



Maeda LC785 Crawler Crane

# Risk Assessment

# SAFETY

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## **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.**

# 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 any operation or maintenance of this machine and observe the safety precautions.

## 1.1 PRECAUTIONS BEFORE STARTING OPERATION

<b>OBSERVE THE MANUAL AND SAFETY LABELS</b>	
<ul style="list-style-type: none"> <li>Study and understand this manual as well as the safety labels labelled on various part of this Machine. Any attempt to drive/operate without understanding it fully may result in incorrect operation that may cause personal or equipment accidents.</li> <li>Fully understand the proper use and inspection/maintenance procedures, and exercise safe working practices.</li> <li>Make sure this manual and the safety labels fixed on various part of this Machine are legible at all times. Whenever illegibility or loss occurs, order from us or our sales service agency and put the safety label back to the original location.</li> </ul>	

<b>DRIVING LICENSE</b>
<ul style="list-style-type: none"> <li>Licenses or training certificates are necessary to drive this Machine. Always obtain a license or training certificate before driving.                             <ul style="list-style-type: none"> <li>★ See “Introduction 4. Qualification for Operation” for details</li> </ul> </li> <li>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.</li> </ul>

<b>COMMIT TO SAFE OPERATION</b>
<ul style="list-style-type: none"> <li>Obey the instructions and signs given by the manager and work supervisor, and observe safety first during the work.</li> <li>Obey the crane work basics during operation.</li> <li>Before starting driving or work, always carry out the inspections first.</li> <li>Do not work under bad weather for instance strong wind, thunder or mist.</li> <li>Do not drive under any condition when you are overtired, have drunk alcohol or after taking a sedatory drug.</li> <li>Obey all of the workplace rules, safety regulations and operation method sequences during driving operations and inspection/maintenance.</li> <li>Pay attention to surrounding conditions and pedestrians at all times when driving or working. If pedestrians approach the working area, abort working and take action to warn and remove them from the area.</li> <li>When driving, be mentally prepared for any unexpected situations so that you can take the appropriate action immediately.</li> <li>Do not attempt any use outside of the capabilities and purposes described in this manual under any circumstance.</li> <li>Observe the designated rated total load and working range when driving.</li> <li>Always pay attention when driving, making sure your operation is smooth and controlled.</li> <li>Remove the ignition key when leaving operation seat.</li> </ul>

## 1.2 PREPARATIONS OF SAFETY OPERATION

### PROVIDE SAFETY DEVICES FOR SURE

- Check that all guards, covers, and mirrors 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

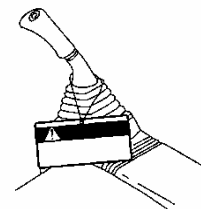
- Carry out secure inspections and services, and be careful to prevent accidents before they happen.
- Whenever you feel an abnormality of the Machine, abort working immediately, ensure safety and report to the manager.
- Assign in advance a person to take care of the solution to prevent secondary accidents.
- 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 leak 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 remove the engine ignition key.



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### TEMPORARY STORAGE WHEN ABNORMALITY IS FOUND WITH MACHINE

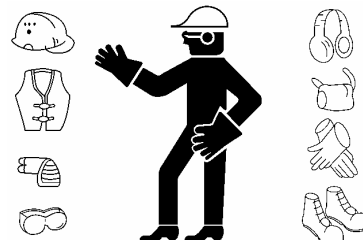
- If the Machine is found to have an abnormality and is therefore placed in storage awaiting service, apply the following measures to notify all persons in the office that its use is prohibited due to failure.
- Attach warning tags on the operation lever and other applicable parts.  
Clearly write the information regarding the abnormality. The name and contact of the storage manager, and the term of storage.
  - Make sure the machine cannot move when parking, by placing blocks under the rubber tracks.
  - Remove the engine ignition key and take it with you.



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### WEAR PROTECTIVE EQUIPMENT AND CLOTHES SUITABLE FOR WORK

- Always wear a helmet and safety shoes. Make sure to wear goggles, mask, gloves, hearing protectors, and safety belt suitable for the relevant working condition.
- Long hair coming out under helmet can be caught in machine. Make sure to tie to prevent accident.
- Do not wear loose garments or accessory items that may catch an operation lever, starter switch, emergency stop switch or any protrusions that could cause unexpected movement of the Machine.
- Make sure for proper function of each protective equipment.



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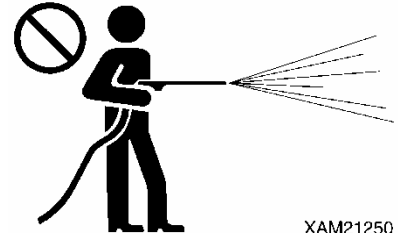
## USE OF MACHINE THAT WAS RENTED OR PREVIOUSLY USED BY SOMEONE ELSE

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) Behaviour 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 of lights and their condition. Check lights of rotating lamps
  - (c) Operation condition of hook, winches, boom, outriggers and other related items

## 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).



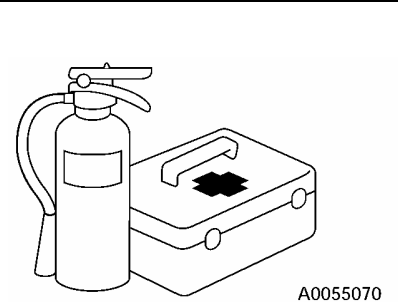
## KEEP OPERATOR'S COMPARTMENT CLEAN

- 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 on 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 the following to prepare for injuries and fires.

- In case of fire, 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 on the location to store the first aid box. Inspect the first aid box periodically and replenish the contents as necessary.
- Consider the measures to take upon an injury or fire.
- Know how to contact the emergency services (for instance the emergency physician, ambulance or fire department), and show the contact information at a designated position so any person can make the contact.



## 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.

Fuel, oil, or antifreeze are particularly flammable and can be hazardous. To prevent fire, always observe the following:

- Do not smoke or use any flame near fuel oil, or antifreeze.
- Stop the engine before refuelling.
- 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.

