protect electrical components and wires from being burnt out.**
- **Fuses are blade fuses. If a fuse was corroded and shows white powder, be sure to change the fuse.**
- **If a fuse has melt down, always check the cause in the circuit and repair the problem before changing the fuse.**
- **Always use a fuse of the same capacity when replacing one.**

The fuse holder is inside the cover at the left rear of the cab.




**[FUSE CAPACITY AND CIRCUIT NAMES]**

The table below shows the fuse system and it's capacity.




| No. | Capacity | Circuit name |
|---|---|---|
| (1) | 10A | Emergency actuation circuit |
| (2) | 30A | Solenoid valve |
| (3) | 15A | Cigarette lighter |
| (4) | 10A | Window washer |
| (5) | 10A | Horn |
| (6) | 5A | Working lamp relay, horn relay |
| (7) | 10A | Work status lamp |
| (8) | 20A | Working lamp |
| (9) | 10A | Radio, speaker |
| (10) | 5A | Air conditioner |
| (11) | 20A | Air conditioner unit |
| (12) | 10A | Moment limiter, crane solenoid, sun roof wiper |
| (13) | 10A | Optional equipment power supply (2), 12V power supply |
| (14) | 10A | Spare |
| (15) | 5A | Air conditioner |
| (16) | 10A | Radio back-up, room lamp |
| (17) | 20A | Monitor, controller, starter switch |
| (18) | 30A | Engine controller |
| (19) | 5A | Engine controller |
| (20) | 5A | PPC oil pressure lock solenoid |



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## 2.9 FUSIBLE LINK

**⚠ CAUTION**

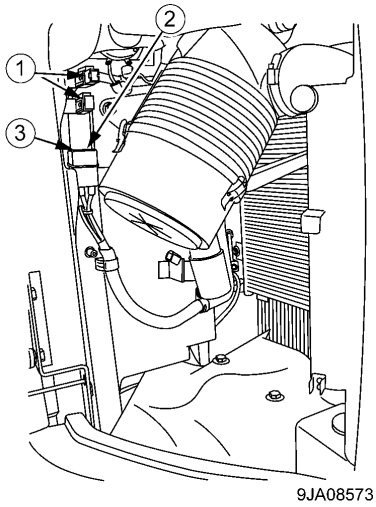
**Be sure to turn the starter switch to the OFF position when checking or replacing a fusIble link.**

**CAUTION**

**A fusible link refers to the large-sized fuse wiring installed in the high current flow portion of the circuit to protect electrical components and wiring from burning, in the same way as an ordinary fuse.**
**• If a fusible link has melt down, always check the cause in the circuit and repair the problem before changing the fusible link.**
**• Always use a fusible link of the same capacity when replacing one.**

If any of the following problems have occurred, there is probably a disconnection in the fusible link. Open the battery room door on the left side of the machine, and check and replace.

- If the starter motor does not turn even when the starter switch is turned to the START position, there is probably a disconnection in the fusible link (1).
- If the battery is discharged, there is probably a disconnection in the fusible link (2).
- In cold weather, if the starter switch is turned to the HEAT position and preheating is carried out, but the engine is difficult to start, there is probably a disconnection in fusible link (3).




**[FUSI BLE LINK CAPACITY AND CIRCUIT NAMES]**

The table below shows the fusible link system and it's capacity.

| No. | Capacity | Circuit name | Connector No. | Part No. |
|---|---|---|---|---|
| (1) | 45A | Permanent power supply | F02 | 20T-06-81230 |
| (1) | 45A | Permanent power supply | F03 | |
| (2) | 50A | Alternator (35A) | F05 | 417-06-22610 |
| (3) | 120A | Preheating | F06 | 421-06-22830 |



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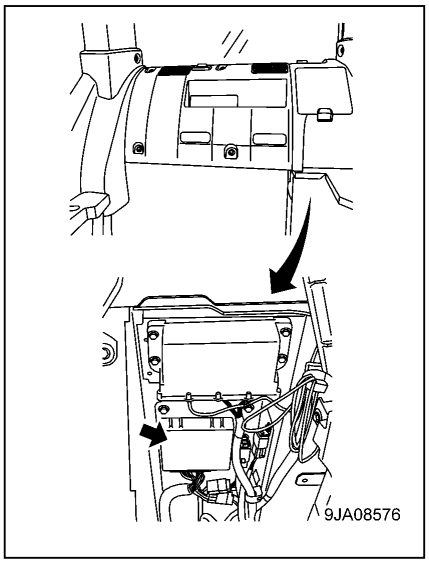
## 2.10 CONTROLLERS

**CAUTION**

- **Do not let water, mud, or any liquid spill on the controller. This will cause failures.**
- **If any problem occurs in the controller, do not repair it yourself. Please contact us or our sales service agency.**

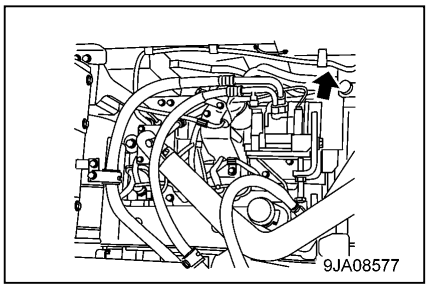
### [1] CHASSIS CONTROLLER

The chassis controller is installed inside the rear cover at the rear of the operator's cab.




### [2] ENGINE CONTROLLER

The engine controller is installed to the exterior frame at the rear of the engine.






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## 2.11 WINDSHIELD

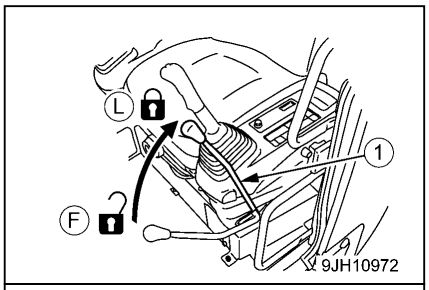
**⚠ WARNING**

- **When opening or closing the front winsow, bottom window, or door, always set the lock lever to the LOCK positon. If the lock lever is at the FREE positon and the control levers or control pedals are touched by mistake, this may lead to a serious accident.**
- **When opening or closing the front window, stop the machine on horizontal ground, stop the engine, then carry out the operation.**
- **When opening the front window, hold the grip securely with both hands, pull up, and do not let go until the automatic lock catch is locked.**
- **When closing the front window, the window will move quicker under is own weight. Hold the grips securely with both hands when closing it.**

• It is possible to stow (pull up) the front window in the roof of the operator's compartment.

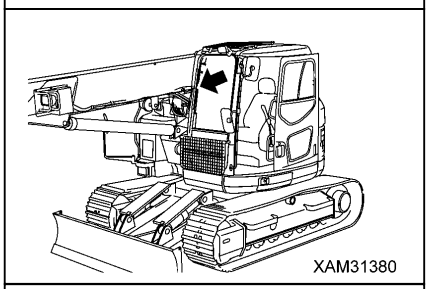
**[1] OPENING**

1. Stop the machine on level ground, stow the crane completely, then stop the engine.

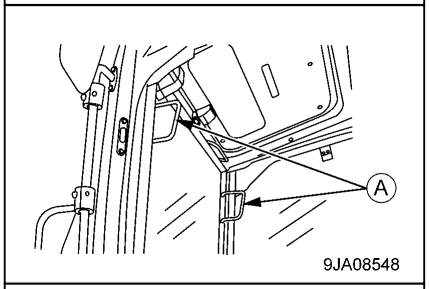


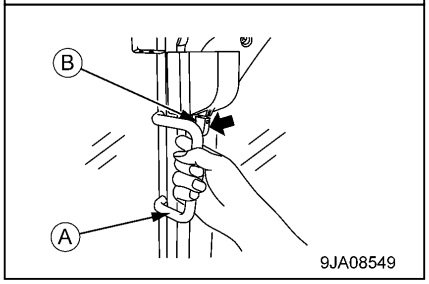

2. Set lock lever (1) securely to the LOCK position (L).

3. Check the wiper blade is stowed in the right stay.




4. Hold 2 grips (A) on the left and right top sides of the front window, and pull the 2 levers (B) to release the lock at the top of the front window. The top of the front window will come out.



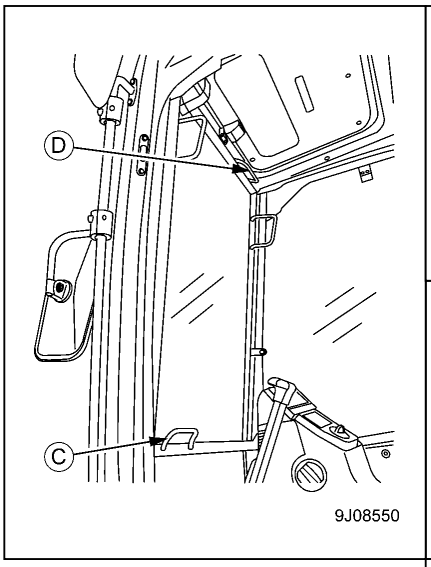



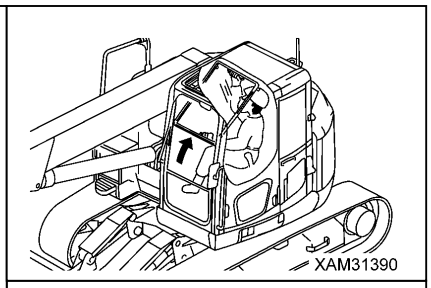


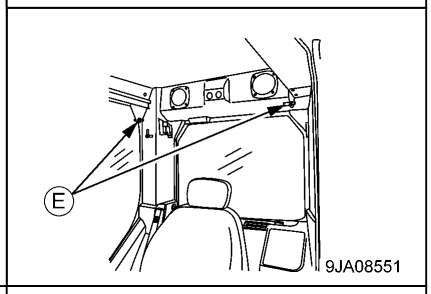

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5. Hold lower knob (C) with your left hand from inside the operator's cab, and with your right hand, grip top knob (D), pull it up, and push it against lock catch (E) at the rear of the cab securely to lock the window.

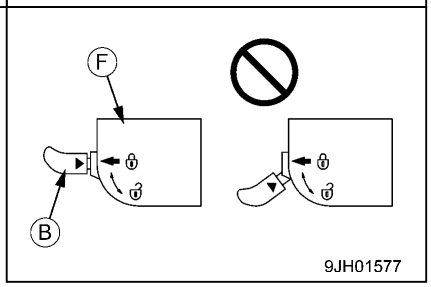



6. Check that lever (B) is securely at the LOCK position.

| NOTES |
|---|
| • The lock is engaged if the arrow on lock case (F) matches the position of the arrow on lever (B). Check visually.<br>• If the arrow on lock case (F) does not match the position of the arrow on lever (B), the lock is not engaged. Repeat the operation in Step 5 to engage the lock. |



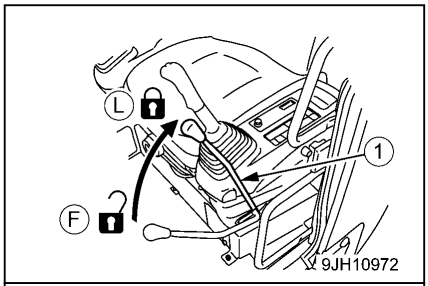

**[2] CLOSING**

**⚠ WARNING**

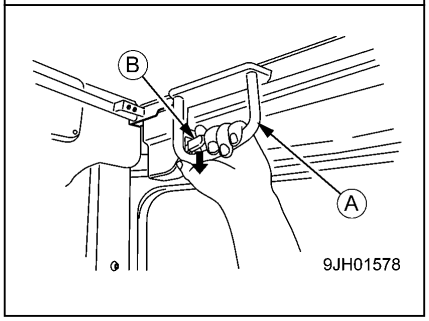
**When closing the window, lower it slowly and be careful not to get your hand caught.**

1. Stop the machine on level ground, stow the crane completely, then stop the engine.

2. Set lock lever (1) securely to the LOCK position (L).




3. Grip left and right handles (A), and pull down lever (B) to release the lock.

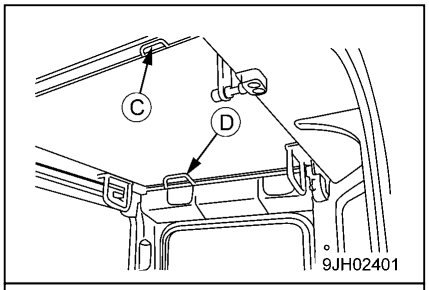


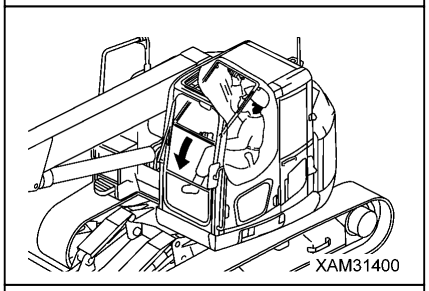



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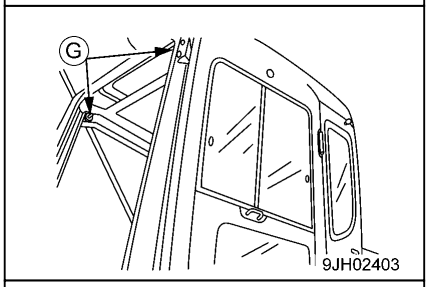
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4. Grip handle (C) at the bottom of the front window with your left hand and handle (D) at the top with your right hand, push to the front, then lower slowly.



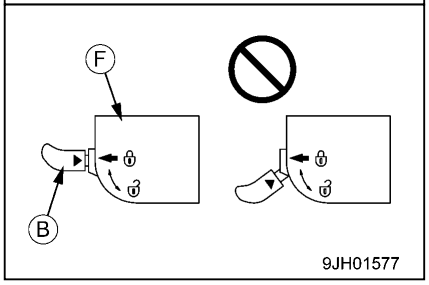




5. When the bottom of the window reaches the top of the lower window, push the top or the bottom window, push the top of the window to the front to push it against left and right lock catches (G) and engage the lock.




6. Check that lever (B) is securely at the LOCK position.

| NOTES |
|---|
| • The lock is engaged if the arrow on lock case (F) matches the position of the arrow on lever (B). Check visually.<br>• If the arrow on lock case (F) does not match the position of the arrow on lever (B), the lock is not engaged. Repeat the operation in Step 5 to engage the lock. |



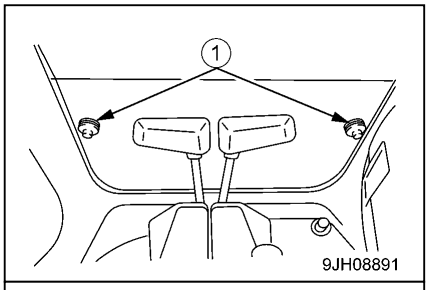



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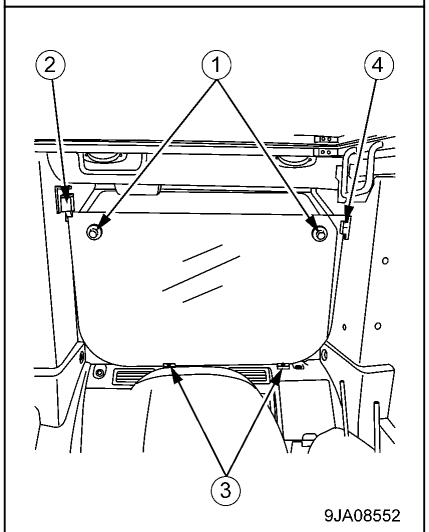
### [3] REMOVING LOWER WINDSHIELD

1. Open the front window, then hold grip (1), pull up, and remove the bottom window.

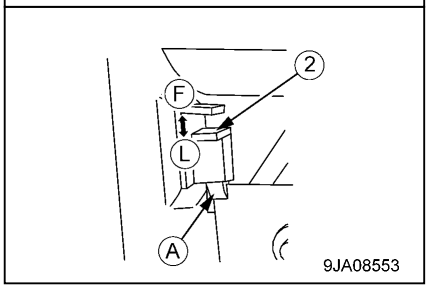



2. After removing the bottom window, store it at the rear of the operator's cab and lock it securely with lock (2). The procedure for stowing is as follows.
   (1) Set it with the protruding part of grip (1) on the glass on the inside and insert the bottom of the glass into the groove in seat (3).

   (2) Insert the top right of the glass into the groove in seat (4).




   (3) Push lock (2) to the free position (F). Tooth (A) will come up, so push the glass against it, then release lock (2) and secure the top of the glass.
   When lock (2) is released, it will return to LOCK position (L) and tooth (A) will go down.




**CAUTION**

**When stowing the glass, lock it securely and check that there is no play. If there is play or the lock is not properly applied, there is danger that the glass may fall.**

   (4) When removing the bottom window from the stowing position, carry out the stowing procedure in the reverse order.



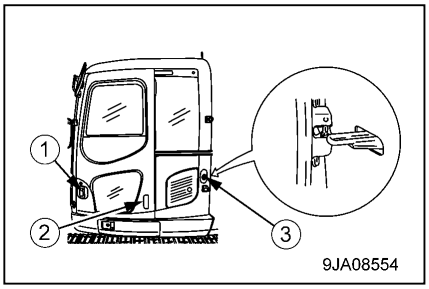
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## 2.12 SLIDING DOOR

**⚠ CAUTION**

- **Be sure to check that the sliding door is locked in position both when it is open and when it is closed.**
- **Always stop the machine on level ground when operating or closing the door. If the door is opened or closed on a slope, there is danger that the operating effort will suddenly change. Do not open or close the door on slopes.**
- **When opening or closing the door, always use door handle (1) and knob (2).**
- **Be careful not to get your hands caught between the front pillar or center pillar.**
- **If there is anyone inside the cab, call out to that person before opening or closing the door.**




**[Door Lock]**

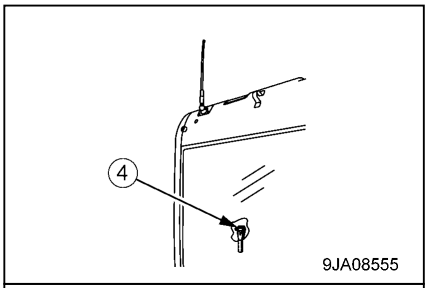
When closing the door, pull the handle back to remove lock (3), and then pull the door to the front.

## 2.13 EMERGENCY ESCAPE HAMMER

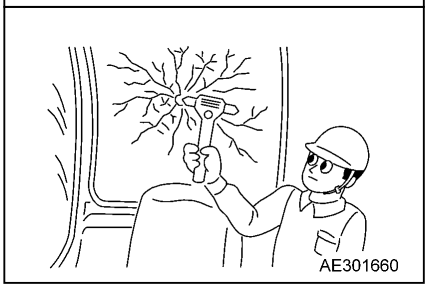
**⚠ CAUTION**

- **If it is necessary to break the window glass with hammer, be extremely careful not to injury yourself on the flying pieces of broken glass.**
- **To prevent injury, remove the broken pieces of glass remaining in the frame before escaping through the window. Be careful also not slip on the broken pieces of glass.**

If it should become impossible to open the cab door for any reason, and it is necessary to make an emergency escape from the operator's compartment, uses hammer (4) to escape.




To escape from Operator's cab, use hammer (4) to break the glass and escape through the window.



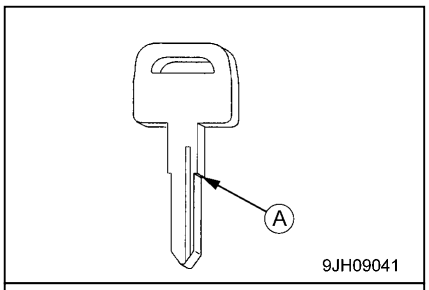



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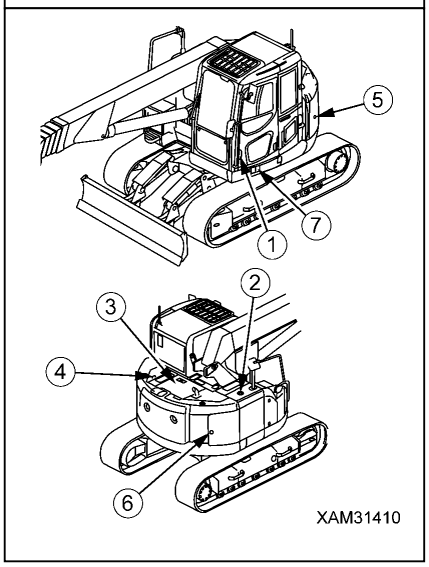
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## 2.14 CAP WITH LOCK

• Use the starter switch key to open and close the locks on the caps and covers.
• Insert the key as far as it will go to the shoulder (A). If the key is turned before it is inserted all the way, it may break.



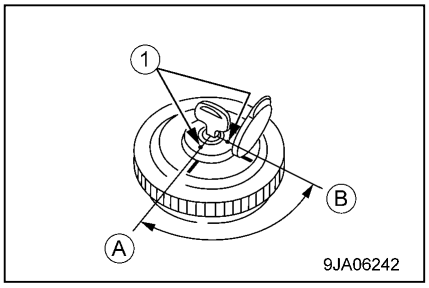

• Locations of the caps and covers with lock, shown in the diagram on the right.
(1) Door of operator's cab
(2) Fuel tank filler port
(3) Engine hood
(4) Cover at rear of cab
(5) Battery room door
(6) Pump room door
(7) Door at front of tool box




### [1] OPENING AND CLOSING CAPS WITH LOCK (For fuel tank filler port)

**[Opening the Cap]**

1. Insert the starter switch key into the key slot.
2. Turn the key clockwise, align the key groove with mark (1) on the cap, then open the cap.
   Position (A): OPEN
   Position (B): LOCK



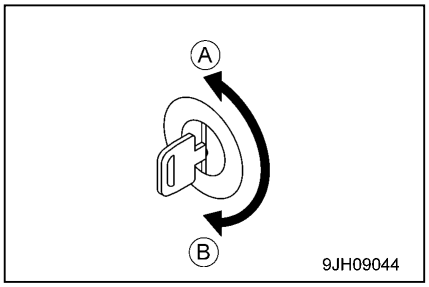

**[Locking the Cap]**

1. Turn the cap until tight, and then insert the starter switch key into the key slot.
2. Turn the key to LOCK position (B), and then remove the key.

### [2] OPENING AND CLOSING COVERS WITH LOCK

**[Opening the Cover]**

1. Insert the starter switch key into the key slot.
2. Turn the key counterclockwise and open the cover by pulling the cover grip.
   Position (A): OPEN
   Position (B): LOCK




**[Locking the Cover]**

1. Close the cover and insert the starter switch key into the key slot.
2. Turn the key clockwise and take the key out.



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## 2.15 ENGINE HOOD

**⚠ CAUTION**

- **When carrying out inspection and maintenance inside the engine hood, always use the hood support lever to hold the engine hood open.**
- **Always keep the engine hood locked except when opening it.**

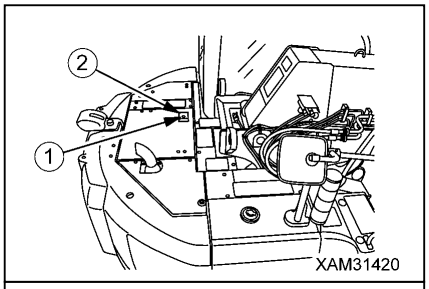
1. Release lock (1) of the engine hood.
   For details, see “Operation 2.14 Cap with Lock [2] Opening and Closing Covers with Lock”.

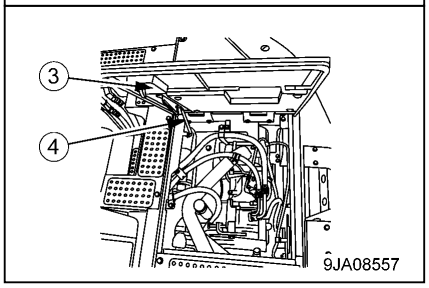
2. Locking can be released by pulling engine hood release lever (2).

3. Pull up engine hood (3) and put engine hood support lever (4) in the position to secure the engine hood.

4. When closing engine hood (3), lower engine hood support lever (4) slowly to the sliding position and then lock the hood securely.

5. Do not forget to lock the engine hood.




## 2.16 CAB REAR COVER

**⚠ CAUTION**

- **When carrying out inspection and maintenance inside the cover, always use the cover support lever to hold the cover open.**
- **Always keep the cover locked except when opening it.**

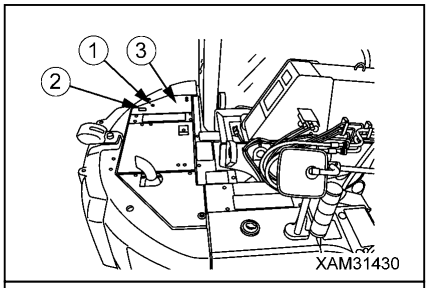
1. Release lock (1) of the cover.
   For details, see “Operation 2.14 Cap with Lock [2] Opening and Closing Covers with Lock”.

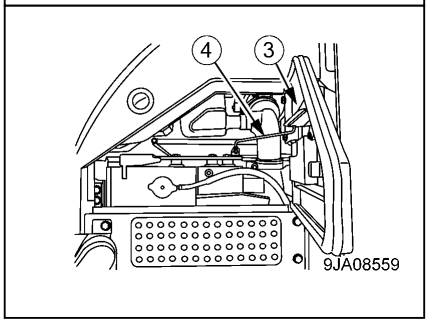
2. Pull knob (2) and open cover (3).

3. After opening the cover, set cover support lever (4) to hold the cover in position.

4. When closing cover (3), set cover support lever (4) to the slide position, and lower the cover slowly.

5. Do not forget to lock the cover.






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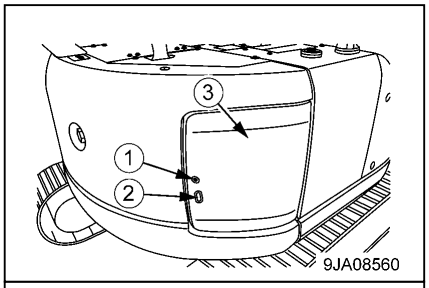
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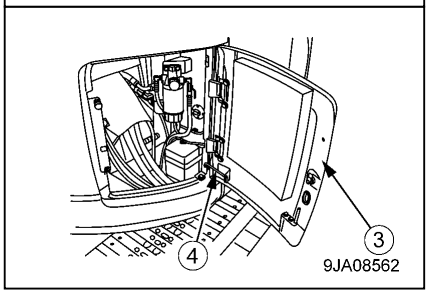
## 2.17 PUMP ROOM DOOR

**⚠ CAUTION**

- **When carrying out inspection and maintenance inside the door, always use the stopper to hold the door open.**
- **Always keep the door locked except when opening it.**

1. Release lock (1) of the door.
   For details, see “Operation 2.14 Cap with Lock [2] Opening and Closing Covers with Lock”.
2. Put finger in hook (2) and pull door (3) open.
3. Inset rod (4) in the groove to secure the door.
4. When closing door (3), pull up rod (4) and remove it from the groove.
5. Do not forget to lock the door.



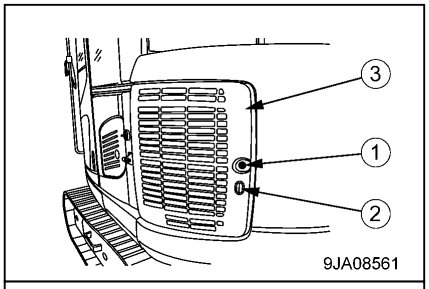



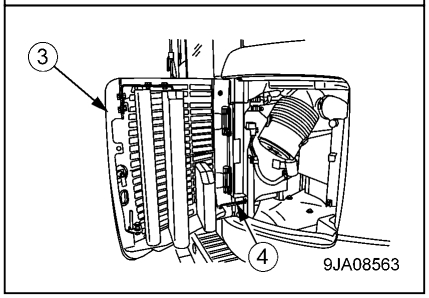

## 2.18 BATTERY ROOM DOOR

**⚠ CAUTION**

- **When carrying out inspection and maintenance inside the door, always use the stopper to hold the door open.**
- **Always keep the door locked except when opening it.**

1. Release lock (1) of the door.
   For details, see “Operation 2.14 Cap with Lock [2] Opening and Closing Covers with Lock”.
2. Put finger in hook (2) and pull door (3) open.
3. Inset rod (4) in the groove to secure the door.
4. When closing door (3), pull up rod (4) and remove it from the groove.
5. Do not forget to lock the door.






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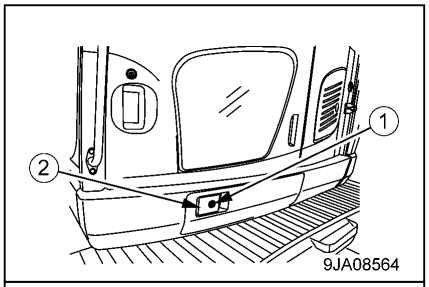
## 2.19 DOOR AT FRONT OF TOOL BOX

**⚠ CAUTION**

- **When carrying out inspection and maintenance inside the door, always use the stopper to hold the door open.**
- **Always keep the door locked except when opening it.**

1. Release lock (1) of the door.
   For details, see “Operation 2.14 Cap with Lock [2] Opening and Closing Covers with Lock”.

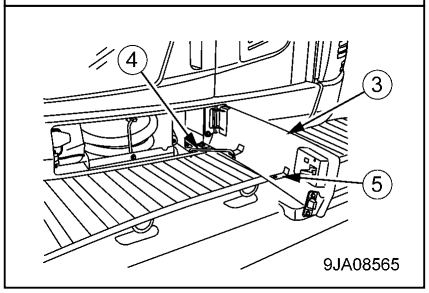
2. Pull door lever (2) to release the lock.




3. Pull door (3) to open it, remove door support lever (4) from spring catcher (5), then insert the L-shaped portion in the hole in the frame.

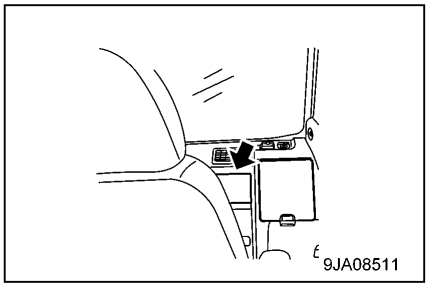
4. To close door (3), lift up door support lever (4), fix it to spring catcher (5) and close it.

5. Do not forget to lock the door.



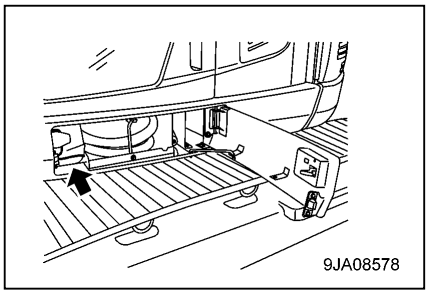

## 2.20 OPERATION MANUAL STORAGE

A magazine box is provided on the left side of the operator’s seat for safekeeping the operation and maintenance manual.
Always keep the Operation and Maintenance Manual in this pocket so that it is possible to read it at any time.




## 2.21 TOOL BOX

Open the door at the front of the tool box. The standard tool compartment is inside.
Put the tools in the supplied hole at the end, and push the grease gun holder fully in to store it.



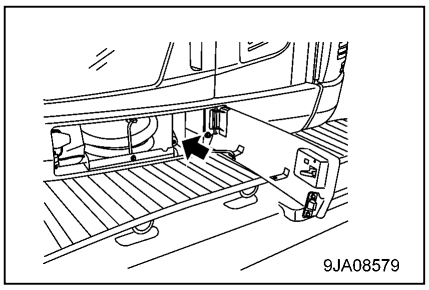



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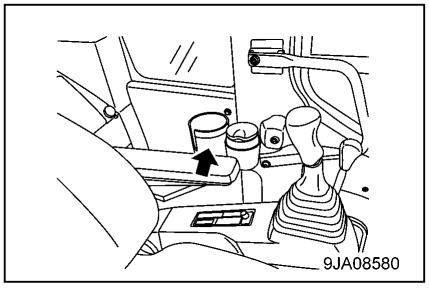
## 2.22 GREASE PUMP HOLDER

Open the door at the front of the tool box. The compartment is inside.
Pass the nozzle through the hole at the end, and push the grease gun holder fully in store it.



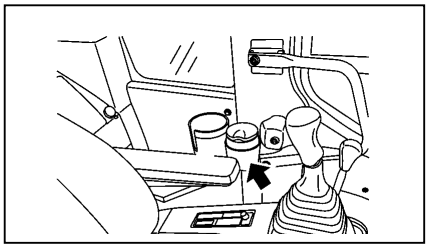

## 2.23 CUP HOLDER

This is on the left side of the operator's cab.




## 2.24 ASHTRAY

This is on the left side of the operator's cab.
Always extinguish your cigarette before putting it in the ashtray, and then be sure to close the lid.





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## 2.25 WIND-IN TYPE SEAT BELT

**⚠ WARNING**

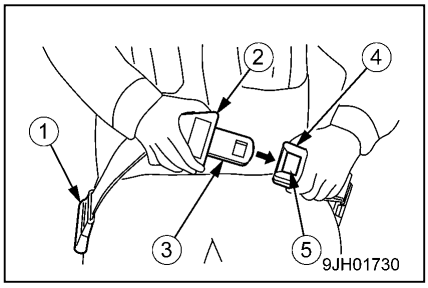
- **Before fitting the seat belt, check that there is no problem in the belt mount bracket or mounting belt. If it is worn of damaged, replace the seat belt.**
- **Even if no problem can be seen in the belt, replace the seat belt every 3 years. The date of manufacture of the belt is shown on the back of the belt.**
- **Always wear the seat belt during operation.**
- **Fit the seat belt so that it is not twisted.**

This seat belt has a wind-in device, so it is not necessary to adjust the length.

**[1] FASTENING SEAT BELT**

Hold grip (2) and pull the belt out from wind-in device (1), check that the belt is not twisted, then insert tongue (3) into buckle (4) securely.

When doing this, pull the belt lightly to check that it is properly locked.




**[2] REMOVING SEAT BELT**

Press button (5) in buckle (4), and remove tongue (3) from buckle (4).

The belt is automatically wound in, so hold grip (2) and return the belt slowly to wind-in device (1).



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# 3. MACHINE OPERATIONS AND CONTROLS

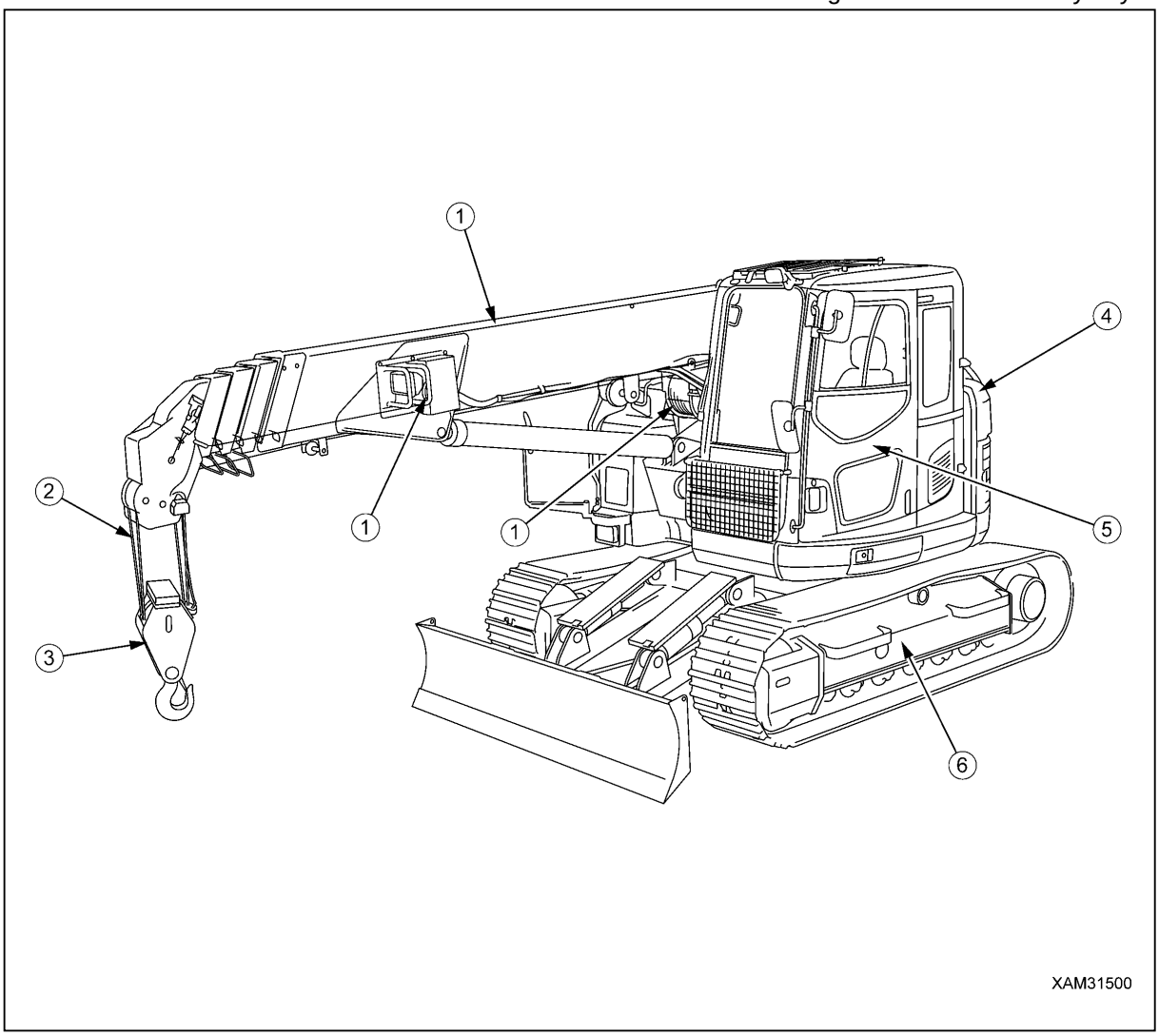
## 3.1 CHECKING BEFORE OPERATION

### 3.1.1 CHECKING BEFORE STARTING ENGINE (VISIBLE CHECKS)

**⚠ WARNING**

- **This machine has a diesel engine. If it smells of fuel around the engine, the fuel may be leaking. Carefully check for cracks on the fuel hose or fuel hose connections.**
- **Remove any flammable materials from around the battery, engine, muffler, turbocharger, or other high temperature engine parts. Leakage of fuel or oil will cause the machine to catch fire. Check carefully, be sure to repair any problem, or contact us or our sales service agency.**

Check the items shown in this section as routine surveillance before starting the first work of every day.






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### [1] CHECKING AROUND CRANE

- Look around and below the boom and boom mounting and look for any oil leak or similar. Be especially careful to check the derrick cylinder and lower part of the winch motor. If you find any abnormality, repair it.
- Check each part of the mounting portion for cracks, excessive deformation, contamination etc. In addition, check bolts, nuts, pins and piping joints for any looseness, drop and damage etc. If you find any abnormality, repair it.
- Check each part of the boom for cracks, excessive deformation and contamination etc. In addition, check bolts, nuts, pins and piping joints for any looseness, drop and damage etc. Be especially careful to check for excessive abrasion and damage of the boom support pin or derrick support pin. If you find any abnormality, repair it.
- Check for excessive damage and deformity of the over hoist weight wire rope of the over hoisting alarm device at the tip of the boom. If there is any abnormality, repair it.
- Check working lamp for cracks, excessive deformation and contamination etc. If you find any abnormality, repair it.
- Check for sagged electrical wire, loosened connection and trace of burns. If you find any abnormality, repair it.

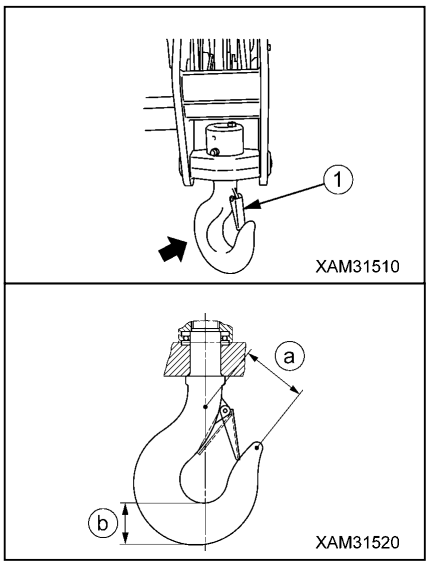
### [2] CHECKING WIRE ROPES

★ See "Operation 5. Handling Wire Ropes" for wire ropes.

- Check the wire ropes for damage, deformation, wear, twists, kinks, corrosion, etc. If you find any abnormality, replace it.
- Check the bound condition of the wire rope ends. If you find any loosened wire rope end, replace it.
- Check for irregular winding of the wire ropes (winch drum). If you find any irregular winding, rewind.

### [3] CHECKING HOOK BLOCK

- Verify that the wire rope latch (1) functions normally. If there is any abnormality, repair it.
- Rotate the hook and verify that the hook rotates smoothly and that trunnion does not emit any abnormal sound.
  If there is any abnormality, repair it.
- Check the hook for any crack or excessive deformation.
  If there is any abnormality, repair it.
- If dimension (a) between the punch marks punched on the hook became "122.4 mm or more" or the hook lower part dimension (b) became "70.8 mm or less", replace the hook.






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**[4] CHECKING AROUND UPPER STRUCTURE**

- Check for fuel, oil or water leaking from the engine. If you find any abnormality, repair it.
- Check the hot engine sections such as the engine muffler and around the battery for the buildup and deposit of combustibles such as dead leaves, paper wastes, dust, oil, and grease. If there is any, remove them.
- Check the starter, alternator, around battery and similar parts for sagged electrical cables, piping joints, and the trace of burn. If you find any abnormality, repair it.
- Look around and below the upper structure and look for any oil leak or similar. Be especially careful to check below the hydraulic oil tank, travel/crane operation section and each traveling motor. If you find any abnormality, repair it.
- Check the handrails and steps for cracks, excessive deformation, contamination and others. In addition, check bolts and nuts for any looseness, drop and damage etc. If you find any abnormality, repair it.
- Check working status lamp and rear view camera for cracks, excessive deformation and contamination and others. If you find any abnormality, repair it.

**[5] CHECKING AROUND OPERATOR'S CAB**

- Check window shields for dislocation or damage, or cracks or impairment in windowpanes. If you find any abnormality, repair it.
- Check the seat belt and mounting bracket for cracks, damages. If you find any abnormality, repair it.
- Verify that all of the operation levers, traveling levers, lock lever and access pedals operate smoothly. If you find any abnormality, repair it.
- Check the moment limiter display and the monitor panel on the instrument panel for damages and dirt. If you find any abnormality, repair it. If dirty, clean.
- Check for sagged electrical wire, loosened connection and trace of burns. If you find any abnormality, repair it.
- Check head light for cracks, excessive deformation or contamination etc. If you find any abnormality, repair it.

**[6] CHECKING AROUND UNDERCARRIAGE**

- Check each of the frames, tracks, rollers, idlers and sprockets for cracks, excessive deformation, and contamination etc. In addition, check bolts, nuts and pins for any looseness, drop, or damage etc. If you find any abnormality, repair it.
- Look around and below the undercarriage and look for any oil leak or similar, check bolts, nuts, pins and piping joints for any looseness, drop or damage etc. If you find any abnormality, repair it.



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## 3.1.2 CHECKING BEFORE STARTING ENGINE

Check the followings in this section without starting the engine and before starting the first work every day.

### [1] CHECKING/REFILLING ENGINE COOLANT

**⚠ WARNING**

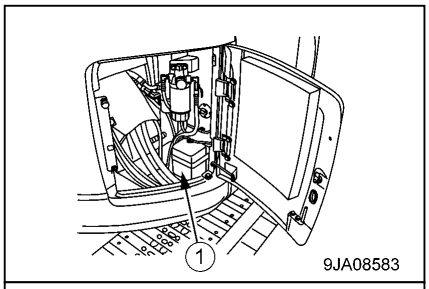
- **Do not open the radiator cap unless necessary. When checking the coolant, always wait for the engine to cool down and check the sub tank.**
- **Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the radiator cap is removed to check the coolant level in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the radiator cap slowly to release the pressure and remove it carefully.**

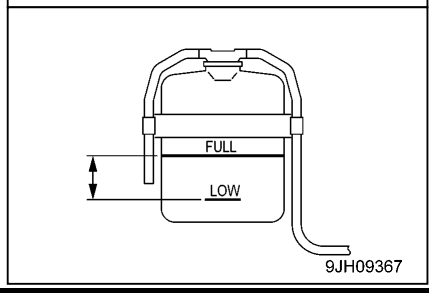
1. Stop the machine at leveled location.

2. Open the pump room door on the machine right side.

3. Check the cooling coolant level in the sub tank (1) to be between FULL and LOW marks.

4. If the coolant level is lower than the LOW level, use the following procedure to refill with tap water.
   (1) Remove the cap of the sub tank (1) and fill water from the filler opening to the level FULL.
   (2) After refilling with water, securely install the cap of the sub tank (1).




**CAUTION**

**If the sub tank is empty, there is probably leakage of water. After inspecting, repair any abnormality immediately. If there is no abnormality, check the water level in the radiator. If the water level is low, add coolant to the radiator, and then fill the sub tank (1).**



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### [2] CHECKING/REFILLING OIL LEVEL IN ENGINE OIL PAN

**⚠ WARNING**

**Parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the oil temperature to go down before performing this operation.**

**CAUTION**

- **See "Maintenance 7.1 Use of Lubricating Oil According to Temperature" for which oil to be used. Using oil, other than those specified may shorten the life of the engine. Be sure to refill with the specified oil.**
- **Keep the engine oil at the appropriate level.**
  **The oil level being too high will result in too much oil consumption and this tends to increase the oil temperature, deteriorating the oil faster. The oil level being too low may burn out the engine.**
- **Be careful not to let any foreign substance go into the filler opening when refilling with the oil.**

1. Stop the machine at leveled location.

2. Open engine hood.

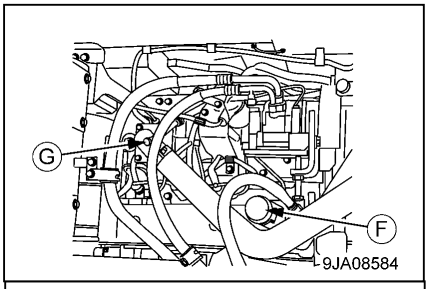
3. Remove the dipstick (G) and wipe the oil off with a cloth.

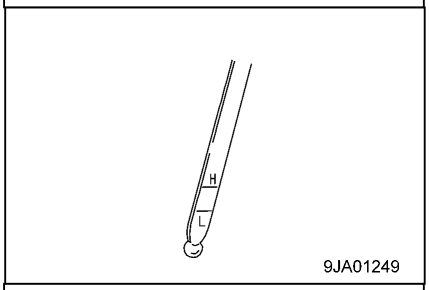
4. Fully insert the dipstick (G) into the gauge guide, and then remove it.

5. If the oil level is between the H and L marks on the dipstick (G), the oil level is normal.

6. If the oil level is lower than the L mark, remove the filler cap (F) and refill with the engine oil from the filler opening.

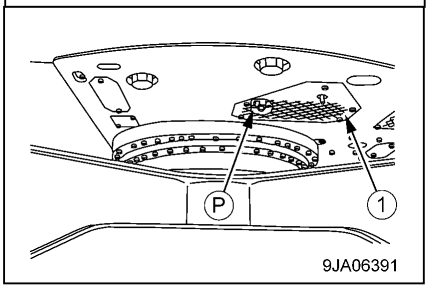
7. After refilling with the oil, securely install the dipstick (G) and the filler cap (F).




**NOTES**

If the oil level is above the H mark, remove undercover (1), drain the excess engine oil from drain valve (P), and then check the oil level again.






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### [3] CHECKING/REFUELING FUEL LEVEL IN FUEL TANK

**⚠ DANGER**

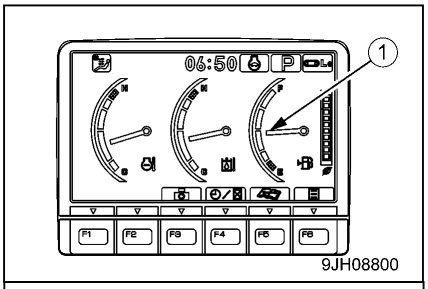
- **Be extremely careful with fire such as cigarette.**
- **Be sure to stop the engine when refueling. If refueling is done with the engine in operation, the fuel spilled on the section where it gets hot such as muffler can catch fire.**
- **Over-refilling may cause fuel spill. Refuel to the level slightly lower than the specified upper limit level. If the fuel spills, be sure to thoroughly wipe it off.**
- **Be sure to close the tank cap after refuelling.**

**CAUTION**

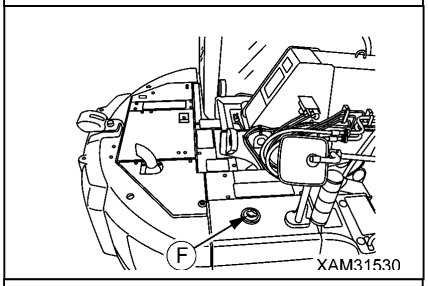
- **See "Maintenance 7.1 Use of Lubricating Oil According to Temperature" for which fuel to be used.**
- **Be careful not to let any foreign substance go into the filler opening when refueling.**

1. Stop the machine at leveled location.

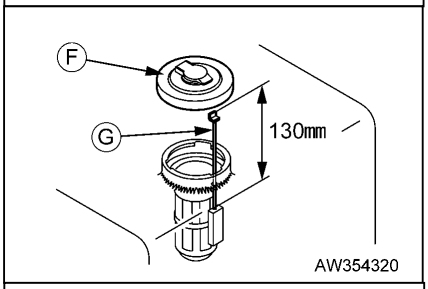
2. Turn the starter switch to the ON position and check that the fuel level gauge (1) on the monitor panel for fuel level.
   After checking, turn the starter switch back to the OFF position.




3. If fuel is found to be low, unscrew fuel filter cap (F) on the fuel tank and add fuel through the filler port until float gauge (G) comes up to the highest point.
   - Specified fuel amount in fuel tank: 195 liters
   - Position of tip of float gauge (G) when tank is full: Approx. 130 mm from top surface of fuel tank.

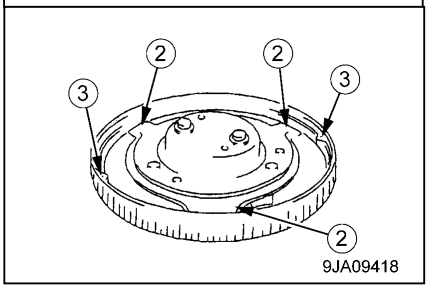



4. After adding fuel, push float gauge (G) straight down with fuel filler cap (F). Be careful not to get float gauge (G) caught in the tab of fuel filler cap (F), and tighten fuel filler cap (F) securely.




**NOTES**

If breather hole (3) on the cap is clogged, the pressure in the tank will drop and fuel will not flow. Clean the hole from time to time.






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### [4] CHECKING/REFILLING OIL LEVEL IN HYDRAULIC OIL TANK

**⚠ WARNING**

- **Parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the oil temperature to go down before performing this operation.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, and then remove it.**
- **Securely close the tank cap after refilling with the oil.**

**CAUTION**

- **See "Maintenance 7.1 Use of Lubricating Oil According to Temperature" for which oil to be used.**
- **Be sure to put the machine in the traveling posture when checking the oil level.**
  **Checking the oil level in the working posture will cause overfilling since the oil in the cylinders has not returned to the tank.**
  **★ For details of traveling posture, see "Operation 3.7 Machine Traveling Posture".**
- **Be careful not to let dust go in from the filler opening when refilling with oil.**

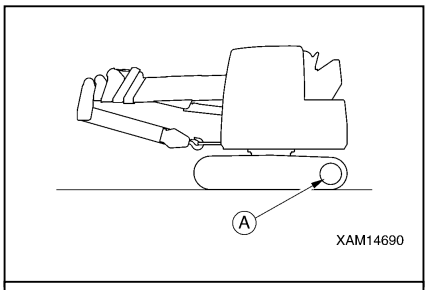
1. Stop the machine at leveled location.

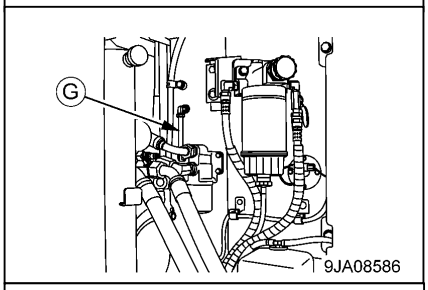
2. Put the machine in the traveling posture, shown in the diagram on the right.

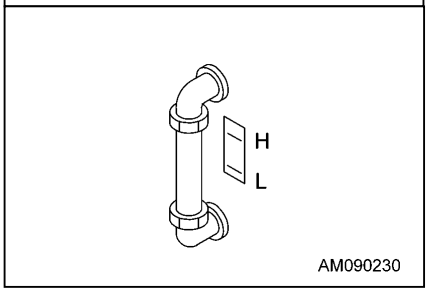
3. Turn the starter switch to the OFF position.

4. Within 15 seconds after stopping the engine, move each control lever (For work equipment and travel) to the full stroke in all directions to release the internal pressure.

5. Open the pump room door on the machine right side, and check sight gauge (G). The oil level should be between the H and L lines.




**NOTES**

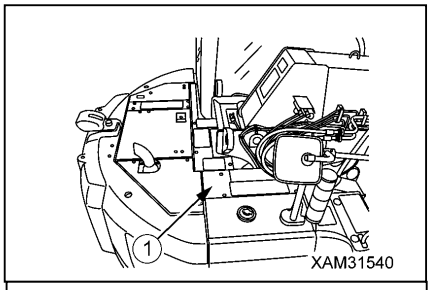
The oil level will vary depending upon the oil temperature. Accordingly, use the following as a guide.
- Before starting operation: Between H and L levels
  (Oil temperature 10 to 30 degrees C)
- Normal operation: Around H level
  (Oil temperature 50 to 80 degrees C)

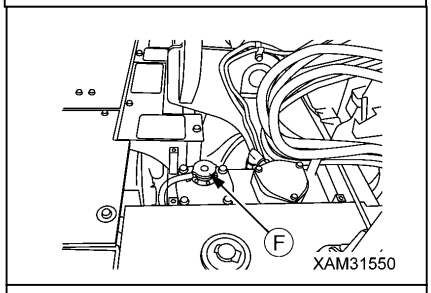


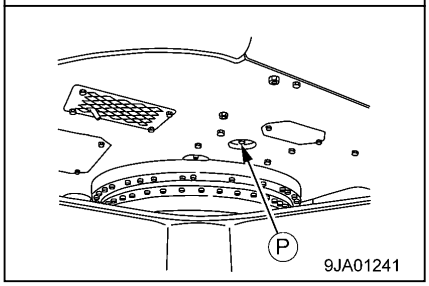
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6. If the oil level is below the L line, remove the cover (1) at the top of the hydraulic oil tank, and then add oil through oil filler (F).




**CAUTION**

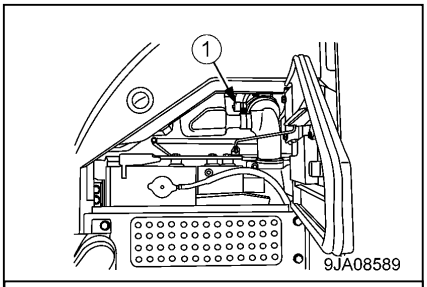
**Do not add oil above the H line. This will damage the hydraulic circuit or cause the oil to spurt out.**
**If oil has been added above the H level, the procedure for draining oil is as follows.**
**1. Swing the upper structure, and stop it so that the drain plug (P) under the hydraulic oil tank will be between both tracks.**
**2. Stop the engine and wait for the hydraulic oil to cool down**
**3. Remove drain plug (P), and drain the excess oil from drain plug (P).**
**4. Check the oil level again.**

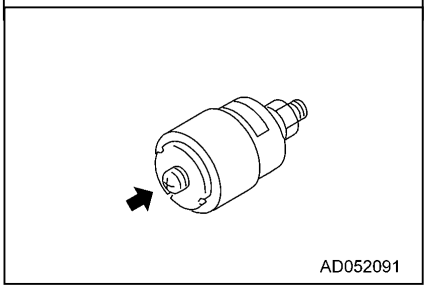
**[5] CHECKING DUST INDICATOR**

1. Open the cab rear cover and check that the red piston is not showing in the part of dust indicator (1).

2. If the red piston has appeared, clean or replace the air cleaner element immediately.
   For details of the method of cleaning the air cleaner element, see “Maintenance 9.3 Irregular Maintenance [3] Checking/ cleaning/replacement Air Cleaner Element”

3. After checking, cleaning, or replacing the air cleaner element, press the knob of dust indicator (1) to return the red piston to it’s original position.






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### [6] CHECKING FOR WATER, SEDIMENT IN WATER SEPARATOR, DRAIN WATER

**⚠ WARNING**

- **The water separator has fuel (diesel oil) inside. Be extremely careful of fire such as cigarette when cleaning the water separator transparent cap.**
- **If the fuel spills when the water separator is removed, thoroughly wipe it off.**

**CAUTION**

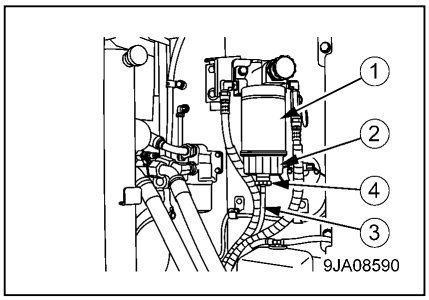
- **Water or dust accumulated inside the water separator will cause engine failure. Check inside the transparent cap and remove any water or dust accumulated inside.**
- **If water remains in the water separator transparent cap, it is assumed that much water is also mixed in the fuel tank. Eliminate water and dust mixed into the fuel tank.**
- **If the water inside the transparent cap freezes, check that the frozen water has melted completely, then use the procedure above to drain the water.**

• The water separator forms one unit with fuel pre-filter (1).
• Place a container to catch drain water.

1. Stop the machine at leveled location.

2. Open the pump room door on the machine right side.

3. Check the transparent cap (2) for any water or dust in the transparent cap (2).




4. It is possible to judge the water level and amount of sediment by looking through transparent cap (2), if there is any water or sediment collected at the bottom, drain using the following procedure.
   (1) Set a container to catch the drain water under drain hose (3).
   (2) Open drain valve (4) to drain the water.
   (3) When fuel starts to drain from drain hose (3), shut off drain valve (4) immediately.

**NOTES**

- If transparent cap (2) is dirty or it is difficult to see the inside, clean transparent cap (2) when replaceing fuel pre^filter cartridge (1).
- When the drain valve (4) has been removed during the cleaning operation, coat the O-ring with grease and tighten until it contacts the bottom.

5. Close the pump room door on the machine right side.



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**[Adjustment of Drain Valve]**

If drain valve (4) is stiff, coat the O-ring portion of the drain valve (4) with grease to make the movement smooth.

1. Set valve (5) at the side of fuel pre-filter cartridge (1) to the shut off position (S).

2. Set the container to catch the fuel under the pre-filter cartridge (1).

3. Open drain valve (4), then drain all the water and sediment in the transparent cap (2) and also the fuel accumulated in filter cartridge (1).

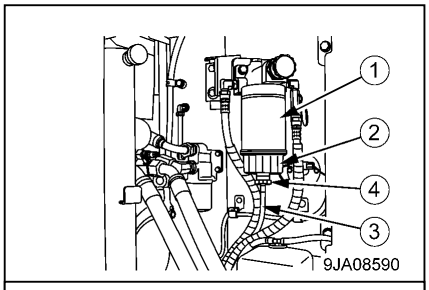
4. Check that nothing more comes out from drain hose (3), then remove drain valve (4).

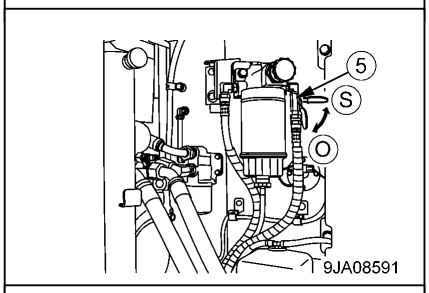
5. Coat O-ring portion (6) with a suitable amount of grease.
   When doing this, be careful not to let the grease get stuck to the drain valve water drain port (7) or drain valve thread (8).

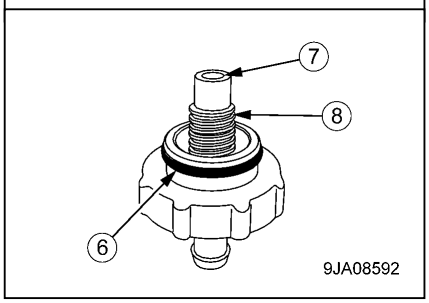
6. Tighten drain valve (4) by hand until it contacts the bottom of transparent cap (2).

7. Remove the fuel container.

8. Set valve (5) to the open position (O).




**[7] DRAIN WATER AND SEDIMENT FROM FUEL TANK**

• Please a container to catch drain water.

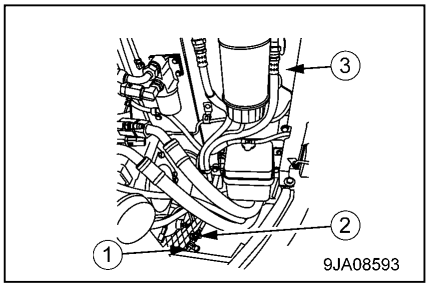
1. Open the pump room door on the machine right side.

2. Set a container to catch the drain water under drain hose (1).

3. Open fuel drain valve (2) at the rear of fuel tank (3) and drain the water and sediment accumulated at the bottom of the tank.

4. When only clean fuel comes out, close drain valve (2).

5. Close the pump room door on the machine right side.






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### [8] CHECKING ELECTRICAL WIRING

**⚠ CAUTION**

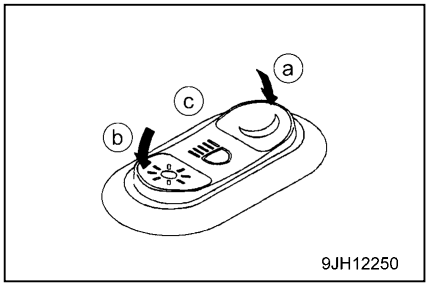
- **If fuses are frequently blown or if there are traces of short-circuiting on the electrical wiring, promptly ask us or our sales service agency to locate the cause and make the repair.**
- **Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clear the breather hole.**

Check that there is no damage to the fuses; that fuses of the specified capacity are used; that there is no disconnection or trace of short-circuiting in the electrical wiring and no damage to the covering. Check also that there are no loosened terminals. If any, tighten them.
Moreover, pay particular attention to the electrical wiring when checking the battery, engine starter and alternator.
Be sure to check that there is no inflammable material accumulated around the battery. If any is found, remove immediately.

### [9] CHECKING WORKING LAMP

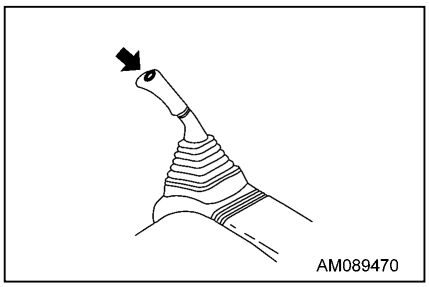
Check that the working lamps and lamps inside the instruments light up properly. Check also that there is no dirt or immediately clean.
If any lamp does not light up, the bulb is probably blown up or there is a disconnection, so ask us or our sales service agency.

1. Turn starter switch to the ON position.
2. Turn the lamp switch ON (night mode (a), and day mode (b)) and check that the working lamp lights up.




### [10] CHECKING FUNCTION OF HORN

1. Turn starter switch to the ON position.
2. Confirm that the horn sounds immediately when the horn button is pressed.
   If the horn does not sound, contact us or our sales service agency.






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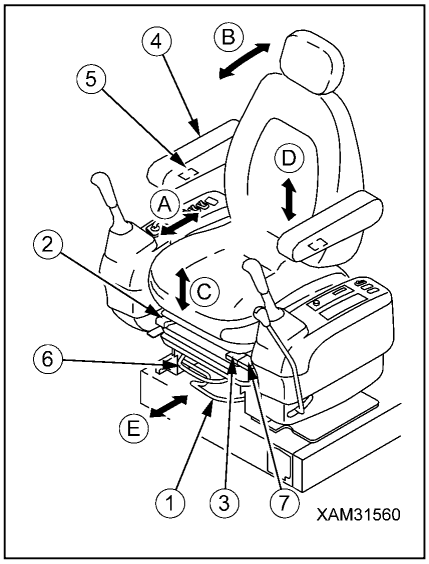
## [11] ADJUSTING OPERATOR'S SEAT

**⚠ WARNING**

- **Adjust the operator's seat position before starting operations or after changing the operator.**
- **Adjust the operator's seat so that the control levers, acelerator pedal, and switches can be operated freely and easily with the operator back against the backrest.**
- **Be sure to stop the engine before adjusting the operator's seat position.**

### [A] Adjusting Fore-and –aft

Pull up lever (1). After the seat is set to the desired position, release the lever (1).




### [B] Adjusting Reclining

**NOTES**

The seat can be reclined more when the seat is pushed to the front. The amount of reclining decreases as the seat is pushed back, so when moving the seat back, return the seat back to the upright position.

Pull up lever (2) and set the backrest to a position that is comfortable for operation, then release the lever.
Sit with your back against the seat backrest when adjusting. If your back is not against the backrest, the backrest may suddenly move forward.

### [C] Adjusting Seat tilting

- Tilt for knee angle (4 steps adjustment)
  Push the lever (3) down so that the seat knee angle is adjusted.
  - To raise the knee angle of the seat, put your weight backward while keeping the lever (3) pushed.
  - To lower the knee angle of the seat, put your weight forward while keeping the lever (3) pushed.
- Tilt for hip angle (4 steps adjustment)
  Pull the lever (7) up so that the seat hip angle is adjusted.
  - To raise the hip angle of the seat, raise your hip a little while keeping the lever (7) pulled.
  - To lower the hip angle of the seat, put your weight backward while keeping the lever (7) pulled.

  Seat tilting adjustment angle: 13 degrees raised/lowered
- Seat height adjustment
  Using knee angle tilt and hip angle tilt at the same time, the seat is adjustable to higher or lower, as well. First set the knee angle or hip angle to obtain the desire height then adjust the opposite side to fix the seat level.
  Seat height adjustment extent: 60mm



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**[D] Adjusting Armrest Angle**

Armrest (4) can be made to spring up by hand approx. 90 degrees. In addition, by turning the dial (5) at bottom of armrest by hand it is possible to make fine vertical adjustment of the armrest angle.

★ Armrest adjusting angle: 25 degrees

**NOTES**

If the seat back is tipped to the front without raising the armrest (4), the armrest will rise automatically.

**[E] Adjusting Overall Fore-and-aft Adjustment of seat**

Pull up lever (6). After the seat is set to the desired position, release the lever (6).

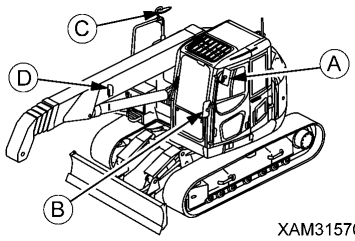
In this case, the operator's seat, left and right control levers, and lock lever all slide together.

★ Amount of adjusting: 120 mm (12 stages)

**[12] ADJUSTING MIRRORS**

**⚠ WARNING**

**Always adjust mirrors before starting operations. When mirrors are improperly adjusted, correct view is not secured, which may result damage to the machine, or even a serious injury.**

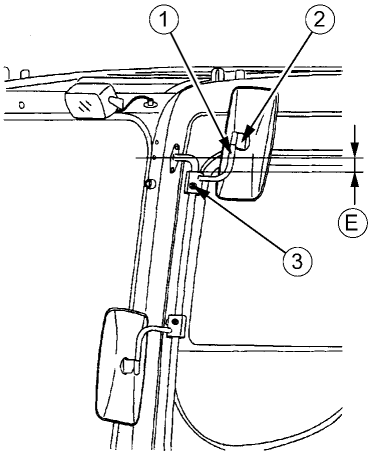


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**[Mirror (A)]**

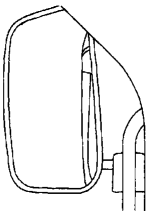
Position of this mirror should be adjusted so that a person standing in the left-rear end of the machine is visible.

- Fix the mirror as shown in the figure in the right.
  ★ Dimension (E): 42.5 mm
- Fix the mirror stay (1) to allow that the mirror position extend fully.
- When fine adjustment of the mirror is not easy, loosen the bolt (2) for the mirror or bolt (3) for stay mount for easy movement.
  ★ Tightening torque of bolt (2): 15.7 - 19.6 Nm (1.6 – 2.0 kgfm)



9JA08791

- Adjust the mirror angle so that the side of the machine body is reflected, as shown in the figure right.


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**[Mirror (B)]**

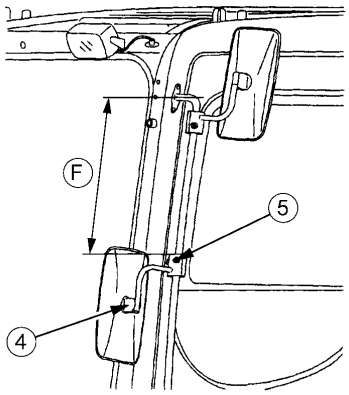
Position of this mirror should be adjusted so that a person standing in the right-front end of the machine is visible.

• Fix the mirror as shown in the figure in the right.

★ Dimension (F): 454 mm

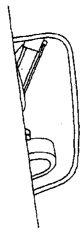
• When fine adjustment of the mirror is not easy, loosen the bolt (4) for the mirror or bolt (5) for stay mount for easy movement.

★ Tightening torque of bolt (4): 15.7 - 19.6 Nm (1.6 – 2.0 kgfm)



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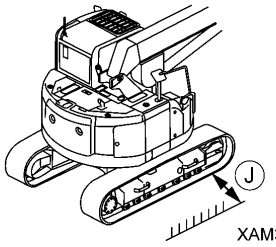
• Adjust the mirror angle so that the right-front part of the machine body is reflected, as shown in the figure right.


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**[Mirror (C)]**

Position of this mirror should be adjusted so that a person in one meter around the machine is visible from the operator's compartment.

★ Dimension (J): 1 m



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• Fix the mirror as shown in the figure in the right.

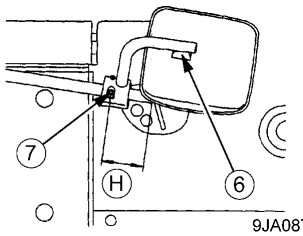
★ Dimension (H): 95.0 mm

★ Angle (K): 45 degrees

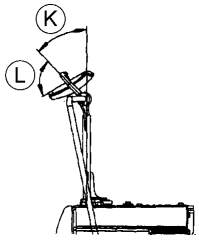
★ Angle (L): 75 degrees

• When fine adjustment of the mirror is not easy, loosen the bolt (6) for the mirror or bolt (7) for stay mount for easy movement.

★ Tightening torque of bolt (6): 15.7 - 19.6 Nm (1.6 – 2.0 kgfm)



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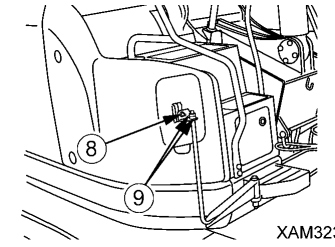
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**[Mirror (D)]**

Position of this mirror should be adjusted so that a person standing in the right side of the machine is visible.

- Fix the mirror as shown in the figure in the right.
- When fine adjustment of the mirror is not easy, loosen the bolt (8) for the mirror or bolt (9) for stay mount for easy movement.



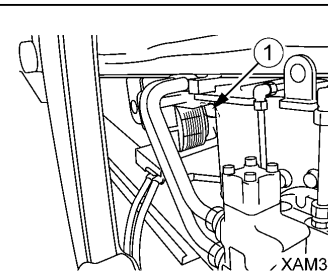

**[13] ADJUSTING WINCH CHECK MIRROR**

**⚠ CAUTION**

**Always adjust this mirror before starting operations. When the mirror is improperly adjusted, any irregular winding of the wire ropes may be overlooked. At the result, the wire ropes may be damaged. In addition, the hoisted load may shake and make a jerking movement, which results in death or serious injury.**

Position of this mirror (1) should be adjusted so that the winch drum is clearly seen.

- When fine adjustment of the mirror is not easy, loosen the bolt of the mirror for easy movement

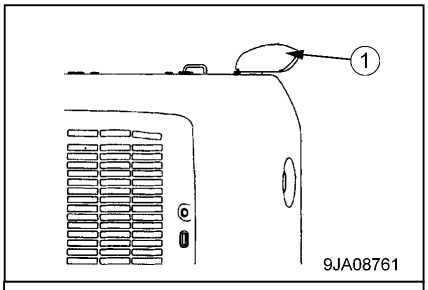




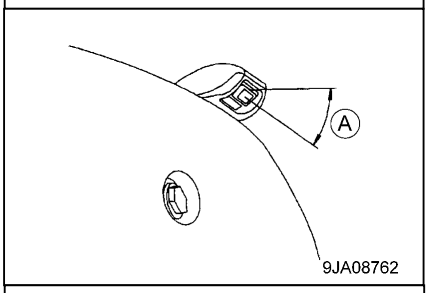

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## [14] ADJUSTING ANGLE OF REAR VIEW CAMERA

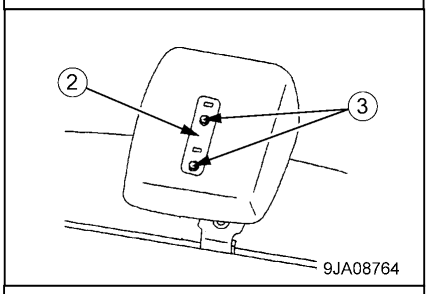
If the image on the monitor is not aligned correctly, remove cover (1) and adjust the mounting angle (A) of the rear view camera.




Amount of adjustment of angle (A): Within a range of 35 to 80 degrees



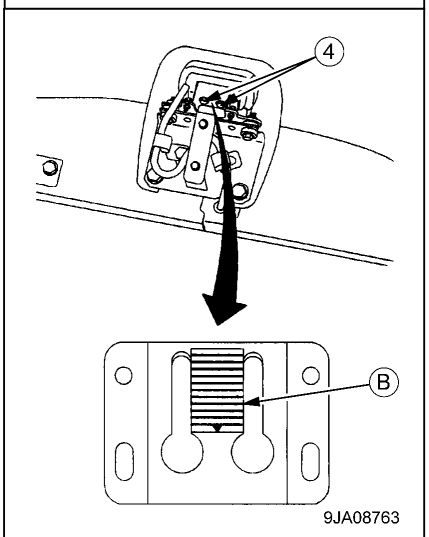

1. When removing cover (1), insert a flat-headed screwdriver into the hole of cover (2), push the tooth on the inside, and remove the cover.




