

Operation Manual



LC785-6

CRAWLER CRANE

Applicable to No.31001 and later

WARNING

Improper use of this machine can lead to serious accidents.

The operators and maintenance personnel must carefully read this manual and sufficiently understand its contents before operating / inspecting / maintaining the machine.

Keep this manual to hand at all times.

M A E D A

Introduction

Introduction

This manual describes the procedures of proper operation, inspection and maintenance of the machine and the items you have to observe for safety. Many accidents are caused by operation, inspection or maintenance of the machine that does not observe basic precautions. Being aware of the dangers to be expected in advance can also prevent accidents.

WARNING

Operators and maintenance personnel must observe the following before operating, inspecting or maintaining the machine.

- **Read this manual carefully and thoroughly understand its contents.**
- **Sufficiently understand the cautions given in this manual and the meanings of safety signs.**

Keep this manual in the instruction manual holder shown below so that those involved can consult it at any time.

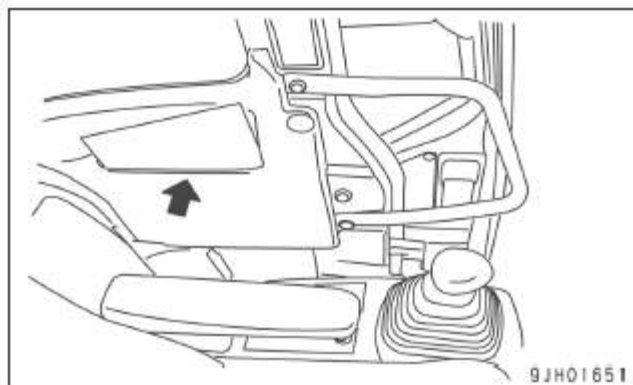
Should you lose or damage this manual, contact our sales service agency immediately and purchase a new manual.

When you transfer this machine, be sure to transfer this manual together with the machine.

This machine is designed and manufactured in compliance with the safety regulations and standards in Japan and safety regulations and standards may differ overseas. Should you use this machine outside Japan, please contact our sales service agency beforehand.

This manual expresses measurement units in the International System (SI) of units. For your reference, we have given the gravitational system of units previously used in {}.

The storage location for the instruction manual is the magazine box on the left, inside the cab.



For Safe Use of Machine

For the safe use of the machine, we use the safety signs that appear in this manual and on the machine to indicate the dangers to be expected and how to avoid them.

Warning signs

The following warning signs notify users of a danger that can lead to injuries.

This machine and this manual use the warning signs shown below according to the severity of the danger to be expected.



Indicates imminent danger that will cause death or serious injury.




Indicates potential danger that can cause death or serious injury.



Indicates potential danger that may cause minor or moderate injury or serious damage to the machine.

Example of safety-related message using a warning sign


Ensure that the safety lock lever is in the lock position before standing up from the cab seat. Accidental contact with an unlocked operation lever can lead to serious injuries.

Other warning signs

Besides the warning signal words given above, the following indications are used to show what must be observed and what will be helpful for the proper functioning of the machine.

IMPORTANT

Indicates that improper handling can damage the machine or shorten the life of the machine.

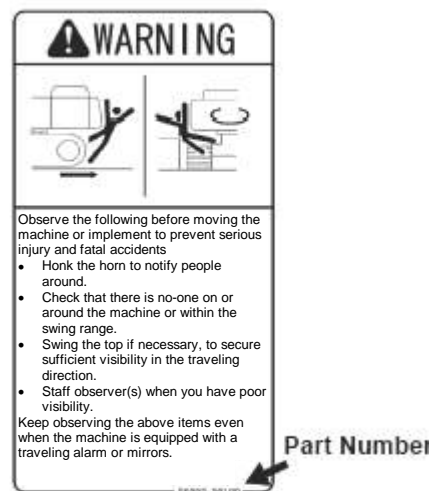
SUPPLEMENTAL

Gives you helpful information.

• Safety signs

To notify the persons involved of the existence of hazards accompanying operation and inspection/maintenance, safety signs are positioned at various locations of the machine. On this machine, safety signs comprise “safety signs by words” and “safety signs by pictograms”.

Example of a safety sign by words



Example of a safety sign by pictograms

Safety signs by pictograms indicate danger that requires signal words. These safety signs employ pictograms to allow operators and maintenance personnel to instantly understand the existence and the nature of a danger. Safety signs by pictograms show the nature of a danger at the top or on the left and how to avoid a danger at the bottom or on the right. The nature of the danger is indicated in the triangle.



We cannot foresee every circumstance in which you will use this machine and thus, the cautions given in this manual and on this machine do not necessarily cover every safety-related issue.

Therefore, it is your own responsibility to consider and take necessary the safety actions when performing operation or inspection/maintenance in a situation that is not described in this manual. However, even in those cases, never attempt the works and operations this manual prohibits you from doing.

The descriptions, numerical values and drawings given in this manual are based on the information we have at the time of writing this manual. The contents of this manual and the specification of this machine may partially differ due to constant improvement of the machine.

Please contact our sales service agency for any question or comment.

The circled numbers in the drawings are given in parentheses in the text. (Ex: ①→(1))

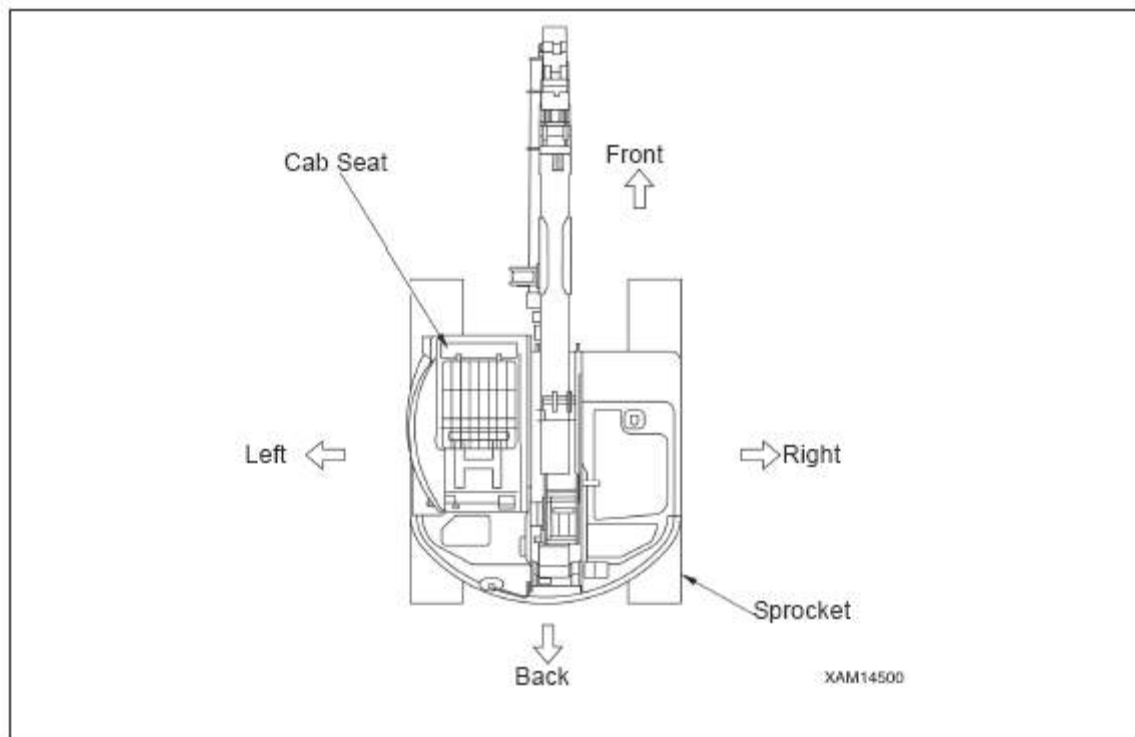
Machine Overview

Specified operations

Use this product mainly in the following operations:

- Crane operation
- Traveling with a suspended load

Machine's front, back, left and right



This manual determines the front, back, left, and right of the machine, assuming that we see the traveling direction (front) of the machine from the cab seat and the sprockets are positioned in the back.

Qualification for Operation

Qualification

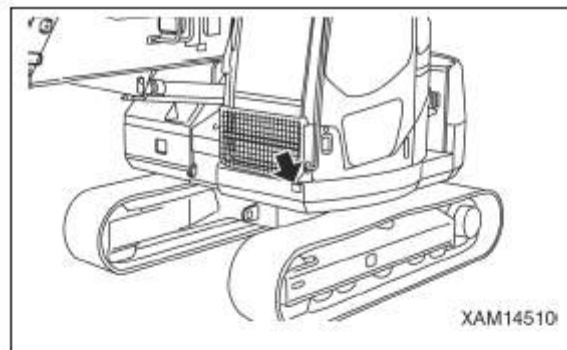
The personnel who operate and work with this machine should obey the crane operation license and related legal regulations applicable to the place of use.

Notes about Machine

Please give the following information to our sales service agency when asking for servicing or ordering parts.

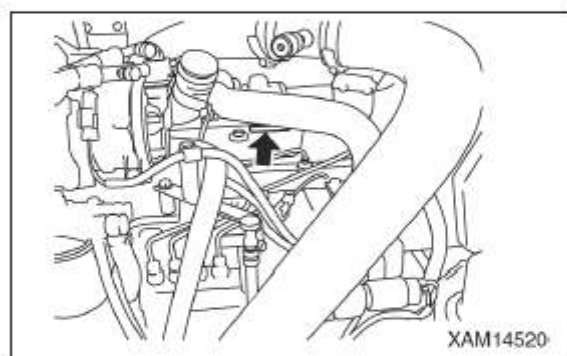
Machine serial number nameplate location

The nameplate is provided on the cab front.



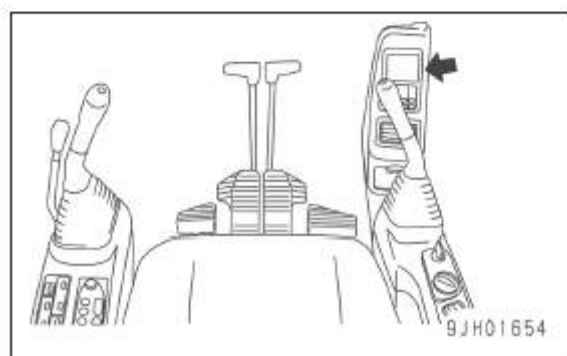
Engine serial number nameplate location

The nameplate is provided on the head cover.



Service meter location

The service meter is provided on the machine monitor.



Information on the serial number and your sales service agency

Machine Serial Number	
Engine Serial Number	
Agency Name	
Address	
Telephone	
Service Person in Charge	

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Safety

WARNING

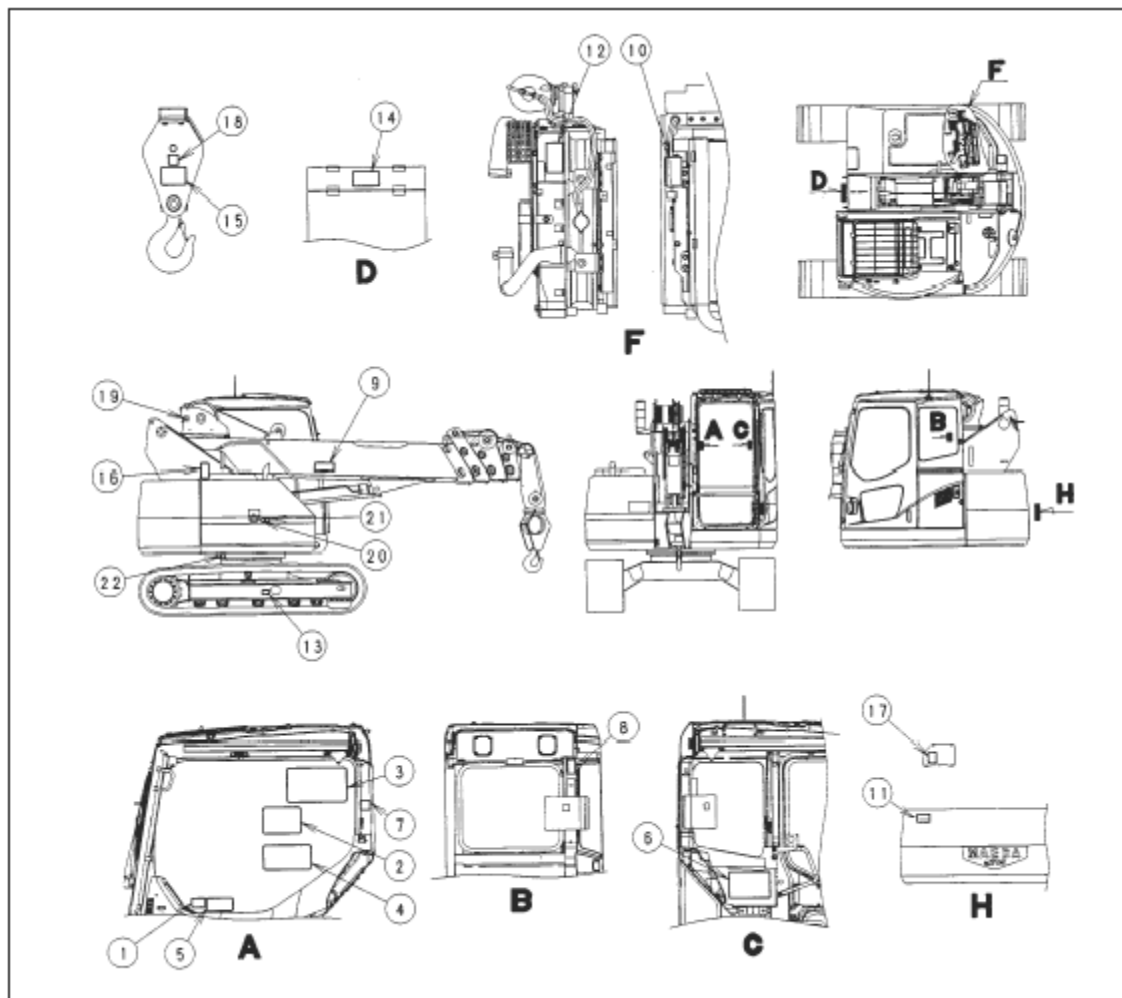
Be familiar with the safety precautions given in this manual and on the machine. Observe these cautions when operating, inspecting or maintaining the machine.

Safety Signs

The safety signs used on this machine are described below.

- Be sufficiently aware of the precise locations of the safety signs, the danger indicated on the signs and how to avoid the danger.
- Keep the safety signs clean so that the contents are visible and legible. Do not use organic solvent or gasoline when cleaning the safety signs, as they may peel.
- If a safety sign gets damaged, becomes illegible or is lost, replace the sign with a new one. Check the part number of the safety sign in this manual or with the actual sign and order new signs from our sales service agency.
- There are labels other than the safety signs on this machine. Handle these labels in the same way as the safety signs.

Position for attaching safety labels



A rectangular warning label with a black border. At the top left is a black triangle containing a white exclamation mark. To its right, the word "CAUTION" is written in large, bold, black capital letters. Below this, a paragraph of text in black font reads: "Turning the emergency switch clockwise and holding it there allows you to disengage the auto-stop function by the moment limiter. However, do not use it except in emergencies." At the bottom right corner, the number "552.4266400" is printed in a small font.

FOR YOUR SAFE OPERATION

Be sure to operate your crane after reading instruction Manual.

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

CAUTION (Operator)

1. Definitely never compromise operation of a crane. Accidents, if it is due to negligence.
2. Do not extend boom with load suspended.
3. Carry out swing operation gradually, avoiding load to sway.
4. Paying loads that obstruct vision is in principle prohibited.
5. Instruments that provide reliability can cause damage to the safety or other components of the machinery.

CAUTION (Work on slope)

1. Working on slope is prohibited. If inevitable, limit the load to 50% of rated load. Never work on slope that is in excess of 3%. Drive may slip over.
2. Working from slopes to lower position or place will be unstable with the load lowered out. Increase boom angle to reduce working radius and lower the swing speed.
3. Never perform travel suspension on slope.

CAUTION (Traveling on slope)

1. When traveling on slope, travel backward as up-hill and forward as down-hill.
2. When traveling in forward or in lateral position inevitably, be sure inclination is not in excess of 10 degrees.

3. Never perform traveling backward on slope as it may cause crane to fly over.

CAUTION (Travel suspension)

1. Travel suspension is in principle prohibited as it is extremely unstable and hazardous. If inevitable, perform your work in accordance with Rated Load for Travel Suspension.
2. Travel suspension is dangerous because load is likely to swing. Travel speed should be less than 1/10 with engine running at low speed.
3. Avoid jolt, start, stop and spin turn.
4. While in travel suspension, do not perform any crane function other than travel.
5. Swing travel on slope is dangerous as it may cause the crane to tip over.

CAUTION (Load storage prior to traveling)

1. Always lower the boom and slow the hook prior to travel. When closing the hook, lower the appropriate ladder. Never attempt to travel with the hook closed and the boom rigid.

CAUTION (Loading to and unloading from truck)

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

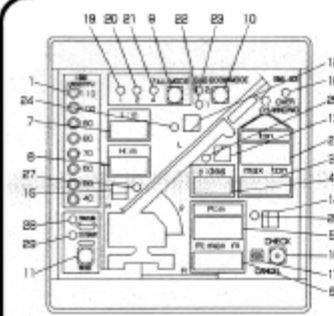
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(4) Precautions for moment limiter operation (553-2102200)

MOMENT LIMITER OPERATION



1. Load ratio display
2. Actual load display
3. Rated overall load display
4. Boom angle display
5. Actual working radius display
6. Rated working radius display
7. Boom length display
8. Lifting height display

9. Hook load number selector button
10. Sub boom select button
11. Station/travel mode select button
12. Boom angle upper limit setting button
13. Boom angle lower limit setting button
14. Working Radius upper limit setting button
15. Lift above ground level upper limit setting button
16. Set up confirm button
17. Set up cancel button
18. Overwind detect display LED (red)
19. Hook 1-load display LED (green)
20. Hook 2-load display LED (green)
21. Hook 4-load display LED (green)
22. Sub boom 1 select display LED (orange)
23. Sub boom 2 select display LED (orange)
24. Boom angle upper limit display LED (green)
25. Boom angle lower limit display LED (green)
26. Working radius upper limit display LED (green)
27. Lift above ground level upper limit display LED (green)
28. Travel mode select display LED (red)
29. Static mode select display LED (orange)

Configuration and how to use its function
 Moment limiter is a safety system installed for preventing accidents such as damage to or tipping over of the crane due to over-loading. For safer operation of your crane, be sure to fully utilize this system.

- In addition to showing the lifting load and ratio of rated total load, It causes a pre-warning (Intermittent sound) to go off at 90% of rated total load, warning (continuous sound) to go off at 100% causing actions of boom lowering, boom extending and hook hoisting to automatically stop, while safe actions such as boom hoisting and boom retracting and hook lowering continue to function.
- Detects lifting load by means of pressure transmitter. Reads out the rated total load with the signal of the boom angle and length. Compares lifting load and rated total load for pre-warning, warning and stopping.

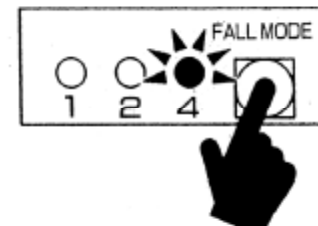
CAUTION

- Swing mechanism does not stop automatically even when overloaded. Be careful.
- Before starting operation of your crane, make sure you conduct a start up check.
- Set the moment limiter so that LED's on it go on at proper working conditions.
- Pay attention to the moment limiter display to avoid over-loading the crane at any time.
- If any unsafe operation (boom extend, boom lower or hook hoisting) automatically comes to a stop, reset to a safe operation (boom retract, boom hoist or hook lowering).
- For lifting a load off the ground, first hoist the hook until the load leaves the ground and stop it momentarily to check for safety. Never lift your load off the ground by hoisting the boom.
- While in travel suspension mode, if the boom is extended to 4 or 5 stages, extension, lowering or hoisting functions will stop and E07 will be displayed. But this is not abnormal. In travel suspension mode, use of the 4 or 5 stage boom is prohibited. Be sure to work with 3 or fewer stages.

553-2102200

(5) Precautions for changing the number of wire falls (553-3181800)

Set the number of part reeving selector switch properly.



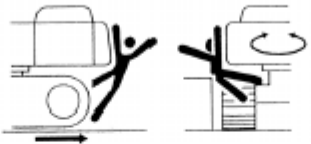

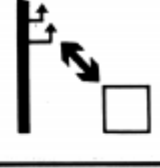




FALL MODE /
 Location of selector switch:
 Moment limiter display

Before starting your work, be sure to check the number of part reeving and set the selector at 4 for 4 part reeving and 2 for 2 part reeving.

If the number of part reeving and its selector switch does not coincide, the moment limiter will not work properly. It may result in a serious accident including the dropping or damaging of the load, or the machine tipping over.

553-3181800

(6) Cautions for operation, inspection, and maintenance (556-3368300)

<p>⚠ CAUTION</p> <p>When opening, closing, removing or replacing the windows, in order to avoid accidents caused by inadvertent movement of the controls, before leaving the operator's seat ALWAYS</p> <ul style="list-style-type: none"> • ground any load • move the safety lock (to the left of the operator's seat) to the LOCK position. If the machine suddenly starts moving or acts in any unexpected way, serious injury or death may result. 	<p>⚠ WARNING</p>  <p>To prevent SERIOUS INJURY or DEATH before moving the machine ALWAYS</p> <ul style="list-style-type: none"> • sound the horn to alert anybody nearby • ensure nobody is on or near the machine, or in the swing area • safety permitting, position the cab to maximize the view of the path of travel • if your view is obstructed, obtain assistance 	     
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556-3368300

(7) Precautions when window goes out (553-4266900)

⚠ CAUTION

For the operator's safety whenever the window goes out of place or is damaged, correct it immediately rather than continuing the work.

553-4266900

(8) Precautions for storing the front window (09803-A0481)

The stored front window might slide down and cause injury.

Check the lock at the storage position.

(9) Indication of maximum operating radius and rated load (556-3368500)



(10) Precautions for high-temperature cooling water and hydraulic oil (553-4268500)



Never remove the cap when the engine is at operating (high) temperatures. Steam or high temperature oil blowing up from the radiator or hydraulic tank, will cause personal injury and/or burns.

Never remove the radiator cap or hydraulic tank oil filler when cooling water or hydraulic oil is at high temperatures.

(11) Prohibited to enter the range of swing (553-2102400)



Your body can get Do not enter the turning revolving superstructure when the machine turns.

(12) Caution when opening or closing the cover (553-4268600)



There exists the hazard of being caught in the rotating parts of the machine causing injury.

Stop the rotating parts of the machine completely when carrying out inspection and maintenance.

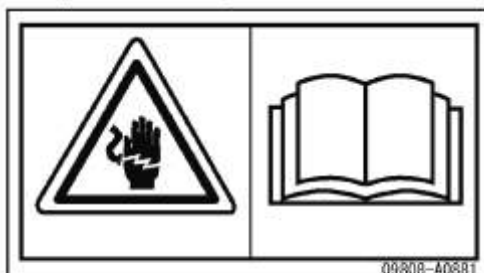
(13) Caution when checking and adjusting the track tension (553-4268700)



If a plug comes out of the track shoe tension adjustment device it will cause injury.