#### • 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, battery, or inside the 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

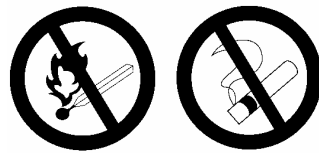
Check that all the hose and tube clamps, guards, and cushions are securely fixed in position. If they are loose, they may vibrate during operation and rub against other parts. This may lead to damage to the hoses, and cause high-pressure oil to spurt out, leading to fire damage or serious injury.

#### • 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 using electrical power for the lighting from the machine, follow the instructions in this manual.



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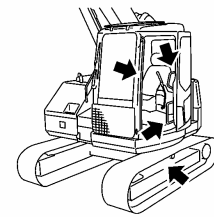
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## 1.4 PRECAUTIONS WHEN GETTING ON OR OFF

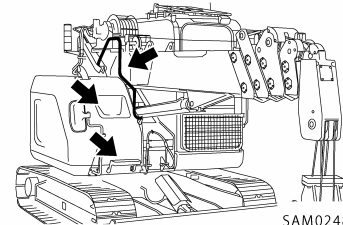
### USE HANDRAILS AND STEPS WHEN GETTING ON OR OFF

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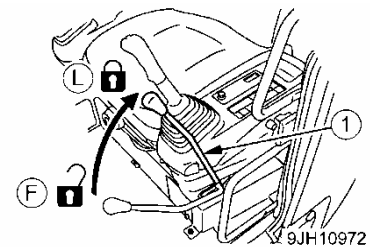
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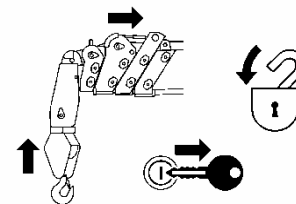
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### PRECAUTIONS WHEN LEAVING OR STANDING UP FROM OPERATOR'S SEAT

- Before standing up from operator's seat (such as 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.



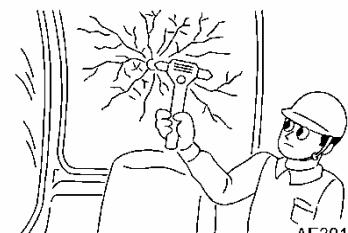
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### EMERGENCY EXIT OF THE OPERATOR'S CABIN

- 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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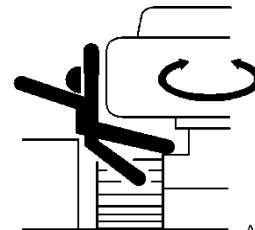
## 1.5 OTHER PRECAUTIONS

### PRECAUTION NOT TO GET CAUGHT IN THE MACHINE

Around the upper structure and crane 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 any rotating or telescoping parts. Especially, avoid putting oneself or your body into locations such 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.

Any 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 a modification that was performed without consulting us.

### ATTACHMENT INSTALLATION

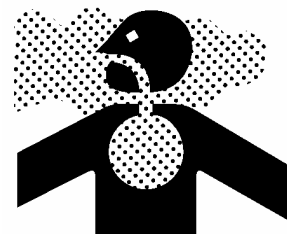
- When installing optional parts or attachments, there may be problems with safety or legal restrictions. Therefore contact our sales service agency for advice.
- Any injuries, accidents, or product failures resulting from the use of unauthorized attachments or parts will not be the responsibility of 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

- The roof window and right side window are 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 object, or when any sign of damage is noticed, replace it with a 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 JOB SITE

#### 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 a no entry zone, for instance, placing guides or surrounding with barriers, to ensure the safety of the traffic vehicles and pedestrians.
- Enforce a no entry zone to prevent people from entering the working site and apply measures to prevent people from approaching. Attempting to approach a moving Machine may result in a 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 travelling 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 travelling 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 travelling in places with poor visibility, always observe the following items strictly.

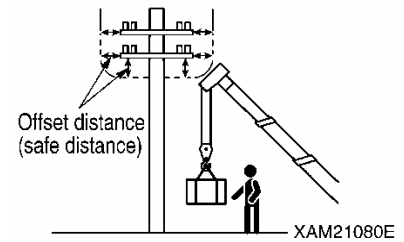
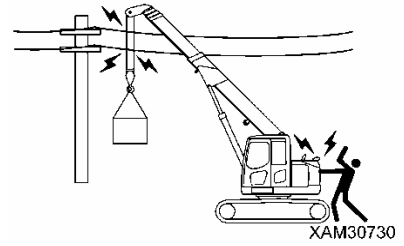
- If the visibility cannot be sufficiently assured, position a flagman if necessary. The operator should pay careful attention to the signs and follow the instruction of the flagman.
- The signals should be given only by one flagman
- When working in dark places, turn on the working lamps and front lamps 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.

#### 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.

## BEWARE OF ELECTRICAL CABLE ABOVE

- Do not let the Machine come in 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 too close to the electrical cable.
- Before doing so, decide on 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. Also check local regulations as they may require larger safety factors.



	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

## MEASURES WHEN CHARGE ACCIDENT OCCURS

If an electrical charge accident occurs, 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 to stop the power transmission, emergency procedures and any related procedures.

### 2. Evacuation of related personnel from vicinity of Machine

Remove all personnel including workers from vicinity of the Machine to prevent any secondary disasters.

Personnel who suffered electrical shock by holding a sling rope, guide rope or other conductors when the Machine was charged should evacuate by his/her own effort.

Do not try to help such persons. Otherwise a secondary electrical shock accident can occur.

### 3. Emergency procedure

Take the solution by the following sequence in case of urgency where personnel received electrical shock because the Machine was charged.

(1) If the Machine can be operated, immediately move the Machine 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. Measures to be taken after an accident

After the accident, do not put the machine back into service. Attempting to do so may cause unexpected accidents and enhances failures. Ask us or our sales service agency for repair.

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

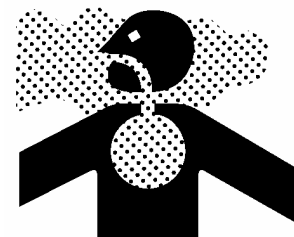
Working with the crane near a high output of microwave emission equipment such as radar or TV/radio broadcast antenna may causes the crane construction to be exposed to the microwave and generates induced current, therefore it is very dangerous. In addition, the machine electronics may become disturbed.