2. Remove 2 bolts (3).

3. Remove cover (1).

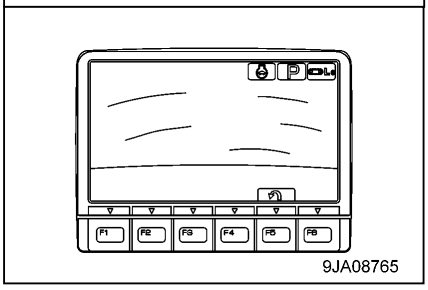
4. Loosen mounting bolt (4) of the camera and adjust mounting angle (A) of the camera so that the center line of mounting bolt (4) is aligned with fourth-from-bottom scale (B).




| NOTES |
| --- |
| Part of the machine is shown on the monitor screen. |

5. After adjusting, tighten bolt (4)
   ★ Tightening torque: 3 - 5 Nm (0.3 – 0.5 kgf•m)

6. Install covers (1) and (2).






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### 3.1.3 CHECKING AFTER STARTING ENGINE

Check the followings in this section after starting the engine and before starting the first work every day.

**CAUTION**

**The checkups described in this section should be carried out after starting the machine. Refer to "Operation 3.2 Operation and Checks After Starting Engine" and later to execute the engine startup, traveling operations, and crane operations.**

#### [1] CHECKING OF ENGINE START ABILITY AND NOISE

When starting the engine, check that the engine causes no abnormal noise and that it starts up easily and smoothly.

Check also that there is no abnormal noise when the engine is idling or when the revolution rises slightly.

- When there is an abnormal noise at the engine startup and if that condition continues, the engine may be damaged. In that case, ask us or our sales service agency to check the engine as soon as possible.

#### [2] CHECKING OF ENGINE ACCELERATION AND DECELERATION

When stopping the machine during the operation, check that there is no irregular engine speed or that the engine does not stop suddenly.

Check also that the engine speed rises smoothly when the fuel control dial is turned to the full (MAX).

- Carry out their checks in a safe place, watching out for danger in the surroundings.
- When the engine performs very badly at low idling or acceleration and if that condition continues, the engine may be damaged or it may be confused by the operator’s style of driving or lower the braking efficiency, and as a result lead to an unexpected accident. In that case, ask us or our sales service agency to check the engine as soon as possible.

#### [3] CHECKING ENGINE EXHAUST GAS COLOR, NOISE AND VIBRATION

Keep the engine idling and continue the operation with no load for about 5 minutes.

Verify that the engine exhaust gas color is either transparent or slightly blue. Also, check for abnormal noises and vibrations. If there is any abnormality, repair.



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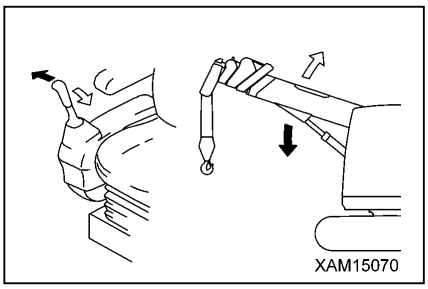
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## [4] CHECKING CRANE OPERATIONS

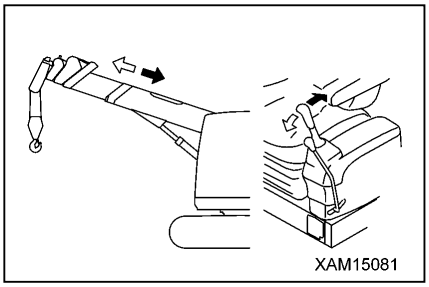
**⚠ WARNING**

**Be sure to refer to the Operation sections between "3.15 Cautions before Crane Operation" and "3.23 Crane Stowing Operation", and strictly observe the methods described and cautions given when checking crane operations.**

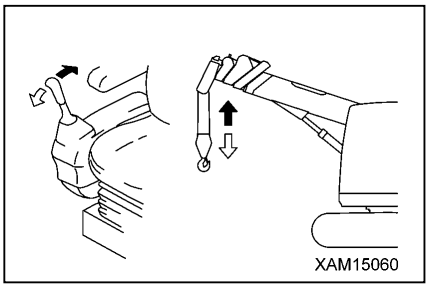
1. Verify that the boom rises smoothly when the right work equipment control lever is operated to "RAISE" side (pull toward you). Also, verify that the boom lowers smoothly when the right work equipment control lever is operated to "LOWER" side (push toward outside).
   When doing the above, check for any abnormal sound emitted by part of the boom or from the boom derrick cylinder.
   If there is any abnormality, repair.



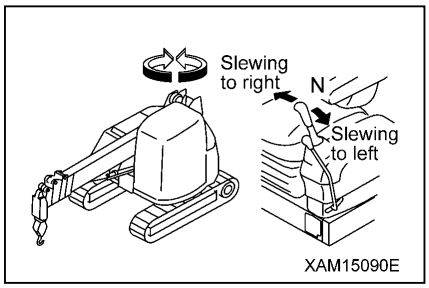

2. Verify that the boom extends smoothly when the left work equipment control lever is operated to "EXTEND" (push forward). Also, verify that the boom retracts smoothly when the left work equipment control lever is operated to "RETRACT" (pull backward).
   When doing the above, check for any abnormal sound emitted by part of the boom or from the boom telescoping cylinder.
   If there is any abnormality, repair.




3. Verify that the hook is wound down smoothly when the right work equipment control lever is operated to "DOWN" (push forward). Also, verify that the hook is wound up smoothly when the right work equipment control lever is operated to "UP" side (pull backward).
   When doing the above, check for any abnormal sound emitted by part of the boom or from the winch motor.
   If there is any abnormality, repair.




4. Verify that the crane smoothly slews counterclockwise when the left work equipment control lever is operated to "LEFT" side (push toward outside). Also, verify that the crane smoothly slews clockwise when the left work equipment control lever is operated to "RIGHT" side (pull toward you).
   When doing the above, check for any abnormal sound emitted nearby the slewing post.
   If there is any abnormality, repair.



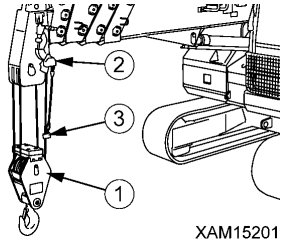



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### [5] CHECKING OVER HOIST DETECTOR FOR OPERATION

Over hoist the hook block (1), and raise the hook with winch and extend the boom, and verify that the buzzer sounds intermittently, the hook raising operation and boom extending operation stop.
If these events do not happen, the over hoist detector (2) may be faulty.
If the alarm does not stop, the over hoist detector (2) may be faulty or the circuit may be open.
Ask us or our sales service agency for repair.



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### [6] CHECKING MOMENT LIMITER FOR OPERATION

**⚠ WARNING**

**If you find any abnormality with the moment limiter, immediately contact us or our sales service agency.**

1. Turn the starter switch to the ON position.
2. Check the working status lamp. All 3 colors light for approximately 3 seconds first, then only the green light keeps lighting.
3. Check the moment limiter display unit.
   Verify that no error code is displayed at the “RATED TOTAL LOAD” display on the display panel.
4. Start the engine and operate the crane as follows to verify if the moment limiter properly displays the value.

| Crane Operation and Displayed Parameter | Value Displayed on Moment Limiter |
|---|---|
| Displayed “boom length” with the boom length at minimum | 4.7 m |
| Displayed “boom length” with the boom length at maximum | 16.3 m |
| Displayed “working radius” with the boom length of “4.7 m” and boom angle of “50 degrees “ | 3.0 ± 0.1 m |

5. Prepare a standard weight of known actual mass. Hoist it to ensure that the displayed "real load" value is the identical to the total masses of the standard weight and the sling instrument. Take note, however, that slight error may appear due to a certain condition of the boom.
6. Operate the crane until the moment limiter display values indicate the boom length is "4.7 m" (4.7 m boom) and boom angle is "50 degrees", and then measure the "boom angle" and "working radius.
   If the measured value(s) differ from the moment limiter display value, contact us or our sales service agency.



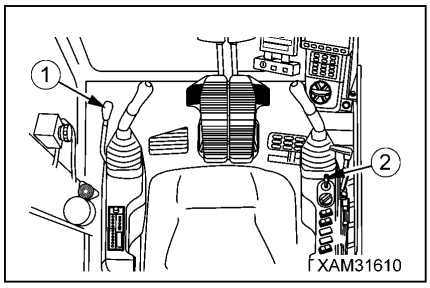
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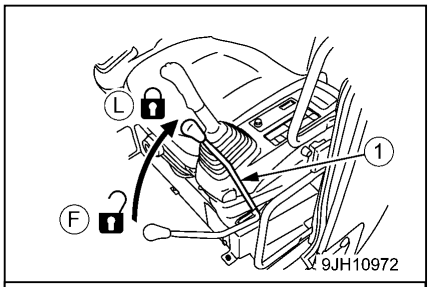
## 3.2 OPERATIONS BEFORE STARTING ENGINE

**⚠ WARNING**

**When starting the engine, check that the lock lever is securely at the LOCK position.**
**If the lock lever is not locked securely and the control levers or control pedals are touched when the engine is started, the machine may move unexpectedly, and this may lead to serious personal injury.**

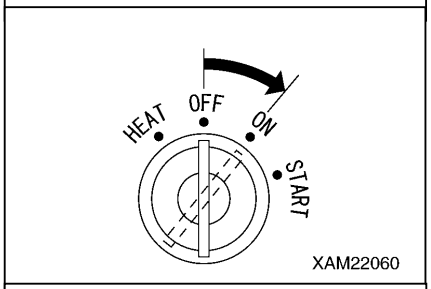



1. Check that lock lever (1) is at the LOCK position (L).

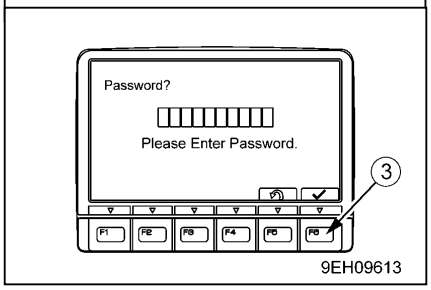



2. Check that each control lever and pedal is at the Neutral position.
   If the control levers and pedals are not being touched, they will be at the Neutral position.

3. Insert the key in starter switch (2), turn the key to the ON position, and then carry out the following checks.




• If a password has been set, the input display screen will be displayed on the monitor screen.
  After inputting the password, press Enter switch F6 (3).




**NOTES**

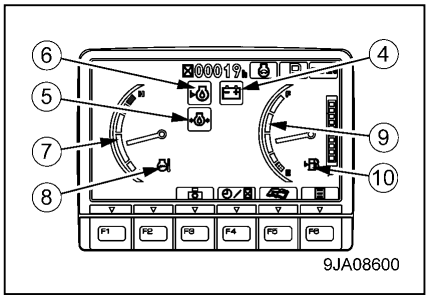
For details of the method of setting, changing, or canceling the password, see separate “PROCEDURE FOR SETTING, CHANGING OR CANCELING PASSWORD”.



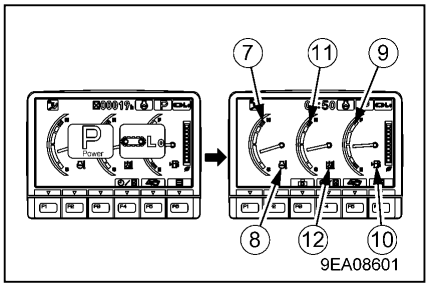
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(1) The buzzer sounds for approx. 2 seconds, and then the monitor or meter lights up for approx. 2 seconds.
- Charging level monitor (4)
- Engine oil pressure monitor (5)
- Engine oil level monitor (6)
- Engine oil temperature gauge (7)

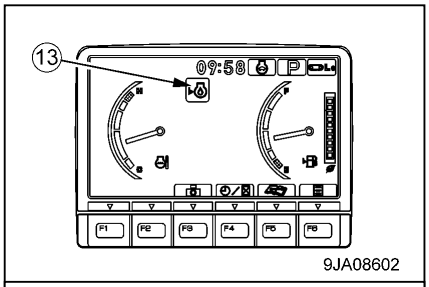
If any monitor does not light up or buzzer does not sound, there is probably a failure in the monitor, so please contact us or our sales service agency.




(2) After approx. 2 seconds, the screen will change to the working mode/travel speed display monitor. Next, it will switch to the standard screen.
- Engine oil temperature gauge (7)
- Engine oil temperature monitor (8)
- Fuel gauge (9)
- Fuel level monitor (10)
- Hydraulic oil temperature gauge (11)
- Hydraulic oil temperature monitor (12)

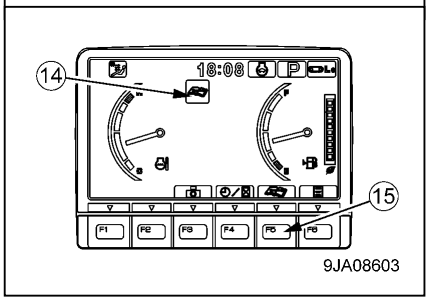



(3) If the hydraulic oil temperature gauge is out or caution lamp (13) stays lit up red, immediately check the item that lights up red.




(4) If the maintenance interval has passed, maintenance interval monitor (14) lights up for 30 seconds. Press maintenance switch F5 (15), check the item, and carry out maintenance immediately.

For details of the method of checking the maintenance interval, see “Operation 2.1.7 Handling Function Switches [3] Maintenance Mode Selector Switch” in the explanation for each component.






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## 3.3 STARTING ENGINE

**⚠ DANGER**

**Never refuel (diesel oil) while the engine is in operation.**
**Always stop the engine when refueling.**

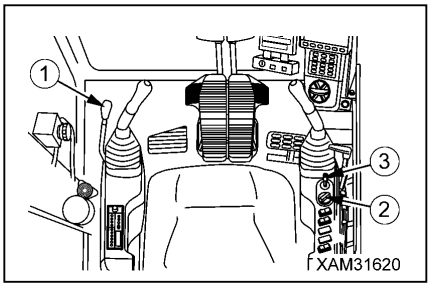
### 3.3.1 NORMAL STARTING ENGINE

**⚠ WARNING**

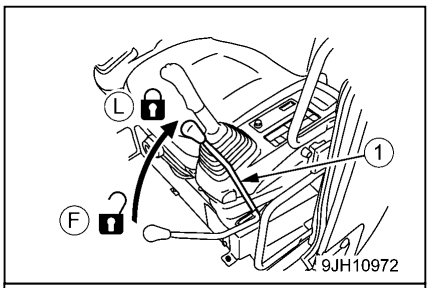
- **Sit down in the operator's seat before starting the engine.**
- **Do not attempt to start the engine by short-circulating the engine starting circuit. Such an act may cause serious bodily injury or fire.**
- **Check that there are no persons or obstacless in the surrounding area, and then sound the horn and start the engine.**
- **Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.**

**CAUTION**

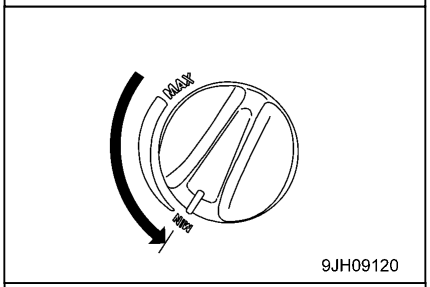
- **If it is hard to start the engine due to low ambient temperature, see "Operation 3.3.2 Starting in cold weather" for the engine starting operation.**
- **Do not try to start the engine with the fuel control dial set near the full engine rotation. Otherwise the engine parts may be damaged.**
- **Do not keep the starter motor rotating continuously for more than 20 seconds. If the engine will not start, wait for least 2 minutes before trying to start the engine again.**



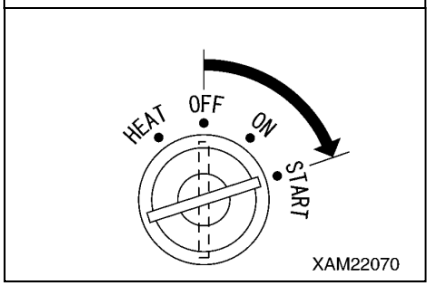

1. Check the lock lever (1) is in the LOCK position (L). If the lock lever is in the FREE position (F), the engine does not start.




2. Set the fuel control dial (2) at the low idle position MIN.




3. Turn the key in the starter switch (3) to START position. The engine starts.



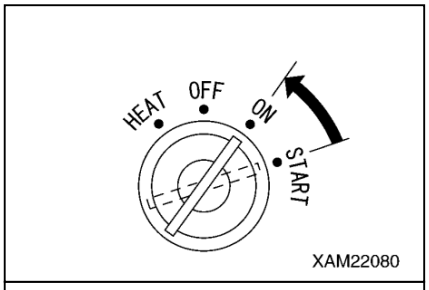



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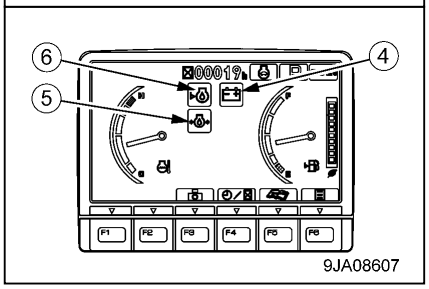
4. When the engine starts, release the key in starter switch (3). The key will automatically return to ON position.

5. Keep the engine idle for the initial 15 seconds right after it has been started, and do not operate any control lever or the fuel control dial during that time.

6. Check that the battery charge monitor (4), engine oil pressure monitor (5), and engine oil level monitor (6) are OFF.



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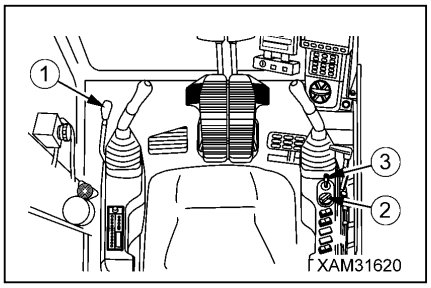
### 3.3.2 STARTING ENGINE IN COLD WEATHER

**⚠ WARNING**

- **Sit down in the operator's seat before starting the engine.**
- **Do not attempt to start the engine by short-circulating the engine starting circuit. Such an act may cause serious bodily injury or fire.**
- **Check that there are no persons or obstacless in the surrounding area, and then sound the horn and start the engine.**
- **Never use starting aid fluids as they may cause explosions.**
- **Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.**

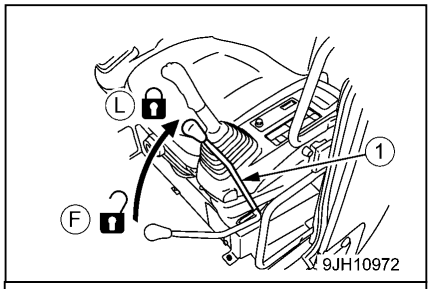
**CAUTION**

- **Do not try to start the engine with the fuel control dial set near the full engine rotation.**
  **Otherwise the engine parts may be damaged.**
- **Do not keep the starter motor rotating continuously for more than 20 seconds. If the engine fails to start, wait for about 2 minutes and repeat from Step 4.**



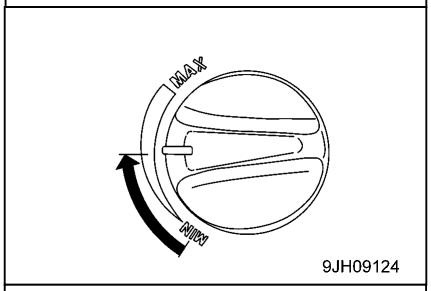

When starting engine in low temperatures, do as follows.

1. Check the lock lever (1) is in the LOCK position (L). If the lock lever is in the FREE position (F), the engine does not start.

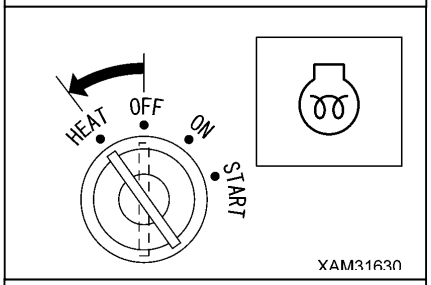


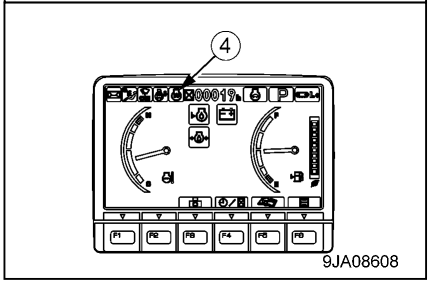

2. Before starting the engine, check that fuel control dial (2) is at the low position MIN.

3. Turn fuel control dial (2) to the center position between LOW IDLING and HIGH IDLE.




4. Hold the key in starter switch (3) at HEAT position and check that preheating monitor (4) lights up.
   After approx. 30 seconds, preheating monitor (4) will flash for 10 seconds to inform the operator that the preheating has been completed.
   The key will automatically return to ON position.

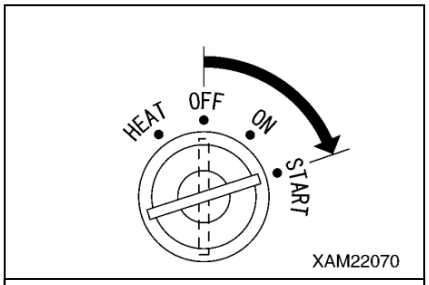


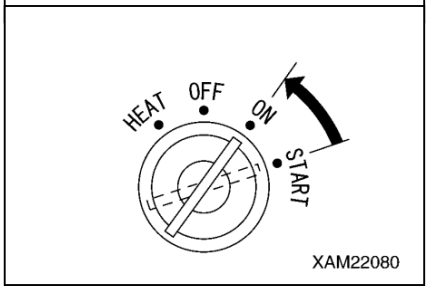



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5. When engine preheating monitor (4) goes OFF, turn the key in starter switch (3) to the START position to start the engine.

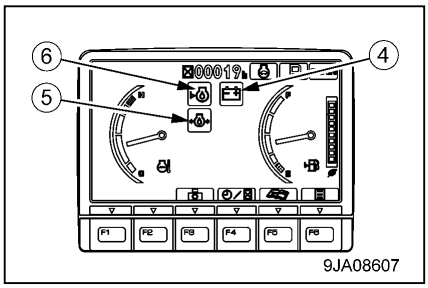



6. When the engine starts, release the key in starter switch (3). The key will automatically return to ON position.




7. Keep the engine idle for the initial 15 seconds right after it has been started, and do not operate any control lever or the fuel control dial during that time.

8. Check that the battery charge monitor (4), engine oil pressure monitor (5), and engine oil level monitor (6) are OFF.




**[Turbocharger Protect Function]**

The turbocharger protect function is a function to protect the turbocharger by keeping the engine speed at less than 1100 rpm immediately after the engine is started.

- When the turbocharger protect function is actuated, the engine speed is held at less than 1100 rpm, regardless of the position of the fuel control dial.
- When the turbocharger protect function is actuated, the engine speed is held at less than 1100 rpm, even if the fuel control dial is operated.
- When the turbocharger protect function is canceled, the engine speed is set to the speed for the position of the fuel control dial.
- The relationship between the length of time of actuating the turbocharger protect function and the temperature of the engine coolant is as shown in the table.

| Coolant temperature | Turbocharger protect time (sec.) |
|---|---|
| Above 10 degrees C | 0 |
| 10 to -30 degrees C | Change 0 to 20 |
| Below -30 degrees C | 20 |



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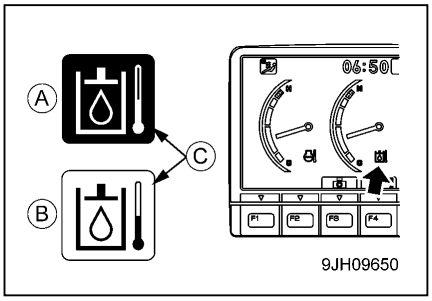
## 3.4 OPERATIONS AFTER STARTING ENGINE

**⚠ DANGER**

**Never refuel (diesel oil) while the engine is in operation.**
**Always stop the engine when refueling.**

**⚠ WARNING**

- **To stop the engine in emergencies or when the actuation of the engine is abnormal or there is any other trouble, turn the key in the starter switch to the OFF position.**
- **Do not carry out operations or operate the control levers or pedals suddenly while the hydraulic oil is at low temperature. Always carry out the warm-up operation for the hydraulic equipment until the hydraulic oil temperature monitor displays the correct temperature.**
  **When the hydraulic oil temperature is low, the low temperature displays the shown on the right is given.**
  - **(A) Display when temperature is correct: Monitor background (C) is blue.**
  - **(B) Display when temperature is low: Monitor background (C) is white.**
- **If the warm-up operation for the hydraulic equipment is not carried out thoroughly, and the machine is moved, the reaction of the control levers and pedals will be slow and the movement may not be what the operator intended. Always warm-up the hydraulic equipment. In particular, in cold areas, always warm-up the hydraulic equipment thoroughly.**




There are two types of warm-up operation: warm up the engine and warm up the hydraulic equipment. In addition, depending on the environment, the method of carrying out the warm-up operation may differ, so carry out the warm-up operation according to the items given in the appropriate section.
When only engine is warmed up, the hydraulic equipment is not warmed up, so always carry out the warm-up operation for the hydraulic equipment separately from the warm-up operation for the engine. Warm up the hydraulic equipment thoroughly ensures that the hydraulic oil is warmed up and that warm hydraulic oil circulates in all the control circuit.

### 3.4.1 ENGINE WARM-UP

**CAUTION**

- **Do not accelerate the engine suddenly until the warm-up operation has completed.**
- **Do not run the engine at low idling or high idling under no load for more than 20 minutes. This will have an adverse effect on the environment, and will also have an adverse effect on the internal structure of the engine. If it is necessary to run the engine at idling for more than 20 minutes, apply a load from time to time or run a mid-range speed.**

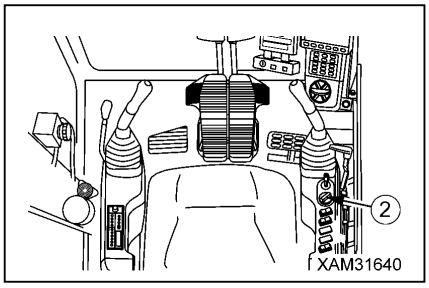
**NOTES**

This machine is equipped with an automatic engine warm-up system, so if the engine water temperatureis below 30 degrees C after the engine is started, the engine warm-up operation starts automatically. When the engine automatic warm-up operation starts, the engine speed is maintained at a speed higher than the normal low idling speed.
If the engine water temperature goes above 30 degrees C or if the warm-up operation has been continued for more than 10 minutes, the automatic warm-up operation is cancelled and the engine speed drops to the normal low idling speed.

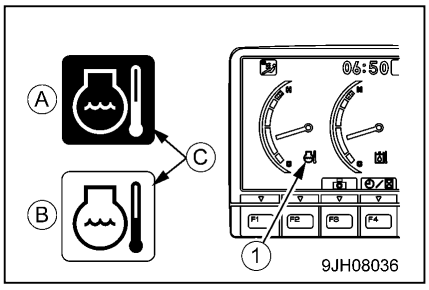


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After the engine starts, do not start operating the machine immediately. First, carry out the following operations and checks.

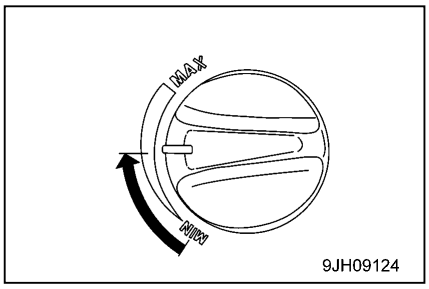



1. Wait until the automatic warm-up operation is cancelled.
   If the engine water temperature goes above 30 degrees C or if the warm-up operation has been continued for more than 10 minutes, the automatic warm-up operation is cancelled and the engine speed drops to the normal low idling speed.




2. Check that the engine coolant temperature monitor (1) displays the correct temperature.
   - (A) Display when temperature is correct: Monitor background (C) is blue.
   - (B) Display when temperature is low: Monitor background (C) is white.

   If it displays low temperature, use the procedure in Step 3 to carry out additional warm up of the engine until the monitor displays the correct temperature.

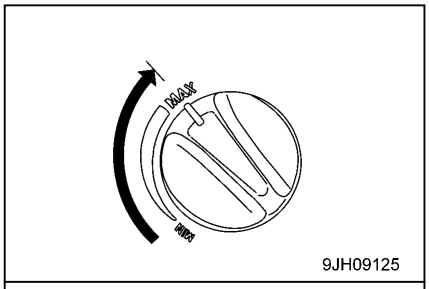



3. Turn fuel control dial (2) to a point midway between low idling (MIN) and full speed (MAX), run the engine under no load at a mid-range speed until engine coolant temperature monitor (1) displays the correct temperature.
   - (A) Display when temperature is correct: Monitor background (C) is blue.
   - (B) Display when temperature is low: Monitor background (C) is white.

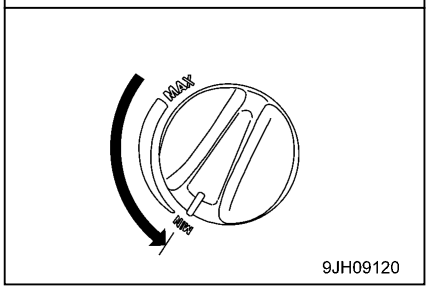
   If the engine coolant temperature monitor displays the correct temperature, the engine warm-up operation is completed.
   After checking that the engine coolant temperature monitor displays the correct temperature, carry out the warm-up operation for the hydraulic equipment.

**[CANCELLING AUTOMATIC WARM-UP OPERATION]**

If it becomes necessary in an emergency to cancel the automatic warm-up operation or to lower the engine speed to low idle, do as follows.




(1) Turn fuel control dial (2) to the full speed (MAX) position and hold it for 3 seconds.




(2) When fuel control dial (2) is returned to the low idle (MIN) position, the engine speed will drop.



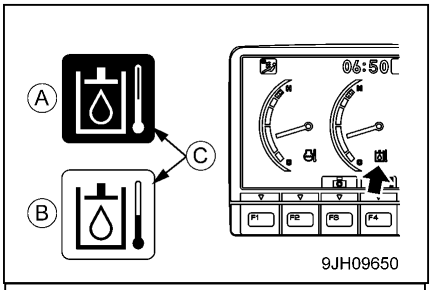
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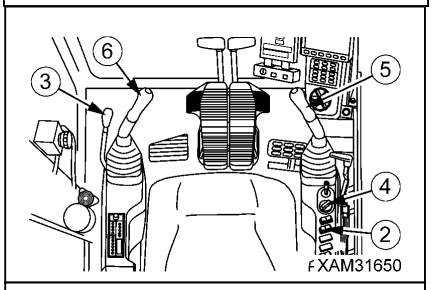
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### 3.4.2 HYDRAULIC EQUIPMENT WARM-UP

**⚠ WARNING**

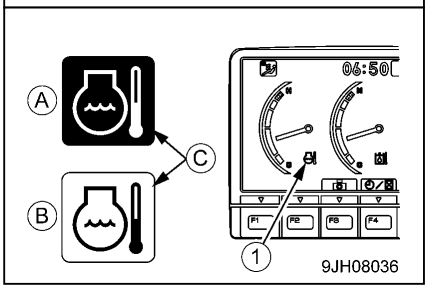
- Before carrying out the warming-up operation for the hydraulic equipment, turn the swing lock switch ON, check on the monitor that the swing lock is actuated, then start the warming-up operation.
- When warming up the hydraulic equipment, check that there is no person or obstacle in the surrounding area, then sound the horn and start the operation.
- Carry out the warming-up operation for the hydraulic equipment until the hydraulic oil temperature monitor displays the correct temperature.
  (When the hydraulic oil temperature is low, the low temperature display shown in the diagram on the right is given.
  - (A) Display when temperature is correct: Monitor background (C) is blue
  - (B) Display when temperature is low: Monitor background (C) is white)
- The warming-up operation for the hydraulic equipment is necessary not only for the circuit between the pump and cylinders and between the pump and motor, but also for the control circuits. Do not carry out the operation just for one cylinder or motor, or the operation just in one direction. Carry out the operation in all directions for all the crane, swing and swing.



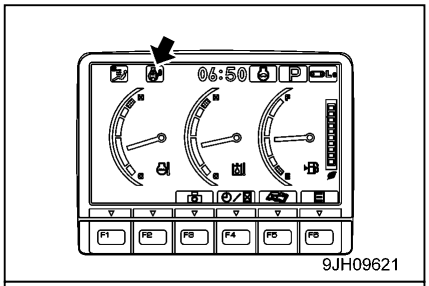




1. Check that the engine coolant temperature monitor (1) displays the correct temperature.
   - (A) Display when temperature is correct: Monitor background (C) is blue.
   - (B) Display when temperature is low: Monitor background (C) is white.

   If it displays low temperature, carry out additional warm up of the engine until engine coolant temperature monitor (1) displays the correct temperature.

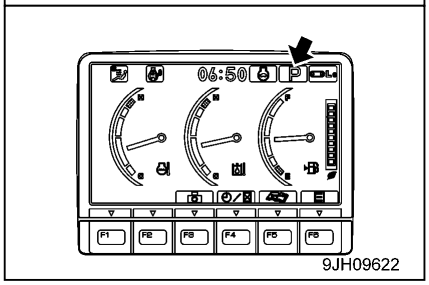



2. Turn swing lock switch (2) ON and check that the swing lock monitor lights up.




3. To complete the warm-up operation of the hydraulic equipment more quickly, set the working mode to P mode (heavy-duty mode).

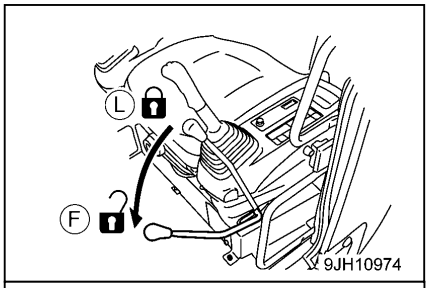
   For details of the procedure for setting the working mode, see (Operation 2.1.6 Monitor Display Switches [1] Working Mode selector Switch".





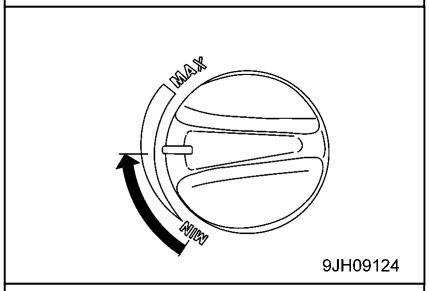

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4. Set lock lever (3) slowly to the FREE position (F).

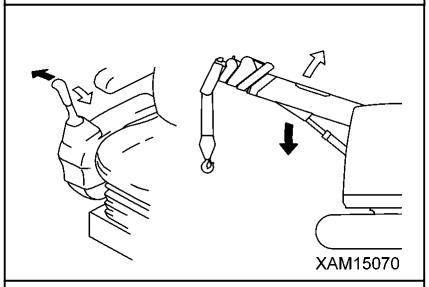



5. For details of the before starting operation of the crane, see “Operation 3.16 Operation of Before Crane Operations” and “Operation 3.17 Crane Operation Posture”.

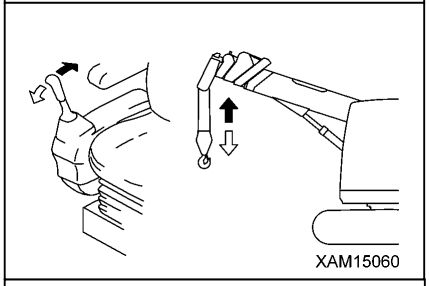
6. Turn fuel control dial ‘4) to a point midway between low idling (MIN) and full speed (MAX).



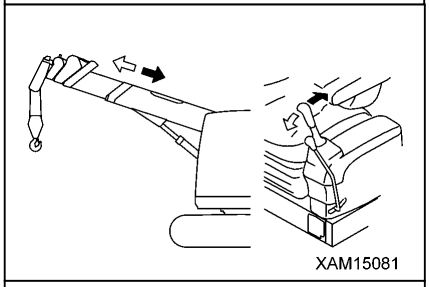

7. Operate right work equipment control lever (5) slowly to LOWER side (push toward outside). Operate the lever to the stroke end and hold it in position for 30 seconds.
   During that task, operate the right work equipment control lever (5) to HOOK RAISING (pull backward) position and raise the hook adequately so that it does not touch the ground.



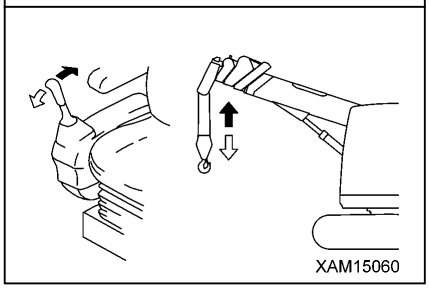

8. Operate right work equipment control lever (5) slowly to RAISE side (pull toward you). Operate the lever to the stroke end and hold it in position for 30 seconds.
   During that task, operate the Right work equipment control lever (5) to HOOK LOWERING (push forward) position and lower the hook adequately to avoid over-winding condition.




9. Operate left work equipment control lever (6) slowly to EXTEND side (push forward). Operate the lever to the stroke end and hold it in position for 30 seconds.
   During that task, operate the Right work equipment control lever (5) to HOOK LOWERING (push forward) position and lower the hook adequately to avoid over-winding condition.




10. Operate left work equipment control lever (6) slowly to RETRACT side (pull backward). Operate the lever to the stroke end and hold it in position for 30 seconds.
    During that task, operate the Right work equipment control lever (5) to WINDING (pull backward) position and raise the hook adequately so that it does not touch the ground.



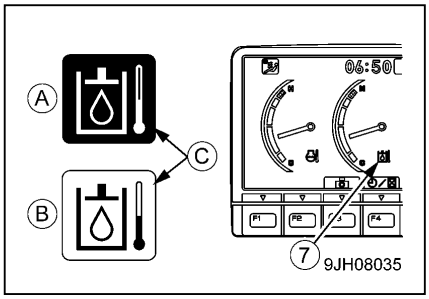

11. Repeat the operation in Steps 7 to 10 for 5 minutes.



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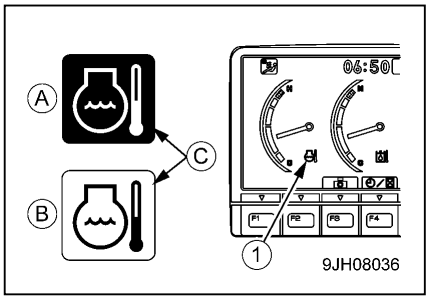
12. Check that hydraulic oil temperature monitor (7) is displaying the correct temperature.
    - (A) Display when temperature is correct: Monitor background (C) is blue.
    - (B) Display when temperature is low: Monitor background (C) is white.

    If the hydraulic temperature monitor is not displaying the correct temperature (it is displaying low temperature), repeat Steps 7 to 11 until the display is the correct temperature.

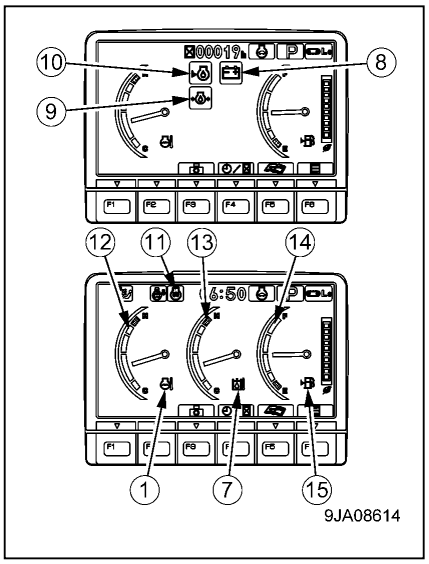



13. Check that engine coolant temperature monitor (1) displays the correct temperature.
    - (A) Display when temperature is correct: Monitor background (C) is blue.
    - (B) Display when temperature is low: Monitor background (C) is white.

    If it displays low temperature, carry out additional warm up of the engine until engine coolant temperature monitor (1) displays the correct temperature.




14. Check that the hydraulic oil temperature monitor and engine coolant temperature monitor are displaying the correct temperature, and then check that all the gauges and caution monitors on the machine monitor are in the following status.
    - Engine coolant temperature monitor (1): Displays correct temperature
    - Hydraulic oil temperature monitor (7): Displays correct temperature
    - Charge level monitor (8): OFF
    - Engine oil pressure monitor (9): OFF
    - Engine oil level monitor (10): OFF
    - Engine pre-heating monitor (11): OFF
    - Engine coolant temperature gauge (12): Indicator in green range
    - Hydraulic oil temperature gauge (13): Indicator in green range
    - Fuel gauge (14): Indicator in green range
    - Fuel level monitor (15): Displays appropriate level




15. Check for abnormal exhaust gas color, noise, or vibration. If any problem is found, contact us or our sales service agency.

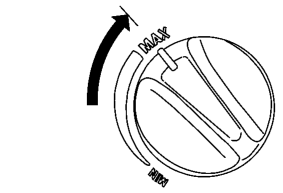
**CAUTION**

**In cold temperature (ambient temperature below 0 degrees C), even when the hydraulic oil temperature monitor displays the correct temperature, carry out additional Step 16 to warm up all the hydraulic equipment.**

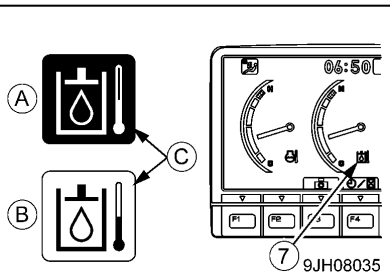


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16. Turn fuel control dial (4) to the full speed (MAX) position, repeat Steps 7 to 10 for 3 to 5 minutes, then check again that the hydraulic oil temperature monitor is displaying the correct temperature.
    If it is not displaying the correct temperature, repeat Steps 7 to 10 for 3 to 5 minutes until hydraulic oil temperature monitor (7) displays the correct temperature.
    - (A) Display when temperature is correct: Monitor background (C) is blue.
    - (B) Display when temperature is low: Monitor background (C) is white.



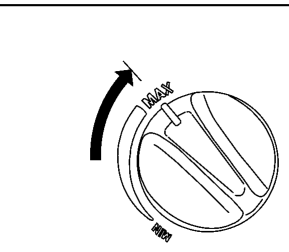
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For both normal temperatures and cold temperatures, carry out the following operation.

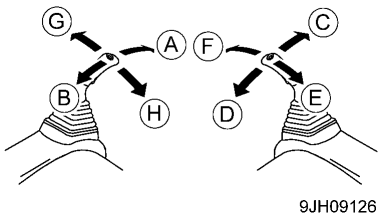
17. Check that fuel control dial (4) is at a point midway between low idling (MIN) and full speed (MAX).
    If it is not at the midway position, set it to the midway position and run the engine at a mid-range speed before operating.



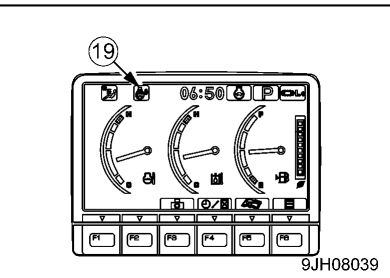
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18. Before starting operations, repeat the following operations slowly 3 to 5 times to circulate warm oil through the control circuits.
    - Boom derricking operation: RAISE (D) to/from LOWER (C)
    - Boom telescoping operation: EXTEND (A) to/from RETRACT (B)
    - Winch operation: RAISE (E) to/from LOWER (F)

    When carrying out swing operations, release swing lock switch (2), check that swing lock monitor (19) goes out, and then operate the swing.
    - Swing operation: Left (G) to/from Right (H)

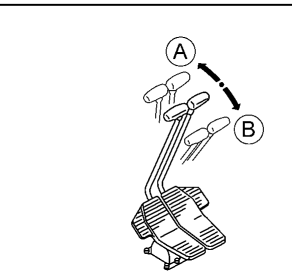


9JH09126



9JH08039

    - Travel (Lo) operation: FORWARD to/from REVERSE

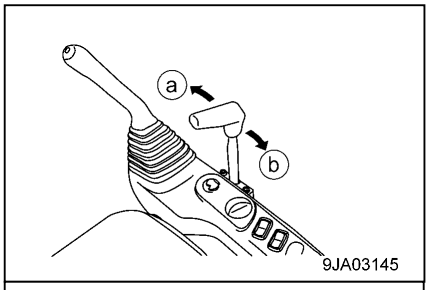


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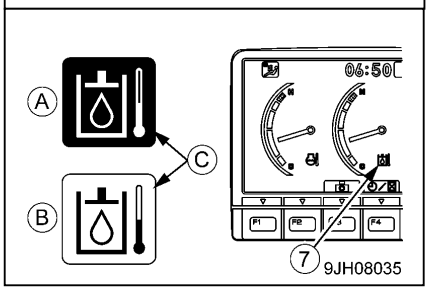


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• Blade operation: LOWER (a) to/from RAISE (b)




19. Check that hydraulic oil temperature monitor (7) is displaying the correct temperature.
    If the hydraulic oil temperature monitor is not displaying the correct temperature (it is displaying low temperature), repeat Steps 7 to 10 until the display is the correct temperature.
    • (A) Display when temperature is correct: Monitor background (C) is blue.
    • (B) Display when temperature is low: Monitor background (C) is white.




If the hydraulic oil temperature monitor displays the correct temperature, the hydraulic equipment warm-up operation is completed.
After confirming that the hydraulic oil temperature monitor displays the correct temperature, carry out the following procedure.

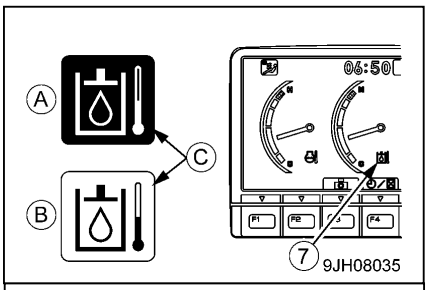


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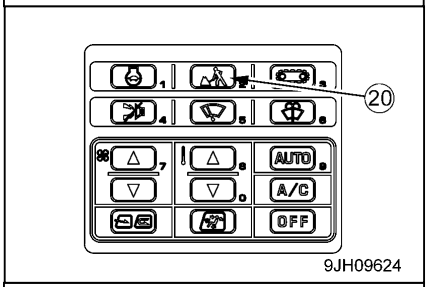
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### 3.4.3 OPERATION AFTER COMPLETION OF WARM-UP OPERATION

1. Check that hydraulic oil temperature monitor (7) displays the correct temperature.
   - (A) Display when temperature is correct: Monitor background (C) is blue.
   - (B) Display when temperature is low: Monitor background (C) is white.

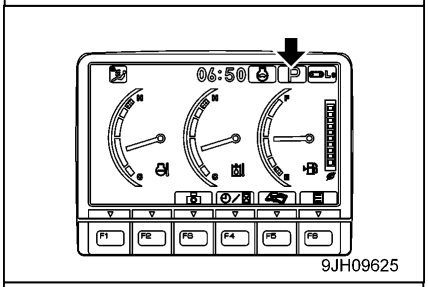



2. Push working mode selector switch (20) of the machine monitor to select the working mode to be used.
   For details of the procedure for selecting the working mode, see ”Operation 2.1.6 Monitor Switches [1] Working Mode Selector Switch”.

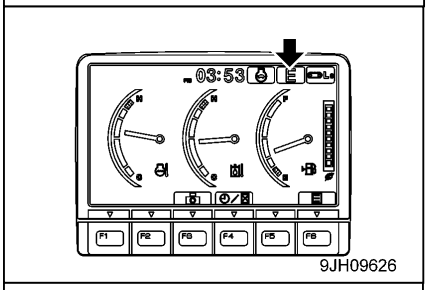



Working mode monitor display

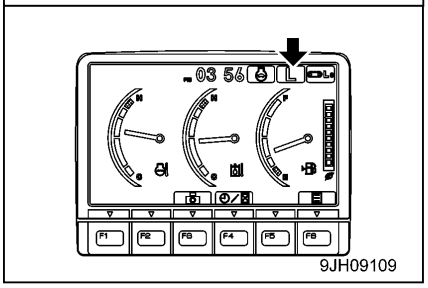
- P mode: For heavy-duty operations




- E mode: For operations with emphasis on fuel economy




- L mode: For operations requiring fine control




| NOTES |
| --- |
| Other operation modes, "B Mode" and "ATT mode", are not available in this machine. |



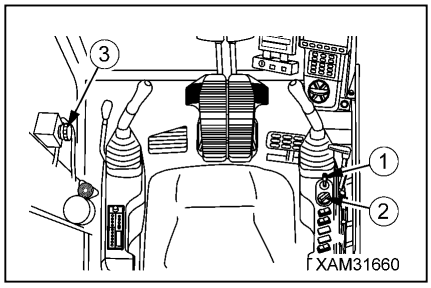
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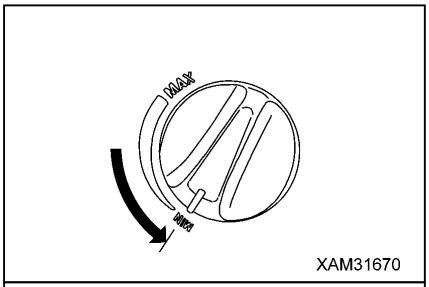
## 3.5 STOPPING ENGINE

**CAUTION**

- **If the engine is stopped abruptly, service life of component parts of the engine may be considerably reduced. Do not stop the engine abruptly except in an emergency.**
- **If the engine has overheated, do not try to stop it abruptly but run it at medium speed to allow it to cool down gradually, and then stop it.**

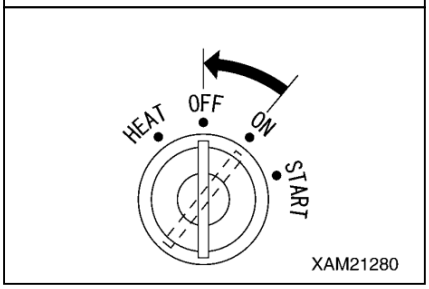



1. Turn fuel control dial (2) at the low idle position MIN, and run the engine at low idling for 5 minutes to cool down gradually.




2. Turn the key in starter switch (1) to the OFF position and stop the engine.

3. Remove the key from starter switch (1).



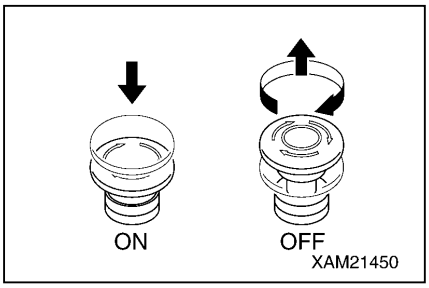

**[EMERGENCY STOP OPERATION FOR THE ENGINE]**

**⚠ WARNING**

**In an emergency where the working circumstances turns to an abnormal condition or the machine has any disorder, and it is required to stop the engine urgently, use this switch. It will stop the engine immediately.**

1. Press the engine emergency stop switch (3) and stop the engine.

2. To re-start the engine when the emergency condition is settled, turn the engine emergency switch (3) clockwise (as arrowed) or pull it's knob up.
   The engine emergency switch (3) is restored to it's position and engine starter is enabled.






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## 3.6 BREAKING-IN MACHINE

**⚠ CAUTION**

**Perform breaking-in for the period of about the first 100 hours (hours displayed on the service meter). The life of the machine shortens if overloaded operation or task is performed before the various sections of the machine are used to the operation. During the period of normal collaboration, do not allow overload servicing or operation, otherwise, it may affect the performance or life of the machine.**

While this machine is shipped after thorough adjustment and inspection, forcing the machine from the beginning will quickly degrade the functions of engine and crane, shortening their life.

Perform the breaking-in for the first “100 hours” (time displayed on the service meter).

Pay attention particularly to the following during the breaking-in period.

- Be sure to perform the engine and hydraulic equipment warm-up operation after the engine has started. See “Operation 3.4 Operations and Checks After Starting Engine”
- Idle the engine for 5 minutes after starting, then perform warm-up operation.
- Avoid overloaded operation or tasks with high-speed operation.
- Avoid sudden starting, sudden acceleration, unnecessary sudden stop or sudden steering



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## 3.7 MACHINE TRAVELING POSTURE

**⚠ WARNING**

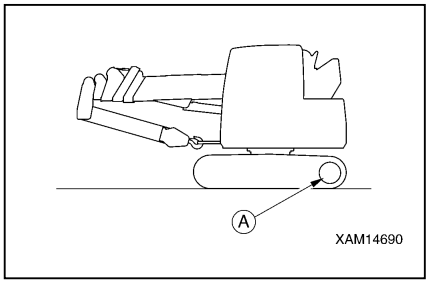
- **When moving this machine self-propelled, take the "traveling posture" with which the boom and hook block are stowed.**
- **Traveling or pick & carry with the boom extended is essentially prohibited. This will overturn the machine, causing serious injury accidents.**
- **Follow the local laws and regulations if driving the machine on public roads.**

Take the traveling posture shown on the right when moving the machine.

**[1] TRAVELING BEFORE AND AFTER THE OPERATION, OR FOR TRANSPORTATION:**

Keep the machine in the traveling posture as shown in the figure in the right, when travel to and from an operation site or a transportation depot.

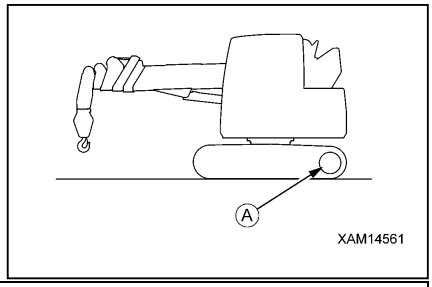
- Retract the boom fully.
- Lower the boom fully.
- Stow the hook block to it's designated stowage position (regular stowage position).
- Always direct the sprocket (A) backward.




**[2] TRAVELING IN THE COURSE OF OPERATIONS:**

Keep the machine in the traveling posture as shown in the figure on the right, when traveling in the course of operations.

- Retract the boom fully.
- Lower the boom fully.
- Stow the hook block to it's temporary stowage position below the boom tip.
- Always direct the sprocket (A) backward.




**NOTES**

For details of hook block stowing operation, see "Operation 3.23 Hook Block Stowing Operation".



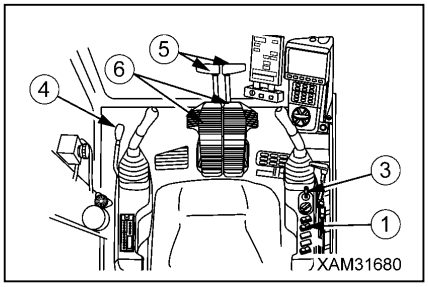
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## 3.8 STARTING/MOVING/STOPPING MACHINE

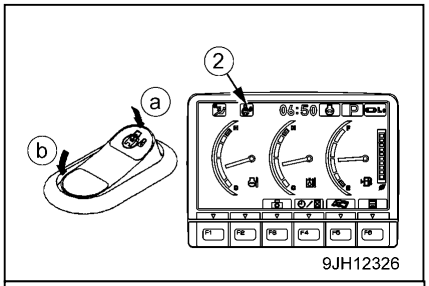
**⚠ WARNING**

- **Before operating the travel lever or travel pedal, check the direction that the track frame is facing. When the track frame is facing the rear (when the sprocket is at the front), the direction of operation of the travel lever and travel pedal is the opposite to the direction of movement of the machine (forward/reverse, left/right).**
- **Do not allow anyone to enter the area around the machine.**
- **Remove any obstacles from the travel path.**
- **Before starting the machine off, check that the area around the machine is safe, and sound the horn.**
- **The area at the rear of the machine is a blind spot. Always use the rear view camera to check the area at the rear of the machine before traveling in reverse.**
- **When the auto-deceleration is being used, if the travel lever or travel pedal are operated, the engine speed will suddenly rise, so be careful when operating the travel lever or travel pedal.**
- **The accelerator pedal should only be used to control the crane operation while the machine is stationed. During traveling operation, use of this pedal is strictly prohibited; otherwise it may cause an accident due to an operation error which may lead to serious personal injury. During traveling operation, always adjust the engine speed only by turning the fuel control dial.**
- **When traveling, check that the travel alarm sounds properly.**
- **During traveling, crane operation such as swinging or boom retraction is also available, however, always avoid such operations. For a crane operation such as swingiing, always stop traveling, beforehand.**

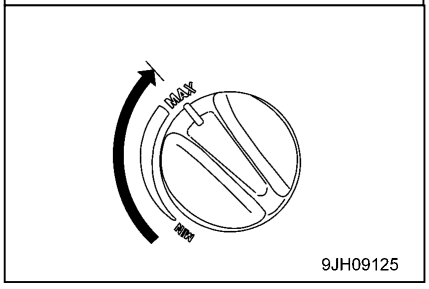



**[PREPARATIONS FOR MOVING THE MACHINE]**

1. Press swing lock switch (1) to the ON (actuated) position and confirm that swing lock monitor (2) lights up.
   (a): ON position
   (b): OFF position




2. Turn fuel control dial (3) towards the full speed (MAX) position to increase the engine speed.



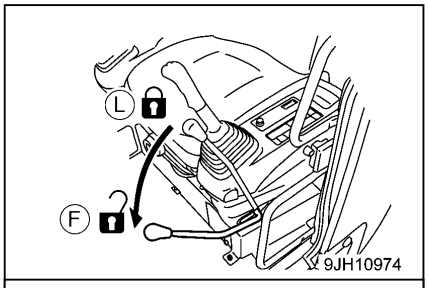



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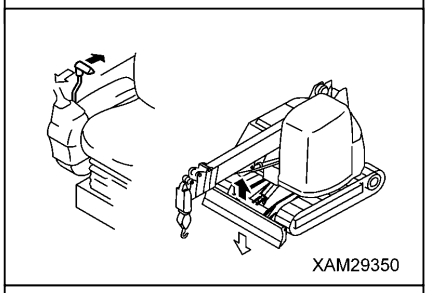
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**[1] MOVING MACHINE FORWARD]**

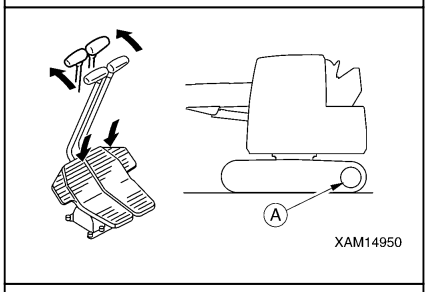
1. Set lock lever (4) to the FREE position (F).



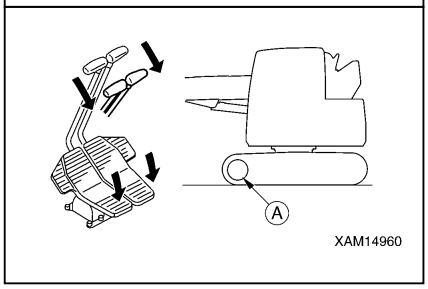

2. Operate blade control lever toward you to raise the blade.




3. Operate right and left travel levers (5) or right and left travel pedals (6) as follows.
   - When sprocket (A) is situated at the rear of the machine;
     Start the machine either by pushing lever (5) forward slowly or by stepping on the front part of pedal (6) slowly.




   - When sprocket (A) is situated at the front of the machine;
     Start the machine either by pulling lever (5) back slowly or by stepping on the rear part of pedal (6) slowly.




## NOTES

- Check that the travel alarm sounds properly. If the travel alarm does not sound, please contact us or our sales service agency.
- In cold temperature, if the machine travel speed is not normal, thoroughly perform the warming-up operation. In addition, if the undercarriage is clogged with mud and the machine travel speed is not normal, remove the soil and mud from the undercarriage.
- In a condition where the hook block is in the temporary stowage position, it may become loose due to vibrations during traveling. In such an event, try a temporary stowage operation, again.

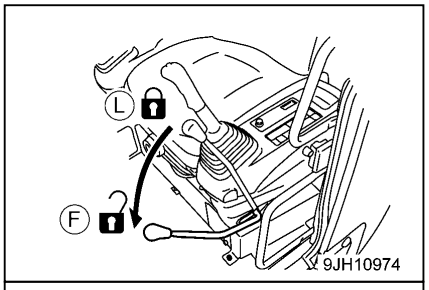


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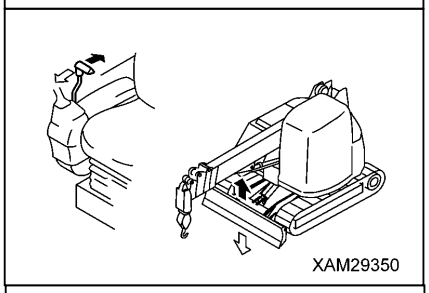
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### [2] MOVING MACHINE BACKWARD]

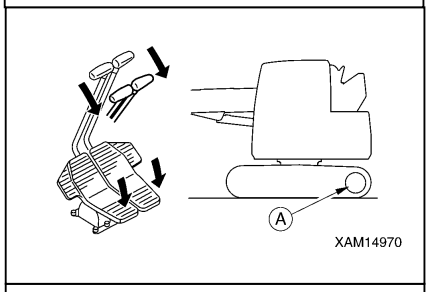
1. Set lock lever (4) to the FREE position (F).



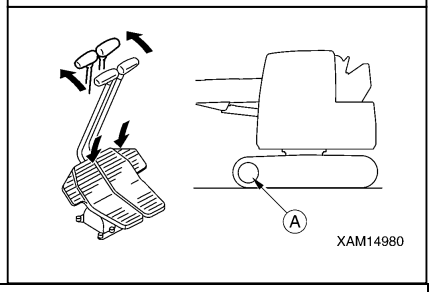

2. Operate blade control lever toward you to raise the blade.




3. Operate right and left travel levers (5) or right and left travel pedals (6) as follows.
   - When sprocket (A) is situated at the rear of the machine;
     Start the machine either by pulling lever (5) back slowly or by stepping on the rear part of pedal (6) slowly.




   - When sprocket (A) is situated at the front of the machine;
     Start the machine either by pushing lever (5) forward slowly or by stepping on the front part of pedal (6) slowly.



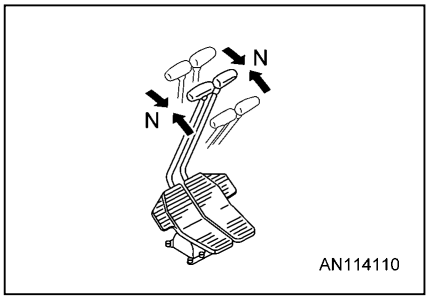

## NOTES

- Check that the travel alarm sounds properly. If the travel alarm does not sound, please contact us or our sales service agency.
- In cold temperature, if the machine travel speed is not normal, thoroughly perform the warming-up operation. In addition, if the undercarriage is clogged with mud and the machine travel speed is not normal, remove the soil and mud from the undercarriage.
- In a condition where the hook block is in the temporary stowage position, it may become loose due to vibrations during traveling. In such an event, try a temporary stowage operation, again.

### [3] STOPPING MACHINE

Avoid stopping suddenly. Give yourself ample room when stopping.

- Put the left and right travel levers (5) to the NEUTRAL position, and then stop the machine.






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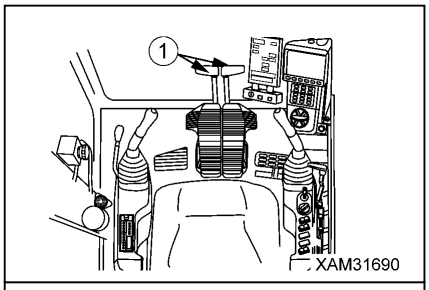
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## 3.9 STEERING MACHINE

**⚠ WARNING**

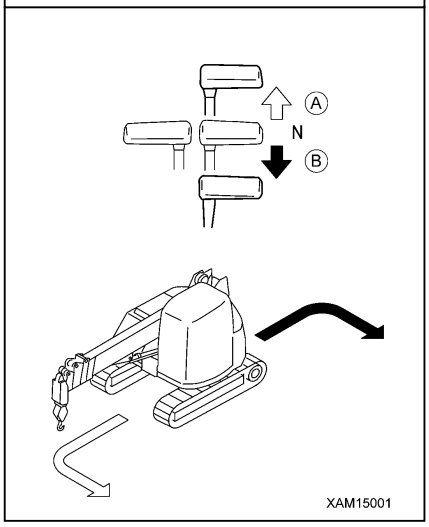
**Before operating the travel lever or travel pedal, check the direction that the track frame is facing. When the track frame is facing the rear (when the sprocket is at the front), the direction of operation of the travel lever and travel pedal is the opposite to the direction of movement of the machine (forward/reverse, left/right).**

Use the travel levers (1) to change direction.
Avoid sudden changes of direction as much as possible. Especially when performing counter-rotation (spin turn), stop the machine before turning.
Operate two travel levers (1) as follows.




### [1] STEERING THE MACHINE WHEN STOPPING

When turning to the left.
Push the right travel lever forward to turn to the left when traveling forward; and pull it back to turn left when traveling in reverse.
(A): Forward left turn
(B): Reverse left turn

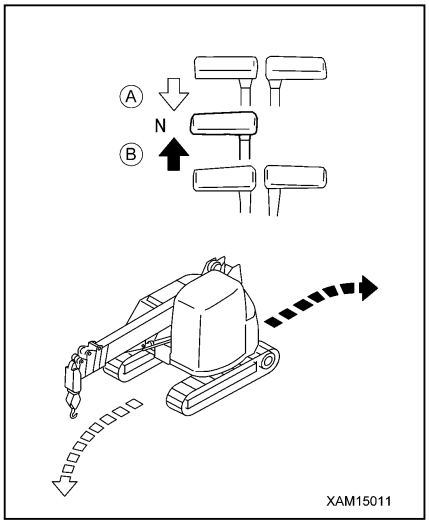



**NOTES**

When turning to the right, operate the left travel lever in the same way.

### [2] CHANGING DIRECTION OF THE MACHINE

When turning to the left.
If the left travel lever is returned to the NEUTRAL position, the machine will turn to the left.
(A): Forward left turn
(B): Reverse left turn




**NOTES**

When turning to the right, operate the right travel lever in the same way.

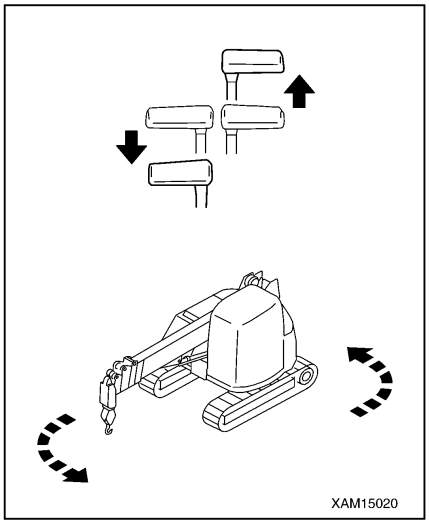


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### [3] COUNTER-ROTATION TURN (SPIN TURN)

When using counter-rotation (spin turn) to turn left, pull the left travel lever back and push the right travel lever forward.




| NOTES |
| --- |
| When using counter-rotation (spin turn) to turn right, pull the right travel lever back and push the left travel lever forward. |



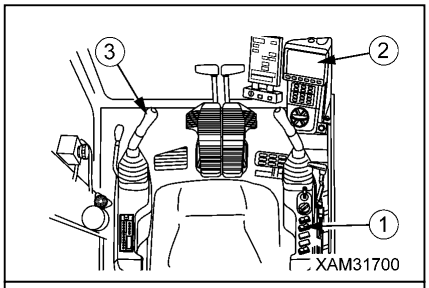
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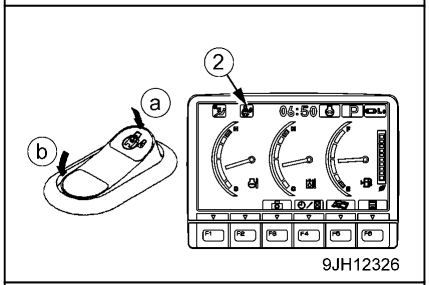
## 3.10 SWINGING

**⚠ WARNING**

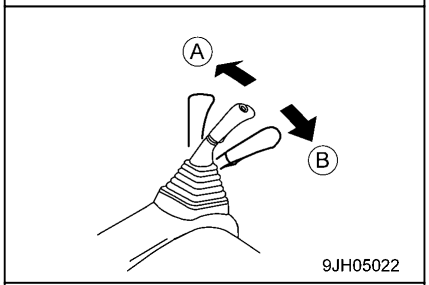
- **The rear of the machine extends outside the track width. Before swinging, check with the rear view monitor and mirror, and also check visually that the surrounding area is safe.**
- **Before swinging the machine off, check that the area around the machine is safe, and sound the horn**
- **When the auto-deceleration has been actuated and the engine speed is low, if the control lever is operated, the engine speed will suddenly rise, so be careful when operating.**



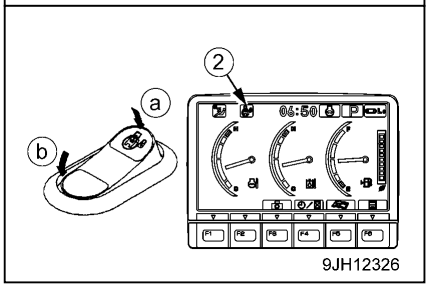

1. Before starting the swing operation, turn swing lock switch (1) OFF and check that swing lock monitor (2) has gone out.
   (a): ON position
   (b): OFF position




2. Operate left work equipment control lever (3) to swing the upper structure.
   (A): Left swing
   (B): Right swing




3. When not using the swing, turn swing lock switch (1) ON. Check that swing lock monitor (2) lights up.
   (a): ON position
   (b): OFF position





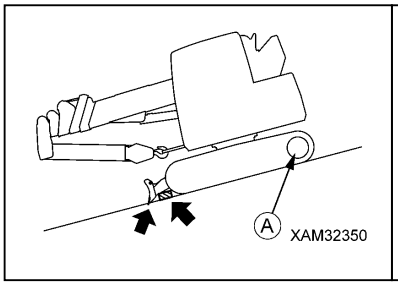

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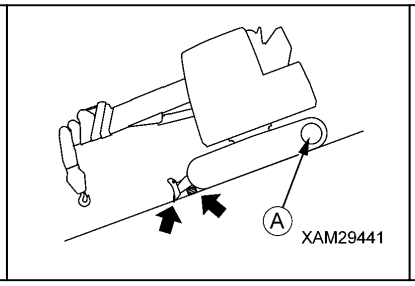
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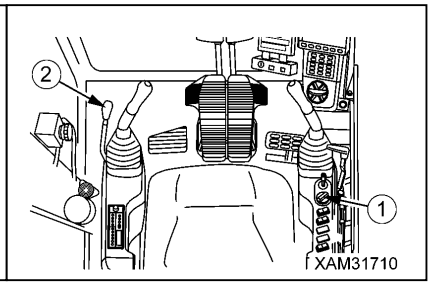
## 3.11 PARKING MACHINE

**⚠ WARNING**

- **Parking the machine on the firm, level ground. Avoid parking the machine on slopes. If it is unavoidably necessary to park the machine on a slope, put blocks under the tracks and dig the blade into the ground surface to stop the machine from moving.**
- **If the control levers are touched by accident, the machine may move suddenly, and this may lead to a serious accident. Before standing up from the operator's seat, always set the lock lever securely to the LOCK position.**
- **Set the blade to downward of the slope and lower it to touch the ground.**

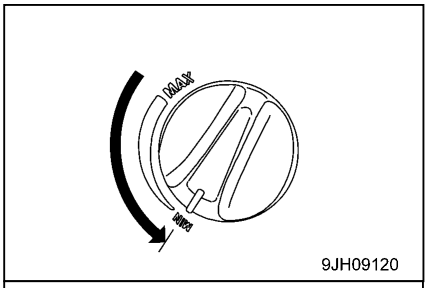


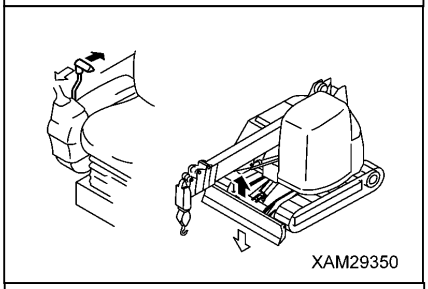




1. Stop the machine.
   For details of the procedure for stopping the machine, see "Operation 3.8 Starting/Moving/Stopping Machine".

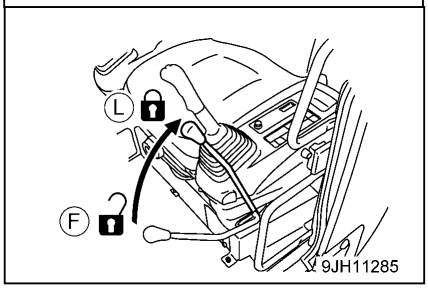
2. Turn fuel control dial (1) to low idling position (MIN) and lower the engine speed.




3. Operate blade control lever forward, and lower the blade to the ground.




4. Set lock lever (2) to LOCK position (L) and stop the engine. For details of the procedure for stopping the engine, see "Operation 3.5 Stopping Engine".





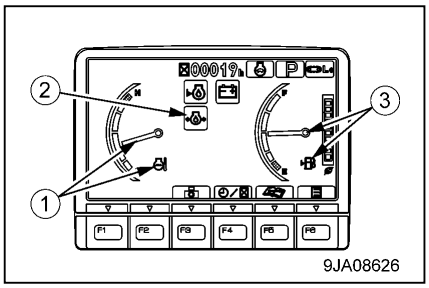

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# 3.12 MACHINE INSPECTION AFTER DAILY WORK

## 3.12.1 BEFORE STOPPING ENGINE

Use the machine monitor to check engine coolant temperature (1), engine oil pressure (2), and fuel level (3).




## 3.12.2 AFTER STOPPING ENGINE

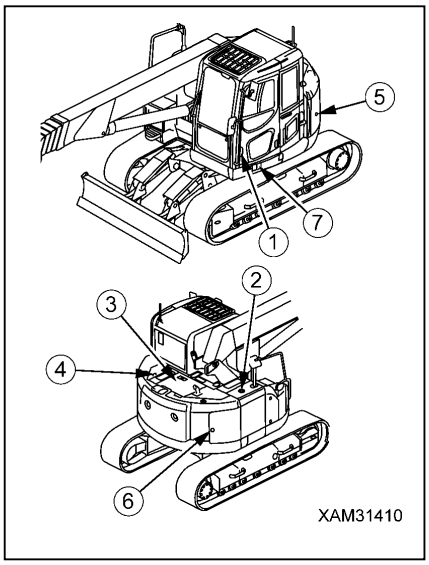
1. Walk around the machine and check the crane, machine exterior, and undercarriage, also check for any leakage of oil or coolant. If any problems are found, repair them.
2. Fill the fuel tank.
3. Check the engine compartment and battery around for paper and debris. Clean out any paper and debris to avoid a fire hazard.
4. Remove any mud affixed to the undercarriage.