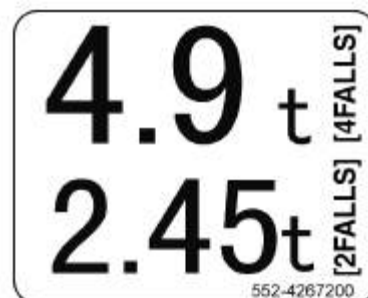
Read the operation and maintenance manual and carrying out the correct method when loosening the track tension.

**(14) Caution when handling cables
(09808-A0881)**

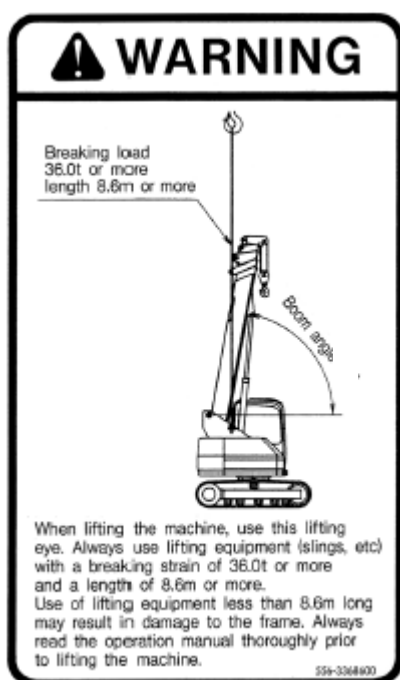


Electrical shock hazard is present during cable handling. Read the instruction manual for correct handling.

**(15) Load indication (With
four/two wire falls)
(553-4267200)**



**(16) Precautions for hoisting a vehicle
(556-3368600)**



**(17) Warnings for high temperature
hydraulic oil (203-00-61260)**



**(18) Precautions for rotating parts
(553-4267400)**



There exists the hazard of being caught in the rotating parts as the wire sheave causes injury.

**(19) Precautions for rotating parts
(553-4267500)**



There exists the hazard of being caught in the rotating parts as the winch drum causes injury.

**(20) Precautions for trapping
(553-4267600)**



There exists the hazard of trapping a hand in the bonnet.

**(21) Precaution for burns
(553-4267700)**



There are high temperature parts in the bonnet. These can

(22) Caution (553-4268000)



When entering under machine, (grease up) pull out the starter key.

Basic Precautions

Observing rules

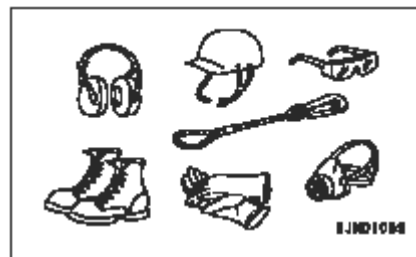
- Only those suitably trained and qualified can operate this machine.
- Observe all the safety precautions and procedures given in this manual when operating, inspecting or maintaining the machine.
- Do not operate the machine if you are in bad physical shape, after taking medicine (that makes you drowsy) or consuming alcohol or if you are mentally unstable.
- When you are working together with someone or use someone to guide you, thoroughly discuss the work details and work with specified signals.

If you notice any abnormality

If you notice any abnormality of the machine (such as noise, vibration, smell, meter deviation, smoke, oil leakage or an error displayed on the warning devices or monitors), report this immediately to your supervisor for appropriate actions. Do not operate the machine until the abnormality is cleared.

Proper clothing and wearing protective equipment

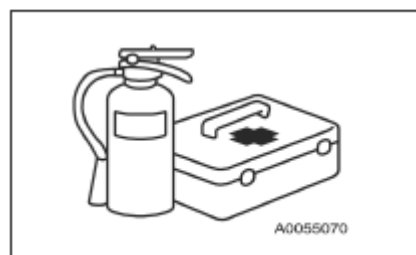
- Loose clothing and accessories may get stuck in the operation lever or protruding sections. Do not wear such clothing and accessories.
- Long hair that protrudes from a helmet may get entangled in the machine. Tie back your hair to prevent this.
- Always wear a helmet and safety shoes. Depending on the work you are carrying out, you also need to wear goggles, mask, gloves, ear protection devices and safety belt.
- Check the function of the protective equipment before use.



Equipping fire extinguisher and first aid kit

To be prepared for unexpected fire and serious injuries, observe the following:

- To be prepared for fire, check the location where the fire extinguisher is located and know how to use it.
- Regularly inspect and maintain the fire extinguisher. Determine where to store the first aid kit. Inspect the kit regularly and replenish the contents.

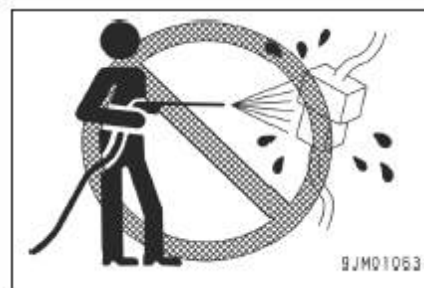


Cautions on safety-related devices

- Check that all protective guards, covers and mirrors are installed properly. If you find them damaged, repair them immediately.
- Be familiar with how to use the safety-related devices.
- Never remove safety-related devices. Maintain the safety-related devices for continuous, proper operation.

Keep the machine clean

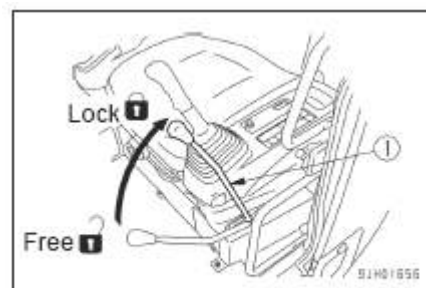
- Water getting into the electrical system will cause problems, leading to malfunctions. Do not clean the electrical system (sensors and connectors) with water or steam.
- When the machine gets dirty with earth, sand or oil, you may slip or fall or some dirt may get into your eyes when getting on/off, inspecting or maintaining the machine. Always keep the machine clean.

**Cautions for inside cab**

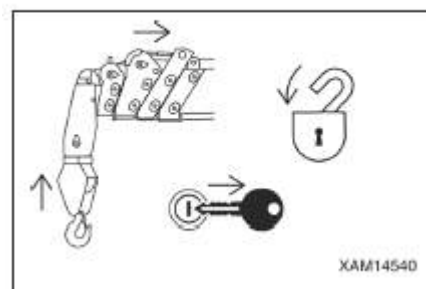
- Clean dirt and oil from the soles of shoes before entering the cab. Operating pedals etc. with dirty or oily soles will cause slipping, resulting in an accident.
- Do not leave any parts and tools around the cab.
- Do not place suction cups on windows. Suction cups may function as lenses and cause fires.
- Do not use cellular phones in the cab while driving/working.
- Do not bring any dangerous goods such as inflammable materials or explosives into the cab.

Cautions before standing up and leaving the cab seat

- Always put down the implement on the ground, place the safety lock lever (1) in the lock position and stop the engine when standing up from the cab seat to open/close the front window or skylight, installing/removing the bottom window or adjusting the cab seat. Accidental contact with an operation lever can cause sudden movement of the machine that can lead to serious injuries.



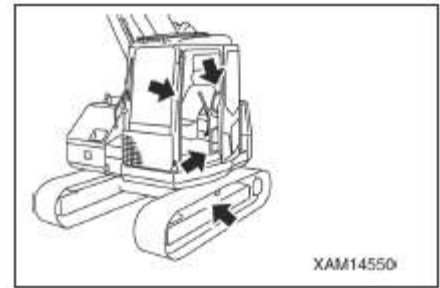
- Stow the implement, move the safety lock lever (1) to the lock position and stop the engine before leaving the machine. Turn off all the keys in locks. Be sure to remove and store the keys at specified locations.



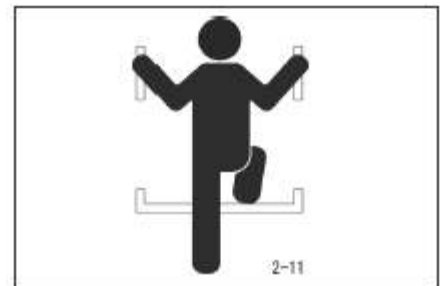
Use rails and steps for getting on/off the machine

To prevent slips and falls leading to injuries, strictly observe the following:

- Use the rails and steps shown with arrows in the figure on the right to help you get on/off the machine.



- Always face the machine when getting on/off it. Using rails and steps, keep at least three of your limbs (two legs and one hand, or one leg and two hands) on the rails and steps (including crawler) to ensure that your body is supported.
- Do not grab an operation lever or safety lock lever for to get on/off the machine.
- Never get on the engine hood and cover where there is no antislip.
- Inspect the rails and steps (including crawler) before getting on/off the machine. If you find any oil and dirt, wipe them off to prevent slipping. Repair any damage and tighten the loosened bolts.
- Do not get on/off the machine with a tool in your hand.

**Do not jump on/off the machine**

- Do not jump on/off the machine. Do not get on/off the machine when in operation.
- Even if the machine starts moving while there is no one on the cab seat, do not attempt to jump into the machine to stop it.

Trapping hazard (risk of being squashed)

The clearance area around the crane changes according to the pivot point(s). Being trapped in the clearance area will result in serious injury. Keep people away from any rotating and extending/retracting sections.

Prevention of burns

Hot cooling water

- To prevent burns caused by blowout of hot water or steam, check that the radiator cap is sufficiently cool for handling with bare hands before inspecting/draining the cooling water. Then slowly loosen the cap and release the internal pressure of the radiator before removing the cap.



Hot oil

- To prevent burns caused by blowout of hot oil or by contact with hot parts, check that the cap and plug are sufficiently cool for handling with bare hands before inspecting/draining the oil. Then slowly loosen the cap and plug and release the internal pressure before removing the cap and plug.



Prevention of fire

• Fire caused by fuel and oil

If fire is close to fuel, oil, antifreeze or window washer fluid, it can catch fire. Strictly observe the following:

- Do not smoke or use fire nearby.
- Shut off the engine before refueling.
- Do not leave your position while refueling or refilling the oil.
- Securely tighten all fuel and oil caps.
- Do not spill fuel on the overheated surface or electrical system components.
- Store fuel and oil in well-ventilated areas.
- Store fuel and oil at specified locations to keep away people other than those involved.
- Wipe off spilled fuel and oil after refilling.
- Move inflammable materials to safe locations before grinding or welding on the machine.
- Use non-flammable wash oil for parts, not flammable oils such as gas oil and gasoline.
- Keep cloths with oil or other combustible materials in a safe container and store them at safe location.
- Do not weld or gas-cut pipes or tubes that may contain combustible solutions.



- **Fire caused by accumulation and adhesion of inflammable materials**

Should you find an accumulation or adhesion of dead leaves, chips, paper or coal dust near an engine exhaust manifold, muffler, battery or cover, remove them.

- **Fire from electrical wires**

Short circuit in the electrical system can cause a fire.

- Keep all the connections of electrical wires clean and secure them properly.

- Inspect wires daily for slack and damage. Re-tighten loose connectors and wire clamps and repair and replace damaged wires.

- **Fires from piping**

Check that the clamps, guards and cushions of hoses and tubes are secured properly. Loosened clamps, guards or cushions will result in vibration of hoses/tubes during operation, leading to friction of hoses/tubes with other components and damage to hoses/tubes. Damaged hoses/tubes can result in blowout of high-pressure oil, leading to fire or injuries.

- **Explosion with lighting equipment**

- Use explosion-proof lighting equipment when inspecting fuel, oil, battery or windscreen washer fluid or cooling water. Not using explosion-proof lighting equipment can cause a fire, leading to serious injuries caused by explosions.
- Follow the instructions given in this manual to remove the power supply for the lighting equipment from the main unit of the machine.

In case of fire

In case of fire, get out of the machine in the following way:

- Turn the starter switch to OFF position and stop the engine.
- Use rails and steps to exit from the machine.

For window washing, use an ethanol-type washer fluid.

Do not use a methanol-type washer fluid as this can hurt your eyes.

Protection against falling objects, flying objects and intruding objects

- Provide necessary equipment according to the working conditions to protect workers from falling, flying or intruding objects that might enter the cab.
- Install a front guard and affix laminated sheet to the windshield when working at the site of demolition or breaker work.
- Install a protective structure against falling objects and a front guard and laminated sheet to the windshield when working where rocks may fall or be projected such as mines and stone-crushing sites.
- Always operate the machine with the windshield closed in the above situations. Check that there is no one other than the operator in the range where falling objects or objects might reach.
- The above situations assume standard works. Additional guards may need to be installed according to the work situation on site. Be sure to contact our sales service agency beforehand.



Cautions with cab glass

- If the cab glass on the implement side is damaged, the implement may directly contact with the body of the operator.

Stop the work immediately and replace the glass.

- The skylight using organic glass (polycarbonate) becomes fragile when damaged and can therefore lose its protective feature. Should you find scratches or cracks from fallen rocks or similar, replace the skylight with a new one.

Do not modify the machine

Modifications may result in safety problems. Please consult our sales service agency before making any modifications.

- We assume no responsibility for injuries, failures and physical damage caused by modifications made without our consent.

Safety at working site

Check the working site for any danger before starting work.

- Note that working near a thatched roof, dead leaves or dead grass can cause fires. Exercise caution when working in such conditions.
- Check the stratum and soil of the working site to determine safe working methods. Do not work where mudslides or rock falls may take place.
- Take necessary measures to prohibit people other than those involved from approaching the working site. Especially, work on streets requires guides or the installation of fences to ensure the safety of passing vehicles and pedestrians.
- Check the ground, terrain condition, depth and flow rate in advance when driving/working in shallow waters or on soft foundations.

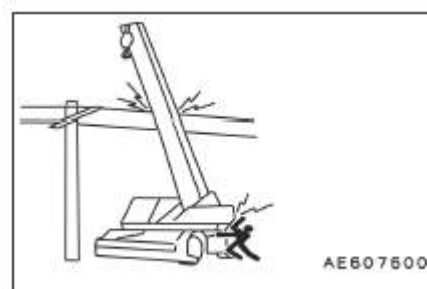
Cautions against falling on unstable ground

- Ground may have been softened near cliffs, shoulders and deep ditches. Do not drive or work in these locations. The weight and vibration of the machine may cause the ground to give way, causing the machine to fall or overturn. Take extreme care after rain, blasting or earthquakes. The ground is more likely to give way in such conditions.
- The ground may give way with the weight and vibration of the machine on earth fill or near excavated holes. Take necessary measures to make the ground safe before working to prevent the machine from falling and turning over.

Pay attention to electrical wires

Do not drive or work near electrical wires as this can cause serious injuries. Strictly observe the following at sites where the machine may come into contact with electrical wires.

- Contact the power company, inform them you will be working near electrical wires and ask for necessary measures to be taken.



- Just approaching high voltage electrical wires can lead to electrical shocks. Secure the safety distance given on the right during work.
- To be prepared for unexpected situations, wear rubber-soled shoes and rubber gloves and cover the cab seat with a rubber sheet. Parts of the body not protected with rubber should not contact the machine body.

	Power Line Voltage	Safe Distance
Low Voltage	100V/200V	2m or more
	6,600V	2m or more
Specially High Voltage	22,000V	3m or more
	66,000V	4m or more
	154,000V	5m or more
	187,000V	6m or more
	275,000V	7m or more
	500,000V	11m or more

- Use a guide to ensure the machine does not move too close to electrical wires.
- To prevent electrical shock, keep people other than those involved away from the machine when working near high-voltage electrical power lines.
- If the machine moves too close to or come into contact with electrical wires, do not stand up from the cab seat but remain seated until the power is shut off. This is to avoid the operator getting an electrical shock. Keep others away from the machine.

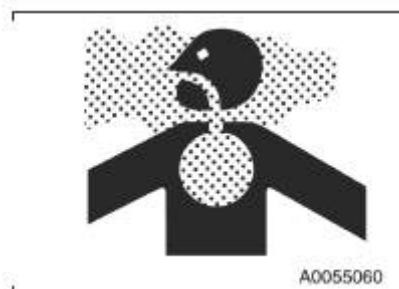
Securing visibility

Carefully check the presence of people or obstacles around the machine and the situation of the site. Strictly observe the following so that you can work or drive safely:

- In dark locations, turn on the machine's working light and headlight. If necessary, add some other lights in the operating area.
- Stop work when there is poor visibility due to fog, snow, rain or sandy dust.

Cautions on indoor ventilation

When starting the engine or handling fuel, wash oil or paint indoors or in badly ventilated locations, open the window and entrances/exits to improve ventilation.



Signs by guides and verification of signs

- Set up signs so that people can identify soft shoulders and ground. When visibility is poor, guides are needed. Operators should pay attention to signs and follow the instructions of guides.
- Only one guide should give signs.
- All workers must understand the meaning of all signals and signs.

Emergency exit of the cab

Should the cab door not open, use the hammer provided on the window to break the window. This serves as an emergency exit.

See the section "Moment limiting device (Overload protector) (3-20)" in this manual.

- Remove glass from the window frame so that you will not get cut when exiting the machine via the window. Be careful not to slip on the broken glass pieces.

Asbestos dust caution

Inhaling air containing asbestos dust can cause lung cancer. The asbestos inhalation hazard is present at the site of demolition work or handling industrial wastes. Strictly observe the following:

- Spray water so that the asbestos does not fly in all directions in the air. Do not use compressed air.
- When operating the machine at a site where the air might contain asbestos dust, the operator must work with the wind at his/her back. The operator must wear a particle mask.
- Keep third persons away during the work.
- Strictly observe the given rules regarding the working site and environmental standards.

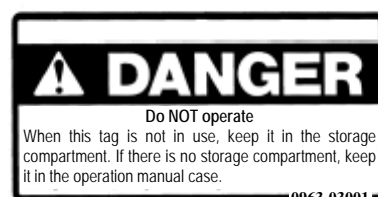
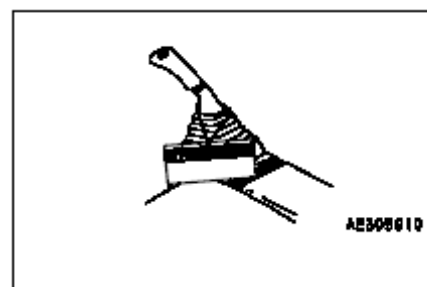
Impure components present the risk of containing asbestos. Use our pure components. No asbestos has been used on this machine.



Cautions on Operations

Starting engine

When a warning tag has been attached to the operation lever of the implement, do not start the engine or touch levers.



Inspection and adjustment before starting engine

Inspect the following before starting the engine.

- Ensure the windows are clean.
- Clean the lens surface of the working light. Check the light for proper illumination.
- Check the cooling water level, fuel level, engine oil pan level, air cleaner and damage to electrical wires.
- Adjust the cab seat for comfortable working position and check the damage and wear on the seat belt and mounting brackets.
- Check the operation of gauges and check that the operation levers are in the neutral position.
- Check that the safety lock lever is at lock position before starting the engine.
- Adjust mirrors so that you can clearly see the bottom rear of the machine (where it is hidden behind the engine hood) from the cab seat.

Refer to "Adjusting mirrors (3-60)" for how to adjust mirrors.

- Check the presence of people or obstacles on under, or around the machine.

Cautions in starting the engine

- Always sit on the cab seat when starting the engine.
- Do not start the engine by creating a short circuit in the starter circuit. It can cause serious injuries or fire.
- For warning, honk the horn before starting the engine.
- Only the operator should be on board.

Cautions in cold weather

- Warm up the machine sufficiently. Operating the operation levers before the engine is warm may slow the reaction of the machine or cause rapid change, leading to accidents.
- If the battery fluid is frozen, do not charge the battery or start the engine with another power supply. The battery may catch fire and explode.

When charging the battery or starting the engine with another power supply, unfreeze the battery fluid and check that there is no battery fluid leakage.

Operations

Checks before operation

Check the machine in a large area with no obstacles, paying sufficient attention to around the machine, and operate slowly. Keep people away from the proximity of the machine.

- Make sure that you wear a seat belt.
- Check that the movement of the machine and the indication on the operation pattern card (a label stuck to the window, with operations and duty decals) agree.

If they do not agree, change the operation pattern card immediately to the one that agrees with the machine movement.

- Check operations such as crane, driving and turning.
- Check the machine noise, vibration, heat, smell, gauge abnormality, oil leakage and fuel leakage.
- Should you find any abnormality, be sure to fix the problem in question.

Cautions in moving forward/backward and turning

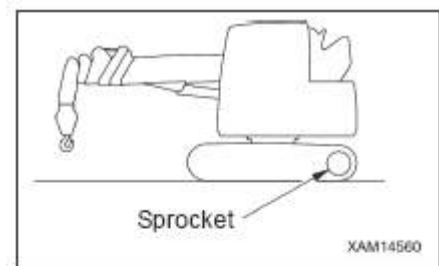
- Drive the machine with the sprockets in the back of the cab seat.

Note that if the sprockets are in front of the cab seat, the machine moves in the opposite direction (forward/backward and left/right steering) to the operating direction of the lever.

- Check that there are no people or obstacles around the machine one more time before starting to move the machine.
- Honk the horn before starting moving, to warn people around.
- Always remain seated on the cab seat when operating the machine.
- Do not let anyone on the machine except the operator.
- Whether they are open or closed, properly secure the doors and windows of the cab seat.

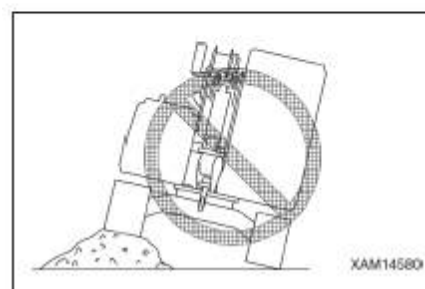
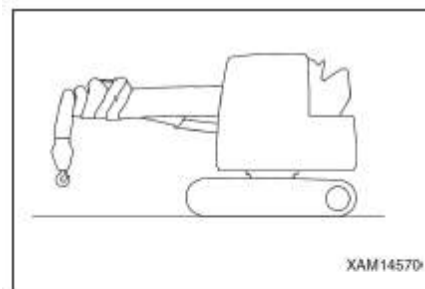
Make sure that they are closed on sites where flying or intruding objects may enter the cab seat.

- If the visibility is blocked on the back of the machine, use guides. Turn the machine slowly while paying sufficient attention not to cause any accidents.