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 of 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 a windward location when driving the Machine at a site that may contain asbestos dusts.
- Enforce a restriction zone 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 STARTING ENGINE

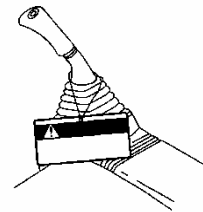
### PRECAUTIONS FOR WARNING TAG

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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#### **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.

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### INSPECTION BEFORE STARTING ENGINE

Check the instructions in "Operation 3.1 Checking Before Operation" as well as the following, without starting the engine and before starting work every day:

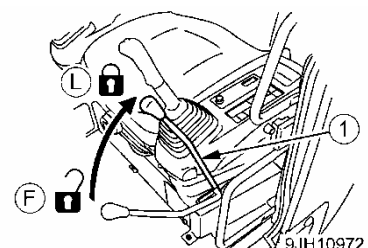
Omitting these inspections may result in serious bodily accidents.

- 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 Checking Before Starting Engine (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 Checking Before Starting Engine (Adjusting Mirrors)" for details.
- Check pedals for piled up mud or alien substances which may disturb their movement, and remove, to ensure correct function.
- Check the operation of the instruments and gauges, and check that the control levers are all at the Neutral position.

Always repair if any of the above is faulty.

### CHECKS BEFORE STARTING ENGINE

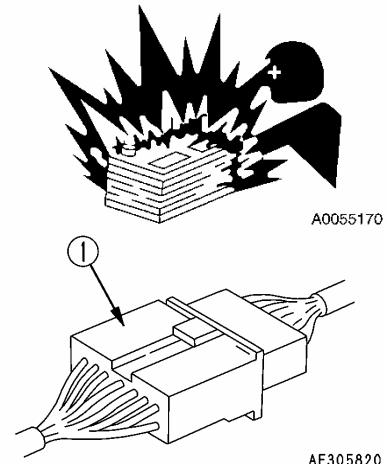
- Make sure no person or object is within the boom swing radius area before starting engine.
- Make sure no person is on, below or around the machine, and also that no person or object is within the boom swing radius area, before starting engine.
- Do not allow anyone apart from the operator to ride 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 (I).
- 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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## CAUTIONS UNDER COLD WEATHER

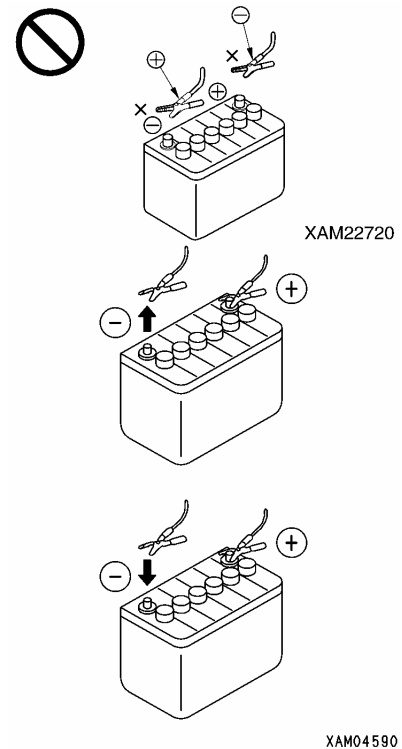
- Remove snow from and unfreeze the swing gear, boom and winch related parts, and check the movements before work.
- Warm up the engine and hydraulics. Attempting to operate the control levers and pedals without enough warm up causes the Machine to react poorly, and may result in unexpected accidents.
- If the battery fluid is frozen, do not charge the battery or start the engine using any other power source. Such an act may cause the battery to catch fire. Before charging or starting up using other power source, unfreeze the battery fluid and check that failures such as a battery fluid leak do not exist.
- After the 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 its next use and cause unexpected accidents.



## CAUTIONS WHEN STARTING UP USING BOOSTER CABLE

The 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 another 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 8.4.4 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.



## 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 travelling conditions, winch winding up and down, boom derricking, and crane operation conditions such as extension, retraction and swinging.
- Inspect the sound, vibration, heat and odour of the Machine, and check for instrument errors, air leaks, oil leaks, fuel leaks, water leaks and other such factors. Be extra careful with fuel leaks.
- Always repair the broken part whenever an abnormality is found. Attempting to use without servicing may result in unexpected bodily accidents and/or Machine failures.

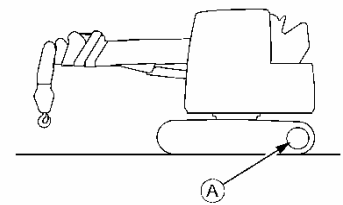
### CAUTIONS WHEN MOVING FORWARD/BACKWARD OR CHANGING DIRECTION

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

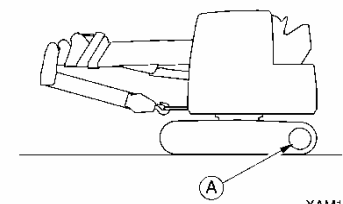
- Set the Machine to the travelling posture shown in the right diagram.
  - ★ See "Operation 3.6 Machine Travelling Posture" for details.
- Do not travel when the hook block is not contained.
- Before travelling, set the machine so that sprocket (A) is behind the operator's seat. If sprocket (A) is in 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.
- Have the boom fully lowered and retracted.
- Fix the hook block to the containment position.
  - For 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 at the front of the upper structure.
- 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 starting to travel observe strictly as follows:

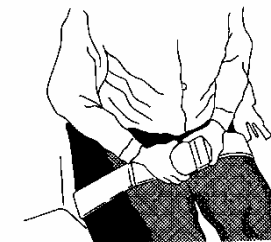
- Always operate the machine only while seated.
- Always fasten your seat belt.
- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
- Before travelling, sound the horn to warn people in the area.
- After starting to travel, check that the travel 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 travelling.