## 3.12.3 LOCKING

Always lock the following places.

(1) Door of operator's cab (Always remember to close the window.)
(2) Fuel tank filler port
(3) Engine hood
(4) Cover at rear of cab
(5) Battery room door
(6) Pump room door
(7) Door at front of tool box

| NOTES |
| --- |
| Use the stater switch key to lock and unlock all these places. |






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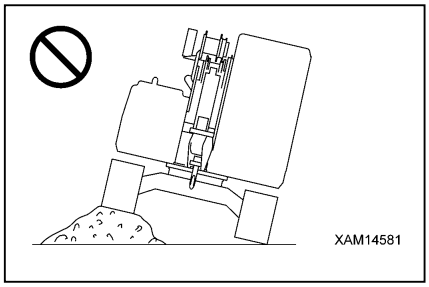
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## 3.13 CAUTIONS IN TRAVELING

**⚠ WARNING**

**Not observing these cautions in traveling will result in serious accidents.**

### [1] CAUTIONS IN TRAVELING




Traveling over boulders, tree stumps, or other obstacles will cause a big shock to the chassis (and in particular to the tracks), and this will cause damage to the machine. For this reason, always remove any obstacles or travel around them, or take other steps to avoid traveling over such obstacles as far as possible.

If you have to travel over the obstacles by necessity, be sure to take the “traveling posture” to lower the center of gravity, and reduce the traveling speed as much as possible so that the machine will go over the obstacles at the center of the crawlers.

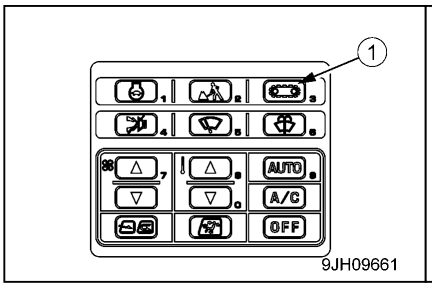
**NOTES**

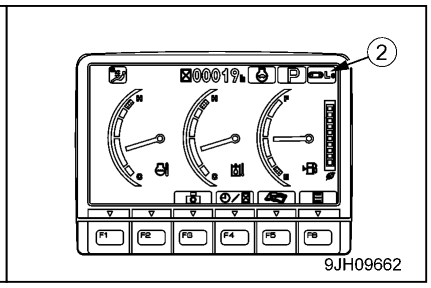
See “Operation 3.7 Machine Traveling Posture” for the traveling posture of the machine.

### [2] CAUTIONS IN HIGH SPEED TRAVELING

On uneven roadbeds such as rock beds or uneven roads with large rocks, travel at Lo speed. When traveling at high speed, set the idler in the forward direction.

• Press travel speed selector switch (1) to change the travel speed. The travel speed (Lo, Hi) is displayed on travel speed monitor (2).

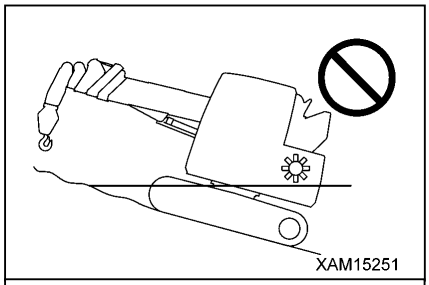



### [3] PERMISSIBLE WATER DEPTH

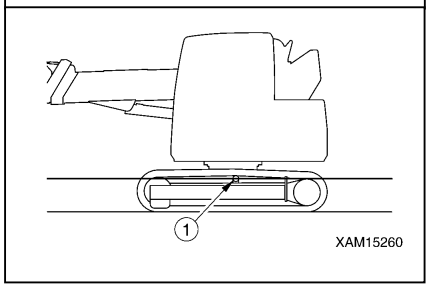
**⚠ CAUTION**

**When driving the machine out of water, if the angle of the machine exceeds 15 degrees, the rear of the upper structure will go under water, and water will be thrown up by the radiator fan. This may cause the fan to break.**
**Be extremely careful when driving the machine out of water.**




Do not drive the machine in water deeper than center of carrier roller (1).

Supply grease to the parts which have been under water for a long time until the used grease is projected out of the bearings.





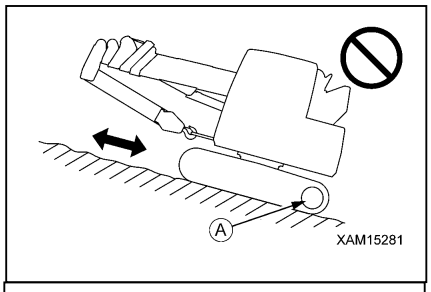

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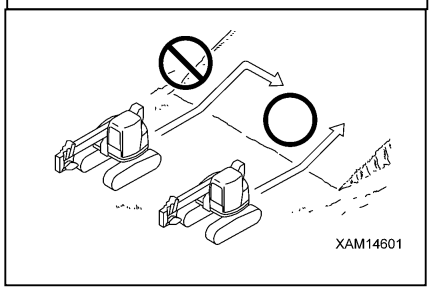
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### [4] CAUTIONS ON SLOPE TRAVELING

**⚠ WARNING**

- **For slope traveling, take care of overturning or drifting.**
- **At the leaning of 15 degrees or more of the machine in a slope, the incline detector actuates and it triggers a buzzer. When the buzzer sounds, stop traveling and change to a safer path.**
- **For slope traveling, always keep the traveling posture, where the hook block is positioned to it's regular stowage. Otherwise, if it is fixed to the temporary stowage position at rhe boom tip, it may become loose. Refer to "Operation 3.7 Traveling Posture" for details.**
- **In a 10 degrees or more slope, use reverse traveling to climb it and forward travel for descend. Always direct the machine front to the downward of the slope. Where forward traveling to climb up and reverse traveling for descend are used, it makes the machine unstable and brings risks of overturning or drifting.**
- **For slope traveling, always keep the machine straight forward the slope and never attempt turning around or traversing it. When possible, route the level ground and make a detour to avoide the slope, to secure safety traveling.**
- **Keep traveling in a manner so that the machine can be stopped whenever it slips or becomes un-stable.**

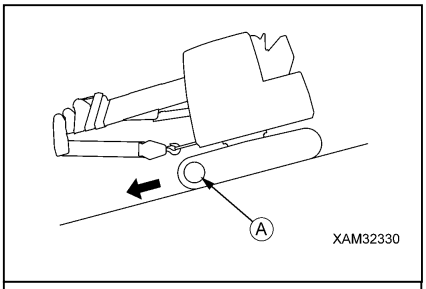


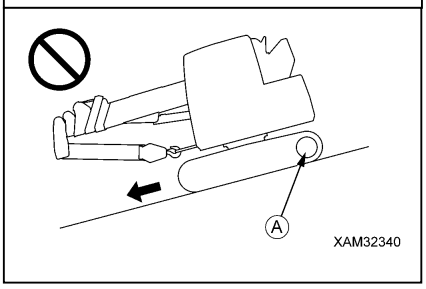




When traveling down steep hills, use the travel lever and fuel control dial to keep the travel speed low. When traveling down a steep hill of more than 10 degrees, with the sprocket (A) side down, and set the machine to the posture shown in the diagram on the right, and lower the engine speed.

**NOTES**

Travel down slopes with the sprocket (A) side down. If the machine travels down with the sprocket (A) side up, the track tends to become loose, and that can cause skipping pitches.




**[TRAVELING DOWNHILL]**

Put the travel lever in the NEUTRAL position. This will cause the brake to be automatically applied.

**[ENGINE STOPPED ON SLOPE]**

If the engine stops when traveling uphill, move the travel levers to the NEUTRAL position, lower the blade to the ground, stop the machine, then start the engine again.

**[CAUTIONS ON SLOPE]**

- If the engine stops when the machine is on a slope, never use the left work equipment control lever to swing operations. The upper structure will swing under it's own weight.
- Do not open or close the sliding door on slopes when traveling or operating. The operating effect may change suddenly. Always keep sliding door locked.
- Be extremely careful when operating or closing the sliding door when the machine is stopped on a slope. There is danger that the weight of the door may cause it to open or close suddenly.



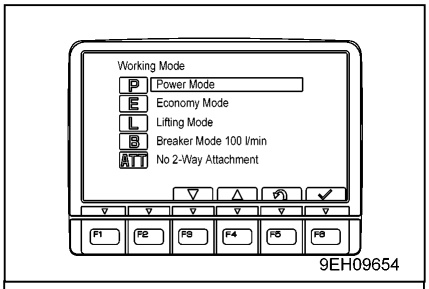
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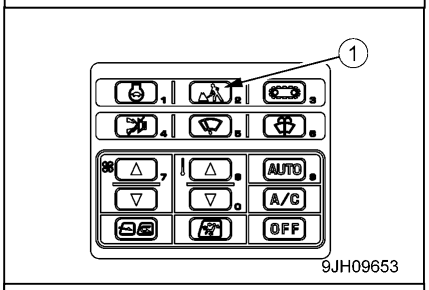
## 3.14 WORKING MODE OPERATION

Use working mode selector switch (1) to select the working mode that matches the operating conditions or purpose. This will make it possible to carry out operations efficiently.
Use the following procedure to select the most efficient working mode.
When the starter switch is turned ON, the working mode is set to the mode that was in operation when the starter switch was last turned OFF.
Use the working mode switch to set the mode to the most efficient mode to match the type of work.

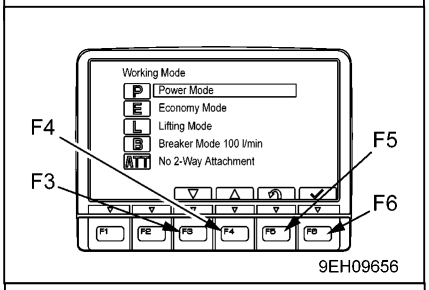
| Working mode | Applicable operations |
|---|---|
| P mode | Normal crane operation |
| E mode | Normal crane operation (Fuel saving) |
| L mode | Normal crane operation (Inching operation) |
| B mode | Not available for this machine |
| ATT mode | Not available for this machine |



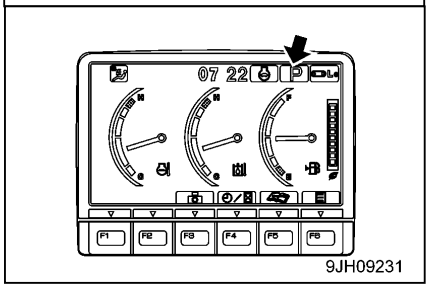
9EH09654



9JH09653



9EH09656



9JH09231

1. If working mode selector switch (1) is pressed, the working mode selection screen is displayed on the monitor.

2. Press switches F3 of F4 at the bottom of the screen or the working mode selector switch to select the appropriate mode.

3. After selecting the desired mode, press switch F6 to accept the change. The screen return to the standard screen.
   If switch F5 is pressed, the screen returns to the standard screen without changing the mode.
   - If a working mode is selected, and nothing is done for 5 seconds, the selected working mode is automatically accepted and the screen returns to the standard screen.
   - If a working mode is selected and working mode switch (1) is kept pressed, the selected mode is accepted and the screen returns to the standard screen.



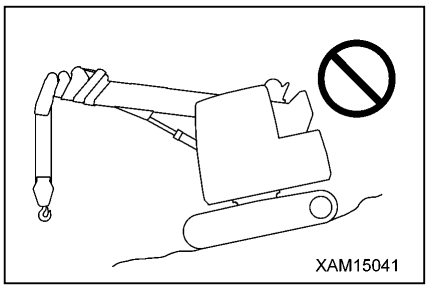
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## 3.15 CAUTIONS BEFORE CRANE OPERATION

**⚠ WARNING**

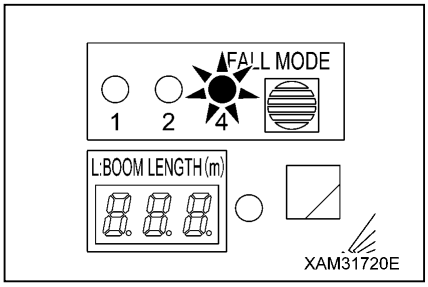
**Not observing these cautions before operation may result in serious accidents.**



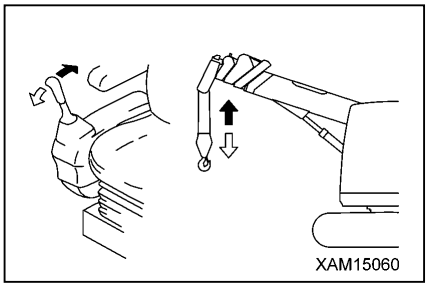

• Always go for a level ground to station the machine for crane operations. Once the machine is stationed, check the level to secure the machine status. The moment limiter computes moment subject to the machine being correctly leveled. Otherwise, it would not provide a pre-warning or warning when the operation comes into pre-warning zone. All operation must be carried out in a level condition.

• Set the moment limiter correctly to the crane operation. The moment limiter computes moment based on the setting. Unless the setting represents the actual condition, breakage of the wire ropes or boom damage may be caused, which may result in serious injury.

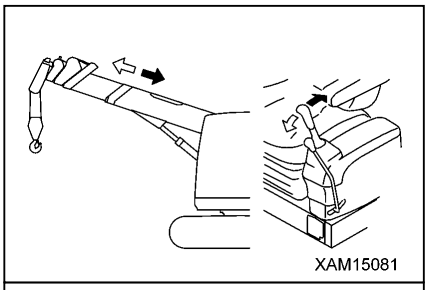
Example:
• Actual number of the wire rope falls: 2
• The fall mode switch setting in the moment limiter: 4
In such a condition as above, the moment limiter computes the load using the value of "4 wire falls", thus even though the actual load reaches pre-warning zone, no pre-warning or warning is provided.
Consequently, when the rated total load exceeds the allowance of the "2 wire falls", the wire rope may break.



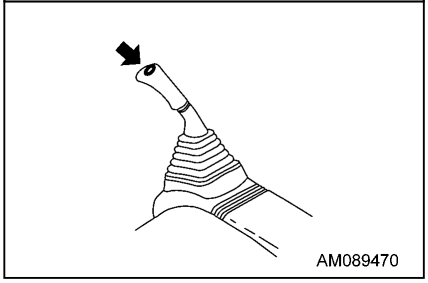

• When you over hoist the hook, the over hoist detector actuates to sound the buzzer and stop hook raising. When the warning buzzer sounds, immediately release the right work equipment control lever and return it to the neutral position to stop hook raising.
Next, operate the right work equipment control lever to HOOK LOWERING position (push forward) so that the hook block is lowered.




• When you extend the boom too much, the hook block is also hoisted, thus the over hoist detector actuates to sound the buzzer and stop extending. When the warning buzzer sounds, immediately release the left work equipment control lever and return it to the neutral position to stop extending the boom.
Next, operate the left work equipment control lever to BOOM RETRACTING position (pull back) so that the boom is shortened.




• Use the horn switch and toot the horn to warn danger to persons nearby, when necessary, during crane operations.






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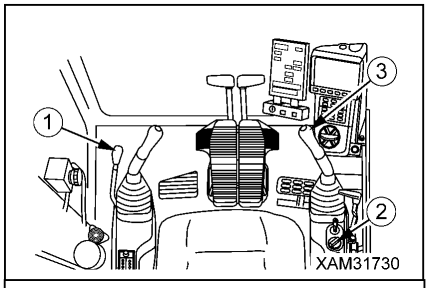
## 3.16 OPERATIONS BEFORE CRANE OPERATION

**⚠ CAUTION**

**Boom extending or raising while the hook block is secured to the wire rope for stowage may damage the wire rope or the regular hook block stowage section in the front of the upper structure. Always lower the hook block at the same time, to avoid excessive tension to the stowage wire rope.**

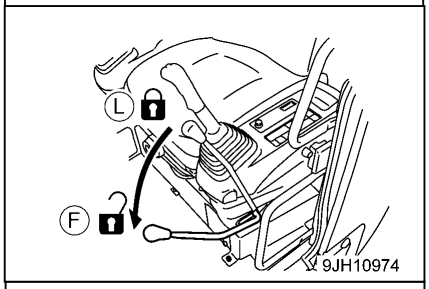
**CAUTION**

- **Be careful not to lower the hook block in to the ground, which may result in irregular winding of the wire rope to the drum.**
- **When the hook block is released from the stowage position before the boom is sufficiently raised to correct position, the hook block may swing badly and cause machine damage or serious injury to persons.**



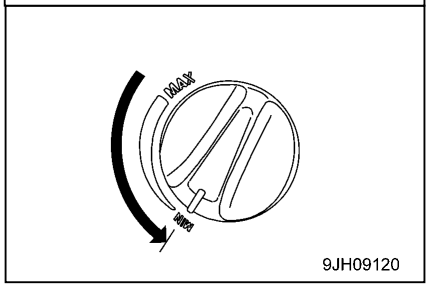

Perform the following operations before crane operation.

1. Set lock lever (1) to the FREE position.




2. Turn fuel control dial (2) to low idling position (MIN).

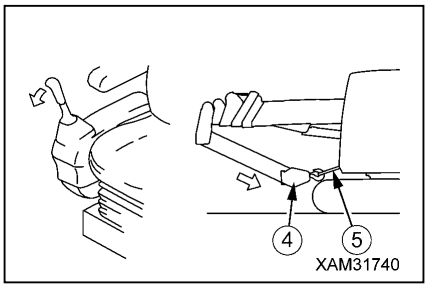
3.Swing the upper strucure 90 degrees so that it comes perpendicular to tracks.




**NOTES**

If the upper structure is not slewed 90 degrees, the blade may disturb required operations.

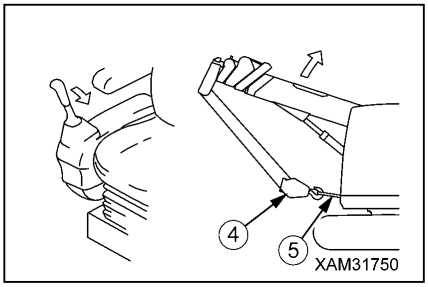
4. Operate the right work equipment control lever to HOOK LOWERING position (push forward) so that the hook block (4) is lowered and the stowage wire rope (5) (of the regular stowage position) is loosened.




**NOTES**

During this operation, over lowering the hook block (4) should be avoided. Otherwise, the loosened hook block (4) may damage other components around.

5. Operate right working control lever (3) to BOOM RAISING side (pull toward you), raise the boom.




**NOTES**

During this operation, excessive tension between the hook block and the stowage wire rope (5) should be avoided. In such event of excessive tension, properly lower the hook block (4).



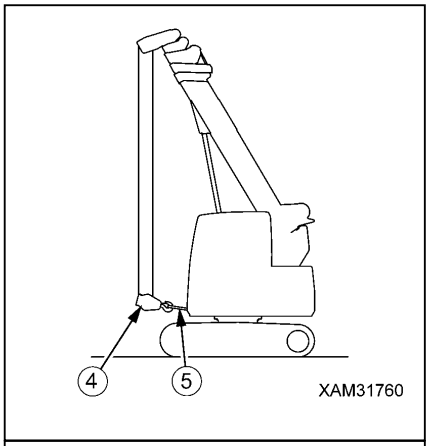
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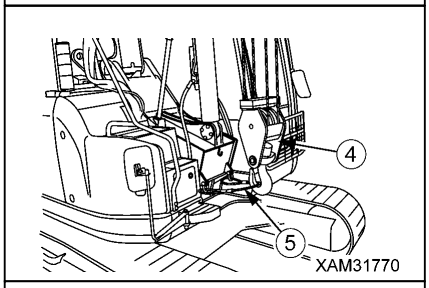
6. Repeat the practices of 4. and 5. above alternately, so that the boom is slowly raised to the position where the hook block (4) comes perpendicular to the stowage position in the front of the crane upper structure.

**⚠ WARNING**

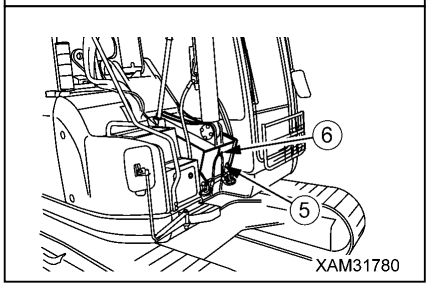
**When the hook block is released from the stowage position before the boom is sufficiently raised to correct position, the hook block may swing badly and cause machine damage or serious injury to persons.**




7. Remove hook block (4) from storage rope (5).




8. Secure the hook block stowage wire rope (5) firmly to the rope hanger (6).



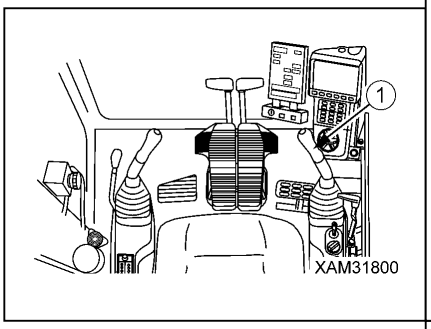


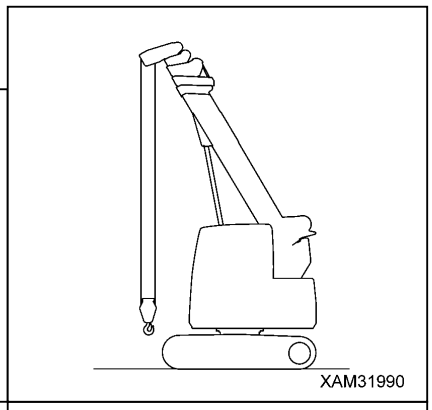

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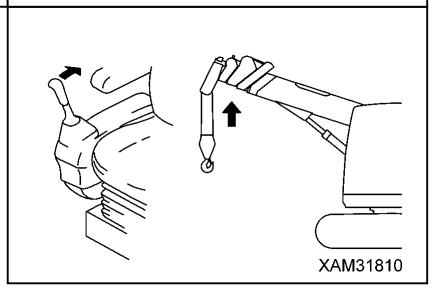
## 3.17 CRANE OPERATION POSTURE

To start the crane operation, following "Operation 3.16 Preparation for Crane Operation", set to the crane operation posture as below:

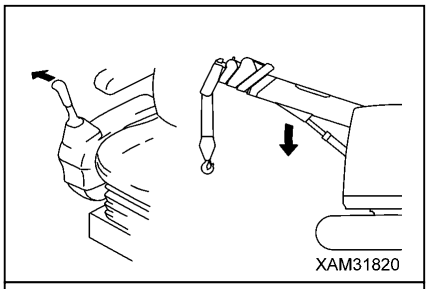


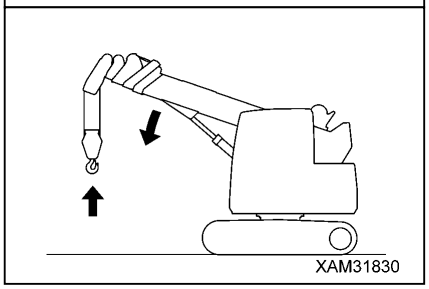

1. Operate the right work equipment control lever to HOOK RAISING position (pull backward) so that the hook block (4) is hoisted.
   Here, take care not to over-hoist the hook block.
   Over-hoisting will cause Over-hoisting warning situation.




2. Operate the right work equipment control lever to BOOM LOWER position (push right) so that the boom (4) is lowered.
   Be careful not to over lower the hook block to avoid it laying on the ground.




3. Repeat the practices of 1. and 2. above alternately, so that the crane posture is as shown in the figure in the right.






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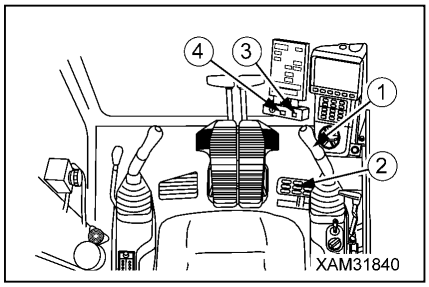
## 3.18 HOOK RAISING /LOWERING OPERATION

**⚠ WARNING**

- **With the boom deflection, the hoisted load slightly shifts forward. Notify the workers around such as slinging operators.**
- **If the hook block was hoisted too much, the over hoisting will be detected. The alarm buzzer sounds will be heard. When the alarm buzzer was heard, operate the right work equipment control lever immediately to the NEUTRAL position and stop raising the hook.**
- **When lowering the hook for long distance for underground works, be sure to leave more than three turns of the wire rope on the winch drum.**

**CAUTION**

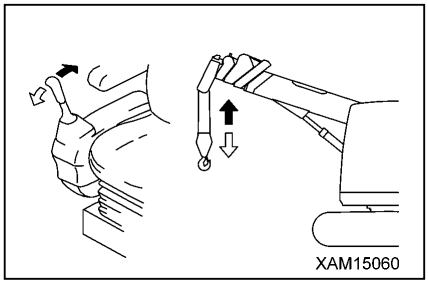
- **Be careful not to over lower the hook block to avoid it laying on the ground, which may result irregular winding of the wire rope to the drum.**
- **During the winch operation, always avoid returning the lever to the neutral position abruptly which loosens the wire rope and may result in irregular winding of the wire rope to the drum.**




### 3.18.1 NORMAL HOOK RAISING/LOWERING OPERATION

Operate the right work equipment control lever (1) as follows.

- Lower: Push the lever forward.
- Neutral: Release your hand from the lever. The lever will return to the NEUTRAL position and the raising/lowering of the hook block stops.
- Raise: Pull the lever toward you.




**NOTES**

Adjust the winch raising/lowering speed with the right work equipment control lever (1) and stroke of the acceleration pedal (2).



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### 3.18.2 HIGH SPEED HOOK RAISING/LOWERING OPERATION

**⚠ WARNING**

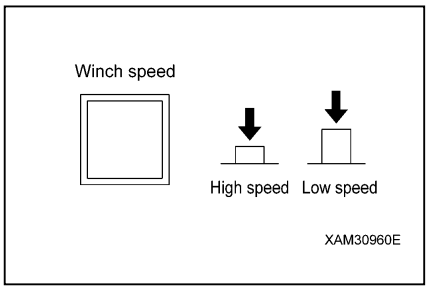
- **Use the high-speed winching only in the no-load condition where a hoisted load is not present. Raising/Lowering the hoisted load in the high-speed mode may cause machine damage or serious accidents such as overturning of the machine or dropping of the load, resulting in death or serious injury.**
- **In a condition where the actual weight of the load is "0.5 tons" or more, the high speed mode is not available even when the winch speed selector switch is pushed to "Hi-speed " position (, with it's light ON). Where the actual weight of the load is "0.2 tons" or less, high-speed winching operation is available, however, such a practice should be avoided as much as possible and preclude machine damage or serious accidents such as overturning of the machine or dropping of the load, resulting in death or serious injury.**

**NOTES**

- At the boom Derricking operation, the actual load indication in the moment limiter may make insignificant changes due to pressure change in the derrick cylinder. In a condition where the actual load indication in the moment limiter is "0.5 tons" or more, the high speed mode is not available even when the winch speed selector switch is pushed to "Hi-speed " position (, with it's light ON).
- When the Fall mode of the moment limiter is set to 1-fall, the high speed mode is not available even though the winch speed selector switch is pushed to "Hi-speed " position ( with it's light ON) it is fixed to Low-speed.

Use the winch speed selector switch (3) in the switch box as follows:

- High-speed: Push the switch button. The pilot lamp inside lights and raising/lowering speed is accelerated.
- Low-speed: Push the switch button, again. The pilot lamp inside goes off and raising/lowering speed returns to normal mode.






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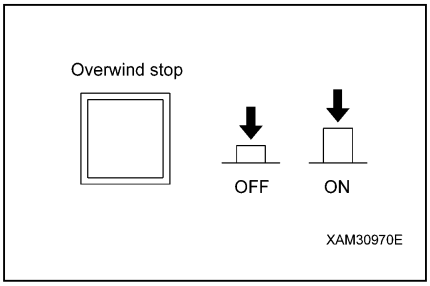
### 3.18.3 HOOK RAISING/LOWERING OPERATION BY OVER-HOISTING CANCEL SWITCH

**⚠ WARNING**

- **The Over-hoisting cancel switch cancels the auto-stop function of the over hoist detector. Operate the right work equipment control lever carefully when stowing the hook block. Pay sufficient attention not to let the hook block collide with the boom.**
- **Use this Over-hoisting cancel switch only when stowing the hook block into it's temporary stowage position in the boom tip.**

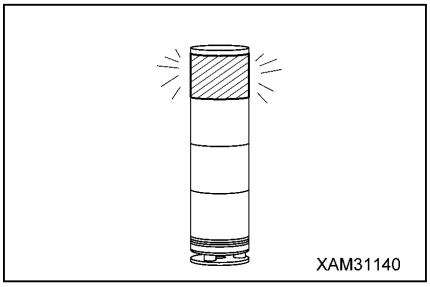
Keep the normal winding operation and use the over-hoisting cancel switch (4) in the switch box as follows:

- Release: Keep the button pushed and operate the right work equipment control lever to HOOK RAISING (pull backward) position. The hook block will be winched for stowage to the boom tip. The pilot lamp inside the switch lights, at this time.
- Auto: Release the finger from the button. It returns to the previous position and the auto-stop function of overwind detector will be enabled.




**NOTES**

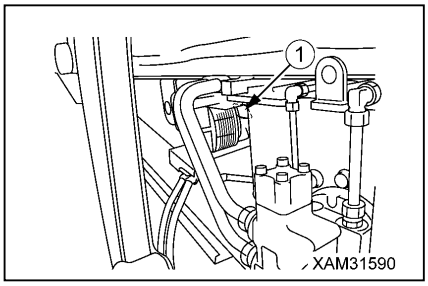
- When turning this Over-hoisting cancel switch (4) to the "Release" position, the red lamp of the working status lamp will light up.
- When the winch is hoisted while this Over-hoisting cancel switch (4) is pushed, the winch speed is slower, however it is not a winch failure.




**[WINCH DRUM CHECK MIRROR]**

**CAUTION**

**The winch drum check mirror is provided below the winch drum to facilitate to check for irregular winding of the wire ropes from the operator's compartment.**
**Use this mirror to carefully check that the wire rope is wound correctly, during winding operations.**





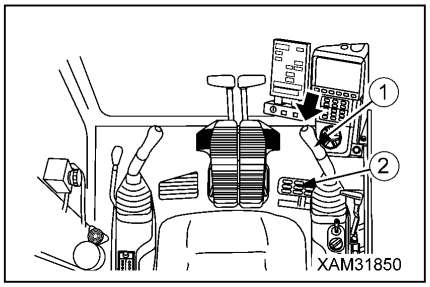

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## 3.19 BOOM DERRICKING OPERATION

**⚠ WARNING**

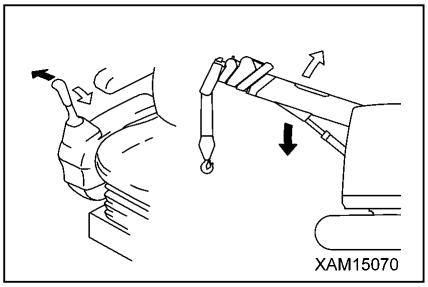
- **Operate the right work equipment control lever as slowly as possible. Sudden lever operation especially while hoisting a load will cause the load to swing, giving a great impact to the machine, and thus may break the crane or overturn the machine.**
- **Never attempt a practice to draw a load forward or set a lying load upright by boom derricking/un-derricking. Such practice must be attained by hook block hoisting/un-hoisting.**
- **Lowering the boom increases the working radius and the rated total load that can be hoisted decreases. Be extremely careful so that the load weight will not be overloaded with the boom most lowered when working by derricking the boom.**




Operate the right work equipment control lever (1) as follows.

- Lower: Push the lever toward outside (right).
- Neutral: Release your hand from the lever.

  The lever goes back to the NEUTRAL position and the boom derricking stops.
- Raise: Pull the lever toward you (left).




**NOTES**

- Adjust the boom derricking speed with the right work equipment control lever (1) and the stroke of the acceleration pedal (2).
- Where the boom length display in the moment limiter indicates "5.3 meters" or more, boom un-derricking will be stopped automatically to prevent it from being lowered below horizontal.



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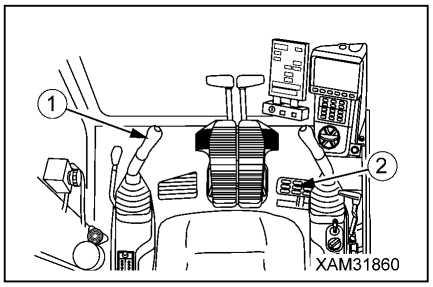
## 3.20 BOOM TELESCOPING OPERATION

**⚠ WARNING**

- **Operate the left working equipment control lever as slowly as possible. Sudden lever operation especially while hoisting a load will cause the load to swing, giving a great impact to the machine, and thus may break the crane or overturn the machine.**
- **Never attempt a practice to draw a load forward or set a laying load upright by boom telescoping. Such practice must be attained by hook block hoisting.**
- **Extending the boom increases the working radius and the rated total load that can be hoisted decreases. Be extremely careful so that the load weight will not be overloaded with the boom most extended when working by telescoping the boom.**
- **When the boom is extended, the hook block is raised. If the alarm buzzer of the over hoist detector is heard during the boom extending operation, return the left working equipment control lever immediately to the NEUTRAL position and stop the boom extending operation.**

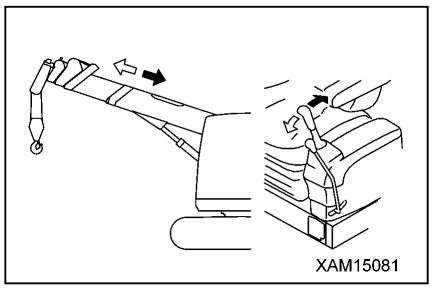
**CAUTION**

- **The hook block is raised or lowered while telescoping the boom. Perform the winch operation at the same time to adjust the hook block height.**
- **When the boom is maintained extended for a long time, the boom slightly retracts due to the temperature change in the hydraulic oil. In this case, extend the boom as needed.**




Perform the left work equipment control lever (1) as follows.

- Extend: Push the lever forward.
- Neutral: Release your hand from the lever.
  The lever returns to the NEUTRAL position and the boom telescoping stops.
- Retract: Pull the lever toward you.

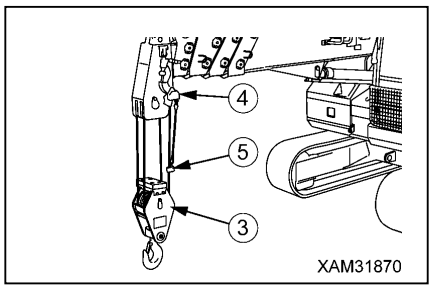



**NOTES**

- Adjust the boom telescoping speed with the left work equipment control lever (1) and the stroke of the acceleration pedal (2).
- When the boom extends, the second boom extends first, and the third boom extends next, then fourth and fifth boom extend together at the same time. When the boom retracts, it retracts in the reverse order of extending the boom.

**CAUTION**

**As the boom extends and the hook block (3) hoists the weight (5) of the over-winding protector (4), the boom extension stops. When the hook has hoisted the weight of the over-winding protector, performing extending operation does not extend the boom. In this case, lower the hook.**





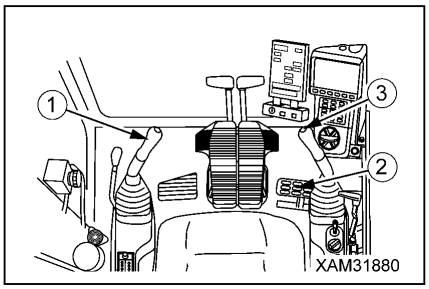

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## 3.21 SLEWING OPERATION

**⚠ WARNING**

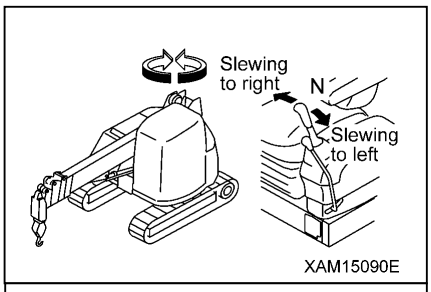
- **Check the safety around and honk the horn before slewing.**
- **Operate the left work equipment control lever as slowly as possible. Start smoothly, slew at low speed, and stop gently. Sudden lever operation especially while hoisting a load will cause the load to swing, causing the loss of stability in the machine, and thus may break the crane or overturn the machine.**
- **Never attempt a practice to draw a load forward or sideways, or set a laying load upright by swing maneuver. Such practice must be attained by hook block hoisting.**




Operate the left work equipment control lever (1) as follows.

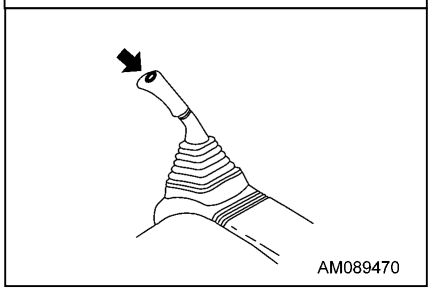
- Slew counter clockwise: Push the lever toward outside (left).
- Neutral: Release your hand from the lever.

  The lever returns to the “NEUTRAL” position and the slewing stops.
- Slew clockwise: Pull the lever toward you (right).




**NOTES**

- Adjust the crane slewing speed with the left work equipment control lever (1) and the stroke of the acceleration pedal (2).
- Use the horn switch (3) in the knob of the right work equipment control lever to warn of swing operation to the surrounding area.




**CAUTION**

**The rated total load is the same througtout 360 degrees, regardless of the position in which the swinging is stopped.**



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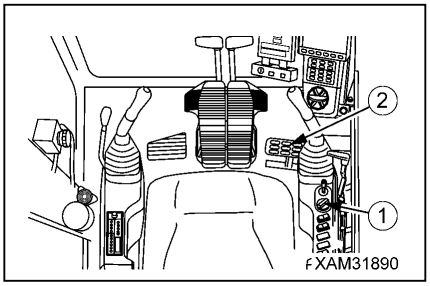
## 3.22 ACCELERATION OPERATION

**⚠ WARNING**

- **It is a dangerous excercise to operate each crane functions un-necessarily fast. Regulate the operation to the adequate speed for each operation.**
- **The accelerator pedal should only be used to control the crane operation while the machine is stationed. During traveling operation, use of this pedal is strictly prohibited; otherwise it may cause an accident due to an operation error which may lead to serious personal injury.**

**CAUTION**

- **Always reduce speed of operations at beginning and ending, and use low speed and high speed as applicable for respective loads, as well.**
- **The engine speed is set by the fuel control dial and the value is given a priority; thus the speed will not be slower than the value even when the foot is released from the pedal. For the accelerator pedal control, use the fuel control dial to set the minimum engine speed required, in advance.**

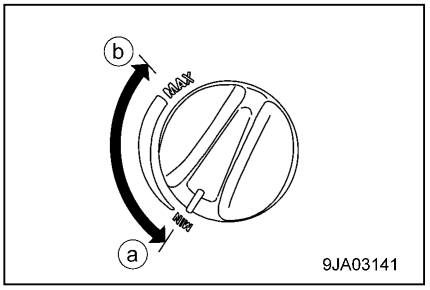



Use both of the fuel control dial (1) and accelerator pedal (2) as applicable for proper control of the operation speed.

**[1] WHERE THE OPERATION SPEEDS ARE UNVARYING:**

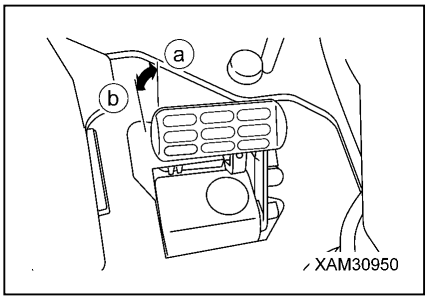
Set the fuel control dial (1) adequately to the operation speed.

- (a) Low idling (MIN): The position that the dial is turned counterclockwise (left) to the end.
- (b) Full throttle (MAX): The position that the dial is turned clockwise (right) to the end




**[2] WHERE THE OPERATION SPEEDS ARE VARYING:**

1. Set the fuel control dial (1) to the minimum speed of the operation
2. Use the accelerator pedal (2) to adjust speed to correspond to the operation load.
   - (a) Low idling: Release you foot from the pedal.
     The engine speed is slower and operation speed of each crane function is slower, accordingly. In this condition, the minimum engine speed regulated by the fuel control dial (1) is available.
   - (b) Full throttle: Use the accelerator pedal.
     The engine speed is faster and operation speed of each crane function is faster, accordingly.




**NOTES**

Use pedal for the rate of the engine speed required to match respective operations.



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# 3.23 STOWAGE OPERATION OF CRANE

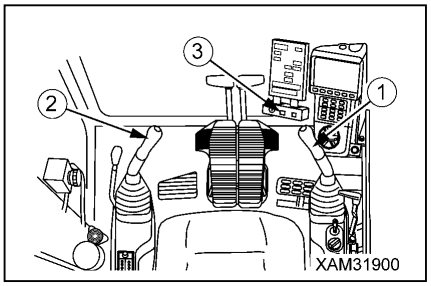
## 3.23.1 CRANE OPERATION FOR TEMPORARY HOOK BLOCK STOWAGE

**⚠ CAUTION**

- **The Over-hoisting cancel switch cancels the auto-stop function of the over hoist detector. Operate the right work equipment control lever carefully when stowing the hook block. Pay sufficient attention not to let the hook block collide with the hook block temporary stowage position in the boom.**
- **Use the hook block temporary stowage position in the boom only for a travel within the site in the middle of crane operations. For a distant travel such as to-and-from a working site or transportation, always secure the hook block to the regular hook block stowage section in the front of the upper structure.**
- **Prior to the hook stowage, always set the boom horizontal. When the hook block is stowed in the condition that the boom is raised, the rubber in the top of the hook block may be damaged.**
- **Never attempt to derrick/un-derrick the boom while the hook block is in the stowed position. That may damage the rubber in the top of the hook block.**
- **Never attempt hook block stowage while the moment limiter emergency stop cancel switch is in the "ON" position. In that condition, the hook block stowage mode is not available and may result damage to the rubber in the top of the hook block, the boom or wire ropes.**

**CAUTION**

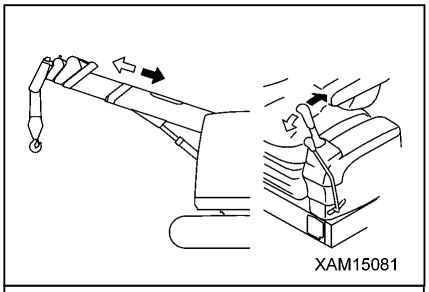
- **Prior to hook block temporary stowage, stop the hook block swinging.**
- **Be careful not to over un-wind the hook block which results from it laying on the ground. This may result in irregular winding of the wire rope to the drum.**
- **The boom retracting operation also leads to hock block un-winding condition. Also boom lowering will cause the hook block to lower. To avoid it laying on the ground, wind up the hook block at the same time.**
- **Winding up should be carried out slowly. Hook block stowage operation in the hi-speed mode must be avoided.**




1. Operate the left work equipment control lever (2) to RETRACT (pull backward) position and retract the boom to it's shortest position.

**NOTES**

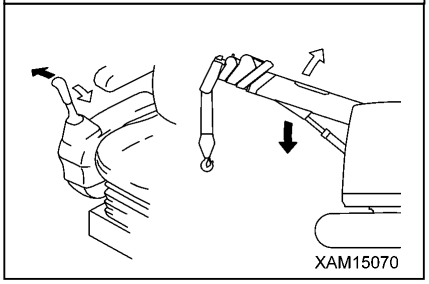
The boom retraction operation also lowers the hook block. Use the wind-up operation to raise the hook block as applicable.




2. Operate the right work equipment control lever to LOWER (push outside) position and lower the boom until it stops.

**NOTES**

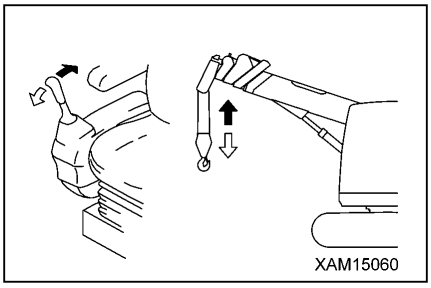
The boom lowering operation also lowers the hook block. Use the wind-up operation to raise the hook block as applicable.






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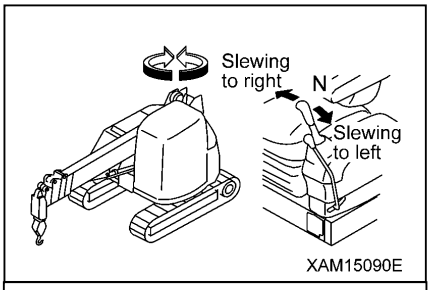
3. On each occasion that the hook block nearly reaches the ground as a result of practice in 3.1. and 2. above, operate the right work equipment control lever to HOOK RISING (pull backward) position and raise the hook block within an extent that over winding can be avoided.




**NOTES**

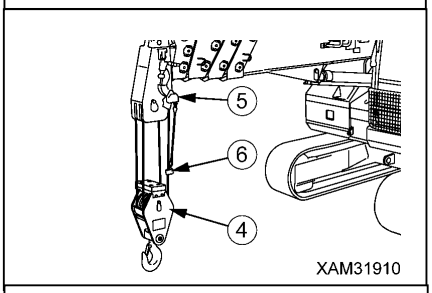
In the condition where the hook block is over wound, the over hoist detector triggers warning buzzer and the winch will automatically stop.

4. Operate the left work equipment control lever (2) to LEFT SWING (push outside) position or RIGHT SWING position so that the boom comes to the center of the machine.

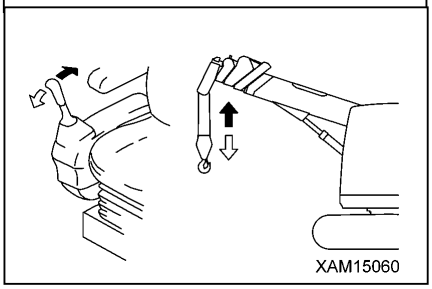



**NOTES**

Through the operations 1. to 4., the boom stowage is complete. Next, the hook block (4) will be stowed as follows:



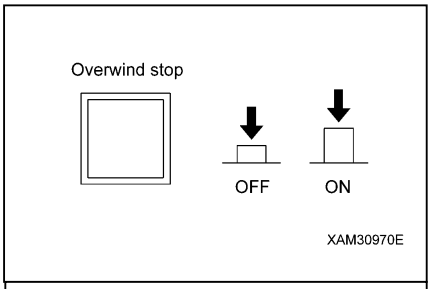

5. Operate the right work equipment control lever to HOOK RAISING (pull backward) position and continue raising the hook block (4) until it lifts the weight (6) then the winding automatically stops (i.e. over winding condition).




**NOTES**

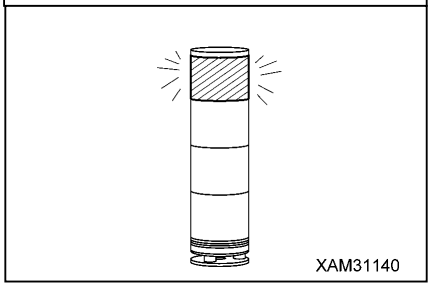
When the hook block is over wound, the warning buzzer sounds and the winching operation will automatically stop.

6. Keep pushing the over-hoisting cancel switch and operate the right work equipment control lever to HOOK RAISING (pull backward) position to raise the hook block up slowly and precisely to secure the hook block (4) below the tip of the boom.




**NOTES**

- When turning this switch to the "Stowage" position, the red lamp of the working status lamp will light up.
- When the winch is hoisted while this switch is pushed, the winch speed is slower, however it is not a winch failure.

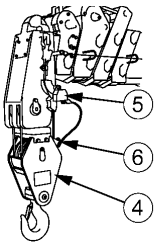





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## NOTES

The figure in the right shows the correct condition where the hook block (4) is properly stowed below the boom tip.



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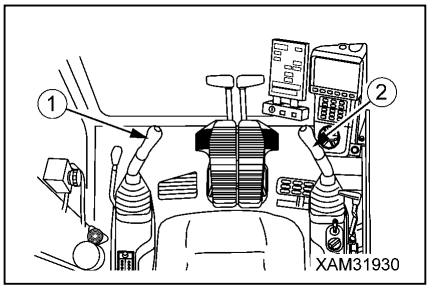
### 3.23.2 CRANE OPERATION FOR REGULAR HOOK BLOCK STOWAGE

**⚠ WARNING**

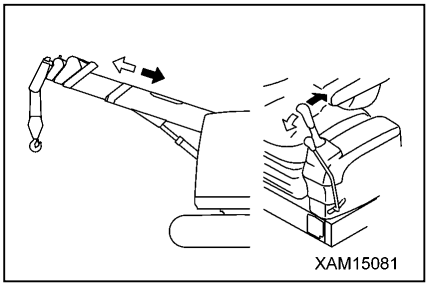
- **For hook block stowage operation, use both the left and right work equipment control levers most carefully. Otherwise, the hook block may shake badly and damage objects around or cause serious accidents resulting in death or serious injury.**
- **Raise the boom to the correct position close to the hook block stowage section. Never attempt to attach the hook block to the stowage wire rope when the hook block is still distant from it, otherwise, the hook block may detach and damage objects around, as well as cause serious accidents resulting in death or serious injury.**

**CAUTION**

- **Prior to the hook block stowage, stop the hook block swinging.**
- **Be careful not to over lowering the hook block which results in it laying on the ground. That may result in irregular winding of the wire rope to the drum.**
- **The boom retracting operation also leads to hock block lowering condition. Also boom lowering results in the hook block being lowered. To avoid it laying on the ground, raise the hook block at the same time.**




1. Operate the left work equipment control lever (1) to RETRACT (pull backward) position and retract the boom to it's shortest position.




**NOTES**

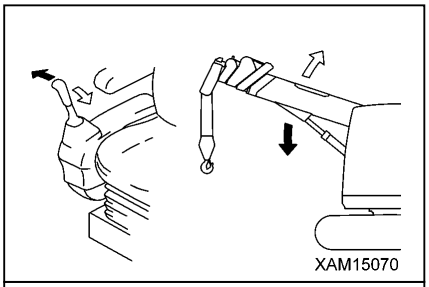
The boom retraction operation also lowers the hook block. Use the hook raising operation to raise the hook block as applicable.

2. Swing the upper strucure 90 degrees so that it comes perpendicular to tracks.

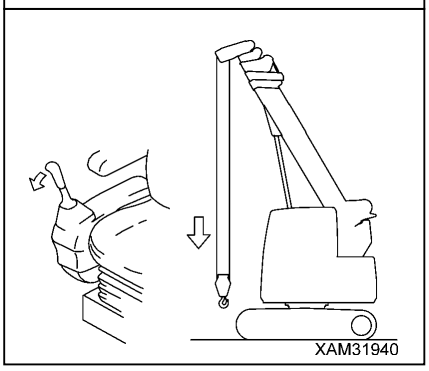
**NOTES**

Unless the upper structure is slewed 90 degrees, the blade may disturb the required operations.

3. Operate the right work equipment control lever (2) to BOOM RAISING (pull inside) position and raise the boom until the hook block reaches close to the regular stowage position.




4. Operate the right work equipment control lever (2) to HOOK LOWERING (push forward) position and lower the hook block until it reaches close to the regular stowage position.



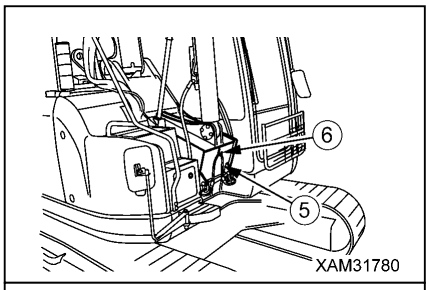

**NOTES**

During this operation, over lowering the hook block (4) should be avoided. Otherwise, the loosened hook block (4) may damage other components around.

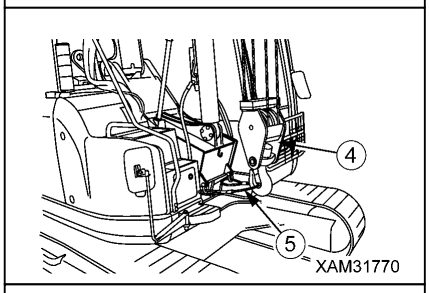


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5. Remove the wire rope (5) for the hook block stowage from the hanger (6).

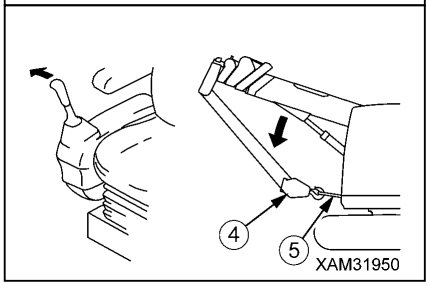



6. Fasten the hook block (4) to wire rope (5) for the hook block stowage.



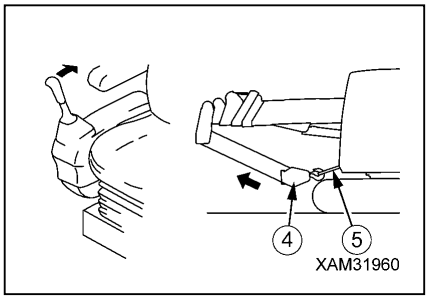

7. Operate the right work equipment control lever (2) to BOOM LOWERING (push outside) position and lower the boom until it stops.

| NOTES |
| --- |
| During this operation, raise the hook block up occasionally to take up the wire rope slack. Be careful so that the hook block (4) will not to give an excessive tension to the stowage wire rope (5). |




8. Operate the right work equipment control lever (2) to HOOK RAISING (pull backward) position and raise the hook block (4) to give a sufficient tension to the stowage wire rope (5).

| NOTES |
| --- |
| During this operation, avoid over raising the hook block (4). Otherwise, the stowage wire rope (5) may damage the regular stowage position etc in the front of the crane upper structure, when over wound |






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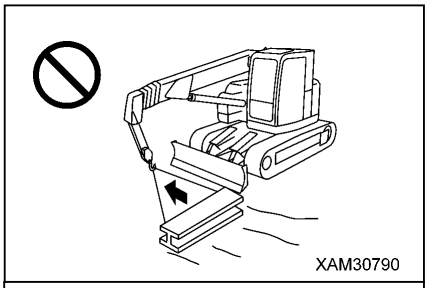
## 3.24 DO'S AND DON'TS DURING OPERATION

**⚠ WARNING**

- **Prior to the crane operation, always place the machine on level and solid ground. Use the level to ensure this.**
- **In the event that a crane operation during traveling is un-avoidable, always stop traveling first, then carry out the crane operation. Controls of both the left and right work equipment control levers during traveling are not available to this machine, except swinging and boom retraction.**
- **See the cautions given in the Safety besides the dos and don'ts in this section.**

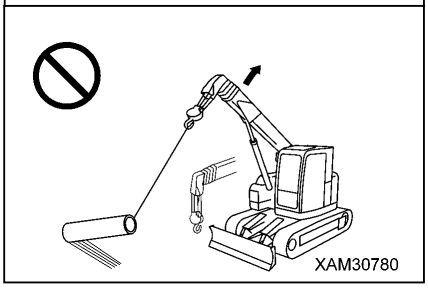
### [1] DON'T OPERATIONS WITH SLEWING FORCE

Drawing in or lifting the load with slewing operation is prohibited.



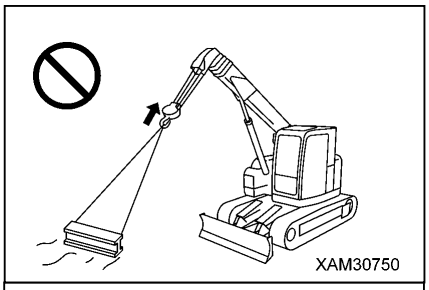

### [2] DON'T OPERATIONS WITH DERRICKING FORCE

Drawing in or lifting the load with boom derricking operation is prohibited.




### [3] DON'T PULL SIDEWAYS, DRAW IN, OR HOIST DIAGONALLY

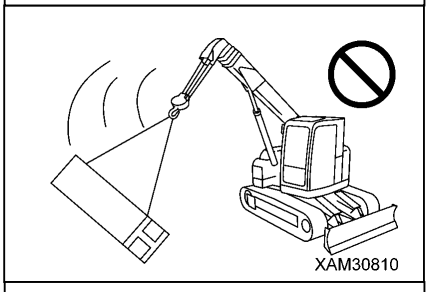
Pulling sideward, drawing in, or hoisting diagonally applies unreasonable force on the machine. It not only damages the machine body, but also is dangerous. Never operate in these ways. The hook must come right above the center of gravity of the load hoisted.




### [4] DON'T OPERATE VIOLENTLY DURING OPERATION

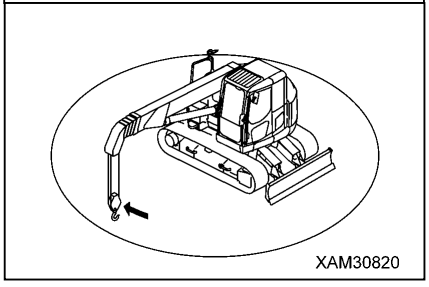
Do not operate the lever suddenly.

Especially, the "slewing", "boom lowering", and "hook lowering" must be operated at low speed.




### [5] DO NOT ALLOW ACCESS INTO WORKING RADIUS

Do not let people access the working radius area such as permitting an operator to go under the hoisted load.



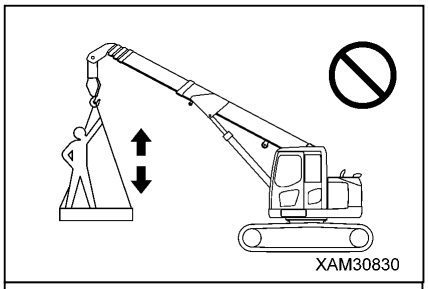



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**[6] DON'T USE FOR OTHER THAN MAIN APPLICATIONS**

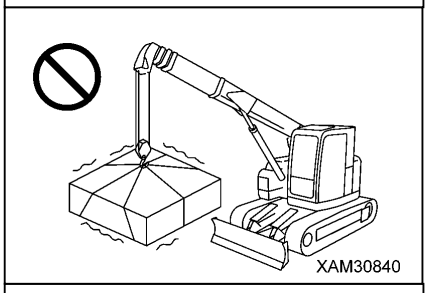
Do not move people up/down with the crane.




**[7] DON'T PERFORM UNREASONABLE OPERATIONS**

Operations requiring more than the machine performance can cause accidents.

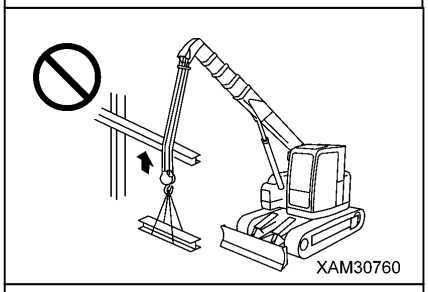
Particularly, crane operations must be carried out according to the rated total load chart.




**[8] DON'T WIND WIRE BY FORCE**

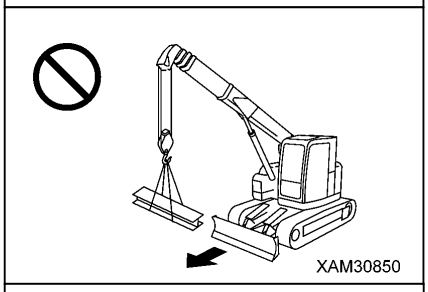
Be careful not to hook the wire rope over a tree or steel beam while working.

If it gets stuck with something, do not force by winding the wire. Untangle and then wind the wire.




**[9] DON'T OPERATE HOIST DURING TRAVELING**

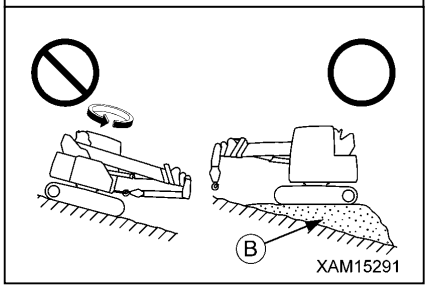
Pick and carry operations are very dangerous and may cause shaking of the hoisted load or overturning of the machine. Thus, it should be prohibited in general. Where such an operation is un-avoidable, refer to "Operation 3.25 Pick & Carry Operation" and strictly observe the safety precautions in it.




**[10] NO OPERATIONS ON SLOPE**

Crane operation on a slope may cause the machine to turn over. Basically do not implement crane operation on a slope. If you absolutely have to do it, place some earth fill (B) on the slope to make the ground leveled and hard, to prevent the machine from turning over, then place the machine on the ground.

Always check that the machine is level using the level gauge on the left side of operator's seat.






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# 3.25 PICK& CARRY OPERATION

## 3.25.1 SAFETY RRECAUTIONS FOR PICK & CARRY OPERATION

**⚠ DANGER**

**Pick and carry operation is a very unstable and dangerous practice; it is prohibited, in genreal. Where such an operation is un-avoidable, strictly adhere the limits in the "Rated total load table for pick and carry operation" and the specified pick and carry traveling posture. Also note that the "Rated total load table for pick and carry operation" only presents the load applicable to traveling on level and solid surface.**
**Any faulure to observe these safety precautions for pick and carry operation may cause an accident resulting in death or serious injury.**

### [1] NOTICE FOR THE RATED TOTAL LOAD FOR PICK AND CARRY OPERATION AND WORKING RANGE:

Strictly observe the rated total load as shown in the table below:

| Item | Description |
|---|---|
| Boom length | 10.5 meters (3 sections) or less |
| Rated total load | Refer to the "Rated total load table for pick and carry operation" |

### [2] NOTICE FOR THE OPERATING LOCATION:

In ground conditions or locations such as below, the machine must not enter or perform pick and carry operations, as they bring a risk of the machine overturning.

Always survey the road surface or the ground prior to operations and arrange a person to direct the correct path in any dangerous or low visible places.

- Slopes, soft surfaces such as damp grounds, grounds with many barriers, rough surface such as riverbeds, or grounds with many bumps to get over.
- Near a deep gutter or a shoulder of a road.
- In water or fords, snowy surfaces, or frozen roads.

### [3] NOTICE FOR OPERATIONS:

Operations as below shall be strictly avoided, which may cause a risk of overturning the machine.

Always be seated in the operator's compartment and exercise a pick and carry operation most carefully.

- Crane operations during traveling are strictly prohibited. Always keep the pick and carry posture as recommended.
- The load to hoist cannot be kept in an elevated position. Keep that hoisted load close to the surface so that shaking is avoided.
- Sudden start and stop, and sharp course change must be strictly avoided. They make the hoisted load shaking and cause a dangerous condition.
  Always set the travel speed selector switch to the "Low" position and keep the engine speed low to provide slow traveling.
- Strictly avoided travelling over bumps. Such practices may overturn the machine. Always make a detour to stay away from such bumps.



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## 3.25.2 POSTURE FOR PICK & CARRY OPERATION

**⚠ DANGER**

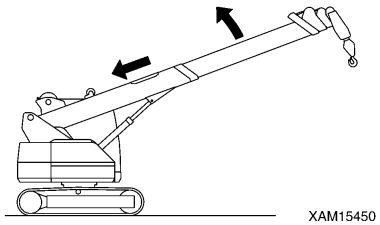
- **During pick and carry operations, keep the machine in "posture for pick and carry operation" as below:**
  - **Retract the boom to "10.5 meters" (3 sections) or less.**
  - **Swing the upper structure to the front and fix the boom at the center position.**
- **During pick and carry operations, any operation which may change the posture above must be strictly avoided. Otherwise, the machine may overturn and result in death or serious injury.**

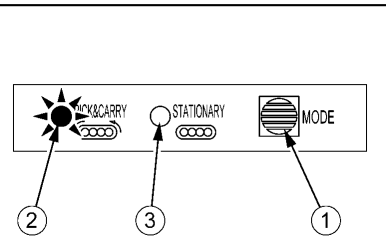
During pick and carry operations, keep the machine in the posture for pick and carry operation as shown in the figure right.

1. Refer to "Operation 3.20 Boom Extending/Retracting" and retract the boom to "10.5 meters" (3 sections) or less, accordingly.

2. Refer to "Operation 3.18 Winding/Un-winding Operation" and accordingly, lower the hoisted load until it nearly touches the ground.

3. Press this mode switch (1) in the moment limiter and keep pressing for 3 seconds or more.
   The operation mode is set to "Pick and Carry Mode" and "PICK&CARRY" LED (2) lights.

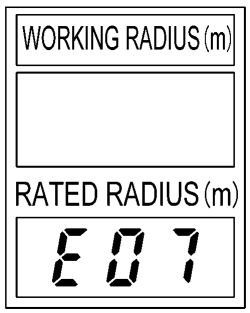

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### NOTES

- If the boom length is "10.6 meters" or longer and where Pick & Carry/ Stationary mode select switch is set to Pick & Carry mode or the travel levers are actuated, the buzzer sounds and the rated radius display is turned to an error code "E07".
  To select Pick & Carry mode, the boom length must be "10.5 meters" (i.e. 3 sections of the boom) or less.
- When the travel levers are actuated to right or left, Pick & Carry mode is automatically activated, over which, however, the Pick & Carry/ Stationary mode select switch setting takes precedence.



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### 3.25.3 PICK & CARRY OPERATION

**⚠ DANGER**

- **Refer to "Operation 3.25.1 Safety Precautions for Pick and Carry Operation" and always take care for the safety operation as provided.**
- **Crane operations during traveling are strictly prohibited. The machine may overturn.**
- **Always be seated in the operator's compartment during a pick and carry operation and exercise it most carefully.**
- **Prior to start travelng, check around the machine to assure the safety and toot the horn.**
- **Before shifitng the direction to forward or backward, or changing the lane, check around the machine to assure the safety and toot the horn.**
- **Always keep the engine speed low to provide slow and cautious traveling.**
  **Always keep sufficient distances away from other machines or structures so that collision of the machine or hoisted laod is avoided.**

1. Refer to "Operation 3.8 Start/Moving/Stopping Machine" and "Operation 3.9 Steering Machine" for traveling the machine.

2. Refer to "Operation 3.18 Hook Raising/Lowering Operation" and "Operation 3.19 Boom Derricking Operation" for crane operation. In this operation, keep the hoisted load at the height almost touching the ground to prevent it shaking.

**NOTES**

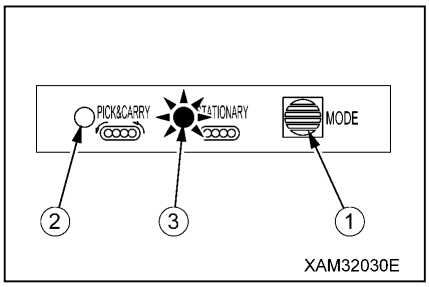
When the moment limiter auto-stop is triggered, a recovery operation is required as described in "Operation 2.4.3 [2] Recovery Operation after Auto Stop".

### 3.25.4 RELEASING PICK & CARRY OPERATION POSTURE

1. Refer to "Operation 3.8 Start and Stop Traveling" and "Operation 3.11 Parking" and park the machine accordingly.

2. Press the Pick and Carry/Stationary Mode Select Switch (1) in the moment limiter.
   The operation mode is set to "Stationary Mode" and "STATIONARY" LED (3) lights.

3. Refer to "Operation 3.7 Machine Traveling Posture" and change the machine to the traveling posture.






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# 3.26 OPERATION OF BLADE

## 3.26.1 PRECAUTION OF BLADE OPERATION

**⚠ WARNING**

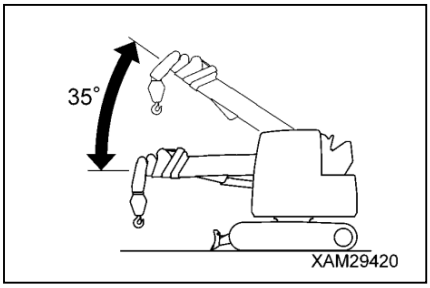
**[BASIC POSTURE OF THE BLADE]**

**• Always clear the Blade from the ground during the hoisting operation. Failure to do so may result a serious hazard including damaging the machine or it's tipping over.**

**• Avoid ground leveling operations at the same time as hoisting operations. Otherwise, it may cause a serious hazard including damaging the machine or it's tipping over.**

**• A basic posture as below shall be observed for ground leveling operations using the Blade.**
- **Keep the Blade ahead.**
- **Retract the boom to the minimum and stow the hook.**
- **Lower the boom to the range between "fully lowered to 35 degrees".**

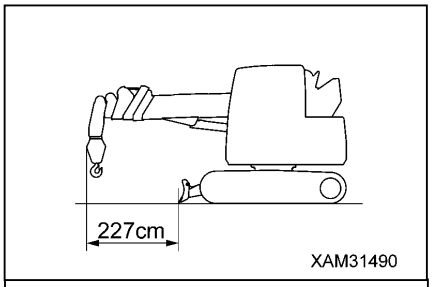
**Where the boom is raised in excess, the machine may tip over and result a serious hazard.**




**• Any leveling operations other than in the basic posture may cause the machine to tip over or damage to the wire rope which triggers a serious accident.**

**[SAFETY PRECAUTIONS FOR GROUND LEVELING]**

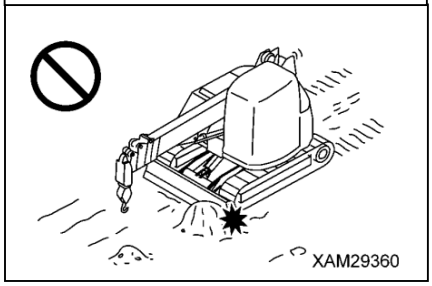
**• In the condition that the boom is "full lowered", it's end exceeds the Blade end by "227cm". It is essential to ensure that no obstacles lie ahead. Else, the boom may hit an obstacle and cause a critical accident.**




**• After leveling operations finish or during transportation, position the Blade to touch the ground. The Blade may lower down causing a critical accident due to a slack Blade cylinder or hydraulic system error.**

**• Do not attempt to travel backwards while the Blade is touching the ground. This can damage the hydraulic hose. The Blade may become inoperable.**

**• Avoid the Blade hitting obstacles such as stones and rocks.**
**Immediate damage of the Blade or cylinder may follow such an event.**






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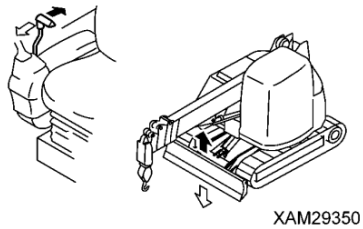
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### 3.26.2 OPERATION OF BLADE

**⚠ WARNING**

- **Always clear the Blade from the ground during the hoisting operation. Failure to do so may result a serious hazard including damaging the machine or it's tipping over.**
- **Avoid ground leveling operations at the same time as hoisting operations. Otherwise, it may cause a serious hazard including damaging the machine or it's tipping over.**

Shift back and forth the Blade control lever in the right side of the operator's seat to actuate the Blade.



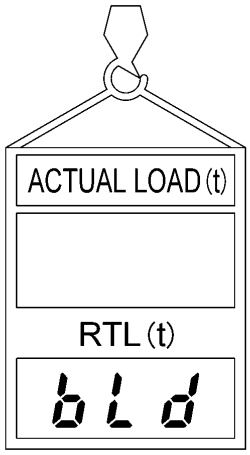
XAM29350

**CAUTION**

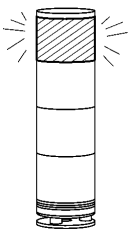
- **Indications and warning are issued against a load hoisting operation in a condition where the Blade is lowered and a certain load is imposed. At the same time, crane functions below are interrupted:**
  **Indications and warnings:**
  - **Rated total load display in the Moment limiter will blink and indicate "bld".**
  - **Buzzer sounds intermittently.**
  - **The red lamp of the rotary lamp lights.**

  **Functions to be interrupted:**
  - **Winch hoisting**
  - **Winch lowering**
  - **Boom derricking**
  - **Boom extending**

  **When a certain loading is applied to the Blade in addition to that of a load that is hoisted, the above conditions continue.**
  **Either clear the Blade from the ground or lowering the hoisted load on the ground will release these indications and warnings, then the crane resumes these functions.**
- **During traveling not for ground leveling operations, keep the Blade clear from the ground. Road surfaces may be damaged in such a condition.**




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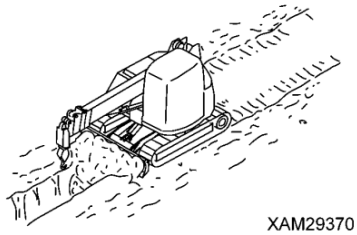
### 3.26.3 WORKING WITH A BLADE

#### [1] GROUND LEVELING

**⚠ WARNING**

**Secure the safety of surroundings, first.**
**Accident to other persons, the machine tipping over due to off-track, or the Main boom crashing may happen, to result in a serious hazard, including injury or death.**

The Blade is employed for ground leveling operations.



XAM29370



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# 4. HANDLING WIRE ROPES

## 4.1 BENCHMARK FOR REPLACING WIRE ROPES

**CAUTION**

- **The benchmark for replacing wire ropes is common to all the wire ropes for winching, telescoping the boom, and slinging.**
- **Measure the wire rope diameter at the section where the rope repeatedly passes through the sheave. Measure from three directions and average the value.**
- **Do not use old wire ropes even if they had not been used.**
- **See "Maintenance 8.5 [2] Replacement Winch Wire Ropes" for how to replace the wire rope.**
- **Contact us or our sales service agency for replacing/repairing the wire ropes.**

### [1] WIRE ROPE NOMINAL DIMENSION

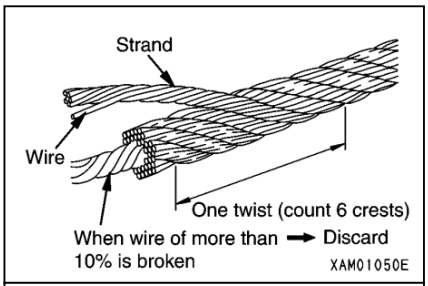
- Wire rope for winching : IWRC 6 x Ws (29) 0/0 $\phi$ 10 x115 m
- No. 5 wire rope for extending boom: IWRC 6 x Fi (29) 0/0 $\phi$ 10
- No. 5 wire rope for retracting boom: IWRC 6 x Fi (29) 0/0 $\phi$ 8

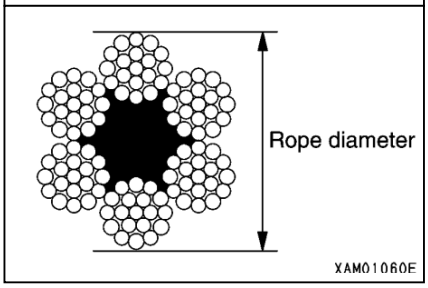
### [2] BENCHMARK FOR REPLACING WIRE ROPES

The wire rope fatigues as time goes by.

Change the wire ropes when they show the following signs.