Cautions during operation

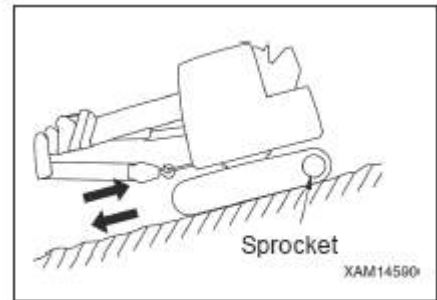
- Speeding, sudden acceleration, sudden stops and sudden changes of direction are dangerous. Do not operate the machine in this way.
- Drive the machine with the boom of the implement completely retracted and laid and with hook stored.
- Drive slowly to avoid turnover when driving on irregular ground. Avoid any sudden steering operation. The implement may touch the ground when doing so, leading to the loss of balance of the machine or damage to the machine or structures around.
- Avoid going over obstacles. If you absolutely have to go over an obstacle, keep the implement close to the ground and drive slowly. The machine tends to turn over to the side rather than front or back. Do not go over obstacles that will greatly affect the balance of the machine to one side.
- Keep appropriate distance during operation to avoid accidents with people, structures and other machines.
- If you have to pass over a bridge or structure, check if it can withstand the weight of the machine in advance. Contact the authorities concerned and follow their instructions when passing through public roads.
- When operating the machine at height-limited locations such as inside tunnels or buildings, under overpasses and electrical wires, pay attention so that the machine and implement do not come into contact with anything. Operate slowly.



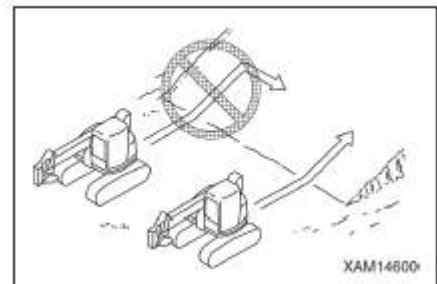
Cautions in driving on slopes

Strictly observe the following to prevent turning over and side slip.

- When going up/down a slope of 10 degrees or more, keep the posture shown in the figure on the right while driving.
- Direct the cab seat to lower side of the slope for going up and down and check the ground while driving.

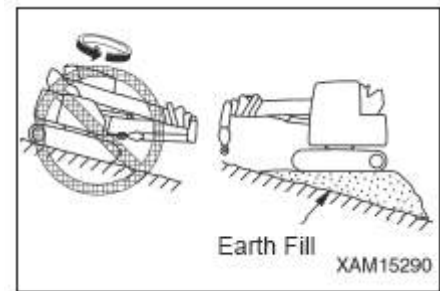


- Slow the engine speed and keep the drive lever close to the neutral position for low-speed drive when going down a slope.
- Drive straight along with the slope. Crossing the slope diagonally or horizontally is very dangerous.
- Do not steer the machine across the slope. If you need to change direction, move to a flat surface to make a detour.
- Drive as slow as possible on grass, dead leaves or wet steel plate. It is very slippery and dangerous on these surfaces, even with a gentle slope.
- Should the engine stop, move the operation levers back immediately to neutral position and start the engine.



Cautions in working on a slope

- Turning operation and implement operation on the slope will result in the loss of balance of the machine, leading to possible turnover and serious injuries. Secure a stable location and work with sufficient care.
- If you absolutely have to work on a slope, provide some level earth fill to form solid ground to avoid turnover accidents.

**Cautions against turnover on unstable ground**

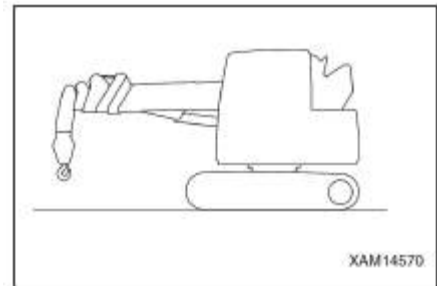
- Do not go on soft ground. It will be difficult to get the machine out of the ground.
- Do not approach the ground near cliffs, shoulders and deep ditches. The weight and vibration of the machine may cause the ground to give way, causing the machine to turn over or fall. Take extreme care after rain, explosions or earthquakes. The ground is more likely to give way in such conditions.
- The ground may give way with the weight and vibration of the machine on earth fill or near excavated holes. Take necessary measures to make the ground safe before working to prevent the machine from turning over and falling.

Cautions when driving on snow-packed or icy land

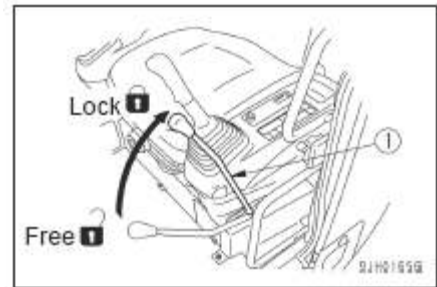
- The machine is likely to slip on snow-packed or icy land. Drive and operate carefully in such conditions and avoid any sudden lever operations. Even gentle slopes can make the ground very slippery. Pay sufficient attention, especially on slopes.
- With rising temperatures, frozen ground can change to soft ground, causing the machine to turn over or get bogged down in the ground. Exercise caution in such situations.
- Going into deep snow may cause the machine to turn over or sink into the snow and is dangerous. Do not go beyond the shoulders or into snowdrifts.
- In snow-covered sites, turnover or collisions are possible because shoulders and installations are not visible under the snow. Be careful when driving in such conditions.

Cautions in parking

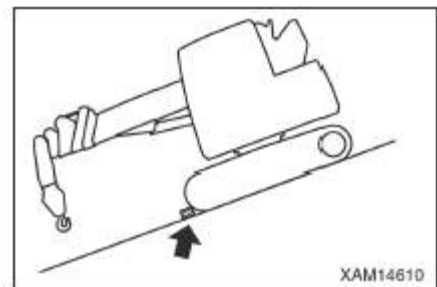
- Choose a location with level and solid ground.
- Choose a location where there is no hazard of landslide, rock fall or submersion.
- Drive the machine with the boom of the implement completely retracted and laid and the hook stored.



- Move the safety lock lever (1) to the lock position and stop the engine before leaving the machine.
- Be sure to close the cab door and turn all the keys in the lock. Make sure that you remove the keys and store them at specified locations so that others cannot operate the machine without asking.



- If you have to park on a slope, observe the followings
- Fully retract and lay the booms and store the hook before directing the boom to the lower side of the slope.
- Provide a block by the side of the crawler so that the machine does not move.



Cautions during crane operation

Inspection before starting crane operation

Check that the operation of safety devices and crane is normal.

- Operate operation levers, pedals and switches with no load to check the normal operation of these devices. Should you find any abnormality, fix the problem immediately.
- Check that the moment limiting device (overload protector) functions properly.

Cautions in selecting a location to install the crane

Always install the crane on level, stable and solid ground. Installing the crane on the following locations is dangerous.

- Streets with a poor tarmac surface
- Streets with thin concrete or stone pavement
- Paved streets under which there is a cavity due to water erosion, which appears solid on the surface but is soft in the ground.
- Locations close to shoulders or holes for construction
- Slopes

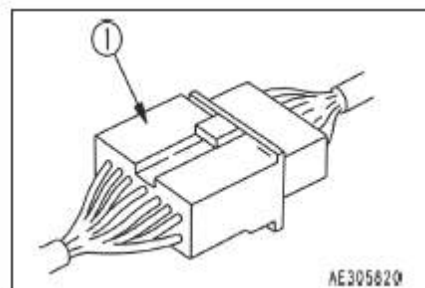
When working on a slope, level the ground before installing the crane. Hoisting without making the crane level not only prevents the accurate operation of the moment limiting device (overload protector) but also imposes unexpected force on the machine, leading to its damage or turnover.

Cautions in cold weather

- Wipe off any water, snow and dirt from the wire harness, connector (1), switches and sensors after completing work and cover these devices.

If water enters the machine and freezes, the machine may malfunction when next used, resulting in accidents.

- Remove snow and unfreeze the swing circle and boom and around the winch and check their operation before starting work.
- Check the operation of the winch brake.
- Warm up the machine sufficiently. Operating the operation levers without sufficient warm-up may slow the reaction of the machine or cause rapid change, leading to accidents.
- Avoid increasing the engine speed right after starting the engine.
- Use the operation lever and release the hydraulic pressure (increase the hydraulic pressure to be higher than the set hydraulic circuit pressure to release the pressurized oil to the operating oil tank) to warm the oil in the hydraulic circuit. This improves the machine's reaction and prevents malfunctions.
- If the battery fluid is frozen, do not charge it or start the engine with another power supply as the battery can catch fire.
When charging the battery or starting the engine with another power supply, unfreeze the battery fluid and check that there is no battery fluid leakage.
- Battery charging rate: See the section "Handling in cold weather (3-132)".
- Accumulation of snow within the working range of the crane can cause problems; remove snow, if necessary, before starting operations.
- If the load to be hoisted is stuck to the ground because it is covered with snow or frozen, do not force the hoisting of the load. Thoroughly remove the snow or unfreeze before operating the crane.



Pay attention to weather forecast

- Stop the crane operation and stow the boom in case of thunderstorm.
- Stop the crane operation when the maximum sustained wind reaches 10 m/s. Retract the boom completely and bring the machine into the travel position.
- Note that the greater the load is, the higher the load is and the longer the boom is, the greater the influence of the wind will be even at the maximum sustained wind of 10 m/s or less.
- The winch wire rope with longer boom and electrical signal cables are also susceptible be gusts of wind.
Note that when working around tall buildings, the wind passing along the side of the buildings might have an even greater speed.
- When hoisting a load with a wide area where wind can hit, such as a steel plate, wind from front, back or side of the boom can turn over or damage the machine. Pay sufficient attention when working in such conditions.
- Wind from the boom front may cause turnover of the machine backward when no load has been hoisted. Pay sufficient attention when working in such conditions.
- In case of earthquakes, stop working. Wait until it calms down.

Cautions in working

- The stability of the crane is determined when the machine is on level ground. Although stability increases diagonally (this refers to the position of the boom in relation to the crane, i.e. it is not pointing straight forwards or backwards but out over the tracks of the crane. In this position, the crane is more stable than when the boom is pointing fore or aft), work exceeding the rated load causes the breakage of the boom or machine. The moment limit device (overload protector) must not be activated, even in diagonal direction.
- Perform crane operation slowly until you are used to it.
- Do not perform any sudden operation of levers or acceleration.
- Pay attention to the indication and warning on the overload protector while working.
- Determine a work supervisor for hoisting work and always follow his/her instructions.
- Follow the instructions of the supervisor for work methods and procedures.
Determine how to give signs and follow these signs.
- A long load is instable when hoisted and therefore dangerous. Attach a rope to both ends of the load to make it stable.
- The operating radius increases due to boom deflection when hoisting a load. Take this deflection into consideration when working.
- With temperature change, the volume of the cylinder operating oil changes. Leaving the crane while hoisting a load lowers the oil temperature over time, and the volume of the operating oil decreases. This will flat the boom derricking angle or shorten the boom length. When it happens, operate the boom operation lever to correct the situation.
- Do not use the crane for purposes other than the main uses, such as moving workers up/down.
- Check that the lever is at lock position before starting the crane operation.
- Do not leave the cab seat while hoisting a load. Put down the load when leaving the cab seat.
- Hoist the hook when not in use. Other workers around the load may run into the hook with no load.
- 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.
- Exercise caution not to let the wire come into contact with trees or steel beams. Should the wire be entangled around something, do not force wind the wire. Untangle it and then wind it up.
- Do not pull horizontally, vertically or pull in the wire. It is dangerous to do so.
- Work that hoists an attachment that generates some vibration such as vibros is forbidden.
Vibration of the attachment may break the winch, etc.

Handling wire ropes

- The wire rope will wear out over time. Always check the wire rope before working. If the wire rope needs replacing, change it immediately. Inspect the boom tip sheave and hook sheave at the same time. Damaged sheaves will accelerate damage to the wire rope.
- Use the wire rope specified.
- Wear leather gloves when handling wire ropes.
- When replacing a wire rope, in principle observe ISO 4309:1990 (E) as well as the legal restrictions applicable to the place where the crane is used.

Cautions in operating winch

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

How to hook wire ropes: See the section for "Handling wire ropes (3-101)"

- Do not allow any worker to go under the hung load.
- Pause the hoisting operation in the critical state where the load leaves the ground, check the safety and then continue the hoisting operation.
- Do not pull horizontally, pull towards you or hoist diagonally.
- Release the acceleration pedal to decrease the engine speed and slowly return the winch lever to decelerate from high-speed hoisting. Returning the winch lever quickly at high speed will result in a rapid deceleration shock in the hook, popping the hook and leading to irregular winding.
- Hoisting/Lowering in high-speed mode should be used to hoist/lower the hook alone. Hoisting/Lowering a hung load in high-speed mode can break the boom/frame or cause serious accidents in which the machine turns over.
- If the hook rotates due to the wire rope being twisted, untwist it before working.
How to deal with twisted wire ropes: See the section for "What to do with twisted wire ropes (3-107)".
- At least three turns of the wire rope must remain on the drum when lowering. The standard number of wire rope falls may still be insufficient to put down a load at a place closer than the ground. In this case, check the remaining wire ropes on the drum while working.

Cautions in boom operation

- Do not raise the boom beyond the height where the load reaches the height of the cab seat. If you raise it higher, the load may fall onto the cab seat.
- Do not perform any sudden derricking or extending/retracting operation. Operate the levers gently.
- Pulling a load in or up with the boom derricking operation is forbidden.
- Check the winch operation when extending/retracting the boom.

Limit the boom angle according to the following table. Boom length (m)

Boom length (m)	Boom angle (deg)
4.6-5.7	70° max
5.8-7.3	47° max
7.4-9.2	78° max

Cautions in turning operation

- Perform turning operation at low speed, pay attention around the machine.
- Pulling a load in or up with the turning operation is forbidden.

Cautions in special crane operation

Cautions in double hoisting

- In principle, double hoisting using two cranes is forbidden since this is highly dangerous and can cause a machine to tip over due to center of gravity bias, fall of the hoisted load, machine breakage or another problem.
- You are permitted to carefully carry out double hoisting while observing the relevant safety and legal restrictions that apply to the place of use, if the legal restrictions that apply to the place where the cranes are used do not forbid double hoisting and double hoisting is unavoidable and the worker is ready to take responsibility for double hoisting with consideration to the working environment, conditions and all other factors.

Crane operation at the site with lift below ground level

- At least three turns of the wire rope must remain on the drum when lowering.
- The signs must be thoroughly understood.
- Crane operation shall be conducted particularly carefully.

Traveling with suspended load

In principle, traveling with suspended load is forbidden since it is always unstable and involves risks. If you absolutely have to travel with a suspended load, observe the following cautions.

Strictly avoid hung load operation if the restrictions that apply to the place where the crane is used forbid you to do so.

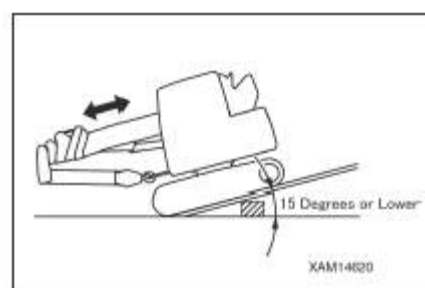
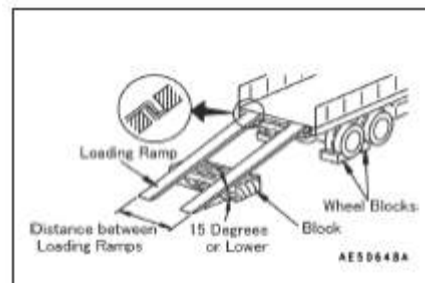
- Strictly observe cautions given in the instruction manual.
Cautions: See the section for "Traveling with suspended load (3-91)"
- Hoist the load that the machine is sufficiently capable of and maintain height around ground level.
- Enforce work in a working posture specified in the instruction manual.
See the section for "Working posture (3-90)"
- Staff guide(s) for driving operation.
- Remove any obstacles on the working path and keep workers away.
- Works exceeding the specified boom length are prohibited.
- The rated load is the maximum possible load. Work with an appropriately safe load for the situation.
- Keep the engine speed at low idling (low-speed rotation) and operate slowly while driving at LOW speed so that the load does not swing while driving with hung load. Do not accelerate or stop suddenly or change the speed to HIGH while traveling. Take appropriate measures against load swing and go slowly.
- Do not change traveling speed or perform turning/crane operations while driving with a hung load.

Transportation

This machine may need to be disassembled for transportation, depending on the legal restrictions that apply to the place of transportation. Consult our sales service agency for further information.

Cautions in loading/unloading the machine

- Improper handling of the machine during loading/unloading will involve turnover and fall hazards. Operators must pay special attention to the following:
- Select a location with level and solid ground and avoid locations near shoulders and cliffs.
- Loading/unloading with the boom is dangerous and can cause turnover and fall. Never load/unload the machine using the boom.
- Put the implement in the stowing position and secure the hook block to the machine body with the wire rope.
- Always load backward.
- Always unload forward.
- Use a loading ramp with appropriate length and width and sufficient strength. Install the loading ramp so that it does not move or come off.
- Remove any deposits such as oil, snow and water from the ground, loading ramp and back of the vehicle to stop it from slipping. Also remove dirt around the legs of the machine. It is especially slippery on rainy days. Exercise caution in such a situation.
- Slow the engine to low speed and drive slowly.
- Do not operate anything other than the lever for traveling (forward/backward) while on the loading ramp.
- Never change the traveling direction on the loading ramp. If you need to change the direction, go back from the loading ramp and adjust your direction.
- The center of gravity moves suddenly at the edge between the loading ramp and the back of the vehicle.
Pass over the edge especially slowly since the machine will be unstable.
- When unloading the machine onto earth fill or platform, ensure sufficient width, strength and slope.
- The ground is unstable when turning the boom on the back of the vehicle. Retract the boom and operate slowly.
- Be sure to lock the door after loading the machine with cab. The door may open during transportation.
See the section for "Transportation (3-124).
- Place a square piece of timber between the machine and the back of the vehicle and secure the machine tightly using the wire rope etc. after loading the machine.



Cautions in transportation

Strictly observe the following when transporting the machine:

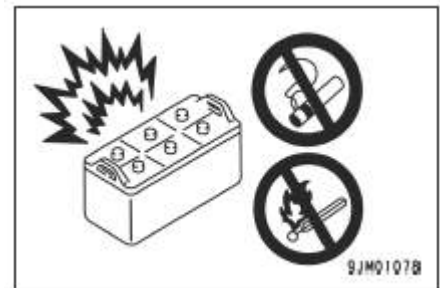
- Carefully check the weight, total length and width of the implement and the transportation height.
- When passing over a bridge or a structure, you have to check if the bridge/structure can withstand the weight of the machine in advance. Contact and follow the instructions of the authorities that apply to the place when traveling on public roads.
- See the section for "Transportation (3-126)" in Handling chapter for how to transport the machine.

Battery

Handling batteries

The battery generates inflammable hydrogen gas, which can cause explosion. The battery fluid also contains diluted sulfuric acid. Improper handling of the battery will cause injuries, explosions or fire. Strictly observe the following:

- Do not use or change the battery if the battery fluid level is lower than the minimum fluid level (LOWER LEVEL). Doing so will cause an explosion. Check the battery fluid level periodically and refill with the distilled water to the maximum fluid level (UPPER LEVEL).
- Always wear goggles and rubber gloves when handling the battery.
- Do not smoke or use fire near the battery.



- Should the battery fluid adhere to your clothes or skin, wash the affected area immediately with plenty of water.
- Should the battery fluid get in your eye, wash your eyes immediately with water and consult a physician.



- Inspect and handle the battery with the starter switch key turned to OFF position.

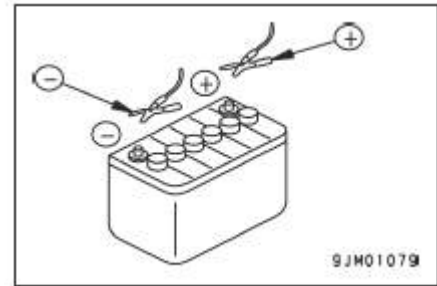
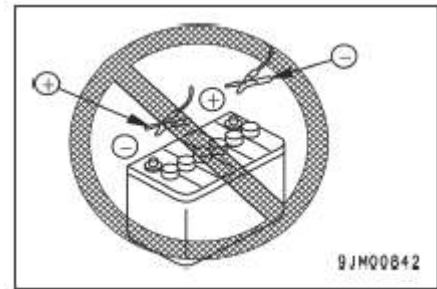
Sparks can be generated. Observe the following:

- Do not allow any contact of metallic objects such as tools with either terminals of the battery. Do not leave tools around.
- When removing the battery terminal, always remove the earth (-) side first. Conversely, always install the (+) side first, before the earth side, when installing the battery. Make sure that the battery terminals are installed securely.
- Inflammable hydrogen gas is produced when charging the battery. Remove the battery from the machine and then move to a well-ventilated area to remove the battery cap before charging the battery.
- Securely tighten the battery cap.
- Secure the battery to the specified location without fail.

Starting with booster cable

Wrong connection with booster cable will lead to battery explosion. Strictly observe the following:

- Starting with booster cable should be performed with two people; one at the cab seat and another by the side of the battery.
- When starting the machine using another machine, take care not to allow the two machines to come into contact with each other.
- When connecting the booster cable, turn the starter switch key of both machines to the OFF position. When the power is supplied, the machine may start and if these switches are at the ON position, this will be hazardous.
- Always connect the booster cable to (+) terminal side first. Conversely, always disconnect (-) terminal (earth) side first.
- When disconnecting the booster cable, do not let the clips of the booster cable touch each other or the machine.
- Be sure to wear goggles and rubber gloves when starting the engine with booster cable.
- When using a second machine, both machines must have batteries of the same voltage.



See the section for "Starting with booster cable (3-138)" in the Handling section for the starting procedure with booster cable.

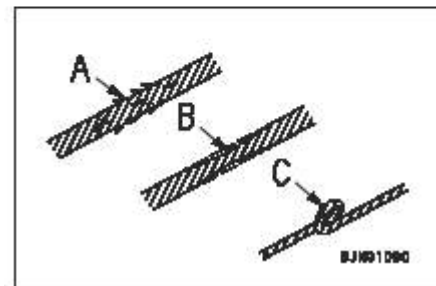
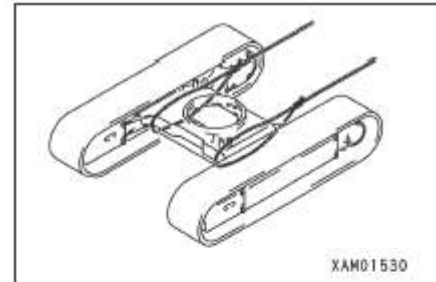
Towing/Being Towed

Cautions in towing/being towed

Wrong selection of wire rope or wrong inspection method or towing method when towing/being towed will lead to serious injuries.

See the section for “How to tow the machine (3-135)” for towing.

- Use leather gloves when handling wire ropes.
- Hook the wire ropes into the truck frame.
- Never go between the towing machine and towed machine during towing.
- Never tow the machine on a slope.
- Place a splint between the wire rope and the machine to prevent damage to the rope and the machine body.
- The wire ropes with broken wires (A), reduced diameter (B), and kink (C) can break. Never use such wire ropes.