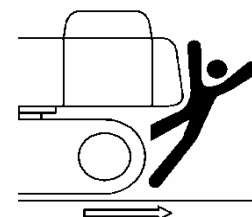
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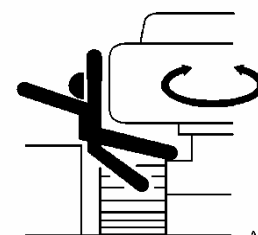
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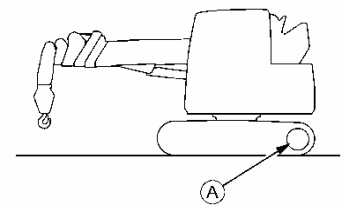


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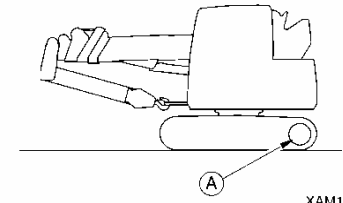
## CAUTIONS WHEN TRAVELLING

Always observe the following to prevent serious injuries and fatal accidents when the Machine is travelling.

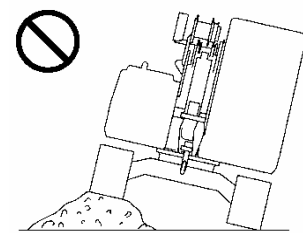
- Set the Machine to the travelling posture shown in the right diagram.
- ★ See "Operation 3.6 Machine Travelling Posture" for details.
- Do not attempt looking sideways or other dangerous acts when driving.
- Do not: over speed, start/stop or swing suddenly, as such acts are dangerous.
- When travelling, always keep a safe distance from people, structures, or other machines to avoid coming into contact with them.
- Avoid travelling over obstacles when possible. If the machine has to travel over an obstacle, keep travel at low speed. Never travel over an obstacle which makes the machine tilt strongly to one side.
- When travelling 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 travelling 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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XAM14690

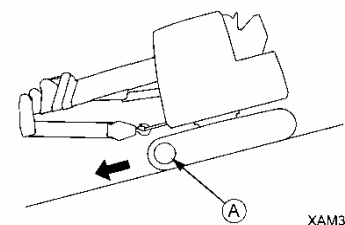


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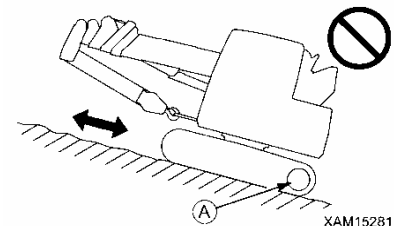
## BE CAREFUL WHEN TRAVELLING OVER SLOPES

ALWAYS observe the following to prevent serious injuries and fatal accidents when travelling over a slope for unavoidable reasons.

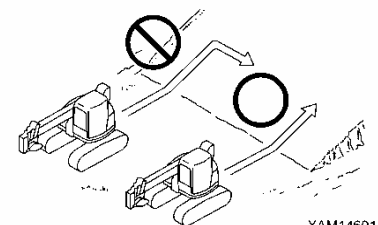
- For travelling on a slope, always keep the correct travelling posture with the hook block secured to the hook block stowage wire rope in the front of the upper structure. When the hook block is temporary stowed below the boom tip, it may become slack during travelling.
- ★ See "Operation 3.6 Machine Travelling Posture" for details.
- In a 10 degrees or more slope, use reverse travelling to climb it and forward travel for descend. Always direct the machine front to the downward of the slope. Where forward travelling to climb up and reverse travelling for descend is used, it makes the machine unstable and brings risks of overturning or drifting.
- Always travel straight up or down a slope. Travelling at an angle or across the slope is extremely dangerous.
- 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 travelling 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 travelling on a slope, move the control levers immediately to the neutral position and start the engine again.



XAM32330



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## BE CAREFUL OF TIPPING ON UNSTABLE GROUND

Always observe the followings to prevent serious injuries and fatal accidents when travelling over unstable ground for any reason.

- Do not enter any soft ground area. The Machine is difficult to remove from this type of ground.
- Ground near a cliff, roadside or a deep gully may be 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 may have loosened after rain, use of dynamite or earthquake.

- Avoid going near earth fills or the vicinity of excavated gutters that are instable. Crumbling 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 or fatal accidents when travelling over snow covered ground or frozen roads for any reason.

- Snow covered ground and frozen roads can cause slips even when the inclination is slight, so decrease the speed when travelling and avoid starting, stopping, and swinging suddenly. Uphill and downhill are especially likely to cause slips and thus dangerous.
- The ground of a frozen road becomes soft when the air temperature rises and causes the Machine travel and other operations to be unstable. Be very careful.
- During cold weather, check that the load to be hoisted is not frozen or stuck to the ground or any other surface. Attempting to hoist without knowing the load is frozen or stuck to the ground or other surfaces is dangerous.
- Do not touch the metal surface with any part of your body, such as a finger or hand during cold weather.

Attempting to contact a metal surface of the Machine under harsh cold weather may cause the skin to stick to the metal surface.

- Remove snow and/or ice from the Machine that causes the safety nameplates to be hard to read. Be especially careful to remove ice or snow that is on the boom and may fall.

## CAUTIONS WHEN PARKING

- Park the machine on firm, level ground.
- Select a place where there is no hazard from falling rocks, landslides, or of flooding if the land is low.
- Set the Machine to the travelling posture shown in the right diagram.

- Fully lower and retract the boom.
- Fix the hook block to the containment position.

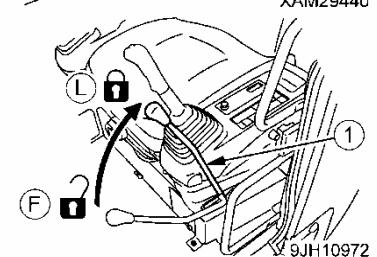
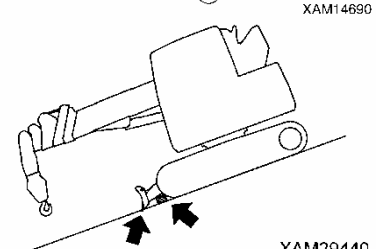
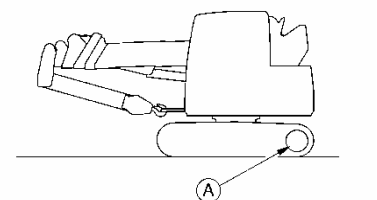
When parking for a short time, secure the hook block to the stowage position below the boom tip. For longer periods of parking, secure it to the regular stowage wire rope at the front of the upper structure.