1. Percentage of the snipped wires in total wires (except filler wires) in outer strands exceeds the ratio below:
   (1) 10% or more of the wires in one twist of the wire rope, or 5% or more when such nipped wires are in one single strand..
   (2) 20% or more of the wires in five twists of the wire rope.
2. The diameter of the wire rope is worn for 7 % or more of the nominal diameter.

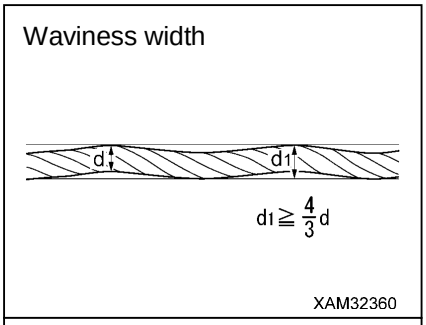


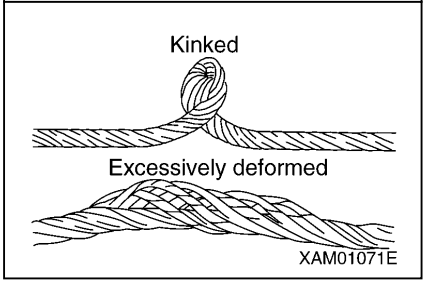




**NOTES**

- Change the 10-mm diameter wire rope when it is reduced to 9.4 mm.
- Change the 8 mm diameter wire rope when it is reduced to 7.5 mm.

3. The wire rope, corroded as below:
   (1) Wire surface has pitching and pitting.
   (2) Wires become slack due to internal corrosion.
4. Excessively deformed as below:
   (1) The rope is twisted and has some kinks.
   (2) Waviness width is 4/3d or more in a distance within 25 times of nominal diameter d.
   (3) The minimum diameter is 2/3 or less of the maximum diameter due to local pressure and being flattened.
   (4) Core wire or wire core projects.
   (5) Excessively curved.
   (6) Basket-like deformation.
   (7) A strand sinks inside.
   (8) One strand or more is slacked.
   (9) Wires project excessively.
5. The rope shows some abnormality at the terminals.






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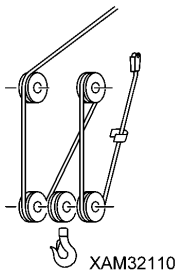
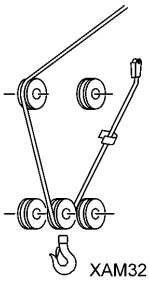
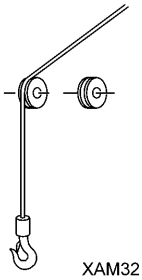
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## 4.2 WINCH WIRE ROPE FALL MODE AND RATED TOTAL LOAD

Number of wire rope falls of the hook block shall be determined based on the load to be hoisted, boom length and winching speed.

The load to one wire rope fall must be within "1500 kg" .

The table below shows the hook block types, wire rope falls and the rated total load in each condition:

| Type of Hook Blocks | For 2 or 4 Falls (Common) | For 2 or 4 Falls (Common) | For 1 fall (Exclusive) |
|---|---|---|---|
| Number of Wire Falls | 4 | 2 | 1 |
| Wire Rope Configuration |  XAM32110 |  XAM32130 |  XAM32140 |
| Rated total load | 6000 kg | 3000 kg | 1500 kg |
| Hook weight | 90 kg | 90 kg | 20 kg |



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## 4.3 What TO DO WITH TWISTED WINCH WIRE ROPE

**⚠ WARNING**

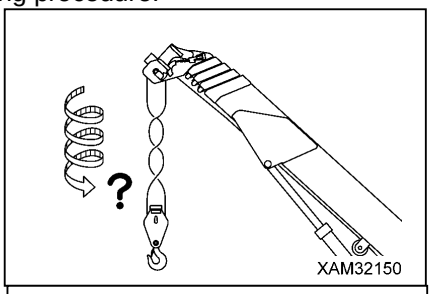
**Be sure to wear a pair of thick leather working gloves when handling wire ropes.**

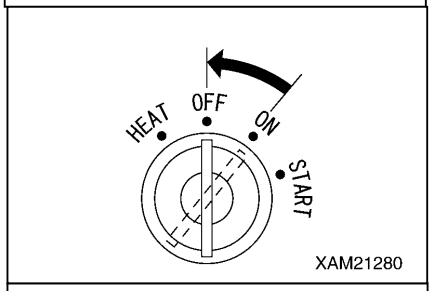
**CAUTION**

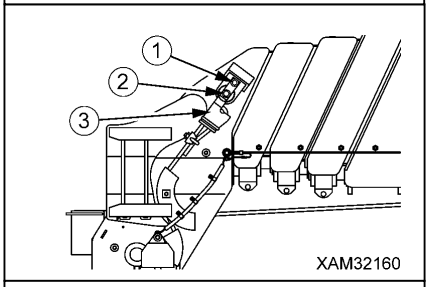
**Change the hooking direction of the wire rope (reverse the hook block side and winch drum side) from time to time to extend the life of the wire rope.**

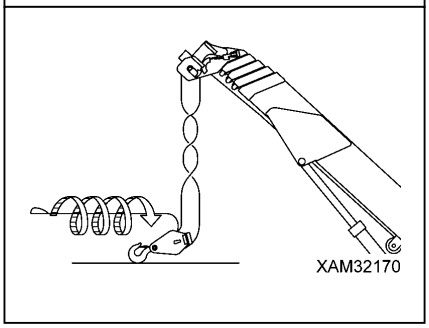
When the wire rope gets twisted, straighten the twist with the following procedure.

1. With the hook in normal condition, check the twisting direction and how many times the rope is twisted.
2. Operate the right work equipment control lever to RETRACT side (pull backward) to retract the boom to lower the boom fully.
3. Operate the right work equipment control lever to LOWERING (push outside) to lower the boom to approx. 20 degrees.
4. Operate the right work equipment control lever to UN-WINDING (push forward) to un-hoist the hook block until it nearly touches the ground, then operate the right work equipment control lever to LOWERING (push outside) to lower the boom so that the hook block reaches the ground, then lower the boom to the end.
5. Turn the starter switch to the OFF position to stop the engine.
6. Remove the securing bolt (1) to remove the wedge socket pin (2), and then remove wedge socket (3).
7. Twist the end of the wire for “n” (number of wire falls) times the number the hook is twisted, to in the opposite direction from the direction the hook block is twisted to and which you checked in the step 1 (opposite direction from the one the wire rope tries to go back to naturally when you release your hand from the wedge socket) and install the wire rope. Replace the wedge, socket, pin and bolt.
8. Start the engine and operate the right work equipment control lever to the RAISE side (pull toward you) to increase the boom angle to it’s maximum.
9. Operate the left work equipment control lever to the EXTEND (push forward) side to extend the boom to it’s maximum.
10. Operate the right work equipment control lever to repeat RAISING/LOWERING (forward/backward) the hook block for several times.
11. Tidily spool up the wire rope into the winch drum with some tension applied to the rope.
12. Repeat the above procedure until the hook is no longer twisted.




If the wire rope is still twisted after performing the procedure above, change with a new wire rope.



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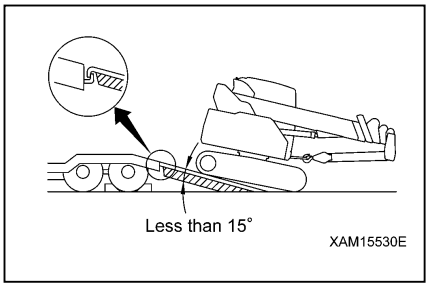
# 5. TRANSPORTATION

When transporting the machine, observe all related laws and regulations, and be careful to assure safety.

## 5.1 LOADING/UNLOADING

**⚠ WARNING**

- **See "Specifications 1.1 Specification List " in the Dimension for the dimensions and mass of the machine.**
- **Select and use the ramp boards that satisfy the following conditions.**
  - **Has the length that when placed, the angle from the track is 15 degrees or less.**
  - **Has the width no narrower than the rubber tracks.**
  - **Has the thickness and strength that can fully withstand the mass of the machine.**
- **Be sure to place the ramp boards perpendicular to the truck box. Also, match the center of the each of the tracks with the center of corresponding ramp board. Misguided ramp boards and unmatched tracks may cause the machine to slip off of the ramp boards and cause serious accidents.**




- **Always put the machine in the “traveling posture” when loading/unloading the machine. See “Operation 3.7 Machine Traveling Posture” for traveling posture.**
- **Always turn the auto-deceleration switch OFF (cancel). If the auto-deceleration switch is left ON, the machine, when operated will move suddenly.**
- **Always set the travel speed selector switch to low speed (Lo), run the engine at low idling, and operate the machine slowly when loading and unloading.**
- **Always load the machine by moving backward. Moving forward involves overturning hazard. The operator must be on the back side of the truck.**
- **Always unload the machine by moving forward. Moving backward involves overturning hazard. The operator must be on the back side of the truck.**
- **Loading/Unloading the machine involves danger. Be extremely careful.**
- **Select flat and solid ground for loading/unloading the machine. Keep sufficient distance from the ground shoulders.**
- **Remove dirt around the crawlers to prevent side slip of the machine on the ramp boards. Remove any materials on the loading ramps such as snow, ice, grease, and oil.**
- **Never change direction on the ramp boards. Go down from the ramp board, and then change the direction.**
- **The center of gravity of the machine will change suddenly at the point between the ramps and the trailer, and there is danger of the machine losing it’s balance. Travel slowly over this point.**
- **Always check that the sliding door of the cab is at the LOCK position, regrardless of whether the door is open or closed. If the door is opend or closed when the machine is on the ramps or on the trailer platform, there is danger that the operating effect for opening or closing the door may suddenly change.**

Always put the machine in the “traveling posture” when loading/unloading the machine. Always use ramp boards or forwarding blocks when loading/unloading the machine and use the following procedure.



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### 5.1.1 LOADING

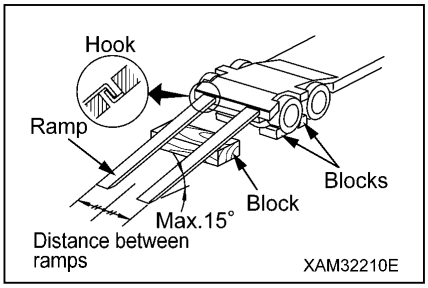
1. Load and unload on firm level ground only. Maintain a safe distance from the edge of a road.

2. Apply the trailer brakes securely, then put blocks under the tires to prevent the trailer from moving.

3. Secure the ramp boards in a way that the center of the trailer and the machine match.

**NOTES**

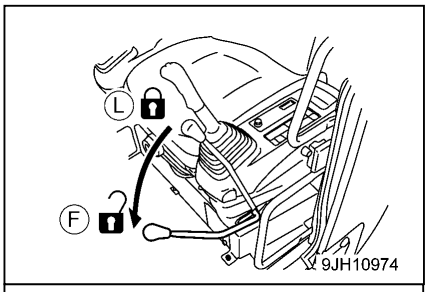
- Set left and right ramps parallel to each other and equally spaced to the left and right of center of the trailer.
- Make angle of installation a maxmum of 15 degrees.
- Hang hook of the ramp securely to hook holder of the tailer.
- If the ramps bend a large amount under the weight of the machine, put blocks under the ramps to prevent them from bending.



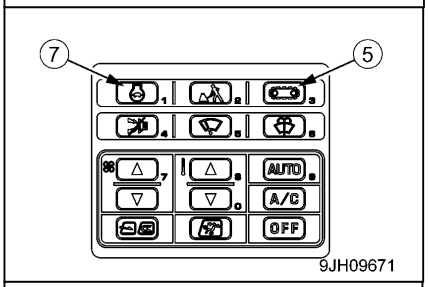

4. Start the engine. Warm the engine up fully.

5. Set the lock lever to FREE position (F).

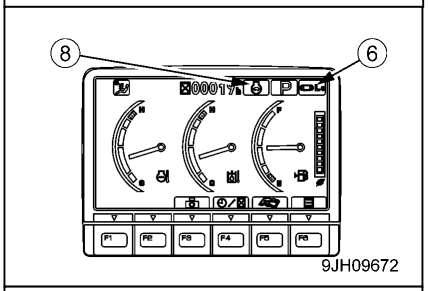
6. Operate blade lever to raise the blade.



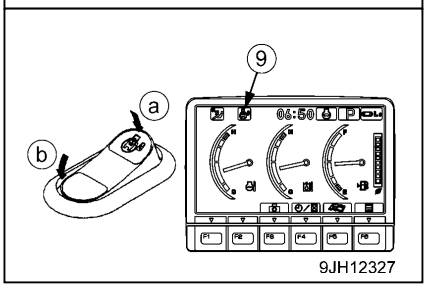

7. Turn the travel speed selector switch (5) to low speed travel range (Lo monitor lights up).
   Press travel speed selector switch (5) to switch the travel speed range. The travel speed range (Lo, Hi) is displayed on the travel speed monitor (6).




8. Turn the auto-deceleration switch (7) OFF and operate the fuel control dial to set the engine speed to low idling.
   Each time auto-deceleration switch (7) is pressed, it switches OFF → ON → OFF in turn.
   When auto-deceleration switch (7) is turned OFF, the auto-deceleration monitor (8) goes out.




9. Turn the swing lock switch ON to apply the swing lock.
   When the swing lock switch is turned to the ON position, the swing lock monitor (9) lights up.
   - (a): ON position
   - (b): OFF position





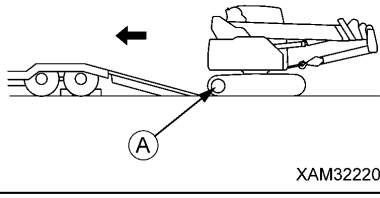

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10. Before moving onto the ramps, make sure that the machine is positioned in a straight line with the ramps and that the centerline of the machine matches that of the trailer.

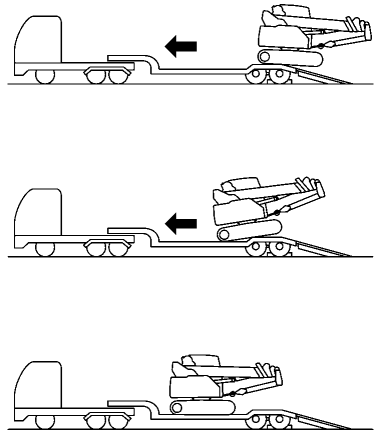
11. Align the direction of travel with the ramps and travel slowly. When on the ramps, operate only the travel. Do not operate any other lever.

12. When the machine travels over the rear wheels of the trailer, it becomes unstable, drive slowly and carefully. Never operate the steering.

13. At the moment the machine passes the rear wheels, it tilts backward, be careful not to let the crane hit the trailer body, Drive the machine backward to the specified position, then stop the machine.



XAM32220


XAM32230



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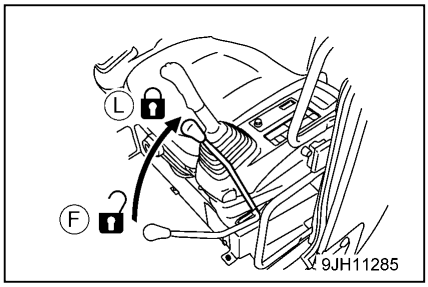
## 5.1.2 SECURING MACHINE

**CAUTION**

**Stow the radio antenna. Reassemble the mirrors so that they are within the width of the machine.**

After placing the machine on the specified position of the trailer, secure it according to the following procedure.

1. Operate blade control lever to lower the blade.

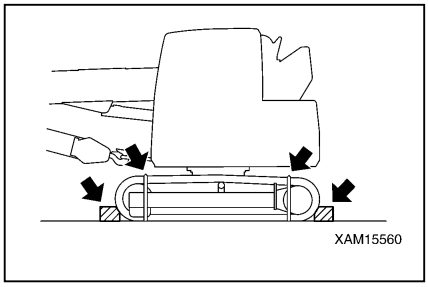



2. Set the lock lever securely to the LOCK position (L).

3. Stop the engine, and then remove the key from the starter switch.

4. Close all doors, windows, and covers. Lock covers, caps, and doors fitted with locks.

5. Place blocks under both ends of the tracks to prevent the machine from moving during transportation, and secure the machine with chains or wire ropes of suitable strength.
   Be particularly careful to secure the machine in position so that it does not slip to the side.

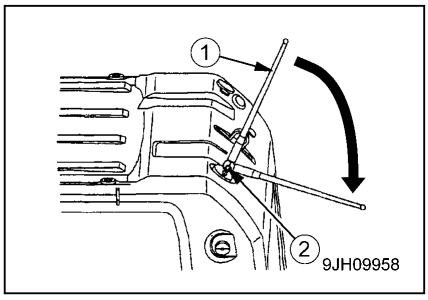



**NOTES**

When securing the machine, put blocks between the wire rope and the machine to prevent damage to the rope or machine.

**[STOWING RADIO ANTENNA]**

- Loosen bolt (2) of radio antenna (1) at the rear of the cab, lower the antenna (1), then tighten bolt (2) again to secure radio antenna (1) in position.
- When unloading the machine from the trailer and operating it, follow the opposite procedure from stowing to set radio antenna (1) vertical, then secure it in position with bolt (2).






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### 5.1.3 UNLOADING

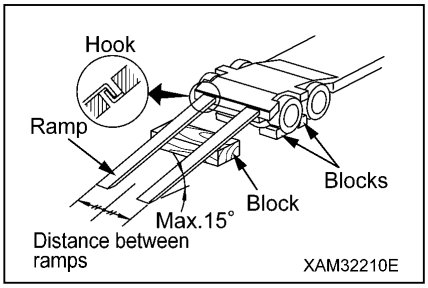
1. Load and unload on firm level ground only. Maintain a safe distance from the edge of a road.

2. Apply the trailer brakes securely, then put blocks under the tires to prevent the trailer from moving.

3. Secure the ramp boards in a way that the center of the trailer and the machine match.

**NOTES**

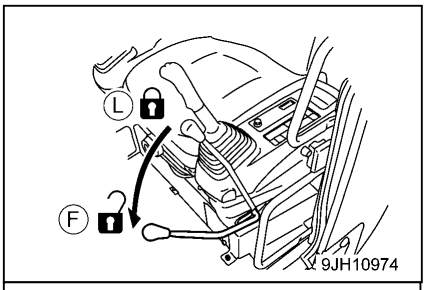
- Set left and right ramps parallel to each other and equally spaced to the left and right of center of the trailer.
- Make angle of installation a maxmum of 15 degrees.
- Hang hook of the ramp securely to hook holder of the tailer.
- If the ramps bend a large amount under the weight of the machine, put blocks under the ramps to prevent them from bending.




4. Remove the chains and wire ropes fastening the machine.

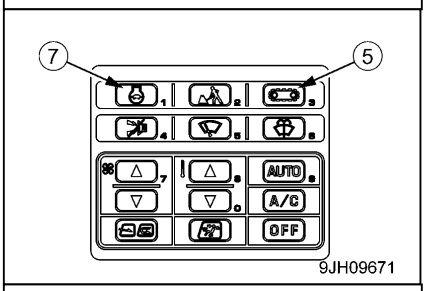
5. Start the engine. Warm the engine up fully.

6. Set the lock lever to FREE position (F).

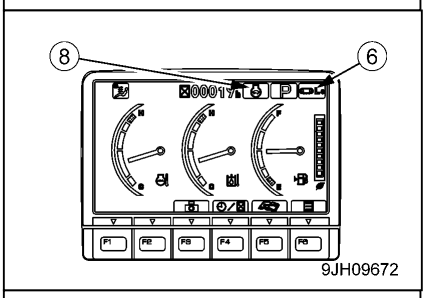



7. Operate blade lever to raise the blade.

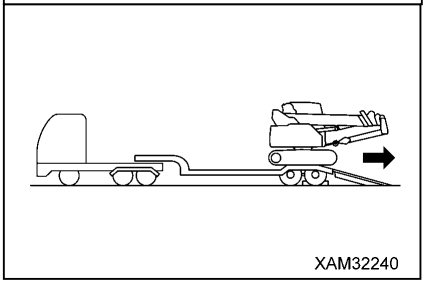
8. Turn the travel speed selector switch (5) to low speed travel range (Lo monitor lights up).
   Press travel speed selector switch (5) to switch the travel speed range. The travel speed range (Lo, Hi) is displayed on the travel speed monitor (6).




9. Turn the auto-deceleration switch (7) OFF and operate the fuel control dial to set the engine speed to low idling.
   Each time auto-deceleration switch (7) is pressed, it switches OFF → ON → OFF in turn.
   When auto-deceleration switch (7) is turned OFF, the auto-deceleration monitor (8) goes out.




10. Align the direction of travel with the ramps and travel slowly. When unloading on the ramps, operate only the travel. Do not operate any other lever.






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# 5.2 LIFTING MACHINE

## 5.2.1 LIFTING UP THE MACHINE IN THE BOOM LOWERED POSTURE

**⚠ DANGER**

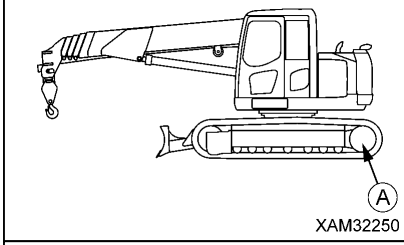
- **See "Specifications 1.1 Specification List " in the Dimension for the dimensions and mass of the machine.**
- **The operator carrying out the lifting operation using a crane must be a properly qualified crane operator.**
- **Never raise the machine with any worker on it.**
- **Always make sure that the wire ropes, and shackle are of amples strength for the weight of this machine.**
- **When lifting, keep the machine horizontal.**
- **During the lifting up practice, always set the lock lever to the LOCK position to prevent the machine from a sudden move.**
- **Never go in the area under or around the machine when it is raised.**
- **The procedure and the scheme for slinging (i.e. slinging wire ropes shall be put through between the first and second track rollers from the front end and first and second from the rear end) other than as specified below must be in no event practiced for lifting up the machine. If such a practice is un-avoidable, please contact us or our sales service agency.**

**CAUTION**

- **This practice for lifting up is available both for standard machine configuration and fly-jib configuration, provided that the fly-jib is stowed in the side of the boom, when equipped.**
- **Use specific sling instruments for lifting up the machine and 2 wire ropes of the same specifications, as well. In addition, avoid that the sling wire ropes touch the machine body during lifting up.**
  - **Wire ropes: Breaking load: 24.5 tons or more, dia.22.4mm X 8.5m or better.**
- **When the machine is lifted up in it's boom lowered posture, make sure that the hook block is in the temporary stowage position. Refer to "Operation 3.7 Machine Traveling Posture" for details.**

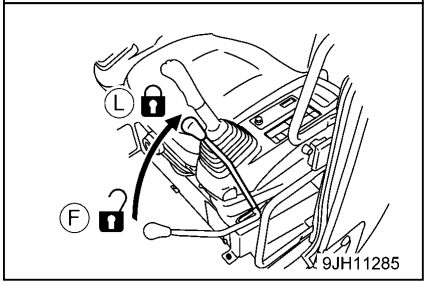
When lifting the machine, carry out the operation on firm level ground only as follows.

1. Put the machine in the "traveling posture" as shown in the diagram on the right.




2. Operate blade control lever to lower the blade.

3. Set the lock lever securely to the LOCK position (L).




4. Stop the engine, and then remove the key from the starter switch. Then check that there is nothing around the operator's compartment and get off the machine.

5. Close all doors, windows, and covers. Lock covers, caps, and doors fitted with locks.



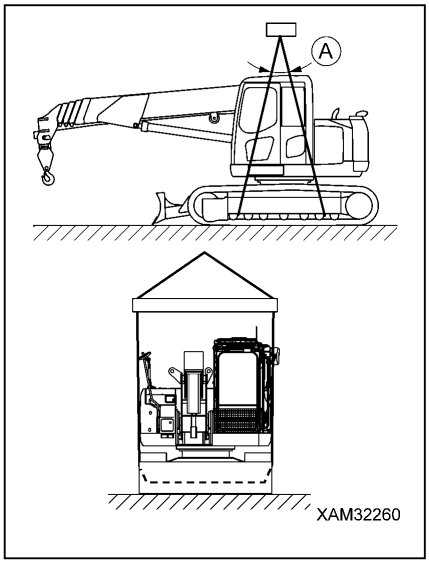
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6. Pass wire ropes between the 1st and 2nd track rollers from the front and between the 1st and 2nd track rollers from the rear.

7. Put blocks between the wire rope and the machine to prevent damage to the rope or machine.

8. Keep the angle of sling wire ropes within a range of 30 to 40 degrees and lift up slowly.




| NOTES |
| --- |
| After the machine comes off the ground, check the hook condition and the lifting posture, and then lift slowly. |



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## 5.2.2 LIFTING UP THE MACHINE IN THE BOOM RAISED POSTURE

**⚠ DANGER**

- **See "Specifications 1.1 Specification List " in the Dimension for the dimensions and mass of the machine.**
- **The operator carrying out the lifting operation using a crane must be a properly qualified crane operator.**
- **Never raise the machine with any worker on it.**
- **Use sling instruments for lifting up the machine, including wire ropes or shackles, with sufficient load intensity for the mass of the machine.**
- **When lifting, keep the machine horizontal.**
- **When carrying out lifting operations, set the lock lever to the LOCK position to prevent the machine from moving unexpectedly.**
- **Never go in the area under or around the machine when it is raised.**
- **The procedure and the scheme for slinging (i.e. put in the holes in two brackets in each left and right side of the crane frame) other than as specified below must be in no event practiced for lifting up the machine. If such a practice is un-avoidable, please contact us or our service agency.**

**CAUTION**

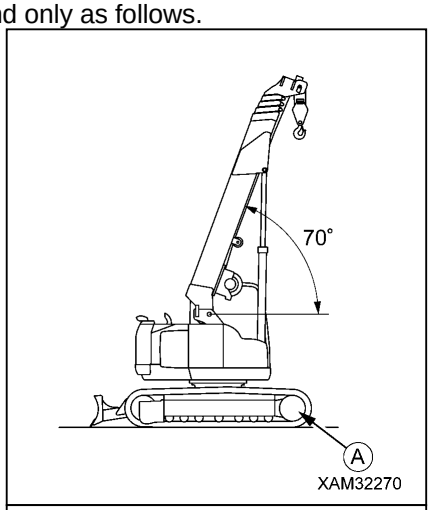
- **This practice for lifting up is available both for standard machine configuration and fly-jib configuration, provided that the fly-jib is stowed in the side of the boom, when equipped.**
- **Use 2 sling wire ropes and shackles of the same specifications, for lifting up the machine.**
  - **Wire ropes: Breaking load: 78.9 tons or more, dia.37.5mm X 6.9m or better.**
  - **Shackles: Using load: 14.0 tons or more**
- **When the machine is lifted up in it's boom raised posture, make sure that the hook block is in the temporary stowage position. Refer to "Operation 3.7 Machine Traveling Posture" for details.**

When lifting the machine, carry out the operation on firm level ground only as follows.

1. Retract the boom to the minimum length, then derrick it up to 70 degrees. Stow the hook block to the temporary position.

2. Swing the upper structure so that the sprocket (A) comes to the front side of the upper structure.

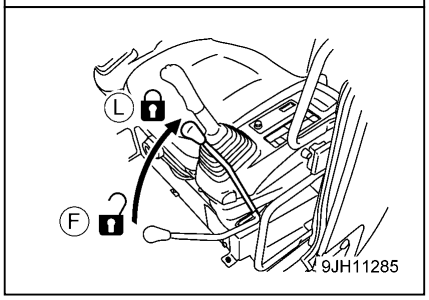
3. Operate blade control lever to lower the blade.




4. Set the lock lever securely to the LOCK position (L).

5. Stop the engine, and then remove the key from the starter switch.

6. Close all doors, windows, and covers. Lock covers, caps, and doors fitted with locks.



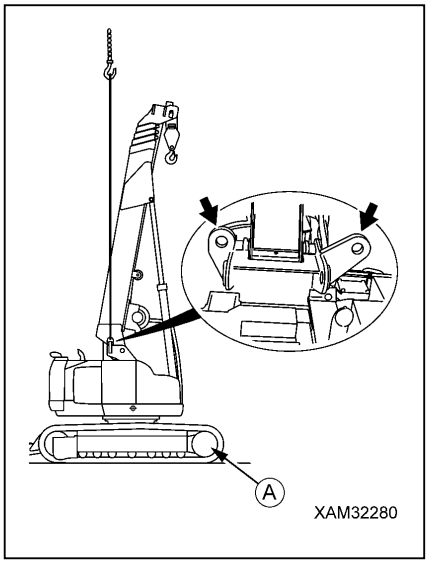



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7. Fix shackles to 2 brackets in the left and right sides of the crane frame, then attach the slinging wire ropes.

| NOTES |
| --- |
| Apply appropriate pads to the locations in which the slinging wire rope may touch the machine, prior to lifting up. |




8. Lift the machine slowly.

| NOTES |
| --- |
| • After the machine comes off the ground, check the hook condition and the lifting posture, and then lift slowly.<br>• Verify that there is no posture change caused by the leakage from the hydraulic circuit on the derricking cylinder head side when the machine is hoisted.<br>• When the machine in the standard configuration is lifted up, it leans about 3 degrees backward and about 3 degrees to the operator's compartment side. Such angle of leaning may slightly vary in accordance with the boom angle and remaining fuel.<br>• When the machine in the fly-jib configuration is lifted up, it leans about 2 degrees to the backward and about 1.5 degrees to the operator's compartment side. Such angle of leaning may slightly vary in accordance with the boom angle and remaining fuel. |

## 5.3 TRANSPORTATION PROCEDURE

| ⚠ WARNING |
| --- |
| **Take road width, height, and weight into consideration in determining the transportation route.** |

If there are applicable local laws and regulations, observe these laws and regulations for safe transportation.

If not, contact us or our sales service agency.



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# 6. HANDLING IN COLD WEATHER

## 6.1 PREPARING FOR LOW TEMPERATURE

When the temperature goes down, the machine may start to have some difficulty in starting. Take the following actions.

**[1] LUBRICATION**

Change the oil to one with a low viscosity. See “Maintenance 7.1 Use of Lubricating Oil According to Temperature” for the specified viscosity.

**[2] COOLING SYSTEM COOLANT**

**⚠ WARNING**

- **Antifreeze is flammable. Do not bring any flame close. Do not smoke when handling antifreeze.**
- **Antifreeze is toxic. Be careful not to get it into your eyes or on your skin. If it should get into your eyes or on your skin, wash it off with large amounts of fresh water and see a doctor at once.**
- **When changing the coolant or when handling coolant containing antifreeze that has been drained when repairing the radiator, please contact us or our sales service agency or request a specialist company to carry out the operation. Antifreeze is toxic. Do not let it flow into drainage ditches or spray it onto the ground surface.**

**CAUTION**

**Never use antifreeze with methanol, ethanol, or propanol-based antifreeze.**

See “Maintenance 10.2 Irregular Maintenance [4] Cleaning Engine Cooling System” for the cooling water replacement period and mixing rate of antifreezing fluid.



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### [3] BATTERY

**⚠ WARNING**

- **The battery generates flammable gas. Do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with a large amount of water and consult a doctor.**
- **If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that the battery may explode.**
- **Battery electrolyte is toxic. Do not let it flow into drainage ditches or spray it on the ground surface.**

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%. Insulate it against cold temperature to ensure the machine can be started easily the next morning.

**NOTES**

Measure the specific gravity and calculate the charging rate from the following conversion table.

| | | Electrolyte Temperature (degrees C) | | | |
|---|---|---|---|---|---|
| | | 20 | 0 | -10 | -20 |
| Charging Rate (%) | 100 | 1.28 | 1.29 | 1.30 | 1.31 |
| | 90 | 1.26 | 1.27 | 1.28 | 1.29 |
| | 80 | 1.24 | 1.25 | 1.26 | 1.27 |
| | 75 | 1.23 | 1.24 | 1.25 | 1.26 |

### [4] AFTER DAILY WORK COMPLETION

To prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move on the following morning, observe the following precautions.

- remove all the mud and water from the machine body. In particular, wipe the hydraulic cylinder rods clean to prevent damage to the seal caused by mud, dirt, or drops of water on the road from getting inside the seal.
- Park the machine on hard, dry ground. If this is impossible, park the machine on boards. The boards prevent the tracks from freezing to the ground, and allow the machine to be moved the next morning.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- Fill the fuel tank to max. capacity. This minimizes moisture condensation in the tank when the temperature drops.
- As the battery capacity drastically drops in low temperatures, cover or remove the battery from the machine, store the battery in a warm place, and install it again the next morning.
- If the electrolyte level is low, add distilled water in the morning before beginning work. Do not add water after the day's work to prevent diluted electrolyte in the battery from freezing during the night.

### [5] AFTER COLD WEATHER SEASON

When the season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.
  For details, see "Maintenance 7.1 Use of Lubricating Oil According to Temperature" .



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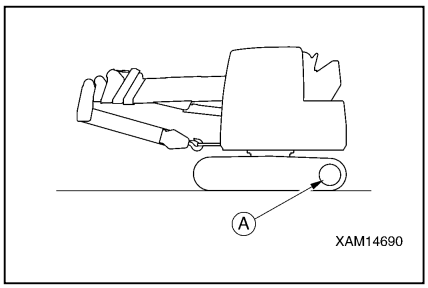
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# 7. LONG TERM STORAGE

## 7.1 BEFORE STORAGE MACHINE

**CAUTION**

**The machine shall take the posture shown in the figure on the right during the long-term storage to protect the cylinder rod. See "Operation 3.7 Machine Traveling Posture" for traveling posture. (To prevent rust on the cylinder rod)**




The custody practice for one month or longer, shall be as follows:

- Clean and wash all parts, then store the machine indoors. If the machine has to be stored outdoors, select level ground and cover the machine with a sheet.
- Completely fill the fuel tank. This prevents moisture from collecting.
- Lubricate and change the oil before storage.
- Coat the exposed portion of the hydraulic cylinder piston rod with grease.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- If the temperature will go down to 0 degrees C or below, add antifreeze. Ask us or our sales service agency for the mixing quantity of the antifreeze.

## 7.2 DURING STORAGE

**⚠ WARNING**

**If it is necessary to perform the rust-prevention operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.**

- During storage, operate and move the machine for a short distance once a month so that a new film of oil will coat moving parts. At the same time, also charge the battery.
- When operating the crane, wipe off all the grease from the hydraulic cylinder rods.
- Operate the air conditioner for 3 to 5 minutes once a month to lubricate all parts of the air conditioner compressor. Always run the engine at low idle when doing this. In addition, check the refrigerant level twice a year.

## 7.3 AFTER STORAGE

**CAUTION**

**If the machine has been stored without carring out the monthly rust-prevention operation, consult us or our sales service agency before using it.**

When using the machine after long-term storage, do as follows before using it.

- Remove the drain plug of the fuel tank, hydraulic oil tank, and engine oil pan to drain any water.
- Add oil and grease at all lubrication points.
- Wipe of the grease from the hydraulic cylinder piston rods.
- Remove the cover over the battery (install the battery to the machine if dismounted for storage). Check the electrolyte level and specific gravity, and then connect the battery cable from the negative side.
- Carefully perform the check before starting operation and warm-up operation. Carefully check the various parts of the machine.



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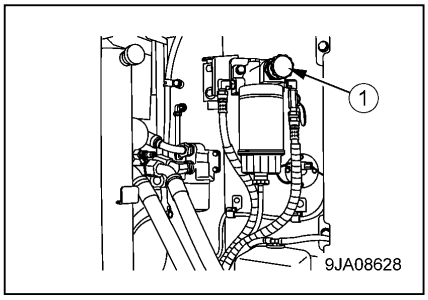
# 8. TROUBLES AND ACTIONS

## 8.1 RUNNING OUT FUEL

When starting the engine again after running out of fuel, fill with fuel, then bleed the air from the fuel system before starting the engine.

**[PROCEDURE FOR BLEEDING AIR]**

1. Loosen the knob (1) of feed pump, pull it out, and then pump it in and out until the movement becomes heavy.




| NOTES |
|---|
| It is not necessary to remove the plug at the top of the fuel prefilter and fuel main filter. |

2. Push in the knob (1) of feed pump and tighten it.
3. Start the engine.

| NOTES |
|---|
| When doing this, do not turn the starter motor continuously for more than 20 seconds. If the engine does not start, wait for at least 2 minutes, then try again. Perform this operation a maximum of 4 times. |

## 8.2 PHENOMENA THAT ARE NOT FAILURES

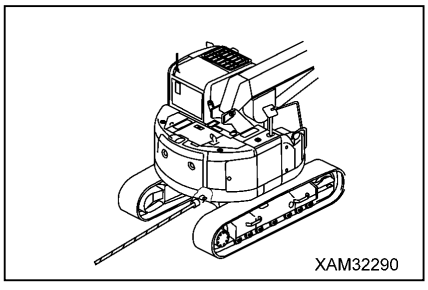
Note that the following phenomena are not failures:

- Some noise from around valves when boom is fully retracted and the boom telescoping cylinder is released at retracted position.
- When starting or stopping the swing, noise will be emitted from the brake valve.
- When going down a steep slope at low speed, a noise will be emitted from the travel motor brake valve.

## 8.3 LIGHTWEIGHT TOWING HOOK

| ⚠ WARNING |
|---|
| **• A shackle must always be used, when connecting the wire rope.**<br>**• Hold the wire rope level and direct it straight to the track frame.**<br>**• Move the machine slowly and be careful not to apply any sudden load to the wire rope.** |

There is a hole in the track frame to fit the shackle when towing light objects.




| NOTES |
|---|
| Permissible towing load: Max. 65,700 N (6,700 kg) |



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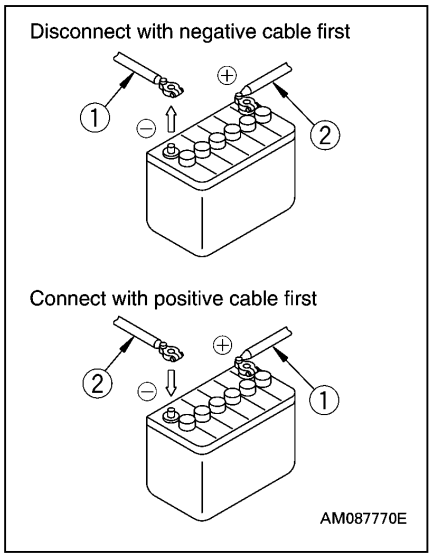
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# 8.4 DISCHARGED BATTERY

## 8.4.1 CAUTIONS IN BATTERY HANDLING

**⚠ WARNING**

- **It is dangerous to charge a battery when mounted on a machine. Make sure that it is dismounted before charging.**
- **When checking or handling the battery, stop the engine and turn the starter switch key to the OFF position.**
- **The battery generates hydrogen gas, so there is a hazard of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.**
- **Battery electrolyte is dilute sulfuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, immediately wash it off with a large amount of water. If it gets in your eyes, wash it out with fresh water and consult a doctor.**
- **When handling batteries, always wear safety glasses and rubber gloves.**
- **When removing the battery, first disconnect the cable from the ground (normally the negative (-) terminal). When installing, install the positive (+) terminal first. If a tool touches the positive terminal and the chassis, there is danger that it will cause a spark, so be extremely careful.**
- **If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion.**
- **Secure the battery when changing the battery to prevent the battery from being displaced. If it is not secured, the terminals will slacken, causing sparks.**
- **When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.**




Observe the followings when handling the battery.

- Always try to keep the battery charged.

  The battery should not be charged quickly after being discharged. Measure the specific gravity of the battery fluid in advance and charge the battery as needed.

  Keeping the battery in the best condition lengthens the life of the battery.
- Check the electrolyte level earlier than regular check and maintenance schedule during the hot season.
- The battery ability remarkably drops during the cold season. Keep the charging rate as close to as 100 % and try to keep it warm for starting the operation next morning.



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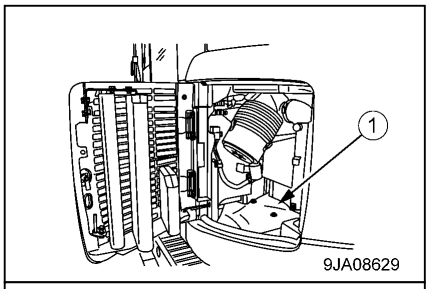
## 8.4.2 BATTERY REMOVAL AND INSTALLATION

**CAUTION**

**After securing the battery, check that it does not move. If it moves, tighten it again securely.**

**[REMOVAL]**

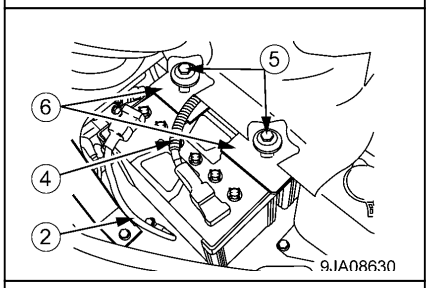
1. Open the battery room door, then move vinyl cover (1) (installed on top of the battery).



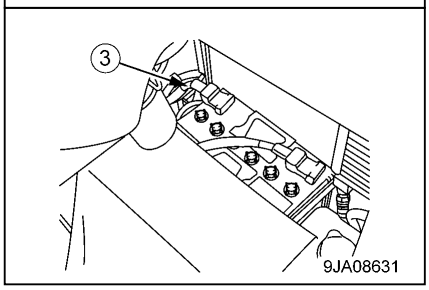

2. Remove cable (2) from the negative (-) terminal (ground).

3. Remove connection cable (4) and cable (3) from the positive (+) terminal.

4. Remove 2 mounting bolts' (5), then remove mounting holder (6) and vinyl cover (1).




5. Pull the battery to the outside of the machine.




**[INSTALLATION]**

1. Place the battery in the specified position.
2. Set mounting holder (6) and vinyl cover (1) to the battery, and tighten mounting bolts (5) securely.
   ★Mounting bolt tightening torque: 9.8 to 19.6 N• m (1 to 2 kgf• m)
3. Connect cable (3) at the positive (+) terminal end.
4. Connect connection cable (4) from the (+) terminal.
5. Connect cable (2) to the negative (-) terminal end (ground).

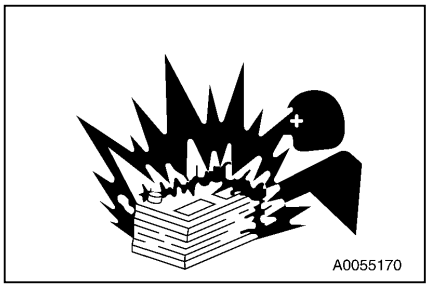


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## 8.4.3 CAUTIONS IN BATTERY CHARGING

When charging the battery, if the battery is not handled correctly, there is a hazard that the battery may explode. Always follow the instructions of "Operation 8.4.1 Cautions In Battery Handling" and the instruction manual accompanying the charger, and do as follows.




- Set the voltage of the charger to match the voltage of the battery to be charged. If the correct voltage is not selected, the charger may overheat and cause an explosion.
- Connect the positive (+) charger clip of the charger to the positive (+) terminal of the battery, then connect the negative (-) charger clip of the charger to the negative (-) terminal of the battery. Be sure to attach the clips securely.
- Set the charging current to 1/10 of the value of the rated battery capacity; when carrying out rapid charging, set it to less than the rated battery.
  If the charger current is too high, the electrolyte will leak or dry up, and this may cause the battery to catch fire and explode.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a danger that this will ignite the battery electrolyte and cause the battery to explode.
- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.



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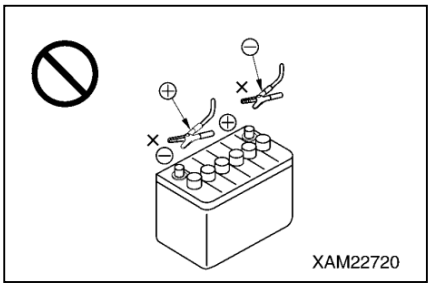
## 8.4.4 STARTING ENGINE WITH BOOSTER CABLE

When starting the engine with a booster cable, do as follows.

### [1] PRECAUTIONS FOR CONNECTING AND DISCONNECTING BOOSTER CABLE

**⚠ WARNING**

- **When connecting the cables, never contact the positive (+) and negative (-) terminals.**
- **When starting the engine with a booster cable, always wear safety glasses and rubber gloves.**
- **Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery. If hydrogen gas explodes, it could cause serious injury.**
- **Be careful not to make a mistake when connecting a booster cable.**
  **In the last connection (to the upper structure frame), a spark will be caused, connect the cable to a spot as far away from the battery as possible. (Avoid the crane, however, because it is not a good conductor)**
- **When removing the booster cable, exercise good care so that the booster cable clips may not contact each other, or they contact the chassis.**



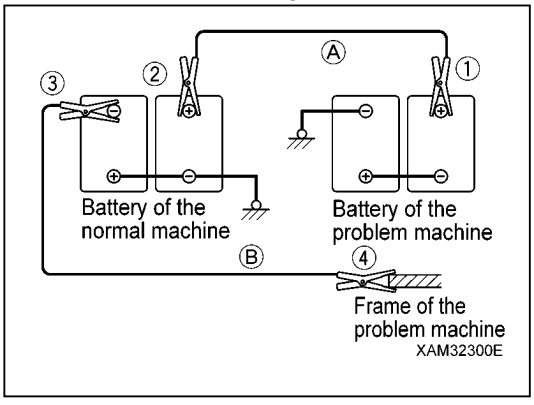

**CAUTION**

- **The size of the booster cable and clip should be suitable for the battery size.**
- **The battery of the normal machine must be the same capacity as that of the engine to be started. The starting system for this machine uses 24 V. For the normal machine, also use a 24 V battery.**
- **Check the cables and clips for damage or corrosion.**
- **Make sure that the cables and clips are firmly connected.**
- **Check that the lock levers of both machines are in the LOCK position.**
- **Check that each lever is in the NEUTRAL position.**

### [2] BOOSTER CABLE CONNECTION

Connect the booster cable as follows, in the order of the numbers marked in the diagram.

1. Keep the starter switch of the normal machine and problem machine in the OFF position.
2. Connect the clip of booster cable (A) to the positive (+) terminal of battery on the problem machine.
3. Connect the clip at the other end of booster cable (A) to the positive (+) terminal of battery on the normal machine.
4. Connect the clip of booster cable (B) to the negative (-) terminal of battery on the normal machine.
5. Connect the other clip of booster cable (B) to the upper structure frame of the problem machine.






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### [3] STARTING ENGINE

**⚠ CAUTION**

**Always check that the lock lever is set to the LOCK position, regardless of whether the machineisworking normal or has failed. Check also that all the control levers are at the HOLD or NEUTRAL position.**

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and run it at high idle speed.
3. Turn the starter switch of the problem machine to the START position and start the engine.
   If the engine doesn't start at first, try again after 2 minutes or so.

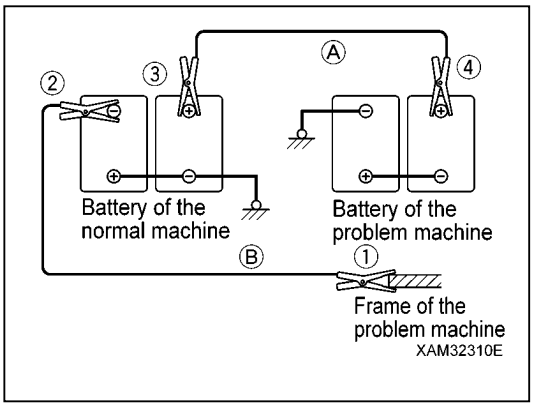
**NOTES**

For details of the engine starting, see "operation 3.3 Starting Engine".

### [4] BOOSTER CABLE DISCONNECTION

After the engine has started, disconnect the booster cables in the reverse of the order in which they wear connected.

1. Remove one clip of booster cable (B) from the upper structure frame of the problem machine.
2. Remove the clip of booster cable (B) from the negative (-) terminal of battery on the normal machine.
3. Remove the clip of booster cable (A) from the positive (+) terminal of battery on the normal machine.
4. Remove clip of booster cable (A) from the positive (+)terminal of battery on the problem machine.






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# 8.5 OTHER TROUBLE

## 8.5.1 ELECTRICAL SYSTEM

• ★: Always contact us or our sales service agency when dealing with these items.

• In causes of problems or causes which are not listed blow, contact us or our sales service agency for repairs.

| Problem | Main causes | Remedy |
|---|---|---|
| Lamp does not glow brightly even when the engine runs at high speed | • Defective wiring, deterioration of battery<br>• Loose fan belt<br>• Defective alternator | ★Check, repair, loose terminals, disconnections, replace battery<br>★Replace fan belt, Check tension<br>★Replace |
| Lamp flickers while engine is running | | |
| Charge level monitor does not go out even when engine is running | • Defective alternator<br>• Defective wiring<br>• Loose fan belt | ★Replace<br>★Check, repair<br>★Replace fan belt, Check tension |
| Abnormal noise is generated from alternator | • Defective alternator | ★Replace |
| Starter motor does not turn when starter switch is turned to START | • Defective wiring<br>• Defective starter motor<br>• Insufficient battery charge | ★Check, repair<br>★Replace<br>• Charge |
| Pinion of starter motor keeps going and out | • Insufficient battery charge<br>• Defective safety relay | • Charge<br>★Replace |
| Starter motor turns engine sluggishly | • Insufficient battery charge<br>• Defective starter motor | • Charge<br>★Replace |
| Starter motor disengages before engine starts | • Defective wiring, defective ring gear and pinion<br>• Insufficient battery charge | ★Check, repair<br>• Charge |
| Starter motor turns but engine does not start | • Defective engine controller power supply circuit<br>• Defective relay<br>• Defective connector at engine end | ★Replace<br>★Replace<br>★Check, repair for loose, missing connector or disconnection |
| Engine pre-heating monitor does not light up | • Defective wiring<br>• Defective heater relay<br>• Defective monitor | ★Check, repair<br>★Replace<br>★Replace |
| Engine oil pressure monitor does not light up when engine is stopped<br>(Starter switch at ON position) | • Defective monitor<br>• Defective caution lamp switch<br>• Defective oil pressure switch | ★Replace<br>★Replace<br>★Replace |
| Outside electrical heater is not warm when touched by hand | • Defective wiring<br>• Disconnection in electric heater<br>• Defective operation of heater relay | ★Check, repair<br>★Replace<br>★Replace |
| Travel alarm does not sound when travel lever is operated | • Defective wiring<br>• Defective alarm<br>• Defective travel PPC pressure sensor | ★Check, repair for loose terminals or disconnection<br>★Replace<br>★Replace |
| Rear-view monitor does not show image | • Defective wiring<br>• Defective camera<br>• Defective monitor | ★Check, repair for loose, missing connector or disconnection<br>★Replace<br>★Replace |



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### 8.5.2 CHASSIS

• ★: Always contact us or our sales service agency when dealing with these items.

• In causes of problems or causes which are not listed blow, contact us or our sales service agency for repairs.

| Problem | Main causes | Remedy |
|---|---|---|
| Speed of travel, swing, boom, hook block is slow | • Lack of hydraulic oil | • Add oil to specified level, see Check Before Starting |
| Pump generates abnormal noise (sucking in air) | • Clogged element in hydraulic oil tank strainer, lack of oil | •Clean, see Every 500 Hours Maintenance |
| Excessive rise in hydraulic oil temperature | • Loose fan belt<br>• Dirty oil cooler<br>• Lack of hydraulic oil | • Check fan belt tension, replace<br>•Clean, see Every 500 Hours Maintenance<br>• Add oil to specified level, see Check Before Starting |
| Track comes off | • Track too loose | • Adjust track tension, see Irregular Maintenance |
| Abnormal wear of sprocket | | |
| Does not swing | • Swing lock switch still applied | • Turn swing lock switch OFF |



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### 8.5.3 ENGINE

• ★: Always contact us or our sales service agency when dealing with these items.

• In causes of problems or causes which are not listed blow, contact us or our sales service agency for repairs.

| Problem | Main causes | Remedy |
|---|---|---|
| Engine oil pressure monitor lights up during engine operating | • Oil level in oil pan (sucking air in)<br>• Clogging oil filter cartridge<br>• Defective tightening of oil pipe, pipe joint, oil leakage from damaged point<br>• Defective engine oil pressure sensor<br>• Defective monitor | • Add oil to specified level, see Check Before Starting<br>• Replace cartridge, see Every 500 Hours Maintenance<br>★Check, repair<br>★Replace sensor<br>★Replace monitor |
| Steam spurts out from top of radiator (pressure valve) | • Coolant level low<br>• Leakage of water<br>• Loose fan belt<br>• Dirt is accumulated in the cooling system | • Add coolant to specified level, see Check Before Starting<br>★Check, repair<br>• Adjust fan belt tension, see Every 250 Hours Maintenance<br>• Change coolant, flush inside of cooling system, see Irregular Maintenance |
| Engine water temperature gauge indicator is in red range | • Clogging radiator fins or damaged fins<br>• Defective thermostat<br>• Loose radiator filler cap (high altitude operations)<br>• Defective monitor | • Clean or repair, see Every 500 Hours Maintenance<br>★Replace thermostat<br>• Tightening cap or replace packing<br>★Replace |
| Engine does not start when starter motor is turned | • Lack of fuel<br>• Air in fuel system<br>• Defective fuel injection pump or defective nozzle<br>• Starter motor cranks engine sluggishly<br>• Pre-heating monitor does not light up<br>• Defective compression (Defective valve clearance) | • Add fuel, see Check Before Starting<br>• Repair place where air is sucked in, see Every 500 Hours Maintenance<br>★Replace pump or nozzle<br>• See ELECTRICAL SYSTEM<br>• See ELECTRICAL SYSTEM<br>★Adjust valve clearance |
| Exhaust gas is white or blue | • Too much oil in oil pan<br>• Improper fuel | • Drain oil, see Check Before Starting<br>• Change to specified fuel |
| Exhaust gas sometime become black | • Clogging air cleaner element<br>• Defective nozzle<br>• Defective compression (Defective valve clearance)<br>• Defective turbocharger | • Clean or replace, see Irregular Maintenance<br>★Replace nozzle<br>★Adjust valve clearance<br>★Clean or replace turbocharger |
| Combustion noise occasionally make breathing sound | • Defective nozzle | ★Replace nozzle |



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| Problem | Main causes | Remedy |
|---|---|---|
| Abnormal noise generated (combustion or mechanical) | • Low grade fuel being used<br>• Overheating<br><br>• Damage inside muffler<br>• Excessive valve clearance | • Change to specified fuel<br>• See “Engine water temperature gauge indicator is in red range” above<br>★Replace muffler<br>★Adjust valve clearance |
| Engine stops while in work | • Clogged pre-filter, main filter<br>• Defective engine and fuel line | • Replace filter cartridge<br><br>★Check, repair |

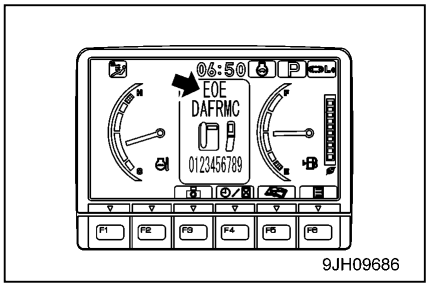


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## 8.5.4 ELECTRONIC CONTROL SYSTEM

When the user code is shown on the display portion of the machine monitor, take the respective measure shown in the self-diagnosis chart below.




**[MACHINE MONITORING SYSTEM]**

| Monitor display | Failure mode | Action |
|---|---|---|
| E02 | Pump control system error | When emergency pump drive switch is at the up (emergency) position, normal operations become possible, but have inspection carried out immediately. (*) |
| E03 | Swing brake system error | Move the swing brake cancel switch up to release the brake. When applying the swing brake, operate the swing lock switch manually. Depending on the cause of the problem, it may not be possible to release it. In any cause, have inspection carried out immediately. (*) |
| E10 | Engine controller power source error<br>Engine controller drive system circuit error (engine stopped) | Have inspection carried out immediately. |
| E11 | Engine controller system error<br>(out put reduced to protect engine) | Operate machine to a safety posture and have inspection carried out immediately. |
| E14 | Abnormality in throttle system | Operate machine to a safety posture and have inspection carried out immediately. |
| E15 | Engine sensor (coolant temperature, Fuel pressure, Oil pressure) system error | Operations are possible, but have inspection carried out immediately. |
| E0E | Network error | Operate machine to a safety posture and have inspection carried out immediately. |

(*): For details of handling the emergency pump drive switch and swing brake cancel switch, see “Operation 2.2 Switches [9] Emergency Pump Drive Switch” and “Operation 2.2 Switches [10] Swing Parking Brake Release Switch”.



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### 8.5.5 MOMENT LIMITER

• ★: Always contact us or our sales service agency when dealing with these items.

• In causes of problems or causes which are not listed blow, contact us or our sales service agency for repairs.

| NOTES |
|---|
| When an error code is displayed on the moment limiter display unit, refer to “Operation 2.4.10 Moment Limiter Error Causes and Actions to be Taken”. |

**★When the moment limiter display is normal**

| Problem | Main causes | Remedy |
|---|---|---|
| Crane operations does not stop even when overloaded | Defective relay circuit on the CPU card | ★Replace moment limiter transducer |
| | Defective moment limiter emergency stop cancel switch | ★Check, replace emergency stop cancel switch |
| | Defective solenoid valve spool | ★Repair, replace solenoid valve |
| | Short circuit in the emergency power supply circuit | ★Check, replace solenoid valve wiring |
| Boom extending, boom lowering and hook hoisting operations not activated even when not overloaded | Defective wiring between the moment limiter transducer and solenoid valve | ★Check, repair, or replace wiring between moment limiter transducer and solenoid valve |
| | Defective solenoid valve coil or spool | ★Disassemble, repair, or replace solenoid valve |

### 8.5.6 OVER HOIST DETECTOR

• ★: Always contact us or our sales service agency when dealing with these items.

• In causes of problems or causes which are not listed blow, contact us or our sales service agency for repairs.

**★Boom extending or hook hoisting operation does not stop even when over hoisted**

| Problem | Main causes | Remedy |
|---|---|---|
| Boom extending or hook hoisting operation does not stop even when over hoisted, but buzzer sounding | Short circuit in emergency power supply circuit | ★Check, replace solenoid valve wiring |
| | Defective Over-hoisting cancel switch | ★Check, replace switch |
| Boom extending or hook hoisting operation does not stop even when over hoisted, but buzzer does not sound | Defective over hoist detector | ★ Check, replace over hoist detector |

**★Boom extending or hook hoisting operation not activated even when not over hoisted**

| Problem | Main causes | Remedy |
|---|---|---|
| Boom extending or hook hoisting operation not activated even when not over hoisted, but buzzer sounding | Defective over hoist detector | ★ Check, replace over hoist detector |
| | Breakage of over hoist detector wiring or entanglement of the wiring | ★Check, repair, or replace over hoist detector wiring |
| | Loss of over hoist detector weight | ★ Check, replace over hoist detector weight |
| | Defective wiring between the moment limiter transducer and over hoist detector | ★Check, repair, or replace wiring between moment limiter transducer and over hoist detector |
| Boom extending or hook hoisting operation not activated even when not over hoisted, but buzzer does not sound | Defective solenoid valve coil or spool | ★Disassemble, repair, or replace solenoid valve |
| | Defective wiring between the moment limiter transducer and solenoid valve | ★Check, repair, or replace wiring between moment limiter transducer and solenoid valve |



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# INSPECTION AND MAINTENANCE


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# 1. PRECAUTIONS FOR MAINTENANCE

Thorough understanding of the inspection and maintenance items is required to perform efficient inspection and maintenance that contributes to safe use of this machine.

**⚠ WARNING**

- **Do not perform any inspection or maintenance that is not described in this manual. Potential serious accident or machine failure may occur if it is performed at the discretion of the individual. In the event that a judgment on the severity of a failure or malfunction is unable to be made, contact us or our sales service agency to request repair.**
- **In the event that a failure or malfunction is encountered in machine operation or found in inspection, report it to your employer or supervisor immediately. Contact us or our sales service agency to request repair accordingly.**
- **Inspection and maintenance should be performed with the machine placed on a level and firm ground.**

**[1] CHECK THE SERVICE METERS**

Read the service meters daily to check for any maintenance item that has reached the obligatory maintenance period.

**[2] USE GENUINE PARTS FOR REPLACEMENT**

Always use Maeda genuine parts as specified in the parts catalogue for part replacement.

**[3] USE PURE GREASE**

Always use recommended pure grease. The viscosity of grease must conform to specifications according to ambient temperature.

**[4] USE CLEAN OIL AND GREASE**

Always use clean oil, grease, and container to keep impurities out of them.

**[5] USE CLEAN WINDOW WASHER FLUID**

Always use automobile window washer fluid, and be careful not to let any dirt get into it.

**[6] KEEP THE MACHINE CLEAN**

Keep the machine clean to facilitate the detection of a malfunction. Especially keep the grease nipple, breather, and oil level gauge (oil access door) clean to prevent impurities from finding their way into the machine.

**[7] HANDLE WATER AND OIL AT ADEQUATE TEMPERATURE**

Drainage, drain oil, and oil filter will be at elevated temperatures immediately after the machine comes to a stop. Remove drainage, drain oil, and filter only after they drop in temperature for safety.

If the oil is cold, raise the temperature of the oil to approx. 20 to 40 degrees C.

**[8] CHECK DRAIN OIL AND OIL FILTER**

For replacement of oil and filter, check the drain oil and oil filter to make sure no excessive amount of metal powder or foreign objects are present.

**[9] CAUTIONS FOR LUBRICATION**

Do not remove the strainer to lubricate if it is attached to the lubrication opening.

**[10] PROTECT OIL FROM IMPURITIES**

Avoid dust when inspecting and replacing the oil to keep dirt out of the oil.

**[11] ATTACH A WARNING TAG**

When draining coolant and oil, always remove the starter switch key for the prevention of accidental engine starting, and then always attach a warning tag to the control lever.

**[12] FOLLOW SAFETY PRECAUTIONS**

Safety precautions provided on the machine should always be followed when using the machine.



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**[13] CAUTIONS FOR WELD REPAIR**

• Power off the machine. (Turn OFF the start switch)
• Do not continuously apply 200V or greater.
• Ground the machine within 1 meter from the welding point.
• Be sure to disconnect the connectors of the moment limiting display unit, and moment limiting converter.
• Remove the negative terminal (-) of the battery.
• Make sure no sealing or bearing is present between the welding point and the grounding point.
Potential damage to sealing may occur due to sparks if disregarded.
• Do not ground around the boom pin or the hydraulic cylinder.
Potential damage to a plated section may occur due to sparks if disregarded.

**[14] KEEP FROM FLAME**

Always clean the parts with noncombustible cleaning agent or light oil.
Keep the machine away from flames when using light oil.

**[15] KEEP THE ATTACHMENT SURFACE CLEAN**

Be sure to clean the attachment surface after removing a part to which the O-ring and gasket sealing are attached.
Replace the part with a new one with the O-ring and gasket reattached.

**[16] EMPTY YOUR POCKETS**

Always empty your pockets before performing inspection and maintenance of the machine in a downward direction with the cover opened.

**[17] ASSURE SAFE TRACK**

When performing crane operation in a rocky location, make sure of no damage to the track and no looseness, cracks, abrasion of bolts and nuts. Loosen the tension of the crawler tread more than usual.

**[18] CAUTIONS FOR MACHINE WASH**

• Do not direct a jet of steam to the electrical parts and connector.
• Keep the operation panel dry.
• Wash the machine with clean cloth, rinsing off dirt and dust.

**[19] PRE- AND POST-WORK INSPECTION**

Before performing crane operation in muddy water, rain, snow and on the seashore, always check plugs and valves for looseness. Post-work inspection requires checking all the units for cracks and damage and check bolts and nuts for looseness or coming off, with the machine washed.
Carry out early greasing. Grease the operating pins that enter muddy water on a daily basis.

**[20] CAUTIONS FOR WORKING IN A DUSTY SITE**

The following precautions should be observed when working in a dusty site.
• For oil check or change, move the machine to some other clean place to avoid contamination.
• Occasionally check the air cleaner for clogging.
• Occasionally check and clean the radiator core to prevent clogging it.
• Clean or replace the fuel filter more frequently.
• Be sure to clean the electrical parts, especially the starter and alternator, to protect them from dust.

**[21] DO NOT MIX OIL**

Never use together with different types of oil under any circumstance.
Replace the oil completely when replenishing with a different type of oil.
Always use Maeda genuine parts for part replacement.



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# 2. BASIC MAINTENANCE

## [1] OIL HANDLING

- Oil is used under extremely harsh conditions (high temperature, high pressure) in the engine and working device, which causes the oil to undergo deterioration with operating time.
  Always use oil that meets requirements such as grade and operating temperature defined in the operation manual. Be sure to perform periodic replacement of oil irrespective of contamination in the oil.
- Oil is equivalent to human blood. Exercise due caution when handling oil, keeping impurities (such as water, metal powder or dust) out of oil. Most of mechanical failures are attributed to intrusion of impurities. Extra caution is required to prevent impurities from entering the system during machine storage and lubrication.
- Do not mix oil with other oil of different grade or brand.
- Oil changes must conform to the designated quantity of oil.
  Failure to add an adequate quantity can lead to a machine failure.
- In the event that oil used in the working device turns cloudy, potential intrusion of moisture or air into the oil may be considered. Contact us or our sales service agency.
- When replacing oil, always replace the relevant filter as well.
- Do not use any other hydraulic oil that is not recommended by us. Failure to follow the instruction may cause the filters to get clogged. A small amount of oil remaining in piping and cylinders does not cause problems even if mixed with other oil.

## [2] FUEL HANDLING

**CAUTION**

**Always use diesel oil for the fuel.**
**To ensure good fuel consumption characteristics and exhaust gas characteristics, the engine mounted on this machine uses an electronically controlled high-pressure fuel injection device. This device requires high precision parts and lubrication, so if low viscosity fuel with low lubricating ability is used, the durability may reduce considerably.**

- The fuel pump is precision equipment that becomes inoperative if fuel containing moisture or impurities is used. Extra caution is required to prevent impurities from entering the system during machine storage and lubrication.
- Do not remove the strainer when replenishing fuel.
- Always use fuel that meets requirements such as grade and operating temperature defined in the operation manual.
- Ensure that the fuel tank is filled up after finishing daily work to prevent condensation of the humid air inside the fuel tank resulting in intrusion of moisture.
- Drain deposits and water out of the fuel tank before starting the engine or approximately 10 minutes after fuel replenishment.
- The air should be released from the circuit when the machine runs out of fuel or fuel filter replacement is performed.
- Clean the tank and fuel system if any foreign objects enter the fuel tank.



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**[3] STOCKING AND STORAGE OF OIL AND FUEL**

- Stock and store oil and fuel indoors to keep impurities such as moisture or dust out of them.
- For lengthy storage of a drum, it should be laid down so that its tap is below the surface of fuel (to prevent moisture entering). Be sure to cover the drums with a waterproof sheet if storing them outside.
- To prevent deterioration of oil and fuel resulting from long-term storage, employ the first-in first-out system for using oil and fuel.

**[4] GREASE HANDLING**

- Grease is designed to prevent the joint from rattling and making noise.
- **Any** nipple that is not described in the Periodic Maintenance chapter is used for overhauls, which requires no grease replenishment. Only grease the nipple if long-term use hinders its smoothness.
- Wipe off old grease squeezed out after greasing. Extra care is required to wipe a part that the adhesion of sands and dust will accelerate the wearing away of the rotating part.

**[5] FILTER HANDLING**

- A filter is an extremely important part that keeps major equipment free from impurities in oil, fuel, and the air circuit, which prevents an associated failure. Periodic replacement of the filter is required in accordance with the Operation Manual. The replacement period should be shortened in responses to harsh operating environments for the oil and fuel (sulfur content) used.
- Do not reuse any washed filter s (cartridge type one) under any circumstances.
- After replacing an oil filter, check the used filter for any metal powder. If check finds metal powder on the used filter, contact us or our sales service agency.
- As to a replacement filter, always unpack it immediately prior to its use.
- Always use Maeda genuine filters.

**[6] COOLANT HANDLING**

- River water contains a large amount of calcium and impurities. Use of the river water results in accumulation of water sludge in the engine and radiator, which causes heat exchange error leading to overheating. Do not use any impure water.
- Always use antifreeze following precautions stated in the Operation Manual.
- Keep antifreeze away from flames. Antifreeze is a flammable solution.
- The mixing proportion of antifreeze varies with outside air temperature. See “Maintenance 10.10 Every 1000 Hours [2] Cleaning engine cooling system” for the mixing proportions.
- In the event of overheating, replenish coolant with the engine cold.
- A machine low in coolant may cause overheating and corrosion attributed to aeration.

**[7] ELECTRICAL PART HANDLING**

- The electrical parts are susceptible to water damage and damaged coating. A current leakage is developed if the electrical parts are wet or have damaged coating, which causes the machine to go out of order and malfunction. Exercise due caution for handling the electrical parts.
- Inspection and maintenance include the checking of belt tension, belt damage, and battery fluid level.
- Never remove and disassemble equipment (electrical parts) from the machine.
- Only optional electrical parts that accompany the machine can be installed.
- Keep the electrical parts away from water when the machine is washed and used in the rain.
- When using the machine at the seashore, keep the electrical parts free of water and impurities to prevent corrosion.



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## [8] HYDRAULIC EQUIPMENT HANDLING

- Hydraulic equipment will be at elevated temperatures during and immediately after operation. Hydraulic equipment operates under high pressure. The following precautions should be observed when performing inspection and maintenance of hydraulic equipment.
- Place the machine in travel position on a level surface to reduce the application of pressure to the cylinder circuit.
- Be sure to stop the engine.
- Hydraulic oil and lubricating oil will be at elevated temperatures and high pressure immediately after equipment comes to a stop. Perform inspection and maintenance only after the oil temperature drops to a safe level. An internal pressure may be exerted despite temperature drop. When removing the plugs, screws and hose joints, stand aside and provide gradual loosening to decompress.
- Be sure to remove the pressure by releasing air from the hydraulic tank before performing inspection and maintenance of the hydraulic circuit.
- Inspection and maintenance include hydraulic oil level check and replacement of the filters and hydraulic oil.
- Check the O-ring for scratches when removing the high-pressure hose. If check finds scratches, replace the O-ring.
- Air bleed of the hydraulic circuit is required after the following tasks are performed: replacement and cleaning of the hydraulic oil filter element and strainer, repair and replacement of hydraulic equipment, and hydraulic piping replacement.



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# 3. LEGAL INSPECTION

If periodic inspection for machine safety assurance is stipulated by laws and regulations of your country, perform inspection complying with the inspection items listed below.

1. Make sure no abnormal event is present in the safety devices.
2. Check the hoisting accessories including a hook block for any abnormalities.
3. Check the winch wire rope end and wire clip for damage.
4. Replace the wire rope promptly if it is damaged.
5. Check the hydraulic hose for oil leaks and friction flaws on the surface. Replace the hose if a surface flaw is detected.
6. Check the structural part including the boom for cracks and deformations.
7. Check the mounting bolts and joints for looseness and falling off.
8. Check if the crane perform proper operation and stop during extending, retracting, raising, lowering, and slewing.

If check finds a malfunction, contact us or our sales service agency.



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# 4. SAFETY CRITICAL PARTS

For using the machine safely for an extended period of time, you must periodically replace the safety critical and fire prevention-related parts listed in the table of important parts.
Material quality of these parts can change as time passes and they are likely to wear out or deteriorate. However, it is difficult to determine the extent of wear or deterioration at the time of periodic maintenance. Hence, it is required to replace them with new ones regardless of their condition after a certain period of usage. This is important to ensure that these parts maintain their full performance at all times.
Furthermore, should anything abnormal be found on any of these parts, replace it with a new one even if the periodic replacement time for the part has not yet arrived.
If any of the hose clamps show deterioration like deformation or cracking, replace the clamps at the same time as the hoses.
Also perform the following checks with hydraulic hoses which need to be replaced periodically. Tighten a ll loose clamps and replace defective hoses, as required.
• When replacing hoses, always replace O-ring, gasket, and other required parts at the same time.
• When replacing safety critical parts, contact us or our sales service agency.

**[SAFETY CRITICAL PARTS LIST]**

| No. | Safety critical parts for periodic replacement | Q'ty | Recommended inspection period |
|---|---|---|---|
| 1 | Fuel hose (fuel tank – injection pump) | 2 | Every 2 years or 4000 hours, whenever come sooner |
| 2 | Fuel return hose (return – fuel cooler inlet port) | 1 | |
| 3 | Fuel cooler return hose (fuel cooler outlet port – fuel tank) | 1 | |
| 4 | Turbocharger lubricating hose | 1 | |
| 5 | Engine oil filter hose (Engine – oil filter) | 2 | |
| 6 | Hydraulic oil hose (pump outlet port – control valve) (delivery) | 2 | |
| 7 | Hydraulic oil hose (pump outlet port – control valve) (PP hose) | 1 | |
| 8 | Hydraulic oil hose (pump outlet port – control valve) (LS hose) | 1 | |
| 9 | Hydraulic oil hose (boom telescoping cylinder hoses) | 2 | |
| 10 | Hydraulic oil hose (boom derricking hoses) | 4 | |
| 11 | Hydraulic oil hose (winch motor hoses) | 2 | |
| 12 | Hydraulic oil hose (swing motor hoses) | 2 | |
| 13 | Hydraulic oil hose (pump inlet hose) | 1 | |
| 14 | Air conditioner heater hoses | 2 | |
| 15 | Seat belt | 1 | Every 3 years |
| 16 | Engine fuel high-pressure piping clamps | 1 set | Every 8000 hours |
| 17 | Fuel spray prevention cap | 1 set | |

All damaged parts found during the inspection should immediately be changed



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# 5. CONSUMABLES

Consumables such as a filter element and wire rope are to be replaced upon periodic maintenance or prior to the wear limit. Proper replacement of consumables delivers increased economy in machine use.
Always use Maeda genuine parts for part replacement.
See the parts catalogue for part numbers when ordering parts.