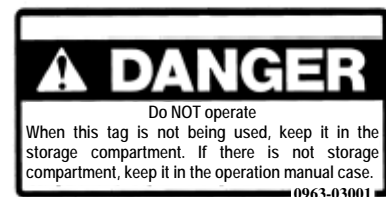
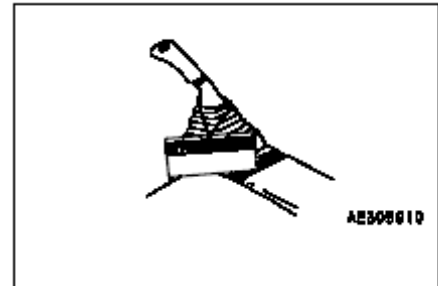


Cautions on Maintenance

Post a warning tag during inspection/maintenance

- Attach a “Do Not Operate” warning tag on an implement operation lever during inspection/maintenance. If necessary, post a tag also around the machine.
- Warning tag Part number: 09963-00101
- When this warning tag is not in use, store it in the toolbox. If there is no toolbox, store it in the manual holder.

If someone other than those involved start the engine or touch an implement operation lever during inspection/maintenance of the machine, this will lead to serious injuries.



Organizing/Cleaning the work area

- Clear the work area of tools and hammers and wipe away grease, oil etc. to provide a clean and safe working environment. A cluttered workplace may result in falling or slipping, leading to injury.
- Use water and not organic solvents to clean the organic glass (polycarbonate) skylight. Using organic solvents such as benzene, toluene or methanol causes a chemical reaction that can damage the polycarbonate.

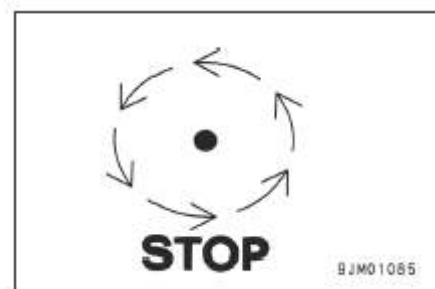
With instructions of supervisor when working in a team

When repairing the machine or removing/installing the implement, determine a supervisor and everyone must follow his/her instructions.

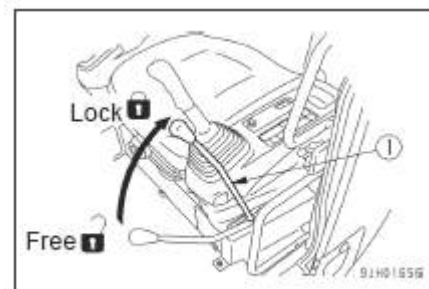
Note that during teamwork, miscommunication among workers can cause accidents.

Stop the engine for inspection/maintenance

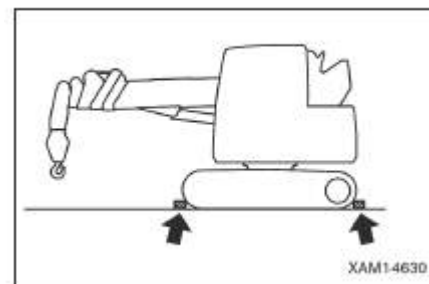
- Select a level location with solid ground and stop the engine.
- Select a location where there will be no potential landslide, rockfall or submersion.
- Put down the implement on the ground and stop the engine.



- Move the safety lock lever (1) to the lock position.



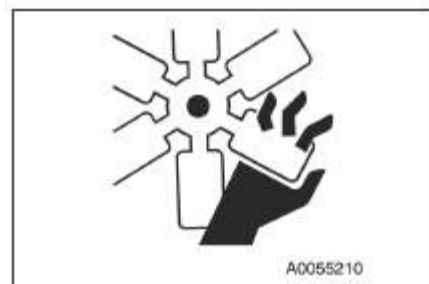
- Provide pawls to the crawlers so that they do not move.



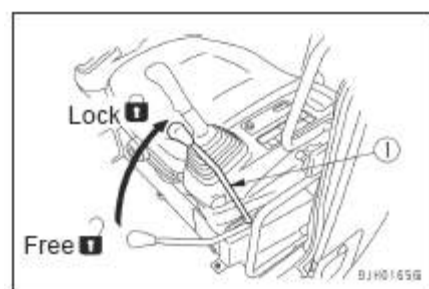
Maintenance on the operating engine by two people

To prevent accidents, do not perform maintenance on the machine while the engine is in operation. If you absolutely have to perform maintenance while the engine is in operation, strictly observe the following:

- One should sit on the cab seat and be ready to stop the engine at any time. Communicate with each other.

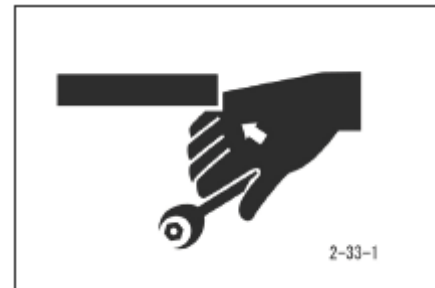


- Move the safety lock lever (1) to the lock position.
- When working near rotating sections such as fans and belts, do not put your body or anything that can be entangled close to the rotating sections.
- Do not touch operation levers. If you absolutely have to operate an operation lever, always give a sign to your partner to leave to safe area.
- Dropping or inserting an object or a tool over the fans or belts will throw or cut the object/tool. Do not drop or insert an object or a tool.



Use of appropriate tools

Use appropriate tools properly. Using damaged or deformed tools or using tools for purposes other than intended can lead to serious injuries.

**Keep away unauthorized people**

Apart from essential workers, keep other personnel away from the machine during maintenance. Utilise observers as required.

Cautions in working under machine or implement

- If you have no choice but to go under the lifted machine or implement to carry out inspection/maintenance tasks, hold the machine and implement securely with a solid block or support that can withstand the weight of the machine or implement.

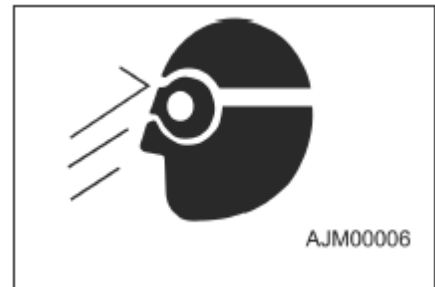
**Noise hazard**

If you will be exposed to noise for a long time because of tasks such as engine adjustment, wear ear covers or earplugs. Loud ambient noise may result in hearing loss or difficulty in hearing.

Cautions against debris during work with hammer

When using a hammer, pins can come out or metal debris may fly in all directions, leading to serious injuries. Strictly observe the following:

- When hammering hard metal parts such as pins, teeth, cutting edges or bearings, objects flying in all directions can result in serious injuries. Wear protective equipment such as goggles and gloves.
- When hammering pins or teeth, debris and other objects can fly in all directions and injure people around. Check that there is no one nearby before hammering these objects.
- Hammering out pins can result in the protruded pins injuring people around.



Cautions in weld repair

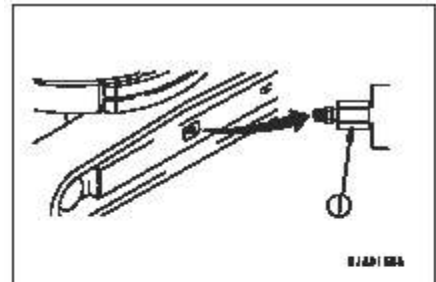
Only qualified personnel shall perform welding at well-equipped facilities. During welding, gas can be generated and fire or electrical shock can take place. Unqualified personnel shall never attempt to perform weld repairs.

Disconnecting battery terminal

Disconnect the (-) terminal of the battery to stop the electrical current running when repairing the electrical system or performing electric welding.

Cautions against high-pressure grease during adjustment of crawler tension

- The grease inside the crawler adjustment device is at high pressure. Making adjustments using an unspecified procedure can cause the grease drain plug to come out, leading to serious injuries.
- Loosen the grease drain plug (1) slowly. Do not loosen it by more than one turn when decreasing the tension of the crawler.
- Do not put your face, hands, feet or body close to the grease drain plug (1).



Do not disassemble recoil spring

Never disassemble the recoil spring assembly.

The recoil spring assembly to buffer the idler has a powerful spring built in. Careless disassembly will allow the spring to come out, leading to serious injuries. If you need to disassemble this assembly, please ask our sales service agency.

High-pressure oil hazard

The hydraulic system has constant internal pressure. Check the pressure in the circuit is released before inspecting/replacing pipes or hoses. Not checking this will result in serious injuries. Strictly observe the following:

- Release the pressure. Do not carry out inspection/replacement work with the pressure being applied.
- If there is oil leakage from pipes and hoses, the areas around them will be wet. Check the pipes and hoses for cracks and swell.
Wear protective equipment such as goggles and gloves when checking pipes and hoses.
- If high-pressure oil leaking from a small hole directly hits skin or eyes, it may cause a puncture in the skin or loss of sight. If your skin or eye becomes affected by high-pressure oil, wash the affected area with clear water and consult a physician as soon as possible.

**Handling high-pressure hoses and pipes**

- Oil or fuel leaking from high-pressure hoses or pipes can lead to fire or serious injuries caused by operation failures. Should you find any loosened connection on the hoses or pipes or oil/fuel leakage from the connections, stop work and re-tighten the connection with specified torque. Should you find any damage or deformation of the hoses or pipes, contact our sales service agency.

Hoses in the following state shall be replaced:

- Damaged or with deformed connector
- With covering scratched or cut or their wire-reinforcing layer exposed
- With covering partially expanded
- With twisted or crushed flexible sections
- With foreign objects buried in the covering

Cautions in disposing of wastes

To prevent environmental pollution, pay special attention to the disposal of waste.

- Always drain waste fluid into containers such as cans and tanks. Never release waste fluid into rivers, sewers, oceans, or lakes.
- Follow the applicable laws and regulations in disposing of harmful substances such as oil, fuel, cooling water, solvent, filters and batteries.
- When disposing of machinery with air conditioning, follow the Law Concerning Collection and Destruction of Chlorofluorocarbon and assign this task to suitably qualified technicians.

**Maintaining air conditioner**

- If air-conditioning refrigerant gets into eyes it can cause blindness and frostbite can occur if it gets onto skin.
Never touch the refrigerant.
- Do not release refrigerant into the air when performing maintenance on the air conditioner. The discharge of refrigerant (R134a) into air is restricted since it causes global warming.

Cautions against compressed air

- Cleaning using compressed air can cause serious injuries with flying litter.
- Wear protective equipment such as goggles, particle mask and gloves when cleaning the filter element or radiator with compressed air.

Periodical replacement of important parts

- For safe and long use of the machine, safety-related parts (especially hoses and seatbelts) must be replaced periodically.
Replacement of important parts: See the section for "Periodical replacement of important parts (8-2)"
- Parts can deteriorate, be worn out or fatigue due to deterioration of material over time or through repeated use and can cause serious human or other problems. It is difficult to judge the remaining life of a part by how it operates and appears.
- Important parts should be replaced if they appear defective, even if they have not reached the normal replacement time.

Handling

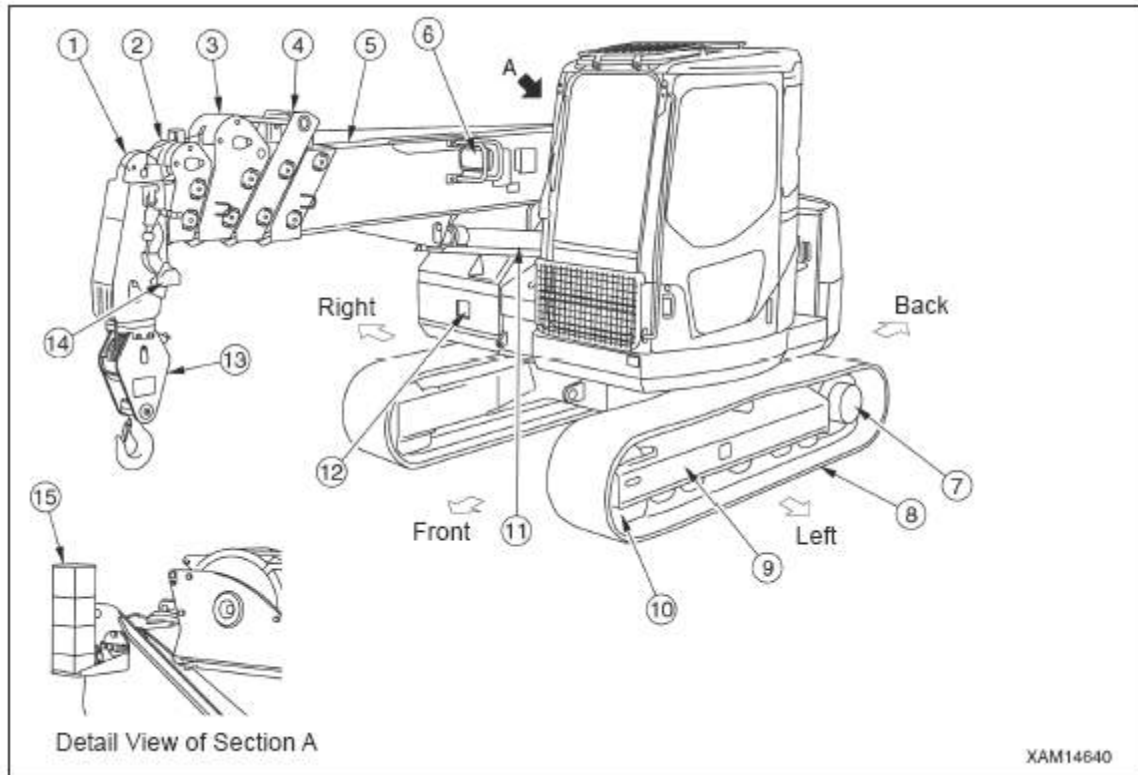
WARNING

Read and understand the contents of the Safety before reading this chapter.

Name of Each Section

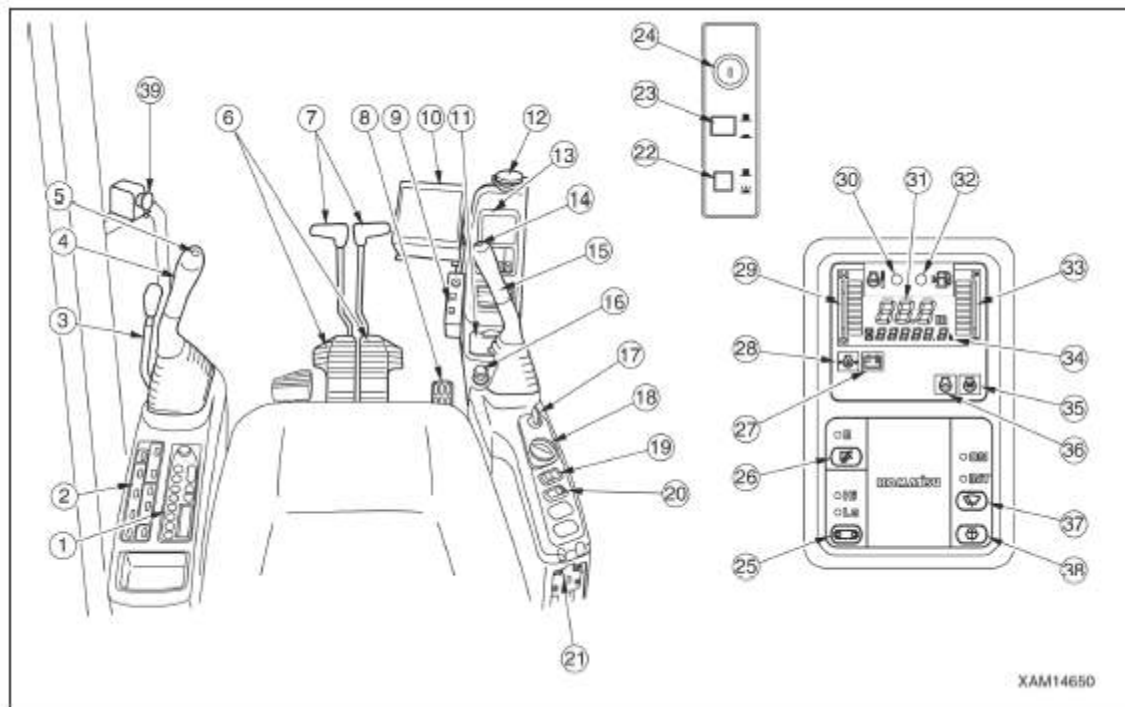
Machine overview

Directions given in this manual indicate those shown with arrows in the figure below.



- | | |
|-------------------|-------------------------------|
| (1) Top boom | (9) Track frame |
| (2) Fourth boom | (10) Idler |
| (3) Third boom | (11) Boom derricking cylinder |
| (4) Second boom | (12) Headlight |
| (5) First boom | (13) Hook |
| (6) Working light | (14) Overwinding detector |
| (7) Sprocket | (15) External indicator |
| (8) Track shoe | |

Controlling device overview



- | | |
|------------------------------------|--|
| (1) Vehicle radio | (21) Swing brake switch |
| (2) Air conditioner control panel | (22) Winch two-speed switch |
| (3) Safety lock lever | (23) Overwinding stop switch |
| (4) Left implement control lever | (24) Moment limiting device emergency switch |
| (5) One-touch deceleration switch | (25) Traveling speed selector switch |
| (6) Traveling pedals | (26) Operation mode selector switch |
| (7) Traveling levers | (27) Battery charge monitor |
| (8) Acceleration pedal | (28) Engine oil pressure monitor |
| (9) Switch box | (29) Engine coolant temperature gauge |
| (10) Moment limiting device | (30) Engine coolant temperature monitor |
| (11) Ashtray | (31) Display (For failures) |
| (12) Level | (32) Fuel level monitor |
| (13) Machine monitor | (33) Fuel gauge |
| (14) Horn switch | (34) Service meter |
| (15) Right implement control lever | (35) Warm-up monitor |
| (16) Cigarette lighter | (36) One-touch deceleration monitor |
| (17) Starter switch | (37) Wiper switch |
| (18) Fuel adjustment dial | (38) Windscreen washer switch |
| (19) Lamp switch | (39) EMO switch |
| (20) Warning buzzer stop switch | |

Description of Each Device

This is the description of devices necessary for the operation of the machine.

The proper understanding of the operations and display details of these devices is critically important for proper, safe and comfortable operations.

The following is an explanation of devices needed for operating the machine.

To carry out suitable operations correctly and safely, it is important to understand fully the methods of operating the equipment and the meanings of the displays.

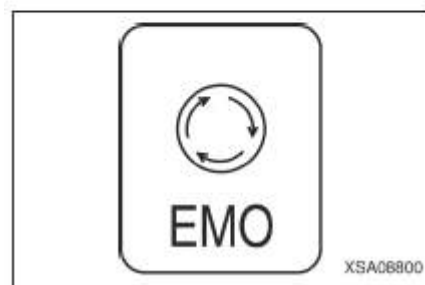
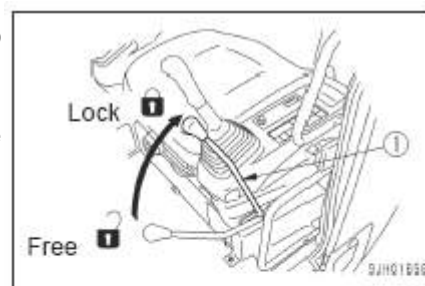
EMO SWITCH (EMERGENCY STOP SWITCH)

WARNING

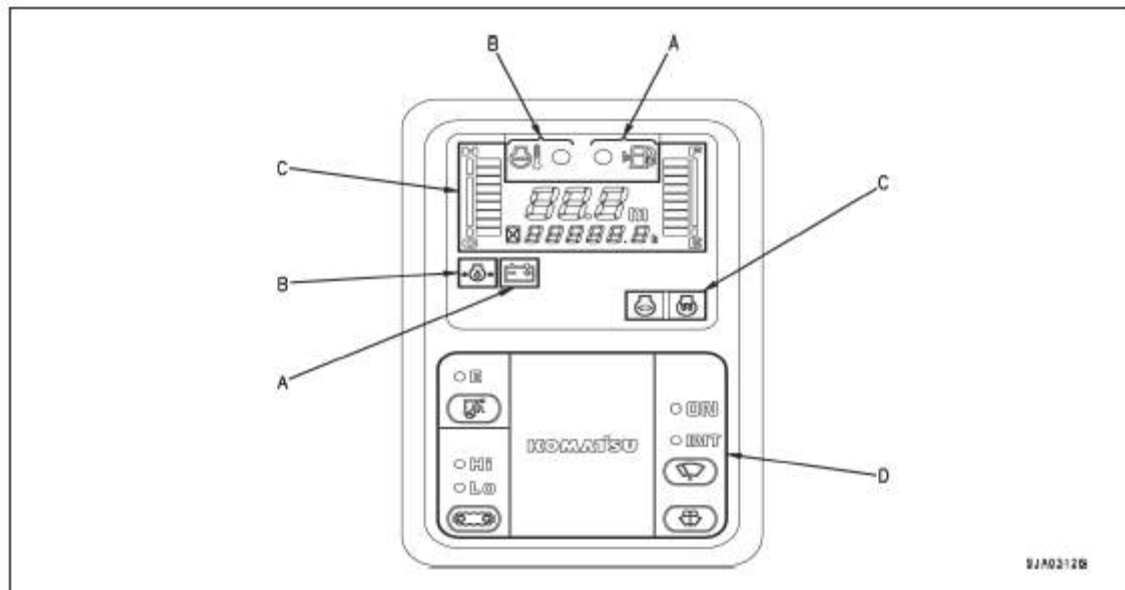
- **Emergency stop**
If a problem such as an abnormal operation occurs, press the EMO switch at the top left of the operator's seat to stop the engine. Then, switch the starting key to the OFF position to turn off the electric system and pull the key out. Then, set the safety lock lever to locked position.
- **Abnormal operation**
If you have stopped the engine/machine because of an abnormal operation, explain the problem to your Maeda agent and request repair. Keep the EMO switch depressed and the switch key pulled out. Do not start the engine again until the machine has been repaired.

When starting the engine again after stopping it with the EMO switch, firstly make sure the safety lock lever is in the locked position.

Next, reset it by turning the switch clockwise. Make sure that the starting switch is in the OFF position, then start the engine.



Machine monitor



A: Caution items

B: Emergency stop items

C: Meter indicator section

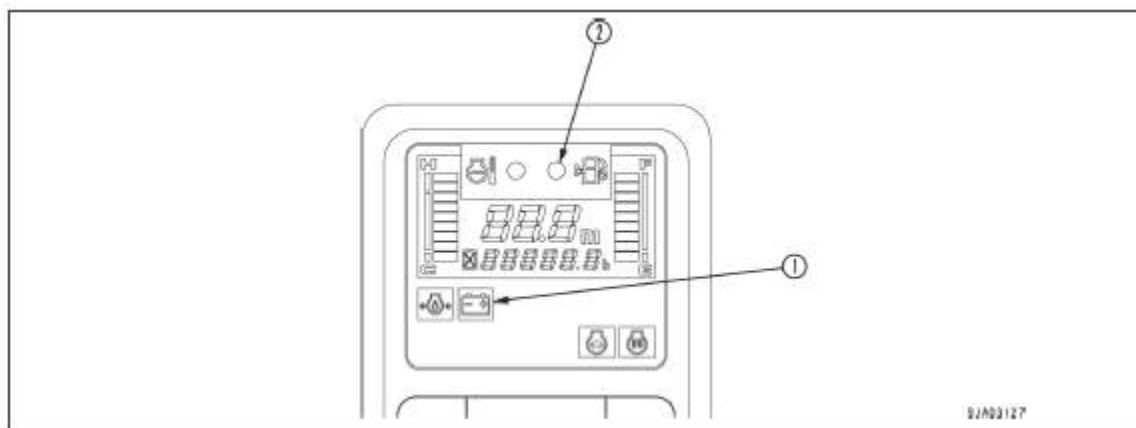
D: Monitor switch section

Caution items

⚠ CAUTION

When the warning monitor flashes, check and maintain the relevant section as soon as possible. Leaving these sections as they are will cause failures.