- Where it is un-avoidable to park the machine on a slope, strictly observe the following:

- Fully lower and retract the boom
- Fix the hook block to the containment position.

When parking for short periods, secure the hook block to the stowage position below the boom tip. For longer periods of parking, secure it to the regular stowage wire rope at 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, strictly observe as follows:
  - Set lock lever (1) to LOCK position (L), and then stop the engine.
  - Always remove the key, take it with you, and leave it in the specified place.





## 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 over-unwinding stop alarm device activate properly.

### CAUTIONS WHEN HANDLING MOMENT LIMITER

- Use/store the moment limiter under the following ranges of ambient temperature.  
★Temperature of use: -10 to 50 °C Storage temperature: -30 to 70 °C
- Avoid direct sunlight so that the temperature of the atmosphere surrounding the moment limiter does not exceed the above range.
- Avoid locations with a strong acid or alkaline atmosphere as much as possible. Otherwise, unexpected failures may occur.
- Avoid impact to the moment limiter body, for instance colliding with an object.  
Doing so may damage the case and result in failures and improper operations.
- Avoid excessive pressure to the panel sheet of the moment limiter body or pushing with a sharp object such as the tip of a screwdriver. Doing so may damage the panel sheet and could result in failures and improper operations.
- Do not remove the case cover or panel sheet from, or disassemble the moment limiter body. Doing so may damage the case and/or panel sheet and could 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. Attempting to use without the correct display results in failure to obtain the correct measurement and may result in serious bodily accidents caused by reasons such as tipping over and/or breakage of the machine.
- Always make sure the fall mode setting of the moment limiter matches with the wire rope fall of the crane. Attempting to use unmatched wire rope falls may result in failure to obtain the correct measurement and could result in serious accidents caused for instance by a breakage of the wire rope.
- Do not change the setting when measuring with the moment limiter. Doing so could result in failure to obtain the correct measurement and may result in serious bodily accidents caused by reasons such as tipping over and/or breakage of the machine.

### PRECAUTIONS WHEN DECIDING THE CRANE OPERATION SITE

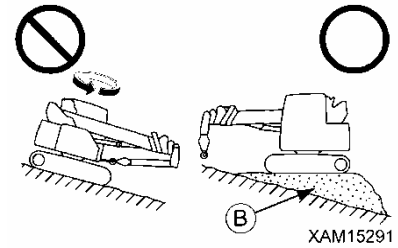
Always place the machine on the level and solid ground.

Crane operation is dangerous when the machine is placed in an area such 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 a pavement has been washed by water and become hollow.
- Soft ground which may collapse, is near a shoulder of a road or an excavated hole.
- Slopes

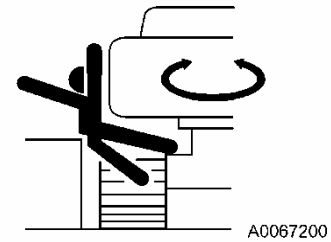
## PRECAUTIONS FOR CRANE OPERATION ON A SLOPE

Where a crane operation on a slope is un-avoidable, firstly fill some soil (B) to prepare a level and solid platform, 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 an 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 agree signals beforehand, and obey the work supervisor and his signals during work.
- When working at a location where any areas are out of sight of the driver, be especially careful to follow the instructions and signals 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 UNDER COLD WEATHER

- Remove snow from and unfreeze the swing gear, boom and winch related parts, and check the movements before work.
- Check the operation of winch brake.
- Warm up the machine. Attempting to operate the operation levers, pedals and switches without enough warm-up time causes the Machine to react dull, and may result in unexpected accidents.  
★ For details of warm up operation, see "Operation 3.3.1 Engine Warm Up".
- Accumulation of snow within the working range of the crane can cause the suspended load to overturn. Workers may also 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 hoisting of the load. Thoroughly remove the snow or unfreeze before crane operation.
- After ending 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 parts.  
If the infiltrated condensation and/or similar substance freeze, the Machine may operate improperly upon next being used and cause unexpected accidents.

## PAY ATTENTION TO WEATHER INFORMATION

- During a thunderstorm, risk of lightning exists, so abort working with the crane, immediately lower the load and contain the boom.
  - Exposing the hoisted load to wind causes the load to swing and the Machine to become unstable, this 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 will increase 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 affected by the wind. In addition, the wind speed may increase when it blows through a high-rise building. 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 tip 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 weather forecast is mean wind velocity (m/s) during 10 m at 10 m above the ground.

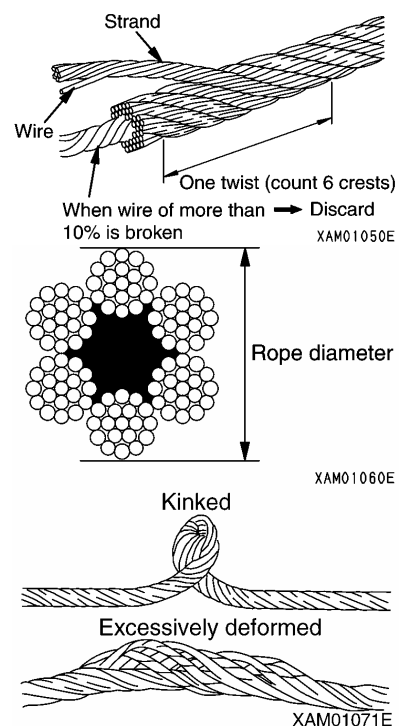
Force	Wind Speed (m/s)	Effect On Land
0	Less than 0.3	Smoke rises vertically.
1	0.3 - below 1.6	Wind motion visible in smoke.
2	1.6 - below 3.4	Wind felt on exposed skin.
3	3.4 - below 5.5	Leaves and smaller twigs in constant motion.
4	5.5 - below 8.0	Dust and loose paper raised. Small branches begin 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.