**[LIST OF CONSUMABLES]**

| Part | Replacement cycle |
|---|---|
| Engine oil filter | Every 500 hrs |
| Fuel pre-filter | Every 500 hrs |
| Hydraulic tank breather | Every 500 hrs |
| Hydraulic oil filter | Every 1000 hrs |
| Fuel main filter | Every 1000 hrs |
| Air cleaner element | As required |
| Electric heater | As required |
| Cylinder gasket | ★ Every 3 yrs |
| Boom slide plate | Every 3 yrs |
| Part | Recommended inspection period |
| Winch wire rope | As required or every 3 yrs |
| Boom extending wire rope | As required or every 3 yrs |
| Boom retracting wire rope | As required or every 3 yrs |

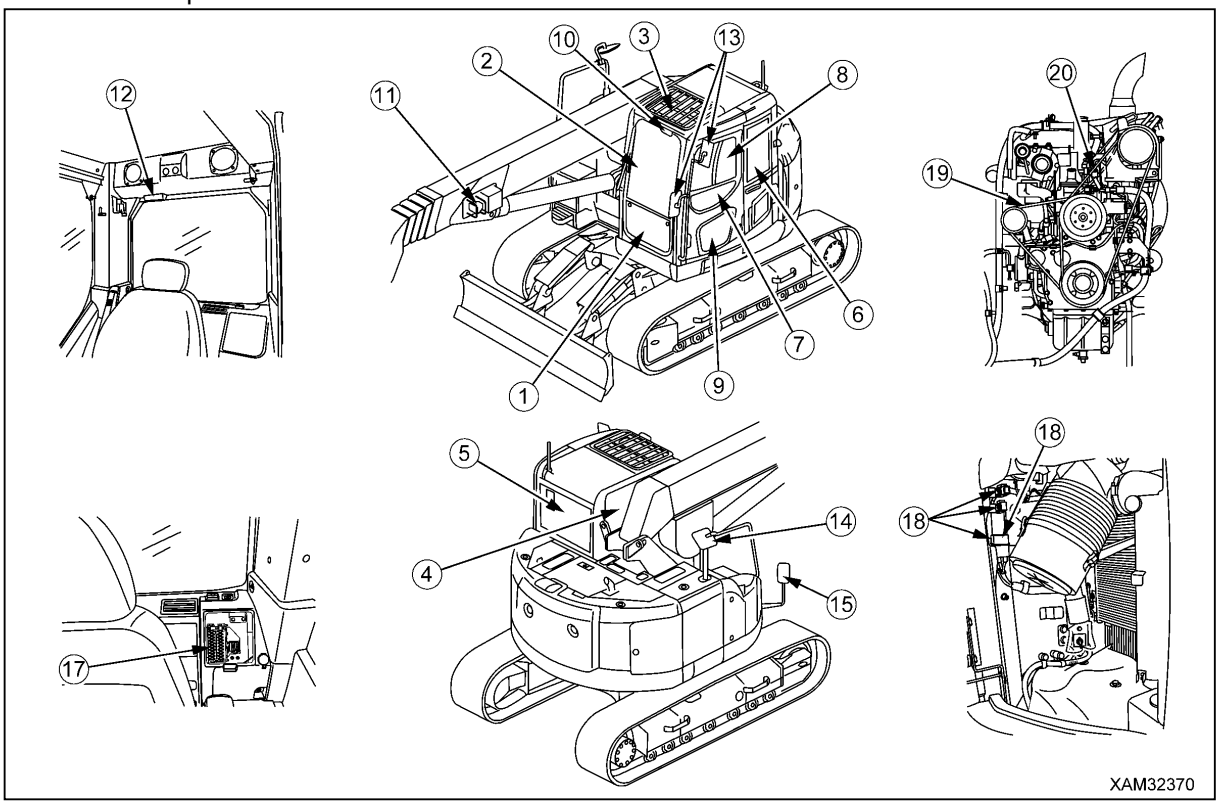
All damaged parts found during the inspection should immediately be changed
* The cycles marked with a star "★" in Replacement cycle include a halt period.
** Contact us or our sales service agency for part replacement.



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# 6. OTHER COMPONENTS

Item numbers of components are subject to change for ongoing product improvements. Prior to ordering spare parts, please contact our service agency and advice your machine number to confirm the correct item number of parts.




| №. | Parts No. | Description | Q'ty |
|---|---|---|---|
| 1 | K22B-54-28410 | Glass | 1 |
| 2 | K22B-54-28321 | Glass | 1 |
| 3 | K22B-54-28531 | Glass guard | 1 |
| 4 | K22B-54-28331 | Glass | 1 |
| 5 | K22B-54-28271 | Glass | 1 |
| 6 | K22B-54-28341 | Glass | 1 |
| 7 | K22B-54-27251 | Glass | 1 |
| 8 | K22B-54-27211 | Glass assembly | 1 |
| | K22B-54-27231 | • Glass | 1 |
| | K22B-54-27241 | • Glass | 1 |
| 9 | K22B-54-27511 | Glass | 1 |
| 10 | K20Y-53-15210 | Working lamp | 1 |
| | K421-06-23330 | • Bulb (70W) | 1 |
| 11 | S551-4040600 | Working lamp | 1 |
| 12 | K20Y-53-12790 | Room lamp | 1 |
| | K08116-02410 | • Bulb (10W) | 1 |

| №. | Parts No. | Description | Q'ty |
|---|---|---|---|
| 13 | K21W-54-47340 | Rear view mirror | 2 |
| 14 | K22B-54-18760 | Rear view mirror | 1 |
| 15 | | Rear view mirror | 1 |
| 16 | | Winch mirror | 1 |
| 17 | K08041-03000 | Fuse (30A) | 2 |
| | K08041-02000 | Fuse (20A) | 3 |
| | K08041-01500 | Fuse (15A) | 1 |
| | K08041-01000 | Fuse (10A) | 9 |
| | K08041-00500 | Fuse (5A) | 5 |
| 18 | K417-06-22610 | Fusible link (50A) | 1 |
| | K421-06-22830 | Fusible link (50A) | 1 |
| | K20T-06-81230 | Fusible link (50A) | 2 |
| 19 | K04120-21751 | Fan belt | 1 |
| 20 | K04120-21766 | Air conditioner belt | 1 |
| | | | |
| | | | |



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# 7. RECOMMENDED FUEL, COOLANT AND LUBRICANT

- In order to keep your machine in the best condition for long periods of time, it is essential to follow the instructions in this Operation and Maintenance Manual.
- Failure to follow these recommendations may result in shortened life or excess wear of the engine, power train, cooling system, and/or other components.
- Commercially available lubricant additives may be good for the machine, but they may also cause harm. Maeda does not recommend any commercially available lubricant additive.
- Use the oil recommended according to the ambient temperature in the chart below.
- Specified capacity means the total amount of oil including the oil in the tank and piping. Refill capacity means the amount of oil needed to refill the system during inspection and maintenance.
- When starting the engine in temperature below 0 degrees C, be sure to use the recommended multi-grade oil, even if the ambient temperature may become higher during the course of the day.

## 7.1 USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURES

Use of fuel, coolant and lubricant should vary with changes in temperature.

| Reservoir | Fluid type | Ambient Temperature (degrees C) | | Recommended Fluids |
|---|---|---|---|---|
| | | Min. | Max. | |
| Engine oil pan | Engine oil | -30 | 30 | SAE 0W30 (Note.1) |
| | | -25 | 40 | SAE 5W40 (Note.1) |
| | | -20 | 40 | SAE 10W30DH |
| | | -15 | 40 | SAE 15W40DH |
| | | 0 | 40 | SAE 30DH |
| Swing machinery case<br>Travel motor gear case<br>PTO gear case | Power train oil (Note.2) | -30 | 40 | SAE 30 |
| Hydraulic system | Power train oil | -20 | 40 | SAE 10W |
| | Hydraulic oil | -20 | 40 | ISO VG46 |
| Winch motor gear case | Gear oil | -30 | 40 | SAE 90G L4 |
| Cooling system | Supercoolant AF-NAC (Note.3) | -30 | 40 | AF-NAC |
| Fuel tank | Diesel fuel | -30 | 20 | ASTM Grade No.1-D S16<br>ASTM Grade No.1-D S500 |
| | | -10 | 40 | ASTM Grade No.2-D S15<br>ASTM Grade No.2-D S500 |

*ASTM: American Society of Testing and Material



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| Reservoir | Specified capacity (Liters) | Refill capacity (Liters) |
|---|---|---|
| Engine oil pan | 11.5 | 11.0 |
| Swing machinery case | 2.5 | 2.5 |
| Travel motor gear case (each) | 2.1 | 2.1 |
| PTO gear case | 0.75 | 0.75 |
| Hydraulic system | 120 | 69 |
| Winch motor gear case | 1.8 | 1.8 |
| Cooling system | 12.4 | --- |
| Fuel tank | 195 | --- |

**CAUTION**

**Always use diesel oil for the fuel.**
**To ensure good fuel consumption characteristics and exhaust gas characteristics, the engine mounted on this machine uses an electronically controlled high-pressure fuel injection device. This device requires high precision parts and lubrication, so if low viscosity fuel with low lubricating ability is used, the durability may reduce considerably .**

Note.1: HTHS (High-Temperature High-Shear Viscosity 150 degrees C), specified by ASTM D4741 must be equal to or higher than 3.5 mPa-S. Maeda SAE 0W30 and SAE 5W40 are the most suitable oils.

Note.2: Powertrain oil has different properties from engine oil. Be sure to use the recommended oils.

Note.3: Supercoolant (AF-NAC)

(1) Supercoolant has the important function of anticorrosion as well as antifreeze.
Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential.
Maeda machines are supplied with Supercoolant AF-NAC. Supercoolant AF-NAC has excellent anticorrosion, antifreeze, and cooling properties and can be used continuously for 2 years or 4000 hours. Supercoolant AF-NAC is strongly recommended whenever available.

(2) For details of the ratio when diluting Supercoolant with water, see “Maintenance 10.2 Irregular Maintenance [4] Clean inside of coolant system”.
Supercoolant AF-NAC may be supplied in premix. In this case, always top off with premix solution. (Never dilute with water)

(3) To maintain the anticorrosion properties of Supercoolant AF-NAC, always keep the density of Supercoolant between 30% and 68%.



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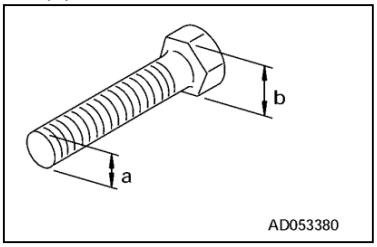
# 8. TIGHTENING TORQUE SPECIFICATIONS

## 8.1 STANDARD TIGHTENING TORQUE LIST

Torque the metric bolts and nuts with no specific indication to a values shown in this table.

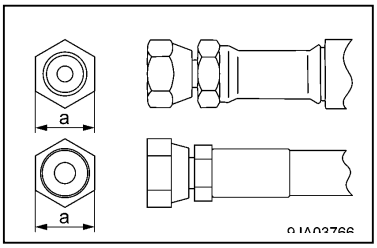
Adequate tightening torque is determined with respect to a width across flat (b) of a bolt or nut.

| Thread diameter of bolt (a) (mm) | Width Across Flats (b) (mm) | Tightening torque | | | |
|---|---|---|---|---|---|
| | | Target value | | Service limit | |
| | | Nm | Kg•m | Nm | Kg•m |
| 6 | 10 | 13.2 | 1.35 | 11.8 - 14.7 | 1.2 - 1.5 |
| 8 | 13 | 31.0 | 3.20 | 27.0 - 34.0 | 2.8 - 3.5 |
| 10 | 17 | 66.0 | 6.70 | 59.0 - 74.0 | 6.0 - 7.5 |
| 12 | 19 | 113 | 11.5 | 98.0 - 123 | 10.0 - 12.5 |
| 14 | 22 | 172 | 17.5 | 153 - 190 | 15.5 - 19.5 |
| 16 | 24 | 260 | 26.5 | 235 - 285 | 23.5 - 29.5 |
| 18 | 27 | 360 | 37.03 | 320 - 400 | 33.0 - 41.0 |
| 20 | 30 | 510 | 52.3 | 455 - 565 | 46.5 - 58.0 |
| 22 | 32 | 688 | 70.3 | 610 - 765 | 62.5 - 78.0 |
| 24 | 36 | 883 | 90.0 | 785 - 980 | 80.0 - 100 |
| 27 | 41 | 1295 | 132.5 | 1150 - 1440 | 118 - 147 |
| 30 | 46 | 1720 | 175.0 | 1520 - 1910 | 155 - 195 |
| 33 | 50 | 2210 | 225.0 | 1960 - 2450 | 200 - 250 |
| 36 | 55 | 2750 | 280.0 | 2450 - 3040 | 250 - 310 |
| 39 | 60 | 3280 | 335.0 | 2890 - 3630 | 295 - 370 |




Apply the following table for hydraulic hose.

| Thread diameter of bolt (a) (mm) | Width Across Flats (b) (mm) | Tightening torque | | | |
|---|---|---|---|---|---|
| | | Target value | | Service limit | |
| | | Nm | Kg•m | Nm | Kg•m |
| 02 | 19 | 44 | 4.5 | 35 - 54 | 3.5 - 5.5 |
| 03 | 22 | 74 | 7.5 | 54 - 93 | 5.5 - 9.5 |
| | 24 | 78 | 8.0 | 59 - 98 | 6.0 - 10.0 |
| 04 | 27 | 103 | 10.5 | 84 - 132 | 8.5 - 13.5 |
| 05 | 32 | 157 | 16.0 | 128 - 186 | 13.0 - 19.0 |
| 06 | 36 | 216 | 22.0 | 177 - 245 | 18.0 - 25.0 |






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# 9. INSPECTION AND MAINTENANCE LIST


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# 10. MAINTENANCE PROCEDURES

## 10.1 CHECKING BEFORE OPERATION

Inspections specified in this section are required to be completed prior to starting an engine first of the day.
See “Maintenance 9. Inspection and Maintenance List” for the inspection and maintenance items
See “Operation 3.1 Checking before Operation” for before operation inspection items and procedure.



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## 10.2 IRREGULAR MAINTENANCE

### [1] REPLACEMENT WINCH WIRE ROPE

**⚠ WARNING**

**Always wear work leather gloves when replacing the wire rope.**

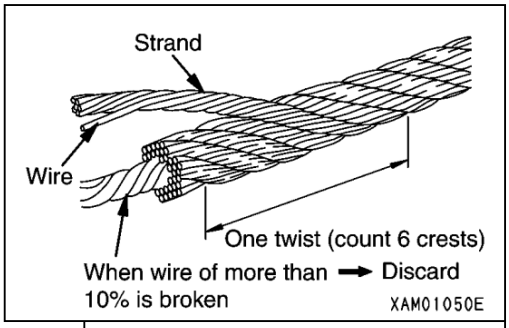
**CAUTION**

- **A diameter of the wire rope is to be measured at points where the wire repeatedly runs through the sheave. A mean value needs to be determined through three-way measurement. (A measurement should be performed at several points, spacing between the points.)**
- **Do not use the old wire rope regardless of the frequency of use.**
- **Always use Maeda genuine wire rope.**

**[CRITERIA FOR WINCH WIRE ROPE REPLACEMENT]**

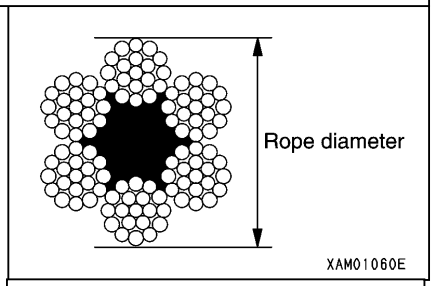
A wire rope undergoes wear and tear over time.
Prompt replacement is required if any of the following events appears in the wire rope.

1. Percentage of the snipped wires in total wires (except filler wires) in outer strands exceeds the ratio below:
   (1) 10% or more of the wires in one twist of the wire rope, or 5% or more when such nipped wires are in one single strand..
   (2) 20% or more of the wires in five twists of the wire rope.
2. The diameter of the wire rope is worn for 7 % or more of the nominal diameter

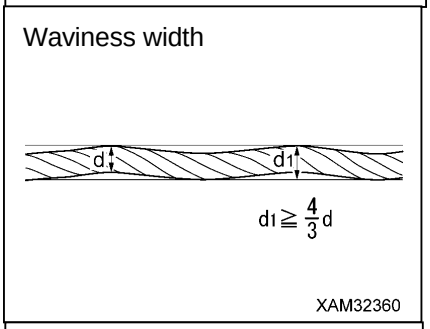


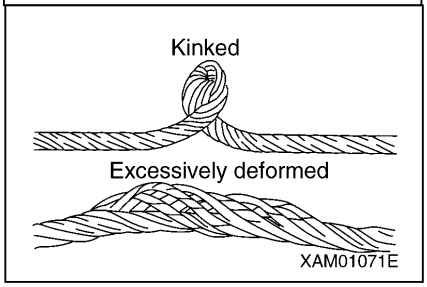

**NOTES**

- Replace a 10 mm diameter wire rope if it is 9.4 mm in diameter.
- Replace a 8 mm diameter wire rope if it is 7.5 mm in diameter.




3. The wire rope, corroded as below:
   (1) Wire surface has pitching and pitting.
   (2) Wires become slack due to internal corrosion.
4. Excessively deformed as below:
   (1) The rope is twisted and has some kinks.
   (2) Waviness width is 4/3d or more in a distance within 25 times of nominal diameter d.
   (3) The minimum diameter is 2/3 or less of the maximum diameter due to local pressure and being flattened.
   (4) Core wire or wire core projects.
   (5) Excessively curved.
   (6) Basket-like deformation.
   (7) A strand sinks inside.
   (8) One strand or more is slack.
   (9) Wires project excessively.
5. The rope shows some abnormality at the terminals.






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**[REMOVAL WINCH WIRE ROPE]**

**⚠ WARNING**

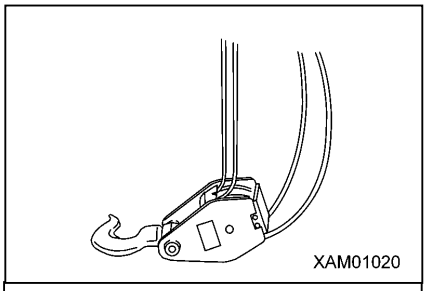
**Always wear thick leather working gloves for handling of wire ropes.**

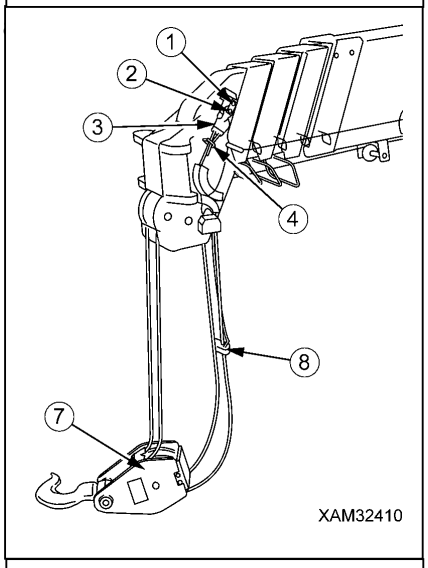
**CAUTION**

**Stop un-winding the hook block when it reaches the ground, otherwise, it may result in irregular winding of the wire rope to the drum. Once the hook block reaches the ground, avoid un-winding any more.**

Use the following procedure to remove the wire rope.

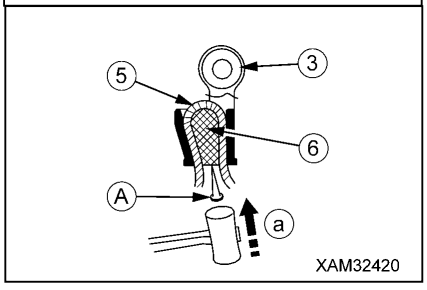
1. Station the machine on a level and solid ground and set it to a posture with minimum boom length and 20 degrees of the angle.
2. At the posture as 1. above, un-wind the hook block until it nearly touches the ground.
3. Operate the right work equipment control lever in the BOOM LOWER position (push it toward outside) to lower the hook block on the ground.
4. Remove the mounting bolt (1) and pull out the wire socket pin (2),
5. Remove the wire clip (4).


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6. Pull out the wire rope (5) of the wire socket (3), following the procedure provided below.
   (1) Bring a 6 to 10 mm round bar (A) into contact with the rope wedge (6).
   (2) Remove the rope wedge (6), lightly tapping the round bar (A) with a hammer in the direction indicated by the arrow (a).
7. Remove the wire rope (5) from the weight (8) of the over hoist detector and the hook block (7).
8. Operate the right work equipment control lever in the HOOK LOWER position (push it toward front) to wind off the wire rope (5) from the winch drum (9).



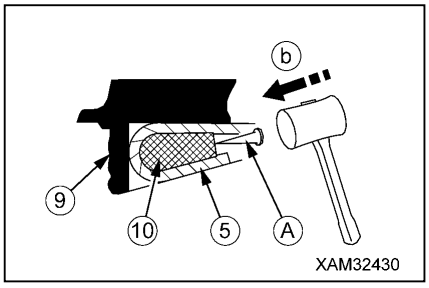
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9. With the wire rope (5) wound off of the winch drum (9), remove the end of the wire rope (5) from the winch drum (9) by following the procedure provided below.
   (1) Bring a 6 to 10 mm round bar (A) into contact with the rope wedge (10).
   (2) Remove the rope wedge (10), lightly tapping the round bar (A) with a hammer in the direction indicated by the arrow (b).




10. Wind up the remaining wire rope (5) completely.

Removal of the winch wire rope is completed.



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**[INSTALLATION WINCH WIRE ROPE]**

**⚠ WARNING**

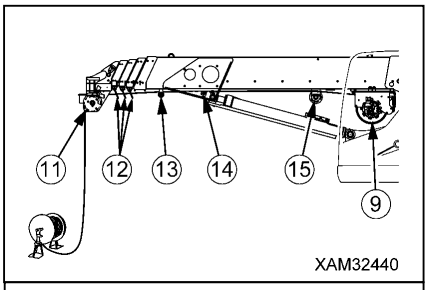
- **Always wear thick leather working gloves for handling of wire ropes.**
- **The rope wedge to secure the wire rope must be fastened correctly and firmly. Otherwise, the wire rope may slip out and result in a serious accident.**

**CAUTION**

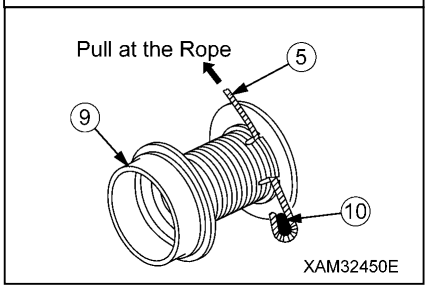
- **Avoid irregular winding of the wire rope on the winch drum.**
- **Always hoist an object (2.9 to 4.9KN {300 to 500kg}) with the boom extended and raised fully immediately after attaching a new rope. Repeat raising and lowering the hook several times until the new rope conforms.**
- **The wire rope is coiled. Exercise caution not to form a kink in the rope when winding it up. Be sure to uncoil by rotating the rope to pull it out of the rope drum.**

Use the following procedure to attach the wire rope.

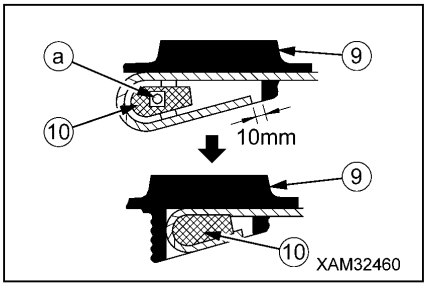
1. With the end of the wire rope held, draw the wire rope (5) through the weight of the over hoist detector, load sheave (11) at the boom end, wire guide (12) of No.2, 3, and 4 boom, roller sheave (13), sheave (14) inside derricking cylinder bracket and slide sheave (14).




2. Draw the wire rope (5) through the attachment hole of the winch drum (9). Secure the wire rope (5) to the winch drum (9), following the procedure provided below.
   (1) Draw the wire rope (5) through the winch drum (9) with the rope loose.
   (2) The rope wedge (10) should be in position (a). Pass the wire rope (5) around the rope wedge and yank at the rope in the direction indicated by the arrow.
   Adjust the length of the wire rope (5) to keep the end of the wire rope from protruding from the narrow hole in the winch drum (9).




3. Place the right work equipment control lever in the HOOK RAISING position (pull it backward) slowly to wind up the wire rope (5) in the winch drum (9).
   Ensure that the wire rope needs to jut out the boom end (approx. 10m).




**CAUTION**

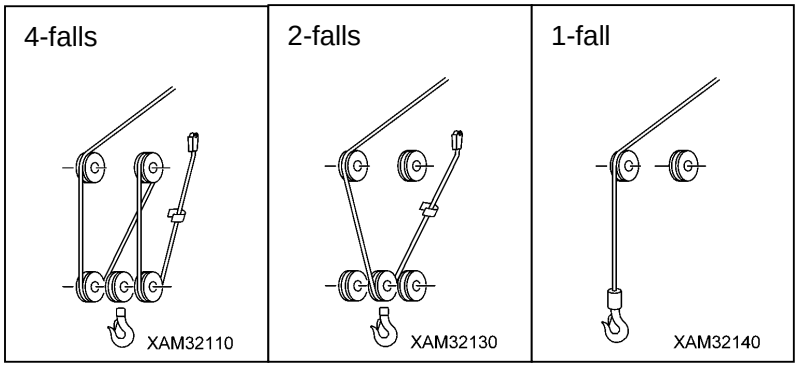
**Especially for the first 1 to 3 windings, hoist the winch with about 150kg tension applied to the wire rope to avoid irregular winding.**



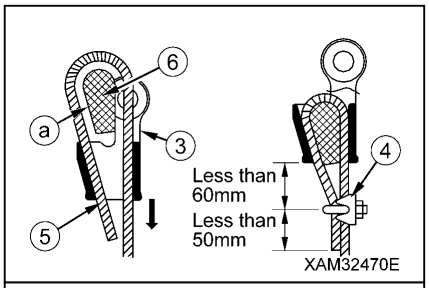
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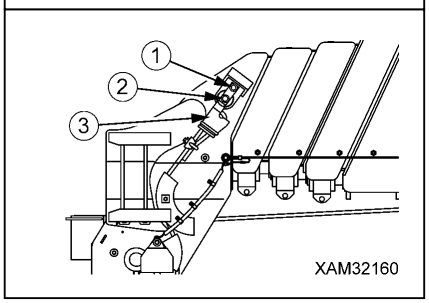
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4. In response to the number of falls, draw the wire rope through the load sheave at the boom end and hook block sheave.




5. Draw the end of the wire rope (5) through the weight of the over hoist detector.
6. Secure the end of the wire rope (5) to the wire socket (3), following the procedure provided below.
   (1) Draw the wire rope (5) through the wire socket (3) as shown at right.
   (2) With the rope wedge (6) in position (a), yank at the wire rope (5) in the direction indicated by the arrow.
7. Install the rope clip (4) to the wire rope (5).
8. Secure the wire socket (3) to the boom with the wire socket pin (2), and tighten the wire socket mounting bolt (1).
9. Place the right work equipment control lever in the BOOM RAISING position (pull it toward you) or the left work equipment control lever in the BOOM EXTENDING position (pull it forward) to raise the hook block.

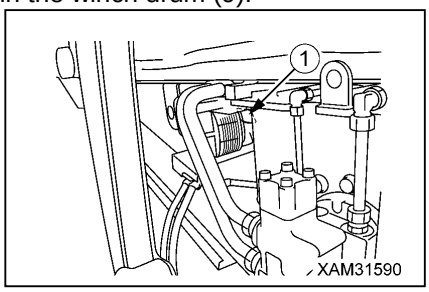



| NOTES |
| --- |
| Winch operation is allowed only after the hook block is raised. |

10. With the boom extended and raised fully.
11. With the wire rope (5) held under tension, place the right work equipment control lever in the HOOK RAISING position (pull it toward you) to wind up the wire rope (5) in the winch drum (9).

| NOTES |
| --- |
| At this time, check for irregular winding of the wire rope with the mirror (1) at the bottom of the winch drum from operator's seat. |






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## [2] CHECKING/ADJUSTING BOOM TELESCOPING WIRE ROPE

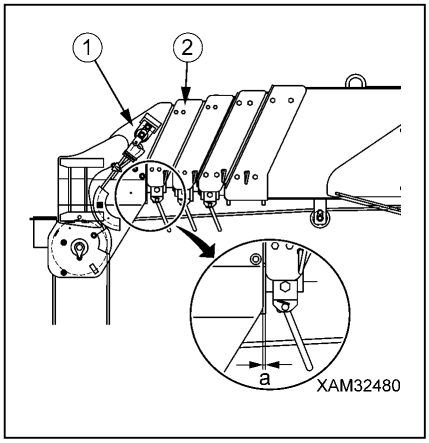
**⚠ WARNING**

- **Always wear thick leather working gloves for handling of wire ropes.**
- **To adjust the boom telescopic wire rope, strictly adhere to the procedure as specified below. Any ommission or falure to follow the procedure may cause a hazard with the boom or hoisting load dropping.**

### [CHECKING BOOM TELESCOPING WIRE ROPE]

Prompt adjustment is required if the following event appears in the boom extending wire rope.

1. Set the boom horizontal and telescope it several times, then retract it to the minimum length.
2. Measure that 5mm clearance (a) (shown at right) is formed between No.4 boom (2) and No.5 boom (1).



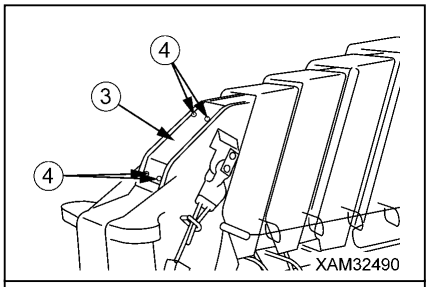

**NOTES**

- If the gap (a) is 2mm or less, there is no need to adjust the wire rope.
- If the gap (a) is 2 to 4mm, see “Adjustment of Boom Telescoping Wire Rope” to adjust the wire rope.
- If the gap (a) is 4mm or more, the boom telescopic cylinder itself is needing adjustment. Please contact us or our sales service agency for the service.

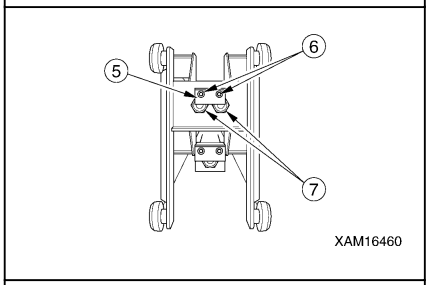
### [ADJUSTMENT OF BOOM TELESCOPING WIRE ROPE]

As a result of checking the wire rope, if the gap (a) is 2 – 4 mm, adjust the wire rope following next instruction.

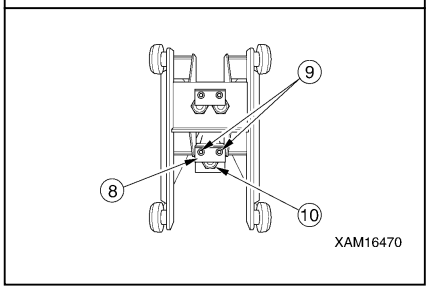
1. Remove 4 mounting bolts (4) and remove the cover (3).




2. Remove 2 mounting bolts (6) and 2 washers, and remove support (5).
3. Loosen both the boom telescopic wire rope adjusting bolts (7) on the left and right side, for 1 turn.




4. Remove 2 mounting bolts (9) and 2 washers, and remove support (8).
5. Tighten the boom retracting wire rope adjuster bolt (10) so that the clearance (a) is 2 mm or less.
6. After adjustment, restore supports (5) , (8), mounting bolts (6), (9) and washers, to the position where they were, then tighten the mounting bolts in both left and right side equally.
7. Set the cover (3) of boom top and tighten mounting bolt (4).






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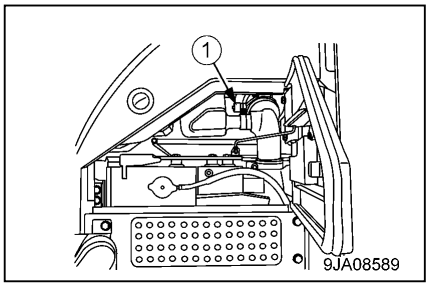
## [3] CHECKING/CLEANING/REPLACEMENT AIR CLEANER ELEMENT

**⚠ WARNING**

- **If inspection, cleaning, or maintenance is carried out with the engine running, dirt will get into the engine and damage it. Always stop the engine before carrying out these operations.**
- **When using compressed air, there is danger that dirt may be blown around and cause serious injuly. Always use protective glasses, dust mask, and other protective equipment.**

### [CHECKING]

1. Open the rear cover of cab.
2. Check dust indicator (1). If a red piston shows in the transparent window, clean the air cleaner element.

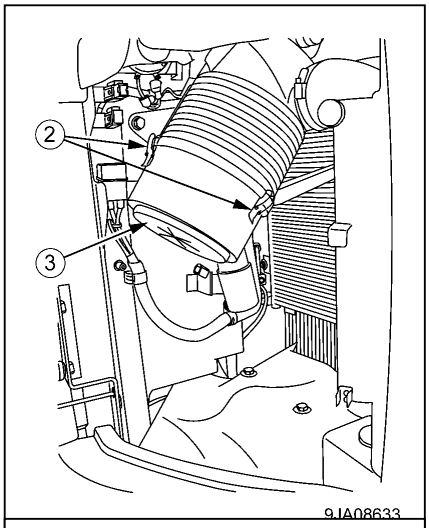



**CAUTION**

**Do not clean the air cleaner element before the red piston in dust indicator (1) appears. If the air cleaner element is cleaned frequently before the red piston in the dust indicator appears, the air cleaner cannot provide the proper performance and the cleaning efficiency is lowered.**

### [CLEANING OUTER ELEMENT]

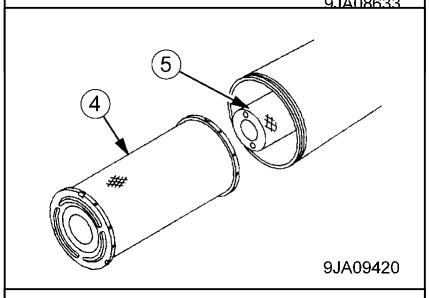
1. Open the battery room door on the left side of the machine.
2. Remove 3 clips (2), and then take out the cover (3).




3. Remove outer element (4).

**CAUTION**

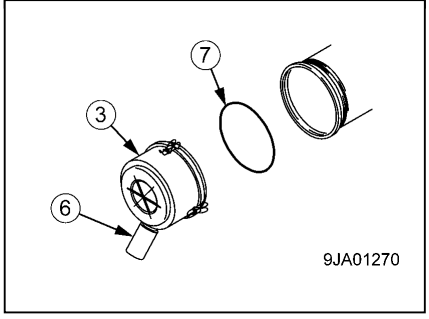
**Never remove inner element (5). If it is removed, dust will enter and cause engine trouble.**




4. Clean the inside of the air cleaner body and the cover (3).

**CAUTION**

**When cleaning cover (3), do not remove evacuator valve (6).**

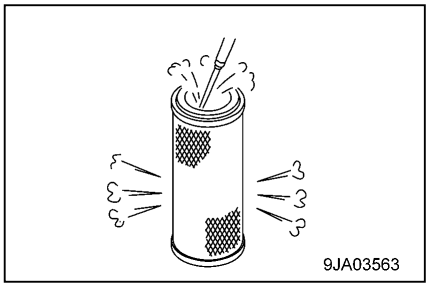





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5. Direct dry compressed air (Max. 0.69 MPa (7 kgf/cm$^2$) from the inside of the outer element along its folds. Then direct the compressed air from the outside along the folds, and again from the inside.

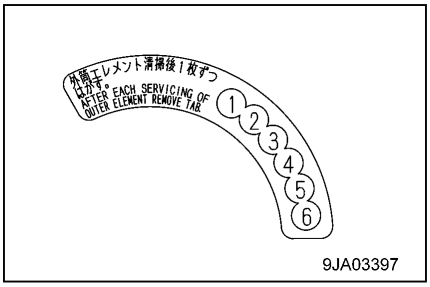



**CAUTION**

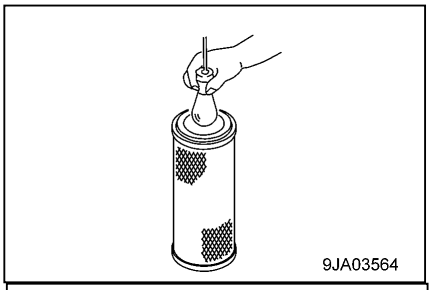
**The inner element must not be used again even after cleaning. When cleaning or replacing the outer element, replace the inner element at same time.**

**NOTES**

- Replace any outer element which has been cleaned 6 times or used for 1 year. Replace the inner element at the same time.
- Replace both inner and outer elements when the dust indicator red piston appears soon after installing the cleaned outer element even through it has not been cleaned 6 times.
- Remove one seal from the element whenever the element has been cleaned.



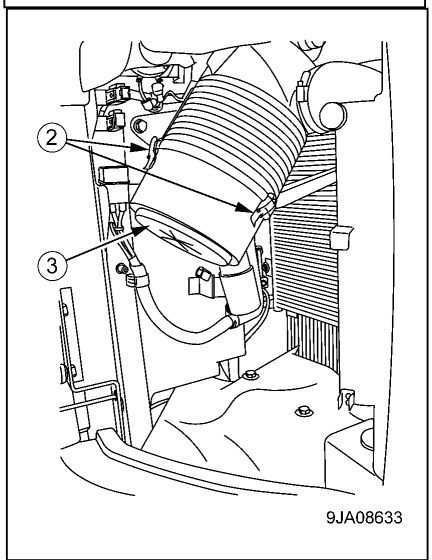

6. If small holes or thinner parts are found on the element when it is checked by shining a light through it after cleaning, replace the element.




**CAUTION**

- **When cleaning the element, do not hit it or beat it against something.**
- **Do not use an element whose folds or gasket or seal are damaged.**
- **Wrap unused element and store them in a dry place.**

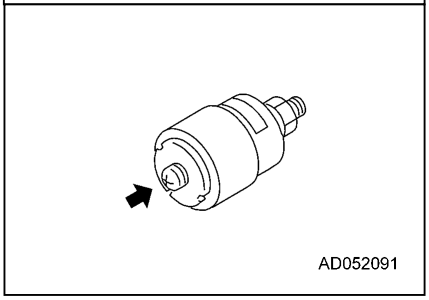
7. Set the cleaned outer element in position, and then secure cover (3) with mounting clips (2).




**⚠ CAUTION**

**When installing the cover (3), check O-ring (7) and replace it if there are any scratches or damage.**

8. Press the button of dust indicator (1) to return the red piston to its original position.



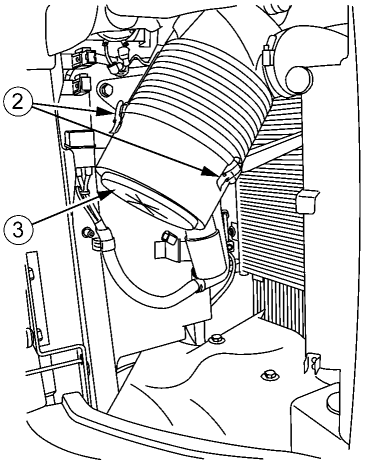



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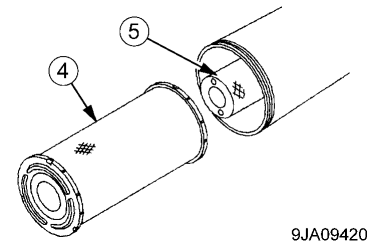
**[REPLACEMENT ELEMENT]**

1. Open the battery room door on the left side of the machine.
2. Remove 3 clips (2), and then take out cover (3).



9JA08633

3. Remove outer element (4).
   Do not remove inner element (5) at this time, however.

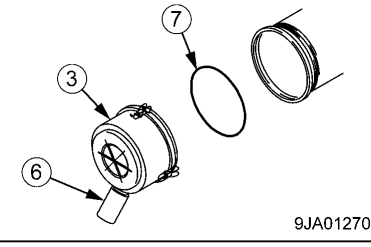


9JA09420

4. Clean the inside of the air cleaner body and the cover (3).

**CAUTION**

**When cleaning cover (3), do not remove evacuator valve (6).**



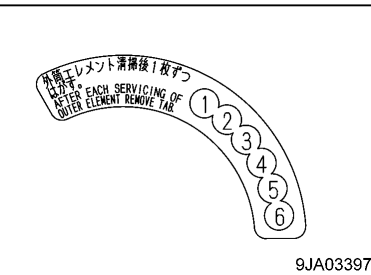
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5. Remove inner element (5), and then install a new inner element immediately.

**⚠ CAUTION**

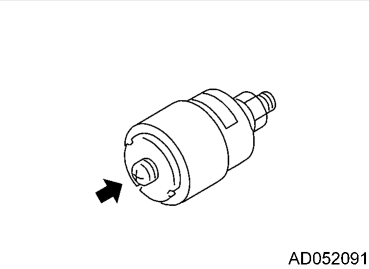
**When installing the cover (3), check O-ring (7) and replace it if there are any scratches or damage.**

6. Set the cleaned outer element in position, and then secure cover (3) with mounting clips (2).
7. Replace the seal attached to cover (3) with new one.



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8. Return the red piston in the dust indicator (1) to its original position.


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## [4] CLEANING INSIDE OF COOLING SYSTEM

**⚠ WARNING**

- **Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to drain the coolant in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the cap slowly to release the pressure before removing it.**
- **Cleaning is carried out with the engine running. When standing up or leaving the operator's seat, set the lock lever to the LOCK position.**
- **The engine is operated when washing, so it is dangerous if the machine moves when you are standing behind it. Never stand behind the machine when the engine is running.**

Clean the inside of the cooling system, change the coolant according to the table below.

| Antifreeze coolant | Interval of cleaning inside of cooling system and changing antifreeze coolant |
|---|---|
| Supercoolant (AF-NAC) | Every 2 years or every 4000 hours whichever comes first |
| Permanent type antifreeze (All-season type*) | Every year (autumn) or every 2000 hours whichever comes first |

*:Permanent type antifreeze shall meet the requirements of ASTM D3306-03.

Stop the machine on level ground when cleaning or changing the coolant.

The coolant has the important function of preventing corrosion as well as preventing freezing.
Even in the area where freezing is not an issue, the use of antifreeze coolant is essential.
Maeda machine are supplied with Supercoolant (AF-NAC). Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours.
Supercoolant (AF-NAC) is strongly recommended whenever available.

To maintain the anticorrosion properties of Supercoolant (AF-NAC), always keep the density of Supercoolant between 30% and 68%.
When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing table given below.
It is actually better to estimate and temperature about 10 degrees C lower when deciding the mixing ratio.
The mixing ration depends on the ambient temperature, but it should always be a minimum of 30% by volume (antifreeze/total amount of coolant x 100).
The freezing temperature of undiluted antifreeze is -15 degrees C. Do not store undiluted antifreeze at a temperature of below -15 degrees C.

**[MIXING RATIO OF WATER AND ANTIFREEZE]**

| Min. atmospheric temperature | degrees C | Above -10 | -15 | -20 | -25 | -30 |
|---|---|---|---|---|---|---|
| Amount of antifreeze | Liter | 3.7 | 4.3 | 5.0 | 5.6 | 6.2 |
| Amount of water | Liter | 8.7 | 8.1 | 7.4 | 6.8 | 6.2 |
| Volume ratio | % | 30 | 35 | 40 | 45 | 50 |



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## ⚠ WARNING

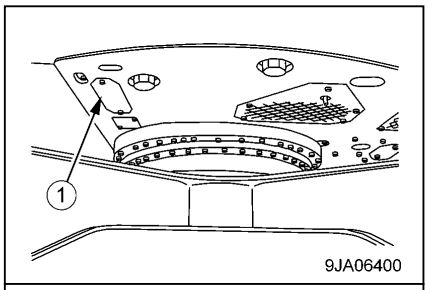
- **Antifreeze is flammable, so keep it away from flame.**
- **Antifreeze is toxic. When open the drain valve, be careful not to get water containing antifreeze on you. If it gets in your eyes, flush your eyes with large amount of fresh water and see a doctor at ones.**
- **When changing the coolant or draining the coolant from the radiator before carrying out repairs, ask a specialist company to handle any coolant containing antifreeze, or contact us or our sales service agency. Antifreeze is toxic, so never pour it into drainage water ditches or drain onto the ground surface.**

## CAUTION

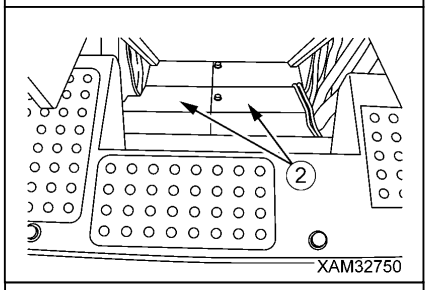
- **Always use tap water for coolant. Contact Maeda or our sales service agency if river water, well water, or water through the small water-supply system is necessarily substituted for tap water.**
- **A mixing ratio of antifreeze is to be controlled by the concentration meter.**

• Prepare a container with a capacity of at least 15 liter to catch the coolant.
• Have a water filling hose available.

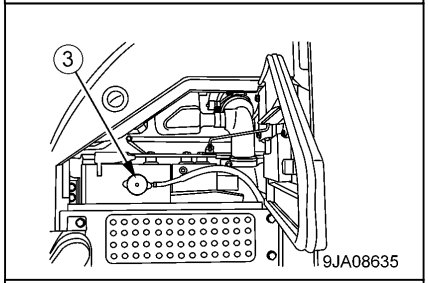
1. Stop the machine on level ground and stop the engine.
2. Remove undercover (1) and then put a container in position to catch the coolant.



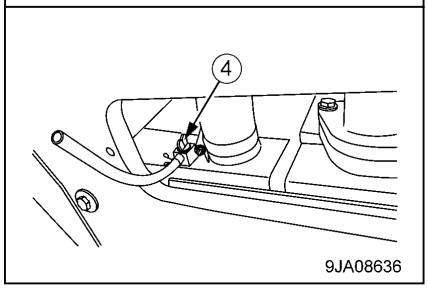

3. Remove 2 covers (2) between the hydraulic tank and operator's cab and then put a container in position to catch the coolant.




4. Check that the coolant temperature has gone down enough to make it possible to touch the radiator cap surface by hand, then turn radiator cap (3) slowly until it contacts the stopper to release the pressure.
5. Following this, push radiator cap (3), turn it until it contacts the stopper, then remove it.




6. Open drain valve (4) at the bottom of the radiator and drain the water.

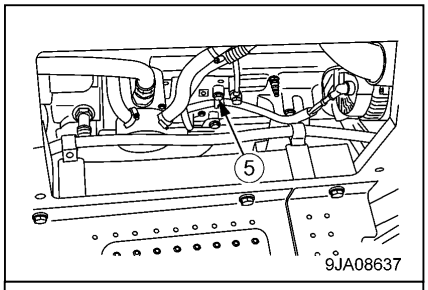


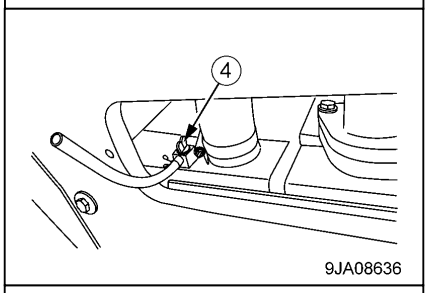


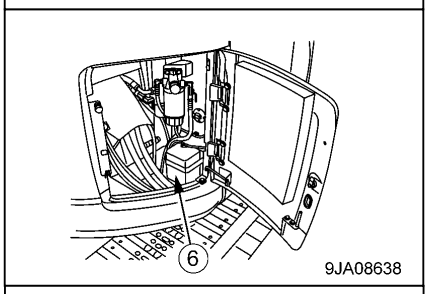

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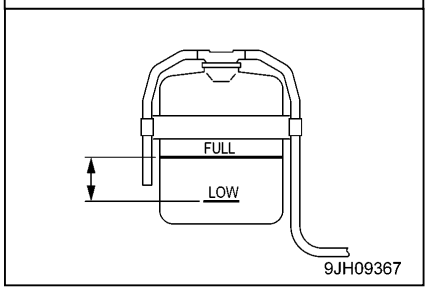
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7. Remove drain plug (5) in the engine cylinder block and drain the water.
8. After draining the water, close drain valve (4) and tighten drain plug (5).
9. Fill with city water.
10. When the radiator is full, start the engine, and run it at low idle.
11. Keep the engine running at low idle for 10 minutes until the water temperature reaches more than 90 degrees C.
12. Stop the engine, let it cool off, then open drain valve (4) and remove drain plug (5) to drain the water.
13. Close drain valve (4). Wind seal tape onto drain plug (5), then tighten it.
14. Install undercover (1) and 2 covers (2).
15. Fill with super coolant and tap water through the water filler up to the bottom of the filler.
    For details of the mix ratio for super coolant and water, see chart "MIXING RATIO OF WATER AND ANTIFREEZE".
16. To bleed the air from the cooling system, run the engine at low idle for 5 minutes, and for a further 5 minutes at high idle. (When doing this, leave the radiator cap off.)
17. Drain the water from sub tank (6), wash the inside of the sub tank.
18. Add cooling water to a point midway between the FULL and LOW marks.
19. Stop the engine and then check the coolant level.
20. Tighten the cap (3).



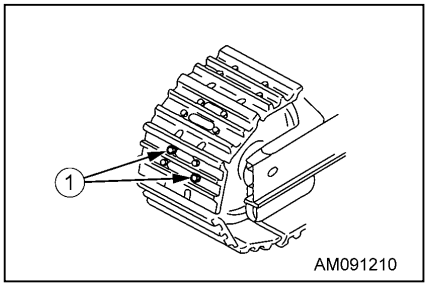




**[5] CHECKING/TIGHTENING TRACK SHOE BOLTS**

If the machine is used with track shoe bolts (1) loose, they will break, so tighten any loose bolts immediately.

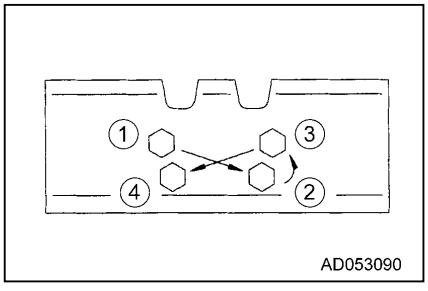
**[TIGHTENING]**

1. First tighten to a tightening torque of 196 ± 19.6 Nm (20 ± 2 kgfm) then check that the nut and shoe are in close contact with the link contact surface.
2. After checking, tighten the angle of the shoe bolts a further 90 ± 10 degrees for steel shoes (120 ± 10 degrees for swamp shoes).




**[ORDER FOR TIGHTENING]**

Tighten the bolts in the order shown in the diagram on the right.
After tightening, check that the nut and shoe are in close contact with the link mating surface.






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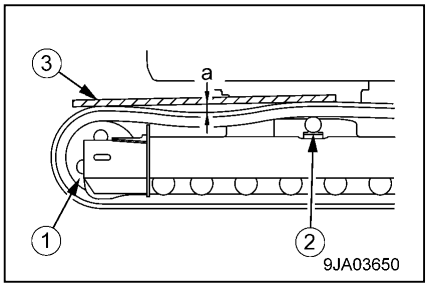
## [6] CHECKING/ADJUSTING TRACK TENSION

The wear of the pins and bushings on the undercarriage will differ with the working conditions and type of soil, so inspect the track tension frequently in order to maintain the standard tension.

Stop the machine on firm, level ground when carrying out the inspection and maintenance.

**[CHECKING]**

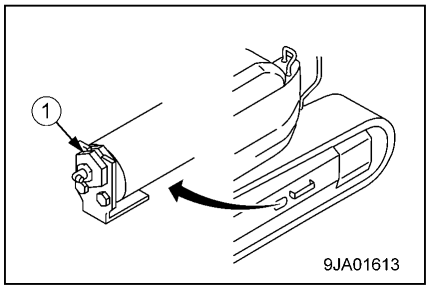
1. Run the engine at low idle, move the machine forward a distance equal to the length of track on ground, then stop the machine.
2. Choose wooden block (3) that will reach from idler (1) to carrier roller (2), then place it on top of the track.
3. Measure the maximum deflection between the top surface of the track and the bottom surface of the wooden block.
   ★Standard deflection (a): 10 to 30 mm




**[ADJUSTING]**

**⚠ WARNING**

- **There is danger of plug (1) flying out under the high internal pressure of the grease. Never loosen plug (1) more than 1 turn.**
  **Never loosen any part other than plug (1).**
  **Never put your face in the mounting direction of plug (1).**
- **If the track tension cannot be loosened with the procedure given here, please contact us or our sales service agency.**

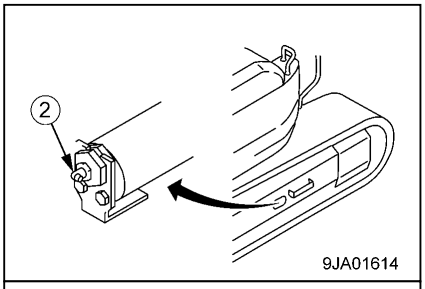



If the track tension is not at the standard value, adjust it in the following manner.

**[INCREASING TRACK TENSION]**

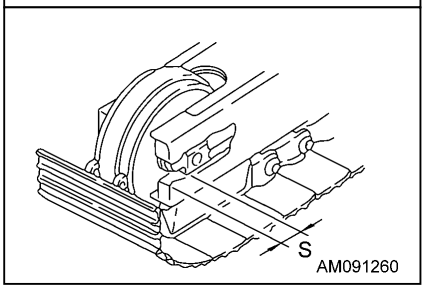
- Prepare a grease pump

1. Pump in grease through grease plug (2) with a grease pump.
2. To check that the track tension is correct, run the engine at low idle, move the machine forward a distance equal to the length of track on ground, then stop the machine.
3. Check the track tension again, and if the tension is not correct, adjust it again.




**CAUTION**

**Continue to pump in grease until dimension (S) becomes zero (0). If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact us or our sales service agency for repairs.**






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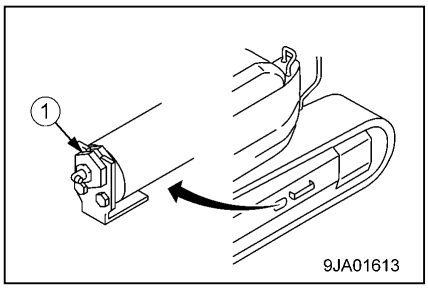
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**[LOOSENING TRACK TENSION]**

**⚠ WARNING**

**It is extremely dangerous to release the grease by any method except the procedure given below. If track tension is not relieved by this procedure, contact us or our sales service agency for repairs.**

1. Loosen plug (1) gradually to release the grease.
   When loosening plug (1), turn it a maximum of one turn.



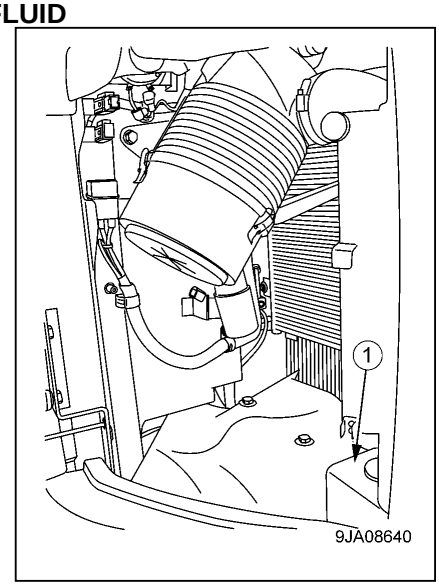

**NOTES**

If the grease does not come out smoothly, move the machine forwards and backwards a short distance.

2. Tighten plug (1).
3. To check that the track tension is correct, run the engine at low idle, move the machine forward a distance equal to the length of track on ground, then stop the machine.
4. Check the track tension again, and if the tension is not correct, adjust it again.

**[7] CHECKING WINDOW WASHER FLUID LEVEL, ADDING FLUID**

If there is air in the window washer fluid, check the level of the fluid in window washer tank (1). Add automobile window washer fluid if necessary.




**NOTES**

When adding fluid, be careful not to let any dust get in.

**[MIXTURE RATIO OF PURE WASHER FLUID AND WATER]**

The proportion differs according to the ambient temperature, so dilute the washer fluid with water to the following proportion before adding.

| Area, season | Proportions | Freezing temperature |
|---|---|---|
| Normal | Washer fluid 1/3: Water 2/3 | -10 degrees C |
| Winter in cold area | Washer fluid 1/2: Water 1/2 | -20 degrees C |
| Winter in extremely cold area | Pure washer fluid | -30 degrees C |

There are two types depending on the freezing temperature:
-10 degrees C (general use) and -30 degrees C (cold area use), select according to the area and season.



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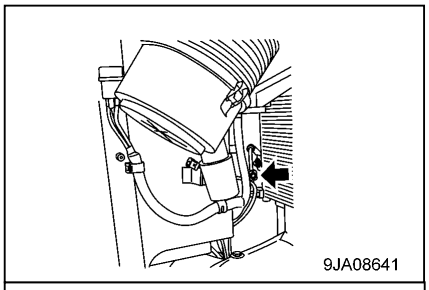
## [8] CHECKING/MAINTENANCE AIR CONDITIONER

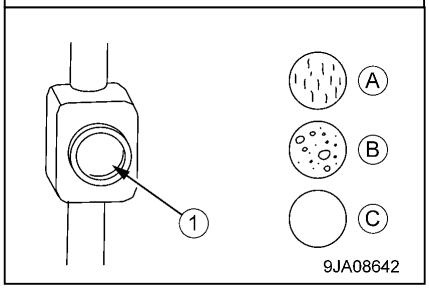
### [CHECKING LEVEL OF REFRIGERANT (GAS)]

**⚠ WARNING**

- **If the refrigerant used in the air conditioner gets into your eyes or on your hands, it may cause lose of sight or frostbite. Do not touch the refrigerant. Never loosen any part of the refrigerant circuit.**
- **Do not bring any flame close to any point where the refrigerant gas is leaking.**

If the refrigerant (gas) level is low, the cooling effect will become poor. When the engine is running at full throttle and the cooler is running at high speed, look at the sight glass (1) (inspection window) in the refrigerant hose mouthpiece to check the condition of the refrigerant gas (Freon 134a) flowing in the refrigerant circuit.




- (A) No bubbles in refrigerant flow: Suitable
- (B) Some bubbles in flow (bubbles pass continuously): Lack of refrigerant
- (C) Colorless, transparent: No refrigerant

**NOTES**

When there are bubbles, the refrigerant gas level is low, so contact us or our sales service agency to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.

### [INSPECTION DURING OFF-SEASON]

Even during the off-season, operate the air conditioner for 3 to 5 minutes once a month to maintain the oil film at all parts of the compressor.

### [INSPECTION AND MAINTENANCE ITEMS]

| Items | Content of checking, maintenance | Interval |
|---|---|---|
| Refrigerant (gas) | Charge amount | Twice a year (spring, autumn) |
| Air conditioner condenser | Clogged fins | Every 5000 hours |
| Compressor | Operating condition | Every 4000 hours |
| V-belt | Damage, tension | Every 250 hours |
| Blower motor, fan | Operating condition (does it make abnormal noise?) | When required |
| Control mechanism | Operating condition (does it function normally?) | When required |
| Piping mounts | Mounting condition, looseness at tightening or connecting portions, leakage of gas, damage | When required |



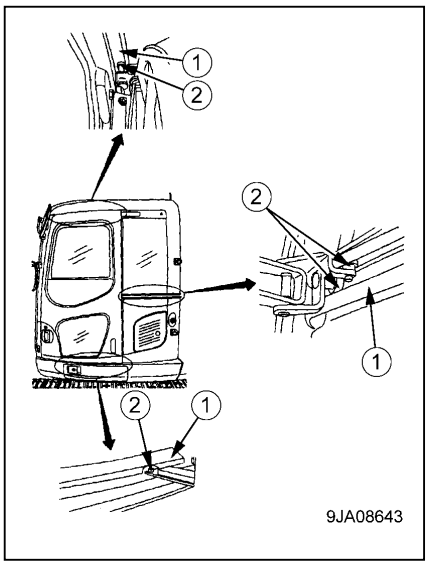
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## [9] CHECKING/CLEANING/GREASING CAB SLIDE DOOR RAIL AND ROLLER

### [CHECKING]

When opening or closing the slide door, it may sometimes not slide smoothly due to mud stuck to the rail. In that case clean and lubricate slide door rail (1) and roller (2) at the 3 points.




### [CLEANING DOOR RAIL]

1. Open and close the door, and use a brush to remove any dirt from rail (1).
2. Use a cloth to wipe off any dirt from rail (1).

### [GREASING DOOR RAIL AND ROLLER]

**CAUTION**

**Do not use high-viscosity oil for the lubricant. Use grease only.**

1. Spray rail (1) and roller (2) thoroughly with lubricant.
2. After spraying with lubricant, slide the door and check that the door opens and closes smoothly. If the movement is not smooth, contact us or our sales service agency for repair.



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### [10] WASHING WASHABLE FLOOR

**⚠ WARNING**

- **When setting the machine at an angle, use strong blocks to stabilize the machine and be extremely careful when carrying out the operation.**
- **If the control levers are touched by mistake, the machine may suddenly move, and this may lead to a serious accident. Always set the lock lever securely to the LOCK position before standing up from the operator's seat.**

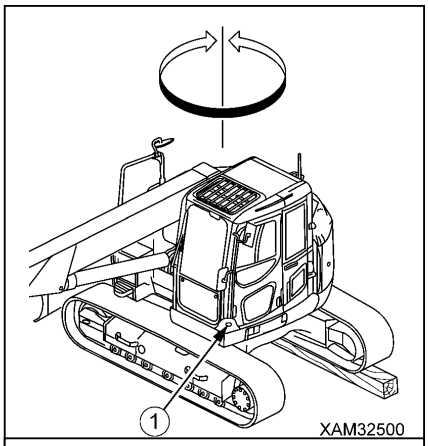
**CAUTION**

**While cleaning the cab floor, take care so that the connector, air conditioner main body and filters may not be splashed with water.**

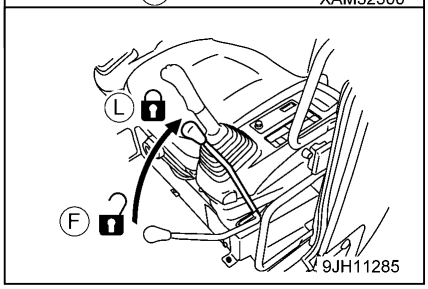
With the washable floor, it is possible to flush out the dirt on the cab floor directly with water.

**[METHOD OF WASHING]**

1. Set the machine at an angle. For details, see "Method of Setting Machine at Angle".
2. Swing the upper structure slowly so that water drain holes (1) in the cab floor are at a low position.




3. Set the lock lever to the LOCK position (L) and stop the engine.




4. Remove the floor mat.
5. Flush out the dirt on the floor directly with water through water drain hole (1).
6. After completing the washing operation, install the floor mat.



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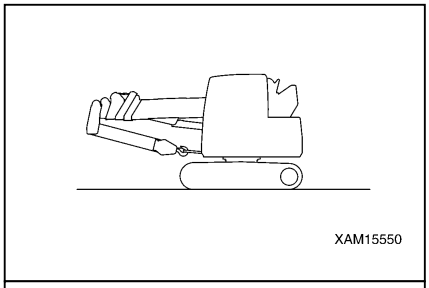
**[PROCEDURE TO MAKE THE MACHINE LEAN AT AN ANGLE)**

**⚠ WARNING**

- **Always exercise this practice only on a level and solid ground.**
- **Refer to "Specifications 1. Main Specifications" for dimension and mass of this machine.**
- **The operator who operates the crane to lift this machine up must be licensed or trained for crane operation.**
- **Sling instruments such as wire ropes and shackles for lifting operation must be sufficiently durable to the mass of this machine.**
- **During the lifting up practice, always set the lock lever to the lock position to prevent the machine from sudden movement.**
- **Any procedure to lift up the crane other than below is strictly prohibited. Oterhwise, the machine may lose balance.**

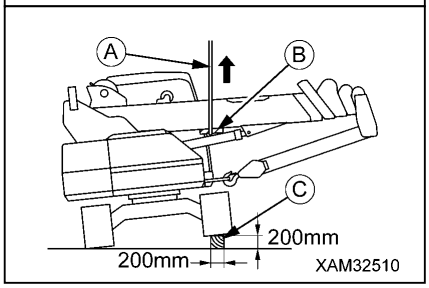
• Prepare a rectangular lumber (200mm X 200mm) to put under the track.

1. Fix the hook block to the stowage wire rope and configure the machine to the "traveling posture" as shown the figure in the right.




2. Swing the boom by 90 degrees.

3. Attach the sling wire rope (A) below the boom and lift the machine up slowly.




**NOTES**

- For this operation, use a pad (B) such as a rectangular lumber between the sling wire rope (A) and the boom to prevent the boom from being damaged.
- Unless the hook block is fastened to the stowage wire rope, when the boom is raised, the machine will not lift up.

4. Insert the rectangular lumber (C) prepared properly, between the ground and the track when the machine is raised.

5. Lower the machine slowly.
   Ensure that the machine is in a stable condition, during this practice.



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## 10.3 MAINTENANCE EVERY 50 HOURS

### [1] GREASING MACHINE UNITS

**CAUTION**

- **Grease type varies with greasing points. Failure to grease properly may cause the machine to shorten its useful life. See the following table for grease types.**
- **Greasing a new machine is required once every 10 hours until the machine attains the first 100 hours of operation, this is the running in period.**

• Use proper grease specified below according to the greasing points.

| № | Greasing point | | Grease type |
|---|---|---|---|
| 1 | Greasing of the boom mounting pin | 1 place | Lithium grease |
| 2 | Greasing of the derrick cylinder bottom mounting pin | 1 place | |
| 3 | Greasing of the derrick cylinder rod mounting pin | 1 place | |
| 4 | Greasing of the guide sheave | 1 place | |
| 5 | Greasing of wire support roller pin | 2 pieces | |
| 6 | Greasing of the hook block | 1 place | |
| 7 | Greasing of accelerator pedal shaft | 1 place | |
| 8 | Greasing of rod guide inside surface of derrick cylinder | 2 pieces | |
| 9 | Greasing of the boom slide plate | 4 pieces | Molybdenum grease |
| 10 | Greasing of both sides and bottom of a boom | Each boom | |
| 11 | Greasing of the winch wire rope | 1 piece | Rope oil |

1. With the use of the grease gun, grease the greasing points (No.1 to 7) specified in the above table through corresponding grease plugs. (See the following page)

2. Wipe off old grease squeezed out after greasing.

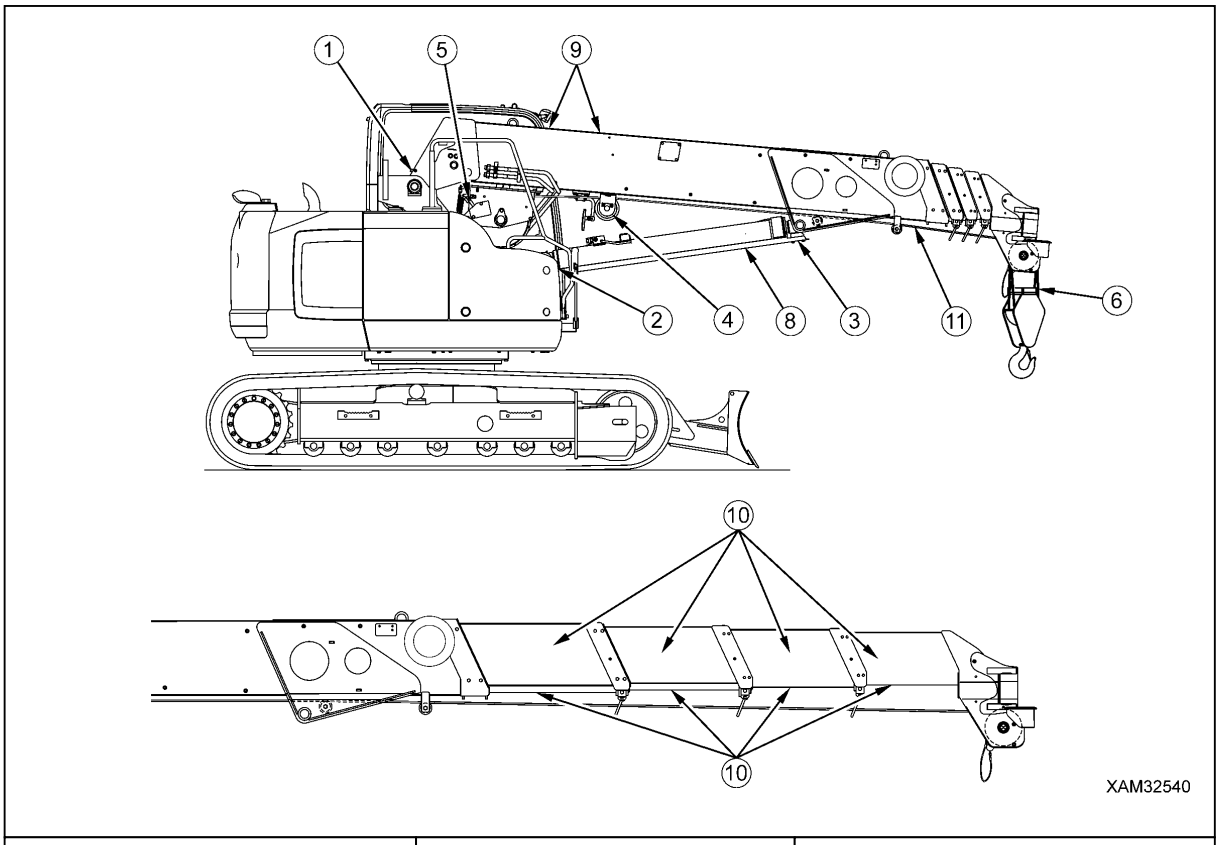
3. Place the left work equipment control lever in the “Extend” position (push it toward the front) to extend the boom for greasing both sides and bottom of the boom and wire rope.

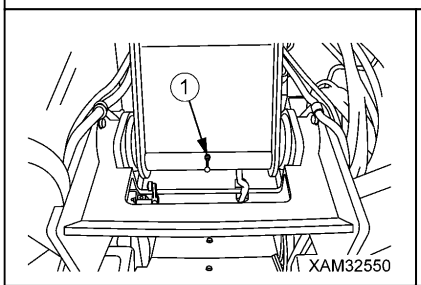
4. Apply red rope grease to prevent wire rope abrasion and rust formation.
   With the rope surface cleaned, grease the rope with a brush.

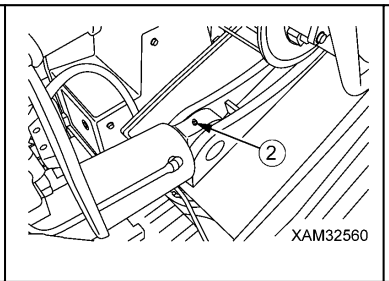


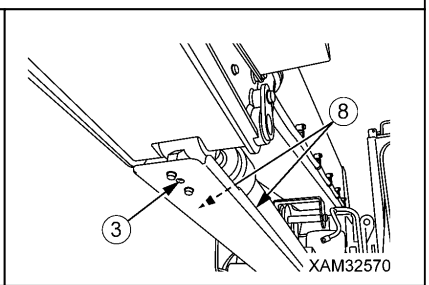
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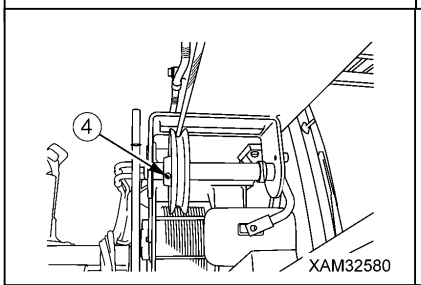
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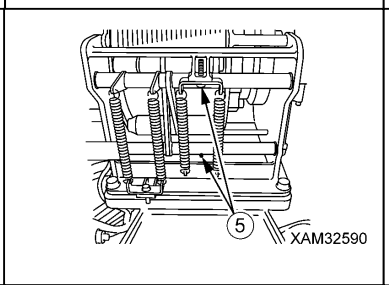


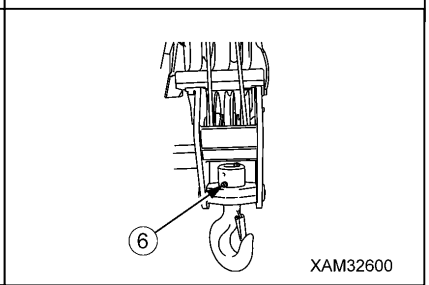



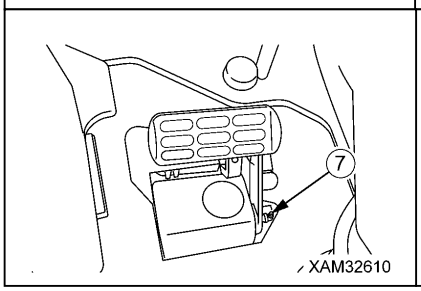



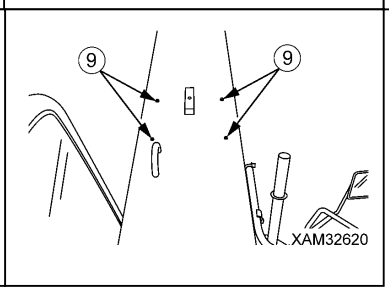






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## 10.4 MAINTENANCE EVERY 100 HOURS

Perform this maintenance in tandem with maintenance every 50 hours.

**[1] CHECKING/REFILLING OIL IN SWING MACHINERY CASE**

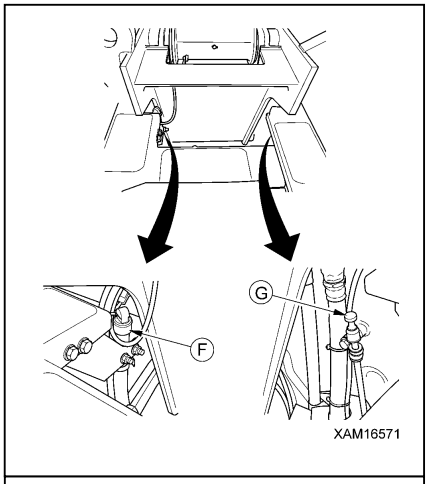
**⚠ WARNING**

**The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**

**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **After checking or refilling, insert the dipstick securely.**

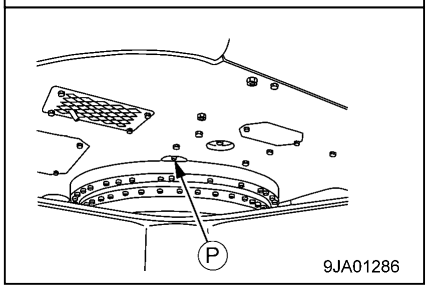
1. Remove dipstick (G) and wipe the oil from the dipstick with a cloth.
2. Fully insert dipstick (G) into the filler pipe.
3. When dipstick (G) is pulled out If oil level is between the H and L marks of the gauge, oil level is correct.
4. If the oil is not up to the L mark on dipstick (G), add oil through filler port cap (F).




**NOTES**

The oil must be filled from the filler cap (F), up to midway between the H and L marks of the dipstick (G).

5. If the oil level exceeds the H mark on the level gauge (G), exercise a practice below:
   (1) Swing the upper structure so that drain plug (P) comes between the right and left tracks.
   (2) Remove drain plug (P) to drain the excess oil.
6. After checking oil level or adding oil, insert the dipstick (G) into the hole and install oil filler cap (F).