These are the items that call for your attention while the engine is in operation. These are the items that should be handled as soon as possible when an error is found. Upon detecting an error, the monitor of the relevant section flashes and a buzzer sounds.



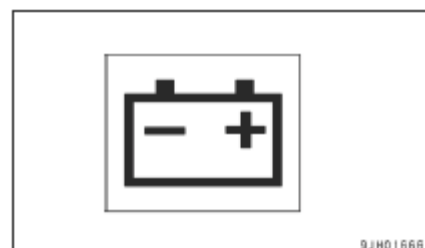
(1) Battery charge monitor

(2) Fuel level monitor

Battery charge monitor

This monitor (1) flashes if the battery has not been charged properly while the engine is in operation.

When the monitor flashes, check the slack of the v-belt. If any abnormality is found, see the section "What to do with this phenomenon (3-142)".



SUPPLEMENTAL

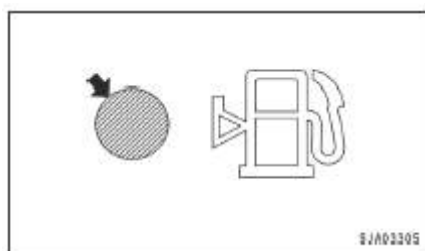
This monitor illuminates when the starter switch is at ON position while the engine is being stopped. This is normal.

The monitor may illuminate for a moment and the buzzer may sound when starting or stopping the engine. This is also normal.

Fuel level monitor

This monitor (2) warns of low fuel level in the fuel tank.

The monitor flashes when the fuel level decreases to about 35 l. Refuel ahead of time.

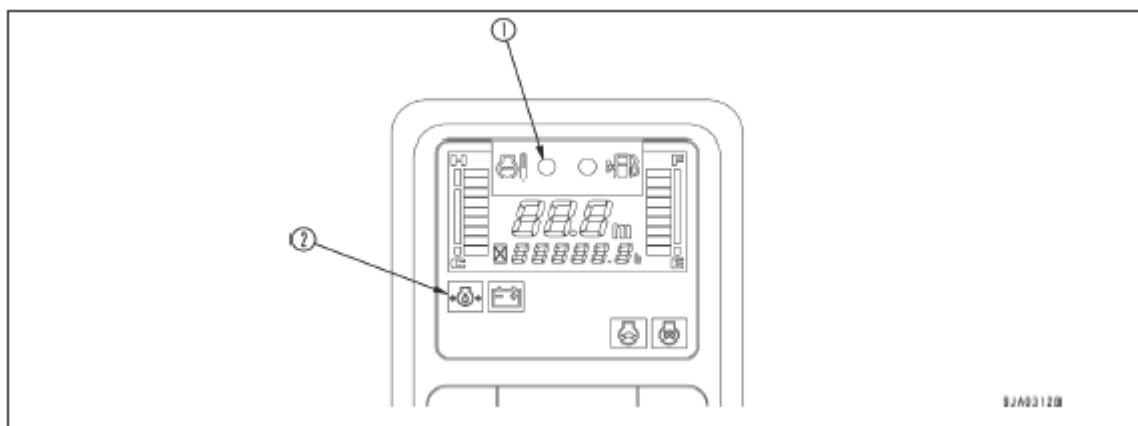


Emergency stop items

⚠ CAUTION

When the monitor flashes, stop the engine or slow the engine immediately to low idling. Check and maintain the applicable section immediately.

These are the items that should be monitored while the engine is in operation. Upon detection of an error, the relevant section monitor flashes and buzzer sounds. Take action immediately.



(1) Engine coolant temperature monitor

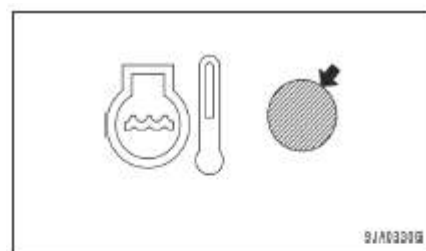
(2) Engine oil pressure monitor

Engine coolant temperature monitor

This monitor (1) warns of a rise in the engine coolant temperature.

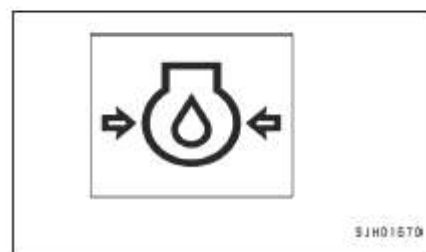
This monitor flashes when the engine coolant temperature rises abnormally.

Stop work and keep the engine in low idling state until the engine coolant gauge returns to the green range.



Engine oil pressure monitor

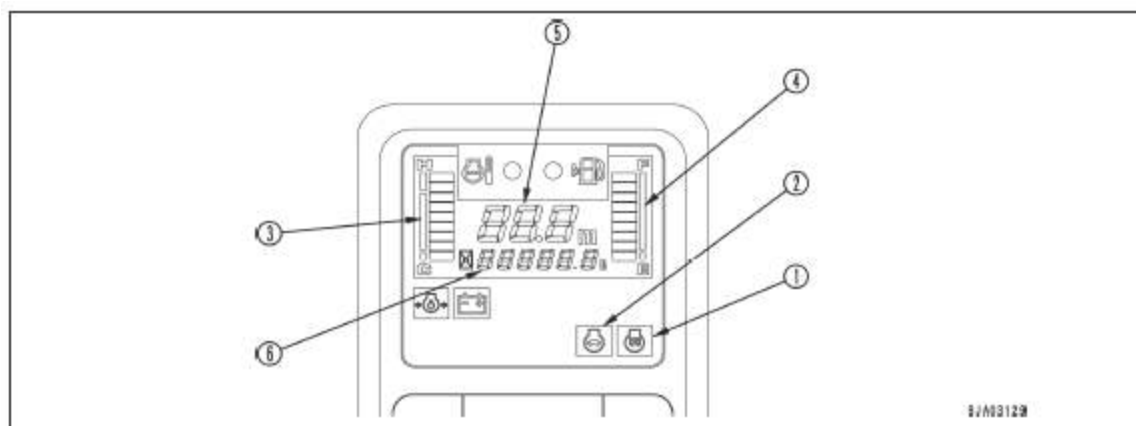
This monitor (2) flashes when the engine lubricant pressure falls below the normal level. When it flashes, stop the engine and check the lubricant system and oil pan level.



SUPPLEMENTAL

- This monitor illuminates when the starter switch is at ON position while the engine is being stopped. This is normal.
- The monitor may illuminate for a moment and the buzzer may sound when starting or stopping the engine. This is also normal.

Meter indicator section



Pilot lamp section

- (1) Warm-up monitor
- (2) One-touch deceleration monitor

Meter section

- (3) Engine coolant temperature gauge
- (4) Fuel gauge
- (5) Display
- (6) Service meter

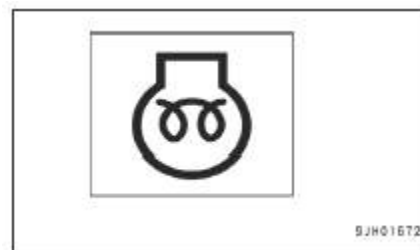
Pilot lamp section

These monitors illuminate when the displayed item is functioning while the starter switch is ON.

Warm-up monitor

This monitor (1) indicates the time required for warm-up when starting the engine at 0 deg C or lower.

The monitor illuminates when the starter switch is moved to HEAT (warm-up) position and flashes in about 30 seconds, notifying that the warm-up has completed (the flashing ends in about 10 seconds).



One-touch deceleration monitor

This monitor (2) notifies that the one-touch deceleration function is being activated.

Activated: ON Released: OFF

Press the one-touch deceleration switch to illuminate the one-touch deceleration monitor.

Press the switch again to turn off the monitor.

**SUPPLEMENTAL**

If the one-touch deceleration monitor is ON, the engine speed will still be in the low idling state even if you operate the fuel adjustment dial.

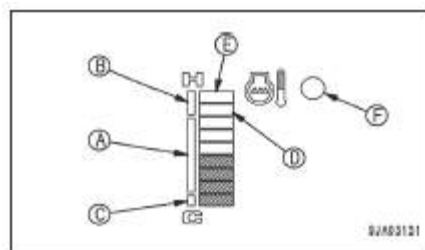
Meter section**Engine coolant temperature gauge**

This meter (3) indicates the temperature of the engine coolant.

If the green range (A) is ON during operation, it is normal.

If the red range (B) turns on during operation, decrease the engine speed to low idling and wait until the gauge returns to the green range (A).

Perform warm-up operation after starting the engine until the gauge shows white range (C) up to green range (A).

**SUPPLEMENTAL**

As the segment (D) turns on, the engine coolant temperature monitor lamp (F) flashes.

As the segment (E) turns on, the engine coolant temperature monitor lamp (F) flashes and the warning buzzer sounds.

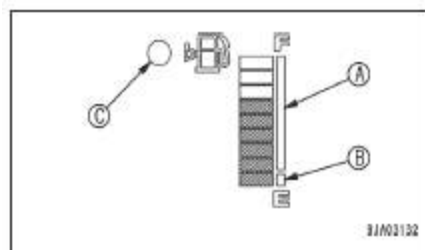
Fuel gauge

This meter (4) indicates the fuel level in the fuel tank.

If the green range (A) is ON during operation, it is normal.

If only the red range (B) turns on during operation, the remaining fuel is 35 l or less. Check the level and refuel.

The gauge may not show exact fuel level for a while after turning on the starter switch. This is normal.

**SUPPLEMENTAL**

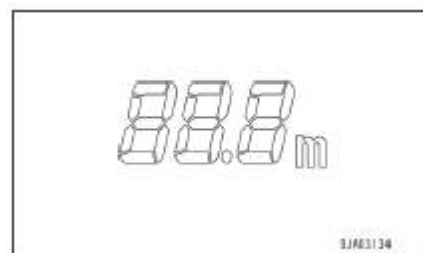
As the red range (B) turns on, the fuel gauge monitor (C) flashes.

Display

This monitor shows failure details when an abnormality is detected.

SUPPLEMENTAL

If there is a machine failure, this monitor shows the failure details while the starter switch is ON. While flashing, it shows all the failure details one by one.



If the indication shown on the right is flashing, see the section "Electrical systems (3-145)".

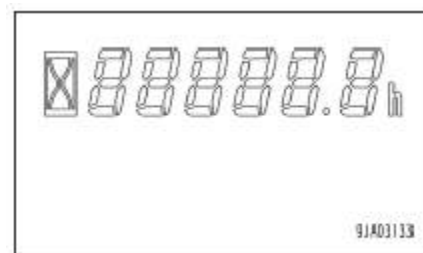
Monitor Indication	Failure Mode
EO3	Error in swivel braking system
EO5	Error in governor system

Service meter

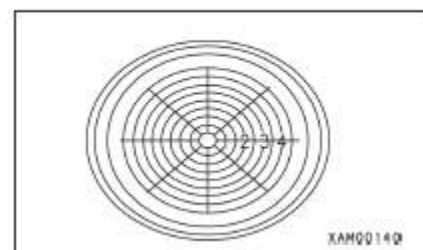
This monitor (6) indicates the total running hours of the machine. Determine the periodical maintenance interval according to the indication on this monitor.

If the engine is in operation, the service meter continues to advance even if the machine is not operating.

When the machine runs for 1/10 hours, the meter advances for 1 regardless of the engine speed.

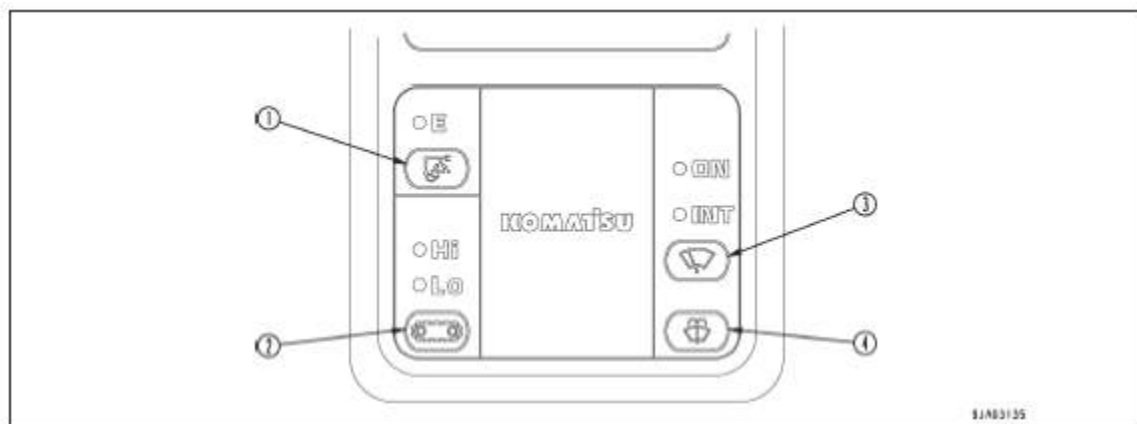
**Level**

This verifies whether the machine body is level or not. You can see how much the machine body is tilted and in which direction by the position of the bubbles.

**IMPORTANT**

Always use the level and work while keeping the vehicle body level in order to activate the moment limiting device properly.

Monitor switch section



(1) Operation mode selector switch

(2) Traveling speed selector switch

(3) Wiper switch

(4) Windscreen washer switch

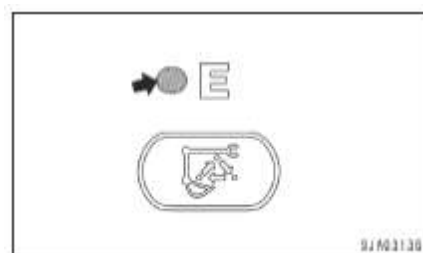
Operation mode selector switch

This switch (1) sets the movement and force of the implement. Select a mode appropriate for the work to facilitate the operation.

E OFF: Active mode (For normal operation) (*E = economical operation*)

E ON: E mode (For operation focusing on fuel consumption)

You can switch the mode each time you press the switch.



SUPPLEMENTAL

This is set automatically to active mode (for normal operation) at the time of starting the engine.

Traveling speed selector switch

⚠ WARNING

- **Always load/unload the machine to/from the trailer at low speed. Never switch the traveling speed select switch while loading/unloading the machine.**
- **Switching the traveling speed between Hi/Lo while traveling can change the traveling direction even while going straight. Change the traveling speed after stopping the machine.**

This switch (2) allows you to switch the traveling speed in two levels.

Lo ON: Low speed traveling

Hi ON: High speed traveling

You can switch the speed each time you press the switch.



SUPPLEMENTAL

With a load of 0.5 t or more, changing the traveling speed selector switch to high speed traveling (Hi ON) does not switch the speed to high speed. For high speed traveling, decrease the load to 0.2 t or lower.

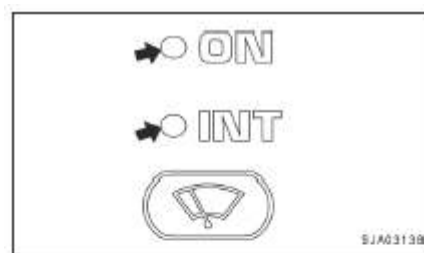
Wiper switch

This switch (3) can activate the wiper on the windshield.

ON: Continuous wiper operation INT: Intermittent wiper operation

OFF: Wiper stopped

Each time you press the switch, you can switch the wiper operation sequentially to stopped → intermittent → continuous → stopped.



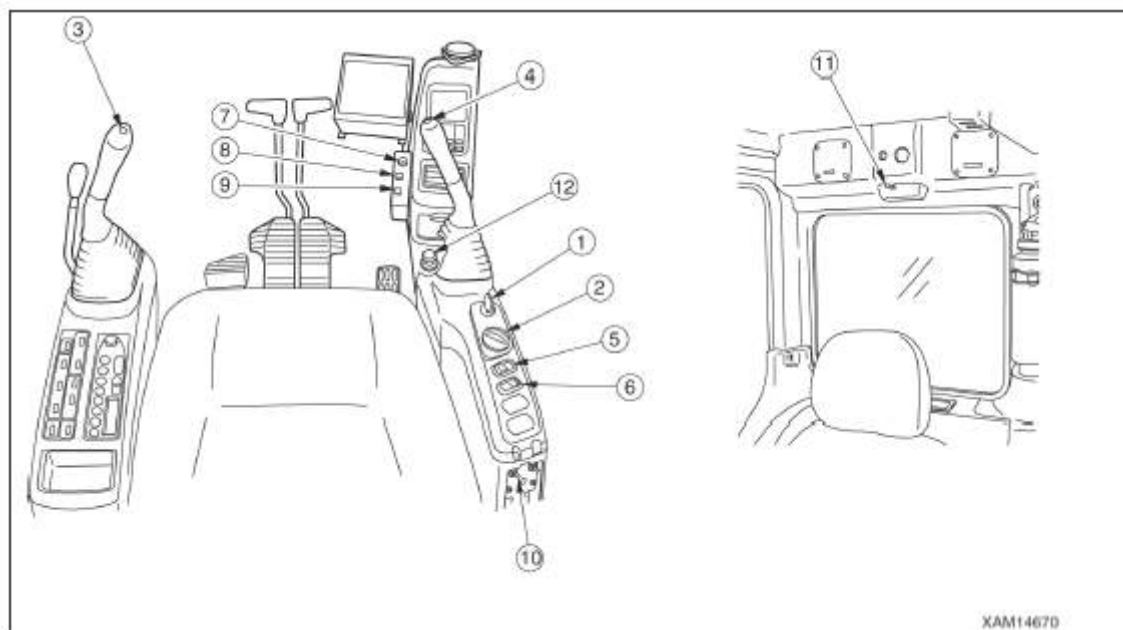
Window washer switch

Keep pressing this switch (4) to release the window washer fluid onto the windshield. To stop fluid coming out, release your finger from the switch.

- If you keep pressing the switch (4) while the wiper is being stopped, window washer fluid comes out as the wiper operates continuously. The wiper stops after two continuous operations when you release the switch (4).
- When you keep pressing the switch (4) while the wiper is in intermittent operation, window washer fluid comes out at the same time and the wiper operates continuously. The wiper returns to intermittent operation after two continuous operations when you release the switch (4).



Switches



- | | |
|-----------------------------------|---|
| (1) Starter switch | (7) Moment limiting device emergency switch |
| (2) Fuel adjustment dial | (8) Overwinding stop switch |
| (3) One-touch deceleration switch | (9) Winch two-speed switch |
| (4) Horn switch | (10) Swivel parking brake release switch |
| (5) Lamp switch | (11) Room lamp switch |
| (6) Warning buzzer stop switch | (12) Cigarette lighter |

Starter switch

This switch (1) starts/stops the engine.

OFF position

You can insert/remove the starter switch key. All the switches for the electrical system except for room lamp and service meter turn off and the engine stops.

ON position

The electricity runs through the charge circuit and lamp circuit. Keep the switch at this position while the engine is in operation.

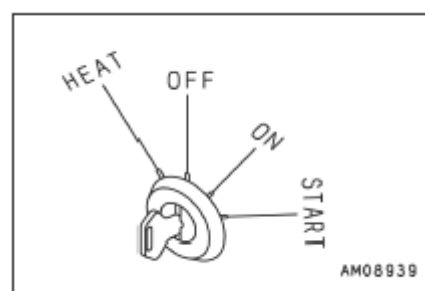
START position

This is the position to start the engine. Keep the switch at this position during cranking and release your hand from the switch right after the engine starts.

The key returns to the ON position.

HEAT position

Turn the key to this position when starting the engine in cold weather. Turning the key to the HEAT position turns on the warm-up monitor. Keep the key in this position until the warm-up monitor flashes. When the warm-up monitor flashes, immediately release your hand from the key. The key returns to OFF position. Turn the key immediately to START to start the engine.



SUPPLEMENTAL

The engine will not start if the safety lock lever is not in the lock position.

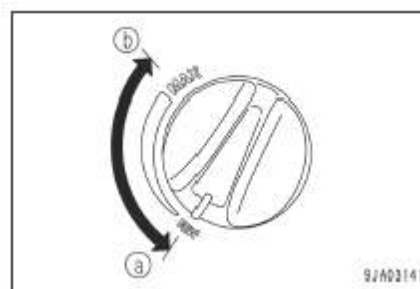
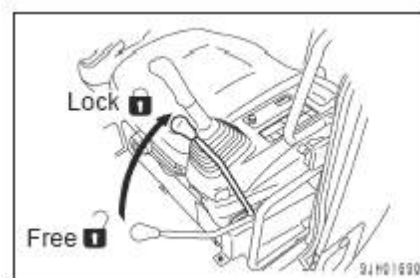
Check that the safety lock lever is at lock position before operating the starter switch.

Fuel adjustment dial

This dial (2) adjusts the rotating speed and output of the engine.

(a) Low idling: where the dial is turned fully leftward (counterclockwise).

(b) High gear: where the dial is turned fully rightward (clockwise).



SUPPLEMENTAL

If the one-touch deceleration monitor is ON, the engine speed will remain at low idling even if you operate the fuel adjustment dial.

To restore the engine speed, press the one-touch deceleration switch at the center of the left implement operation lever to cancel the deceleration function.

One-touch deceleration switch

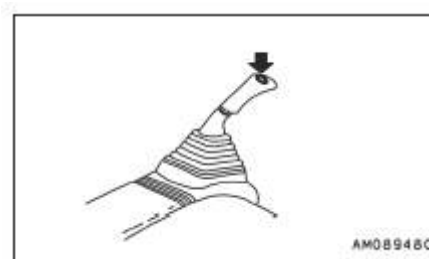
WARNING

Operate the one-touch deceleration switch after switching the implement and traveling levers to the neutral position. Operating the switch while the lever is in operation will make a sudden change in the implement moving and traveling speeds.

This switch (3) decreases the engine speed and activates the device to lower the fuel consumption when the engine output is not necessary such as when traveling levers, implement operation levers, and pedals are in the neutral position.

Press the switch at the center of the left implement operation lever to turn on the one-touch deceleration monitor and the engine speed reduces to low idling.

Press the switch again to turn off the one-touch deceleration monitor and the engine speed returns to the speed set by the fuel adjustment dial.