## CAUTIONS WHEN SLINGING

- Check the following before hoisting a load.  
Attempting to hoist the load without checking may result in serious bodily accidents by dropping of the load or tipping of the crane.
- Observe the values in the rated total load chart.
- Hoist from the centre 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 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 angles when hoisting the load increases the force on the sling rope even when the load weight is unchanged, and can cause the sling rope to snap. 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 lose 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 loads may cause the load to lose balance and is dangerous.  
In case of lengthy loads, hoist vertically by using a clamp, or achieve balance of the hoisted load by applying a rope to both ends of the load.

## 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 injury from wire splinters.
- 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.



## 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 when the moment limiter is in trouble or during the inspection or maintenance works.
- Pay attention to indication and warning on the moment limiter while working.
- Attempting 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.
- Operate the crane under slow and controlled movements.  
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 signals and follow them.
- 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 working area or stand below the load, since there is a risk of the load falling and contact with the load. Doing so 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 steelwork when hoisting a load.  
If caught by an obstacle, do not forcibly wind up the hoisted load, but untangle the caught part before winding up.
- Do not pull laterally, pull toward you or hoist diagonally. Doing so may cause the crane to tip or suffer damage.
- Do not attempt to work with the crane when the view is bad due to location or weather it is dangerous. Ensure brightness by posting a work lamp or other illumination facilities 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 the purpose, of raising a person using the crane hook, Unless in an approved cage, check local regulations before lifting personnel.
- If the over-winding detector alarm buzzer is heard, immediately remove your hand from the winch lever. The hook block winding will then stop. Then, operate the winch lever to Down (push forward) to wind down the hook block. Also note that the hook block is raised 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 raised 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, 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 hoisted, as time passes, 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 raise up when not in use.  
Otherwise, persons near the load may collide the hook block.
- Operator must not leave operation seat during operation.
- Any work that hoists an attachment that generates some vibration such as a VIBRO is forbidden. The vibration of the attachment may break the winch, etc.

## CAUTIONS HIGH TEMPERATURE OIL WHEN WORKING WITH CRANE

When the hydraulic oil temperature exceeds 80 degrees, high pressure hoses and seals can be damaged by heat. It may cause a burn from spouting oil.

If the 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 long periods of acceleration will raise oil temperature. Take care during these operations.

## CAUTIONS WHEN OPERATING WINCH

- Select the hook appropriate for the load weight and right number of wire rope falls.

★ For details, see "Operation 4. Handling Wire Cables".

- 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. Doing so may cause the crane to tip or suffer damage.
- Over-winding of the hook block may result in a collision with the boom, snapping the wire ropes and causing the hook block and load to fall, causing serious accidents. Be very careful to prevent over-winding the hook block.
- Be careful to prevent the wire rope and/or hoisted load from contacting any obstacle such as a tree or steelwork when hoisting a load.

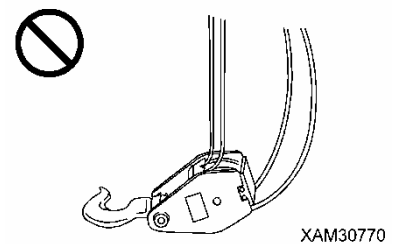
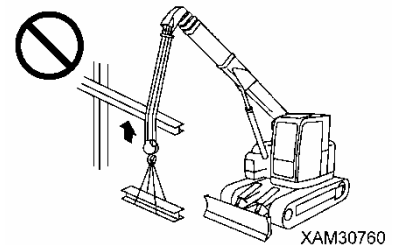
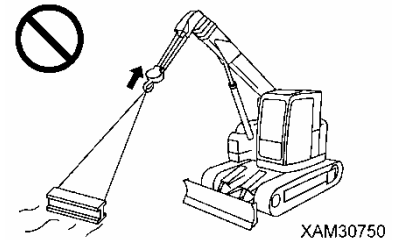
If caught by an obstacle, do not forcibly wind up the load, but untangle the caught part before winding up.

- Do not use the winch drum wire rope in a random way. Doing so will only damage the wire rope and shortens its working life, or the wire rope may snap and cause serious accidents.

Observe the following precautions to avoid wire rope from becoming random.

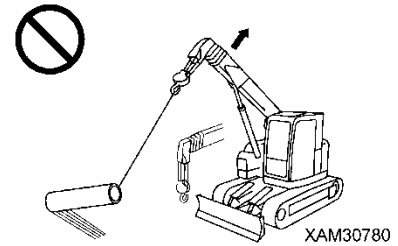
- Do not let the hook block hit the ground.
- Before leaving the hook block lowered for a long time, for instance when working below ground, leave at least three loops of wire rope in the winch drum.
- Release the accelerator pedal to decrease the engine speed, and slowly return the right working control lever to decelerate from high-speed hoisting. Returning the right working control lever quickly at high speed will result in a rapid deceleration shock to the hook, jerking the hook and leading to irregular winding.
- If the wire rope is twisted and causes the hook block to turn, fully eliminate the twist before work.

★ See "Operation 4.3 What to do with Twisted Winch Wire Rope" for details.



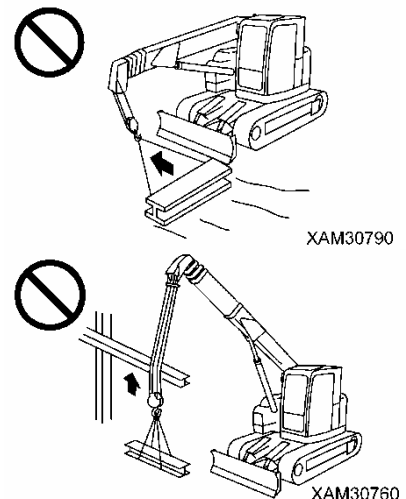
## CAUTIONS WHEN OPERATING BOOM

- 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 a large impact to the Machine, and thus may damage the crane or tip 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 the load in 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 extended 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.
  - Attempting to pull the load in or stand the load up by swinging operation is 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 steelwork when hoisting a load or when swinging.
- If caught by an obstacle, do not forcibly wind up the 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 the machine to tip due to uneven centre of gravity, resulting in dropping 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 cranes of the same model.
  - Choose the Machine model that can handle sufficiently larger loads than the load to be hoisted.
  - Make sure only one person gives signals.
  - Limit the crane operations to single operations as the rule, and do not attempt any swing operation.
  - Appoint one experienced slinger who will take overall responsibility.