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## 10.5 MAINTENANCE EVERY 250 HOURS

Perform this maintenance in tandem with maintenance every 50/100 hours.

**[1] CHECKING/REFILLING OIL IN TRAVEL MOTOR REDUCTION GEAR CASE**

**⚠ WARNING**

- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.**

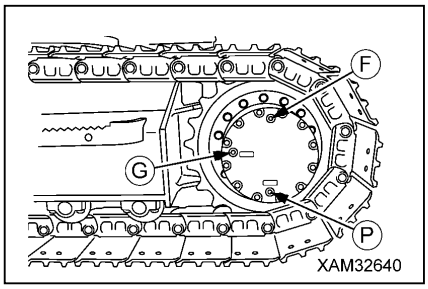
**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **Use seal tape, etc. at the thread of the filler plug to stop the oil leak and securely tighten the plug after refilling with the oil.**

• Prepare a container to catch drain oil.

• Prepare a hexagon wrench.

The diagram on the right shows the left travel motor reduction gear case.




1. Move the machine forward and reverse, set so that plug (F) is at the top, with plug (F) and plug (P) perpendicular to the ground.
2. Using a hexagon wrench, remove plug (G) and check that the oil level is within a range from the bottom of the plug hole to a point 10 mm below it.
3. If the oil level is low, remove plug (F) and add oil through the hole of plug (F).

**NOTES**

• Add oil until oil overflows from the hole of plug (G).
• Wipe off the oil completely if spilled.

4. After checking oil level or adding oil, install plugs (F) and (G) securely.



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### [2] CHECKING/REFILLING OIL IN WINCH MOTOR REDUCTION GEAR CASE

**⚠ WARNING**

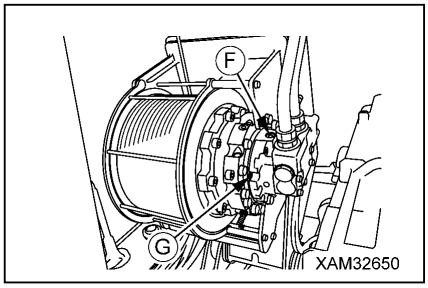
- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.**

**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **Use seal tape, etc. at the thread of the filler plug to stop the oil leak and securely tighten the plug after refilling with the oil.**

- Prepare a container to catch drain oil.
- Prepare a hexagon wrench.

1. Stop the machine on a level and solid ground and raise the boom to 80 degrees.
2. Using a hexagon wrench and remove plug (G). When the oil overflows from the plug hole, the oil level is correct.
3. If the oil level is low, remove plug (F) and add oil through the hole of plug (F).




**NOTES**

- Add oil until oil overflows from the hole of plug (G).
- Wipe off the oil completely if spilled.

4. After checking oil level or adding oil, install plugs (F) and (G) securely.



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### [3] CHECKING LEVEL OF BATTERY ELECTROLYTE

**⚠ WARNING**

- **Do not use battery if the battery electrolyte level is below the LOWER LEVEL line. This will accelerate deterioration of the inside of the battery and reduce the service life of the battery. In addition, it may cause an explosion.**
- **The battery generates flammable gas and there is danger of explosion, do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with a large amount of water and consult a doctor.**
- **When adding distilled water to the battery, do not allow the battery electrolyte to go above the UPPER LEVEL line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts.**

**CAUTION**

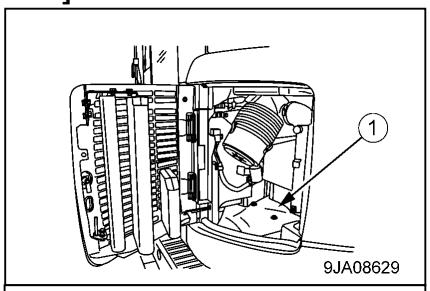
- **Rub the top of the battery with a wet cloth to keep it clean.**
- **If there is a fear that the battery water may freeze after refilling with purfied water (e.g. commercially available replenishment water for a battery), do the replenishment before the day's work on the next day.**

Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

**[WHEN CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY]**

If it is possible to check the electrolyte level from the side of the battery, check as follows.

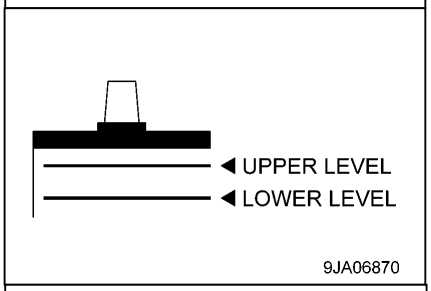
1. Open the battery room door, and the move vinyl cover (1) (installed on top of the battery).




2. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the UPPER LEVEL and LOWER LEVEL lines.

**NOTES**

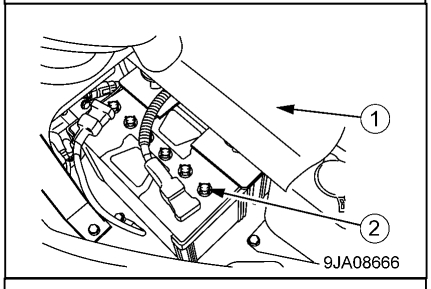
If the battery is wiped with a dry cloth, static electricity may cause a fire or explosion.

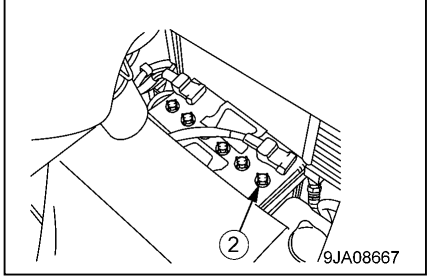



3. If the electrolyte level is below the midway point between the UPPER LEVEL and LOWER LEVEL lines, remove all caps (2) add distilled water to the UPPER LEVEL line.
4. After adding distilled water, tighten all caps (2) securely.

**NOTES**

If distilled water is added to above the UPPER LEVEL line, use a syringe to lower the level to the UPPER LEVEL line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult us or our sales service agency or battery maker.





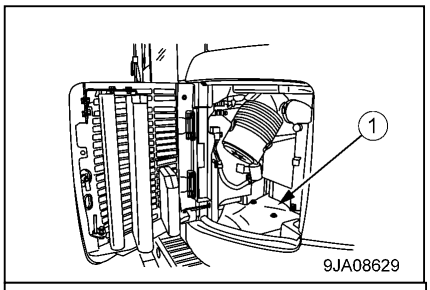

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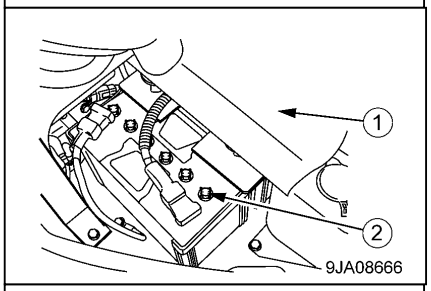
**[WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SIDE OF BATTERY]**

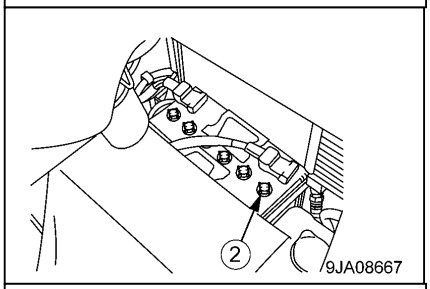
If it is impossible to check the electrolyte level from the side of the battery, or there is no display of the UPPER LEVEL line on the side of the battery, check as follows.

1. Open the battery room door, and the move vinyl cover (1) (installed on top of the battery).

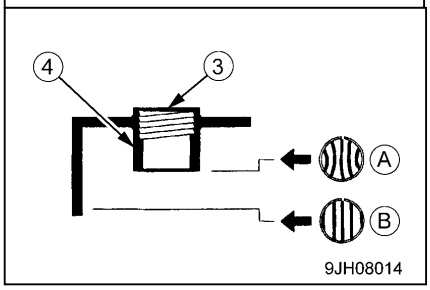



2. Remove all caps (2) at the top of the battery, look through the water filler port (3), and check the electrolyte surface.




3. If the electrolyte does not reach the sleeve (4), add distilled water so that the level reaches the bottom of the sleeve (UPPER LEVEL line) without fail.
   - (A) Suitable level: Electrolyte level is up to bottom of sleeve, so surface tension causes electrolyte surface to bulge and poles appear bent.
   - (B) Low: Electrolyte level is not up to bottom of sleeve, so poles appear straight and not bent.




4. After adding distilled water, tighten all caps (2) securely.

| NOTES |
|---|
| If distilled water is added to above the bottom tip of the sleeve, use a syringe to remove electrolyte. Neutralize the removed electrolyte with sodium bicarbonate, then flush it away with a large amount of water. If necessary, contact us or our sales service agency or battery maker. |

**[WHEN IT IS POSSIBLE TO USE INDICATOR TO CHECK ELECTROLYTE LEVEL]**

If it is possible to use an indicator to check the electrolyte level, follow the instructions given.



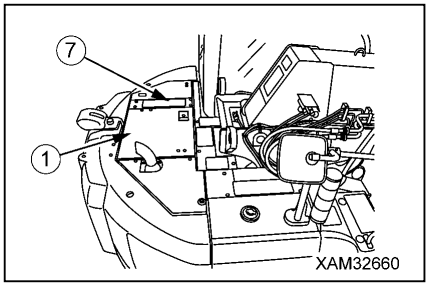
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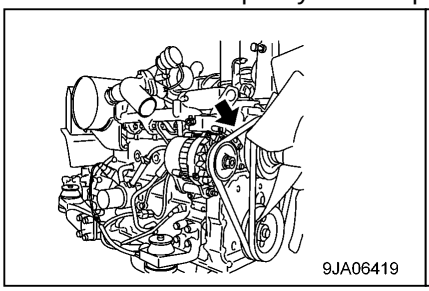
### [4] CHECKING/ADJUSTING COOLING FAN BELT TENSION

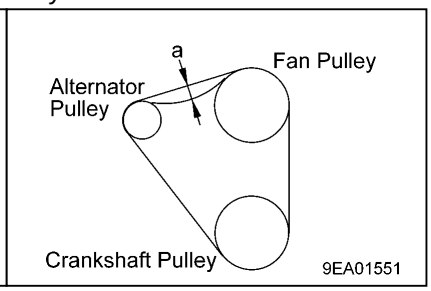
#### [CHECKING]

1. Open the engine hood (1) and remove step (7).



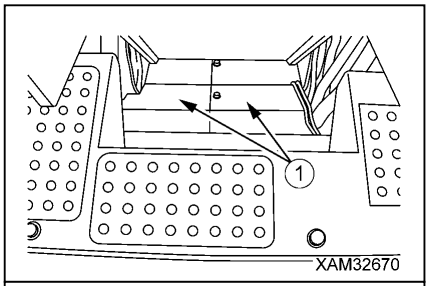

2. Deflection (a) should be 7 to 10 mm when the belt is pressed with the thumb with a force of approx. 58.8 N (6 kg) at a point midway between the alternator pulley and fan pulley.



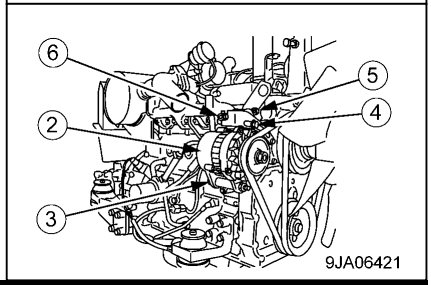




#### [ADJUSTMENT]

1. Remove 2 covers (1) between the hydraulic tank and operator's cab.




2. Loosen mounting bolt (3) of alternator (2).
3. Loosen alternator lock bolt (4).
4. Turn tension bolt (5) of alternator (2) in the direction to loosen it, and adjust so that the belt tension is 7 to 10 mm (approx. 58.8 N (6 kg)). When doing this, do not touch double nut (6).
5. Tighten mounting bolt (3) and lock bolt (4).
6. Install step (7) and close cover (1).




**CAUTION**

Inspect the followings as well when you inspect the tension of the fan belt.
- Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.
- If the belt is stretched and there is no allowance for adjustment, or if it is cut or cracked, please contact us or our sales service agency for replacement.



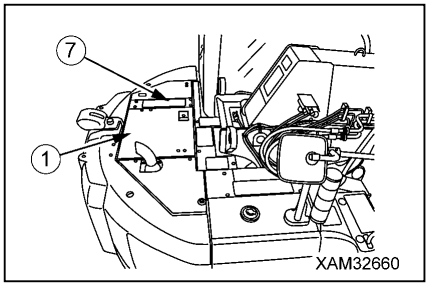
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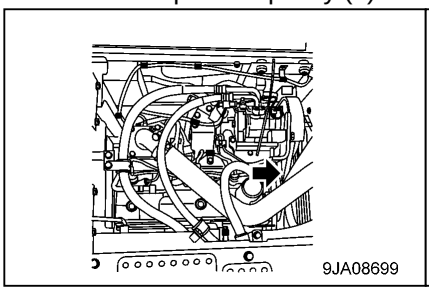
## [5] CHECKING/ADJUSTING AIR COMPRESSOR BELT TENSION

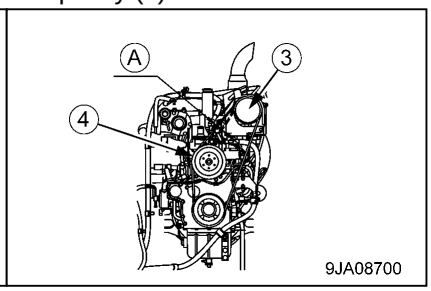
### [CHECKING]

1. Open the engine hood (1) and remove step (7).




2. Deflection (A) should be 5 to 8 mm when the belt is pressed with the thumb with a force of approx. 58.8 N (6 kg) at a point midway between the compressor pulley (3) and fan pulley (4).

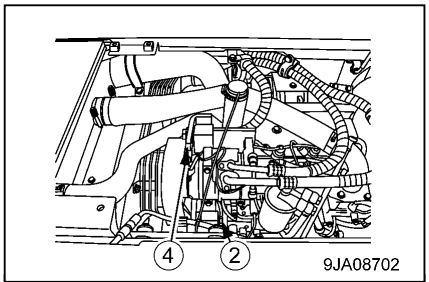



### [ADJUSTMENT]

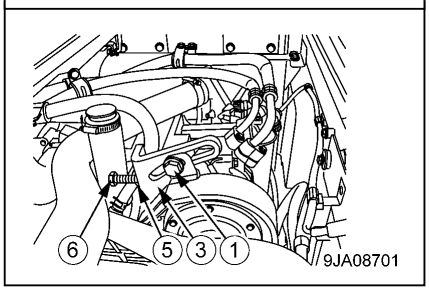
1. Loosen bolts (1) and (2).

| NOTES |
|---|
| Bracket (4) holds the compressor in place. When bolts (1) and (2) are loosened, bracket (4) moves with the bolt (2) securing position as a fulcrum. |




2. Loosen nut (5) attached to the fixed bracket (3) and then tighten bolt (6).

| NOTES |
|---|
| Tighten bolt (6) so that the deflection of the belt will be 5 to 8 mm (approx. 58.8 N (6 kg)). |




3. Tighten bolts (1) and (2) to secure bracket (4).
4. Loosen bolt (6) to remove from bracket (4).
5. Tighten nut (5).

| CAUTION |
|---|
| Inspect the followings as well when you inspect the tension of the air compressor belt.<br>• Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.<br>• If the belt is stretched and there is no allowance for adjustment, or if it is cut or cracked, please contact us or our sales service agency for replacement.<br>• When the new V-belt is set, readjust it after one hour of operation. |



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## 10.6 MAINTENANCE EVERY 500 HOURS

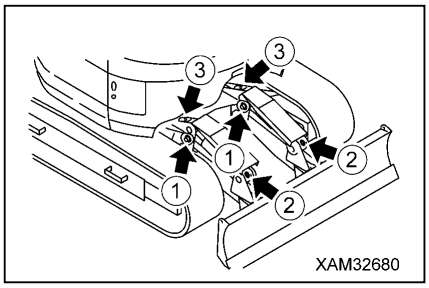
Perform this maintenance in tandem with maintenance every 50/100/250 hours.

**[1] GREASING EACH BLEAD SECTION**

**CAUTION**

- **Grease type is lithium grease. Failure to grease properly may cause the machine to shorten its useful life.**
- **Greasing a new machine is required once every 10 hours until the machine attains the first 100 hours of operation, this is the running in period.**

1. Lower the blade to ground and stop the engine.
2. Using a grease gun, pump in grease through the grease plugs shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.
   (1) Blade connecting pin (2 places)
   (2) Blade cylinder foot pin (2 places)
   (3) Blade cylinder rod end pin (2 places)






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## [2] REPLACEMENT OF ENGINE LUBRICATING OIL AND OIL FILTER CARTRIDGE

**⚠ WARNING**

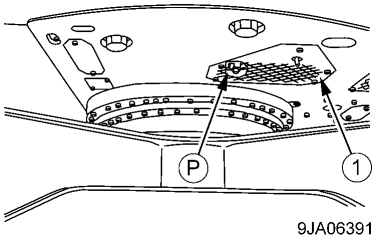
**The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**

**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **Failure to use proper oil may cause the engine to shorten its useful life. Always use the specified oil for replenishment.**
- **The engine oil must be maintained at a proper amount.**
- **The complete draining of oil is not possible if the engine becomes completely cold. Oil draining is allowed when the engine is cold to touch.**
- **Keep impurities out of the filler cap when replenishing oil.**

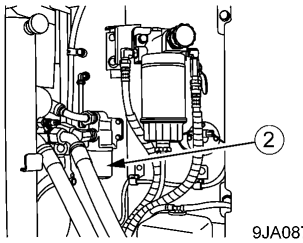
- Oil pan refill amount: 11 liters
- Prepare a container to catch drain oil: 15 liters or more
- Prepare a filter wrench.

1. Remove undercover (1) at the bottom of the machine, then set the container under drain valve (P) on the left side of the machine to catch the oil.
2. Open drain valve (P) and drain the oil. Be careful not to get oil on yourself.
3. After draining oil, close drain valve (P).



9JA06391

4. Open the pump room door on the right side of the machine.
5. Using filter wrench, turn filter cartridge (2) to the left to remove it.
6. Clean the filter holder, fill the new filter cartridge with clean oil, coating the thread and packing portion of the new filter cartridge with oil (or coat thinly with grease), then install.

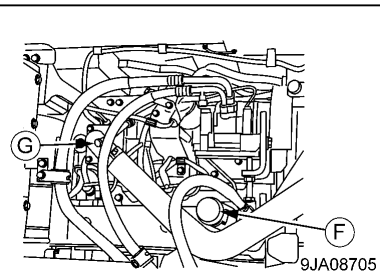


9JA08704

**NOTES**

- Check that there is no old packing stuck to the holder. If there is any old packing stuck to the filter, it will cause leakage of oil.
- When installing, tighten until the packing surface contacts the filter holder, then tighten a further 3/4 turn.

7. After replacing the filter cartridge, add oil through oil filler (F) until the oil level is between H and L marks on the dipstick (G).
8. Run the engine at idle for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see "Operation 3.1.2 [2] Checking Oil Level In Engine Oil Pan Add Oil".



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### [3] REPLACEMENT FUEL PRE-FILTER CARTRIDGE

**⚠ WARNING**

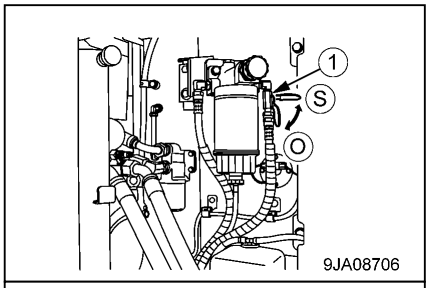
- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **High pressure is generated inside the engine fuel piping system when the engine is running. When replacing the filter, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before replacing the filter.**
- **Do not bring any fire or flame close.**

**CAUTION**

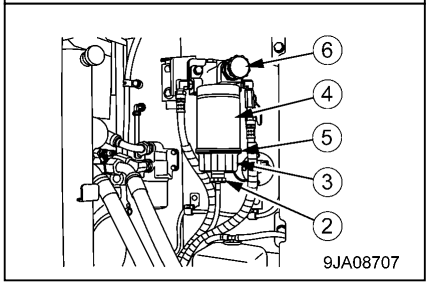
- **Genuine Maeda fuel filter cartridges use a special filter that has highly efficient filtering ability. When replacing the filter cartridge, always use a genuine Maeda parts.**
- **The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection pump and nozzle. If any part other than a genuine Maeda filter cartridge is used, dust or dirt may get in and cause problems with the injection system. Always avoid using substitute parts.**
- **When carrying out inspection or maintenance of the fuel system, pay more attention than normal to the entry of dirt. If dirt is stuck to any part, use fuel to wash it off completely.**

- Prepare a container to catch drain fuel.
- Prepare a filter wrench.

1. Open the pump room door on the right side of the machine.
2. Set valve (1) at the side of the fuel pre-filter cartridge to the shut position (S).




3. Set the container to catch the fuel under the pre-filter cartridge.
4. Loosen drain valve (2), then drain all the water and sediment in the transparent cap (3) and also the fuel accumulated in filter cartridge (4).
5. Using a filter wrench, turn transparent cap (3) counterclockwise to remove it. (This cap is used again.)
6. Using a filter wrench, turn cartridge (4) counterclockwise to remove it.
7. Install transparent cap (3) to the bottom of the new filter cartridge. (When doing this, always replace O-ring (5)).
8. When installing, apply oil to the packing surface and bring the packing surface into contact with the seal surface of filter cartridge (4) and then tighten it further by 1/4 to 1/2 turns.




**NOTES**

If the transparent cap is tightened too much, the O-ring will be damaged and this will cause leakage of fuel; if it is not tightened enough, fuel will leak through the gap at the O-ring. To prevent these problems, always tighten securely to the fixed tightening angle.



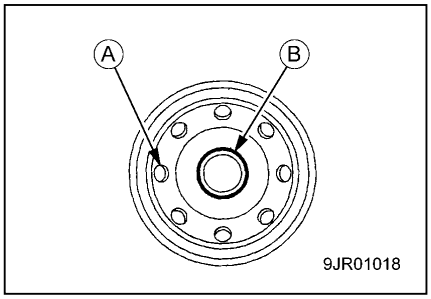
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9. Clean the filter holder, fill the new filter cartridge with clean fuel, coat the packing surface thinly with oil, then install to the filter holder.

**CAUTION**

- **When adding fuel, do not remove cap (B). Always add fuel from the 8 small holes (A) on the dirty side.**
- **After adding fuel, remove cap (B) and install the fuel filter cartridge.**
- **Always fill with clean fuel. Be careful not to let any dirt or dust get into the fuel. In particular, center portion is the clean side, so do not remove cap 'B) when adding fuel. Be careful not to let dirt or dust get into centre portion on clean side.**

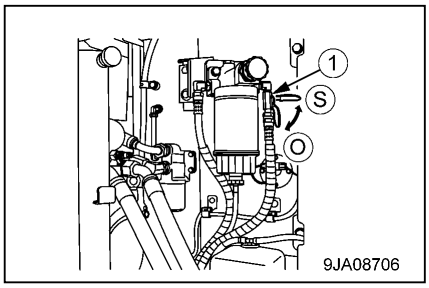



10. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it 3/4 of a turn.

**NOTES**

- If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten the correct amount.
- When tightening with a filter wrench, be extremely careful not to dent or damage the filter.

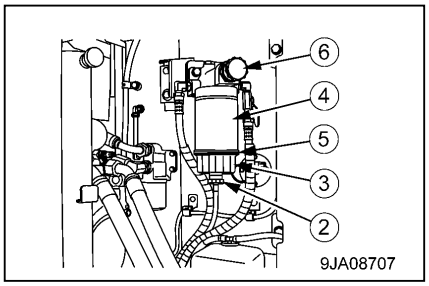
11. Check that the drain valve (2) is tightened securely.
12. Set valve (1) at the side of the fuel pre-filter cartridge to the open position (O).
13. After completing the replacement of filter cartridge (4), bleed air.




**[PROCEDURE FOF BLEEDING AIR]**

Bleed the air as follows:

1. Fill fuel tank with fuel (to the position where the float is at the highest position).
2. Loosen the knob of feed pump (6), pull it out, and then pump it in and out until the movement becomes heavy.




**NOTES**

- It is not necessary to remove the plug at the top of the fuel pre-filter and fuel main filter.
- After the engine runs out of fuel, use the same procedure to operate feed pump (6) and bleed the air.

3. After finishing bleeding air, push in the knob of feed pump (6) and tighten it.
4. After replacing the filter cartridge, start the engine and run it at low idling for 10 minutes.

**NOTES**

Check for leakage of fuel from the filter seal surface and transparent cap mounting. If any fuel is leaking, check the tightening of the filter cartridge.
If there is still fuel leakage, remove the filter cartridge, and if any damage or embedded foreign material in the packing surface is found, replace it with a new cartridge.



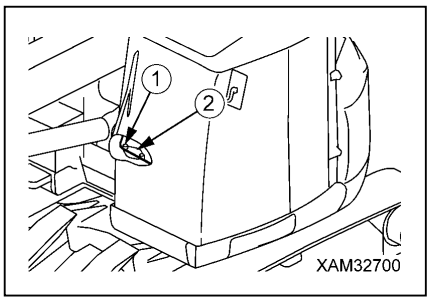
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### [4] CHECKING SWING PINION GREASE LEVEL, ADDING GREASE

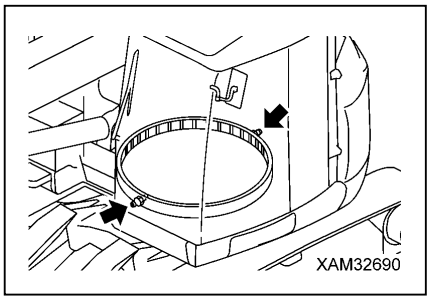
• Prepare a scale.

1. Remove 2 bolts (1) on the top of the upper structure and remove cover (2).
2. Insert a scale into the grease and check that the height of the grease in the portion where the pinion passes is at least 4 mm. Add more grease if necessary.
3. Check if the grease is milky white. If it is milky white, it is necessary to change the grease. Please contact us or our sales service agency.
   ★Total amount of grease: 10 liters (9.1 kg)
4. Install cover (2) with bolts (1).




### [5] GREASING SWING CIRCLE

1. Using a grease gun, pump in grease through the grease plug shown by arrows. (2 places)
2. After greasing, wipe off any old grease that was pushed out.






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## [6] CLEANING/CHECKING RADIATOR FINS, OIL COOLER FINS, FUEL COOLER FINS, AND AIR CONDITIONER CONDENSER FINS

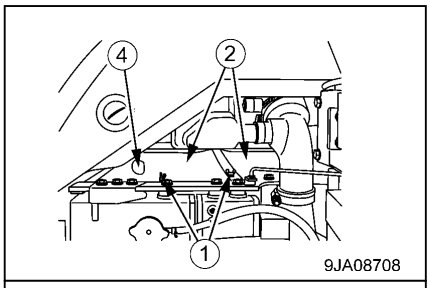
**⚠ WARNING**

**If compressed air, high-pressure water, or steam hits your body directly or dirt is sent flying by the compressed air, high-pressure water, or steam, there is danger of personal injury. Always wear protective glasses, dust mask, and other protective equipment.**

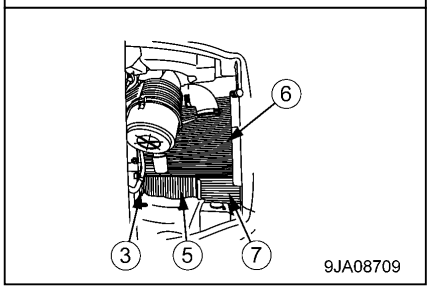
**CAUTION**

**When using compressed air, keep a distance from air nozzle, to prevent damage to the fins.**
**To prevent damage to the fins, apply compressed air from an appropriate distance. Damaged fins may cause water leakage or overheating. In a dusty site, check the fins daily, irrespective of the maintenance interval.**

1. Open the cover at the rear of the cab and the battery room door at the left side of the machine.
2. Remove 4 wing screws (1) and remove net (2).
3. Check the front and rear surfaces of oil cooler fins (3), radiator fins (4), after cooler fins (5), air conditioner condenser fins (6), and fuel cooler fins (7). If there is any mud, dirt, or leaves stuck to the fins, blow the dirt off with compressed air.



9JA08708



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**NOTES**

Steam or water may be used instead of compressed air.
However, when carrying out powerful steam cleaning (high-pressure machine wash) of the heat exchange equipment (radiator, oil cooler, after cooler, fuel cooler, air conditioner condenser), maintain sufficient distance from the machine when carrying out the operation. If steam cleaning (high-pressure machine wash) is carried out at close range, there is danger that the internal fins of the heat exchange equipment may be deformed, and this will cause early closing and breakage.

4. Check the rubber hose. Replace with a new one if the hose is found to have cracks or has hardened. Also, check hose clamps for looseness.
4. Check the rubber hose. Replace with a new one if the hose is found to have cracks or to be hardened by again. Also, check hose clamps for looseness.
5. After completing inspection and cleaning, install net (2) to its original position.



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## [7] CLEANING AIR CONDITIONER FRESH/RECIRC FILTERS

**⚠ WARNING**

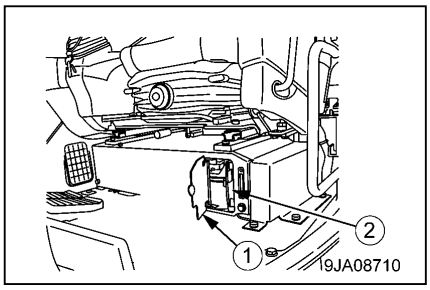
- **When using compressed air, there is danger of dirt flying and causing personal injury. Always wear protective glasses, dust mask, and other protective equipment.**
- **Always check that the slide door is locked at the open or closed position before cleaning the FRESH or RECIRC filter. If the slide door is free, there is danger that it may suddenly move and catch your fingers or break the cover.**

**CAUTION**

- **The guide for cleaning the filter is 500 hours, but if the machine is used on an extremely dusty jobsite, reduce the maintenance interval and clean the filter more frequently.**
- **When washing the floor, be careful not to get water on the air conditioner system.**

### [CLEANING RECIRCULATED AIR FILTER]

1. Open cover (1) at the front bottom left of the operator's seat.
2. Take out internal filter (2).
3. Clean internal filter (2) with compressed air. If there is oil stuck to the filter (2) or it is extremely dirty, wash it in a neutral agent. After washing, dry it thoroughly before using it again.



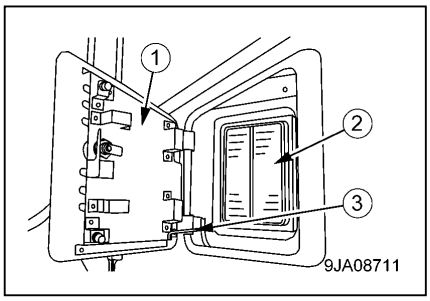

**NOTES**

If the clogging of the filter cannot be removed by blowing it with compressed air or washing in water, replace the filter with a new one.

4. After cleaning filter (2), return it to its original position and close cover (1).

### [CLEANING FRESH AIR FILTER]

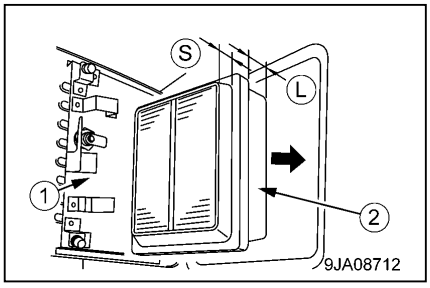
1. Use starter key to unlock cover (1) at the rear left of the operator's cab.
2. Open cover (1) by hands, secure it in position with cover support lever (3), then remove filter (2) from the inside.
3. Clean the filter with compressed air. If there is oil on the filter, or if the filter is extremely dirty, wash it in a neutral agent. After rinsing it in water, dry it thoroughly before using it again.




**NOTES**

Replace the filter with a new part every year. If the clogging of the filter cannot be removed by blowing with air or washing in water, replace the filter immediately.

4. After cleaning, return filter (2) to its original place.
5. Remove support lever (3), and close the cover (1). When doing this, lock it with the starter key. After locking it, do not forget to remove the starter key.




**NOTES**

The FRESH filter must be installed facing in the correct direction. When installing, insert the long (L) end of filter (2) into the filter case first. If the short (S) end is installed first, cover (1) will not close.



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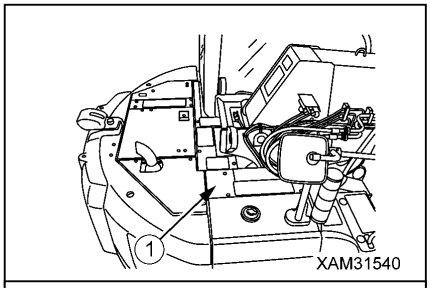
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## [8] REPLACEMENT BREATHER ELEMENT IN HYDRAULIC TANK

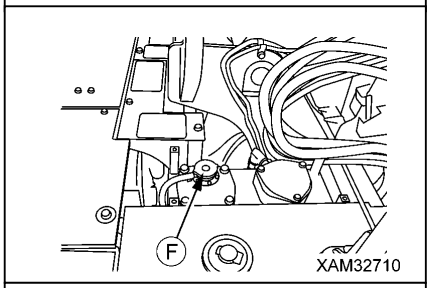
**⚠ WARNING**

- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **When removing the oil filter cap, turn it slowly to release the internal pressure, then remove it.**

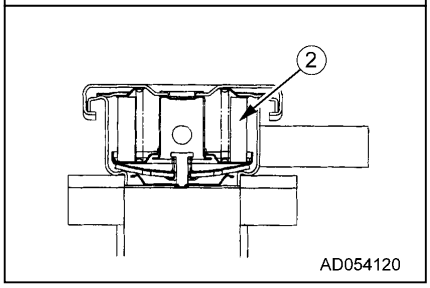
1. Remove cover (1) at the top of the hydraulic tank.




2. Remove the cap of oil filler (F) over the hydraulic tank.




3. Replace element (2) inside the cap.






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### [9] REPLACEMENT OIL IN WINCH MOTOR REDUCTION GEAR CASE

★The following maintenance should be performed after 500 hours operation, limited to the first maintenance of a new machine.

**⚠ WARNING**

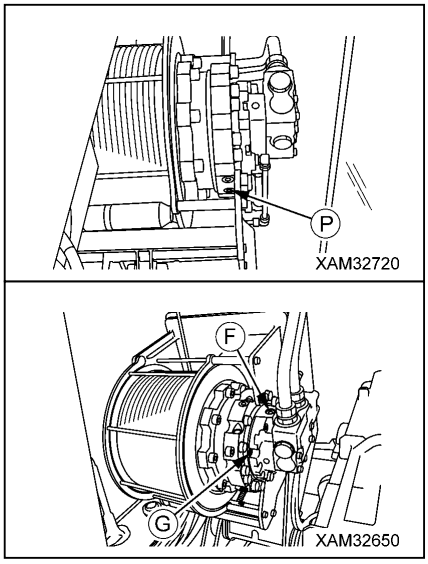
- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.**

**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **Use seal tape, etc. at the thread of the filler plug to stop the oil leak and securely tighten the plug after refilling with the oil.**

- Refill capacity: 1.8 liters
- Prepare a container to catch drain oil.
- Prepare a hexagon wrench.

1. Stop the machine on a level and solid ground and raise the boom to 80 degrees.
2. Set a container to catch the oil under drain plug (P).
3. Using a hexagon wrench and remove plugs (F), (G) and (P), then drain oil.
4. After draining oil, install drain plug (P) securely.
5. Add the replacement amount of oil through the hole of plug (F).
6. After the oil flows out of the hole, for plug (G), install plugs (G) and (F) securely.






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## 10.7 MAINTENANCE EVERY 1000 HOURS

Perform this maintenance in tandem with maintenance every 50/100/250/500 hours.

**[1] REPLACEMENT OIL IN SWING MACHINERY CASE**

**⚠ WARNING**

**The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**

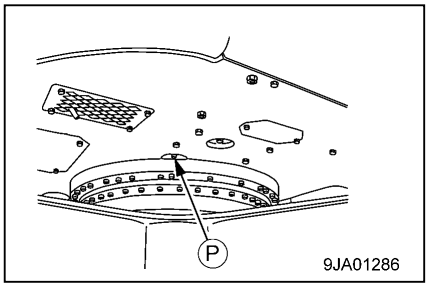
**CAUTION**

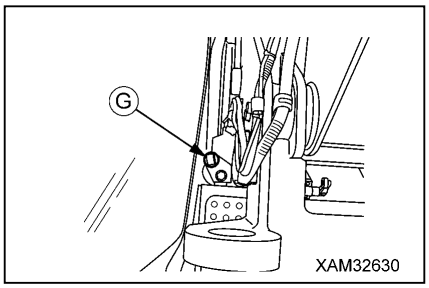
- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **After replacing oil, fully insert dipstick securely.**

• Refill capacity: 2.5 liters

• Prepare a container to catch drain oil.

1. Swing the upper structure so that drain plug (P) is between the left and right tracks.
2. Set a container under drain plug (P) at the bottom of the machine.
3. Remove drain plug (P) at the bottom of the machine, drain the oil.
4. After draining oil, tighten drain plug (P) securely.
   ★Tightening torque: 44.1 to 93.1 Nm (4.5 to 9.5 kgfm)
5. Remove dipstick (G) and add the specified amount of oil from gauge guide hole.
6. Wipe off the oil on the dipstick (G) with a cloth.
7. Fully insert dipstick (G) into gauge guide, then remove it.
8. The oil level should be between the H and L marks on oil level gauge (G).
9. If the oil level is below the L mark, add oil through gauge guide hole.




**NOTES**

The oil must be filled up to midway between the H and L marks of the dipstick (G).

10. If the oil is above the H mark, drain the excess oil from drain plug (P), then check the oil level again.
11. After adding, insert dipstick (G) into gauge guide securely.



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### [2] REPLACEMENT OIL IN TRAVEL MOTOR REDUCTION GEAR CASE

**⚠ WARNING**

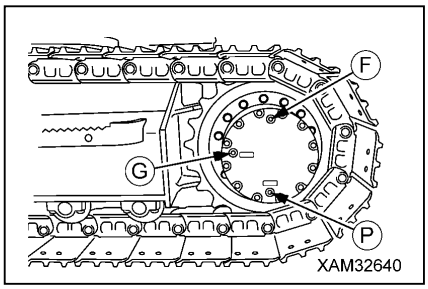
- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.**

**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **Use seal tape, etc. at the thread of the filler plug to stop the oil leak and securely tighten the plug after refilling with the oil.**

- Refill capacity (each): 2.1 liters
- Prepare a container to catch drain oil.
- Prepare a hexagon wrench.

1. Move the machine forward and reverse, set so that plug (F) is at the top, with plug (F) and plug (P) perpendicular to the ground.
2. Set a container under drain plug (P).
3. Using a hexagon wrench and remove plugs (F), (G) and (P), then drain oil.
4. After draining oil, install drain plug (P) securely.
5. Add the replacement amount of oil through the hole of plug (F).
6. After the oil flows out of the hole, for plug (G), install plugs (G) and (F) securely.






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### [3] REPLACEMENT OIL IN WINCH MOTOR REDUCTION GEAR CASE

**⚠ WARNING**

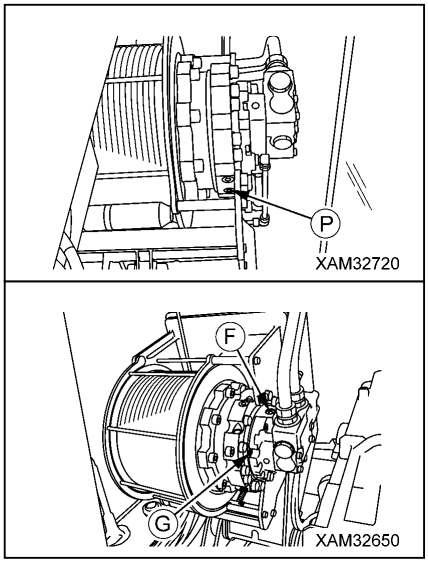
- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.**

**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **Use seal tape, etc. at the thread of the filler plug to stop the oil leak and securely tighten the plug after refilling with the oil.**

- Refill capacity: 1.8 liters
- Prepare a container to catch drain oil.
- Prepare a hexagon wrench.

1. Stop the machine on a level and solid ground and raise the boom to 80 degrees.
2. Set a container to catch the oil under drain plug (P).
3. Using a hexagon wrench and remove plugs (F), (G) and (P), then drain oil.
4. After draining oil, install drain plug (P) securely.
5. Add the replacement amount of oil through the hole of plug (F).
6. After the oil flows out of the hole for plug (G), install plugs (G) and (F) securely.






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### [4] REPLACEMENT HYDRAULIC OIL FILTER ELEMENT

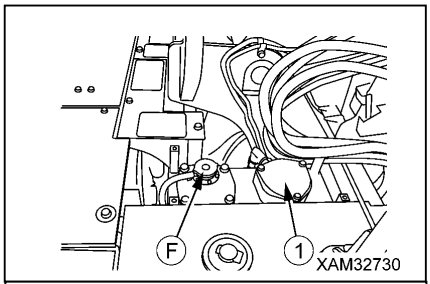
**⚠ WARNING**

- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **The engine must be at halt until piping and hydraulic equipment is filled with oil after replacement of the hydraulic oil filter.**

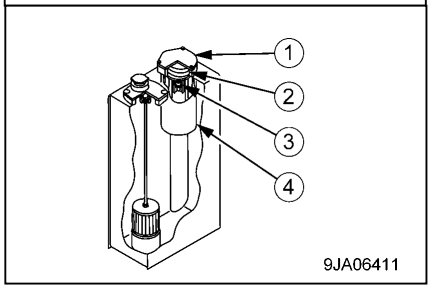
1. Remove the cover at the top of the hydraulic tank.
2. Remove the cap (F) from oil filler, and release the internal pressure.
3. Remove 3 bolts, then remove cover (1).




**NOTES**

When doing this, the cover may fly out under the force of spring (2), so hold the cover down when removing the bolts.

4. After removing spring (2) and valve (3), take out element (4).
5. Clean the removed parts in flushing oil.
6. Install the new element in the place where old element (4) was installed.
7. Set valve (3) and spring (2) on top of the element.
8. Set cover (1) in position, push it down by hands, and install the cover with the mounting bolts.
9. Install the oil filler cap (F) at the top of the hydraulic tank.
10. Install the cover at the top of the hydraulic tank.
11. To bleed the air, start the engine and run the engine at low idle for 10 minutes.
12. Stop the engine.




**NOTES**

Operate the machine after halting for more than 5 minutes to eliminate bubbles in the oil inside the tank.

13. Check for oil leakage and wipe off any spilled oil.



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### [5] REPLACEMENT FUEL MAIN FILTER CARTRIDGE

**⚠ WARNING**

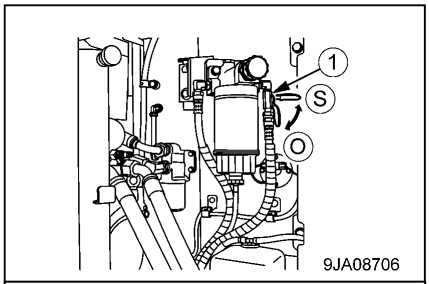
- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **High pressure is generated inside the engine fuel piping system when the engine is running. When replacing the filter, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before replacing the filter.**
- **Do not bring any fire or flame close.**

**CAUTION**

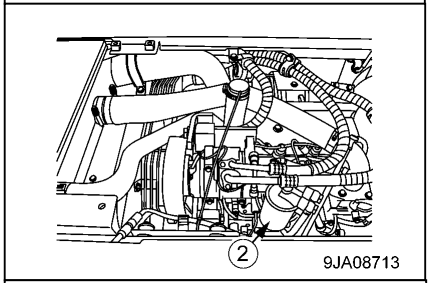
- **Genuine Maeda fuel filter cartridges use a special filter that has highly efficient filtering ability. When replacing the filter cartridge, always use a genuine Maeda parts.**
- **The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection pump and nozzle. If any part other than a genuine Maeda filter cartridge is used, dust or dirt may get in and cause problems with the injection system. Always avoid using substitute parts.**
- **When carrying out inspection or maintenance of the fuel system, pay more attention than normal to the entry of dirt. If dirt is stuck to any part, use fuel to wash it off completely.**

• Prepare a container to catch drain oil.
• Prepare a filter wrench.

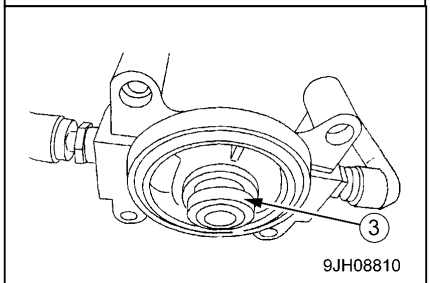
1. Open the pump room door on the right side of the machine.
2. Set valve (1) at the side of the fuel pre-filter cartridge to the shut position (S).




3. Open the engine hood.
4. Set a container to catch the fuel under the filter cartridge.
5. Using a filter wrench, turn filter cartridge (2) counterclockwise to remove it.

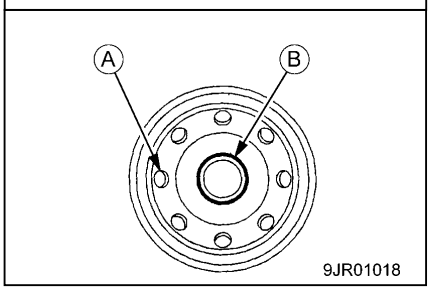



6. Clean the filter holder, replace inner seal (3) with a new part.
7. Coat the packing surface of the new filter cartridge thinly with oil, then install the filter cartridge to the filter holder.




**CAUTION**

- **Do not fill the new filter cartridge with fuel.**
- **Remove cap (B) and install the filter cartridge.**





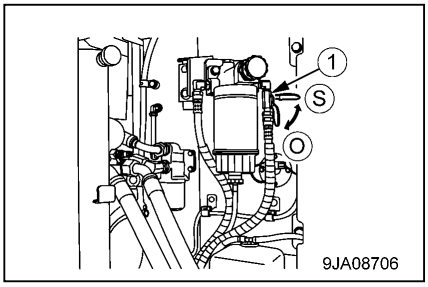

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8. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it 3/4 of a turn.

| NOTES |
|---|
| If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten the correct amount. |

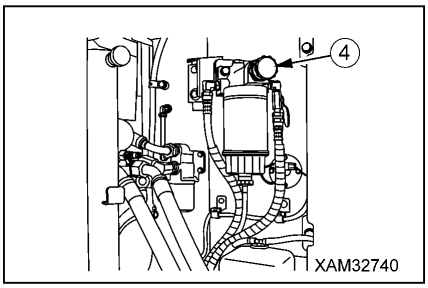
9. Set valve (1) at the side of the fuel pre-filter cartridge to the open position (O).
10. After completing the replacement of filter cartridge (2), bleed air.




**[PROCEDURE FOR BLEEDING AIR]**

Bleed the air as follows:

1. Fill fuel tank with fuel (to the position where the float is at the highest position).
2. Loosen the knob of feed pump (4), pull it out, and then pump it in and out until the movement becomes heavy.




| NOTES |
|---|
| • It is not necessary to remove the plug at the top of the fuel pre-filter and fuel main filter.<br>• After the engine runs out of fuel, use the same procedure to operate feed pump (4) and bleed the air. |

3. After finishing the bleeding of air, push in the knob of feed pump (4) and tighten it.
4. After replacing the filter cartridge, start the engine and run it at low idling for 10 minutes.

| NOTES |
|---|
| Check for leakage of fuel from the filter seal surface and transparent cap mounting. If any fuel is leaking, check the tightening of the filter cartridge.<br>If there is still fuel leakage, remove the filter cartridge, and if any damage or embedded foreign material in the packing surface is found, replace it with a new cartridge. |



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### [6] CHECKING/REFILLING OIL IN PTO GEAR CASE

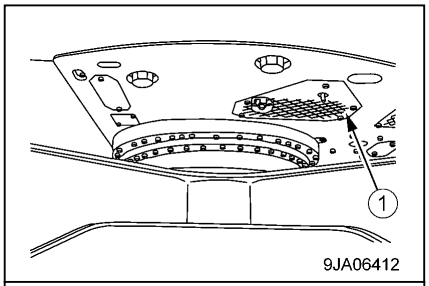
**⚠ WARNING**

**The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**

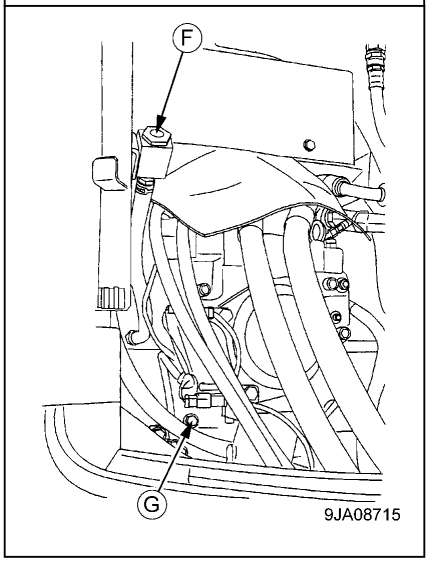
**CAUTION**

**For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**

1. Swing the upper structure so that the PTO gear case is in the middle between the left and right tracks.
2. Remove undercover (1) at the bottom of the machine.




3. Remove oil inspection plug (G) and check that the oil is near the bottom of the plug hole.
4. If the oil level is low, open the pump room door on the right side of the machine, remove the oil filler plug (F), and add oil.
   Add oil until the oil level is close to the bottom of the hole of oil inspection plug (G).
5. Install plugs (G) and (F).
6. Install undercover (1).




### [7] CHECKING ALL TIGHTENING POINTS OF ENGINE AIR INTAKE PIPE CLAMPS

Please ask us or our sales service agency to check the tightening of the clamps between air cleaner – turbocharger – after cooler – engine.



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## 10.8 MAINTENANCE EVERY 2000 HOURS

Perform this maintenance in tandem with maintenance every 50/100/250/500/1000 hours.

**[1] CLEANING HYDRAULIC TANK STRAINER**

**⚠ WARNING**

- **The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

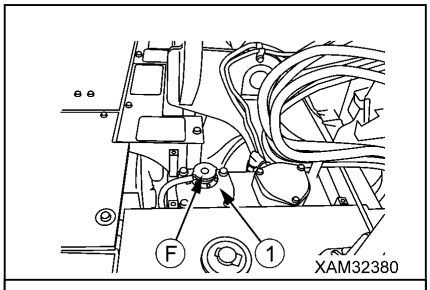
**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **The engine must be at a halt until piping and hydraulic equipment is filled with oil after replacement of the hydraulic oil filter.**

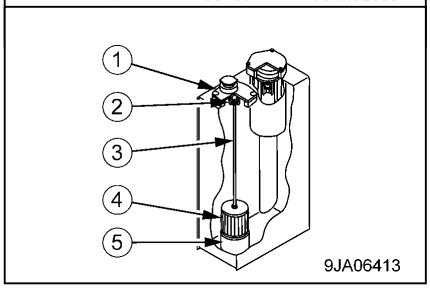
1. Remove the cover at the top of the hydraulic tank.
2. Remove the cap (F) from oil filler, and release the internal pressure.
3. Remove 4 bolts, and then remove cover (1).

**NOTES**

When doing this, the cover may fly out under the force of spring (2), so hold the cover down when removing the bolts.




4. Hold the top of rod (3) and pull up to remove spring (2) and strainer (4).
5. Remove any dirt stuck to strainer (4), and then wash it in flushing oil. If strainer (4) is damaged, replace it with a new part.
6. When installing, insert strainer (4) into protruding part (5) of the tank, and assemble.
7. Install cover (1) with bolts.
8. Install the oil filler cap (F) at the top of the hydraulic tank.
9. Install the cover at the top of the hydraulic tank.




**[2] CHECKING ALTERNATOR AND STARTER MOTOR**

The brushes may be worn or the bearing may have run out of grease, contact us or our sales service agency for inspection and repairs.

If the engine is started frequently, have this inspection carried out every 1000 hours.

**[3] CHECKING/ADJUSTING ENGINE VALVE CLEARANCE**

Special tools are needed for inspection and maintenance, please contact us or our sales service agency.



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## [4] CHECKING CHARGE PRESSURE OF NITROGEN GAS IN ACCUMULATOR

**⚠ WARNING**

**The accumulator is charged with high-pressure nitrogen gas, so mistaken operation may cause an explosion, which will lead to serious injury or damage. When handling the accumulator, always do as follows.**

- **The pressure in the hydraulic circuit cannot be completely removed. When removing the hydraulic equipment, do not stand in the direction that the oil spurts out when carrying out the operation. In addition, loosen the bolts slowly when carrying out the operation.**
- **Do not disassemble the accumulator.**
- **Do not bring it near flame or dispose of it in fire.**
- **Do not make holes in it or weld it.**
- **Do not hit it, roll it, or subject it to any impact.**
- **When disposing of the accumulator, the gas must be released. Please contact us or our sales service agency to have this work carried out.**

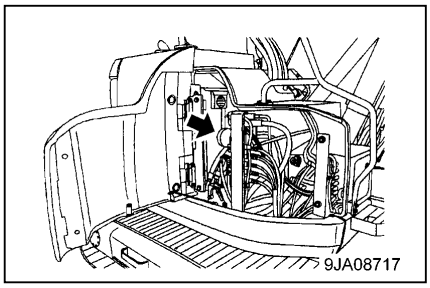
### [FUNCTION OF ACCUMULATOR]

The accumulator is installed to the position shown in the diagram on the right.

The accumulator stores the pressure in the control circuit.

Even after the engine is stopped, the control circuit can be operated, so the following actions are possible.

- If the blade control lever operated in the direction to lower the blade, it is possible for the blade to go down under its own weight.
- The pressure in the hydraulic circuit can be released.

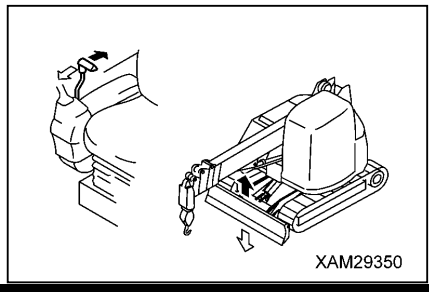



### [CHECKING FUNCTION OF ACCUMULATOR]

Replace the accumulator every 2 years or every 4000 hours, whichever comes sooner.

Check the nitrogen gas charge pressure as follows.

1. Stop the machine on firm and level ground.
2. Set the blade to the maximum raise and hold the blade at position.

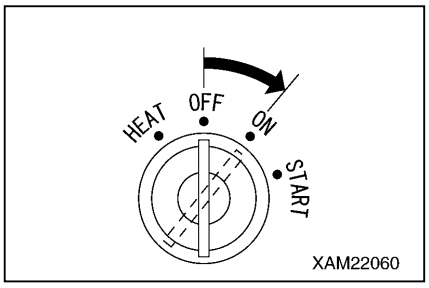



**CAUTION**

**Carry out the following procedure to lower the blade to the ground within 15 seconds of stopping the engine. When the engine stops, the pressure in the accumulator gradually goes down, so inspection can only be carried out immediately after the engine is stopped.**

3. Keep the blade at its highest position and then turn the starter switch to the OFF position and stop the engine.

4. Turn the starter switch to the ON position.

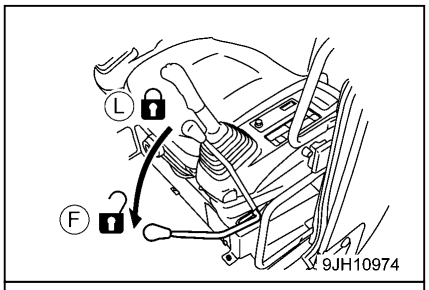





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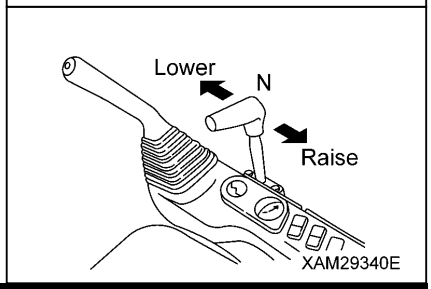
5. Set the lock lever to the FREE position (F).




6. Operate the blade control lever fully to the LOWER position.

7. Check that the blade goes down to the ground under its own weight.

This completes the inspection.




## CAUTION

**If the nitrogen gas charge pressure in the accumulator is low and operations are continued, it will become impossible to release the remaining pressure inside the hydraulic circuit if a failure occurs on the machine.**
**In these following causes, the charge pressure of the accumulator has gone down. Please contact us or our sales service agency.**
- **Blade does not go down.**
- **Stop while going down.**



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## 10.9 MAINTENANCE EVERY 4000 HOURS

Perform this maintenance in tandem with maintenance every 50/100/250/500/1000/2000 hours.

**[1] CHECKING WATER PUMP**

Check that there is no play in the pulley, leakage of oil or water, or clogging of the drain hole. If any problem is found, please contact us or our sales service agency for repairs or replacement.

**[2] REPLACEMENT ACCUMULATOR (FOR CONTROL CIRCUIT)**

Replace the accumulator every 2 years or every 4000 hours, whenever comes sooner.

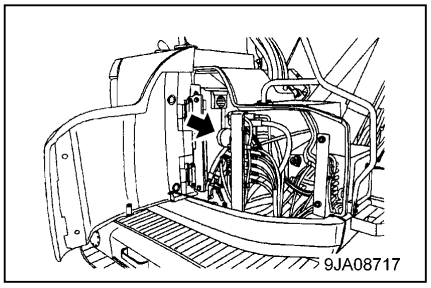
**⚠ WARNING**

**The accumulator is charged with high-pressure nitrogen gas, so mistaken operation may cause an explosion, which will lead to serious injury or damage. When handling the accumulator, always do as follows.**

- **The pressure in the hydraulic circuit cannot be completely removed. When removing the hydraulic equipment, do not stand in the direction that the oil spurts out when carrying out the operation. In addition, loosen the bolts slowly when carrying out the operation.**
- **Do not disassemble the accumulator.**
- **Do not bring it near flame or dispose of it in fire.**
- **Do not make holes in it or weld it.**
- **Do not hit it, roll it, or subject it to any impact.**
- **When disposing of the accumulator, the gas must be released. Please contact us or our sales service agency to have this work carried out.**

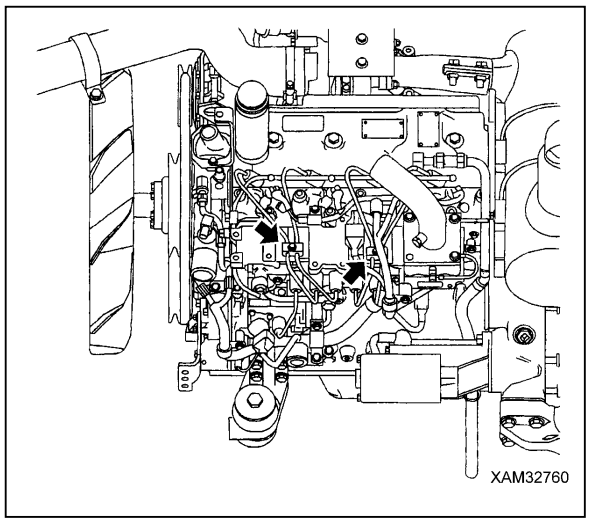
The accumulator is installed to the position shown in the diagram on the right.

If operations are continued after the performance of the accumulator has dropped, if will be impossible to release the remaining pressure in the hydraulic circuit if there should be a failure on the machine. Please ask us our sales service agency to replace the accumulator.




**[3] CHECKING FOR LOOSENESS OF HIGH-PRESSURE PIPING CLAMP, HARDENING OF RUBBER**

Check visually and touch by hand to check that there is no hardening of the rubber and no loose bolts of the 2 mounting clamps for the high-pressure piping between the supply pump and the common rail. If there are any problems, the parts must be replaced. In this case, please ask us or our sales service agency to carry out replacement.



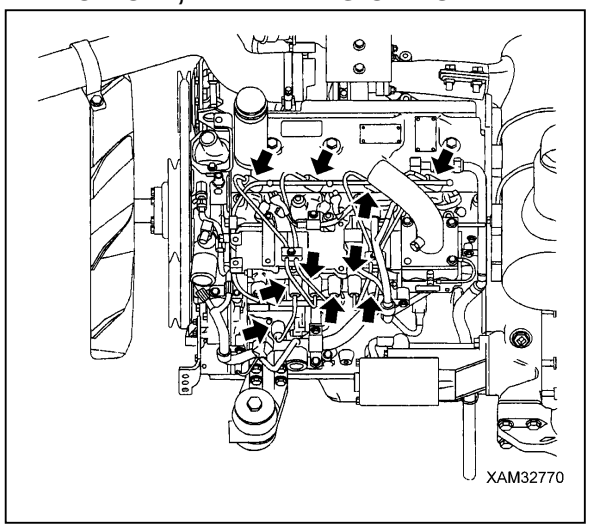



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### [4] CHECKING FOR MISSING FUEL SPRAY PREVENTION CAP, HARDENING OF RUBBER

The fuel spray prevention 10 caps on the fuel injection piping and both ends of the high-pressure piping act to prevent the fuel from coming into contact with high-pressure parts of the engine and causing a fire if the fuel should leak or spray out. Check visually and touch by hand to check that there are no missing caps, loose bolts or hardening of the rubber. If there are any problems, the parts must be replaced. In this case, please ask us or our sales service agency to carry out replacement.






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## 10.10 MAINTENANCE EVERY 5000 HOURS

Perform this maintenance in tandem with maintenance every 50/100/250/500/1000 hours.

**[1] REPLACEMENT OIL IN HYDRAULIC TANK**

**⚠ WARNING**

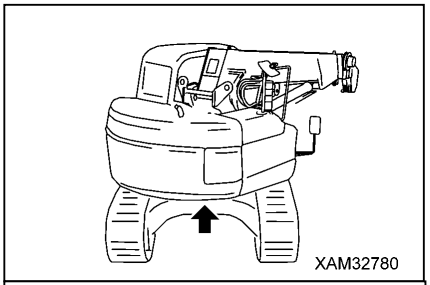
- **Parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the oil temperature to go down before performing this operation.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**
- **Securely close the tank cap after refilling with the oil.**

**CAUTION**

- **For details of using oil specified, see "Maintenance 7.1 Use of Fuel, Coolant and Lubricants According to Ambient Temperature".**
- **Be sure to put the machine in the traveling posture when checking the oil level.**
  **Checking the oil level in the working posture will cause overfilling since the oil in the cylinders has not returned to the tank.**
  **★ For details of traveling posture, see "Operation 3.7 Machine Traveling Posture".**
- **The engine must be at halt until piping and hydraulic equipment is filled with oil after replacement of the hydraulic oil filter.**

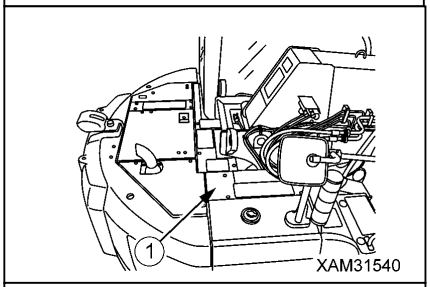
- Refill capacity: 69 liters
- Prepare a container to catch drain oil.
- Prepare a handle (for the socket wrench)

1. Swing so that the drain plug at the bottom of the hydraulic tank is in the middle between the left and right tracks.

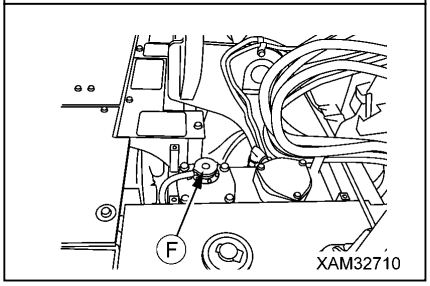



2. Set the lock lever to the LOCK position and stop the engine.

3. Remove cover (1) at the top of the hydraulic tank.



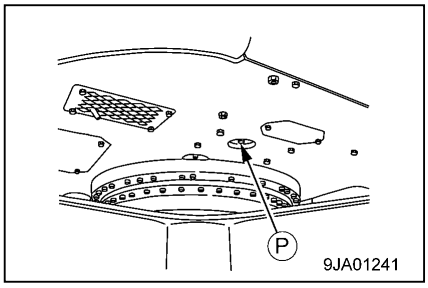

4. Remove the cap (F) of oil filler over the hydraulic tank.






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5. Set a container to catch the oil under the drain plug under the machine.
6. Using a handle, remove drain plug (P) and drain the oil.




| NOTES |
| --- |
| Take care not to get oil on yourself when you remove drain plug (P). |

7. Check the O-ring installed to plug (P), and if it is damaged, replace the O-ring.
8. After draining the oil, tighten drain plug (P) securely.
   ★Tightening torque: 58.8 to 78.4 Nm (6 to 8 kgfm)
9. Add the replacement amount of oil through oil filler (F).
10. Check that the oil level is between the H and L lines on the sight gauge. For details of oil level check, See Operation 3.1.2 Checking Before Starting Engine [4] Checking/refilling Oil Level in Hydraulic Tank".

## 10.11 MAINTENANCE EVERY 8000 HOURS

Perform this maintenance in tandem with maintenance every 50/100/250/500/1000/2000/4000 hours.

**[1] REPLACEMENT ENGINE HIGH-PRESSURE PIPING CLAMP**

Please contact us or our sales service agency to have the engine high-pressure clamps replaced.

**[2] REPLACEMENT FUEL SPRAY PREVENTION CAP**

Please contact us or our sales service agency to have the fuel spray prevention cap replaced.



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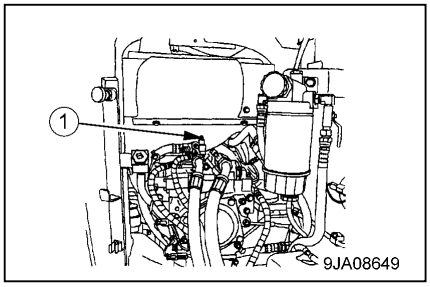
# 11. BLEEDING AIR FROM HYDRAULIC SYSTEM

| NOTES |
| --- |
| For details, see “Operation 3.3 Starting Engine”. If it is necessary to refer to the items for starting the engine, moving the machine off, steering, or stopping, see “Operation 3.8 Starting/moving/stopping Machine” and “3.9 Steering Machine”. |

### [1] BLEEDING AIR FROM PUMP

| CAUTION |
| --- |
| **If the pump is operated without filling the pump case with hydraulic oil, there is danger that the pump may be prematurely damaged. Be sure to bleed the air completely.** |

1. Open the pump room door on the right side of the machine.
2. Loosen air bleed plug (1) installed to the drain port and check that oil oozes out.
3. After completion of the air bleeding operation, tighten the air bleed plug (1).
4. Start the engine, and then run the engine at low idle for 10 minutes after starting, then start operations.




### [2] BLEEDING AIR FROM CYLINDERS

| CAUTION |
| --- |
| **If the engine is run at high speed immediately after startup or a cylinder is pushed up to its stroke end, air taken inside the cylinder may cause damage to the piston packing.** |

1. Run the engine at low idle, and extend and retract each cylinder 4 to 5 times, taking care that a cylinder is not moved to the end of its stroke. (Stop the cylinder approx. 100 mm short of its stroke end)

2. Next, operate each cylinder 3 to 4 times to the end of its stroke.

3. Finally, operate each cylinder 4 to 5 times to the end of its stroke to completely remove the air.



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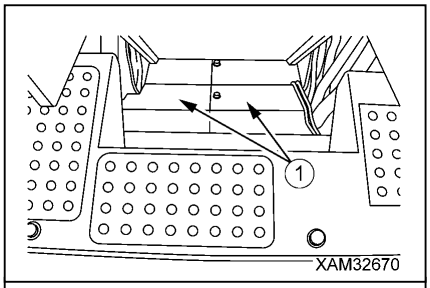
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### [3] BLEEDING AIR FROM SWING MOTOR

**CAUTION**

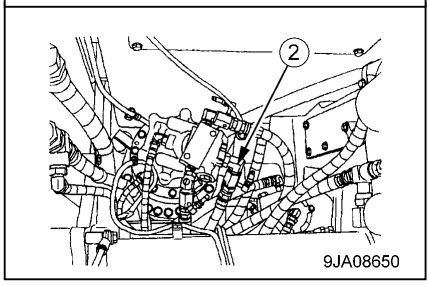
- **Carry out only if the oil inside the swing motor case has been drained.**
- **If the air is not bleed from the swing motor, the motor bearings may be damaged.**

1. Remove 2 covers (1) between the hydraulic tank and the operator's cab




2. Start the engine, and then run the engine at low idle.

3. Loosen mount piece (2) at the motor "S port", and check that oil comes out from mount piece (2) of the motor "S port".




**CAUTION**

**Do not operate the swing under any circumstances.**

**NOTES**

If no oil oozes out, stop the engine, remove mount piece (2) from the motor "S port", then fill the inside of the motor case with hydraulic oil.

4. After completing the air bleed operation, tighten mount piece (2)of the motor "S port".

5. Run the engine at low idle, and slowly swing the upper structure at least 2 times uniformly to the left and right.



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## [4] BLEEDING AIR FROM WINCH MOTOR

**⚠ CAUTION**

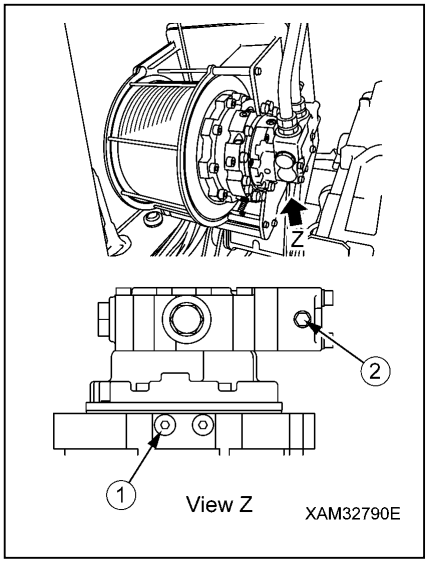
**To loosen or tighten the bleeder plug of the winch motor, always practice it when the hook block is lowered to touch the ground and the equipment control levers are positioned to NEUTRAL. Otherwise, the plug or oil may come out due to the internal pressure.**

**CAUTION**

- **Make sure that the air is fully bled from the winch motor. Where the bleeding is not sufficient, the motor will not run smoothly when started.**
- **Make sure that bleeder plug is securely tightened. Otherwise, the brake may not be released, when it is not correctly tightened, and also the oil may leak.**

**[BLEEDING FROM THE MECHANICAL BRAKE]**

1. Lower the hook block to the ground and return the right work equipment control lever to the NEUTRAL position.
2. Loosen the bleeder plug (1) for the mechanical brake for 3 to 4 turns.
3. Slowly wind up, stop and un-wind the hook block without any load.
4. When the hydraulic oil leaks from segment of the bleeder plug (1) for the mechanical brake, stop the winch operation and tighten the bleeder plug (1) securely.
   ★Tightening torque: 12.3 Nm (1.25 kgfm)




**[BLEEDING FROM THE COUNTER BALANCE VALVE]**

1. Lower the hook block to the ground and return the right work equipment control lever to the NEUTRAL position.
2. Loosen the bleeder plug (2) for the counter balance valve for 3 to 4 turns.
3. Slowly wind up, stop and un-wind the hook block without any load.
4. When the hydraulic oil leaks from segment of the bleeder plug (2) for the counter balance, lower the hook block to the ground and return the right work equipment control lever to the NEUTRAL position.
5. Tighten the bleeder plug (2) securely.
   ★Tightening torque: 12.3 Nm (1.25 kgfm)



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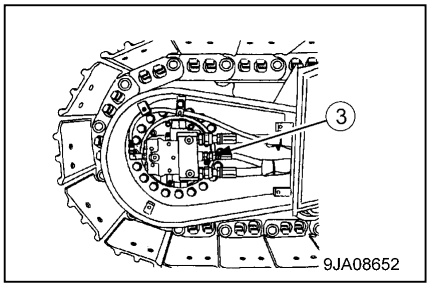
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### [5] BLEEDING AIR FROM TRAVEL MOTOR

**NOTES**

Only when oil inside travel motor case has been drained.

1. Start the engine, and then run the engine at low idle.
2. Remove hose (3) from “port C”, then when the oil has flowed out, tighten it again.
3. Stop the engine, and then raise the undercarriage. For details, see following procedure.
4. Start the engine again, and then run the engine at low idle.
5. Rotate the track under no load for 2 minutes.




**NOTES**

- Rotate the track equally both forward and in reverse.
- Repeat this procedure on both the left and right sides.

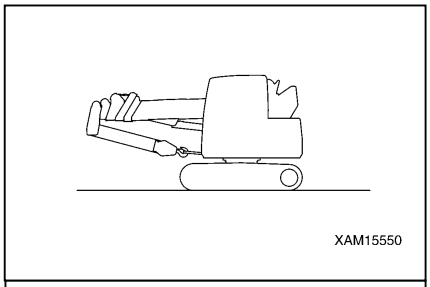
### [PROCEDURE TO RAISE THE UNDERCARRIAGE USING A CRANE]

**⚠ WARNING**

- **Always exercise this practice only on level and solid ground.**
- **Refer to "Specifications 1. Main Specifications" for dimension and mass of this machine.**
- **The operator who operates the crane to lift this machine up must be licensed or trained for crane operation.**
- **Sling instruments such as wire ropes and shackles for lifting operation must be sufficiently durable for the mass of this machine.**
- **During the lifting up practice, always set the lock lever to the lock position to prevent the machine from a sudden move.**
- **Any procedure to lift up the crane other than below is strictly prohibited. Otherwise, the machine may lose balance.**

• Prepare a rectangular lumber (450mm X 450mm) to put under the track frame.

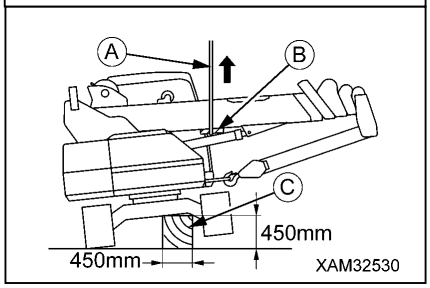
1. Configure the machine to the "traveling posture" as shown the figure in the right.
2. Swing the upper structure 90 degrees.




3. Attach the sling wire rope (A) below the boom and lift the machine up slowly.

**NOTES**

For this operation, use a pad (B) such as a rectangular lumber between the sling wire rope (A) and the boom to prevent the boom from being damaged.




4. Insert the rectangular lumber (C) prepared properly, between the ground and the track frame which is lifted.
5. Lower the machine slowly. Ensure that the machine is in a stable condition, during this practice.