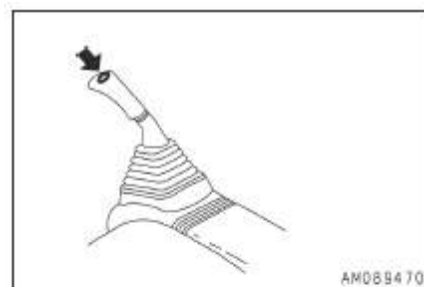


SUPPLEMENTAL

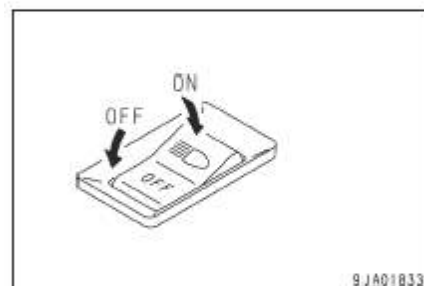
- Even if you press this switch when the fuel adjustment dial is at low idling, the engine speed will not decrease further.
- When the engine speed does not increase, this switch may be ON. Check the switch state with the one-touch deceleration monitor.
- If you turn the starter switch to the OFF position while the one-touch deceleration switch is ON, the deceleration function is canceled.

Horn switch

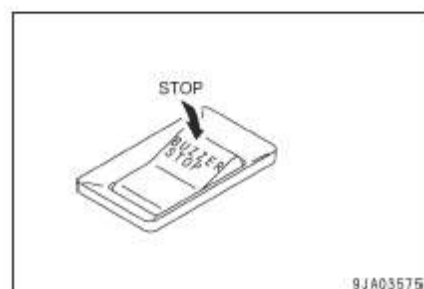
Press the switch (4) at the center of the right implement operation lever to honk the horn.

**Lamp switch**

This switch (5) turns on the working light and monitor illumination.

**Warning buzzer stop switch**

This switch (6) stops the warning buzzer sound for the warning item error while the engine is in operation.



Moment limiting device (overload protector) emergency switch**⚠ WARNING**

There is turnover hazard and overwinding hazard during operation. Do not use the switch during operation.

Use this switch (7) before inspection, service or maintenance or to cancel the auto stop function of the moment limiting device as required.

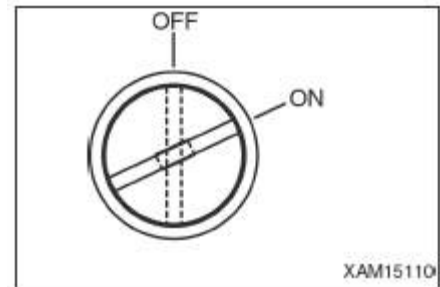
Releasing your hand from this switch will automatically return the key to the ON (automatic) position.

OFF (automatic) position:

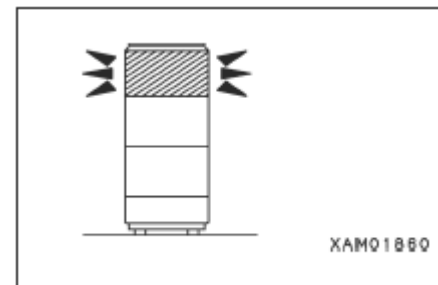
You can insert/remove the key for the moment limiting device emergency switch and the moment limiting device is activated.

ON (cancel) position:

The auto stop function of the moment limiting device is canceled. The auto stop function remains canceled while the key is maintained at this position.

**SUPPLEMENTAL**

Turning the moment limiting device emergency switch to ON (cancel) position turns on the red lamp of the external indicator.

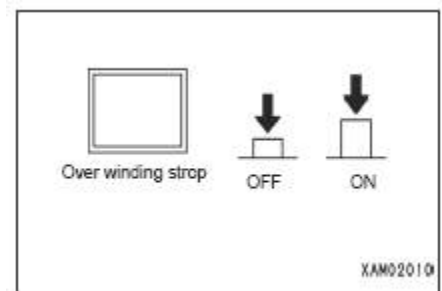


Overwinding stop switch

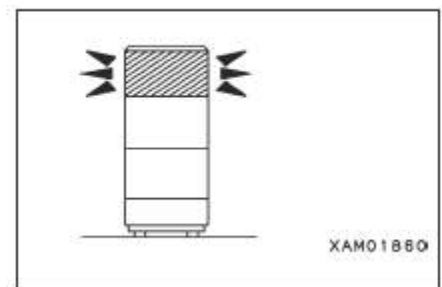
Use this switch (8) to store the hook.

If you hoist the hook to store it, the overwinding alarm sensor is activated and auto stop is applied.

At this point, keep pressing this switch and perform hoisting operation with the right operation lever. While the switch is being pressed, the hoisting operation is enabled and the hook store lamp turns on.

**SUPPLEMENTAL**

- Stop the overwinding only when the overwinding alarm is issued.
- Auto stop cannot be canceled against the overload limit alarm and operation range restriction limit alarm.
- When hoisting the winch by pressing the overwinding stop cancel switch, the flow rate automatically decreases and the hoisting speed slows. This is not a failure.
- Pressing the overwinding stop switch turns on the red lamp of the external indicator.

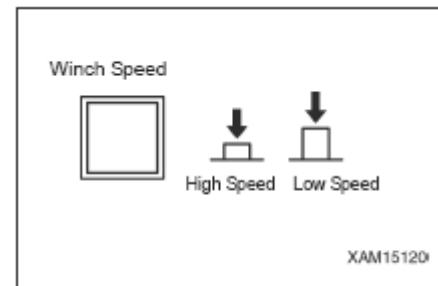


Winch two-speed switch

Use this switch (9) during hoisting/lowering operation with right operation lever.

Press the winch high-speed switch (9) for high-speed winching and then the winch high-speed switch lamp illuminates.

Press the winch high-speed switch again to return to low speed and the winch high-speed switch lamp goes off.

**IMPORTANT**

High-speed hoisting/lowering of the winch can be performed only with no load (no hoisted load). High-speed hoisting/lowering with a hoisted load causes failures or accidents.

SUPPLEMENTAL

- High-speed hoisting/lowering of the winch should be performed only with no load.
- With a load of 0.5 t or more, changing the winch two-speed switch to high speed position does not switch the speed to high speed. For high-speed hoisting/lowering, decrease the load to 0.2 t or lower.

Swing brake switch

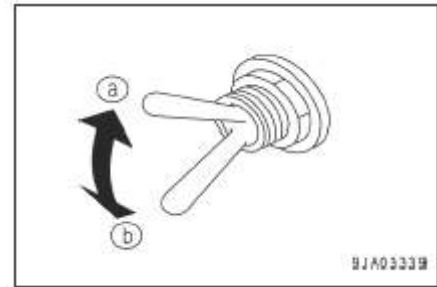
IMPORTANT

- This switch temporarily enables the swing operation when the swing braking system has a problem, and thus is not permanent. Repair the abnormal section as soon as possible.
- If you accidentally change this switch to “cancel” position and work while the machine is in normal state, “E03” will be displayed.
- When “E03” is displayed during the work, check if the switch is in “auto” position or not.

This swing (10) temporarily enables the swing operation when the swivel parking braking system has a problem (“E03” displayed).

- (a) Cancel: Abnormal (Switched to top)
(b) Auto: Normal (Switched to bottom)

Switch this switch to top when “E03” is displayed to enable the operation.



Room lamp switch**IMPORTANT**

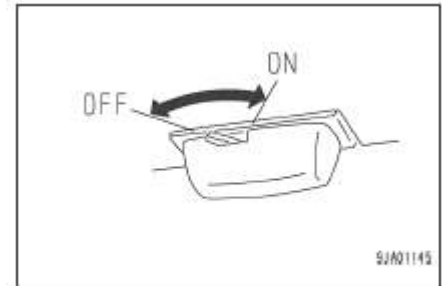
Failing to turn off the switch will result in a dead battery.

Be sure to change the switch to OFF position after using the room lamp.

This switch (11) turns on the room lamp.

ON: ON

OFF: OFF

**SUPPLEMENTAL**

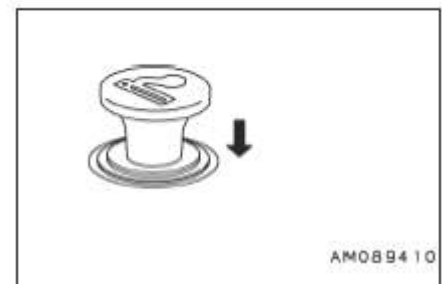
This switch turns on even if the starter switch is at OFF position. Do not forget to switch it off.

Cigarette lighter

Use this lighter (12) to light a cigarette.

Push in this cigarette lighter and it returns to its original position in a few seconds. Pull out the lighter and use.

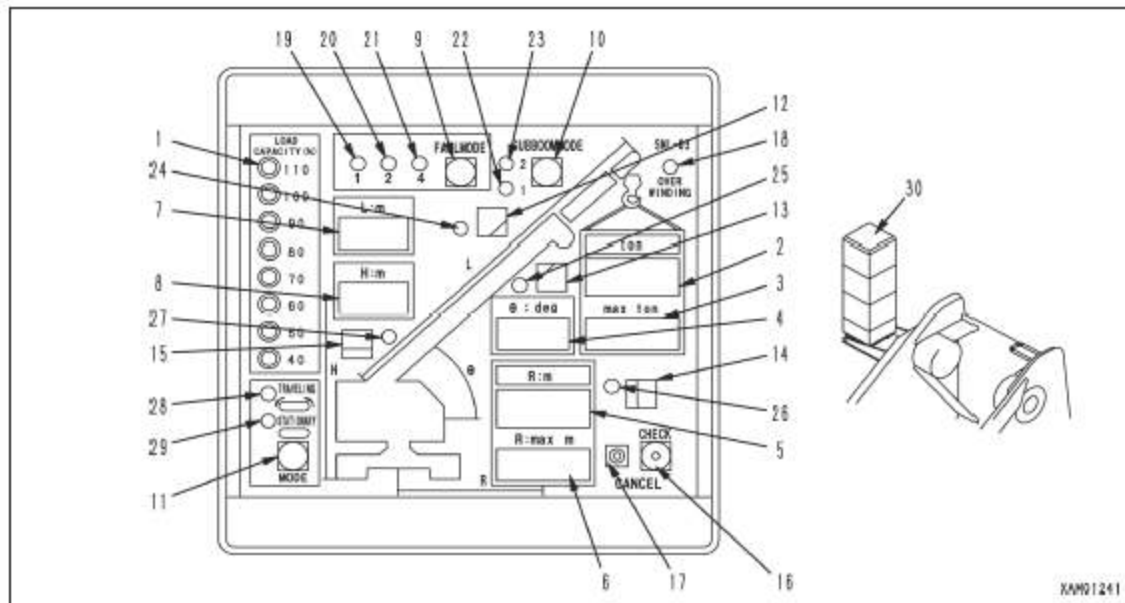
With the cigarette lighter removed, this can be used as a power supply.

**IMPORTANT**

This cigarette lighter uses 24 V. Do not use this as a power supply for 12-V devices. Doing so will cause the device to fail.

The power of the cigarette lighter is 85 W (24 V x 3.5 A).

Moment limiting device (Overload protector)



- | | |
|--|--|
| (1) Moment ratio LED | (16) Check Setting button |
| (2) Actual load display | (17) Cancel Setting button |
| (3) Rated total load display | (18) Overwinding detection LED (Red) |
| (4) Boom angle display | (19) One wire fall hooking LED (Green) |
| (5) Actual working radius display | (20) Two wire falls hooking LED (Green) |
| (6) Rated working radius display | (21) Four wire falls hooking LED (Green) |
| (7) Boom length display | (22) Sub-boom 1 selection LED (Orange) |
| (8) Lifting height display | (23) Sub-boom 2 selection LED (Orange) |
| (9) Number of wire falls selector button | (24) Boom angle upper limit LED (Green) |
| (10) Sub-boom selection button | (25) Boom angle lower limit LED (Green) |
| (11) Still/Travel mode switch button | (26) Operating radius upper limit LED (Green) |
| (12) Boom angle upper limit setting button | (27) Lifting height upper limit LED (Green) |
| (13) Boom angle lower limit setting button | (28) Travel mode selection LED (Red) |
| (14) Working radius upper limit setting button | (29) Still mode switching LED (Orange) |
| (15) Lifting height upper limit setting button | (30) Moment ratio indicator (External indicator) |

The switch No. 10 and lamps (LEDs) No. 22 and 23 are not used.

Functions of moment limiting device

WARNING

- Do not remove the detector to install it at another location or disassemble it for repair.
- If you hit or notice damage to a detector, check the operation state of the auto stop.
- Do not change the moment limiting device emergency switch to cancel side except when there is an abnormal condition or when inspecting/servicing the detectors.
- Note that the swivel operation does not stop automatically, even when overloaded.
- When the boom operation is at high speed, the boom may go beyond the specified stop position, leading to the serious accidents such as turnover of the vehicle. Always operate the boom at low speed when you approach the stop position.

The moment limiting device (overload protector) is installed to prevent the hoisted load from falling, the boom from breaking and the vehicle turning over due to overloading.

Always check the operation of the moment limiting device for any abnormality before starting the crane operation.

SUPPLEMENTAL

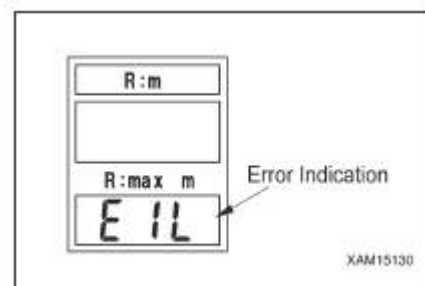
- The hoisted load is detected by the derrick cylinder pressure via the pressure sensor converter. Read the rated load with the boom angle and length. Compare the hoisted load and the rated load for pre-warning and auto stop.
- When derricking the boom, the actual load value changes slightly due to change in the derricking cylinder pressure.

Moment limiting device error message display

When an error occurs in the angle detector, length detector or load detector, or when an open circuit takes place in a wire or a connector is disconnected, the self-diagnosis is carried out at the moment limiting device operation section in the cab.

The result appears as an error code on the rated load indicator at the moment limiting device display, and the buzzer sounds to notify the operator of the error.

Stop using the vehicle when an error code is displayed.



E1L, E1H	Error in load detector 1
E2L, E2H	Error in load detector 2
E3L, E3H	Error in angle detector
E4L, E4H	Error in length detector
:	See the section "What to do in this phenomenon (3-1140)" for other displays and error details.

Activating the moment limiting device

The moment limiting device is an emergency device. The operation relying on this device will be potentially hazardous. Exercise caution in operating so that the crane does not stop automatically.

Overload

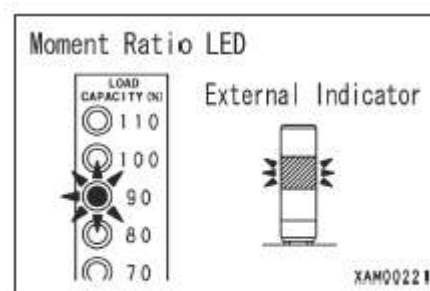
⚠ WARNING

When hoisting a load after auto stop, check that indication is 100% or lower. Then, slowly hoist the load until the load leaves the ground. Do not raise the boom suddenly to hoist a load.

Recovery operation from overloading

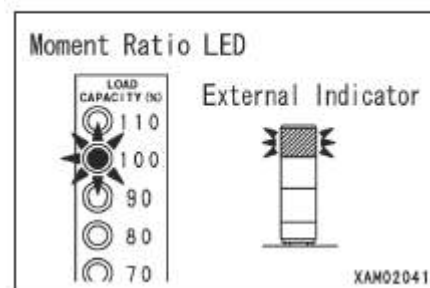
When the hoisted load gets closer to 90% of the rated load (pre-warning), the buzzer sounds intermittently to notify the operator of the fact that the hoisted load is close to the rated load. At this time, the moment ratio LED indication changes from green to orange. Change the working condition by lowering or retracting the hook or raising the boom.

If you continue the operation and the hoisted load reaches overload level (100%), the buzzer sounds continuously and hook hoisting, boom extension and boom lowering automatically stop. At this time, the moment ratio LED changes from orange to red.



SUPPLEMENTAL

The external indicator illuminates blue when the load rate is below 90%, yellow between 90% and 100% and red at 100% or more.



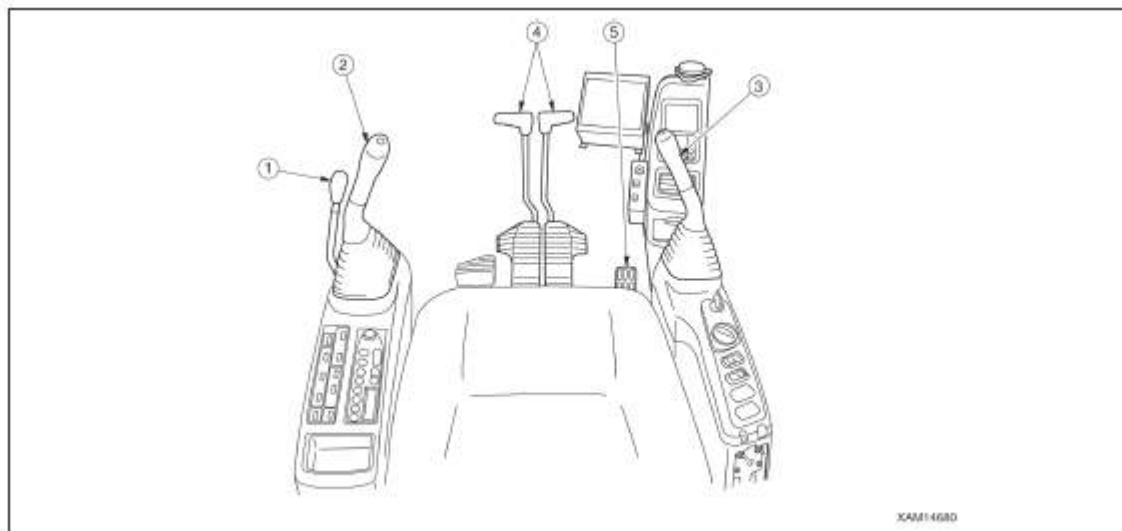
When the boom angle falls below the limit value

When the boom angle becomes 0 degrees while lowering the extended boom, the boom lowering operation stops automatically.

SUPPLEMENTAL

When all the booms are stored, the operation does not stop automatically even if the boom angle became 0 degrees.

Control levers and pedals Safety lock lever



(1) Left implement control lever
(2) Right implement control lever

(3) Traveling levers (with pedals)
(4) Acceleration pedal

Safety lock lever

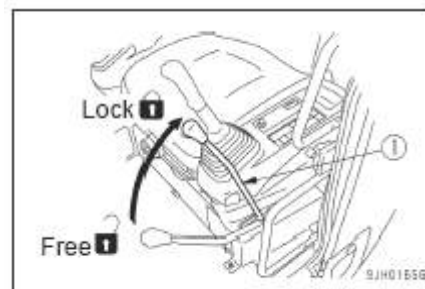
WARNING

- Ensure that the safety lock lever is locked before standing up from the cab seat. Accidental contact with an operation lever when the safety lock lever is not locked can cause serious accidents.
- Check that the safety lock lever is at the position shown in the figure. If the safety lock lever is not fully locked, serious accidents can arise.
- Be careful not to touch an implement operation lever when engaging or releasing the safety lock lever.

This lever (1) locks operations such as implement, swivel, travel and attachment.

Pulling up the lever locks the operation.

This safety lock lever uses a hydraulic system to lock the operations. While the operation levers and pedals still work even if the lever is moved to lock position, the implement and the machine body does not move.



SUPPLEMENTAL

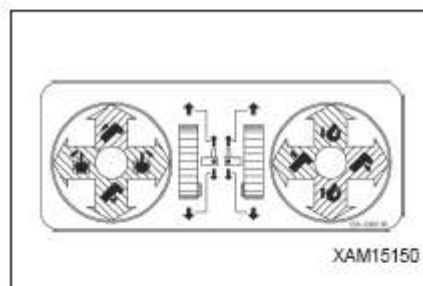
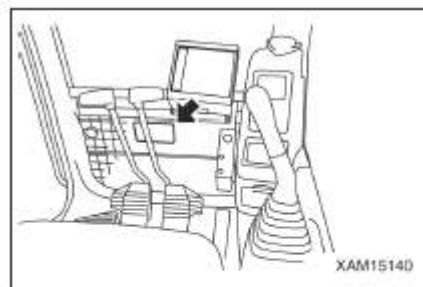
The engine will not start if the safety lock lever is not in the lock position.

Check that the safety lock lever is in the lock position before operating the starter switch.

Implement control levers

! WARNING

- If you need to change the operation pattern, ask our sales service agency.
- When changing the operation pattern, you also need to change the operation nameplate so that it agrees with the machine movement.



Extend/Retract the top revolving superstructure and boom using the left implement operation lever (2).

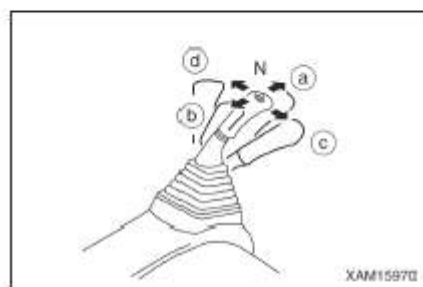
Boom extend/retract operation: (a) Extension

(b) Retraction

Swivel operation:

(c) Clockwise swing

(d) Counter-clockwise swing



N (Neutral): The top revolving superstructure and the boom are retained stopped at that position. When extending the boom, lower the hook sufficiently to prevent overwinding.

Use the right implement operation lever (3) to operate the winch and boom derricking.

Winch operation:

(a) Hoisting

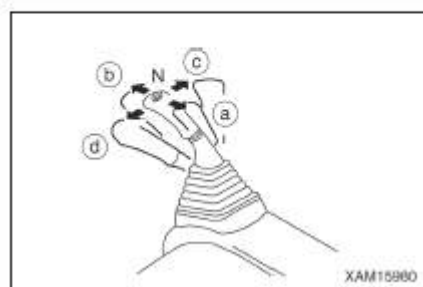
(b) Lowering

Boom-derricking operation:

(c) Lower

(d) Raise

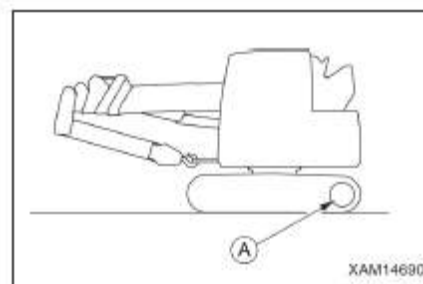
N (Neutral): The winch and the boom are retained stopped at that position.



Traveling levers

WARNING

- Check that the safety lock lever is at the position shown in the figure. If you have your foot on a pedal while working, you may accidentally tread on it, causing sudden traveling of the machine which can lead to serious accidents.
- When the track frame is facing backward, the traveling operation (forward/backward) is inverted.
- Check whether the track frame is facing forward or backward when operating a traveling lever. (The track frame is facing forward when the drive sprocket (A) is at the back.)
- Exercise sufficient caution when traveling/operating using pedals.