## WORKING AT A SITE WITH BELOW GROUND LIFTING

- Leave at least three loops of wire rope in the winch drum when winding down the wire rope in the case of underground work or similar. 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 PRECAUTIONS FOR PICK & CARRY OPERATION

Pick and carry operation can be very unstable and dangerous.

Where such an operation is un-avoidable, strictly observe the following. Failure to observe precautions may result in death or serious injury.

- Observe the precautions specified in the operation manual:
  - ★Refer to "Operation 3.21.1 Safety Precautions for Pick and Carry Operation".
- Always keep the correct posture as specified in the operation manual:
  - ★Refer to "Operation 3.21.2 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 travelling.
- Remove all the obstacles in the pick and carry path and keep out all 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 keep the travel speed slow. Avoid operations such as sudden start and stop or using travel speed pedal.
- 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.



### 3. TRANSPORT PRECAUTIONS

#### CAUTIONS DURING TRANSPORT

When transporting the machine on a trailer, do as follows.

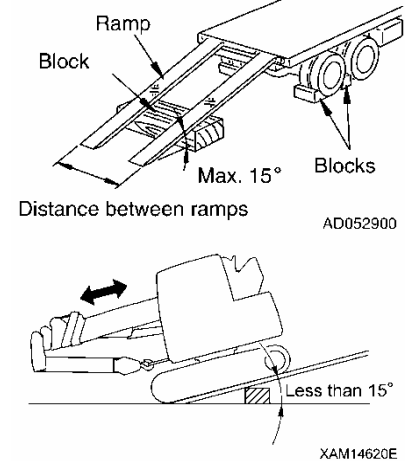
- The weight, transportation height, and overall length of the machine differ according to the crane.
- When passing over bridges or structure on private land, check first that the structure is strong enough to support the weight of the machine.
- When travelling on public roads, check first with the 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 at 15 degrees or less. In addition, decide on the distance between ramps to meet the centre of the tracks.
- Use ramps that have the width, length and thickness, and that enable safe loading/unloading. Reinforce with blocks or other materials if the ramps deflect much.
- Remove mud and other substances from the footing to prevent the Machine from skidding over the ramps. Remove any substances stuck to the ramps such as grease, oil or ice, and keep clean. Be especially careful during rainy days where slips easily occur.
- When loading or unloading the machine, always keep it in a travelling posture and fix the hook block by the stowage wire rope.  
★ See "Operation 3.6 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 travel.
- 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 centre 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 travelling posture and operate slowly, as the base is unstable.
- After loading the machine, apply wood blocks so that the machine does not move, and securely fix with wire ropes or other means.  
★ See "Operation 5. Transportation" for details.  
★ See "Operation 5.1 Loading/Unloading" for details.

#### CORRECT

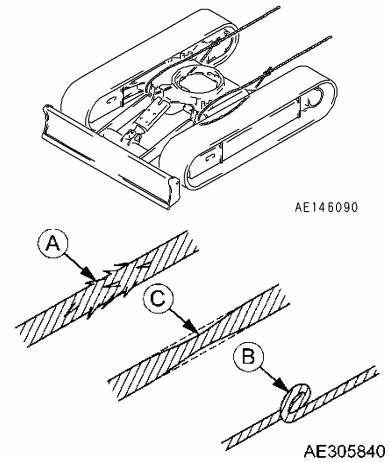


## 4. TOWING PRECAUTIONS

### 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 8.3 How to tow the machine”.
- 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.



## 5. MAINTENANCE PRECAUTIONS

### 5.1 PRECAUTIONS BEFORE MAINTENANCE

#### FAILURE REPORT

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

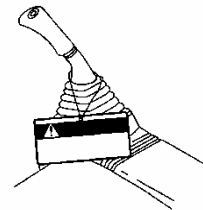
#### PRECAUTIONS FOR WARNING TAG

- 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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**⚠ 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

#### 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 safely.  
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 landslides, or flooding if the land is low.

#### PERSONNEL

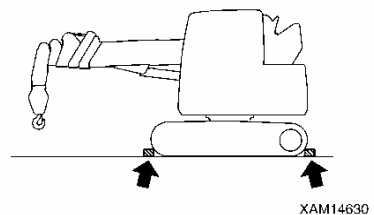
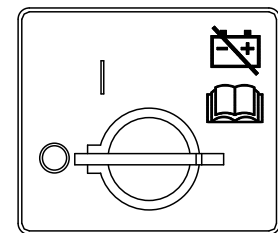
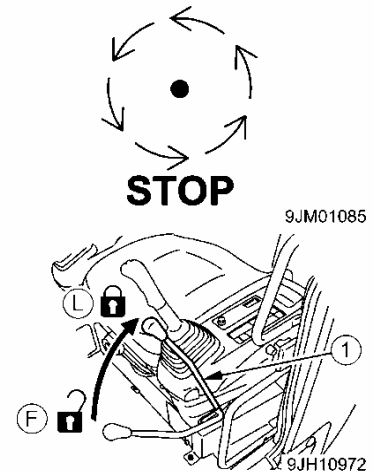
Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area. If necessary, employ an observer.

#### 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.

## STOP ENGINE BEFORE CARRYING OUT MAINTENANCE

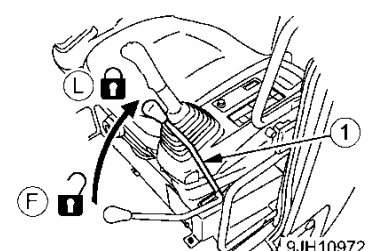
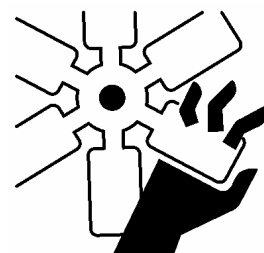
- Stop the machine on firm, level ground. Store the crane, and then stop the engine.
- Turn the starter switch to the ON position. Operate the work equipment control lever back and forth. Left and right at the full stroke 2 to 3 times to eliminate the remaining internal pressure in the hydraulic circuit, 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 "O" position to cut the power line, to prevent the engine from un-expected starting during maintenance.
- Put blocks under the track to prevent the machine from moving.



## 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 workers 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 to 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.