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# 12. METHOD FOR RELEASING PRESSURE IN HYDRAULIC CIRCUIT

**⚠ WARNING**

**The pressure in the hydraulic circuit cannot be completely removed. When removing the hydraulic equipment, do not stand in the direction that the oil spurts out when caring out the operation. In addition, loose the bolts slowly when carrying out the operation.**

**NOTES**

Refer to "Operation 3.3 Starting Engine" for starting the engine. Also refer to the description in "Operation" for starting and stopping, and turning the travel direction, as applicable.

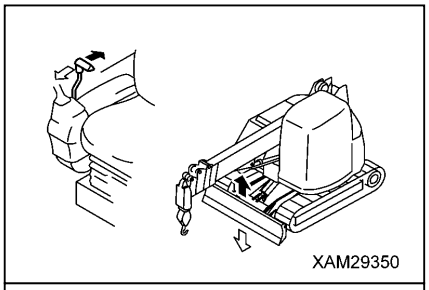
**CAUTION**

**Carry out the following procedure to operate the blade control lever fully to the front and rear within 15 seconds of stopping the engine. When the engine stops, the pressure in the accumulator will gradually go down, so the pressure can only be release immediately after the engine is stopped.**

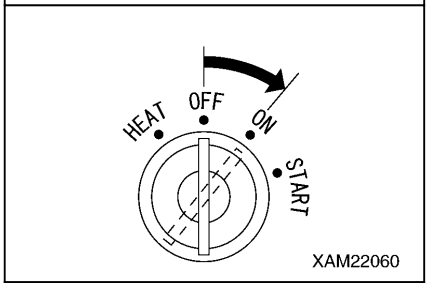
1. Stop the machine at leveled location.

2. Lower the blade to the ground.

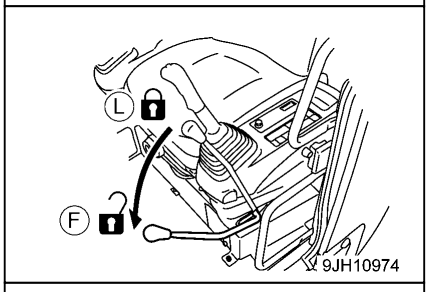
3. Turn the starter switch to the OFF position and stop the engine.



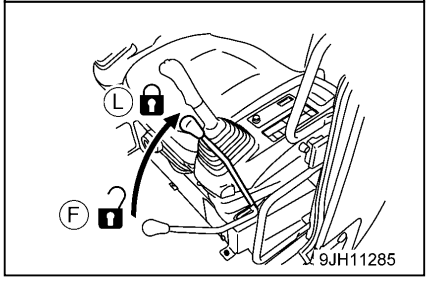

4. Turn the starter switch to the ON position.




5. Set the lock lever to the FREE position (F), then operate each work equipment control lever and blade control lever fully to the front, rear ,left and right to release the pressure in the hydraulic circuit.




6. Set the lock lever to the LOCK position (L) to lock the work equipment control levers and blade control lever.






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# SPECIFICATIONS


| | |
|---|---|
| 1. SPECIFICATION LIST | 5- 2 |
| 2. SPECIFICATION DIMENSIONAL DRAWING | 5- 4 |
| 3. RATED TOTAL LOAD CHART | 5- 5 |
| 4. WORKING RADIUS AND LIFTING HEIGHT | 5- 8 |




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# 1. SPECIFICATION LIST

| System / Item | | | LC1385M-8B |
|---|---|---|---|
| Mass and dimensions | Machine mass | | 15640kg |
| | Overall length × width × height | | 6545mm x 2490mm x 2965mm |
| | Distance between idler and sprocket | | 2880mm |
| | Track gauge | | 1990mm |
| | Track width | | 500mm |
| | Swing radius at machine rear end | | 1600mm |
| Capacity | Maximum rated total load × working radius | | 6.0t x 2.6m |
| | Maximum working radius | | 16.1m |
| | Maximum lifting height | | 16.7m |
| Winch system | Method | | 2 speeds hydraulic motor with built-in automatic brake, Grooved drum with a planetary differential type reduction gear |
| | Number of falls | | 4-falls/2-falls (1-fall Optional) |
| | Winding speed | Low | 28.0m/min (4th drum, 4 ropes) |
| | | High | 41.0m/min (4th drum, 4 ropes) |
| | Hoisting rope | | IWRC 6 x WS (29) 0/0 Type B φ10mm x 115m |
| Boom telescoping system | Method | | 3 sequential telescoping double acting hydraulic cylinders + 1 wire rope telescoping device |
| | Boom type | | Hexagonal sectioned hydraulic automatic telescoping boom, 5 sections (sections 2 and 3: sequential, sections 4 and 5: simultaneous) |
| | Boom length | | 4.745m – 7.625m – 10.505m – 13.385m - 16.265m |
| | Boom telescoping stroke/time | | 11.52m/25sec |
| Boom derrick system | Method | | Direct push-type hydraulic double-acting cylinder |
| | Derrick angle/ time | | -5 to 80 deg./18sec |
| Slewing system | Method | | Fixed displacement piston type |
| | Slewing angle/ speed | | 360 degrees, continual, 3.4 rpm |
| Traveling system | Method | | Variable displacement piston type |
| | Travel speed | Low | Forward/backward: 0 – 2.9km/h |
| | | High | Forward/backward: 0 – 5.1km/h |
| | Gradeability | | 34 deg. |
| | Ground pressure [shoe width] | | 53.3kPa (0.54kgf/cm$^2$) [500mm] |
| Hydraulic system | Hydraulic pump | | Variable displacement piston type |
| | Hydraulic oil tank capacity | | 120 liters |



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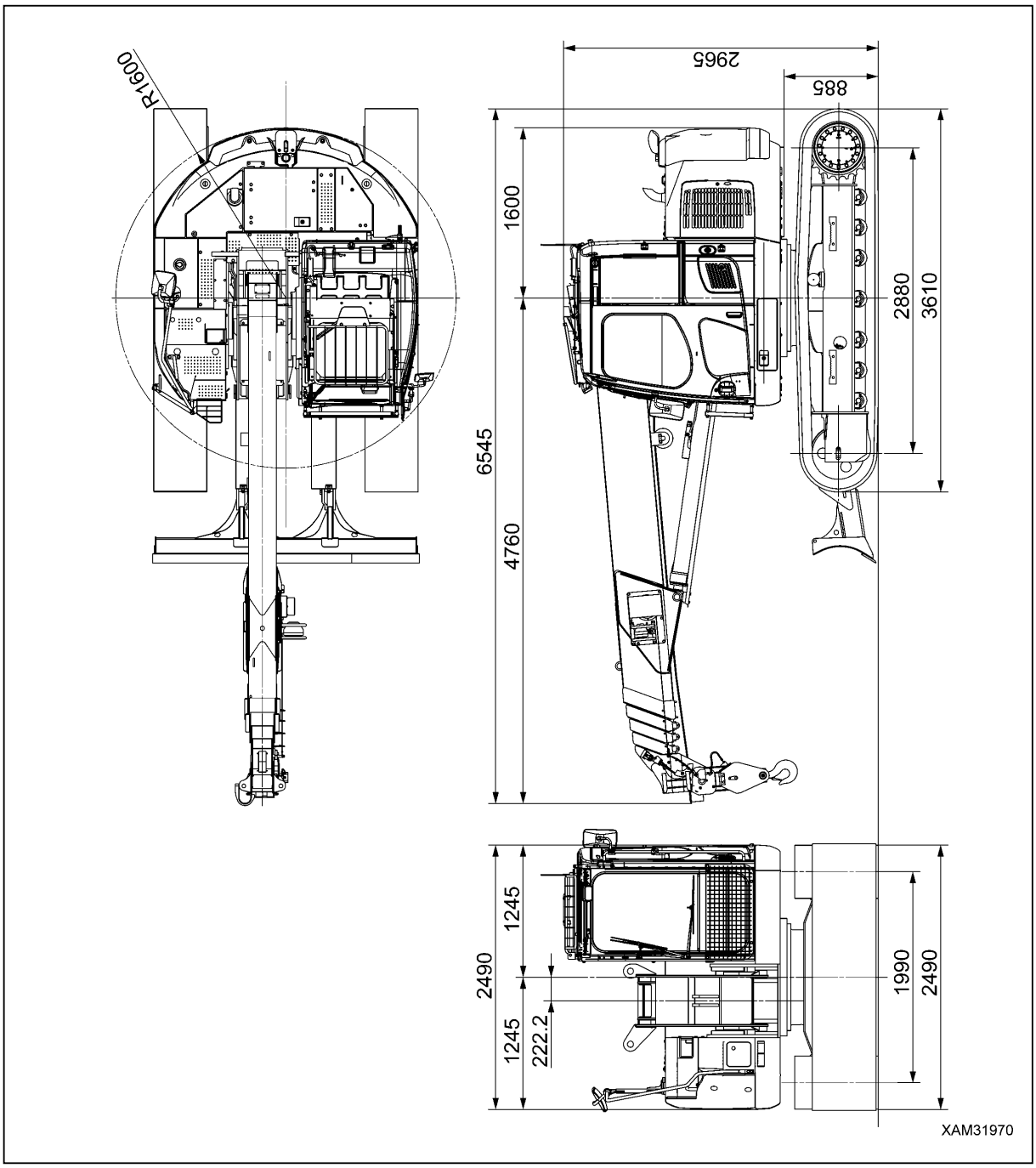
| System / Item | | LC1385M-8B |
|---|---|---|
| Engine | Model | Komatsu SAA4D95LE-5 |
| | Type | Vertical in-line 4-cylinder, Water cooled, 4-cycle, Direct fuel injection type, With turbocharger |
| | Displacement | 3.26 liters (3260cc) |
| | Rated output (continuous) | 68.4kW/2200min$^{-1}$ (93PS/2200rpm) |
| | Fuel tank capacity | Light oil/195 liters |
| Safety device | Over hoist detector, three-winding stop device, moment limiter (working envelope limited), slinging rope detachment protector, hydraulic safety valve, telescoping cylinder hydraulic automatic locking device, derricking cylinder hydraulic automatic locking device, alarm buzzer, machine body inclination alarm, working status lamp, level, control lever lock lever | |



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# 2. SPECIFICATION DIMENSIONAL DRAWING






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# 3. RATED TOTAL LOAD CHART

## [1] RATED TOTAL LOAD CHART AT WIRE ROPE 4 FALLS

Unit: kg

| Working radius (m) | 4.745m Boom | | 7.625m Boom | | 10.505m Boom | | 13.385m Boom | 16.265m Boom |
|---|---|---|---|---|---|---|---|---|
| | Stationary | Pick & Carry | Stationary | Pick & Carry | Stationary | Pick & Carry | Stationary | Stationary |
| 2.00 | 6000 | 2000 | 6000 | 2000 | 3000 | 1500 | | |
| 2.50 | 6000 | 2000 | 6000 | 2000 | 3000 | 1500 | 3000 | |
| 2.60 | 6000 | 2000 | 6000 | 2000 | 3000 | 1500 | 3000 | |
| 3.00 | 5250 | 2000 | 5260 | 2000 | 3000 | 1500 | 3000 | 2600 |
| 3.20 | 4910 | 2000 | 4920 | 2000 | 3000 | 1500 | 3000 | 2600 |
| 3.50 | 4450 | 2000 | 4460 | 2000 | 3000 | 1500 | 3000 | 2600 |
| 3.85 | 4000 | 2000 | 4000 | 2000 | 3000 | 1500 | 3000 | 2600 |
| 4.00 | 3830 | 1915 | 3820 | 1910 | 3000 | 1500 | 3000 | 2600 |
| 4.50 | 3320 | 1660 | 3310 | 1655 | 3000 | 1500 | 3000 | 2600 |
| 4.58 | 3250 | 1625 | 3240 | 1620 | 3000 | 1500 | 2940 | 2600 |
| 4.60 | | | 3220 | 1610 | 3000 | 1500 | 2920 | 2600 |
| 5.00 | | | 2880 | 1440 | 2710 | 1355 | 2640 | 2600 |
| 5.50 | | | 2520 | 1260 | 2400 | 1200 | 2340 | 2320 |
| 6.00 | | | 2210 | 1105 | 2140 | 1070 | 2100 | 2080 |
| 6.50 | | | 1950 | 975 | 1920 | 960 | 1890 | 1880 |
| 7.00 | | | 1720 | 860 | 1720 | 860 | 1710 | 1710 |
| 7.46 | | | 1530 | 765 | 1570 | 785 | 1570 | 1580 |
| 7.50 | | | | | 1550 | 775 | 1560 | 1560 |
| 8.00 | | | | | 1400 | 700 | 1430 | 1430 |
| 8.50 | | | | | 1270 | 635 | 1310 | 1320 |
| 9.00 | | | | | 1150 | 575 | 1200 | 1210 |
| 10.00 | | | | | 940 | 470 | 1020 | 1040 |
| 10.34 | | | | | 880 | 440 | 970 | 980 |
| 11.00 | | | | | | | 880 | 890 |
| 12.00 | | | | | | | 750 | 770 |
| 13.00 | | | | | | | 650 | 670 |
| 13.22 | | | | | | | 630 | 650 |
| 14.00 | | | | | | | | 580 |
| 15.00 | | | | | | | | 500 |
| 16.00 | | | | | | | | 440 |
| 16.10 | | | | | | | | 430 |
| Boom angle range (deg) | 0～64.3 | | 0～74.4 | | 0～78.8 | | 0～80.0 | 0～80.0 |

★Hook mass: 90kg

★Boom length:

4.745m boom → Boom retracted minimum

7.625m boom → Boom length more than 4.745m less than 7.625m

10.505m boom → Boom length more than 7.625m less than 10.505m

13.385m boom → Boom length more than 10.505m less than 13.385m

16.265m boom → Boom length 13.385m or more

★The Rated total load Chart is based on the actual working radius including boom deflection.

★The weight of hook block must be included as part of the load shown in the Rated total load Chart.



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## [2] RATED TOTAL LOAD CHART AT WIRE ROPE 2 FALLS

Unit: kg

| Working radius (m) | 4.745m Boom | | 7.625m Boom | | 10.505m Boom | | 13.385m Boom | 16.265m Boom |
|---|---|---|---|---|---|---|---|---|
| | Stationary | Pick & Carry | Stationary | Pick & Carry | Stationary | Pick & Carry | Stationary | Stationary |
| 2.00 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | | |
| 2.50 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | 3000 | |
| 2.60 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | 3000 | |
| 3.00 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | 3000 | 2600 |
| 3.20 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | 3000 | 2600 |
| 3.50 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | 3000 | 2600 |
| 3.85 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | 3000 | 2600 |
| 4.00 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | 3000 | 2600 |
| 4.50 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | 3000 | 2600 |
| 4.58 | 3000 | 1000 | 3000 | 1000 | 3000 | 1000 | 2940 | 2600 |
| 4.60 | | | 3000 | 1000 | 3000 | 1000 | 2920 | 2600 |
| 5.00 | | | 2880 | 1000 | 2710 | 1000 | 2640 | 2600 |
| 5.50 | | | 2520 | 1000 | 2400 | 1000 | 2340 | 2320 |
| 6.00 | | | 2210 | 1000 | 2140 | 1000 | 2100 | 2080 |
| 6.50 | | | 1950 | 975 | 1920 | 960 | 1890 | 1880 |
| 7.00 | | | 1720 | 860 | 1720 | 860 | 1710 | 1710 |
| 7.46 | | | 1530 | 765 | 1570 | 785 | 1570 | 1580 |
| 7.50 | | | | | 1550 | 775 | 1560 | 1560 |
| 8.00 | | | | | 1400 | 700 | 1430 | 1430 |
| 8.50 | | | | | 1270 | 635 | 1310 | 1320 |
| 9.00 | | | | | 1150 | 575 | 1200 | 1210 |
| 10.00 | | | | | 940 | 470 | 1020 | 1040 |
| 10.34 | | | | | 880 | 440 | 970 | 980 |
| 11.00 | | | | | | | 880 | 890 |
| 12.00 | | | | | | | 750 | 770 |
| 13.00 | | | | | | | 650 | 670 |
| 13.22 | | | | | | | 630 | 650 |
| 14.00 | | | | | | | | 580 |
| 15.00 | | | | | | | | 500 |
| 16.00 | | | | | | | | 440 |
| 16.10 | | | | | | | | 430 |
| Boom angle range (deg) | 0～64.3 | | 0～74.4 | | 0～78.8 | | 0～80.0 | 0～80.0 |

★Hook mass: 90kg

★Boom length:

4.745m boom → Boom retracted minimum

7.625m boom → Boom length more than 4.745m less than 7.625m

10.505m boom → Boom length more than 7.625m less than 10.505m

13.385m boom → Boom length more than 10.505m less than 13.385m

16.265m boom → Boom length 13.385m or more

★The Rated total load Chart is based on the actual working radius including boom deflection.

★The weight of hook block must be included as part of the load shown in the Rated total load Chart.



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## [3] RATED TOTAL LOAD CHART AT WIRE ROPE 1 FALL

Unit: kg

| Working radius (m) | 4.745m Boom | | 7.625m Boom | | 10.505m Boom | | 13.385m Boom | 16.265m Boom |
|---|---|---|---|---|---|---|---|---|
| | Stationary | Pick & Carry | Stationary | Pick & Carry | Stationary | Pick & Carry | Stationary | Stationary |
| 2.00 | 1500 | 500 | 1500 | 500 | 1500 | 500 | | |
| 2.50 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | |
| 2.60 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | |
| 3.00 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 3.20 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 3.50 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 3.85 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 4.00 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 4.50 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 4.60 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 4.68 | 1500 | 500 | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 5.00 | | | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 5.50 | | | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 6.00 | | | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 6.50 | | | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 7.00 | | | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 7.50 | | | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 7.56 | | | 1500 | 500 | 1500 | 500 | 1500 | 1500 |
| 8.00 | | | | | 1400 | 500 | 1430 | 1430 |
| 8.50 | | | | | 1270 | 500 | 1310 | 1320 |
| 9.00 | | | | | 1150 | 500 | 1200 | 1210 |
| 10.00 | | | | | 940 | 470 | 1020 | 1040 |
| 10.44 | | | | | 860 | 430 | 950 | 970 |
| 11.00 | | | | | | | 880 | 890 |
| 12.00 | | | | | | | 750 | 770 |
| 13.00 | | | | | | | 650 | 670 |
| 13.32 | | | | | | | 620 | 640 |
| 14.00 | | | | | | | | 580 |
| 15.00 | | | | | | | | 500 |
| 16.00 | | | | | | | | 440 |
| 16.20 | | | | | | | | 420 |
| Boom angle range (deg) | 0～64.3 | | 0～74.4 | | 0～78.8 | | 0～80.0 | 0～80.0 |

★Hook mass: 20kg

★Boom length:

4.745m boom → Boom retracted minimum

7.625m boom → Boom length more than 4.745m less than 7.625m

10.505m boom → Boom length more than 7.625m less than 10.505m

13.385m boom → Boom length more than 10.505m less than 13.385m

16.265m boom → Boom length 13.385m or more

★The Rated total load Chart is based on the actual working radius including boom deflection.

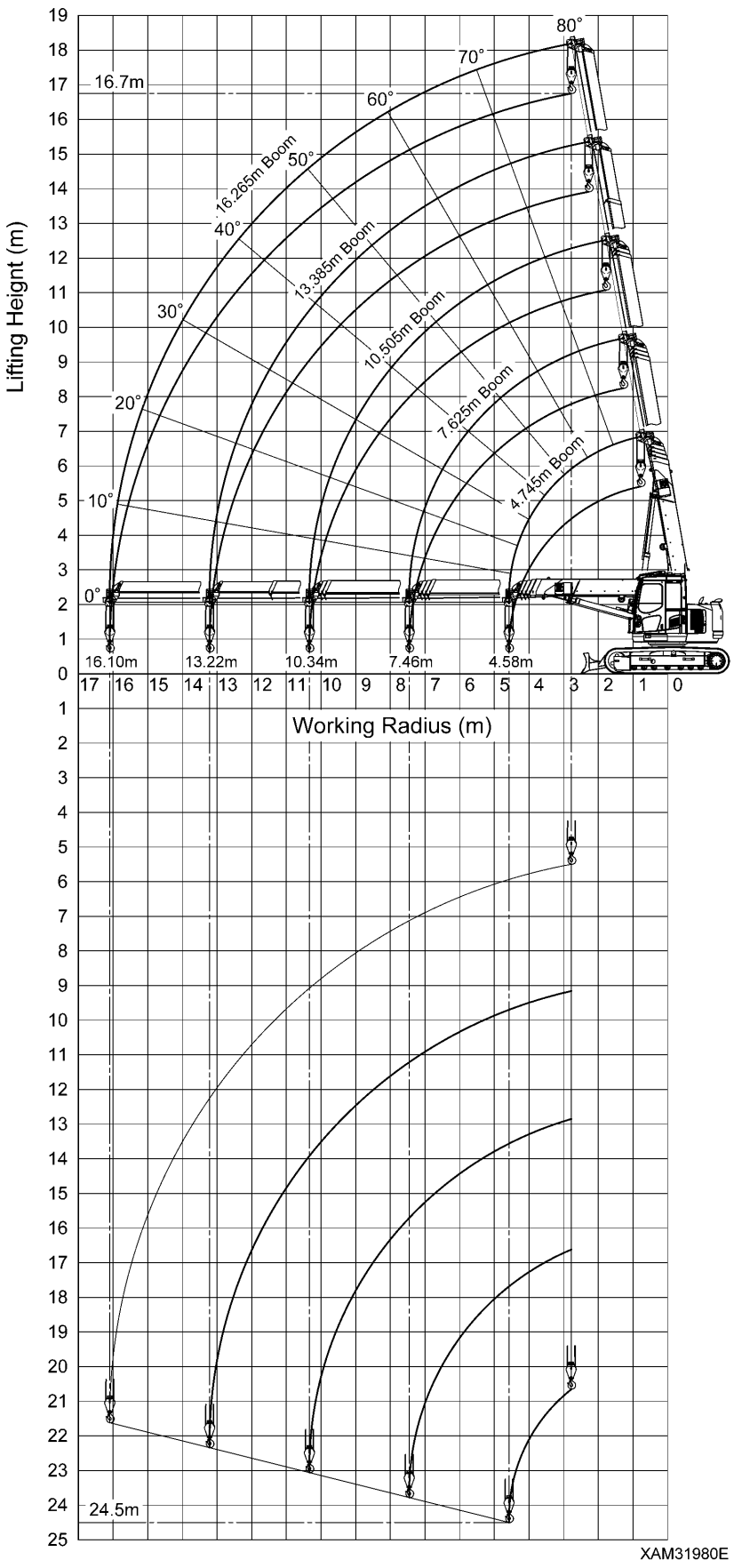
★The weight of hook block must be included as part of the load shown in the Rated total load Chart.



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# 4. WORKING RADIUS AND LIFTING HEIGHT






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# FLY-JIB


| | |
|---|---|
| 1. PRECAUTIONS OF FLY-JIB OPERATION | 6- 2 |
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# 1. PRECAUTIONS OF FLY-JIB OPERATION

**⚠ WARNING**

- **The Fly-jib is installed to the Main boom with two position pins. The Fly-jib tilt angle is adujusted by extending or retracting of the angle adjuster rod, then the Fly-jib is fixed to the angle by one position pin. The Fly-jib consists of two sections and another position pin fixes the 1st and 2nd section. Prior to starting operation, always ensure these three position pins are inserted in the correct positions and secured by the linchpins. If the linchpins are not secure, the pins may drop out and the Fly-jib will collapse which may cause a serious hazard.**

- **Whenever the Fly-jib is installed, it is essential to re-connect the over-hoist detector harness from the Main boom detector to the Fly-jib detector. Also, always ensure the over-hoist detector of the Fly-jib is working correctly before starting operation. In the event that the over-hoist detector mis-functions, it may cause the hook or hoisted load to drop and result in a serious hazard.**

- **Whenever the Fly-jib is installed, ensure that the number of the Fly-jib sections used and the indication in the moment limter for the Fly-jib are identical, before starting the Fly-jib operations. Otherwise, it may cause serious accidents such as the Fly-jib breakage or the machine tipping resulting in death or serious injury.**

- **Whenever the Fly-jib is installed, always keep the engine speed in low idling so that the machine is operated in low speed. Sudden lever operation may produce excessive load to the Fly-jib which may cause the Fly-jib breakage resulting serious accidents.**

- **When the Fly-jib is installed, any error in crane operations may deform brackets or crack welded joints which may result collapsing the Fly-jib. Prior to starting operations, always check each area of the Fly-jib to ensure it has no deformation or cracked welded joint.**

- **The Fly-jib is stowed to the side of the Main boom and fixed to it with two position pins. When installing or stowing the fly-jib, always ensure either position pin is inserted in the correct position and secured by their linchpins. Otherwise, if any of the pins drop out, the Fly-jib will become removed from the main boom and fall off, which may cause a serious hazard.**

- **When the Fly-jib is stowed, always re-connect the over-hoist detector harness from the Fly-jib detector to the Main boom detector. Always ensure the over-hoist detector of the Main boom is working correctly before starting operation. In the event that the over-hoist detector mis-functions, it may cause the hook or hoisted load to drop and result in a serious hazard.**

- **This section of the manual applies only to a machine with the Fly-jib installed to the Main boom. If the Fly-jib is removed from the Main boom, the Moment limiter must be reset accordingly. Contact our sales partner in every such event. If the moment limiter is not reset correctly, operation of the machine may result in a serious hazard such as machine damage or tipping over.**

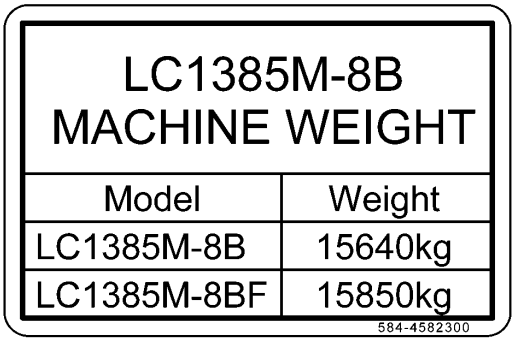


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## CAUTION

- **The machine weight depends on the machine configuration.**
  **Model names in the Table right represent the respective machine configurations:**
  - **LC1385M-8B stands for a Blade model.**
  - **LC1385M-8BF stands for a Blade and Fly-Jib model.**



LC1385M-8B
MACHINE WEIGHT

| Model | Weight |
|---|---|
| LC1385M-8B | 15640kg |
| LC1385M-8BF | 15850kg |

584-4582300

- **The Fly-jib tilt angle is adjustable to four (4) positions (0, 20, 40 and 60 degrees).**
  **During the Fly-jib operations, always keep the boom angle in the range as specified below:**
  **[At the Fly-jib angle in 0 or 20 degrees]**
  **Perform the crane operation in the boom angle range of "45 degrees" or more. When a load is hoisted in a condition that the boom angle is less than "45 degrees" and the boom length is "5.3m" or longer, the moment limiter emits a warning signal, the buzzer sounds intermittently, and hook hoisting, boom telescoping and boom lowerring operations automatically stop.**
  **However, when the boom length is less than "5.3m", the moment limiter does not emit a warning signal. In a condition where the boom angle is less than "45 degrees", boom lowering operation is not available unless the boom length is less than "5.3m".**
  **[At the Fly-jib angle in 40 or 60 degrees]**
  **Perform the crane operation in the boom angle range of "65 degrees" or more. When a load is hoisted in a condition that the boom angle is less than "65 degrees" and the boom length is "5.3m" or longer, the moment limiter emits a warning signal, the buzzer sounds intermittently, and hook hoisting, boom telescoping and boom lowering operations automatically stop.**
  **However, when the boom length is less than "5.3m", the moment limiter does not emit a warning signal. In a condition where the boom angle is less than "65 degrees", boom lowering operation is not available unless the boom length is less than "5.3m".**

- **For all other safety precautions not covered in this section, refer to the section “SAFETY”.**



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# 2. SAFETY LABEL LOCATION

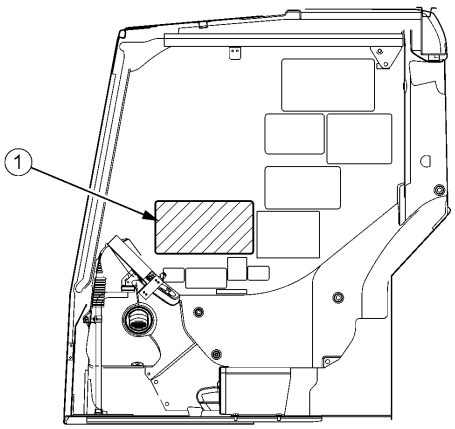
**CAUTION**

**In this section, the safety labels indicated are exclusive for The Fly-jib model but different from those of a standard model. For labels other than these, refer to the section: "Safety 5. Safety Label Location".**

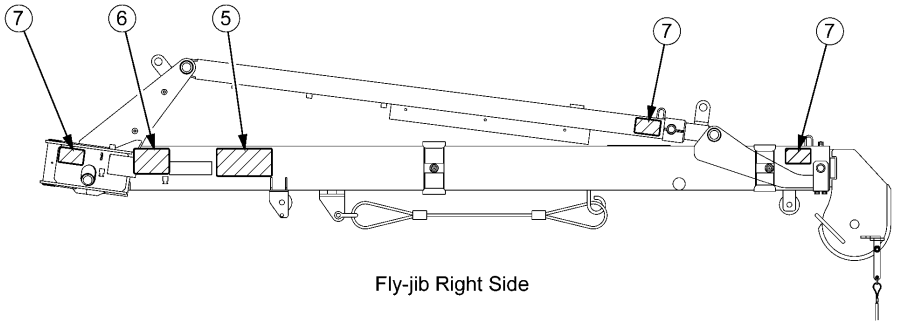
Keep these safety labels clean and legible at all times.

When a safety label is degraded, missing or illegible, replace with a new label.

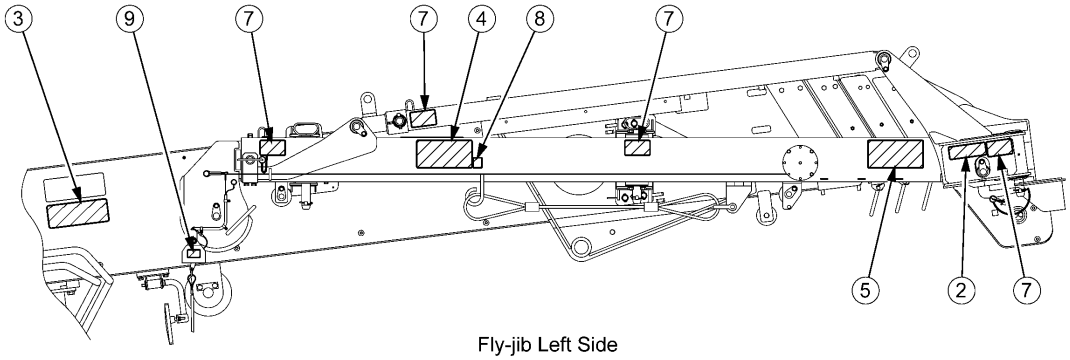
In addition to the safety labels shown below, some other labels are required to be used. Control them in the same manner.




Right Side Glass in Cab




Fly-jib Right Side



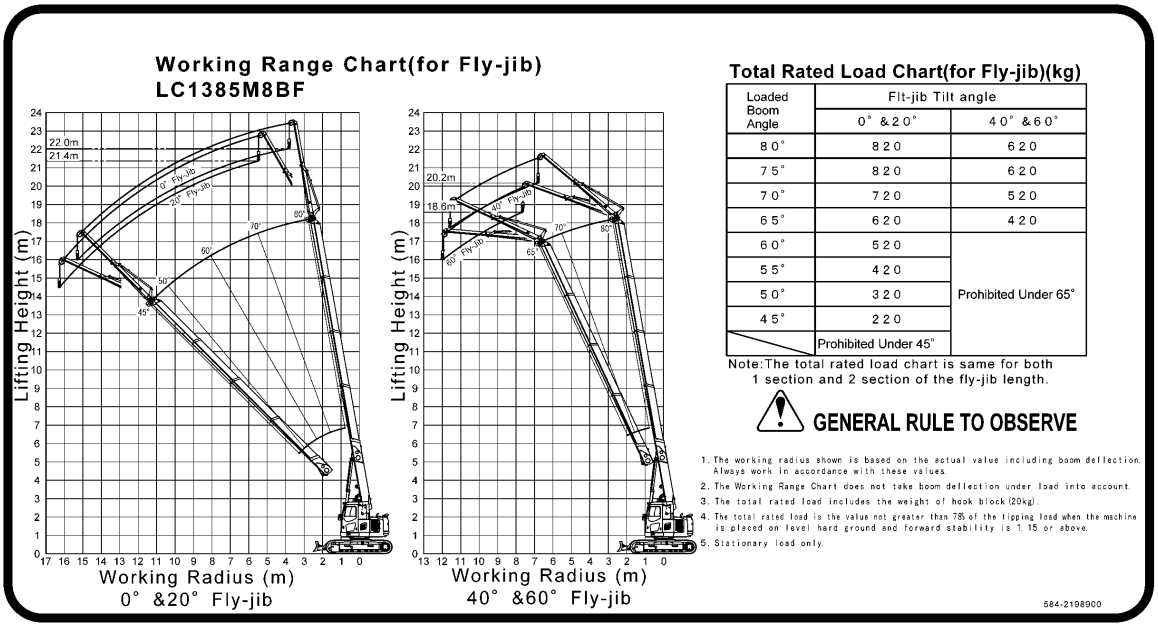

Fly-jib Left Side

XAM32800E

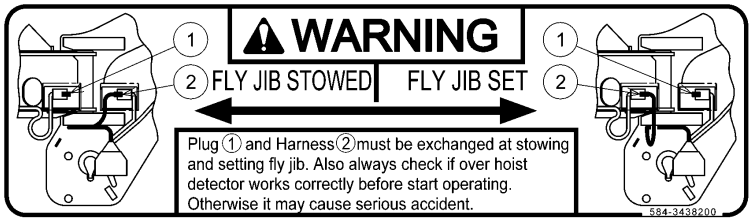


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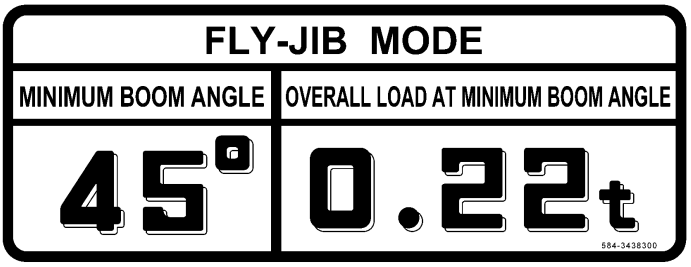
(1) Work range chart for fly-jib (584-2198900)



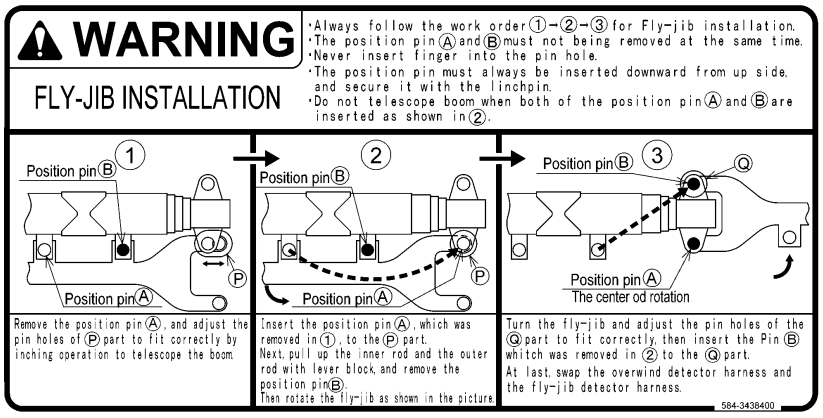

(2) Over-hoist detection wiring instruction (584-3438200)




(3) Fly-jib minimum hoisting load (584-3438300)



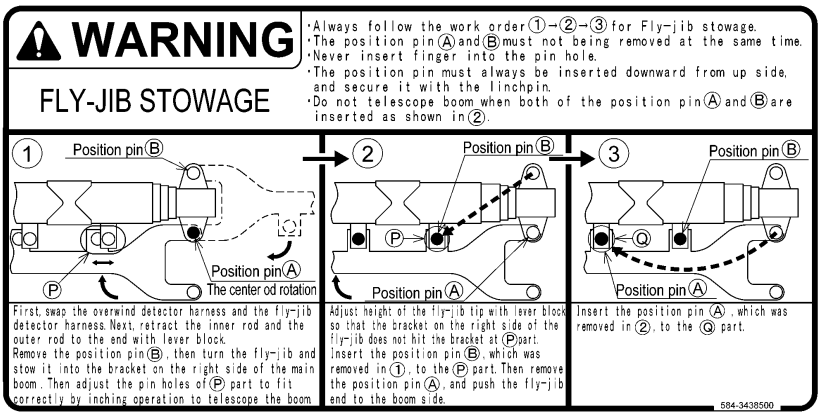

(4) Warning for fly-jib installation (584-3438400)



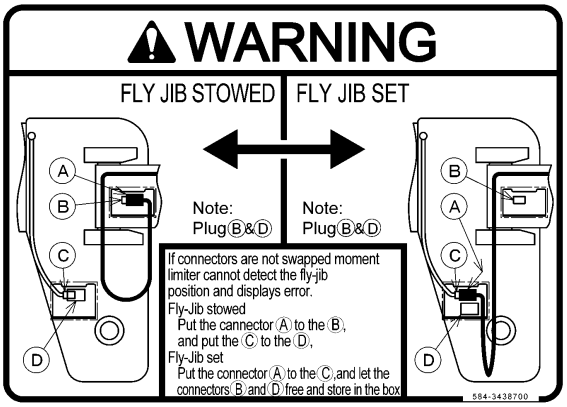



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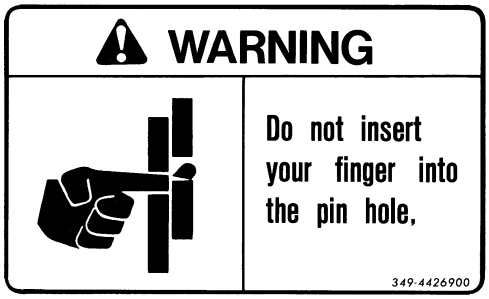
(5) Warning for fly-jib stowage (584-3438500) (2 places)




(6) Fly-jib detection wiring instruction (584-3438700)



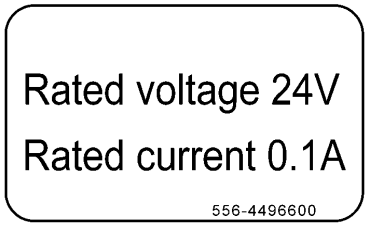

(7) Pin hole caution (349-4426900) (7 places)




(8) Caution for hole (556-4580700)




(9) Rated voltage and current (556-4496600)

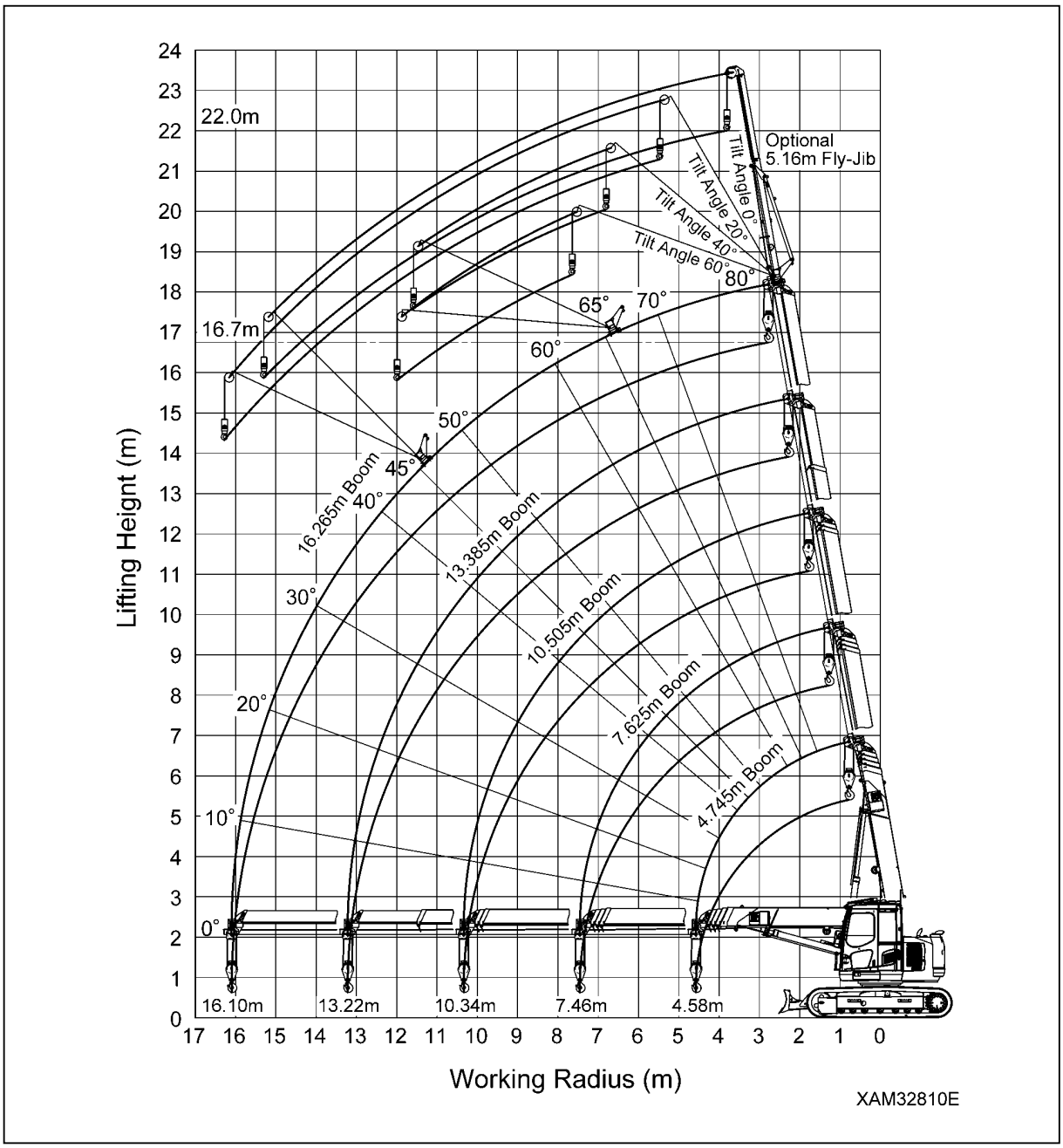





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# 3. WORKING RANGE CHART






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# 4. RATED TOTAL LOAD CHART

**CAUTION**

- **The rated total load is a load including the weight of the hook block (20kg).**
- **During the Fly-jib operations, the boom angle range must be kept at "45 degrees" or more when the Fly-jib tilt angle is "0 or 20 degrees". Or, the boom angle range must be kept at "65 degrees" or more when the Fly-jib tilt angle is "40 or 60 degrees".**

Unit: kg

| Boom angle (deg) | Jib tilt angle | | | |
|---|---|---|---|---|
| | 0 deg | 20 deg | 40 deg | 60 deg |
| 80 | 820 | 820 | 620 | 620 |
| 75 | 820 | 820 | 620 | 620 |
| 70 | 720 | 720 | 520 | 520 |
| 65 | 620 | 620 | 420 | 420 |
| 60 | 520 | 520 | Prohibited under 65 deg | |
| 55 | 420 | 420 | | |
| 50 | 320 | 320 | | |
| 45 | 220 | 220 | | |
| 40 | Prohibited under 45 deg | | | |

★The rated total load table indicates values which include all the weight of utensils for hoisting (, including a single line hook, approx. 20kg).

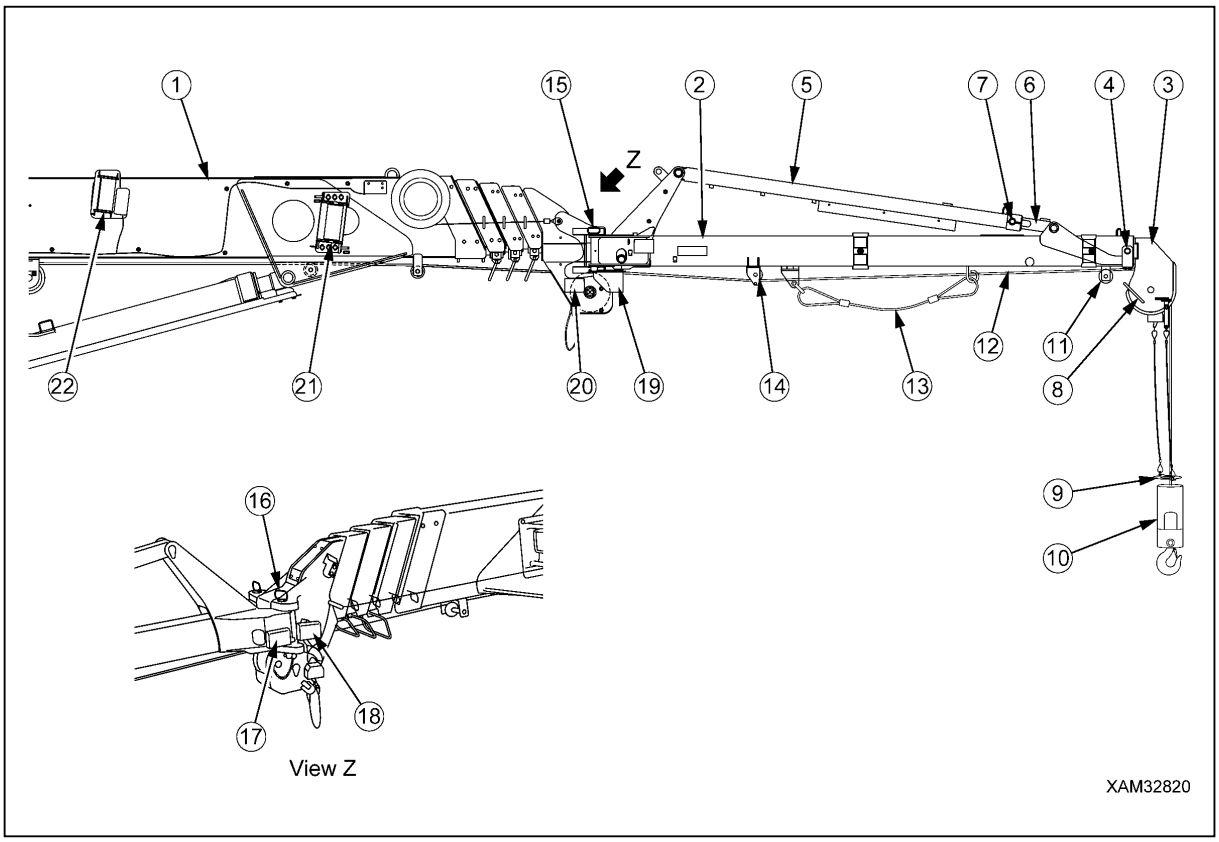
★The rated total load table is common to both of the Fly-jib configurations, using No. 1 only or both No.1 and 2.



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# 5. FLY-JIB EACH SECTION




(1) Main boom
(2) No.1 Fly-jib
(3) No.2 Fly-jib
(4) Position pin
(5) Outer rod (For fly-jib angle adjusting)
(6) Inner rod (For fly-jib angle adjusting)
(7) Position pin
(8) Sheave
(9) Weight
(10) Hook
(11) Sheave
(12) Wire rope
(13) Hook stowing wire
(14) Sheave
(15) Position pin A
(16) Position pin B
(17) Harness connection part
(For over hoist detection) (Fly-jib side)
(18) Harness connection part
(For over hoist detection) (Main boom side)
(19) Harness connection part
(For o fly-jib detection) (Fly-jib side)
(20) Harness connection part
(For fly-jib detection) (Main boom side)
(21) Fly-jib bracket A
(22) Fly-jib bracket B



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# 6. FLY-JIB INSTALLATION AND STOWAGE

**⚠ WARNING**

- **Fly-jib installation and stowage will require two people. Prior to operation, discuss each person's duties in detail and follow the agreed signals during the operation. If signals are not clearly understood, it may cause an accident resulting in injury or death.**
- **Fly-jib installation and stowage must be practiced on solid level ground. Otherwise, the Fly-jib may turn under its own weight and cause a serious hazard.**
- **Fly-jib installation and stowage require a rigid stepping stool of sufficient height. An unstable stool may result in the user falling from a height and may incur serious personal harm.**
- **For Fly-jib installation and stowage, it is essential to keep the main boom angle level. Otherwise, when the boom is not kept level, the weight of the Fly-jib itself will make it turn which may result a serious accident.**
- **The Fly-jib is installed to the Main boom with two position pins. The Fly-jib consists of two sections and another position pin fixes the 1st and 2nd sections. Prior to starting operation, always ensure these three position pins are inserted in the correct positions and secured by linchpins, as well. Otherwise, if any of the pins drops out, the Fly-jib will drop which may cause a serious hazard.**
- **The Fly-jib tilt angle is adjustable from the stowage position to four (4) positions (0, 20, 40 and 60 degrees), and one postion pin is used to fix it. When the Fly-jib angle is adjusted to the intended tilt angle, insert the position pin to the correct location and secure it with a linchpin firmly. Otherwise, when the position pin drops out, the Fly-jib collapses which may result a serious accident.**
- **Whenever the Fly-jib is installed, it is essential to re-connect the over-hoist detector harness from the Main boom detector to the Fly-jib detector. Always ensure the over-hoist detector of the Fly-jib is working correctly before starting operation. In the event that the over-hoist detector mis-functions, it may cause the hook or hoisted load to drop and result in a serious hazard.**
- **Whenever the Fly-jib is installed, it is essential to re-connect the Fly-jib detector harness from the connector in the Fly-jib to the one in the Main boom. In the event that the moment limiter fails its correct functions, that may cause the hook or hoisted load to drop resulting in death or serious injury.**
- **The Fly-jib is stowed to the side of the Main boom and fixed to it with two position pins. When installing or stowing the fly-jib, always ensure either position pin is inserted in the correct position and secured by their linchpins. Otherwise, if any of the pins drop out, the Fly-jib will become removed from the main boom and fall off, which may cause a serious hazard.**
- **When the Fly-jib is stowed, always re-connect the over-hoist detector harness from the Fly-jib detector to the Main boom detector. Always ensure the over-hoist detector of the Main boom is working correctly before starting operations. Should the over-hoist detector mis-functions, it may cause the hook or hoisted load to drop resulting in a serious hazard.**
- **Whenever the Fly-jib is stowed, it is essential to re-connect the Fly-jib detector harness from the connector in the Main boom to the one in the Fly-jib. In the event that the moment limiter fails its correct functions, that may cause the hook or hoisted load to drop resulting in death or serious injury.**

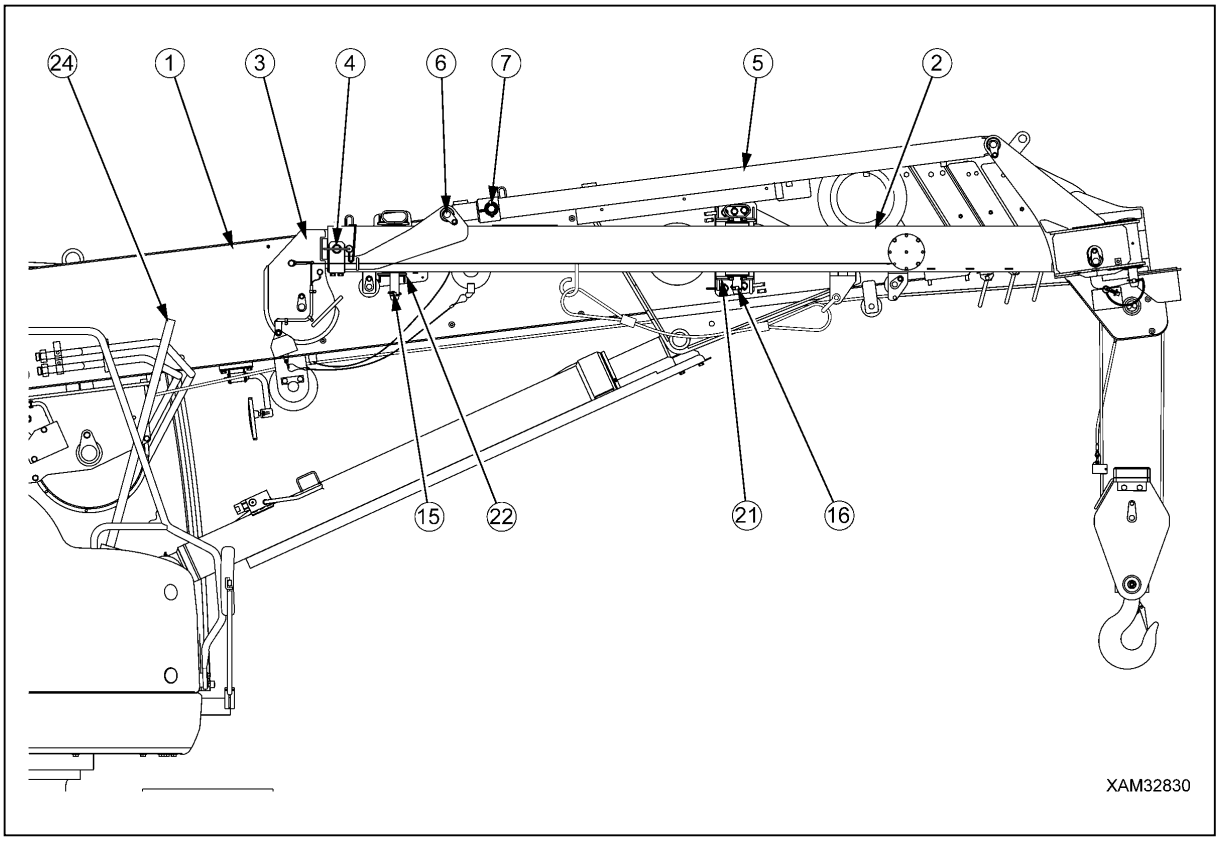


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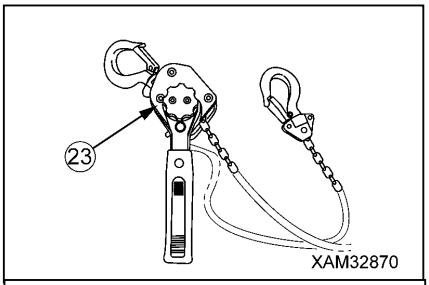
## 6.1 INSTALLATION OF FLY-JIB

Practice installing the Fly-jib to the Main boom from the stowed position from the right side as shown below:



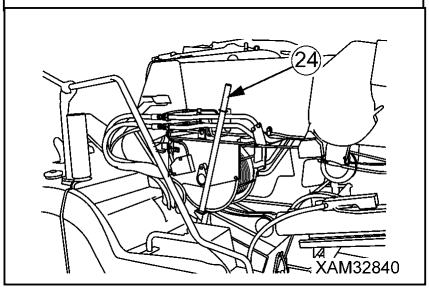

**CAUTION**

**The lever block (23) included in the accessories shall be set to the bracket between the tilt angle adjuster outer rod and inner rod, for the purpose to match the holes in the Main boom and No.1 Fly-jib or changing the Fly-jib tilt angle. For the use of the lever block, refer to the attached manual.**




**CAUTION**

**The adjuster bar (24) stowed in the right of the winch drum in the upper structure shall be used for the purpose to match the holes in the Main boom and No.1 Fly-jib.**
**The bar shall be inserted in the position pin hole of the Fly-jib foot to move it to left and right, or to front and back.**






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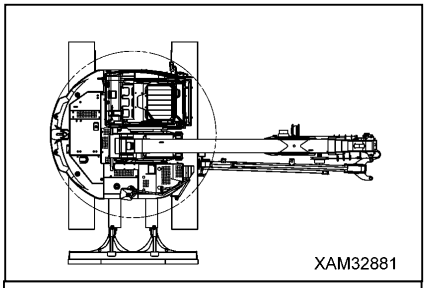
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## ⚠ WARNING

**Always avoid standing on crawlers or blade for installation work. You may miss your footing and fall resulting in serious injury. For elevated work, always prepare a strongly-built work platform.**

### NOTES

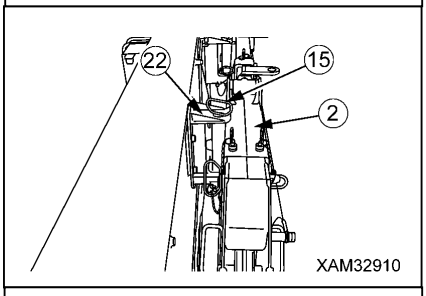
Slew the upper strucure 90 degrees so that it comes perpendicular to crawlers.
Otherwise if the upper structure is not 90 degrees slewed, crawlers or blade may disturb the required operations.


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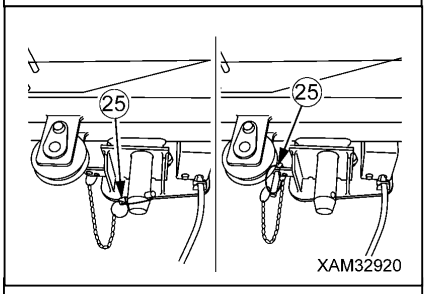
1. Pull the linchpin (25) out from the position pin (15) in the Fly-jib bracket B (22) to pull out the position pin (15).

### NOTES

- The removed position pin (15) will be required for the later operation of installing the Fly-jib to the right side of the Main boom tip.
- The removed linchpin (25) of the position pin (15) shall be firmly inserted in the hole for storage in the stowage bracket B (22). When inserted, ensure the ring to be turned to lock it.

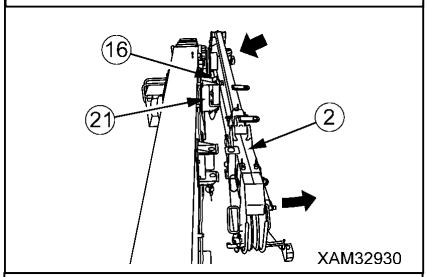


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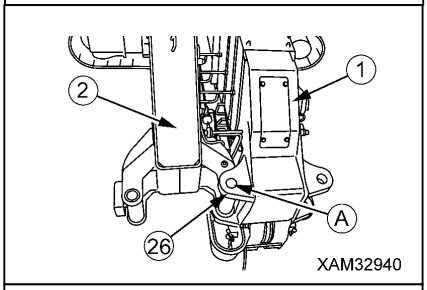
2. Slide the No.1 Fly-jib (2) forward through the position pin (16) in the Fly-jib bracket A (21) as a point of support, then fit the connection hole of the No.1 Fly-jib (2) to the hole (A) of the bracket (26) in the right side of the Main boom tip.



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### NOTES

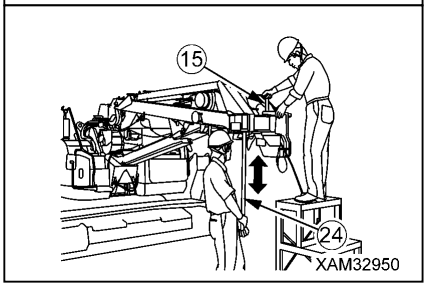
When the connection hole of the No.1 Fly-jib (2) and the hole (A) of the bracket (26) in the right side of the Main boom tip do not fit correctly, slowly telescope the Main boom to allow a correct fit.



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### NOTES

When you find it difficult to insert the position pin (15), insert the attached bar (24) from the lower side of the hole (B) in the No.1 Fly-jib (2) to rock to left and right, or to front and back, so that the pin is inserted.
The attached bar (24) is stowed to the right of the winch drum in the upper structure.



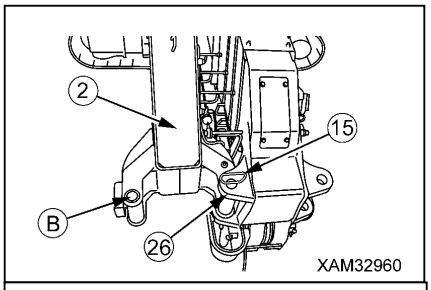
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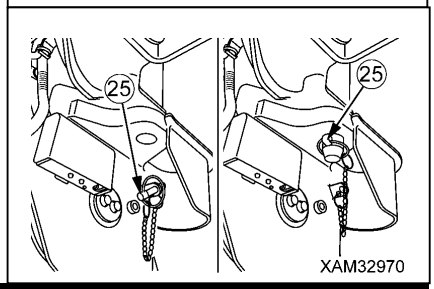
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3. Once the connection hole of the No.1 Fly-jib (2) and the hole (A) of the bracket (26) on the right side of the Main boom tip are aligned, insert the position pin (15) to the hole then secure it with the linchpin (25).




**NOTES**

Detach the linchpin (25) for the position pin (15) from the hole for storage at the boom tip and apply to the position pin (15).




**⚠ WARNING**

- **Do not remove the position pin (16) from the fly-jib bracket A (21) until the position pin (15) is fully inserted into the hole of the bracket (21). Incorrect fitting order may cause a serious hazard.**
- **The position pin (15) must always be inserted downward from upper side. If it is inserted from the underside it could drop out allowing the Fly-jib to collapse causing a serious hazard.**

**CAUTION**

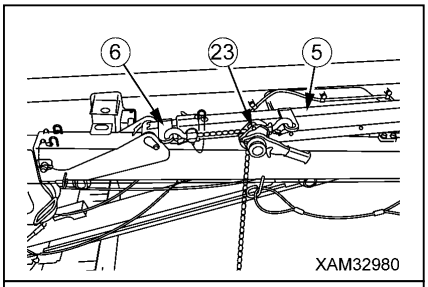
**When the position pins (15) and (16) are fitted into both holes of the bracket (26) on the right side of the Main boom tip and Fly-jib bracket A (21), Main boom telescoping must not be operated. This operation will critically damage the Fly-jib and Main boom.**

4. Start the engine and then operate the boom to hold it level.

**NOTES**

To make the boom level, ensure that the boom angle display of the moment limiter indicates "0".
In addition, visually check the boom is level.

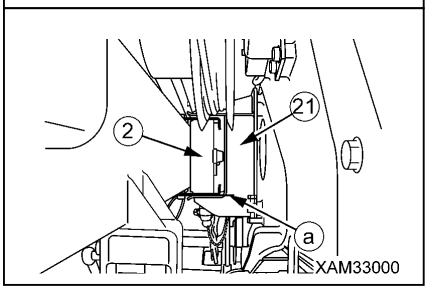
5. Set the attached lever block (23) between the tilt angle adjuster outer rod (5) and inner rod (6).




**NOTES**

Lever block (23) handling will be easier, when you set the lever side to the outer rod side (5).

6. Wind up the lever block (23) to provide the clearance (a) between the bracket of No.1 Fly-jib (2) and the stowage bracket (21).



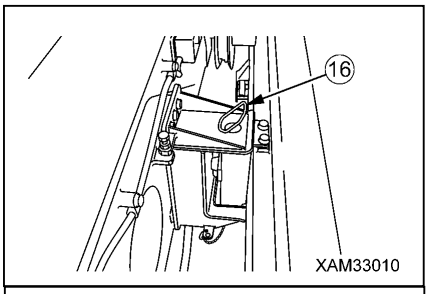

**NOTES**

The lever block (23) is also required for changing the Fly-jib tilt angle. Leave the lever block (23) attached, but do not detach it.



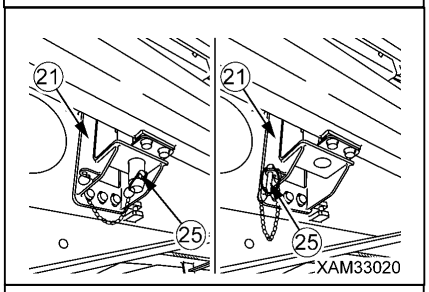
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7. Pull the linchpin (25) out from the position pin (16) in the Fly-jib bracket A (21) to pull out the position pin (16).

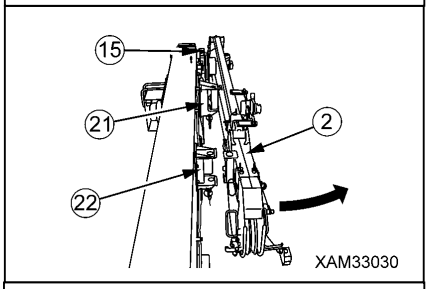



**NOTES**

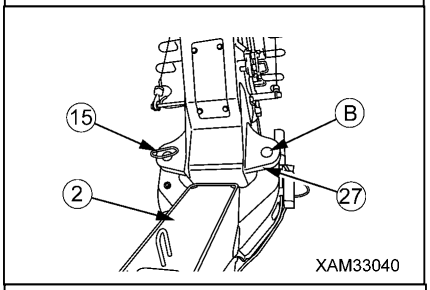
- When you find it difficult to extract the position pin (16), use the lever block (23) again to make a clearance between the bracket of No.1 Fly-jib (2) and the stowage bracket (21).
- Removed position pin (16) will be necessary for the later operation to install the Fly-jib to the left side of the Main boom tip.
- The removed linchpin (25) of the position pin (16) should be firmly inserted in the hole for storage in the stowage bracket A (21). When inserted, ensure the ring is turned to lock it.




8. Slide the No.1 Fly-jib (2) forward through the position pin (15) on the right side of the Main boom tip as a point of support, and then turn it toward to the front of the Main boom.

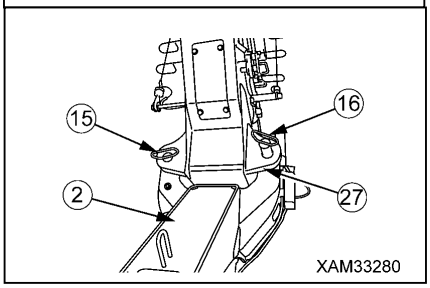



9. Fit the connection hole of the No.1 Fly-jib (2) to the hole (B) of bracket (27) on the left side of the Main boom tip.




**NOTES**

To match the holes, temporarily insert the position pin (16) to the hole (B) first, and then start the engine to lower the boom to the lowest position. Also, when you find it difficult to insert the position pin (16), lift up the Fly-jib tip.

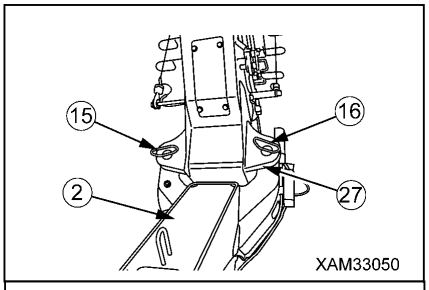





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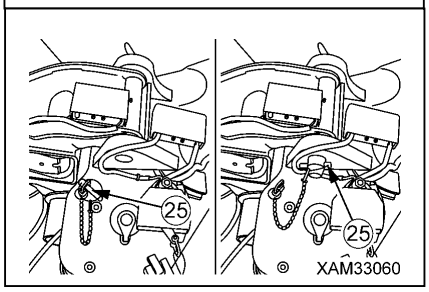
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10. Once the connection hole of the No.1 Fly-jib (2) and the hole (B) of the bracket (27) on the left side of the Main boom tip are adjusted, insert the position pin (16) to the hole then secure it with the linchpin (25).




**NOTES**

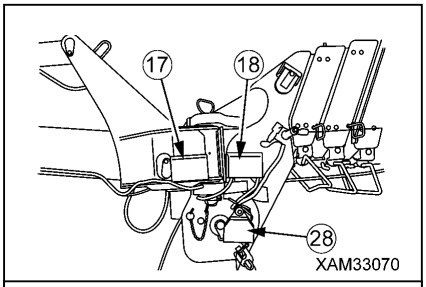
Detach the linchpin (25) for the position pin (16) from the hole for storage at the boom tip and apply to the position pin (16).




**⚠ WARNING**

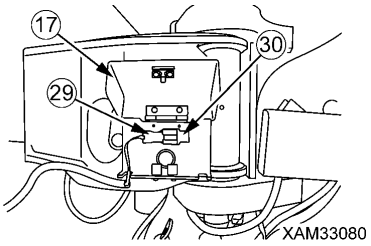
**The position pin (16) must always be inserted downward from the upper side. Otherwise, if it is inserted upward from the underside, the position pin could easily drop down to cause the Fly-jib to collapse causing a serious hazard.**

11. Swap the harness connection part (17) and (18) as shown below to switch and connect over-hoist detector.




(1) Open the cover of the harness connection part (17: Fly-jib side) and extract the dummy plug (30) from the connector (29).

Before harness exchange;
the Fly-jib side:

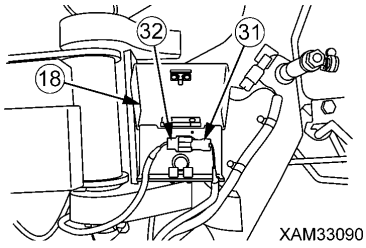



**NOTES**

Removed dummy plug (30) will be later inserted into a connector in the harness connection part (18: Main boom side).

(2) Open the cover of the harness connection part (18: Main boom side) and extract the harness plug (32) from the connector (31).

Before harness exchange;
the Main boom side:




**NOTES**

Removed harness plug (32) will be later connected into a connector of the harness connection part (17: Fly-jib side).



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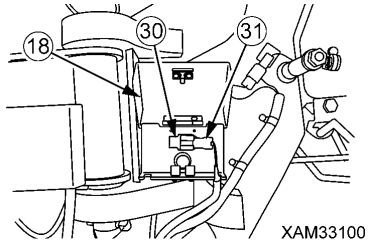
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(3) Connect the dummy plug (30), as extracted in (1) above, to the connector (31) and then close the cover.

**⚠ CAUTION**

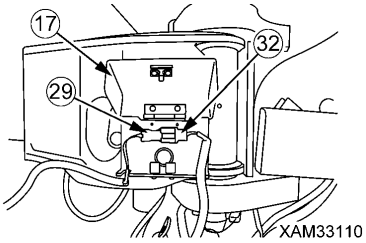
**Don't forget to install the dummy plug (30) into the connector (31) in the harness connection part (18: Main boom side). If you do not, the absence of the dummy plag may cause mis-function of the over-hoist detector. In such event, it may cause the hook or hoisted load to drop and result in a serious hazard.**

After harness exchange;
the Main boom side:

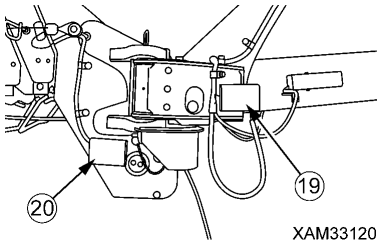



(4) Open the cover of the harness connection part (17: Fly-jib side) and connect the harness plug (32), as extracted in (2) above, to the connector (29) and then close the cover.

After harness exchange;
the Fly-jib side:




12. Swap the harness connection part (19) and (20) as shown below to switch and connect fly-jib angle and length detector.

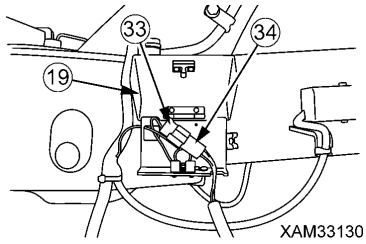



(1) Open the cover of the harness connection part (19: Fly-jib side) and extract the harness connector (34) from the storage connector (33) and then close the cover.

**NOTES**

- Removed harness connector (34) will later be connected into a connector in the harness connection part (20: Main boom side).
- When you close the cover, take care that the remaining storage connector (33) is within the harness connection part.

Before harness exchange;
the Fly-jib side:

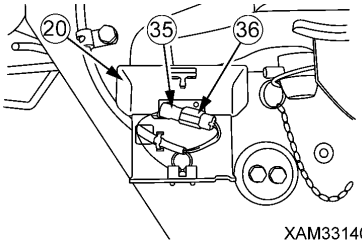



(2) Open the cover of the harness connection part (20: Main boom side) and extract the harness connector (36) from the storage connector (35).

**NOTES**

Removed harness connector (36) will later be connected into a connector in the harness connection part (19: Fly-jib side).

Before harness exchange;
the Main boom side:



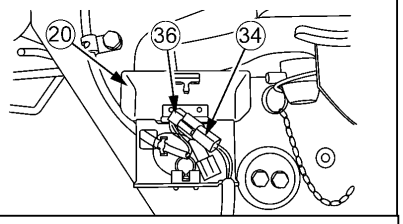



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(3) Connect the harness connector (34), as extracted in (1) above, then close the cover.

After harness exchange;
the Main boom side:



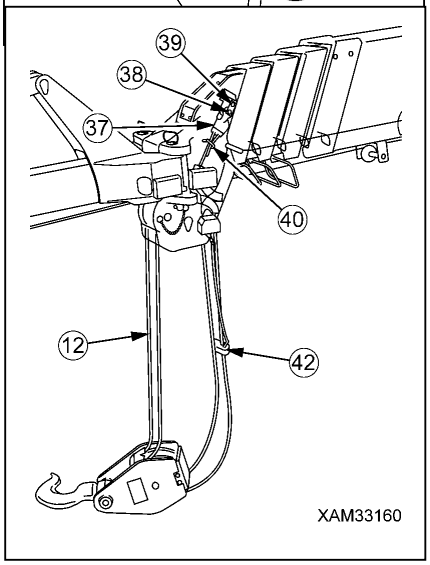

## NOTES

- Arrange the harness connector (34) to pass through the notch hole under the harness connection part (20: Main boom side) after removing it from harness connection part (Fly-jib side).
- When you close the cover, take care that the harness connectors (34 and 36) and storage connector (35) are within the harness connection part.

13. Remove the wire rope from the hook block as shown below:

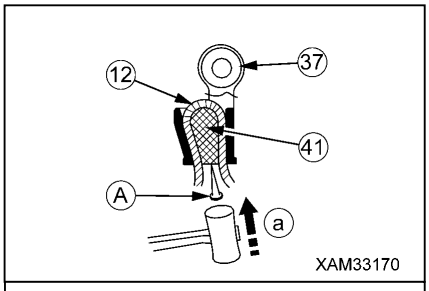
## CAUTION

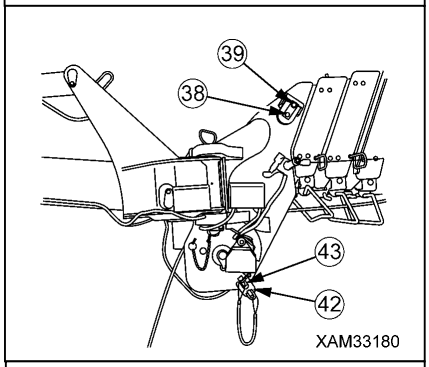
- **Take care to avoid the wire rope winding randomly.**
- **Avoid unwinding after the hook is grounded; that will make the wire rope wind randomly around the winch drum.**




(1) Retract the boom fully and set the boom angle to approx. 20 degrees.
(2) Lower the hook so that it almost touches the ground.
(3) Lower the boom to allow the hook to ground.
(4) Remove bolt (39) and extract a wedge socket pin (38), then remove the wire socket (37) from the Main boom.
(5) Remove the wire clip (40).