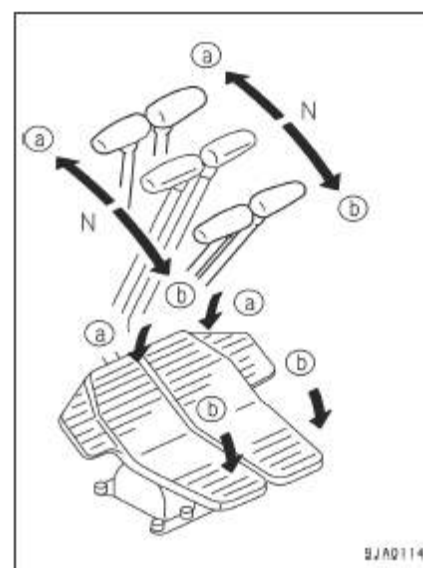


Use these levers (4) to drive the machine.

(a) Forward: Lever pushed forward

(b) Backward: Lever pulled backward

N (Neutral): The vehicle stops.



SUPPLEMENTAL

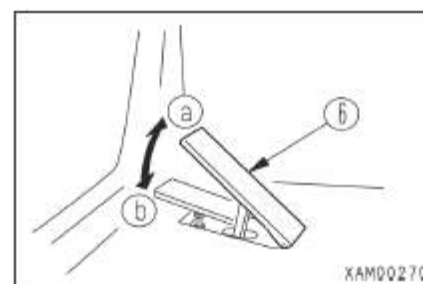
When the traveling lever is operated (tilted) forward/backward, the rated load of the moment limiting device automatically switches to traveling mode and you will hear a "Bleep" (see the section "Handling moment limiting device (3-111)").

Acceleration pedal

This pedal (5) adjusts the engine speed and output.

(a) Low speed: Position where your foot is released from the pedal

(b) High speed: Position where you fully stepped on the pedal



SUPPLEMENTAL

Turning the fuel adjustment dial clockwise will rev up the engine to high speed.

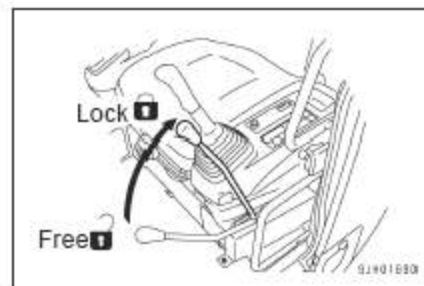
Because the engine speed set by the fuel adjustment dial has priority, the engine speed does not fall below the speed set by the dial even if the operator's foot is released from the acceleration pedal.

Turn the fuel adjustment dial counterclockwise to decrease the engine speed.

Opening/Closing Cab Front Window

WARNING

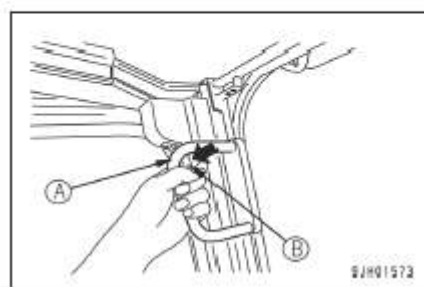
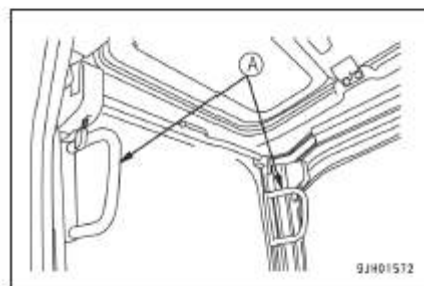
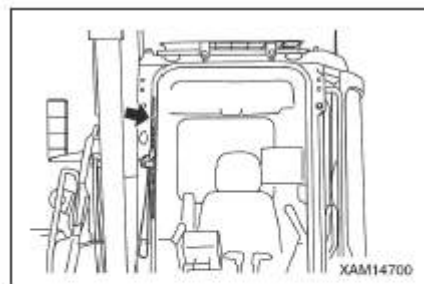
- Always move the safety lock lever to the lock position when opening/closing the front or bottom window or door.
Accidental contact with an operation lever can cause serious injuries.
- Put down the implement on level ground and stop the engine before opening/closing the front window.
- To open the front window, hold the handles firmly with both hands and pull the handles up. Do not release until the handles are locked by the auto lock catch.
- Close the front window by firmly holding the handles with both hands.



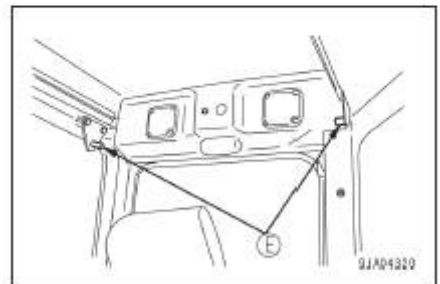
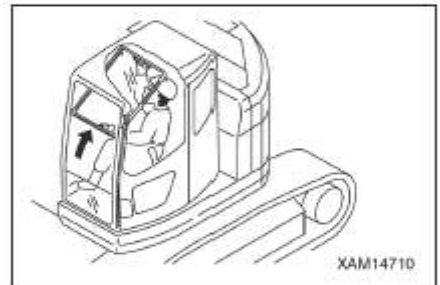
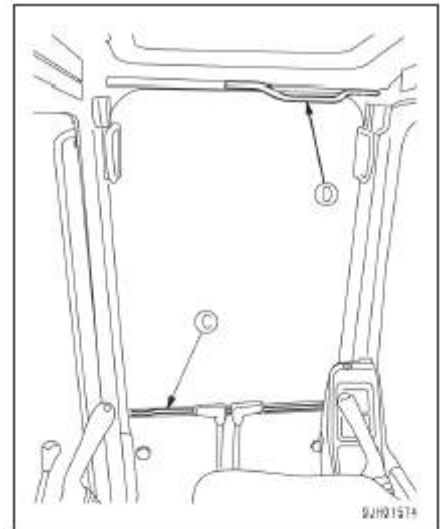
The front window (upper section) can be stored (pulled up) in the cab ceiling.

To open

1. Put down the implement on level ground and stop the engine.
2. Make sure that the safety lock lever is set in the lock position.
3. Check that the wiper blade is stored in the right support.
4. While holding the handles (A) on the left and right at the upper section of the front window, unlock the upper section by pulling the lock lever (B) toward you. The upper section of the front window is disengaged.

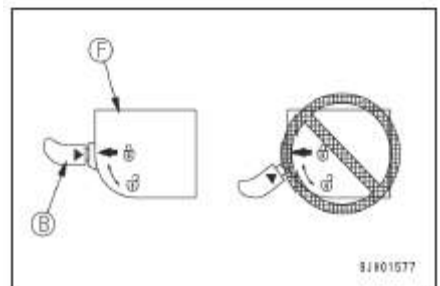


5. Hold the lower handle (C) with your left hand and upper handle (D) with your right hand in the operator cab and pull them up. Press them firmly against the lock catches (E) in the back of the cab to lock the handles.



6. Check that the lock lever (B) is surely locked.

- If the arrow on the lock case (F) and the arrow position on the lock lever (B) line up, the handles are locked. Check this visually.
- If the arrow on the lock case (F) and the arrow position on the lock lever (B) do not line up, they are not locked. Repeat the operation in 5. to lock the handles.

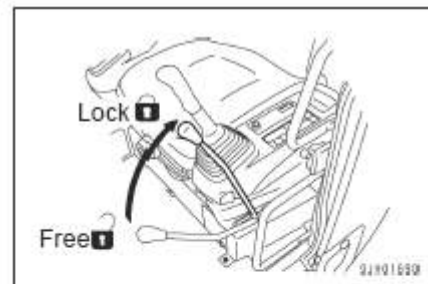


To close

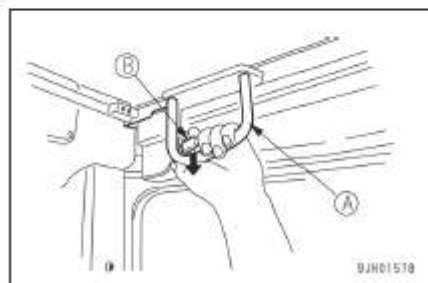
⚠ WARNING

Lower the window slowly so as not to pinch your hands when closing the window.

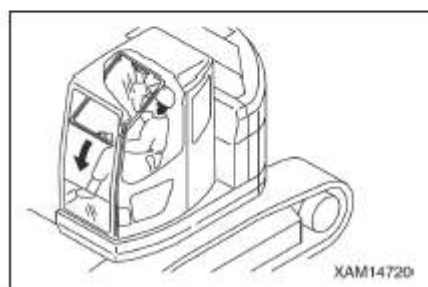
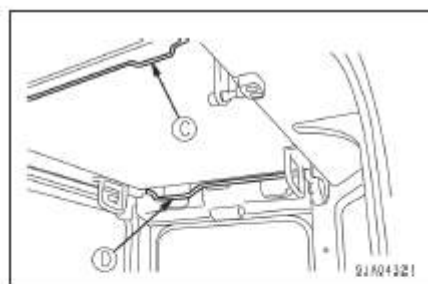
1. Put down the implement on level ground and stop the engine.
2. Make sure that the safety lock lever is set in the lock position.



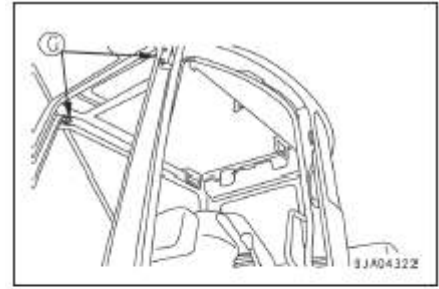
3. While holding the left and right handles (A), pull down the lock lever (B) to unlock the handles.



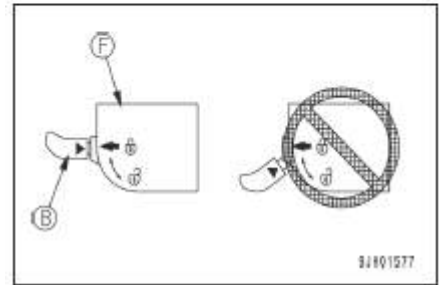
4. Hold firmly the front window lower handle (C) with your left hand and upper handle (D) with your right hand, push them forward and slowly lower the window.



5. When the bottom of the window reaches the top of the lower window, push the upper section of the window forward and against the lock catches (G) on the left and right to lock the window.

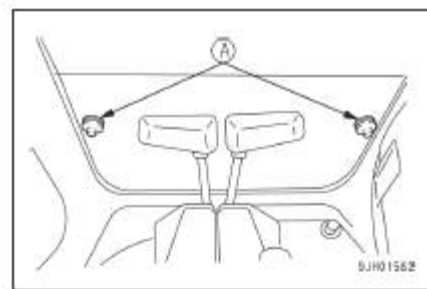


6. Check that the lock lever (B) is securely locked.
- If the arrow on the lock case (F) and the arrow on the lock lever (B) line up, the handles are locked. Check the lock state visually.
 - If the arrow on the lock case (F) and the arrow on the lock lever (B) do not line up, they are not locked. Repeat the operation in 5. to lock the handles.

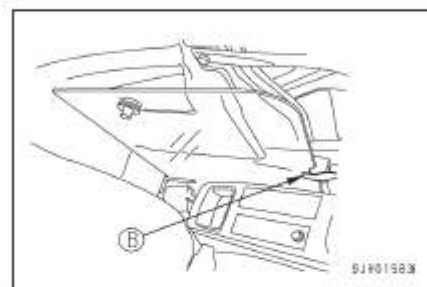


Removing front window (bottom)

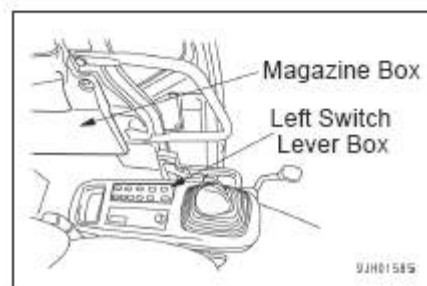
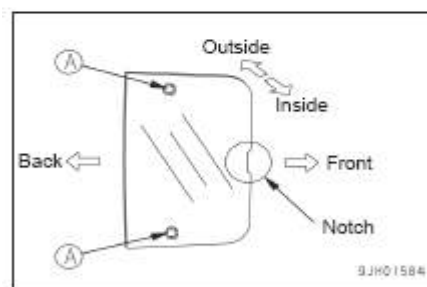
1. While the front window is open, pull up the knobs (A) to remove the bottom window.



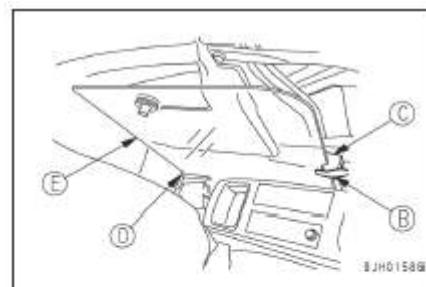
2. Store the removed bottom window inside the left of the operation cab and lock the window securely with the lock lever (B). Store the window with the following procedure:



3. Hold the window with the glass notch facing forward and the knob (A) protrusions inside, insert the window between the magazine box inside the left of the operation cab and the left switch lever box.

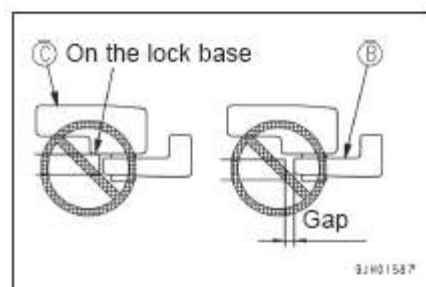


4. After inserting the window into the bottom frame rubber groove (D) and back frame rubber (E), press the bottom window against the lock base (C).

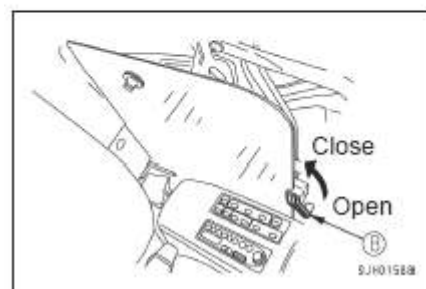


IMPORTANT

Using force to lock the window while glass is on the lock base (C) or not touching the lock lever (B) can break the glass. Check these before locking the window.



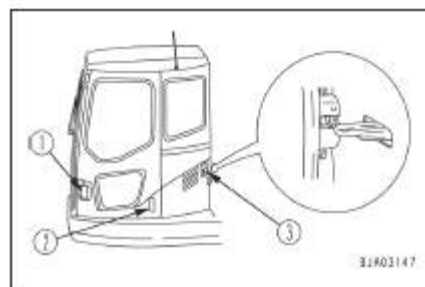
5. Lock (Close) the lock lever (B).



Sliding door

⚠ CAUTION

- Check that the sliding door is locked before opening/closing the door.
- Always open/close the sliding door when the crane is standing on level ground.
- Avoid opening/closing the sliding door on a slope since the force of gravity can change suddenly.
- Always open/close the sliding door by holding door handles (1) and (2).
- Be careful not to get your hand pinched between the door and the front or center pillar.
- If there is someone in the cab, talk to him/her first before opening/closing the sliding door.



Door lock

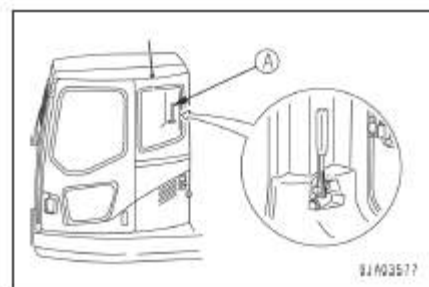
Pull the door handle (1) backward first to release the lock (3), and then pull the door forward to close the door.

Emergency escape hammer

⚠ CAUTION

- When hammering a window, beware of scattered glass fragments.
- When exiting a window, remove any glass fragments from the window frame so as not to cut or hurt yourself. Watch your step so as not to slip on the glass fragments.

A hammer (A) is equipped so that you can use it to escape from the cab in emergency such as the cab door not opening.



Break the window with the hammer (A) to escape and climb out through it.

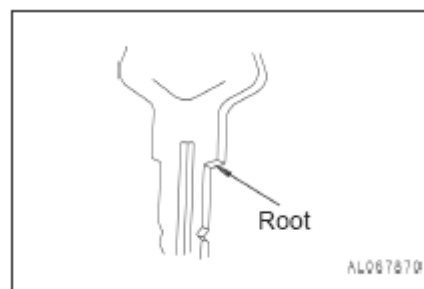


Locked caps and covers

Use the starter switch key to open/close the locked caps and covers.

See the section "Locking (3-100)" for the location of locked caps and covers.

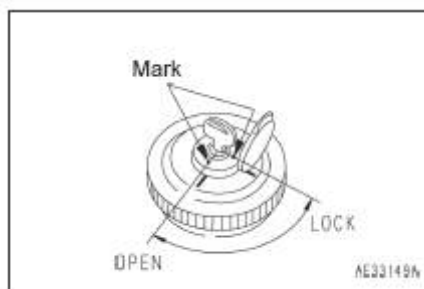
Fully insert the key and turn. Turning a half-inserted key can break it.



How to open/close the locked cap (For fuel tank filler cap)

To open

1. Insert the key into the key slot.
2. Turn the key clockwise and align the mark on the key slot and cap to open the cap.



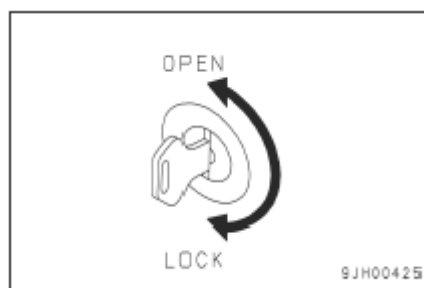
To lock

1. Screw in the cap and insert the key into the key slot.
2. Turn the key counterclockwise and then remove it.

How to open/close the locked cover

To open (When locked)

1. Insert the key into the key slot.
2. Turn the key counterclockwise and pull the cover handle to open the cover.



To lock

1. Close the cover and insert the key into the key slot.
2. Turn the key clockwise and then remove it.

Engine hood

WARNING

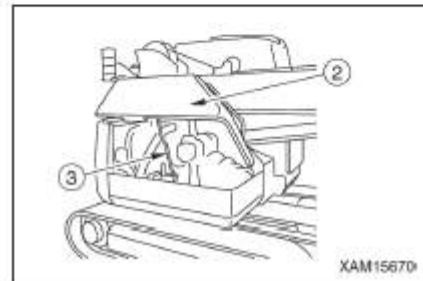
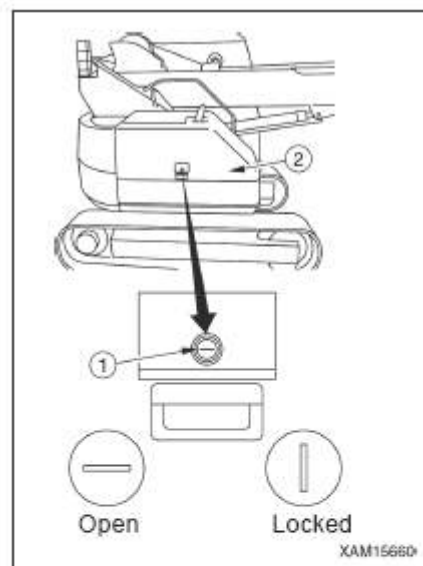
Always use the hood support lever to keep the engine hood open when inspecting/maintaining the hood.

IMPORTANT

Always lock the hood when it is closed.

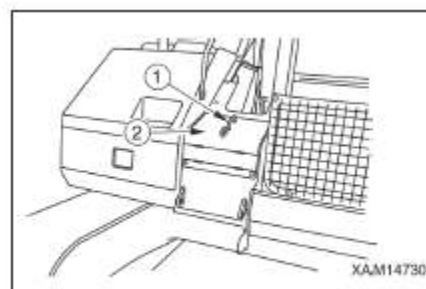
You can check whether the hood is locked by looking at the key slot direction of the opening knob.

1. Unlock (1) the engine hood
(See the section "How to open/close the locked cover (For locked cover) (3-33)".)
2. While pressing the engine hood opening knob (1), open the hood (2).
3. After opening the hood, secure the hood support lever (3) at its securing position.
4. To close the hood (2), remove the hood support lever (3) and secure the lever in the lever lock. To lock the hood, lower the hood gently and press it down.

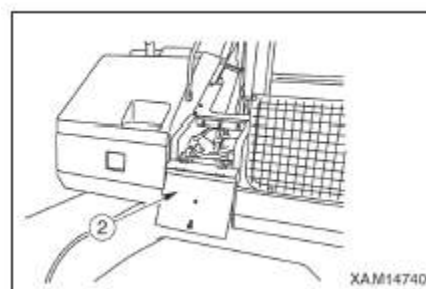


Battery inspection cover

1. Lift the cover handle (1).
2. While lifting the cover (2), pull the cover toward you and then lower it.



3. Close the cover (2) so that the spring clip at the end of the cover (2) is fastened.



Fuses

IMPORTANT

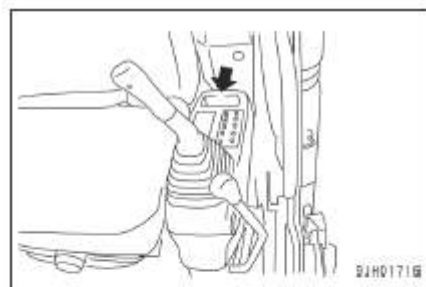
- Always turn off the power (starter switch to OFF position) before replacing a fuse.

Fuses protect electrical components and wires from burning out.

Replace the fuse if a fuse is corroded and covered with white powder, or if there is some slack between a fuse and the fuse holder.

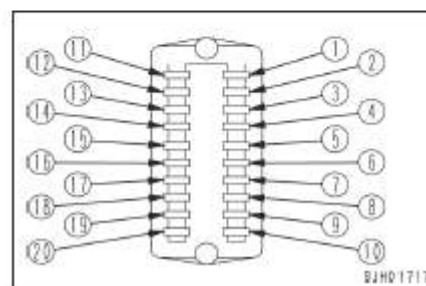
Replace a fuse with the one of same capacity.

- The fuse box is provided on the back of the left console box.



Fuse Capacity and Circuit Name

No.	Capacity	Circuit Name
(1)	10A	Controller
(2)	10A	Pump Solenoid Cancel
(3)	10A	Crane Solenoid, Revolving Light
(4)	10A	Windscreen Washer Cigarette Lighter
(5)	5A	Horn
(6)	15A	Working Light
(7)	10A	Radio
(8)	25A	Air Conditioner, Heater
(9)	15A	Fuel Governor Control
(10)	5A	Swing Parking Brake, Moment Limiting Device, Relay Cancel
(11)	10A	Deceleration Switch Controller
(12)	10A	Spare
(13)	10A	Monitor Panel
(14)	10A	PPC Hydraulic Solenoid
(15)	15A	Key Stop Solenoid
(16)	5A	Radio Backup
(17)	10A	Air Conditioner Backup
(18)	10A	Monitor (Constant Power Supply)
(19)	5A	Room Lamp
(20)	30A	Starter Switch (B)

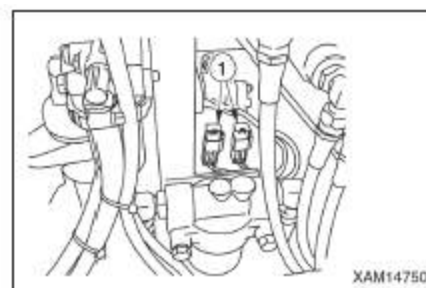


Fusible link

If the power does not turn on even if the starter switch is turned to the ON position, the fusible link (1) may have an open circuit. Open the engine hood on the right of the machine body to check/replace the fusible link.