## USE APPROPRIATE TOOLS

Use only tools suited to the task and be sure to use tools correctly. Using damaged, low quality, faulty, makeshift tools or 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 AND CRANE

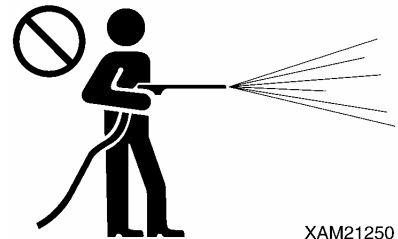
- Hoists or jacks used to lift the machine up must be capable to carry on the weight of the component and be in good condition. In addition, avoid using a hydraulic jack to lift up the damaged, bent or twisted part of the machine. Also, the wire rope for hoisting should be without any wire breakage, decreasing in the diameter and/or kink. Avoid using bent or damaged hooks.
- If it is 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 under small loads.



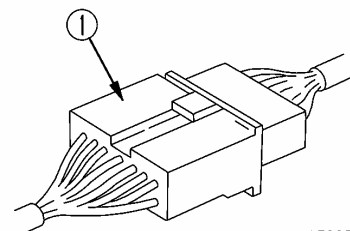
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## CLEAN BEFORE INSPECTION OR MAINTAIN

- Before starting an inspection or maintenance, clean the Machine and prevent rubbish from entering the Machine and make sure that safety will be ensured during maintenance.
- Attempting to inspect or maintain the machine whilst still dirty not only lessens the chance of locating a faulty part, but may cause rubbish or mud to enter your eye, also slipping and tripping resulting in injury.
- Always observe the 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 wash. Avoid 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, ML display, monitor panel and related). Entrance of water into the electrical system causes faulty operations and may trigger improper operations, thus is dangerous.
  - Do not directly spray water onto bottom side of operator's seat.



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## 5.2 PRECAUTIONS DURING MAINTENANCE

### CAUTIONS DURING WELDING REPAIR

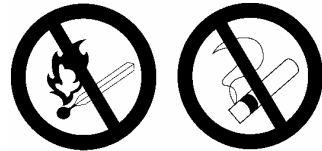
Welding operation must always be carried out by a qualified welder and in a place equipped with proper equipment. There is a hazard of gas, fire, or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

### BATTERY HANDLING CAUTIONS

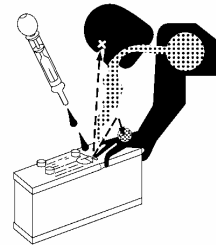
To check or handle the battery, turn the starter switch to the OFF (cut) position to cut the power line, to prevent the engine from un-expected starting during maintenance.

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 battery fluid has 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 acts may cause the battery to catch fire.
- Before charging or starting up using another power source, defreeze the battery fluid and check that failures such as battery fluid leaks do not exist.
- Always detach the battery from the Machine frame before charging the battery.



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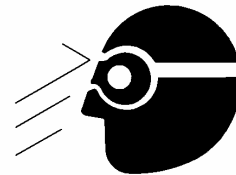
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### BEWARE OF CHIPS WHEN WORKING WITH HAMMER

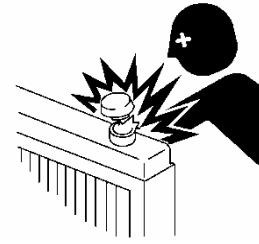
Whilst working with a hammer, keep protective equipment such as protective glasses and a helmet on, and insert a copper bar or similar object between the hammer and the target when hitting. Giving impact to a hard metal part such as a pin or a bearing may cause the broken chip to enter an eye and inflict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



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## CAUTIONS WHEN COOLANT TEMPERATURE IS HIGH

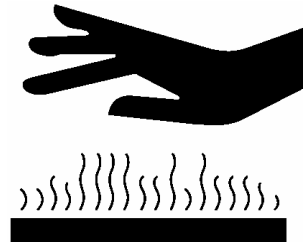
To prevent burns from hot water or steam spurting out when checking or draining the coolant, wait for the water to cool to a temperature where it is possible to touch the radiator cap by hand before starting the operation. Even when the coolant has cooled down, loosen the cap slowly to relieve the pressure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



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## 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.



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## 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".

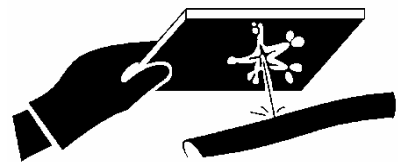
- If there is any leakage from the piping or hoses, the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.

When carrying out an 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.



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## 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.

## SAFETY HANDLING HIGH-PRESSURE HOSES

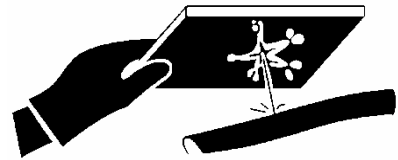
If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to serious injury. If any loose bolts are found, stop work and tighten to the specified torque. If any damaged hoses are found, stop operations immediately and contact us or our sales service agency.

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.

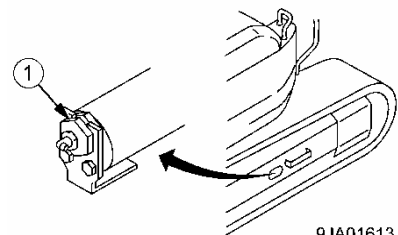
If the noise from the machine is too loud, it may cause temporary or permanent hearing problems.

## 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 disassembled by mistake, the spring will fly out and cause serious injury. When it becomes necessary to disassemble it, ask us or our agent.



### 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.

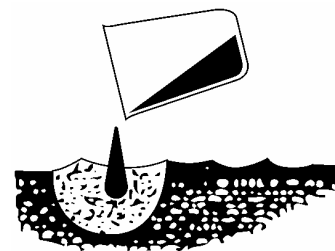
### CAUTION FOR AIR CONDITIONER MAINTENANCE

- If air conditioner refrigerant gets into your eyes, it 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.



### HOW TO CHOOSE A WIND WASHER LIQUID

Use wind washer liquid in ethyl alcohol kind.

Do not use washer liquid in methyl alcohol kind since it may cause to damage your eyes.

### PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- For using the machine safely 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.