(6) Using a bar (A) with a diameter of 6 to 8mm and apply to the rope wedge (41) and hammer it lightly; so that the rope wedge (41) is removed.
(7) Remove the wire rope (12) from the hook.
(8) Remove the wire rope (12) from the over-hoist detector weight (42).
(9) Pull out the wire rope (12) to a sheave in the Main boom tip.
(10) Hook the over-hoist detector weight (42) to the weight hanger (43) below the main boom.

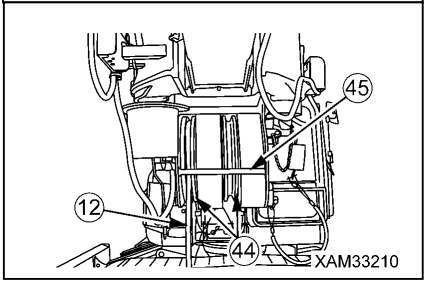



14. Start the engine and wind up the removed wire rope in accordance with 13, above by winch operation.

## CAUTION

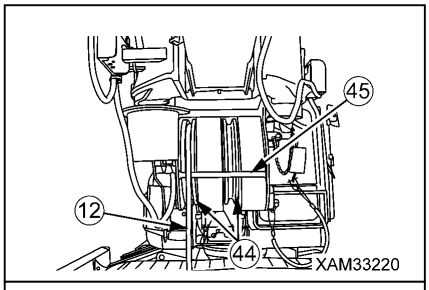
- **Take care to avoid the wire rope winding randomly.**
- **The wire rope should not be wound to the end, so stop winding to allowing 7m to 8m excess from sheave (44) of the boom tip.**



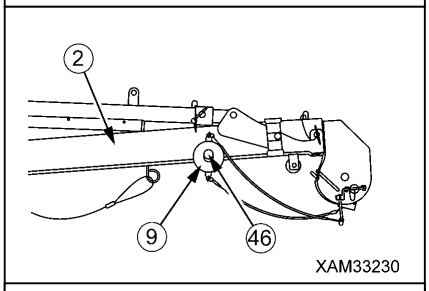



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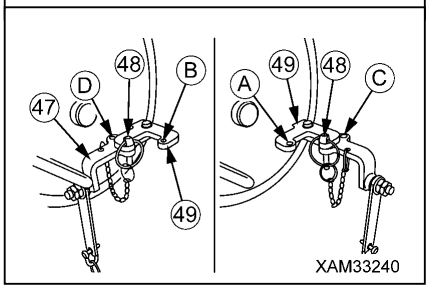
15. Stop the engine then take the wire rope off from the wire rope holder at the boom tip. Arrange the wire rope to go straight through the sheave of the main boom tip to the Fly-jib.




16. Detach the over-hoist detector weight (9) from the weight hanger (46) on the right side of the Fly-jib (2).



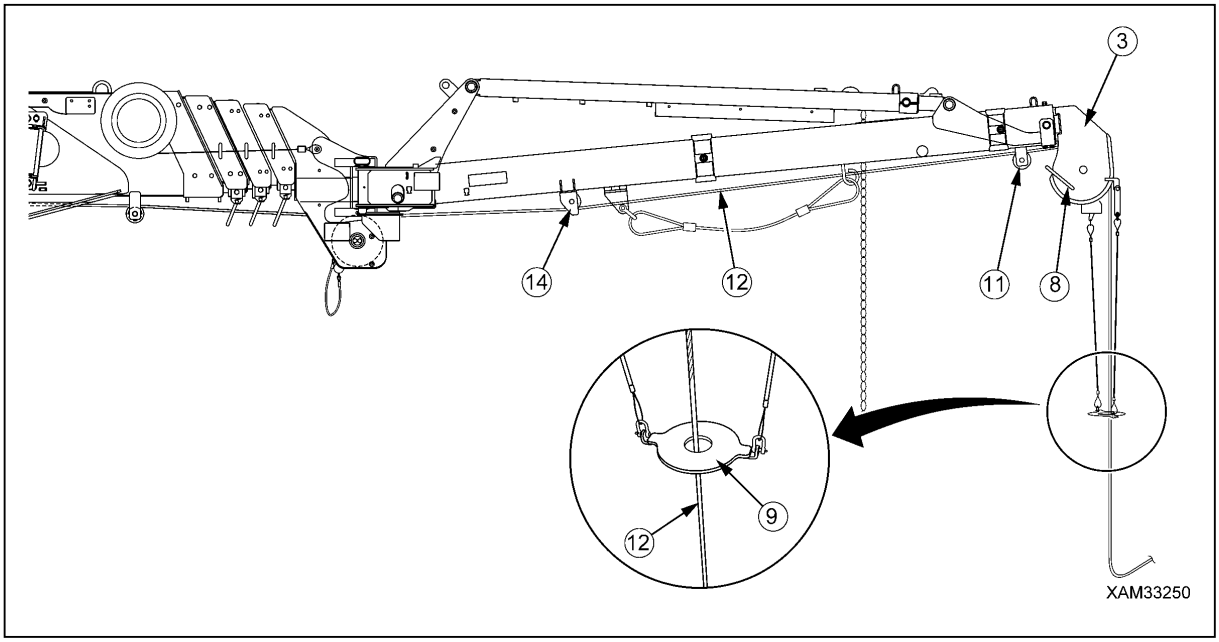

17. Extract the linchpin (48) at the tip of No.2 Fly-jib and turn the wire bracket (47) of the over-hoist detector weight. Match the hole (B) of the wire bracket (49) and hole (D) of the wire bracket (47), then insert the linchpin (48). When inserted, ensure the ring is turned to lock it.




18. Arrange the wire rope (12) to pass below the sheave (14) and over the sheave (11) and sheave (8), then through the center of the weight (9).

**⚠ WARNING**

**The wire rope must be correctly installed. Otherwise incorrect fitting will damage the wire rope and result in a potentially serious hazard.**



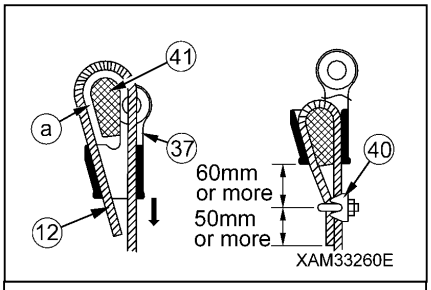



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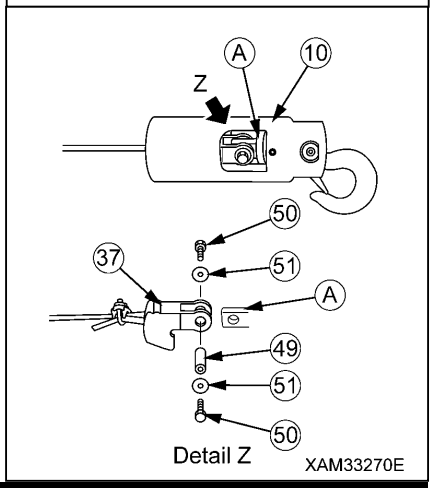
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19. Put the wire rope (12) through the wire socket (37), as removed in 13 above, and set the rope wedge (41) to position (a). Pull the wire rope (12) intensely to the direction of the arrow.

20. Install the rope clip (40) to the wire rope (12). Refer to the Figure on the right for the rope clip position.




21. Insert the wire socket (37) into connection base (A) inside the hook (10). Adjust the holes of both and insert a pin (49), then secure it with end plates (51) and bolts (50).




## NOTES

The hook (10), pin (49), bolts (50) and end plates (51) are specific Fly-jib parts and packaged separately.

## CAUTION

**The Fly-jib as installed is still in the stowage position. In this condition, the signal of the Fly-jib availability is not transmitted to the moment limiter. To make the Fly-jib operation ready, set the Fly-jib to one of the four Fly-jib operation angles (0, 20, 40 and 60 degrees).**
**Refer to "Fly-jib 5.2 Changing of the Fly-jib Tilt Angle" for details.**



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## 6.2 CHANGING OF FLY-JIB TILT ANGLE

**⚠ CAUTION**

**Changing of the Fly-jib tilt angle should be always practiced without any hoisted load and only with the No.1 Fly-jib. Avoid changing the Fly-jib tilt angle with a hoisted load and/or using No.2 Fly-jib, otherwise excess load is applied to the lever block which may damage it.**

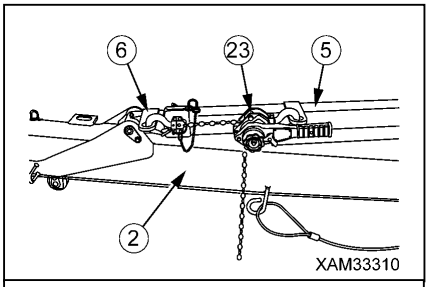
**CAUTION**

- **This Fly-jib is adjustable to four tilt angles (0, 20, 40 and 60 degrees) from its stowage position. Select the suitable position for the intended job.**
- **The Fly-jib as installed is in its stowage position. In this condition, the signal of the Fly-jib availability is not transmitted to the moment limiter. To make the Fly-jib operation ready, set the Fly-jib to one of the four Fly-jib operation angles (0, 20, 40 and 60 degrees).**
- **When the Fly-jib tilt angle is set to other than its stowage position, the tilt angle data is transmitted to the moment limiter, then the moment limiter display indicates the angle, as well as computing the rated total load automatically.**

### 6.2.1 CHANGING OF FLY-JIB TILT ANGLE

To change the tilt angle of the Fly-jib from its stowage position, follow the instructions below:

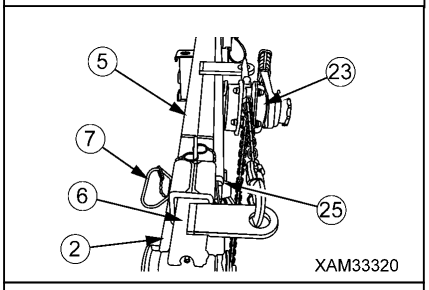
1. Set the attached lever block (23) between the tilt angle adjuster outer rod (5) and inner rod (6).



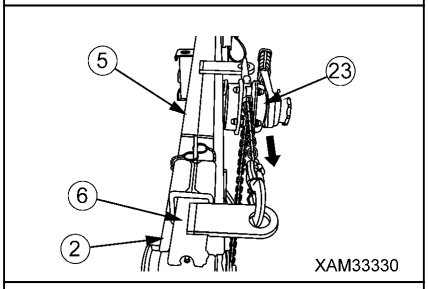

**NOTES**

Lever block (23) handling will be easier, when you set the lever side to the outer rod side (5).

2. Detach the linchpin (25) from the position pin (7), then use the lever block (23) and extract the position pin (7).

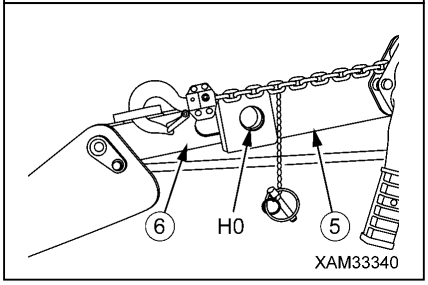



3. Wind up the lever block (23) to provide some slack between outer rod (5) and inner rod (6), and then lower the No.1 Fly-jib (2).




**NOTES**

When the No.1 Fly-jib (2) lowers, the inner rod (6) lowers together. Use the lever block (23) further to match the hole (H0) of the inner rod (6) for 0 degree angled Fly-jib and the hole of the outer rod (5).

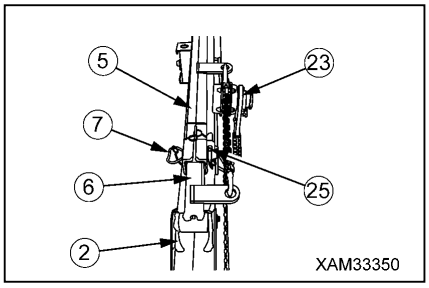





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4. When the hole of the inner rod (6) for 0 degree angled Fly-jib and the hole of the outer rod (5) match, insert the position pin (7) to the holes and insert the linchpin (25). When inserted, ensure the ring is turned to lock it.

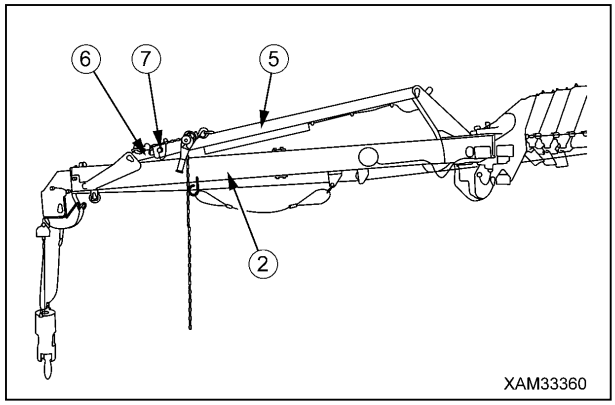
5. Remove the lever block (23).




**[Posture of the 0 degree angled Fly-jib]**

**CAUTION**

**The posture in the figure in the right shows that the Fly-jib is configured to 0 degree tilt angle from the stowage position in accordance with the procedure 1 to 4, as above. Once configured to this posture, the 0 degree tilt angle data is transmitted to the moment limiter, then the moment limiter display indicates the angle of the Fly-jib, and the rated total load is also computed.**

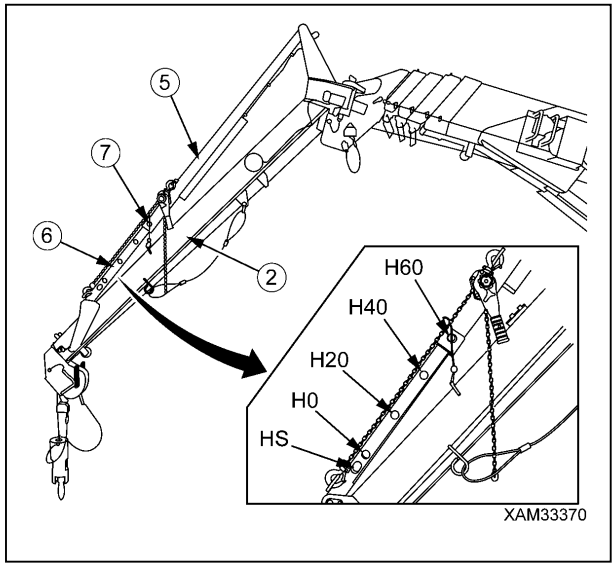



**[Posture of the 60 degrees angled Fly-jib]**

**CAUTION**

**The posture in the figure below right shows that the Fly-jib is configured to 60 degrees tilt angle from [Posture of the 0 degree angled Fly-jib] as above. Once configured to this posture, the 60 degrees tilt angle data is transmitted to the moment limiter, then the moment limiter display indicates the angle of the Fly-jib, and the rated total load is also computed.**
**To change the Fly-jib tilt angle to 60 degrees:**
**(1) Continue the boom derricking operation and the procedure specified in 3. above (un-winding the lever block) alternately to allow the Fly-jib angle to be gradually adjusted.**
**(2) Match the hole of the outer rod and the the hole of the inner rod for 60 degrees angled Fly-jib.**
**(3) When the hole of the inner rod (6) for 60 degrees angled Fly-jib and the hole of the outer rod (5) match, insert the position pin (7) to the holes and insert the linchpin (25). When inserted, ensure the ring is turned to lock it.**
**• To change the Fly-jib tilt angle to 40 degrees, practice similarly as above to obtain the Fly-jib tilt angle of 40 degrees.**
**• To change the Fly-jib tilt angle to 20 degrees, use only the lever block function to obtain the Fly-jib tilt angle of 20 degrees.**

(HS): Hole for stowage
(H0): Hole for 0 degree
(H20): Hole for 20 degrees
(H40): Hole for 40 degrees
(H60): Hole for 60 degrees





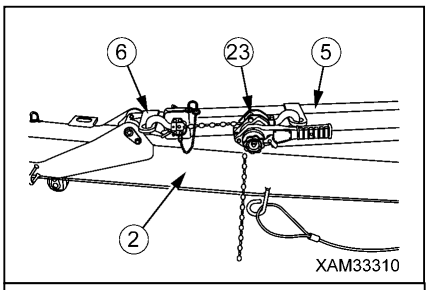

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## 6.2.2 CHANGING OF FLY-JIB TILT ANGLE TO STOWAGE POSITION

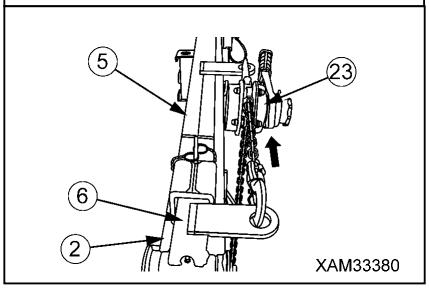
To return the Fly-jib to the stowage position, follow the instructions below:

1. Set the attached lever block (23) between the tilt angle adjuster outer rod (5) and inner rod (6).




| NOTES |
|---|
| Lever block (23) handling will be easier, when you set the lever side to the outer rod side (5). |

2. Wind up the lever block (23) to narrow the gap between outer rod (5) and inner rod (6), then raise the No.1 Fly-jib (2), and match the hole (6) of the inner rod for the Fly-jib stowage and the hole of the outer rod (5).




| NOTES |
|---|
| • To return the Fly-jib to the stowage position from 40 or 60 degrees, lift up the No.2 Fly-jib (3) tip when the lever block (23) winding becomes harder.<br>• When the Fly-jib is raised to a certain degree, perform the boom lowering operation so that the lever block is handled in a lower location. |

3. When the hole of the inner rod (6) for Fly-jib stowage and the hole of the outer rod (5) match, insert the position pin (7) to the holes and insert the linchpin (25). When inserted, ensure the ring to be turned to lock it.

| CAUTION |
|---|
| **After the Fly-jib is returned to its stowage position, ensure that the moment limiter display indicates as follows:**<br>**• "- - -“ is flashing in each of the Actual load display, Rated total load display, Working radius display, Rated radius display and Fly-jib angle display.**<br>**• Wire falls LEDs and Load capacity LEDs are flashing.** |



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# 6.3 EXTENDING AND RETRACTING NO.2 FLY-JIB

## 6.3.1 EXTENDING NO.2 FLY-JIB CONFIGURED 0 DEGREE OR 20 DEGREES TILT ANGLE

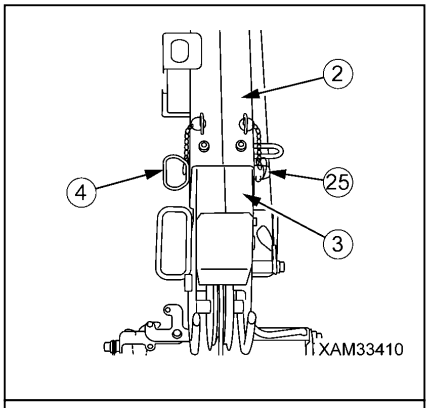
To extend the No.2 Fly-jib configured 0 or 20 degrees, follow the instructions below:

1. Lower the main boom to the lowest angle.

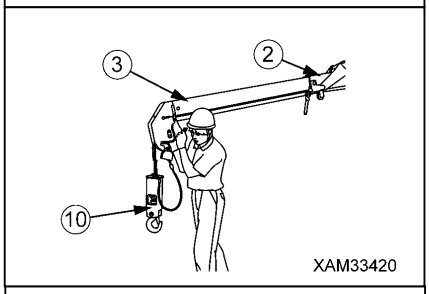
2. Pull the linchpin (25) out from the position pin (4) in the tip of No.1 Fly-jib (2) to extract the position pin (4).

**NOTES**

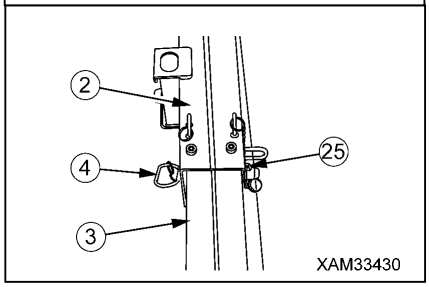
Removed position pin (4) will be necessary for the later operation to secure the extended No.2 Fly-jib (3).




3. Continue hook un-winding operation and take hold of handles in the both left and right side in the tip of No.2 Fly-jib (3) and pull the No.2 Fly-jib (3) out.



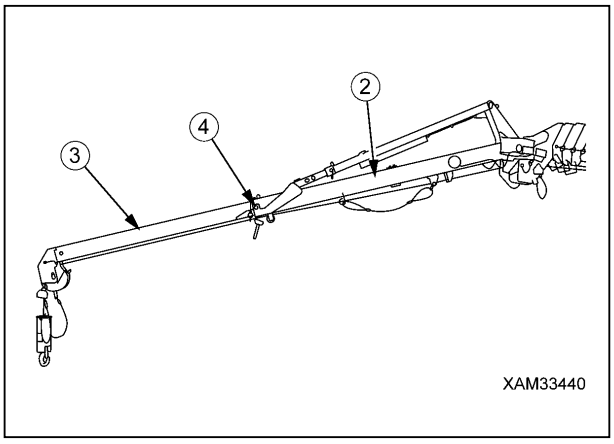

4. When the No.2 Fly-jib (3) is extended, adjust both side holes of the No.1 Fly-jib (2) and No.2 Fly-jib (3) to insert the position pin (4). Apply the linchpin (25) to secure the position pin.




**[Posture of the 20 degrees angled Fly-jib]**

**CAUTION**

**The posture in the figure in the right shows that the No.2 Fly-jib is extended in accordance with the procedure 1 to 3 as above.**
**Once configured to this length, the No.2 Fly-jib length data is transmitted to the moment limiter, then the Fly-jib length (2) LED of moment limiter will turn on.**






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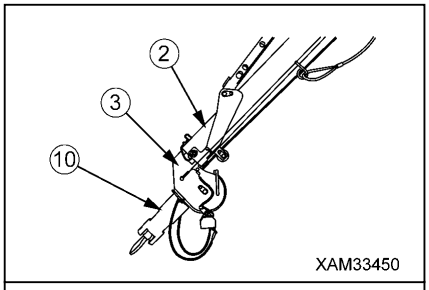
### 6.3.2 EXTENDING NO.2 FLY-JIB CONFIGURED 40 DEGREES OR 60 DEGREES TILT ANGLE

**⚠ WARNING**

- **When the Fly-jib angle is set higher, No.2 Fly-jib may rapidly slide out when the position pin which fixes it is extracted and it may cause a serious accident resulting in death or serious injury. Before you extract the position pin, always wind up the hook close to the Fly-jib tip to prevent No.2 Fly-jib from rushing out. In case of this, be careful to avoid your hand or a part of your body being caught between the No.2 Fly-jib tip and the hook.**
- **Whilst winding up the hook to the Fly-jib tip, never use the moment limiter emergency stop cancel switch to wind the hook up. Excessive force may be applied and damage the Fly-jib. To wind up the hook, always use the over-winding cancel switch.**

To extend the No.2 Fly-jib configured at 40 or 60 degrees, follow the instructions below:

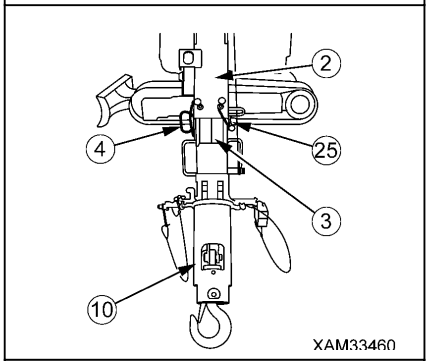
1. Keep pressing the over-winding cancel swtich and wind up the hook (10) slowly, until it lightly touches the No.2 Fly-jib (3) tip.




2. Pull the linchpin (25) out from the position pin (4) in the tip of No.1 Fly-jib (2) to extract the position pin (4).

**NOTES**

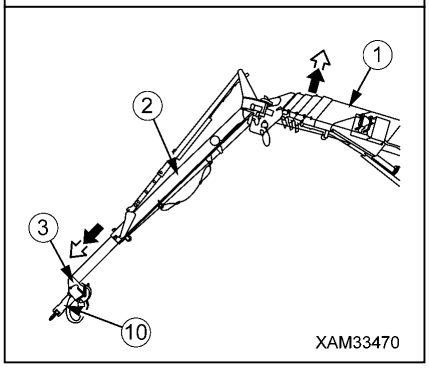
Removed position pin (4) will be necessary for the later operation to secure the extended No.2 Fly-jib (3).




3. Keep pressing the over-winding cancel switch and continue the hook un-winding operation and the boom raising operation alternately, so that the No.2 Fly-jib (3) slides out.

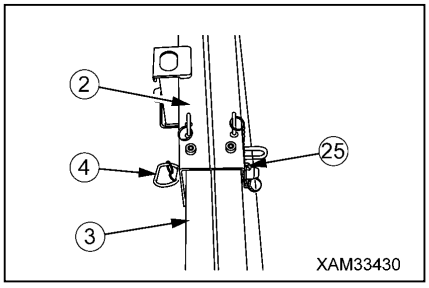
**CAUTION**

- **When the hook is un-wound, the weight of the No.2 Fly-jib (3) will slide out under it's own weight. Continuing this operation will result in No.2 Fly-jib (3) hitting the ground. To prevent this, raise the boom. Continue these operations alternately.**
- **If the the weight of the No.2 Fly-jib (3) cannot make it slide out, take hold of handles in the both left and right side at the tip of No.2 Fly-jib (3) and pull the No.2 Fly-jib (3) out.**




4. When the No.2 Fly-jib (3) is extended, adjust the both side holes of No.1 Fly-jib (2) and No.2 Fly-jib (3) to insert the position pin (4). Apply the linchpin (25) to secure the position pin.

5. Un-wind the hook down so that it departs from the No.2 Fly-jib (3).





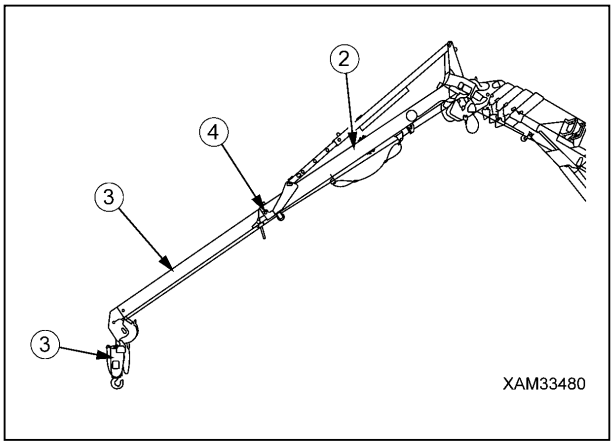

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**[Posture of the 60 degrees angled Fly-jib]**

**CAUTION**

**The posture in the figure on the right shows that the No.2 Fly-jib is extended in accordance with the procedure 1. to 4. as above. Once configured to this length, the No.2 Fly-jib length data is transmitted to the moment limiter, then the Fly-jib length (2) LED of moment limiter will turn on.**






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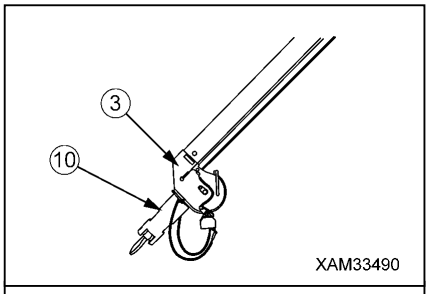
### 6.3.3 RETRACTING OF No.2 FLY-JIB

**⚠ WARNING**

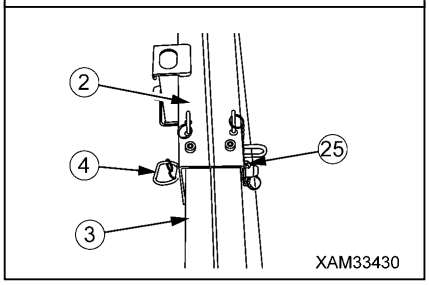
- **When the Fly-jib angle is set higher, No.2 Fly-jib may rapidly slide out when the position pin which fixes it is extracted, which may cause a serious accident resulting in death or serious injury. Before you extract the position pin, always wind up the hook close to the Fly-jib tip to prevent No.2 Fly-jib from rushing out. In such events, be careful to avoid your hand or part of your body being caught between the No.2 Fly-jib tip and the hook.**
- **Whilst winding the hook to the Fly-jib tip, never use the moment limiter emergency stop cancel switch to wind the hook up. Excessive force may be applied and damage the Fly-jib. To wind up the hook, always use the over-winding cancel switch.**

To retract the No.2 Fly-jib, follow the instructions below:

1. Keep pressing the over-winding cancel swtich and wind up the hook (10) slowly, until it lightly touches the No.2 Fly-jib (3) tip.




2. Pull the linchpin (25) out from the position pin (4) in the tip of No.1 Fly-jib (2) to extract the position pin (4).




**NOTES**

Removed position pin (4) will be necessary for the later operation to secure the retracted No.2 Fly-jib (3).

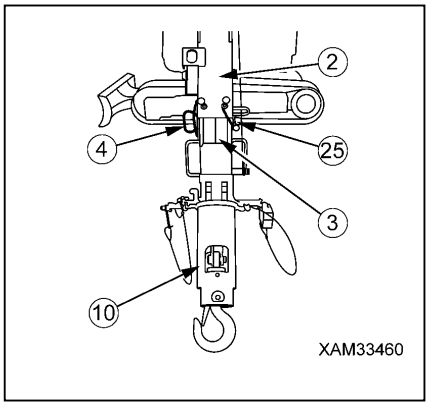
3. Keep pressing the over-winding cancel switch and continue the hook winding up operation and the boom lowering operation alternately, so that the No.2 Fly-jib (3) is slowly retracted.

**CAUTION**

**When the hook is wound up, No.2 Fly-jib (3) is retracted by the force of the winch. During such practices, the Fly-jib No.2 (3) may not be smoothly drawn in due to it's angle.**
**In such an event, lower the boom or take hold of handles on the both left and right side at the tip of No.2 Fly-jib (3) and push No.2 Fly-jib (3) in.**

4. When No.2 Fly-jib (3) is retracted, adjust both side holes of No.1 Fly-jib (2) and No.2 Fly-jib (3) to insert the position pin (4). Apply the linchpin (25) to secure the position pin.

5. Un-wind the hook down so that it departs from the No.2 Fly-jib (3).






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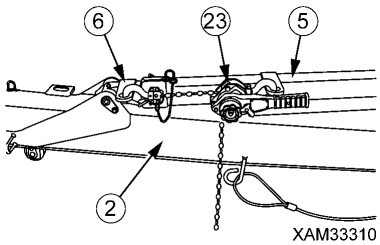
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## 6.4 STOWAGE OF FLY-JIB

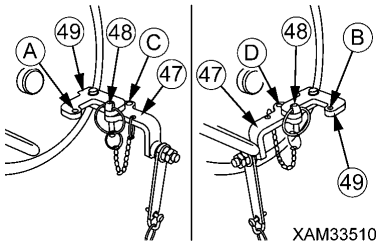
| NOTES |
|---|
| •When the No.2 Fly-jib (3) is extended, refer to section; “FLY-JIB, 6.3 Extending and Retracting No.2 Fly-jib” and retract the No.2 Fly-jib (3) correctly.<br>• Refer to "Fly-jib 6.2.2 Changing of Fly-jib Tilt Angle to Stowage Position" for details to return the Fly-jib (3) to its stowage position. |

1. Set the attached lever block (23) between the tilt angle adjuster outer rod (5) and inner rod (6).

| NOTES |
|---|
| Lever block (23) handling will be easier, when you set the lever side to the outer rod side (5). |

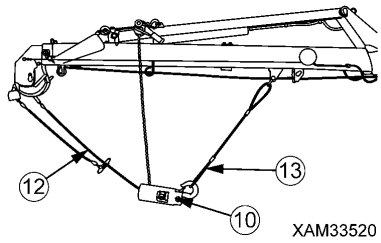



2. Extract the linchpin (48) at the tip of No.2 Fly-jib and turn the wire bracket (47) of the over-hoist detector weight. Match the hole (A) of the wire bracket (49) and hole (C) of the wire bracket (47), then insert the linchpin (48). When inserted, ensure the ring to is turned to lock it.

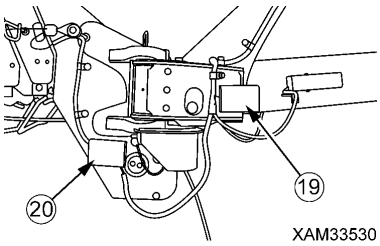



3. Hang the hook (10) for Fly-jib to the hook stowing wire (13) on the underside of the Fly-jib (2).

| NOTES |
|---|
| Allow the wire rope (12) to be adequately slack. |



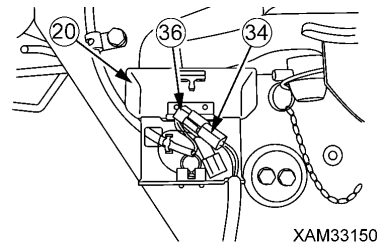

4. Swap the harness connection part (19) and (20) as shown below to switch and connect fly-jib angle and length detector.




(1) Open the cover of the harness connection part (20: Main boom side) and extract the harness connector (34) from the harness connector (36).

| NOTES |
|---|
| Removed harness connector (34) will be later connected into a connector in the harness connection part (19: Fly-jib side). |

Before harness exchange;
the Main boom side:



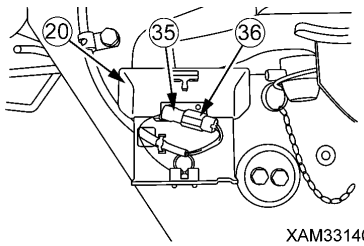



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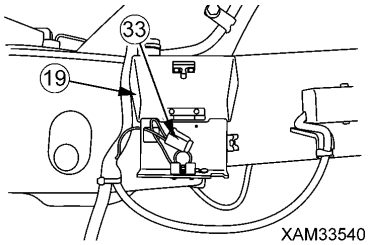
(2) Connect the harness connector (36), as extracted in (1) above, to the storage connector (35) and the close the cover.

After harness exchange;
Main boom side:



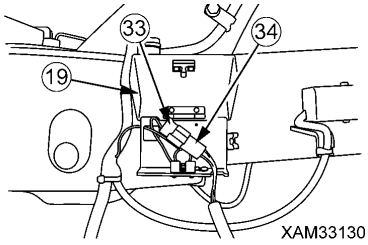

(3) Open the cover of the harness connection part (19: Fly-jib side).

Before harness exchange;
Fly-jib side:




(4) Connect the harness connector (34), as extracted in (1) above, to the storage connector (33) and the close the cover.

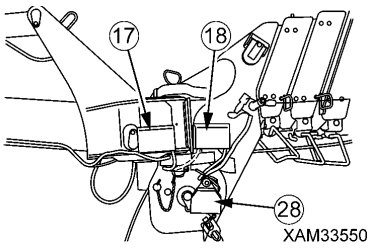
After harness exchange;
Fly-jib side:




**NOTES**

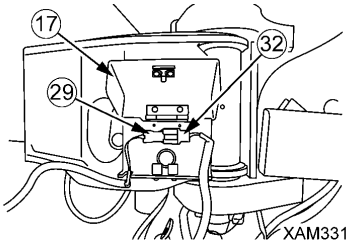
- Ensure that wire of the harness connector (34) is guided out of the connector box through the hole cut in the bottom.
- When you close the cover, take care that the harness connectors (34) and the storage connector (33) are within the harness connection part.

5. Swap the harness connection part (17) and (18) as shown below to switch and connect over-hoist detector




(1) Open the cover of the harness connection part (17: Fly-jib side) and extract the harness plug (32) in the connector (29).

Before harness exchange;
Fly-jib side:




**NOTES**

The removed harness plug (32) will be later connected into a connector in the harness connection part (18: Main boom side).



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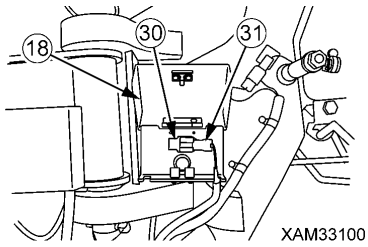
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(2) Open the cover of the harness connection part (18: Main boom side) and extract the dummy plug (30) in the connector (31).

**NOTES**

The removed dummy plug (30) will be later connected into a connector in the harness connection part (17: Fly-jib side).

Before harness exchange;
Main boom side:

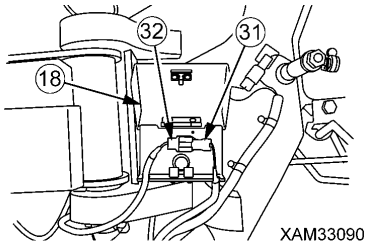



(3) Connect the harness plug (32), as extracted in (1) above, to the connector (31).

**NOTES**

Ensure that wires of the harness plug (32) and connector (31) are guided out of the connector box through the hole cut in the bottom left.

After harness exchange;
Main boom side:

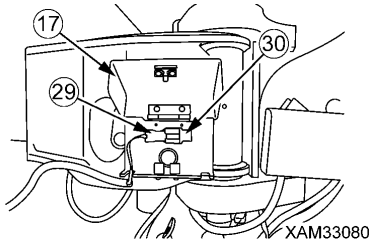



(4) Open the cover of the harness connection part (17: Fly-jib side) and connect the dummy plug (30), as extracted in (2) above, to the connector (29).

**⚠ CAUTION**

**Don't forget to install the dummy plug (30) into the connector (29) in the harness connection part (16: Fly-jib side). If not, the absence of the dummy plug may cause mis-function of the over-hoist detector. In such event, it may cause the hook or load to drop and result in a serious hazard.**

After harness exchange;
Fly-jib side:

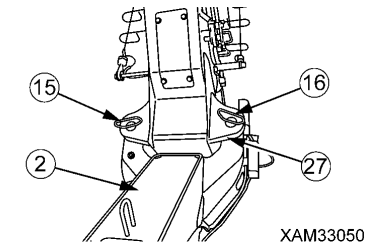


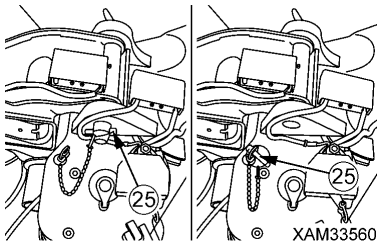

6. Start the engine to lower the boom fully, then stop the engine.

7. Detach the linchpin (25) from the position pin (16) attached to the hole of the bracket (27) on the left side of the main boom tip, then extract the position pin (16) from the hole in the lower part of the bracket (27).

**NOTES**

- Do not pull out the position pin (16) completely until the main boom is set level, later on.
- When you find it difficult to extract the position pin from the hole in the lower part of the bracket (27), lift the Fly-jib tip and extract the pin.
- The removed linchpin (25) of the position pin (16) shall be firmly inserted in the hole for storage at the boom tip. When inserted, ensure the ring is turned to lock it.






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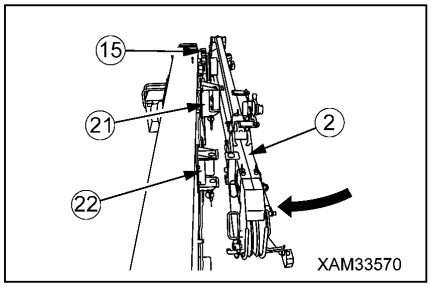
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8. Start the engine again to raise the boom level, then stop the engine.
Now pull out the position pin (16) completely.

**NOTES**

- To make the boom level, ensure that the boom angle display of the moment limiter indicates "0". In addition, visually check the boom is level.
- The removed position pin (16) wiil be used later to connect the No.1 Fly-jib and the Fly-jib stowage bracket A (21).

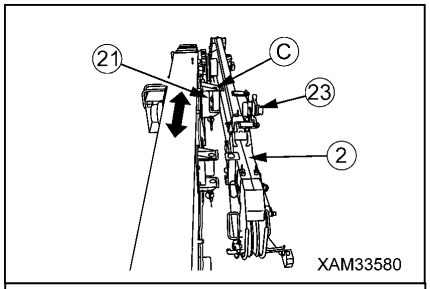
9. Turn the No.1 Fly-jib (2) around the position pin (15) on the right side of the Main boom tip and stow it into the Fly-jib bracket A (21) on the side face of the Main boom.




**NOTES**

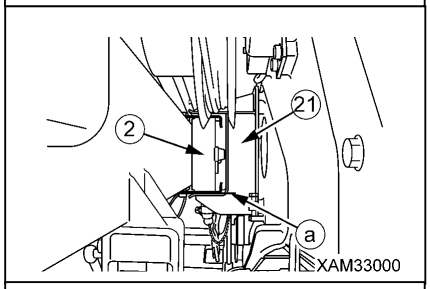
To turn the No.1 Fly-jib (2) around, drag the Fly-jib hook (10). When the No.1 Fly-jib (2) turns too rapidly, hold the hook (10) to stop turning.

10. Adjust the connection hole of No.1 Fly-jib (2) and hole (C) of Fly-jib bracket A (21) .

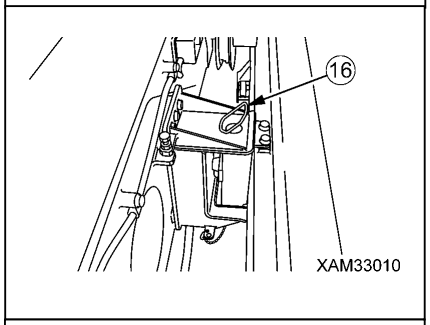



**NOTES**

- When you find it difficult to set the connection part of the No.1 Fly-jib (2) into the Fly-jib stowage bracket A (21), use the lever block (23) again to provide a clearance (a) to facilitate that the connection part of the No.1 Fly-jib (2) is set into the Fly-jib stowage bracket A (21).
- When the connection hole of the No.1 Fly-jib (2) and hole (C) of Fly-jib bracket A (21) do not correctly fit, telescope the Main boom slowly to allow a correct fit.

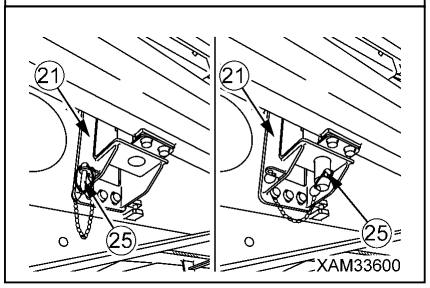



11. Once the connection hole of the No.1 Fly-jib (2) and the hole of Fly-jib bracket A (21) are adjusted, insert the position pin (16) to the hole then secure it with the linchpin (25).




**NOTES**

Detach the linchpin (25) for the position pin (16) from the hole for storage in the stowage bracket A (21) and apply to the position pin (16).






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## ⚠ WARNING

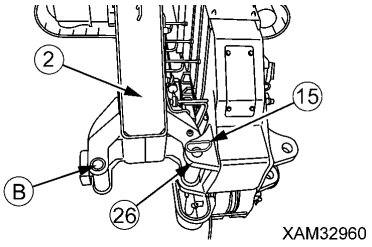
- **Do not remove the position pin (15) from the bracket (26) until the position pin (16) is fully inserted into the hole of the fly-jib bracket A (21). Incorrect fitting order may cause a serious hazard.**
- **The position pin (16) must always be inserted downward from the upper side. Otherwise, where it is inserted upward from the underside, the position pin could easily drop down to cause the Fly-jib to collapse and may cause a serious hazard.**

## CAUTION

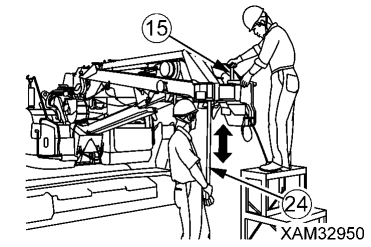
**When the position pins (15) and (16) are fitted in both holes of the bracket (26) on the right side of the Main boom tip and Fly-jib bracket A (21), the Main boom telescoping must not be operated. If operated it will critically damage the Fly-jib and Main boom.**

12. Remove the lever block (23).

13. Pull the linchpin (25) out from the position pin (15) placed in the bracket (26) hole on the right side of the Main boom tip, to pull out the position pin (15).



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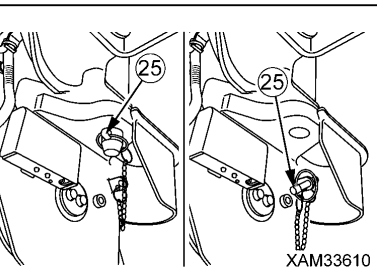
XAM32950

## NOTES

- When you find it difficult to pull out the position (15), insert the the attached bar into the hole (B) of the No.1 Fly-jib (2) from the bottom side and rock it to left and right, or to front and back to facilitate pulling the pin out. The attached bar (24) is stowed at the right of the winch drum in the upper structure.
- Removed position pin (15) will be necessary for the later operation to stow the No.1 Fly-jib (2) to the Fly-jib bracket B (22).

## NOTES

The removed linchpin (25) of the position pin (15) shall be firmly inserted in the hole for storage at the boom tip. When inserted, ensure the ring is turned to lock it.

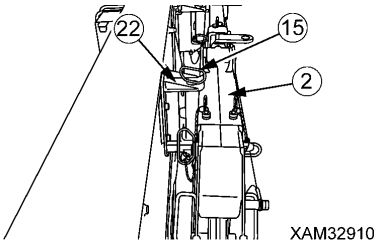


XAM33610

14. Push the No.1 Fly-jib (2) into the Fly-jib bracket B (22), then insert the position pin (15) into the hole of the Fly-jib bracket B (22). Use the linchpin (25) to secure the position pin.

## ⚠ WARNING

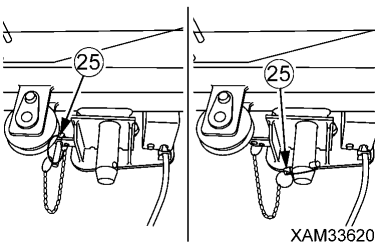
**The position pin (15) must always be inserted downward from the upper side. When it is inserted upward from the underside, the position pin could easily drop down to cause the Fly-jib to drop and may cause a serious hazard.**



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## NOTES

Detach the linchpin (25) for the position pin (15) from the hole for storage in the stowage bracket B (22) and apply to the position pin (15).



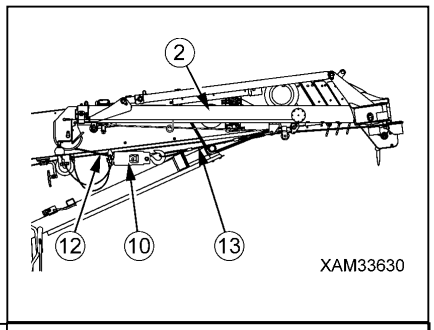
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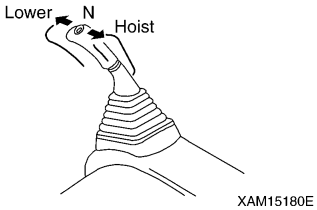
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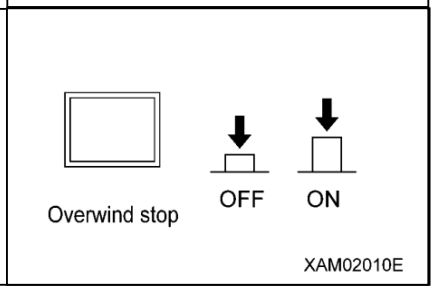
15. Keep pressing the over-winding cancel switch and wind the winch slowly, to reduce the wire rope slack.




**⚠ CAUTION**

**Never attempt hook stowage using the moment limiter emergency stop cancel switch. The hook stowage mode is not available and may result in damage to the bracket for the hook stowage wire rope (13), main boom, or wire rope (12). Always use the over-winding cancel switch to stow the hook.**




**CAUTION**

**When the Fly-jib is not correctly stowed, the moment limiter display indicates as follows:**

- **"- - -" is flashing in each of the Actual load display, Rated total load display, Working radius display, Rated radius display and Fly-jib angle display.**
- **Wire falls LEDs and Load capacity LEDs are flashing.**
- **Warning buzzer beeps intermittently.**

**In such events, check as follows:**

- **The Fly-jib is properly fixed by the position pin A (15) and position pin B (16) to stow in the side of the main boom.**
- **The Fly-jib tilt angle detector harness and length detector harness are correctly connected. (Refer to the instructions in 5. above).**



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# 7. HANDLING MOMENT LIMITER

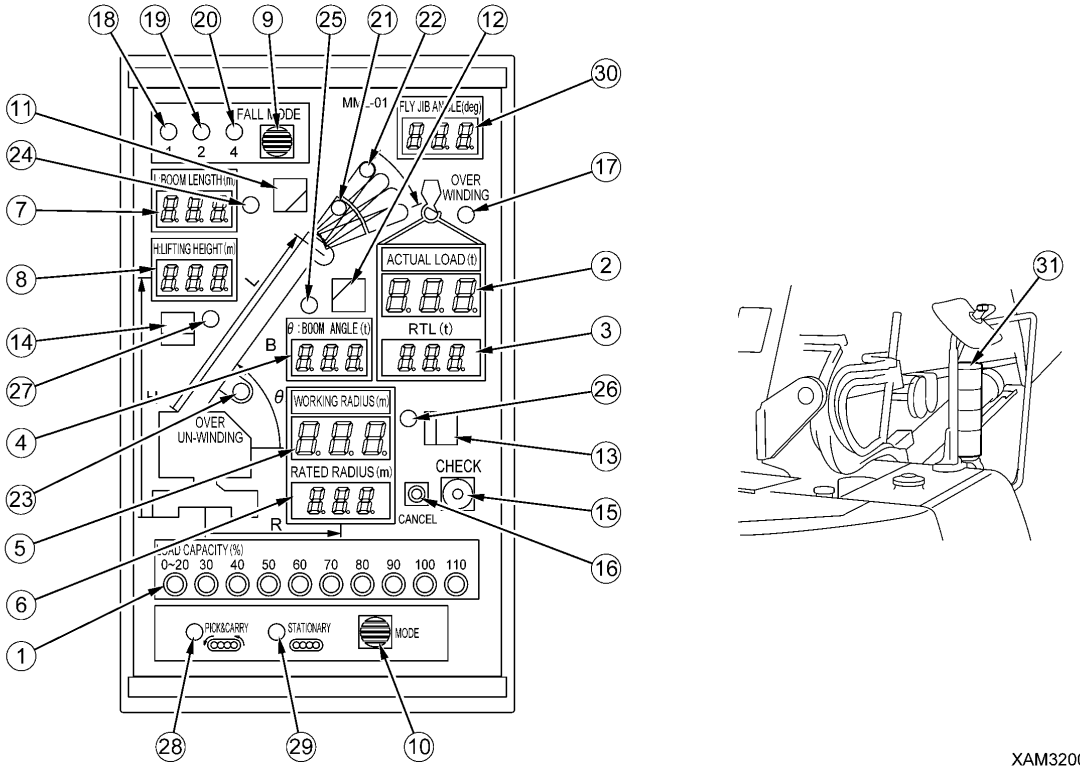
**⚠ WARNING**

**Do not turn off the power to the moment limiter and do not set the emergency switch to the OFF position during working. Doing so may cause the hoisted load to fall, breakage of the boom, or turnover of machine due to overloading, leading to serious injury or even resulting in death.**

**CAUTION**

**In this section, the devices indicated are exclusive for The Fly-jib model but different from that of a standard model. For devices other than these, refer to the section: "Operation 2.4 Moment Limiter".**

## 7.1 MOMENT LIMITER DISPLAY






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(1) Load capacity display
(2) Actual load display
(3) Rated total load display
(4) Boom angle display
(5) Working radius display
(6) Rated radius display
(7) Boom length display
(8) Lifting height display
(9) Fall mode selector switch
(10) Pick & Carry/ Stationary mode select switch
(11) Boom angle upper limit switch
(12) Boom angle lower limit switch
(13) Working radius upper limit switch
(14) Lifting height upper limit switch
(15) Check switch
(16) Cancel switch
(17) Overwind detection LED (Red)
(18) 1 fall LED (Green)
(19) 2 falls LED (Green)
(20) 4 falls LED (green)
(21) Fly-jib length (1) LED (Orange)
(22) Fly-jib length (2) LED (Orange)
(23) Over un-winding detection LED (Red)
(24) Boom angle upper limit LED (Green)
(25) Boom angle Lower limit LED (Green)
(26) Working radius upper limit LED (Green)
(27) Lifting height upper limit LED (Green)
(28) Pick & carry mode selection LED (Red)
(29) Stationary mode selection LED (Orange)
(30) Fly-jib angle display
(31) Working status lamp

## CAUTION

**To change the mode to the Fly-jib operation, it is not necessary to turn the switch in the moment limter displays, instead, it is automatically switched when the Fly-jib is installed and the tilt angle is set to 0 or more from its stowage position.**
**The Fly-jib tilt angle is adjustable to four (4) positions (0, 20, 40 and 60 degrees) and the current angle is indicated in the Fly-jib angle display.**
**In addition, when the No.2 Fly-jib is extended, Fly-jib length (2) LED lights, while the Fly-jib length (1) LED lights when it is retracted.**

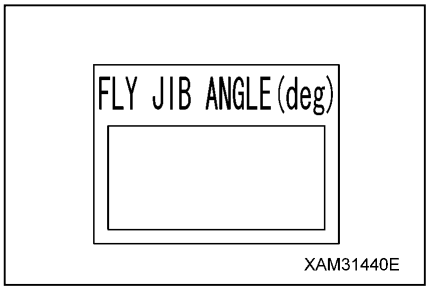
### [1] DESCRIPTIONS OF MOMENT LIMITER DISPLAY UNIT

1. Fly-jib angle display (30)

   The Fly-jib angle display indicates current Fly-jib angle continuously, during the crane operation.

   Fly-jib angle means the angle between the Fly-jib and the main boom.

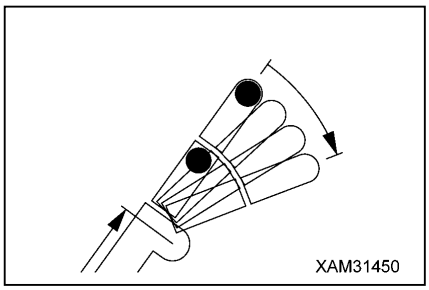
   The Fly-jib angle is adjustable to four (4) positions, 0, 20, 40 and 60 degrees.



XAM31440E

2. Fly-jib length (1) LED (Orange) / Fly-jib length (2) LED (Orange)

   When the Fly-jib is installed, the Fly-jib length (1) LED lights automatically, and when the No.2 Fly-jib is extended, Fly-jib length (2) LED lights.


XAM31450



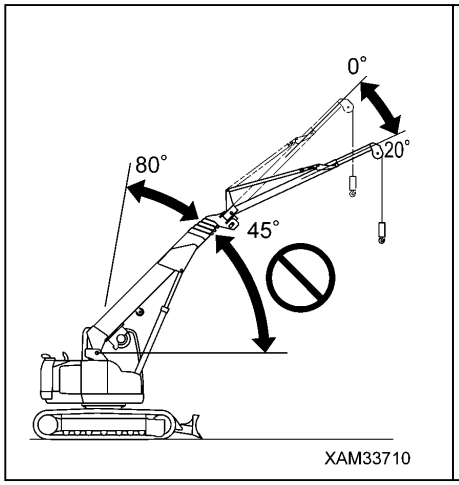
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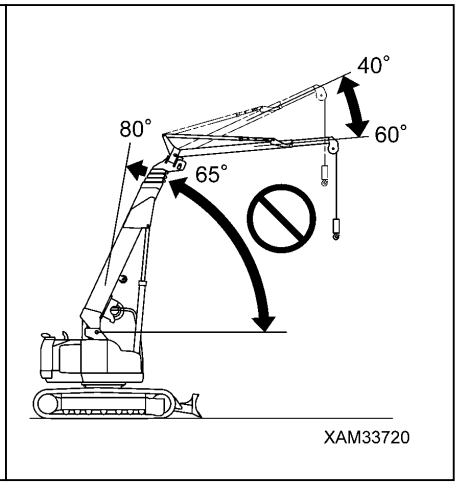
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## 7.2 MOMENT LIMITER FUNCTIONS

**CAUTION**

**During the Fly-jib operations, always keep the boom angle in the range as specified below:**
**[At a Fly-jib angle in 0 or 20 degrees]**
**Perform the crane operation in the boom angle range of "45 degrees" or more. When a load is hoisted in a condition that the boom angle is less than "45 degrees" and the boom length is "5.3m" or longer, the moment limiter emits a warning signal, the buzzer sounds intermittently, and hook hoisting, boom telescoping and boom lowering operations automatically stop.**
**However, when the boom length is less than "5.3m", the moment limiter does not emit a warning signal. In a condition where the boom angle is less than "45 degrees", boom lowering operation is not available unless the boom length is less than "5.3m".**
**[At a Fly-jib angle in 40 or 60 degrees]**
**Perform the crane operation in the boom angle range of "65 degrees" or more. When a load is hoisted in a condition that the boom angle is less than "65 degrees" and the boom length is "5.3m" or longer, the moment limiter emits a warning signal, the buzzer sounds intermittently, and hook hoisting, boom telescoping and boom lowering operations automatically stop.**
**However, when the boom length is less than "5.3m", the moment limiter does not emit a warning signal. In a condition where the boom angle is less than "65 degrees", boom lowering operation is not available unless the boom length is less than "5.3m".**






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### 7.2.1 DISPLAY FOR FLY-JIB MODE SWITCHING

1. Fly-jib angle at 0 degree:

   When the Fly-jib tilt angle is set to 0 degree, the Rated total load display, Working radius display, Fly-jib angle display and Lifting height display are switched to Fly-jib tilt angle 0 degree mode.

   • The Fly-jib angle display indicates "0".

   • The Rated total load display indicates the value for Fly-jib tilt angle 0 degree mode.

   • Working radius display indicates the value for Fly-jib tilt angle 0 degree mode.

   • Lifting height display indicates the value for Fly-jib tilt angle 0 degree mode.

2. Fly-jib angle at 20 degrees:

   When the Fly-jib tilt angle is set to 20 degrees, the Rated total load display, Working radius display, Fly-jib angle display and Lifting height display are switched to Fly-jib tilt angle 20 degrees mode.

   • The Fly-jib angle display indicates "20".

   • The Rated total load display indicates the value for Fly-jib tilt angle 20 degrees mode.

   • Working radius display indicates the value for Fly-jib tilt angle 20 degrees mode.

   • Lifting height display indicates the value for Fly-jib tilt angle 20 degrees mode.

3. Fly-jib angle at 40 degrees:

   When the Fly-jib tilt angle is set to 40 degrees, the Rated total load display, Working radius display, Fly-jib angle display and Lifting height display are switched to Fly-jib tilt angle 40 degrees mode.

   • The Fly-jib angle display indicates "40".

   • The Rated total load display indicates the value for Fly-jib tilt angle 40 degrees mode.

   • Working radius display indicates the value for Fly-jib tilt angle 40 degrees mode.

   • Lifting height display indicates the value for Fly-jib tilt angle 40 degrees mode.

4. Fly-jib angle at 60 degrees:

   When the Fly-jib tilt angle is set to 60 degrees, the Rated total load display, Working radius display, Fly-jib angle display and Lifting height display are switched to Fly-jib tilt angle 60 degrees mode.

   • The Fly-jib angle display indicates "60".

   • The Rated total load display indicates the value for Fly-jib tilt angle 60 degrees mode.

   • Working radius display indicates the value for Fly-jib tilt angle 60 degrees mode.

   • Lifting height display indicates the value for Fly-jib tilt angle 60 degrees mode.



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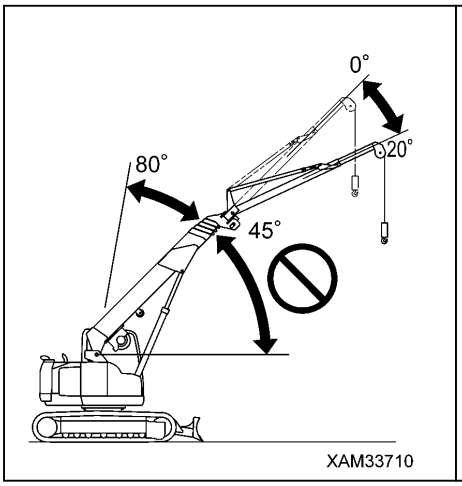
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## 7.3 SETTING OF OPERATING CONDITIONS

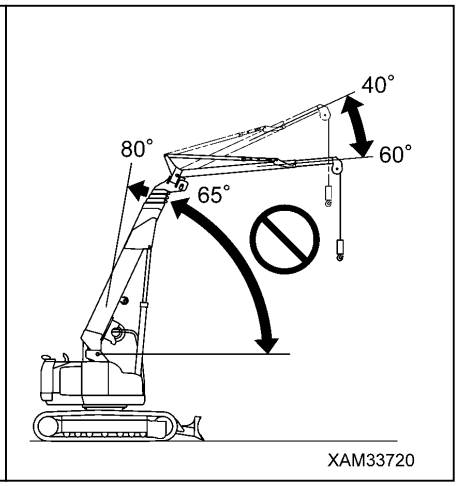
**CAUTION**

**When the Fly-jib is installed to the boom tip and its tilt angle is set to 0 degree or more from its stowage position, the machine is configured to the following operating conditions:**

- **The rated total load value is switched to the Fly-jib mode in the Moment limiter.**
- **When the Fly-jib tilt angle is set to 0 or 20 degrees, load hoisting operation is not available where the boom angle is "45 degrees" or less. The moment limiter emits an over-load warning.**
- **When the Fly-jib tilt angle is set to 40 or 60 degrees, load hoisting operation is not available where the boom angle is "65 degrees" or less. The moment limiter emits an over-load warning.**
- **The winch is fixed to low speed mode.**
- **The number of wire falls selection button is not valid during Fly-ib operation hence the number of wire falls is fixed to single fall mode.**



XAM33710

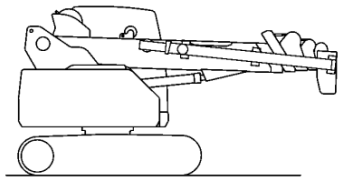


XAM33720

**CAUTION**

**When the Fly-jib is stowed to the side of the Main boom, the operation mode of the crane is provided as follows:**

- **The rated total load value is switched to the main boom mode in the Moment limiter.**
- **The number of wire falls selection button is valid now; the number of wire falls is optional.**


XAM29820



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# 8. OPERATIONS

**CAUTION**

**In this section, the devices indicated are exclusive to a Fly-jib model but different from those of a standard model. For devices other than these, refer to the section: “Operation”.**

## 8.1 CAUTIONS FOR FLY-JIB OPERATION

- Whenever the Fly-jib is installed, always keep the engine speed in low idling so that the machine is operated in low speed. Sudden lever operation may produce excessive load to the Fly-jib which may cause Fly-jib breakage resulting in a serious accident.
- At a Fly-jib angle in 0 or 20 degrees, perform the crane operation in the boom angle range of "45 degrees" or more. When a load is hoisted in a condition that the boom angle is less than "45 degrees" and the boom length is "5.3m" or longer, the moment limiter emits a warning signal, the buzzer sounds intermittently, and hook hoisting, boom telescoping and boom lowering operations automatically stop. However, when the boom length is less than "5.3m", the moment limiter does not emit a warning signal. In a condition where the boom angle is less than "45 degrees", boom lowering operation is not available unless the boom length is less than "5.3m".
- At a Fly-jib angle in 40 or 60 degrees, perform the crane operation in the boom angle range of "65 degrees" or more. When a load is hoisted in a condition that the boom angle is less than "65 degrees" and the boom length is "5.3m" or longer, the moment limiter emits a warning signal, the buzzer sounds intermittently, and hook hoisting, boom telescoping and boom lowering operations automatically stop. However, when the boom length is less than "5.3m", the moment limiter does not emit a warning signal. In a condition where the boom angle is less than "65 degrees", boom lowering operation is not available unless the boom length is less than "5.3m".



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# 9. INSPECTION AND MAINTENANCE

**CAUTION**

**In this section, the devices indicated are exclusive to a Fly-jib model but different from those of a standard model. For devices other than these, refer to the section: "Inspection and Maintenance".**

## 9.1 CHECKING BEFORE OPERATION

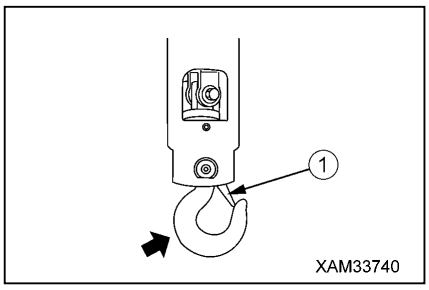
Check the followings in this section before starting the first work every day after installing fly-jib.

**[1] CHECKING AROUND FLY-JIB**

- Check each part of the fly-jib for cracks, excessive deformation, and contamination etc. In addition, check bolts, nuts and pins for any looseness, drop, and damage etc. Be especially careful to check for excessive abrasion and damage of the position pins. If you find any abnormality, repair.
- Check for excessive damage and deformity of the over hoist weight wire rope of the over winding alarm device at the tip of the fly-jib. If there is any abnormality, repair.
- Check for excessive damage and deformity of the cord real on the left side surface of the fly-jib. If there is any abnormality, repair.
- Check for sagged electrical wire, loose connections and trace of burns. If you find any abnormality, repair.

**[2] CHECKING HOOK BLOCK**

- Verify that the wire rope latch (1) functions normally. If there is any abnormality, repair.
- Rotate the hook and verify that the hook rotates smoothly and that the trunnion does not emit any abnormal sound.
  If there is any abnormality, repair.
- Check the hook for any cracks or excessive deformation.
  If there is any abnormality, repair.






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## [4] CHECKING MOMENT LIMITER FOR OPERATION

**⚠ WARNING**

**If you find any abnormality with the moment limiter, immediately contact us or our sales service agency.**

1. Turn the starter switch to the ON position.
2. Check the working status lamp. All 3 colors light for approximately 3 seconds first, then only the green light remains lit.
3. Check the moment limiter display unit.
   Verify that no error code is displayed at the “RATED TOTAL LOAD” display on the display panel.
4. Configure the Fly-jib as listed below to confirm that the moment limiter indicates correctly:

| Crane Operation and Displayed Parameter | Value Displayed on Moment Limiter |
|---|---|
| Fly-jib length (1) LED, when only No.1 Fly-jib is used | Lit up |
| Fly-jib length (2) LED, when only No.2 Fly-jib is used | Lit up |
| "Fly-jib angle display" indication, when the Fly-jib tilt angle is set to 0 | 0 |
| "Fly-jib angle display" indication, when the Fly-jib tilt angle is set to 20 | 20 |
| "Fly-jib angle display" indication, when the Fly-jib tilt angle is set to 40 | 40 |
| "Fly-jib angle display" indication, when the Fly-jib tilt angle is set to 60 | 60 |

5. Start the engine and operate the crane as follows to verify if the moment limiter is acting properly for each function.

| Crane operation | Action of Moment Limiter |
|---|---|
| When the Fly-jib angle is 0 or 20 degrees, the boom angle is lowered to 45 degrees or less and the boom is extended to 5.3m or more. | • An over-load warning is emitted and the buzzer sounds intermittently.<br>• The hook hoisting, boom telescoping and boom lowering operation automatically stop. |
| When the Fly-jib angle is 0 or 20 degrees, the boom angle is lowered to 45 degrees or less but the boom is extended to less than 5.3m. | • The boom lowering operation is available. |
| At a Fly-jib angle of 0 or 20 degrees, perform the crane operation in the boom angle range of "45 degrees" or more. When a load is hoisted in a condition that the boom angle is less than "45 degrees" and the boom length is "5.3m" or longer. | • An over-load warning is emitted and the buzzer sounds intermittently.<br>• The hook hoisting, boom telescoping and boom lowering operation automatically stop. |
| When the Fly-jib angle is 40 or 60 degrees, the boom angle is lowered to 65 degrees or less and the boom is extended to 5.3m or more | • An over-load warning is emitted and the buzzer sounds intermittently.<br>• The hook hoisting, boom telescoping and boom lowering operation automatically stop. |
| When the Fly-jib angle is 40 or 60 degrees, the boom angle is lowered to 65 degrees or less but the boom is extended to less than 5.3m. | • The boom lowering operation is available. |
| At a Fly-jib angle of 40 or 60 degrees, Perform the crane operation in the boom angle range of "65 degrees" or more. When a load is hoisted in a condition that the boom angle is less than "65 degrees" and the boom length is "5.3m" or longer. | • An over-load warning is emitted and the buzzer sounds intermittently.<br>• The hook hoisting, boom telescoping and boom lowering operation automatically stop. |



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## 9.2 MAINTENANCE EVERY 50 HOURS

### [1] GREASING

**CAUTION**

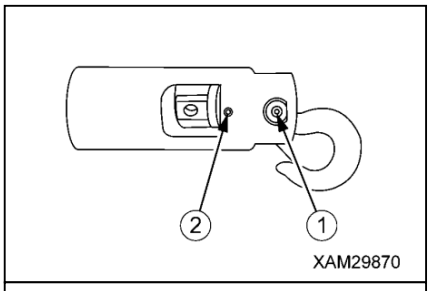
- **Grease a new machine regularly until it has been operated for 100 hours, that is the time when the machine will have settled down and may be considered as run-in.**
- **Any unusual noise at greasing points requires immediate greasing regardless of the maintenance period.**

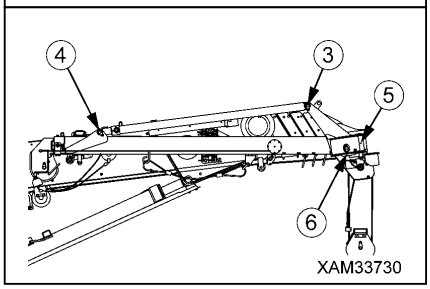
Use a grease type in the following table depending on the greasing point.

| No. | Greasing Point | | Grease Type |
|---|---|---|---|
| 1 | Hook block greasing | 2 Places | Lithium grease |
| 2 | | | |
| 3 | Fly-jib angle adjusting outer rod pin greasing | 1 place | |
| 4 | Fly-jib angle adjusting inner rod pin greasing | 1 place | |
| 5 | Fly-jib mounting boss greasing (Greasing when installed fly-jib) | 2 Places | |
| 6 | Fly-jib foot pin greasing | 1 place | |

1. Grease, by using a grease pump, to the grease fitting indicated with an arrow.

2. Cleanly wipe off the old grease that was pushed out after greasing.






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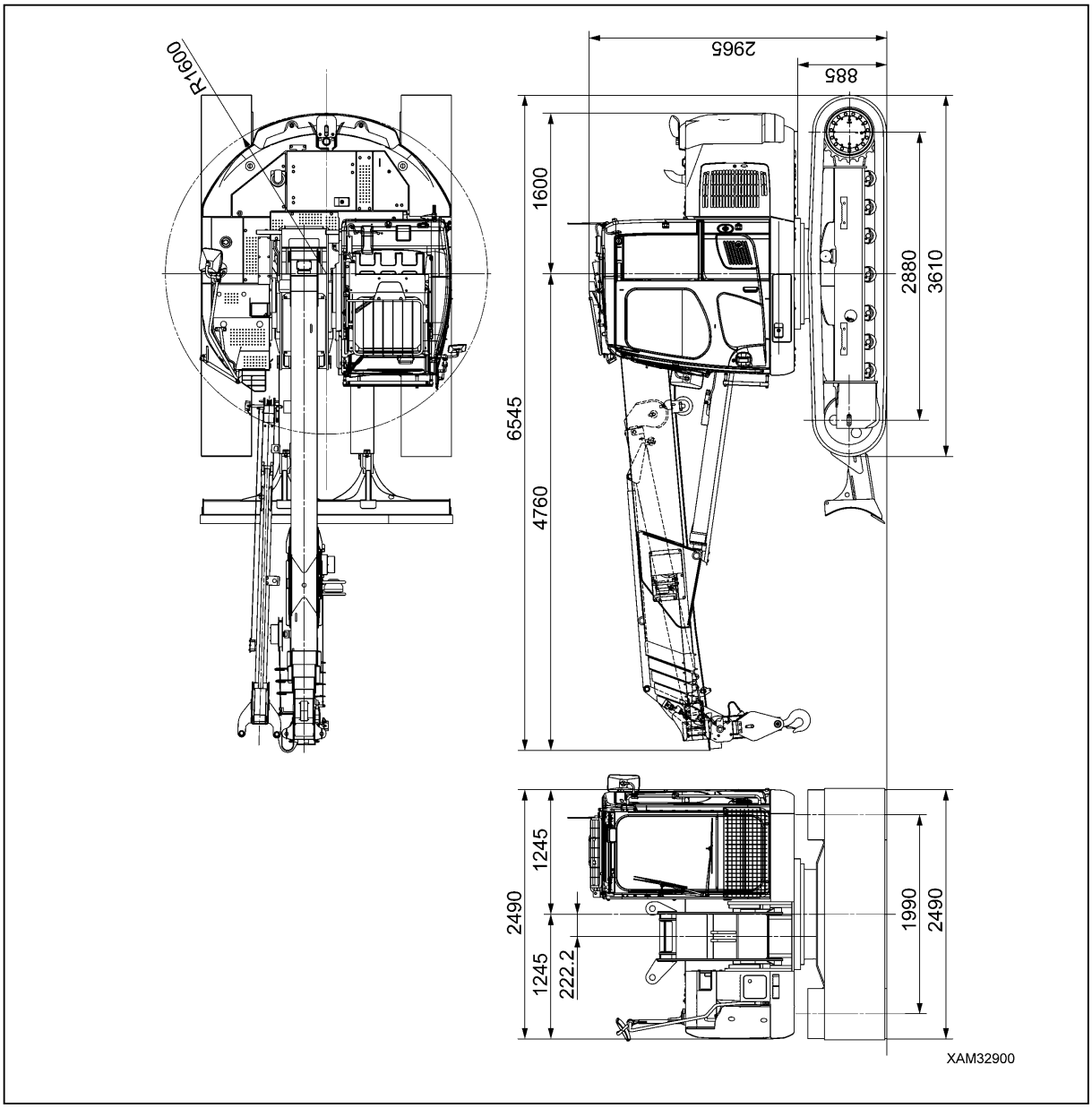
# 10. SPECIFICATIONS

**CAUTION**

**In this section, the data indicated is exclusive for the Fly-jib model but different from those of a standard model.**
**For data other than this, refer to the section: "SPECIFICATIONS" of the LC1385 operation manual.**

| System / Item | | LC1385M-8BF |
|---|---|---|
| Mass and dimensions | Machine mass | 15,850kg |
| | Overall length x width x height | 6,545mm x 2,490mm x 2,965mm |
| | Distance between idler and sprocket | 2,880mm |
| | Track gauge | 1,990mm |
| | Track width | 500mm |

# 11. DIMENSIONS






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# MAEDA CRAWLER CRANE LC1385M-8 OPERATION MANUAL

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