SUPPLEMENTAL

The fusible link is a large fuse wire mounted on the circuit where high power current runs through. As is the case with fuses, this protects electrical components and wires from being burned out by abnormal currents.



Controller

IMPORTANT

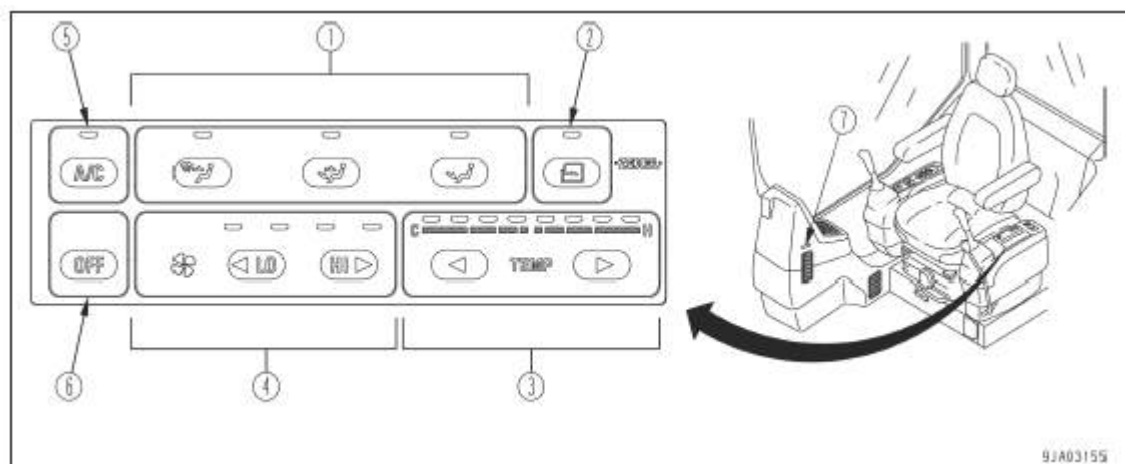
- Do not spill water, dirt or juice on the controller. This will cause failures.
- Should you find any abnormality in the controller, do not repair it by yourself but ask our sales service agency to repair it.

The controller is positioned behind the operator seat.



Handling air conditioner

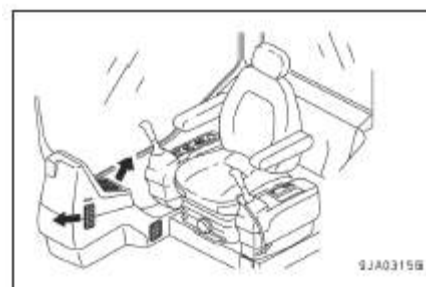
Name of each section of the control panel



- | | |
|--|----------------------------|
| (1) Air outlet selector switches | (5) Air conditioner switch |
| (2) Inside/Outside air selector switch | (6) Off switch |
| (3) Temperature control switches | (7) Defroster switch lever |
| (4) Airflow selector switches | |

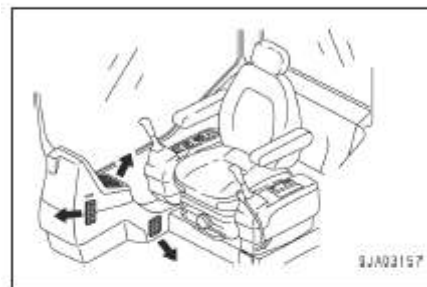
Air outlet selector switch (sends air towards upper body)

Press this switch (1) to send air from the air conditioner to the upper body. This is suitable for cool air in the summer.

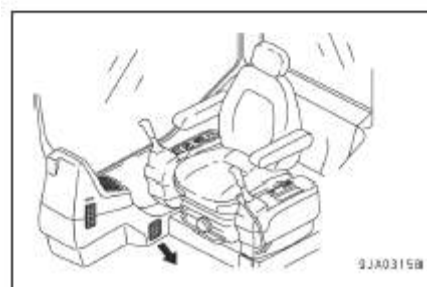
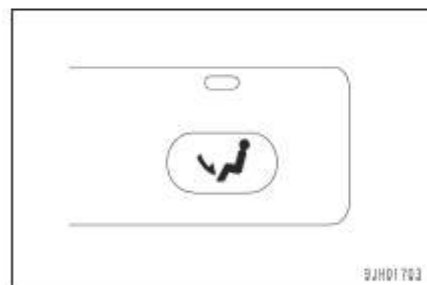


Air outlet selector switch (sends air towards upper body and feet)

Press this switch (1) to send air from the air conditioner towards upper body and feet.

**Air outlet selector switch (sends air towards feet)**

Press this switch (1) to send air from the air conditioner towards the feet. This is suitable for warm air in winter.



Inside/Outside air selector switch (for outside air)

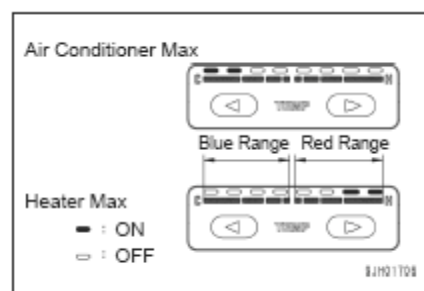
Press this switch (2) to take air from outside the cab for cooling/heating. Use this switch to take in clean air from outside the cab or to defog the cab window.

**Inside/Outside air selector switch (internal air circulation)**

When this switch (2) is OFF, it only circulates air in the cab. Use this switch to quickly cool/heat the cab or when the outside air is dirty.

**Temperature control switch (Low temperature)**

The closer the range illumination is to "C", the lower the temperature is. The closer the range illumination is to "H", the higher temperature is.

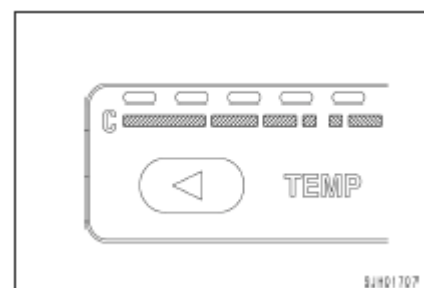


There are 11 ranges and each range is further divided into countless other ranges.

This switch (3) lowers the temperature.

Press this switch to lower the temperature of the air coming out of the air conditioner outlet.

The closer the range illumination is to "C", the lower the temperature will be.

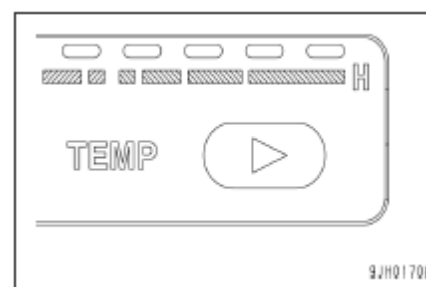


Temperature control switch (High temperature)

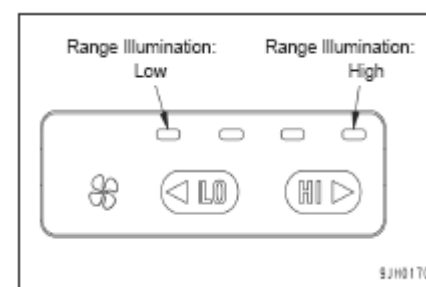
This switch (3) increases the temperature.

Press this switch to raise the temperature of the air coming out of the air conditioner air outlet.

The closer the range illumination is to "H", the higher the temperature will be.

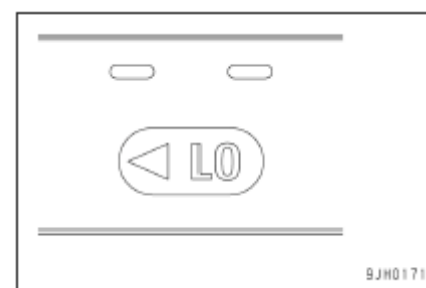
**Airflow selector switches**

There are four ranges. The closer the range is to LO (rear of the machine), the lower the airflow will be. The closer the range is to HI (front of the machine), the higher the airflow will be.

**Airflow selector switch (LO)**

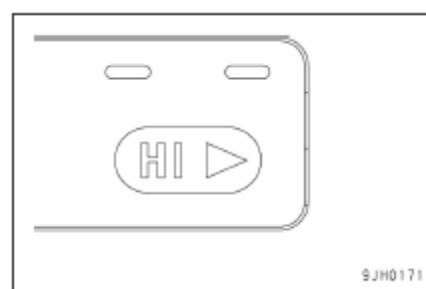
This switch (4) lowers the outlet airflow from the air conditioner.

Press this switch to lower the outlet airflow. The closer the range is to LO (rear of the machine), the lower the outlet airflow will be.

**Airflow selector switch (HI)**

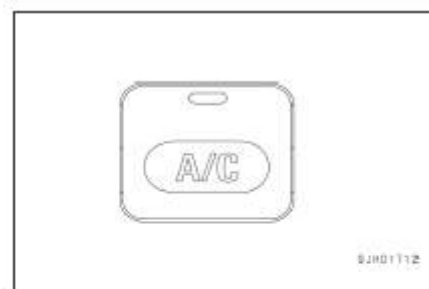
This switch (4) increases the outlet airflow from the air conditioner.

Press this switch to increase the outlet airflow. The closer the range is to HI (front of the machine), the higher the outlet airflow will be.



Air conditioner switch

Use this switch (5) to turn on/off the air conditioner.

**Off switch**

Use this switch (6) to stop the fan.

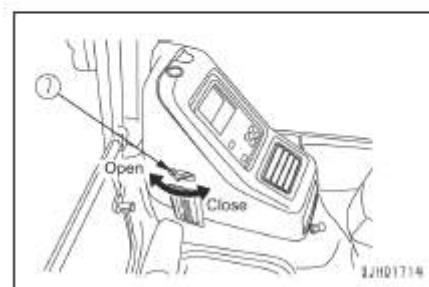
**Defroster switch lever**

This switch (7) defrosts the mist formed on the windshield in winter and rain.

Switch lever forward: To defroster (Open)

Switch lever backward: Close

The defroster can be used when the air outlet selector switch is set to upper body, or to upper body and feet.

**Cautions when using air conditioner****Occasional ventilation during air-conditioning**

You may get sore eyes if you smoke while air-conditioning is on. In this case, open the window for temporary ventilation and extract the smoke.

When air-conditioning is on for long period, ventilate once an hour.

Be careful of overcooling

The healthiest temperature is one which feels a bit cool when we enter the vehicle (5 to 6 deg C of difference compared to the outside temperature). Pay sufficient attention to temperature control.

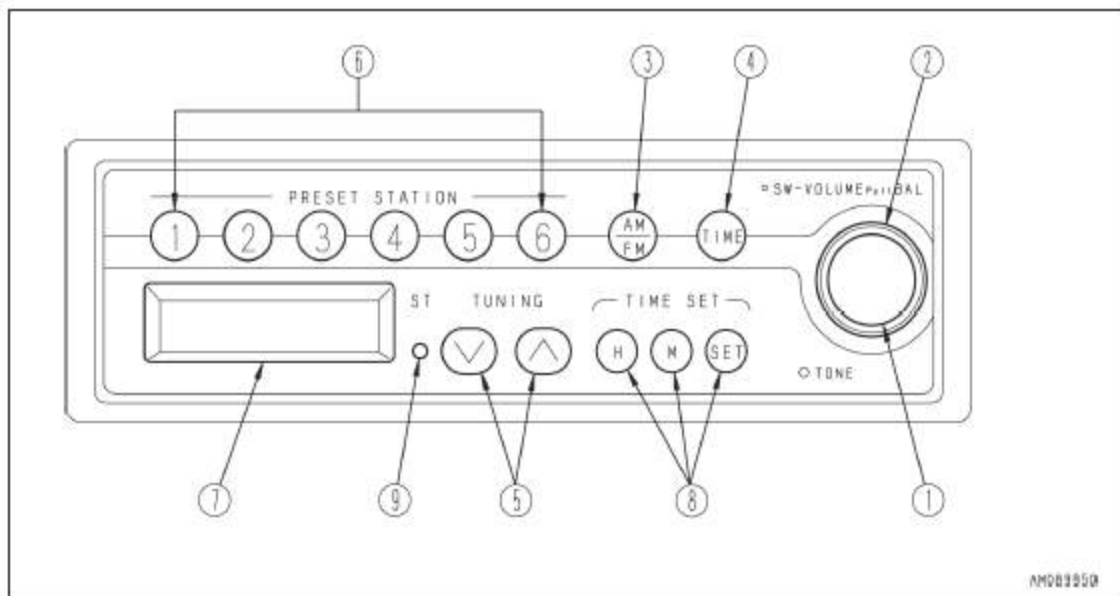
Inspection/Maintenance of vehicles with air conditioner

When inspecting/maintaining a vehicle with air conditioning, see the section "Maintenance for the first 250 hours (only the first maintenance for new vehicles) (4-10)" and carry out inspection/maintenance according to the list.

Handling vehicle radio

Description of each system

The vehicle radio may be unusable depending on the area where the crane is used.



- (1) Power switch, volume control knob, balance control knob
- (2) Tone control knob
- (3) FM/AM selector button
- (4) Display switch button

- (5) Manual tuning buttons
- (6) Pre-set buttons
- (7) Display
- (8) Time adjustment buttons
- (9) Stereo indicator

Power switch, volume control knob (SW-VOLUME), balance control knob (Pull BAL)

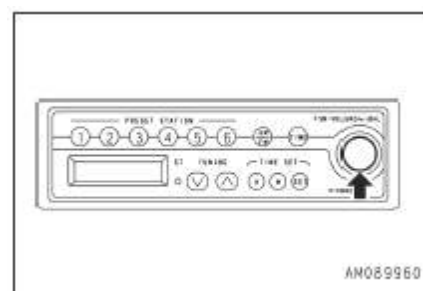
Press this knob (1) to turn on the radio and display the frequency on the display (7). Press it again to turn it off.

Turn the knob clockwise to increase the volume and counterclockwise to lower it. Pull this knob until it is locked and turn to adjust the balance of the speakers on the left and right.

Turn the knob clockwise to enhance the sound on the right, and counterclockwise on the left.

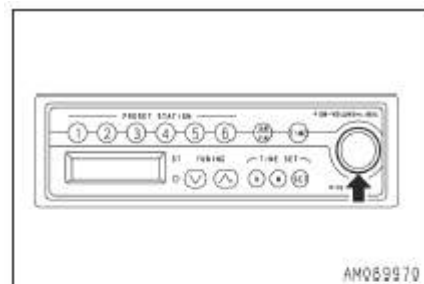
When you have finished with balance adjustment, lightly press the knob to return to the original state.

(You cannot adjust the volume if the knob is pulled out).



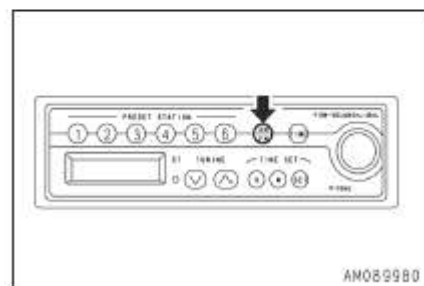
Tone control knob (TONE)

Turning this knob (2) clockwise from the middle position enhances the treble and counterclockwise reduces it.

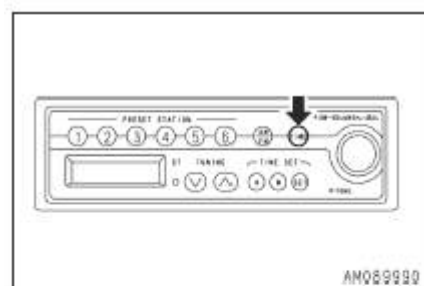
**FM/AM selector button (AM/FM)**

Press this button (3) to select a desired band.

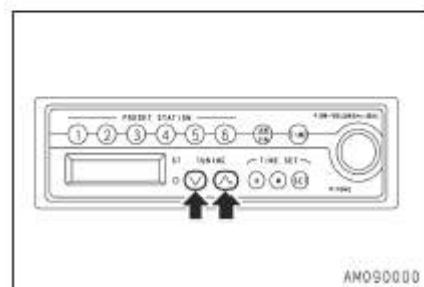
It changes between AM and FM each time you press the button.

**Display switch button (TIME)**

This button puts priority on frequency display. Press the button (4) when frequency is being displayed to show the current time for 5 seconds. After 5 seconds, the display automatically shows frequency again. Pressing a button other than TIME SET (H, M, SET) returns the display to show frequency.

**Manual tuning buttons (TUNING)**

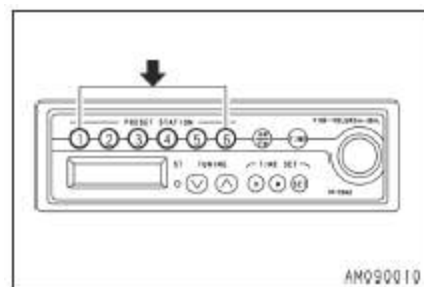
Press the up arrow of button (5) to increase frequency and the down arrow to decrease the frequency. Keep pressing the button continuously, until you find the station you want.



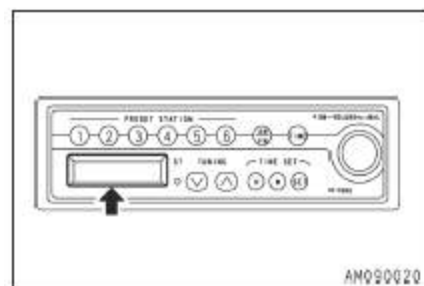
Pre-set buttons (1, 2, 3, 4, 5 and 6) (PRESET STATION)

Pre-setting a desired station to this button (6) then allows you to select the station with a touch of the button.

See the section “How to adjust pre-set buttons (3-46)” for how to pre-set a station and detailed description.

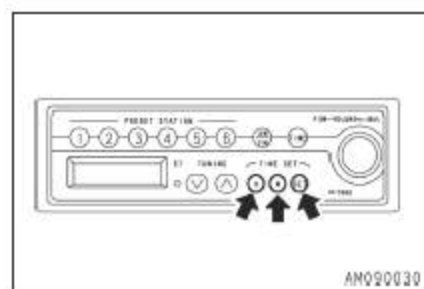
**Display**

This display (7) shows the reception band, frequency, pre-set no. and time.

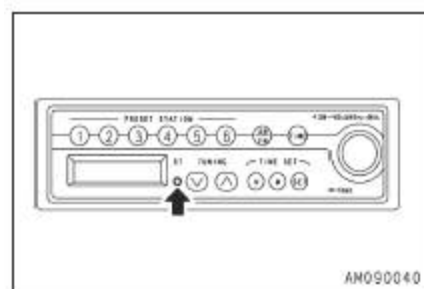
**Time adjustment buttons**

Use these buttons (8) to adjust the time.

H: Hour, M: Minute SET: 00 minute adjustment

**Stereo indicator (ST)**

This indicator (9) illuminates when the radio is receiving stereo broadcasting whilst on an FM station.

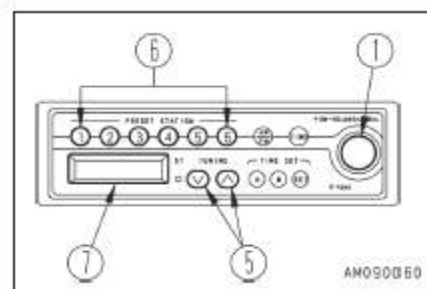


Operations

How to adjust pre-set buttons

1. Press the power switch (1). The frequency appears on the display (7).
2. Use the tuning buttons (5) (manual, auto) to find the desired frequency.
3. When you would like to store a frequency, press a pre-set button for 1.5 seconds or more. Although the sound you were hearing will be lost, it will return once the frequency has been stored. At the same time, the pre-set no. is shown on the display (7) to notify that the frequency has been stored.

Once the frequency has been stored, press the pre-set button (6) for 1.5 seconds or less and release your finger to receive the station that is memorized to that button number. You can memorize 1 AM station and 1 FM station per pre-set button.



Manual tuning

Press the tuning buttons (5) and find desired frequency.

The frequency changes by 9 kHz in AM and 0.1 MHz in FM each time you press the button.

Down triangle button: Moves to lower frequency

Up triangle button: Moves to higher frequency

- When the frequency reaches the upper or lower limit, the frequency automatically changes from upper to lower limit or lower to upper limit.

Automatic tuning

Press a tuning button (5) for 0.5 seconds or more. The tuning automatically stops when the radio finds a station. Press the tuning button (5) again for 0.5 seconds or more to find the next station.

Down triangle button: Automatically selects a station of lower frequency

Up triangle button: Automatically selects a station of higher frequency

- Press this button during the auto tuning to cancel auto tuning and receive the set frequency before making the cancellation.

How to adjust the time

1. Press the display switch button (4) to display the time.
The display returns to frequency after 5 seconds, and you cannot adjust the time. Press the display switch button (4) again to adjust the time.

2. Press the time adjustment buttons (8) to set the Hour and Minute.

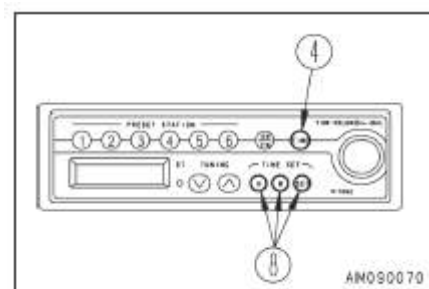
H button: Sets the hour (advances one hour each time the button is pressed)

M button: Sets the minute (advances one minute each time the button is pressed)

SET button: Press the SET button to reset as follows;

Reset to 00 minutes 00 seconds if the time was between 00 min. and 05 min.

Reset to 00 minutes 00 seconds by advancing one hour if the time was between 55 min and 59 min. Cannot be reset if the time was between 06 min. and 54 min.



Ex.

10:05 → 10:00

10:59 → 11:00

10:26 → 10:26

Press the H, M, or SET button to set the desired time.

Antenna

IMPORTANT

Always lay down the antenna before transportation or before putting the machine into the garage, to avoid any breakage of the antenna.

Put the antenna up if the receiving sensitivity is low or if you hear noise.



Cautions in using the radio

- For safety reasons, use your radio at a volume at which you can still hear sound outside the machine during operation.
- Water going into the speaker case or vehicle radio (auto tuning) will cause unexpected failures. Be careful not to allow water to get into these devices.
- Do not wipe meters and buttons with solvent such as benzine and thinner. Use a dry soft cloth (soaked in alcohol for heavy soil).
- When a battery is changed, all the memories in the pre-set buttons will be lost. Set them again.